Trendwest Properties: Cle Elum UGA Final EIS



March 18, 2002

City of Cle Elum

City of Cle Elum
119 West First Street
Cle Elum, Washington 98922

Telephone: 509 674-2262
Fax: 509 674-4097

March 18, 2002

Dear Interested Parties and Affected Agencies:

Attached to this letter you will find a copy of the Final Environmental Impact Statement (Final EIS) for the subarea planning, zoning and master planned development review of the City of Cle Elum Bullfrog UGA. The Final EIS analyzes a fifth development alternative (Alternative 5), builds on the environmental analyses contained in the Draft EIS, and responds to comments received on the Draft EIS as required under SEPA.

The proposal analyzed in the Final EIS is the adoption of a subarea plan and zoning by the City of Cle Elum and the approval of a preliminary master plan for the development of approximately 1,100 acres of the subarea by Trendwest Properties, Inc. The Bullfrog Subarea is located west and adjacent to the City of Cle Elum and is approximately 1,270 acres. The Subarea Plan proposes a variety of residential, commercial, public and recreational uses for the UGA that would be integrated with the existing City. It is the City's goal that development in the UGA preserve and enhance the natural environment of the Cle Elum River corridor and Bullfrog flats while providing opportunities for new housing, community recreation and employment. The EIS evaluates a No Action alternative and four development alternatives (three in the Draft EIS and one in the Final EIS)

Since publication of the Draft EIS, and in response to public input, the applicant has submitted a master site plan application that incorporates several key changes in elements of the site plan evaluated in the preliminary master plan (Alternative 2) and Alternatives 3 (Expanded Residential) and 4 (Reduced Residential). The primary differences between Alternative 5 and Alternatives 2, 3, and 4 relate to housing mix and recreational facilities. Under Alternative 5, there is a greater emphasis on single family housing and neighborhood facilities; the lodge and golf course have been removed. Construction of the Washington State Horse Park is not included in this alternative. Alternative 5 includes development of a 950,000-square-foot Business Park, which was analyzed as part of Alternative 2 in the Draft EIS. Overall, residential development is at a similar scale as analyzed under Alternative 3.

The FEIS includes supplemental analysis of impacts from Alternative 5 on the following elements of the environment: earth, air quality, water quality, water supply, plants and animals, fisheries, wetlands, noise, land use, population and housing, aesthetics/light and glare, cultural resources, parks and recreation, transportation, public services, utilities, and economic and fiscal conditions.

Copies of the FEIS and technical appendices are available for purchase from the City of Cle Elum. Copies are available for review at Cle Elum City Hall, and the Cle Elum, Roslyn, Ellensburg and Central Washington University libraries.

Publication of the FEIS is the end of the formal SEPA process. Under the State Environmental Policy Act, the City cannot act on a proposal for at least seven days following the date of FEIS issuance. The City Council is expected to conduct public hearings on the proposal during the month of April or May, 2002. Appeals on the adequacy of the FEIS are governed by CEMC 15.28.250.

Thank you for your time and interest in the environmental review process for the City of Cle Elum Bullfrog UGA. Questions regarding this document, the subarea plan or the environmental review process may be addressed to the City of Cle Elum at 509.674.2262 or by email at bcarrico@eburg.com.

Sincerely,

Gary Berndt
Mayor City of Cle Elum

TABLE OF CONTENTS

Page

FACT SHEET ..... *i*

1. SUMMARY 1-1
- 1.1 Proposed Action 1-1
- 1.2 Background 1-2
- 1.3 Final EIS Organization 1-2
- 1.4 Summary of Alternatives Evaluated 1-3
- 1.5 Issues Identified During Scoping 1-4
- 1.6 Relationship of the Cle Elum UGA EIS to the MPR EIS 1-6
- 1.7 Water Rights Transfer Applications 1-7
- 1.8 Washington State Horse Park 1-8
- 1.9 Phasing of Environmental Review 1-8
- 1.10 Summary of Impacts and Mitigation Measures 1-8

2. DESCRIPTION OF THE ALTERNATIVES 2-1
- 2.1 Alternative 1: No Action 2-1
- 2.2 Alternative 2: Preliminary Master Plan 2-4
- 2.3 Alternative 3: Expanded Residential 2-5
- 2.4 Alternative 4: Reduced Residential 2-8
- 2.5 Alternative 5: Master Site Plan Application 2-9
- 2.6 Alternative 5 Description 2-12

3. AFFECTED ENVIRONMENT, IMPACTS, AND MITIGATION MEASURES
- 3.1 Earth 3.1-1
- 3.2 Air Quality 3.2-1
- 3.3 Water Quality 3.3-1
- 3.4 Water Supply 3.4-1
- 3.5 Plants and Animals 3.5-1
- 3.6 Fisheries 3.6-1
- 3.7 Wetlands 3.7-1
- 3.8 Noise 3.8-1
- 3.9 Land Use 3.9-1
- 3.10 Population and Housing 3.10-1
- 3.11 Aesthetics/Light and Glare 3.11-1
- 3.12 Cultural Resources 3.12-1
- 3.13 Parks and Recreation 3.13-1
- 3.14 Transportation 3.14-1
- 3.15 Public Services 3.15-1
- 3.16 Utilities 3.16-1
- 3.17 Economic Conditions 3.17-1
- 3.18 Fiscal Conditions 3.18-1

4. RESPONSE TO COMMENTS
- 4.1 Public Comment Letters and Responses
  - Letter 1: Evelyn Nelson, Cle Elum-Roslyn School District
  - Letter 2: Wendy Mifflin, Kittitas County Solid Waste Program
  - Letter 3: Evelyn Nelson, Cle Elum-Roslyn School District
  - Letter 4: Ellie Belew
  - Letter 5: Len Norwitz
  - Letter 6: Ellen Murray Howe, Phoenix Group

Letter 7:	Brian Carpenter, REBOUND
Letter 8:	Ken Boles
Letter 9:	Erin Nelson, Upper Kittitas County Senior Center
Letter 10:	Fred Hein
Letter 11:	Shannon Cernick
Letter 12:	Mark S. Teske, Washington Department of Fish and Wildlife
Letter 13:	Patrick D. Spurgin, Oshie and Spurgin
Letter 14:	Troy A. Suing, Washington Department of Transportation
Letter 15:	Gayle Fox
Letter 16:	Larry Susich
Letter 17:	Brian Lenz, Puget Sound Energy
Letter 18:	Brian Lenz, Puget Sound Energy
Letter 19:	Dr. Jeff Morgan & Dr. Paula Szkody
Letter 20:	Molly Palmer
Letter 21:	Lisa Messmer, MountainStar Master Planned Resort
Letter 22:	James R. Ellis
Letter 23:	Milly A. Radonovich
Letter 24:	Edmund Januszkiewicz
Letter 25:	Randall Doneen, Washington Department of Ecology
Letter 25a:	Peter Schwartzman, Pacific Groundwater Group
Letter 26:	Erin Krake
Letter 27:	David Gerth, City of Roslyn
Letter 28:	Derald Gaidos, Fire Marshal, Kittitas County
Letter 29:	Brian Carpenter, REBOUND
Letter 30:	Bruce Weertman, Dark Skies Northwest
Letter 31:	Catherine G. Dunn
Letter 32:	James L. DeVere, Mayor, Town of South Cle Elum
Letter 33:	Chuck Norton, Cle Elum Fire Department
Letter 34:	Peg Bryandt & Gordy Cook
Letter 35:	Keith W. Hartley
Letter 36:	RIDGE Narrative Comments
Letter 36a:	RIDGE Scoping Comments/Record for Cle Elum UGA
Letter 37:	David A. Bricklin
Letter 38:	Edmund Januszkiewicz
Letter 39:	Rachael Paschal
Letter 40:	Ellie Belew

4.2 Public Hearing Comments and Responses

Public Hearing 1 - April 18, 2001

Comment 1:	JoAnn Rushton
Comments 2-11:	Evelyn Nelson, Cle Elum-Roslyn School District
Comment 12:	Brian Lenz, Puget Sound Energy
Comment 13:	Keith Hartley
Comment 14:	Thelma Simon
Comment 15:	Jeff Dantzler

Page

Public Hearing 2 - April 25, 2001

Comments 1-4:	Ellie Belew
Comments 5-8:	Brian Carpenter, REBOUND
Comments 9-15:	Derald Gaidos
Comments 16-21:	Peggy Pace
Comments 22-27:	David Gerth, City of Roslyn
Comment 28:	Pat Christensen
Comments 29-34:	Thelma Simon
Comments 35-36:	Larry Susich
Comment 37:	Bruce Weertman, Dark Skies Northwest
Comments 38-42:	Larry Jammes
Comments 43-48:	Courtney Cook
Comments 49-59:	Peg Bryant
Comments 60-70:	Len Norwitz
Comment 71:	Ellen Howe, Phoenix Group
Comments 72-74:	Susan Willis
Comments 75-78:	Thelma Simon
Comments 79-82:	Peg Bryant

5. REFERENCES 5-1

6. ACRONYMS AND ABBREVIATIONS 6-1

7. DISTRIBUTION LIST 7-1

List of Tables

Table 1-1:	MountainStar Unit Reductions
Table 1-2:	Impact Summary Table
Table 2-1:	Summary – UGA Subarea/Development Alternatives
Table 2-2:	Summary – Alternative 2
Table 2-3:	Summary – Alternative 3
Table 2-4:	Summary – Alternative 4
Table 2-5:	Summary – Alternative 5
Table 3.1-1:	Estimated Cleared and Impervious Areas in Acres
Table 3.1-2:	Estimated Earthwork Quantities in Cubic Yards
Table 3.3-1:	Changes to the Draft EIS Stormwater Treatment Proposal for the Cle Elum UGA
Table 3.3-2:	Alternative 5 Untreated and Treated Stormwater Runoff Quality
Table 3.3-3:	Alternative 5 Predicted Stormwater Quality
Table 3.3-4:	Alternative 5 Proportionately Mixed, Treated Stormwater Compared to Existing Groundwater Quality
Table 3.3-5:	Yakima River Water Quality Resulting from the UGA Analysis
Table 3.4-1:	Summary of Trendwest Surface Water Rights

TABLE OF CONTENTS (continued)

Table 3.4-2: Estimated Water Demand at Residential Buildout, 302 gpd/ERU, Annual Ac-Ft, Alternative 5
Table 3.4-3: Monthly Water Requirements at UGA Residential Buildout in Ac-Ft, Alternative 5
Table 3.4-4: Comparison of UGA Consumptive Use and Average Available Consumptive Use in Ac-Ft, Alternative 5
Table 3.4-5: Annual Average Water Demand at Buildout, Non-Residential Uses, Annual Ac-Ft
Table 3.4-6: Monthly Water Requirements in Ac-Ft, UGA Residential and MPR at Buildout
Table 3.4-7: Comparison of UGA Residential and MPR Net Consumptive Use and Average Available Consumptive Use in Ac-Ft
Table 3.4-8: Summary of Mean Monthly Changes in Tributary Stream Flow under Long-term Average Year Conditions that Would Occur from Leaving Trendwest Tributary Water Rights as Instream Flows (Study Years 1991-1993, 1995)
Table 3.4-9: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under Long-term Average Year Conditions (Study Years 1991-1993, 1995)
Table 3.4-10: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001)
Table 3.4-11: Mean Monthly Changes in Yakima River Flow from the "Combined Model" (Includes Tributary Irrigation Return Flow Timing Effects) under Long-term Average Year Conditions (Study Years 1991-1993, 1995)
Table 3.4-12: Mean Monthly Changes in Yakima River Flow from the "Combined Model" (Includes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001)
Table 3.4-13: Distribution of In-Migrant Households within Kittitas County Jurisdictions excluding Kittitas/UGA
Table 3.4-14: Consumptive Use, In-migrant Households Associated with Trendwest Employment—Unincorporated Areas
Table 3.4-15: Consumptive Use, In-migrant Households Associated with Business Park In-Migration—Unincorporated Areas
Table 3.4-16: Consumptive Use, In-migrant Households Associated with Trendwest-Related In-Migration, Incorporated Areas
Table 3.4-17: Consumptive Use, In-migrant Households Associated with Business Park In-Migration, Incorporated Areas
Table 3.4-18: Subbasin Groundwater Consumptive Use and Base Flow Comparison, MPR Reduced Density and UGA Alternative 5, including Non-Residential UGA Uses
Table 3.4-19: Consumptive Use from Future Use of Fallowed Lands
Table 3.4-20 Trendwest's Average Annual Consumptive Use and Supply Balance for Direct and Indirect Uses, in Ac-Ft
Table 3.5-1: Percentages of Vegetative Cover Types within the Cle Elum UGA
Table 3.5-2: Wildlife Species Identified by Federal and State Agencies as Potentially Occurring near the Cle Elum UGA since the Draft EIS was Prepared
Table 3.6-1: Kittitas County Freshwater Fishing License Sales
Table 3.6-2: Expected Population Increase in Kittitas County associated with Trendwest at Full Buildout
Table 3.6-3: Potential Fishing Impact Areas
Table 3.9-1: Alternative 5 Land Demand (in Acres) at Years 5, 20, and 30
Table 3.9-2: Alternative 5 Residential Buildout and Net Density at Years 5, 20, and 30
Table 3.10-1: Kittitas County Population, 1980 to 2000
Table 3.10-2: Housing Units - 1980 to 2000

TABLE OF CONTENTS (continued)

Table 3.10-3: Allocation of Projected Population - 2020
Table 3.10-4: Housing Needs (Number of Units)
Table 3.10-5: Local and Non-local Construction Labor Demand, Cle Elum UGA
Table 3.10-6: Direct Employment Impacts of Business Park Operation under Alternative 5 (Annual FTEs)
Table 3.10-7: Population Capacity in Permanent Residential Housing Units
Table 3.10-8: Estimated Average Daily Seasonal Population Increase in Kittitas County, Project Year 30
Table 3.13-1: Park Acreage Need Based on City of Cle Elum Draft Subarea Plan
Table 3.13-2: Recreation Facility Needs Based on City of Cle Elum Draft Subarea Plan
Table 3.14-1: LOS Criteria for Two-Way Stop-Controlled Intersections
Table 3.14-2: Level-of-Service Criteria for Signalized Intersections
Table 3.14-3: Existing Summer Weekday and Weekend PM Peak-Hour Level-of-Service Summary
Table 3.14-4: Roslyn and Cle Elum Parking Supply and Demand
Table 3.14-5: City of Cle Elum Approved Development Projects
Table 3.14-6: Cle Elum UGA PM Peak Hour Trip Generation for Project Years 5, 10, and 30
Table 3.14-7: Revised Alternative 1 Intersection LOS in Project Years 5 and 10
Table 3.14-8: PM Peak Hour Trip Generation Rates, Cle Elum UGA Land Use Types
Table 3.14-9: Total PM Peak Hour Trip Generation, Alternative 5
Table 3.14-10: Weekday Projected PM Peak Hour Vehicle Trips in Vehicles per Hour, Alternatives 2, 3, 4, and 5
Table 3.14-11: Weekend Projected PM Peak Hour Vehicle Trips in Vehicles per Hour, Alternatives 2, 3, 4, and 5
Table 3.14-12: PM Peak Hour Roadway Traffic Volumes in Project Year 30, Alternatives 2, 3, 4, and 5
Table 3.14-13: Weekday and Weekend Intersection LOS, Alternatives 2, 3, 4, and 5
Table 3.14-14: PM Peak Hour Roadway Traffic Volumes in Project Year 30 with MPR, Alternatives 2, 3, 4, and 5
Table 3.14-15: Weekday and Weekend Intersection LOS with MPR, Alternatives 2, 3, 4, and 5
Table 3.14-16: Vehicle Trip Composition at Affected Intersections, Weekday, Entering Volumes
Table 3.14-17: Vehicle Trip Composition at Affected Intersections, Weekend, Entering Volumes
Table 3.15-1: Representative Travel Times, Cle Elum UGA
Table 3.15-2: Projected Student Enrollment Impacts, Cle Elum UGA
Table 3.15-3: Projected Student Enrollment Impacts, Reduced Density MPR and Cle Elum UGA
Table 3.16-1: Projected CDL Generation Rates (tons/year) and Total Quantity Producted (tons) at Full Buildout, Cle Elum UGA
Table 3.16-2: Unit Demand for Interior Treated Water in the Cle Elum UGA, Alternative 5
Table 3.16-3: Treated Water Demand at Buildout, Trendwest Residential and Non-Residential Uses
Table 3.16-4: Maximum Monthly Treated Water Demand, Trendwest Residential Uses
Table 3.16-5: Maximum Monthly Treated Water Demand, Non-Residential Uses
Table 3.16-6: Monthly Net Lake Evaporation (Inches), Artificial Water Bodies, Cle Elum UGA
Table 3.16-7: Untreated Water Demand Summary (in Acre-Feet/Month) Trendwest Residential Uses
Table 3.16-8: Untreated Water Demand Summary (in Acre-Feet/Month), Non-Residential Uses
Table 3.16-9: Average Monthly Wastewater Flow with and without Infiltration/Inflow (in mgd)
Table 3.16-10: Projected UGA Wastewater Loadings - Alternatives 2, 3, and 4 and 5 in Pounds per Day
Table 3.16-11: Solid Waste Production (tons/year), Cle Elum UGA

TABLE OF CONTENTS (continued)

Table 3.16-12: Regional Wastewater Flows at Planning Horizon Year 30
Table 3.16-13: Summary of Effluent Pollutant Loads in Year 30
Table 3.17-1: Personal Income by Source, 2000
Table 3.17-2: Average Annual Wage by Industry Sector, Kittitas County and Washington State, 1999
Table 3.17-3: Taxable Retail Sales with Kittitas County, 1995-2000 ($1,000s)
Table 3.17-4: Total Assessed Property Value, 1990-1998
Table 3.17-5: Construction Employment by Annual Wage or Salary, Alternative 5 (Annual FTEs)
Table 3.17-6: Wage Range by Construction Occupations
Table 3.17-7: Local Construction Employment Impacts from the Cle Elum UGA
Table 3.17-8: Local Proportion of Construction Demand by Wage Range
Table 3.17-9: Distribution of Business Park Employment, Alternative 5
Table 3.17-10: Direct Operations Employment Impacts from the Cle Elum UGA Business Park Alternative 5 (Annual FTEs)
Table 3.17-11: Local Proportion of Business Park Operational Employment Demand by Wage Range
Table 3.17-12: Direct Operations Employment Impacts from the Cle Elum UGA Business Park Alternative 5 (Annual FTEs)
Table 3.17-13: Cle Elum Permanent Resident and Visitor Expenditures with Resulting Employment, Alternative 5 (in Thousands of 2000 Dollars)
Table 3.17-15: Summary of Direct, Indirect, and Induced Employment Impacts Generated by Construction Employment at the Cle Elum UGA, Alternative 5
Table 3.17-16: Summary of Direct, Indirect, and Induced Impacts Generated by Business Park Operations Employment at the Cle Elum UGA, Alternative 5
Table 3.17-17: Summary of Indirect, and Induced Employment Impacts Generated by Permanent Resident and Visitor Spending, Alternative 5
Table 3.17-18: Cumulative Construction Employment from the Reduced Density MPR and UGA Development, Alternative 5 (Annual FTEs)
Table 3.17-19: Local Construction Employment Impacts from the Reduced Density MPR and UGA, Alternative 5, (Annual FTEs)
Table 3.17-20: Operations Employment, Reduced Density MPR and UGA, Alternative 5 (Annual FTEs)
Table 3.18-1: City of Cle Elum Revenue and Cost Summary, Cle Elum UGA, Alternative 5 (in thousands of constant 2000 dollars)
Table 3.18-2: Cle Elum-Roslyn School District #404 Revenue and Cost Summary, Cle Elum UGA, Alternative 5 (thousands of constant 2000 dollars)
Table 3.18-3: Potential Portable Classroom Costs for the Cle Elum UGA, Alternative 5
Table 3.18-4: Potential Classroom Construction Costs for the Cle Elum UGA, Alternatives 5
Table 3.18-5: Potential New Bus Costs for the Cle Elum UGA, Alternative 5
Table 3.18-6: Projected New Bond Capacity from the Cle Elum UGA, Alternative 5
Table 3.18-7: Kittitas County Hospital District No. 2, Revenue and Cost Summary, Cle Elum UGA, Alternative 5 (in Thousands of Constant 2000 Dollars)
Table 3.18-8: Net Fiscal Impact Summary Cle Elum UGA, Alternative 5 (average annual constant 2000 dollars)
Table 3.18-9: Cumulative Net Fiscal Impact Summary, MPR and Cle Elum UGA, Alternative 5 (average annual constant 2000 dollars)
Table 3.18-10: Potential Portable Classroom Costs for MountainStar MPR and the Cle Elum UGA, Alternative 5
Table 3.18-11: Potential Classroom Construction Costs for MountainStar MPR and Cle Elum UGA Enrollment, Alternative 5
Table 3.18-12: Potential New Bus Costs, MPR and Cle Elum UGA, Alternative 5

List of Figures

Figure 1-1: Vicinity Map
Figure 2-1: Alternative 1: No Action
Figure 2-2: Alternative 2: Preliminary Master Plan
Figure 2-3: Alternative 3: Expanded Residential
Figure 2-4: Alternative 4: Reduced Residential
Figure 2-5: Alternative 5: Master Site Plan
Figure 3.3-1: Management Zones and Aquifer Susceptibility
Figure 3.4-1: Upper Yakima Basin and Sub-basins
Figure 3.4-2: Yakima River Diversion Locations, Cle Elum to Ellensburg
Figure 3.6-1: Recreational Fishing Access and Use
Figure 3.7-1: Wetlands
Figure 3.9-1: Generalized Existing Land Use and Zoning
Figure 3.14-1: Existing Roadway Network

Appendices

Volume 1
Appendix A - Water Quality Technical Report
Appendix B - Water Supply Technical Report Supplement
Appendix C - Employment-Induced Water Demand Analysis

Volume 2
Appendix D - Fiscal Impact Analysis
Appendix E - Site Engineering Technical Report
Appendix F - Transportation
Appendix G - Agency Correspondence

Fact Sheet



FACT SHEET

Project Title:

Development of properties within the Cle Elum Urban Growth Area (UGA) owned by Trendwest Investments, Inc. and proposed for development by Trendwest Properties, Inc. (Trendwest).

Actions required by the City of Cle Elum are adoption of the Bullfrog Subarea Plan as part of the City's Comprehensive Plan, adoption of the Planned Mixed Use zone and zoning map for the UGA as part of the City's Zoning Ordinance, approval of a final site plan for the development, and approval of a Development Agreement with conditions prior to construction.

Proposed Action:

Trendwest proposes to develop 1,100 acres of property it owns within the approximately 1,270-acre Cle Elum UGA into a master planned community consistent with goals and requirements for urban growth areas as stated in the Washington State Growth Management Act (RCW 36.70A). Kittitas County designated the area a UGA in 1998 based on a request from the City of Cle Elum. Population projections for Kittitas County were adjusted in 1999 to reflect the inclusion of the UGA in Cle Elum's 20-year growth projections, based on the Office of Financial Management's high series growth projections.

The City of Cle Elum will adopt the Bullfrog Subarea Plan and Planned Mixed Use zoning for the UGA that will take effect upon annexation of the property, consistent with RCW 35A.14.330. Policies, regulations, and conditions of approval will be identified in a Development Agreement consistent with RCW 36.70B.170. The Development Agreement, Bullfrog Subarea Plan, and Planned Mixed Use zoning will govern the City's subsequent review of any proposed development in the UGA.

The proposal for the UGA consists of a master plan community containing single-family and multifamily residential, commercial, and recreational land uses. Under each of the alternatives, a Business Park and Community Recreation Center would be developed. Land would be set aside as expansion areas for the Cle Elum-Roslyn School District #404, the existing cemetery, and the City of Cle Elum's water treatment plant. Designated undeveloped open space would include area within the Cle Elum River corridor.

Alternatives:

Four alternatives were analyzed in the Draft Environmental Impact Statement (EIS). After publication, in part to respond to public comments, a fifth development alternative (Alternative 5)

was proposed. This alternative represents another site plan variation for development of the Cle Elum UGA that incorporates many of the land uses evaluated under Alternatives 2, 3, and 4 in the Draft EIS. Alternative 5 is now designated the Preferred Alternative.

Alternative 5 has been designed to result in a level of environmental impact that falls within the range of impacts evaluated in the Draft EIS. As such, new significant environmental impacts are not anticipated. Alternative 5 is analyzed and compared to the other development alternatives in the Final EIS.

In February 2002, Kittitas County approved a rezone of 23 acres of the UGA from Forest and Range zoning to Suburban. This rezone is considered in the analysis of the No Action Alternative in the Final EIS. The following five alternatives are evaluated in the Draft and Final EISs:

Alternative 1 - No Action. Under the No Action Alternative, future development in the Cle Elum UGA would be consistent with the current Forest and Range and Suburban zoning designations under the Kittitas County Zoning Code (KCC 17.56). Residential development in the UGA would be single-family residential. Based on the number of existing parcels and further subdivision allowed under the zoning code, the UGA could accommodate from 19 to more than 106 single-family residences.

Alternative 2 - Preliminary Master Plan. Alternative 2 is a Preliminary Master Plan initially submitted to Kittitas County. (Kittitas County withdrew its co-lead agency status in January 2001 and the City of Cle Elum became the sole lead agency for the EIS.) The Preliminary Master Plan calls for approximately 1,028 residential units, including single-family houses, apartments, and condominiums. A 950,000-square-foot Business Park would be located on an 80-acre campus. A golf course, 100-room lodge, and clubhouse would also be developed on approximately 200 acres. Land would be set aside for the Washington State Horse Park, a Community Recreation Center (12-acre parcel), expansion areas for the Cle Elum-Roslyn School District #404 (25 acres), the existing cemetery (10 acres), and the City of Cle Elum's water treatment plant (11 acres). Approximately 230 acres would be maintained as the Cle Elum River corridor and perimeter buffers.

Alternative 3 - Expanded Residential. In Alternative 3, the Washington State Horse Park would be replaced with single-family residential development. The addition of these lots would increase the number of single-family residences over that proposed for Alternative 2 by approximately 380 units. A 600,000-square-foot Business Park would be developed on an 80-acre campus. The capacity of the lodge and RV campground would be lower than under Alternative 2. Property proposed for a golf course and land set aside for the Community Recreation Center, expansion areas, City of Cle Elum water treatment plant, and designated open space would be the same.

Alternative 4 - Reduced Residential. Alternative 4 has fewer total residential units than Alternatives 2 and 3 and the lowest number of multifamily units. A 300,000-square-foot Business Park would be developed on a 40-acre business campus. The capacity of the lodge and RV campground would be lower than under Alternative 2. As with Alternative 2, a golf course would be developed and land would be set aside for the Washington State Horse Park, public facilities, and open space. The cemetery expansion area would be a 3-acre parcel instead of a 10-acre parcel.

Alternative 5 - Bullfrog Subarea Plan, Mixed Use Zoning, and Master Site Plan Application. Alternative 5 (Preferred Alternative) is similar in scope to Alternative 3 with 1,334 total units. Alternative 5 features the highest number of single-family residences and the lowest number of multifamily units. A lodge, RV campground, golf course, and Horse Park are not proposed under this alternative. Like Alternative 2, a 950,000-square-foot Business Park would be developed on an 80-acre campus, and land would be set aside for public facilities. Recreational facilities would include a neighborhood lake and clubhouse in addition to the Community Recreation Center. Approximately 246 acres of undeveloped open space would be maintained as the Cle Elum River corridor. Approximately 172 acres would be maintained as perimeter buffers and natural open space.

Location:

The project site consists of 1,106 acres of property owned by Trendwest within the Cle Elum UGA. The UGA is generally bounded by SR 903 and the city limit on the east, Bullfrog Road on the north and west, and Interstate 90 on the south. A portion of the UGA extends east of SR 903 to the Coal Mine Trail/Crystal Creek. The property lies adjacent and west of the City of Cle Elum.

The proposed MountainStar Master Plan Resort (approved by Kittitas County in October 2000) is adjacent and northwest of the UGA. The following figure shows Trendwest properties and the Cle Elum UGA relative to the City of Cle Elum, the proposed Master Planned Resort, and surrounding jurisdictions.

Proponent: Trendwest Properties, Inc.

Lead Agency:
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Responsible Official:
Gary Berndt, Mayor
City of Cle Elum

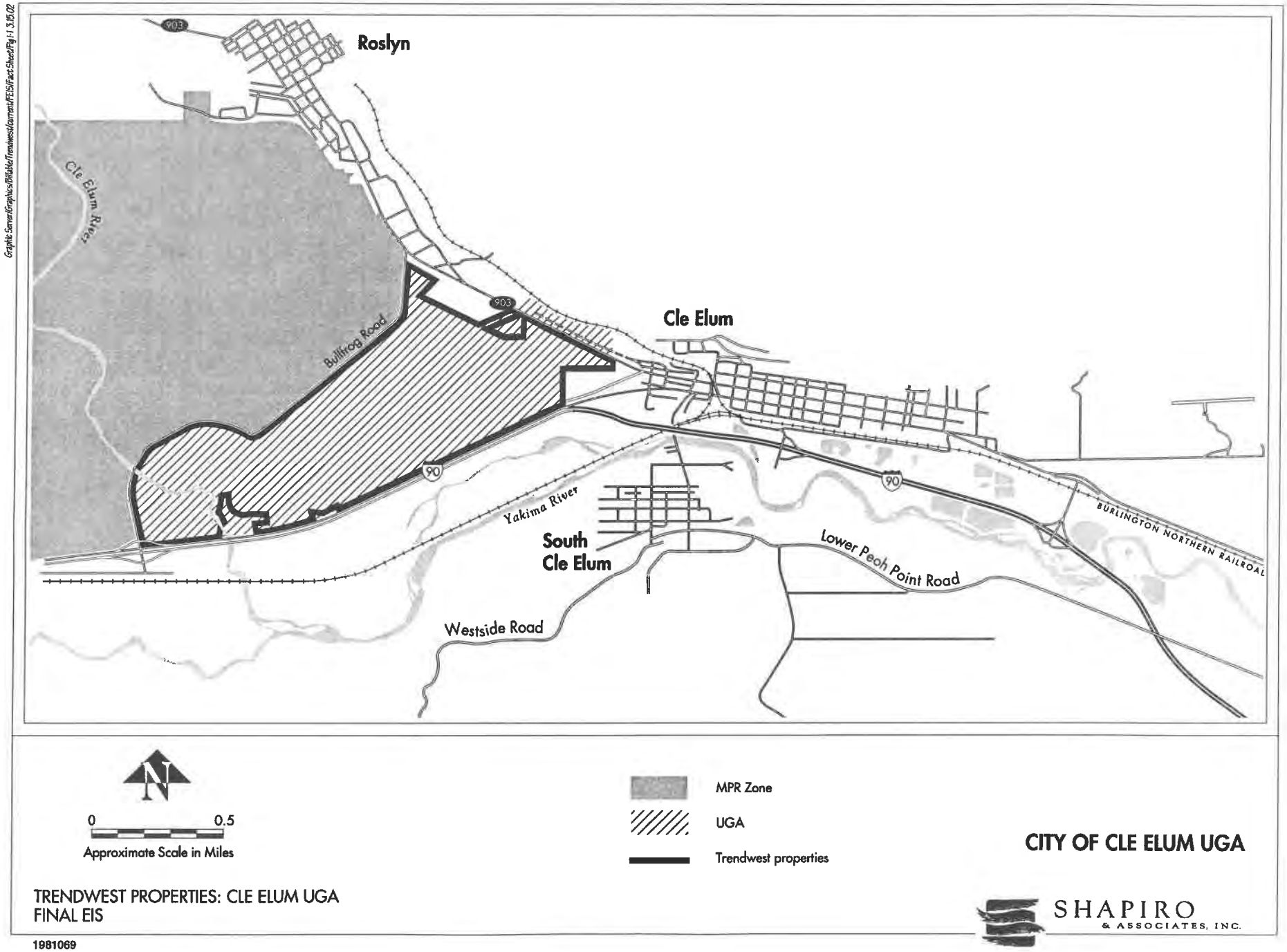
Lead Agency Contact Person:
Brian Carrico, Planner
City of Cle Elum
119 West First Street
Cle Elum, WA 98922
(509) 674-2262

Permits and Approvals:

State of Washington
Water Rights Changes
National Pollutant Discharge Elimination System
Utilities Franchise Permits
Forest Practices Approval

Kittitas County
Right-of-Way Use Permit

City of Cle Elum
Water and Sewer Plan Amendments
Comprehensive Plan Amendment/Subarea Plan
Annexation
Zoning Code Amendment
Development Agreement
Master Site Plan Approval
Site and Design Review
Grading Permit
Critical Areas Permit
Street Cutting Permit
Building Permits
Certificate of Water Availability
Water and Sewer Permits
Right-of-Way Use Permits



TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

EIS Authors and Principal Contributors:

- **Shapiro and Associates, Inc.** (Project Management, EIS Preparation, Earth, Air Quality, Plants and Animals, Fisheries, Wetlands, Noise, Land Use, Relationship to Plans and Policies, Population and Housing, Aesthetics, Cultural Resources, Parks and Recreation, Transportation, Public Services, and Utilities)

- **A.C. Kindig and Co.** (Water Quality)
- **American Engineering** (Surface Water Drainage)
- **Archaeological Frontiers** (Cultural Resources)
- **Brown and Caldwell** (Water Supply Analysis)
- **Camp, Dresser & McKee, Inc.** (Surface Water and Groundwater)
- **Foster Wheeler Environmental** (Water Supply Analysis)
- **Johnson-Gardner, LLC** (Fiscal and Economic Analysis)
- **Mentor Law Group** (Water Supply Analysis)
- **Montgomery Water Group** (Water Supply Analysis)
- **Northwest Hydraulic Consultants, Inc.** (Water Supply Analysis)
- **Pacific Groundwater Group** (Water Supply Analysis)
- **Raedeke & Associates** (Wildlife Habitat Evaluation)
- **TModel Corporation** (Transportation Modeling)
- **W&H Pacific** (Site Engineering Analyses)

Issue Date of Final EIS: March 18, 2002

Location of Background Material:

City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Shapiro and Associates, Inc.
101 Yesler Way, Suite 400
Seattle, WA 98104

To Obtain a Copy of the Final EIS: Copies of the Final EIS and Appendices are available for public review at the Cle Elum City Hall and the Cle Elum, Roslyn, Ellensburg, and Central Washington University libraries. Copies of the Final EIS are available for $25.00 from the City of Cle Elum. Appendices are included in two volumes at a cost of $20.00 each.

1. Summary



1. SUMMARY

This chapter contains a description of the proposed action, the project purpose and need, and a summary of the alternatives evaluated in the Draft and Final EISs. Summaries of areas of concern identified through the scoping process, the status of related projects, impacts, and mitigation are also provided.

1.1 PROPOSED ACTION

The City of Cle Elum proposes to: (1) adopt the Bullfrog Subarea Plan as part of the City's Comprehensive Plan; (2) adopt mixed use, residential, and public reserve zoning designations and a zoning map for the UGA as part of the City's Zoning Ordinance; (3) approve a master plan for the development; and (4) approve a Development Agreement.

This Final Environmental Impact Statement (EIS) evaluates potential impacts and mitigation measures associated with the above-identified actions, including a fifth development alternative, the Master Site Plan Application, for the Cle Elum Urban Growth Area (UGA).

The proposal for Trendwest properties within the UGA consists of a master plan community containing single-family and multifamily residential, commercial, and recreational land uses. A Business Park and Community Recreation Center would be developed. Land would be set aside as expansion areas for the Cle Elum-Roslyn School District #404, the existing cemetery, and the City of Cle Elum's water treatment plant. Undeveloped open space would be retained within the Cle Elum River corridor under each of the alternatives.

The City of Cle Elum will consider adoption of the Bullfrog Subarea Plan and zoning that will take effect upon annexation of the property, consistent with RCW 35A.14.330. Policies, regulations, and conditions of approval will be identified in a Development Agreement consistent with RCW 36.70B.170. The Development Agreement, Bullfrog Subarea Plan, and zoning regulations will govern the City's subsequent review of any proposed development in the UGA.

The Final EIS has been prepared in accordance with RCW 43.21C, SEPA Rules, Chapter 197-11 WAC, as amended, and Chapter 15.28 of the Cle Elum Municipal Code (SEPA Regulations). The City of Cle Elum is the lead agency for preparation of the EIS. The Draft EIS was issued for public review and comment on March 23, 2001. Two public hearings on the Draft EIS were held on April 18 and April 25, 2001 at the Walter Strom Middle School in Cle Elum. Comments on the Draft EIS were received until May 7, 2001.

1.2 FINAL EIS ORGANIZATION

This Final EIS provides the following:

- Responds to comments on the Draft EIS received from agencies, interested parties, and the general public as required under the State Environmental Policy Act (SEPA).
- Provides environmental review of Alternative 5 (Preferred Alternative).

- Provides an updated analysis of potential cumulative impacts associated with development under Alternative 5 and the Conceptual Master Plan (reduced density) for the MountainStar Master Planned Resort (MPR).

Since the Draft EIS was published, Trendwest has entered into a Settlement Agreement (September 19, 2001) that provides for a reduced density MPR, which is further described in Section 1.6 below. This Final EIS evaluates the cumulative impacts of Alternative 5 and the Reduced Density MPR.

Chapter 1 presents a summary of the proposed action and alternatives, the proponent's purpose and need for the project, and a summary of potential significant impacts and mitigation measures. Chapter 2 provides a detailed description of the proposal and alternatives for development of the Cle Elum UGA. Chapter 3 describes the affected environment, potential significant impacts, mitigation measures, and significant unavoidable adverse impacts for each element of the environment. Analysis in Chapter 3 evaluates Alternative 5 compared to Alternatives 2, 3, and 4 and does not repeat the Draft EIS analysis of the No Action Alternative or the other development alternatives. Cumulative impacts are analyzed with the Reduced Density MPR. Chapter 4 contains the comments on the Draft EIS received the public and agencies, and the responses to those comments. Chapter 5 contains a list of references used in the analyses. Chapter 6 contains a list of acronyms and abbreviations used in the Final EIS. Chapter 7 contains the distribution list for the Final EIS.

Technical appendices that provide more detailed analyses of specific topics are provided in two separate volumes. Volume 1 includes the Water Quality Technical Report (Appendix A), the Water Supply Technical Report Supplement (Appendix B), and the Employment-Induced Water Demand Analysis (Appendix C). Volume 2 includes the Fiscal Impact Analysis for Alternative 5 (Appendix D), the Site Engineering Technical Report (Appendix E), the Transportation Appendix for Alternative 5 (Appendix F), and agency coordination letters (Appendix G).

1.3 PURPOSE AND NEED

The City of Cle Elum's 1995 Comprehensive Plan identified the area known as the Bullfrog Flats as a study area for accommodating future growth. In 1997, the City of Cle Elum initiated a study of this areas as a UGA and issued the *Bullfrog Urban Growth Area Report,* which evaluated future population capacity of the City of Cle Elum and the need for additional land outside the city limits for residential, recreational, governmental, and employment uses. Other items the City of Cle Elum considered were:

- The Washington State Horse Park Authority's proposal to locate its facilities on up to 200 acres in the Bullfrog Flats.
- Identification of alternative sites in the Bullfrog Flats for the City of Cle Elum's new water treatment facility.
- Proposed expansion of the School District's complex by 25 acres.
- Expansion of the City's cemetery.
- Identification of alternative sites for a new Community Recreation Center.

On December 22, 1998, the Kittitas County Board of Commissioners adopted an amendment to the County Comprehensive Plan to establish the Cle Elum UGA (Ordinance 98-24). Trendwest initially submitted a Preliminary Master Plan to Kittitas County for environmental review of the development in the Cle Elum UGA.

On February 22, 1999, Kittitas County issued a Determination of Significance/Scoping Notice for preparation of an EIS on Trendwest's proposal for development in the Cle Elum UGA. In November 1999, Kittitas County, the City of Cle Elum, and Trendwest entered an agreement for EIS review and EIS consulting services for joint preparation of an EIS on proposed development in the UGA. Population projections for Kittitas County were adjusted in 1999 to reflect the inclusion of the UGA in Cle Elum's 20-year growth projections, based on the Office of Financial Management's (OFM) high series growth projections.

In July 2000, Trendwest and the City executed a Pre-Annexation Agreement for the UGA. In January 2001, Kittitas County and the City of Cle Elum agreed that the City should be the lead agency for preparation of the EIS.

This Final EIS analyzes the following City of Cle Elum actions: (1) adopt the Bullfrog Subarea Plan as part of the City's Comprehensive Plan; (2) adopt mixed use, residential, and public reserve zoning designations and a zoning map for the UGA as part of the City's Zoning Ordinance; (3) approve a master plan for the development of approximately 1,100 acres of the subarea owned by Trendwest Properties, Inc.; and (4) approve a Development Agreement. These actions will guide future development of the City's UGA consistent with the planning as stated in the Growth Management Act (RCW 36.70A).

The Bullfrog subarea is adjacent and west of the City of Cle Elum and is approximately 1,270 acres. The subarea plan proposes a variety of residential, commercial, public, and recreational uses for the UGA that would be integrated with the existing City. It is the City's goal that development in the UGA preserve and enhance the natural environment of the Cle Elum River corridor and Bullfrog Flats while providing opportunities for new housing, community recreation, and employment.

1.4 SUMMARY OF ALTERNATIVES EVALUATED

Trendwest proposes to develop approximately 1,100 acres of property it owns within the Cle Elum UGA. Figure 1-1 shows the location of the UGA in relation to Cle Elum and Upper Kittitas County. Five alternatives are evaluated in the EIS (Draft and Final):

- Alternative 1: No Action
- Alternative 2: Preliminary Master Plan
- Alternative 3: Expanded Residential
- Alternative 4: Reduced Residential
- Alternative 5: Master Site Plan Application (Preferred Alternative)

1. SUMMARY

This chapter contains a description of the proposed action, the project purpose and need, and a summary of the alternatives evaluated in the Draft and Final EISs. Summaries of areas of concern identified through the scoping process, the status of related projects, impacts, and mitigation are also provided.

1.1 PROPOSED ACTION

The City of Cle Elum proposes to: (1) adopt the Bullfrog Subarea Plan as part of the City's Comprehensive Plan; (2) adopt mixed use, residential, and public reserve zoning designations and a zoning map for the UGA as part of the City's Zoning Ordinance; (3) approve a master plan for the development; and (4) approve a Development Agreement.

This Final Environmental Impact Statement (EIS) evaluates potential impacts and mitigation measures associated with the above-identified actions, including a fifth development alternative, the Master Site Plan Application, for the Cle Elum Urban Growth Area (UGA).

The proposal for Trendwest properties within the UGA consists of a master plan community containing single-family and multifamily residential, commercial, and recreational land uses. A Business Park and Community Recreation Center would be developed. Land would be set aside as expansion areas for the Cle Elum-Roslyn School District #404, the existing cemetery, and the City of Cle Elum's water treatment plant. Undeveloped open space would be retained within the Cle Elum River corridor under each of the alternatives.

The City of Cle Elum will consider adoption of the Bullfrog Subarea Plan and zoning that will take effect upon annexation of the property, consistent with RCW 35A.14.330. Policies, regulations, and conditions of approval will be identified in a Development Agreement consistent with RCW 36.70B.170. The Development Agreement, Bullfrog Subarea Plan, and zoning regulations will govern the City's subsequent review of any proposed development in the UGA.

The Final EIS has been prepared in accordance with RCW 43.21C, SEPA Rules, Chapter 197-11 WAC, as amended, and Chapter 15.28 of the Cle Elum Municipal Code (SEPA Regulations). The City of Cle Elum is the lead agency for preparation of the EIS. The Draft EIS was issued for public review and comment on March 23, 2001. Two public hearings on the Draft EIS were held on April 18 and April 25, 2001 at the Walter Strom Middle School in Cle Elum. Comments on the Draft EIS were received until May 7, 2001.

1.2 FINAL EIS ORGANIZATION

This Final EIS provides the following:

- Responds to comments on the Draft EIS received from agencies, interested parties, and the general public as required under the State Environmental Policy Act (SEPA).
- Provides environmental review of Alternative 5 (Preferred Alternative).

- Provides an updated analysis of potential cumulative impacts associated with development under Alternative 5 and the Conceptual Master Plan (reduced density) for the MountainStar Master Planned Resort (MPR).

Since the Draft EIS was published, Trendwest has entered into a Settlement Agreement (September 19, 2001) that provides for a reduced density MPR, which is further described in Section 1.6 below. This Final EIS evaluates the cumulative impacts of Alternative 5 and the Reduced Density MPR.

Chapter 1 presents a summary of the proposed action and alternatives, the proponent's purpose and need for the project, and a summary of potential significant impacts and mitigation measures. Chapter 2 provides a detailed description of the proposal and alternatives for development of the Cle Elum UGA. Chapter 3 describes the affected environment, potential significant impacts, mitigation measures, and significant unavoidable adverse impacts for each element of the environment. Analysis in Chapter 3 evaluates Alternative 5 compared to Alternatives 2, 3, and 4 and does not repeat the Draft EIS analysis of the No Action Alternative or the other development alternatives. Cumulative impacts are analyzed with the Reduced Density MPR. Chapter 4 contains the comments on the Draft EIS received the public and agencies, and the responses to those comments. Chapter 5 contains a list of references used in the analyses. Chapter 6 contains a list of acronyms and abbreviations used in the Final EIS. Chapter 7 contains the distribution list for the Final EIS.

Technical appendices that provide more detailed analyses of specific topics are provided in two separate volumes. Volume 1 includes the Water Quality Technical Report (Appendix A), the Water Supply Technical Report Supplement (Appendix B), and the Employment-Induced Water Demand Analysis (Appendix C). Volume 2 includes the Fiscal Impact Analysis for Alternative 5 (Appendix D), the Site Engineering Technical Report (Appendix E), the Transportation Appendix for Alternative 5 (Appendix F), and agency coordination letters (Appendix G).

1.3 PURPOSE AND NEED

The City of Cle Elum's 1995 Comprehensive Plan identified the area known as the Bullfrog Flats as a study area for accommodating future growth. In 1997, the City of Cle Elum initiated a study of this areas as a UGA and issued the *Bullfrog Urban Growth Area Report,* which evaluated future population capacity of the City of Cle Elum and the need for additional land outside the city limits for residential, recreational, governmental, and employment uses. Other items the City of Cle Elum considered were:

- The Washington State Horse Park Authority's proposal to locate its facilities on up to 200 acres in the Bullfrog Flats.
- Identification of alternative sites in the Bullfrog Flats for the City of Cle Elum's new water treatment facility.
- Proposed expansion of the School District's complex by 25 acres.
- Expansion of the City's cemetery.
- Identification of alternative sites for a new Community Recreation Center.

On December 22, 1998, the Kittitas County Board of Commissioners adopted an amendment to the County Comprehensive Plan to establish the Cle Elum UGA (Ordinance 98-24). Trendwest initially submitted a Preliminary Master Plan to Kittitas County for environmental review of the development in the Cle Elum UGA.

On February 22, 1999, Kittitas County issued a Determination of Significance/Scoping Notice for preparation of an EIS on Trendwest's proposal for development in the Cle Elum UGA. In November 1999, Kittitas County, the City of Cle Elum, and Trendwest entered an agreement for EIS review and EIS consulting services for joint preparation of an EIS on proposed development in the UGA. Population projections for Kittitas County were adjusted in 1999 to reflect the inclusion of the UGA in Cle Elum's 20-year growth projections, based on the Office of Financial Management's (OFM) high series growth projections.

In July 2000, Trendwest and the City executed a Pre-Annexation Agreement for the UGA. In January 2001, Kittitas County and the City of Cle Elum agreed that the City should be the lead agency for preparation of the EIS.

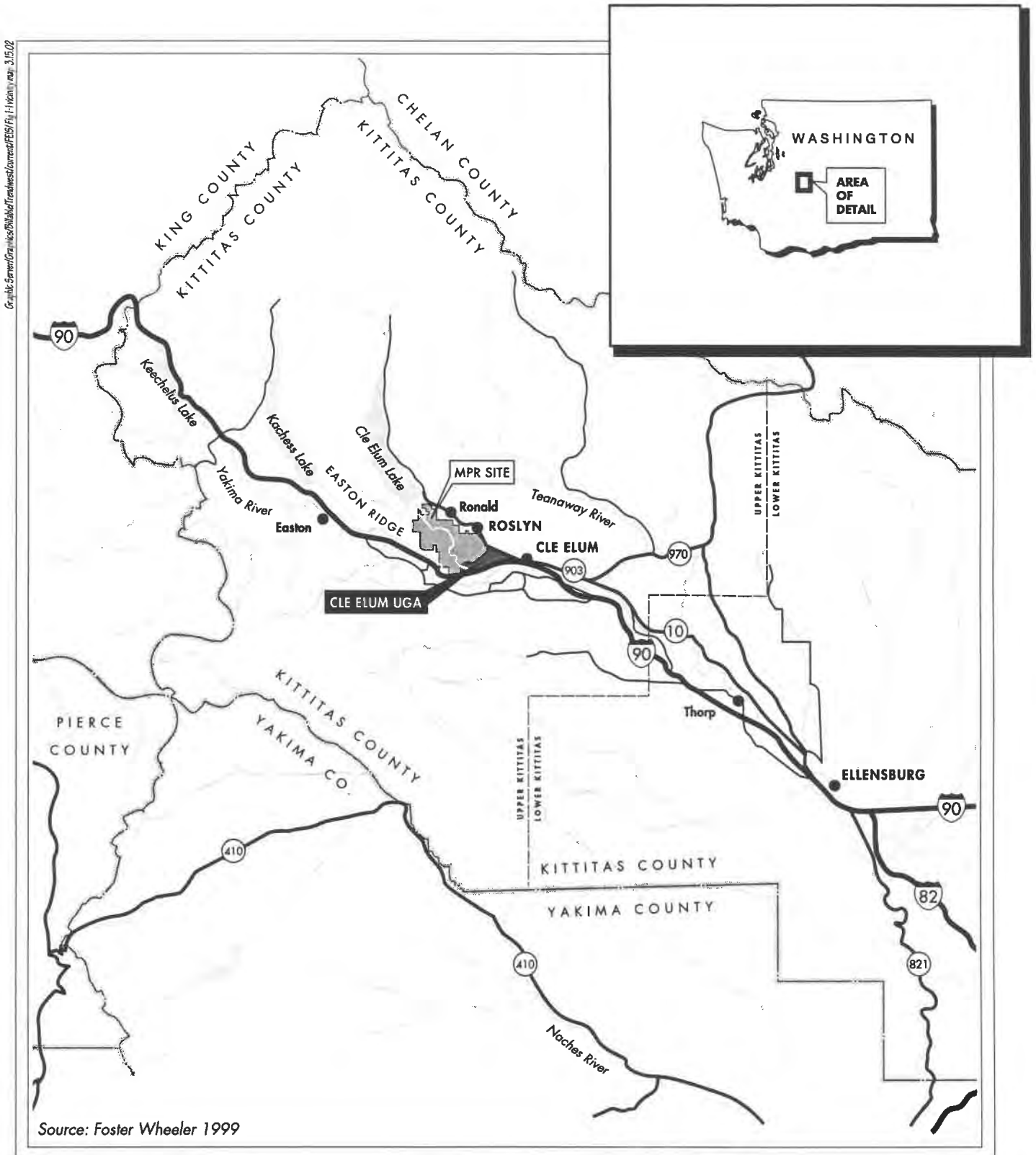
This Final EIS analyzes the following City of Cle Elum actions: (1) adopt the Bullfrog Subarea Plan as part of the City's Comprehensive Plan; (2) adopt mixed use, residential, and public reserve zoning designations and a zoning map for the UGA as part of the City's Zoning Ordinance; (3) approve a master plan for the development of approximately 1,100 acres of the subarea owned by Trendwest Properties, Inc.; and (4) approve a Development Agreement. These actions will guide future development of the City's UGA consistent with the planning as stated in the Growth Management Act (RCW 36.70A).

The Bullfrog subarea is adjacent and west of the City of Cle Elum and is approximately 1,270 acres. The subarea plan proposes a variety of residential, commercial, public, and recreational uses for the UGA that would be integrated with the existing City. It is the City's goal that development in the UGA preserve and enhance the natural environment of the Cle Elum River corridor and Bullfrog Flats while providing opportunities for new housing, community recreation, and employment.

1.4 SUMMARY OF ALTERNATIVES EVALUATED

Trendwest proposes to develop approximately 1,100 acres of property it owns within the Cle Elum UGA. Figure 1-1 shows the location of the UGA in relation to Cle Elum and Upper Kittitas County. Five alternatives are evaluated in the EIS (Draft and Final):

- Alternative 1: No Action
- Alternative 2: Preliminary Master Plan
- Alternative 3: Expanded Residential
- Alternative 4: Reduced Residential
- Alternative 5: Master Site Plan Application (Preferred Alternative)



Source: Foster Wheeler 1999

0 8
Approximate Scale in Miles

FIGURE 1-1

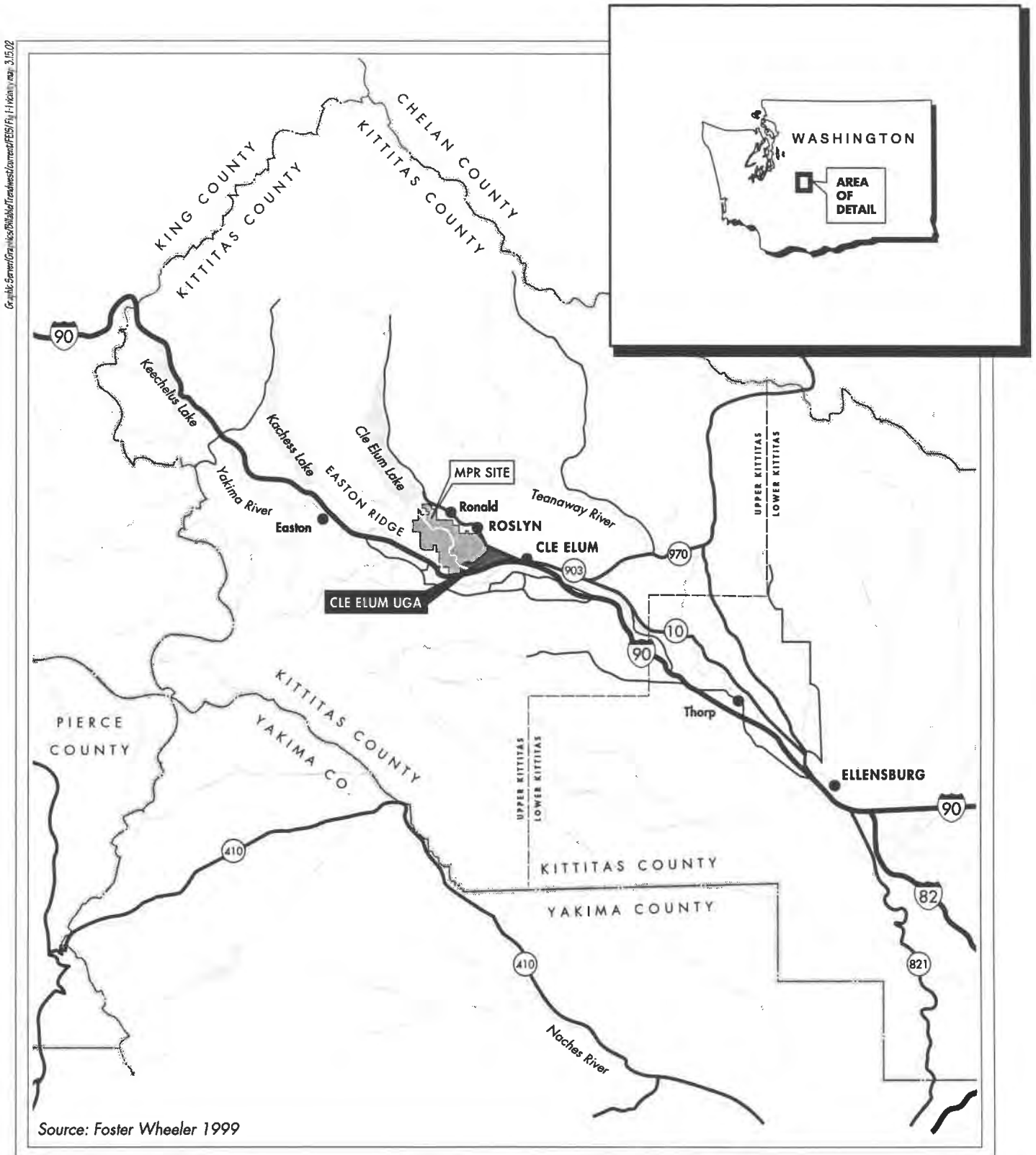
VICINITY MAP

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

SHAPIRO & ASSOCIATES, INC.

1981069

H-01



Source: Foster Wheeler 1999

0 8
Approximate Scale in Miles

FIGURE 1-1

VICINITY MAP

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

SHAPIRO & ASSOCIATES, INC.

1981069

H-01

Alternative 1 (No Action) and Alternatives 2, 3, and 4 are evaluated in the Draft EIS. Alternative 5 is the Master Site Plan Application, which was submitted to the City of Cle Elum in August 2001. This alternative represents another site plan variation for development of the Cle Elum UGA that incorporates many of the land uses evaluated under Alternatives 2, 3, and 4, responds to identified impacts of those alternatives, and reflects public input. Alternative 5 has been designed to result in a level of environmental impact that falls within the range of impacts evaluated in the Draft EIS. As such, new significant environmental impacts are not anticipated. Alternative 5 is the Preferred Alternative and is evaluated in the Final EIS.

Since the Draft EIS was published, Trendwest has entered into a Settlement Agreement (September 19, 2001) that provides for a reduced density MPR, which is further described in Section 1.6 below. This Final EIS evaluates the cumulative impacts of Alternative 5 and the Reduced Density MPR.

Under Alternative 1, development within the Cle Elum UGA would occur under existing Kittitas County zoning. Under Alternative 2, development would occur according to the Preliminary Master Plan for the UGA. Alternatives 3 and 4 represent variations of Alternative 2 in the layout and distribution of residential, commercial, and recreation uses. Alternative 5 is the Master Site Plan Application submitted to the City of Cle Elum.

Features of the proposal common to Alternatives 2, 3, 4 and 5 include a master plan community containing single-family and multifamily residential units; a Business Park; areas dedicated for future school expansion and cemetery expansion; the City of Cle Elum's new water treatment plant; and a Community Recreation Center. Other recreational facilities common to Alternatives 2, 3, and 4 include a lodge, a golf course with related facilities, and a recreational vehicle (RV) campground. Under Alternative 5, a neighborhood lake and clubhouse are proposed.

The number of residential units would vary, depending on the alternative, from approximately 800 units to approximately 1,300 units. Under Alternatives 2, 3, 4, and 5, the majority of multifamily residences are proposed for construction in the first five years. Single-family residences would be constructed over a projected 30-year buildout period. Trendwest non-residential land uses proposed under the respective alternatives would be constructed in the initial construction phase. It is anticipated that development of the Business Park and Community Recreation Center (city facilities) would also begin during this time period.

Under Alternatives 2 and 4, up to 200 acres of land would be reserved for the Washington State Horse Park, a multiple-use, national-class equestrian facility. Under Alternative 3, the area proposed for the Washington State Horse Park would be developed as single-family housing. Alternative 5 does not propose a Horse Park; however, the southern portion of the property is a 175-acre reserve that may be developed as a horse park in the future as a separate project (discussed below).

Alternatives 2, 3, and 4 would retain 230 acres as undeveloped natural open space, including the Cle Elum River corridor and natural buffers along the UGA perimeter. Additional internal buffers, private open space, and recreational areas would occur within the developed areas. Alternative 5 would retain a total of 418 acres as undeveloped natural open space, including 246

acres of the Cle Elum River corridor, 131 acres of perimeter buffers, and 41 acres of steep slope areas.

1.5 ISSUES IDENTIFIED DURING SCOPING

The Draft EIS addresses potential impacts for each element of the environment. The scoping process conducted in February, March, and April of 1999 helped to identify more specific issues to be addressed within each of those elements. Following is a list of the key issues identified during the scoping process that are addressed in the EIS:

- Potential effects on fisheries in the Cle Elum and Yakima rivers from stormwater runoff and water supply diversions.
- Effect of chemicals, household waste, and fertilizers on water quality.
- Impacts of additional traffic on the regional and local transportation networks, including parking.
- Impacts of the development proposed in the UGA on the capacity of state, municipal, and local public service agencies to provide adequate services.
- How development in the UGA can be appropriately phased to minimize fiscal impacts to local governments and service providers including police, fire protection, and emergency services.
- Potential impacts on the Cle Elum-Roslyn School District #404's enrollment, transportation, classroom capacity, and staffing levels.
- The most appropriate method for habitat evaluation and impact assessment in the UGA.
- The impact of population and employment growth on housing availability and affordability.
- The effects of development in the UGA and MPR on the types and quality of employment opportunities.
- How options for water supply will affect the quantity and quality of sources, instream flows, impacts on agriculture and other third parties, and conservation.
- The potential impacts on air quality of increased traffic, open burning, and construction dust/particulate.
- Noise associated with increased traffic and construction.
- Potential safety and public health hazards presented by abandoned coal mines.
- The potential effects of the solid waste stream on local and regional landfill capacity, and the associated costs of disposal and recycling.
- The cumulative effects of development in the UGA, coupled with buildout of the MPR and other growth in the Cle Elum-Roslyn area.
- Compliance and consistency of development in the Cle Elum UGA with the Growth Management Act (GMA).
- Impacts of development on the existing pattern and character of land uses in the Upper Kittitas Valley.
- Potential effects of development on existing recreation resources, increased demand for new recreation facilities, and the fiscal impact on federal, state, and local agencies in meeting that demand.
- Potential view impacts on the National Scenic Byway and Mountains-to-Sound Greenway corridor.

1.6 RELATIONSHIP OF THE CLE ELUM UGA EIS TO THE MPR EIS

The Cle Elum UGA and the MountainStar MPR are geographically adjacent and are being developed by related companies. However, the UGA and MPR projects are independent of each other. The purpose and need for the UGA and MPR projects are significantly different. Also, the two projects fall under different legislative mandates and local code requirements. Neither project depends on any larger proposal for justification or implementation. Either project can proceed without the other project.

Because the nature of proposed development in the UGA and MPR is fundamentally different, impacts are also fundamentally different. The proposed uses in the UGA are being developed consistent with GMA goals and requirements for urban growth areas and include typical urban uses. The MPR is focused on destination resort facilities and short-term visitor accommodations, consistent with legislation for master plan resorts. These differences lead to differences in type, timing, and magnitude of impacts on the elements of the environment, such as transportation, population, economics, and public services.

Mitigation measures are analyzed in relationship to identified significant impacts (direct, indirect, and cumulative). Proposed mitigation measures are generally project-specific; however, there is overlap to the extent that project impacts from the MPR and UGA may affect the same service provider, facility, or infrastructure. In these cases, mitigation measures for the MPR and UGA reflect a potential coordinated approach. However, each project is obligated to address its own mitigation and would do so independent of the other project.

RIDGE Settlement Agreement

In September 2001, Trendwest entered into a settlement agreement with RIDGE, a non-profit conservation organization. In return for RIDGE's commitment to withdraw outstanding appeals and refrain from legal challenges to future MPR and UGA approvals, Trendwest agreed to a number of project modifications. First, Trendwest agreed to reduce the MPR's project density. Second, Trendwest agreed to add an additional 550 acres of open space to the UGA and MPR projects. The new open space will be protected by conservation easements. Third, Trendwest agreed to provide a comprehensive package of economic and environmental benefits for the local community. These include, in part, a commitment to transfer water rights to the City of Roslyn to provide water for induced growth within Roslyn's municipal service area, and to provide water for expansion of the Cle Elum-Roslyn School District #404. The MPR-approved units, and the unit reductions agreed to by Trendwest for a Reduced Density MPR, are shown in Table 1-1. As described previously, cumulative impacts for the analysis of Alternative 5 are evaluated in combination with the Reduced Density MPR.

Table 1-1: MountainStar Unit Reductions

Type of Unit	County Approved	Settlement Terms	Unit Reduction	Percentage Reduction
Single-Family Residence	3250	2695	555	17%
Condominium	850	790	60	7%
Hotel	550	300	250	45%
Totals	4650	3785	865	18.6%

Source: Trendwest 2001.

1.7 WATER RIGHTS CHANGE APPLICATIONS

In December 2000, Trendwest entered into a contract with the Washington Department of Ecology (Ecology) for the purpose of conducting additional environmental review and processing of Trendwest's water rights change applications. Over the course of 2001 and into 2002, Trendwest and the City of Cle Elum worked with Ecology to conduct additional environmental review of the Trendwest water transfer proposals and to incorporate that information into the City of Cle Elum's Final EIS. The detailed analysis of this additional environmental review and analysis of potential impacts from implementation of the water rights changes is included as Appendix B, the Water Supply Technical Report Supplement. Information from that report is summarized in Chapter 3.4, Water Supply, of the Final EIS.

Some of the environmental analysis that was performed disclosed additional information on specific water-related aspects of the MPR proposal. Kittitas County prepared an Addendum to the MPR Final EIS in March 2002. Information contained in the City of Cle Elum's EIS and MPR Final EIS Addendum is intended to satisfy any SEPA compliance requirements associated with the water rights change applications Trendwest has filed in connection with both the MPR and UGA developments.

1.8 WASHINGTON STATE HORSE PARK

In the Draft EIS, Alternatives 2 and 4 included a site for future development as an equestrian facility by the Washington State Horse Park Authority. Impact analyses for Alternatives 2 and 4 addressed potential impacts of the Horse Park, to the extent that project information was available. In Alternative 5, however, the Horse Park is not included. Instead, a 175-acre parcel adjacent to I-90 would be set aside as a "Reserve." Under the terms of an agreement between Trendwest and the Horse Park Authority, the Reserve would be donated to the Authority for development of the facility subject to a number of conditions:

- Trendwest would receive approvals from the City of Cle Elum and other agencies for land use, water supply, and water and wastewater treatment for its properties within the UGA.
- The Horse Park Authority would provide or complete all government approvals; a master plan; design and engineering; full funding for the first phase of the project; an operating plan; a project-specific SEPA review; mitigation measures; water rights; onsite utilities and roads,

stormwater facilities; a horse waste management plan; and completion of phase one within four years, and all phases within 10 years of Trendwest's approvals.

- If the Horse Park is not developed under the terms of the agreement, the site could be developed for other uses consistent with City of Cle Elum policies and regulations for the Bullfrog subarea.

1.9 OTHER ENVIRONMENTAL REVIEW

This Final EIS focuses on the issues related to UGA land use and development that are ready for decision by local and state agencies with jurisdiction. Future environmental review will be undertaken for a Horse Park (if the project moves forward) and the City of Cle Elum's regional sewer treatment facilities when those issues are ready for decision. In addition, there are other ownerships within the UGA that may require additional SEPA review prior to development.

1.10 SUMMARY OF IMPACTS AND MITIGATION MEASURES

Table 1-2, Summary of Impacts and Mitigation Measures, summarizes the direct environmental impacts and recommended mitigation measures for Alternatives 1, 2, 3, 4, and 5. For the Final EIS, updated and expanded analyses of water quality, water supply, transportation, public services, and fiscal conditions have been prepared in response to comments and project evolution. Most of the impacts and mitigation for Alternative 5 are comparatively summarized to Alternative 2 (Preliminary Master Plan). For the topics identified above, the summary of Alternative 5 impacts and mitigation measures includes these updated and expanded analyses.

Table 1-2: Summary of Direct Impacts and Mitigation

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Earth		
Alternative 1 No Action	• Construction impacts to earth (e.g., erosion, potential slope failure) under Alternative 1 would be minor because only limited development would occur over an extended time period. • Operational impacts would be localized and would likely be associated with homeowner landscaping practices or improper installation of drainage facilities.	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Cut and fill amounts would be approximately 1.1 million cubic yards. Impervious (279 acres) and landscaped area (271 acres) would be highest for Alternative 2, compared to the other alternatives. • Clearing and grading during construction would increase erosion potential through removal of vegetation and exposure of soil to precipitation, runoff, and wind. • Any fill placed in the East Ravine could be subject to erosion if poorly compacted or placed too steeply. If surface water drained down the ravine, it could potentially decrease fill slope stability and result in ultimate subsidence or failure. • Portions of proposed residential areas overlap or border areas of moderate to steep slopes. Clearing on and above moderate to steep slopes could increase erosion and landslide potential by removing vegetation that would normally moderate runoff and infiltration and by disrupting drainage patterns.	• Prior to construction, a Temporary Erosion and Sediment Control Plan would be prepared outlining erosion control practices and techniques that would be implemented and including clearing guidelines. • A geotechnical engineer would review structure locations relative to areas susceptible to seismic impacts before final planning. • Appropriate Uniform Building Code guidelines would be followed for design of the Cle Elum UGA facilities. • Appropriate setback distances would be implemented for both new construction and location of infiltration facilities to minimize landslide hazards. • Stormwater from the Cle Elum UGA would be collected and tightlined away from the top of slopes greater than 15%. • Fill, topsoil, or other debris would not be placed over the top of steep slopes. • Vegetation removal would be restricted from steep slopes and an associated buffer area determined as part of the planning/permitting process. • Stormwater management facilities would be designed and located to avoid areas of moderate or steep slopes in order to minimize erosion and landslide potential.
Alternative 3 Expanded Residential	• Potential earth related impacts associated with development of Alternative 3 would be similar to those described for Alternative 2. • Cut and fill amounts would be approximately 869,000 cubic yards. Impervious (205 acres) and landscaped area (247 acres) would be lowest for Alternative 3 primarily because the Horse Park would not be developed.	• Mitigation measures proposed under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Potential earth related impacts associated with development of Alternative 4 would be similar to those described for Alternative 2. • Cut and fill amounts would be approximately 881,000 cubic yards. Impervious (235 acres) and landscaped area (257 acres) would be higher than Alternative 3.	• Mitigation measures proposed under Alternative 4 would be the same as those described for Alternative 2.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 5 Preferred Alternative	• Alternative 5 would result in approximately 403 acres of cleared area and 247 acres of impervious surface. • Cut and fill volumes would be approximately 584,000 cubic yards.	• Mitigation measures proposed under Alternative 5 would be the same as those described for Alternative 2.
Air		
Alternative 1 No Action	▪ No significant construction-related air quality impacts would occur. Potential impacts from increases in particulate (PM-10) associated with construction would be short-term and minor. ▪ Operational impacts on air quality from Alternative 1 would not be significant. The low-density residential development under the No Action Alternative would not create a significant number of new vehicle trips or sources of air pollution. ▪ Wood-burning fireplaces would not be prohibited under the No Action Alternative. Noticeable effects from combined fireplace emissions could occur under adverse weather conditions (temperature inversions and light wind conditions).	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Construction activities would temporarily generate PM-10 and small amounts of CO from equipment. If not properly mitigated, fugitive dust would escape from the construction site and from uncovered trucks carrying materials and could affect nearby residences. • Several residences and the Cle Elum-Roslyn School District campus are within 250 to 500 feet of the eastern edge of the UGA. At these distances, PM-10 from construction activities could be noticeable if uncontrolled. • Long-term effects on air quality in the Cle Elum UGA would primarily result from vehicle emissions. Ozone and PM-10 concentrations would be expected to increase slightly under Alternative 2. Residential wood burning and yard waste burning in the residential component of the UGA would be restricted and/or prohibited. • Air quality modeling for Alternative 2 shows that concentrations of CO would not approach the one-hour standard or eight-hour standard. Weekend concentrations are higher than weekday, reflecting higher visitor traffic volumes through Cle Elum. In all cases, under Alternative 2 model CO concentrations would be well below the one-hour average NAAQS of 35 ppm.	Ecology regulates particulate emissions (in the form of fugitive dust during construction activities). Any emission of fugitive dust requires implementation of the best available control technology. Mitigation measures that would control PM-10, deposition of particulate matter, and emissions of CO during construction include: • Covering exposed soil during grading and pre-seeding periods. • Covering all trucks that transport materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck). • Providing wheel washers to remove mud that would otherwise be carried offsite by vehicles. • Routing and scheduling construction trucks so as to reduce delays to traffic during peak travel times. • Requiring appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel and using relatively new well-maintained equipment. • No operational mitigation measures would be required under Alternative 2.
Alternative 3 Expanded Residential	• Potential air quality impacts associated with development of Alternative 3 would be similar to those described for Alternative 2. In all cases under Alternative 3 CO concentrations would be well below the one-hour average NAAQS of 35 ppm.	▪ Mitigation measures proposed under Alternative 3 would be the same as those described for Alternative 2.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 4 Reduced Residential	• Potential air quality related impacts associated with development of Alternative 4 would be similar to those described for Alternative 2. In all cases under Alternative 4 CO concentrations would be well below the one-hour average NAAQS of 35 ppm.	▪ Mitigation measures proposed under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Construction related air quality impacts under Alternative 5 would be the same as those described for Alternatives 2, 3, and 4. • Land clearing burning would require a Land Clearing Burning Permit from Ecology. • Operational impacts to air quality would be the same as described for Alternatives 2, 3, and 4.	▪ Mitigation measures for construction-related impacts to air quality would be the same as those described for Alternatives 2. ▪ Alternative measures for disposal in lieu of, or in conjunction with burning, include onsite chipping, donation for firewood, hauling material offsite or abandoning material onsite to provide wildlife habitat.
Water Quality		
Alternative 1 No Action	• The risk of impacts to water quality from use of petroleum compounds, concrete, and other chemicals during construction would be minor. This is due primarily to a significantly lower density of development occurring over many years. Because construction would occur incrementally on individual lots, however, there could be less control over construction practices. • Some potential for localized soil erosion exists in the areas disturbed by construction. However, assuming use of best management practices, the probability is low that sediment-bearing runoff would discharge into the Cle Elum or Yakima rivers in detectable amounts. • Water quality under Alternative 1 could be impacted through use of landscaping nutrients and chemicals, disposal of vehicle repair fluids, and disposal of excess paint solvents or other household chemicals. These impacts could affect groundwater quality and subsequently water quality in the Cle Elum and Yakima rivers. Proper disposal would minimize the likelihood of impacts on water resources from hazardous wastes. • Under Alternative 1, the risk of groundwater contamination would be low. Heavy equipment use would be confined to each individual lot and development at each lot would likely be spaced over time so any contamination would be localized and not of significant magnitude. • Residential use of fertilizers and pesticides for landscaping would be anticipated. Excess nutrients and pesticides can leach below the root zone and into groundwater.	• No mitigation measures related to construction or operation are proposed for Alternative 1.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 2 Preliminary Master Plan	• Cut and fill operations would create a significant potential for erosion and the generation of turbid surface water runoff. • Potential impacts to surface water quality include overuse of agricultural chemicals when landscaping, and spills or disposal of construction chemicals, concrete wash water, petroleum hydrocarbon fuels, and lubricants. • Stormwater runoff would not be discharged directly to the Cle Elum or Yakima Rivers, reducing potential water quality impacts. Water quality impacts would primarily be limited to contamination that could occur from infiltration to groundwater • Groundwater quality impacts could occur from construction activities under Alternative 2. Heavy equipment operation during construction poses the primary potential threat to groundwater quality. Also, construction waste, in particular concrete wash water, has the potential to raise surface water pH if uncontrolled. Such waste or accidental releases of pollutants could migrate to groundwater. • Infiltration is proposed as the primary stormwater management technique. Infiltration would occur over a wide area of the UGA; any rise in the water table would be largely undetectable. Because groundwater is not laterally confined within the UGA, any infiltrating water will commingle with site groundwater and flow out of the UGA. • Groundwater quality impacts from pest control related to the golf course/landscaping and from application of fertilizers could occur if not properly mitigated. A Golf Course Management Plan would be implemented. • The potential for contaminants (fecal coliforms, total phosphorous, nitrate-nitrogen, and ammonia nitrogen) from the Horse Park to affect groundwater is high without the implementation of BMPs for handling manure and bedding. • The Business Park could include buildings that produce, use, or house hazardous materials. The risk and extent of groundwater quality impact would ultimately depend on the proportion of businesses that would bring hazardous materials to the Cle Elum UGA.	• A temporary erosion and sediment control plan would be required as part of the stormwater pollution prevention plan accompanying the National Pollutant Discharge Elimination System permit required for construction. • The MDP proposed that infiltration facilities at the Cle Elum UGA be sized to handle flows from a 100-year flood. • Stormwater treatment facilities are proposed at locations close to the point of generation. Oil/water separators would be installed in parking lots. Detention facilities would discharge to infiltration ponds outside of till soil units. • BMPs would be applied to Horse Park operation. • Potential impacts on groundwater quality during construction would be addressed in a Stormwater Pollution Prevention Plan required for an NPDES permit. • A landscaping nutrient/pesticide/herbicide application program could be developed for residential and business use in the Cle Elum UGA. • For the golf course, irrigation would be computer controlled to minimize leaching and transport of fertilizers and pesticides. • All pesticides selected for use in the Golf Course Management Plan would be either relatively nontoxic, if mobile, or relatively immobile or nonpersistent if toxic. • Horse Park horses could be stabled under a covered barn or in individual stalls during the wet season, with no use of open paddocks allowed. • Horse Park gutters and downspouts would be directed to route clean surface water away from manure accumulation areas. • Horse Park paddock areas could be lined with a low permeability barrier and roofed to direct surface water to a special water treatment facility before infiltration. • Horse Park manure would be cleared regularly and trucked offsite. • Businesses that may use or store hazardous chemicals could be required to develop a site-specific spill prevention/control plan.
Alternative 3 Expanded Residential	• Potential impacts to surface water associated with development of Alternative 3 would be similar to those described for Alternative 2. • Potential impacts to groundwater associated with development of Alternative 3 would be similar to those described for Alternative 2.	• Mitigation measures proposed for Alternative 3 would be similar to those described for Alternative 2.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 4 Reduced Residential	• Potential impacts to surface water associated with development of Alternative 4 would be similar to those described for Alternative 2. • Potential impacts to groundwater associated with development of Alternative 4 would be similar to those described for Alternative 2.	• Mitigation measures proposed under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Alternative 5 lowers construction risk by avoiding development near the Cle Elum River in the highest risk portion of the UGA. This would help prevent sediment introduction to the river as a result of clearing and grading. Since the Draft EIS was published, the proposal for water quality treatment of stormwater runoff has been modified, in most cases increasing treatment prior to infiltration. • All of the water quality constituents in the UGA stormwater recharging the aquifer would meet the state surface water quality standards, except dissolved lead. The predicted dissolved lead concentration would be slightly elevated above the chronic surface water quality standard, but unlikely to be distinguishable from the existing background groundwater quality. • The conceptual site plan for Alternative 5 includes a number of artificial water bodies (small lakes or ponds) to provide landscape and recreational amenities for the community. None of the lakes would discharge to or be connected with natural surface water. • The analysis forecast that TSS, TP, fecal coliforms, total and dissolved metals from infiltrated treated stormwater would not influence existing groundwater concentrations.	• A Stormwater Pollution Prevention Plan (SPPP) would be prepared that employs applicable portions of Volume II of Ecology's 2001 *Stormwater Management Manual for Western Washington*. This exceeds the minimum 1992 Ecology manual required for the City of Cle Elum and Kittitas County. • Infiltration is feasible and proposed after enhanced stormwater treatment for all areas. Rooftop runoff would be infiltrated without needing water quality treatment. • Native vegetation would be encouraged for common landscaping for commercial and multi-family landscaping. This would minimize the need for landscape chemicals. If chemicals must be used, slow-release fertilizers low in phosphorus, and herbicide or pesticide usage on a minimal "as-needed" basis, selected on the basis of minimal transport and persistence potential, is recommended. • Installing covered parking, parking garages, or carports in multi-family and office areas could reduce vehicular contaminants in storm runoff from commercial development.
Water Supply		
Alternative 1 No Action	• No significant impacts to water supply would occur under Alternative 1; water supply would be provided through exempt groundwater wells permitted as Group B water systems.	• No mitigation measures are proposed under Alternative 1.
Alternative 2 Preliminary Master Plan	• Construction water would be either trucked in to the construction site or diverted from existing utility lines for untreated water. Demand for untreated water during the initial construction phase is roughly estimated at between 80,000 and 100,000 gpd. • The total diversion requirement would be about 1,053 acre-feet per year, including a Horse Park; the net consumptive use would be about 497 acre-feet per year. • Tributaries would experience increases in streamflow depth and velocity during the irrigation season (April through October.)	• Trendwest would transfer its tributary water rights to the State of Washington under the Yakima River Basin Trust Water Rights Program to offset increase in the annual consumptive quantity of water due to the transfer of its mainstem Yakima River water rights. • Trendwest could monitor streamflow using radio telemetry meters and gauges to determine daily changes during the irrigation season. This information would allow Trendwest to reduce water withdrawals, as appropriate. • Trendwest would work with "third-party users" to improve their delivery systems and reduce conveyance losses.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• The Yakima River would experience a net reduction in streamflow downstream of Cle Elum's Yakima River diversion. No significant impacts to third party users are anticipated. Changes in streamflow would result in barely measurable lowering of river levels.	• Trendwest and the City of Cle Elum are negotiating water supply agreements to ensure that deliveries of water by the City to Trendwest would not interfere with the exercise of water rights and ability of the City to supply its service area customers. • A Cooperative Agreement between Trendwest, WDFW, and the Yakama Nation has been entered into. As part of this Agreement, Trendwest would provide funding to acquire water rights for instream flows. The Cooperative Agreement is contingent on approval by Kittitas County of the MPR permits and approvals.
Alternative 3 Expanded Residential	• Impacts to tributaries would be the same as Alternative 2. • Changes to Yakima River streamflow would similar but lower than under Alternative 2. The total diversion requirement would be about 926 acre-feet, 12% less than Alternative 2.	• Mitigation measures proposed under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Impacts to tributaries would be the same as Alternative 2. • Changes to Yakima River streamflow would be similar but lower under Alternative 2 and very slightly greater than Alternative 3. The total diversion requirement would be about 960 acre-feet, 9% less than Alternative 2.	• Mitigation measures proposed under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• As for Alternatives 2, 3, and 4, construction water for development of the UGA under Alternative 5 would likely be purchased from private or public water sources and either trucked into the construction site or diverted from existing utility lines for untreated water. • Trendwest would transfer approximately two-thirds of the water available under its water rights for use within the MPR and the remaining approximate one-third for use within the UGA. This allocation is based upon the approximate quantities of consumptive use demands estimated for each project. • Monthly water requirements for the UGA would fluctuate on a seasonal basis with the highest consumptive use between June and September (due to irrigation). On a seasonal basis, consumptive use deficits attributable to Alternative 5 would occur between November and March. • Changes in Yakima River streamflow would begin with an increase at the mouth of Big Creek, followed by a reduction at the City's diversions at Cle Elum. The net change downstream of Cle Elum's diversions would be a reduction in streamflow. This net reduction would diminish downstream as contributions from the transferred Teanaway River, First and Swauk Creeks, and Yakima River water rights entered the Yakima River. • Water levels for diversions on the mainstem would be lowered less than 0.5 inch. • Total consumptive use as a percentage of baseflow in analyzed subbasins would be approximately 0.18%.	• Trendwest would transfer its tributary water rights to instream flows to offsetincreases in consumptive use of water under its mainstem water rights. • An ongoing monitoring program would be established to ensure Trendwest and other water users that (1) the amount of water that would be used in connection with the MPR and UGA proposals is consistent with the water available under the several water rights that have been acquired by Trendwest and (2) the collective operations described in the water supply plan for the Trendwest resort are protective of other water users' rights on the Yakima River's tributaries and mainstem. • Streamflow monitoring is proposed for each tributary on which Trendwest has water rights. The mainstem river flow in the reach between Cle Elum and Ellensburg also would be monitored. • When an acquired water right is one of two or more that are diverted at a common point, or share a ditch or canal, provision for monitoring the other water user diversions on their ditch, pipe, or pump would be developed specifically to address the situation. • Trendwest has identified three feasible options, in addition to monitoring, to mitigate for the cumulative water supply impacts. The three options are not mutually exclusive.The three options are groundwater infiltration, onsite storage releases, and water right acquisition(s). • Trendwest could acquire additional water rights and transfer them to instream flows to offset late irrigation season irrigation deficits.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• Water demand from future use of fallowed lands would be approximately 48 acre-feet per year.	• Under drought conditions, Trendwest could employ demand management by reducing irrigation on the MPR golf courses. • Trendwest has reached an agreement in principal with most of the affected 3rd party diversions as to appropriate mitigation measures and fully anticipates agreements with all users in the near future. • Operational measurement of Cle Elum's diversions of water would be needed on a daily basis. Measurement of hydrologic conditions on the tributaries also would be recorded on at least a daily basis. Monitoring of other tributary water users will depend on compliance with applicable monitoring and reporting orders. The hydrologic monitoring by Trendwest and Cle Elum would be incorporated into USBR's monitoring network. • Among other provisions, the Cooperative Agreement signed by Trendwest, WDFW and the Yakama Tribe establishes that Trendwest will provide funding for the MountainStar Conservation Trust to acquire water rights from the Upper Yakima River and its tributaries, to increase instream flows and to reduce consumptive uses of water within the upper basin. • The RIDGE Settlement Agreement obligesTrendwest to secure water rights to mitigate for indirect growth within Roslyn and for the School District.
Plants and Animals		
Alternative 1 No Action	• Habitat reduction under Alternative 1 would be substantially lower than for Alternatives 2, 3, and 4. Significantly lower levels of clearing would occur, and greater amounts of native vegetation and undeveloped open space would be retained. • Audible and visual disturbance from traffic and occasional road-related wildlife mortality would continue where roadways already exist. Gradual increases in traffic levels and pedestrian use would result in incremental increases in the level of disturbance to wildlife over time.	• No mitigation measures related to construction are proposed for Alternative 1. • No mitigation measures related to operation are proposed for Alternative 1.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 2 Preliminary Master Plan	• Alternative 2 would result in the greatest overall reduction in vegetation. Development within the UGA could promote the establishment of invasive and exotic species in native areas. • Development of the UGA would result in the fragmentation, alteration, and removal of some wildlife habitat. Loss of habitat would result in a decrease in wildlife diversity and abundance over existing conditions. • Development of the UGA is not likely to have significant adverse impacts on federally listed plant species. • Developing the UGA would reduce the capacity of the site to support elk. • The Cle Elum UGA does not contain breeding nests for spotted owls or bald eagles. Bald eagle wintering areas are known to occur more than a mile from the UGA. The removal of upland forested habitat in the UGA would decrease potential perching habitat for bald eagles. • Operational impacts would be principally related to increases disturbance from human activity, including traffic. Wildlife mortality could increase with higher traffic levels, and new road segments would create new barriers to wildlife movements. Noise effects would be limited to the immediate vicinity of development.	• Construction equipment would be kept out of uncleared vegetated areas to preserve habitat, as well as minimizing soil compaction and erosion. Construction slash, including stump and root wads, could be piled outside of clear zones to provide cover and forage habitat for wildlife. • Before land clearing, native plants could be salvaged and retained to the extent feasible and practical for use in plantings for landscaped areas. • Existing vegetation within the Cle Elum UGA would be retained wherever possible. • Revegetating disturbed soils with native species would occur immediately after construction and final grading to help reduce soil erosion and colonization by non-native species. • Guidelines for the use of native species in landscape plantings in the development areas would be included in the landscape controls applicable to both common facilities and individually owned units. • Snags, brush piles, and downed trees would be left in riparian, steep slope, and wetland area buffers. • Construction activities could be scheduled based on WDFW and other agencies' recommendations to avoid disturbance to breeding wildlife. • Within areas planned for golf course development, trees greater than 6 inches dbh, preferably in clumps, could be retained. • Detention ponds and water quality swales could be vegetated using native plants to provide cover and forage. • The Cle Elum River corridor, which includes the geomorphic floodplain of the Cle Elum River, would be maintained as undeveloped open space. • Interpretive or educational materials would be developed and made available. • Maintenance practices during the operational phase of the project could be designed to create diverse grassland habitat over time. • Winter use could be restricted in areas of known moderate or high winter elk use (i.e., Cle Elum River corridor). • Active measures would be required to keep elk from the developed areas.
Alternative 3 Expanded Residential	• Potential impacts to Plants and Animals associated with development of Alternative 3 would be similar to those described for Alternative 2.	• Mitigation measures proposed under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Potential impacts to Plants and Animals associated with development of Alternative 4 would be similar to those described for Alternative 2.	• Mitigation measures proposed under Alternative 4 would be the same as those described for Alternative 2.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 5 Preferred Alternative	• Under Alternative 5, construction impacts to wildlife habitat from clearing and converting habitat to developed land uses would be 50 to 150 acres lower than under Alternatives 2, 3, and 4. • Under Alternative 5, a significantly larger area of forested habitat associated with the riparian corridor of the Cle Elum River would be retained. The types of impacts associated with clearing vegetation under Alternative 5 (invasive species colonization and soil compaction) would be the same as described for Alternatives 2, 3, and 4. • Although development under Alternative 5 would result in the fragmentation, alteration, and removal of wildlife habitat. The amount of habitat loss would be lower than under the other development alternatives. • Development of the Cle Elum UGA under Alternative 5 is not likely to have significant adverse impacts on federally listed plant or wildlife species. • Construction activities associated with Alternative 5 would likely have a lower impact on the elk population because of the addition of sub-planning areas T and U as part of the elk winter range. • Under Alternative 5, impacts associated with operation of the project and associated human disturbance would be similar to Alternatives 2, 3, and 4. ▪ Cumulative reductions in vegetative cover types from the development of the MPR in conjunction with Alternative 5 would be less than Alternatives 2, 3, and 4.	▪ Mitigation measures would include those described for Alternatives 2,3, and 4. ▪ Mitigation measures inherent to Alternative 5 would include those provisions in the Cooperative Agreement between Trendwest, the WDFW and the Yakama Nation, and in the RIDGE Settlement Agreement that apply to potential cumulative impacts from the MPR and Cle Elum UGA developments.
Fisheries		
Alternative 1 No Action	• No significant construction-related impacts to fish would occur under Alternative 1. • Potential impacts on fish resources from human activity would be comparatively lower under Alternative 1 based on significantly lower population.	• The Cooperative Agreement with WDFW and the Yakama Nation (contingent on approval of MPR project permits and approvals) retains the Cle Elum River corridor up to the geomorphic floodplain line as undeveloped open space. This agreement would reduce the likelihood of construction and operation-related impacts on the Cle Elum and Yakima rivers.
Alternative 2 Preliminary Master Plan	• Direct impacts from construction are not expected to include physical loss or degradation of habitat features associated with structures built within or next to the active stream channel, riparian area, or active floodplain. Loss of riparian zone function is not expected. • There is a risk of contamination to water quality from construction activities; with implementation of mitigation measures, this risk would not be significant.	• Construction in the floodplain of the Cle Elum River would be limited to an interpretive center and supporting road. • Construction would occur in compliance with City of Cle Elum CAO, modified to accommodate Type 1 streams; no construction would be allowed in the riparian zone of the Cle Elum River. • Construction BMPs would be implemented. • Mitigation proposed for surface and groundwater quality would also mitigate potential water quality impacts to fish resources.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• The Horse Park could affect water quality if not properly mitigated. Associated nitrates and total phosphorous could affect aquatic resources and their habitats. • Impacts of the proposed water right transfers would result in a potential increase in affected tributary streamflow, and no significant negative impact in the Yakima River. The proposed water right transfers are not expected to have any significant negative impact on fish habitat quality in the upper Yakima River basin. ▪ Development and human activity within the floodplain and along the Cle Elum River could potentially affect fish resources.	• Future large woody debris recruitment would be maintained. • Any blasting or other activity likely to cause noticeable ground vibration and loud, ambient noise could be avoided or timed so that disturbance to fish is minimized. • By working with the Yakama Nation and WDFW, Trendwest could develop a program to minimize human disturbance to fisheries habitat. • Equestrian access would not be allowed near streams. • Anglers' (and others) use of the river could be limited to avoid over-fishing.Additional measures to protect fisheries habitat could include a voluntary stream steward program and community self-policing of salmon habitat during spawning season.
Alternative 3 Expanded Residential	• Potential impacts to fisheries associated with development of Alternative 3 would be similar to those described for Alternative 2.	• Mitigation measures under Alternative 3 would be the same as described for Alternative 2.
Alternative 4 Reduced Residential	• Potential impacts to fisheries associated with development of Alternative 4 would be similar to those described for Alternative 2.	• Mitigation measures under Alternative 4 would be the same as described for Alternative 2.
Alternative 5 Preferred Alternative	• Construction-related impacts to fisheries resources from Alternative 5 would be the same as identified for Alternatives 2, 3, and 4. • Potential impacts on fish, streams, and riparian function (e.g., fishing, wading, etc.) could be caused by human activities that occur near or in the Cle Elum River as well as nearby streams that include the Yakima and Teanaway rivers, and Big, First, Swauk, and Reecer creeks. • The Cle Elum River and its tributaries may experience an increase in pressure from recreational fishing. • Implementation of the water supply plan for the UGA and MPR could result in increasing water levels by 0.5 inch during the early part of the irrigation season to decreasing water levels by 0.25 inch during September. These small fluctuations would not be expected to have any measurable impact of fish or aquatic resource habitats.	• Mitigation measures for identified significant impacts associated with Alternative 5 would include those described in the DEIS • The WDFW would continue to manage the regional fishery in much the same way it currently does. Fishing in regional rivers would be monitored and local fish populations evaluated. Additional mitigation measures could include: • Exploring angler management options with the WDFW and Yakama Nation • Implementation of creel surveys (coordinated with WDFW) to address issues related directly to angler fishing presence. • Implementation of population surveys (coordinated with WDFW) to assess quantitative changes in discrete stream reaches.
Wetlands		
Alternative 1 No Action	• No significant construction or operational impacts to wetlands would be anticipated under Alternative 1.	• Construction activities and the location of land uses would be subject to Kittitas County sensitive area regulations, and protection of wetlands and wetland buffers would be required.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 2 Preliminary Master Plan	• Potential construction impacts to wetlands, wetland buffers, and associated functions and values would occur from clearing, filling, and grading activities. • Operational impacts to wetlands would be minor. Wetland 2 could potentially experience minor operational impacts from pollutants in stormwater runoff due to increased traffic on the existing roadway crossing of the wetland. Wetlands 31 and 33 could potentially experience minor operational impacts from stormwater runoff or leaching of contaminates from upgradient residential development.	• Development in the UGA would be subject to City of Cle Elum sensitive area regulations, and protection of wetlands and wetland buffers would be required. • A temporary erosion and sedimentation control plan would be prepared and implemented. • Stormwater management facilities for construction activities would be located in suitable locations outside wetlands and wetland buffers. • Clearing and grading during construction would be limited in areas adjacent to wetlands and buffers. • Staging areas for construction would be located outside wetland buffers. • Stormwater management facilities to support operation would be located in suitable locations outside wetlands and wetland buffers and would be maintained, meeting or exceeding all applicable drainage design standards.
Alternative 3 Expanded Residential	• Impacts to wetlands under Alternative 3 would be the same as those described for Alternative 2.	• Mitigation measures proposed to protect wetlands under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Impacts to wetlands under Alternative 4 would be the same as those described for Alternative 2.	• Mitigation measures proposed to protect wetlands under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Potential impacts to wetlands would not differ significantly between Alternative 5 and Alternatives 2, 3, and 4 because no development is proposed within any of the identified wetlands or wetland buffers within the UGA.	• Mitigation measures designed to reduce or eliminate potential impacts on wetlands and wetland buffers would be the same under Alternative 5 as those described under Alternatives 2, 3, and 4.
Noise		
Alternative 1 No Action	• No significant construction or operational noise impacts would occur under Alternative 1.	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Maximum noise levels from construction equipment could range from 69 to 95 dB (A) at 50 feet and as high as 80 dB (A) at 200 feet (EPA, 1971). • No significant operational noise impacts are anticipated to occur under Alternative 2. Events at the Horse Park could generate noticeable increases in noise levels; these effects would be temporary. Receptors most likely to be impacted by operational land use activities would be single-family residences, multifamily housing, and recreation facilities.	The following construction industry best management practices would be incorporated into construction plans and contractor specifications: • Limit noisy construction activities to between 7 a.m. and 7 p.m. • Equip construction equipment engines with adequate mufflers, intake silencers, and engine enclosures • Turn off construction equipment when it isn't used for prolonged periods. • Locate stationary equipment away from receiving properties. • No operational noise-related mitigation would be required under Alternative 2.
Alternative 3 Expanded Residential	• The potential for noise related impacts under Alternative 3 would lower than for Alternative 2 based on the absence of the Horse Park.	• Mitigation measures under Alternative 3 would be the same as described for Alternative 2.
Alternative 4 Reduced Residential	• The potential for noise related impacts under Alternative 4 would be the same as described for Alternative 2.	• Mitigation measures under Alternative 4 would be the same as described for Alternative 2.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 5 Preferred Alternative	• Construction noise levels under Alternative 5 would be similar to those described under Alternatives 2, 3, and 4. • Noise levels from within the UGA under Alternative 5 would be similar to Alternatives 2, 3, and 4, except that Alternative 5 would not include a Horse Park. Additional vehicular traffic to and from the Cle Elum UGA would be the primary source of noise. • Traffic volumes on SR-903 and Bullfrog Road would be approximately 18 to 24 percent higher in project-year 30 under Alternative 5 • In the wintertime, development could result in an increase snowmobile use and associated noise.	• Mitigation for construction noise under Alternative 5 would be the same as identified for Alternatives 2, 3, and 4 and would include best management practices in construction plans and contractor specifications.
Land Use		
Alternative 1 No Action	• Under Alternative 1, development in the UGA would result in the conversion of existing forestry, natural resource management, and passive recreation land uses to low-density residential land uses. The intensity of the construction activities over the duration of buildout of the Cle Elum UGA would be low in comparison to Alternatives 2, 3, and 4, and no significant impacts would be expected. • The *Kittitas County Comprehensive Plan* and Zoning Code would govern development in the Cle Elum UGA. Attaining the maximum number of permitted units on the Cle Elum UGA under this alternative would require cluster subdivision development. Assuming 106 total units at buildout, the gross residential density in the UGA would be approximately 1 DU per 10 acres.	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Potential construction-related impacts on land uses surrounding the UGA under Alternatives 2, 3, and 4 would be associated primarily with noise and dust (see impact summary for Noise and Air Quality). • Under Alternative 2, a total of 334 acres (30% of the 1,106 total acres) would be dedicated for residential land uses. Approximately 80 acres (7% of the total) is proposed for commercial/industrial lands use (Business Park). Approximately 414 acres (37% of the total) would be developed in recreational uses. Of that, up to 200 acres would be designated for the Washington State Horse Park and 12 acres would be dedicated to the City for a community recreation center. Approximately 48 acres (4% of the total) would be converted to public facilities, including the Cle Elum Water Treatment Plant, school, and cemetery. The remaining 230 acres (20%) includes planning areas dedicated to the Cle Elum River Corridor and perimeter buffers.	• No mitigation measures related to construction are proposed for Alternative 2. • Perimeter buffers and natural open space in critical areas and along the Cle Elum River would be retained. • Trendwest would set aside a 25-30 acre parcel to the Cle Elum-Roslyn School District for future school expansion. • Trendwest would set aside 10 acres for future expansion of the Laurel Hill Memorial Cemetery. • Trendwest would set aside approximately 11 acres for a new water treatment facility. • Trendwest would set aside approximately 12 acres for the Community Recreation Center. • Proposed uses in the UGA would be consistent with adopted plans and policies of Kittitas County and the City of Cle Elum.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• Under Alternative 2, overall net residential density would be 5.4 DU/acre at Year 5, decreasing to 4.4 DU/acre at Year 20 and 4.1 DU/acre in Year 30. Residential density would decrease as more of the lower density single-family housing is built. The density under Alternative 2 would be consistent with densities of neighboring communities (e.g., Cle Elum and Roslyn).	• Trendwest and the City of Cle Elum have negotiated a Pre-Annexation Agreement containing measures to ensure consistency of the proposal with City plans and policies.
Alternative 3 Expanded Residential	• Alternative 3 would dedicate the largest acreage to residential uses (487 acres, or 44% of the total acres). This represents approximately 45% more acreage than Alternative 2 and 27% more acreage than Alternative 4. Without the Horse Park, land dedicated for recreational use would be approximately 38% less than under Alternatives 2 and 4. • Under Alternative 3, the overall residential density would be 4.2 DU/acre at Year 5, decreasing to 3.7 DU/acre at Year 20 and 3.6 DU/acre in Year 30. This would be a slightly lower density than under Alternative 2, despite the increase of 281 units (mostly single-family homes). The elimination of the Horse Park from this alternative allows an additional 90 acres for single-family dwellings, thereby reducing the overall density.	• Mitigation measures under Alternative 3 would be the same as described for Alternative 2.
Alternative 4 Reduced Residential	• Potential land use impacts associated with development of Alternative 4 would be similar to those described for Alternative 2. • Under Alternative 4, a total of 381 acres (34% of the total) would be dedicated for residential land use. Land dedicated to commercial use would be reduced from 7% (Alternatives 2 and 3) to approximately 4% of the total 1,106 acres. Land converted to public facilities would be slightly lower (41 versus 48 acres because of a smaller cemetery expansion area). • Under Alternative 4, overall net residential density would be 3.6 DU/acre at Year 5, decreasing to 3.0 DU/acre at Year 20 and 2.8 DU/acre in Year 30. This alternative would have lower single-family and multifamily densities than Alternatives 2 and 3. Its overall residential density of 2.8 also would be lower than and less consistent with the densities of the City of Cle Elum and the City of Roslyn.	• Mitigation measures under Alternative 4 would be similar to those described for Alternative 2. Alternative 4 would set aside 3 acres for future expansion of the Laurel Hill Memorial Cemetery rather than 10 acres as proposed under Alternatives 2 and 4.
Alternative 5 Preferred Alternative	• At full buildout, Alternative 5 proposes the greatest number of total residential units of all project alternatives (810 single-family and 524 multi-family for a total of 1,334 units). • Under Alternative 5, a total of 293 acres would be developed for residential uses. This is the lowest amount of residential land use for any of the Alternatives. • Under Alternative 5 overall net residential density would be 6.5 DU/acre at Year 5, decreasing to 6.2 DU/acre at Year 20 and to 6.1 DU/acre in Year 30.	• Alternative 5 calls for significantly more open space when compared to Alternatives 2 through 4. • The *Draft Bullfrog Subarea Plan* and proposed Planned Mixed-Use (PMU) zoning regulations would ensure that uses in the UGA would be consistent with the City of Cle Elum's Comprehensive Plan and development regulations. • Trendwest and the City of Cle Elum have negotiated a development agreement containing measures to ensure consistency of the proposal with City plans and policies.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
		• Trendwest would set aside 10 acres for future expansion of the Laurel Hill Memorial Cemetery. A 50-foot wooded buffer would be retained around the cemetery expansion area. • Trendwest would set aside a 25-35 acre parcel for the Cle Elum-Roslyn School District for future school expansion.
Population and Housing		
Alternative 1 No Action	• Under Alternative 1 population at full buildout is estimated at 234 persons. Population and housing capacity under the No Action Alternative are accommodated under Washington State Office of Financial Management projections, and no significant impacts to population or housing capacity are anticipated.	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Construction-related impacts to population and housing would result from worker in-migration. Construction within the Cle Elum UGA would be accomplished using a combination of local area workers, non-local construction workers, and independent contractors. The largest demand for construction employees would occur during the first five years, when the visitor housing units, infrastructure, golf course, and other project components would be built. • Operational demand for housing would increase due to employment in-migration that would support Trendwest owned facilities within the UGA, the Horse Park, and the Business Park. Housing demand generated by this in-migration could be accommodated, in part, by residential development proposed for the UGA. Potential housing impacts in the cities of Cle Elum and Roslyn and the Town of South Cle Elum could initially include lower vacancy rates, housing shortages, and potential increases in housing costs. • The housing capacity proposed under Alternative 2 would accommodate populations within the Office of Financial Management high series 2020 population projections for the City of Cle Elum. Alternative 2 would account for 72% of Cle Elum's projected population increase. • Vacation accommodations, recreational day use, and a potential Horse Park would all contribute to attracting seasonal populations. Of the alternatives, implementation of Alternative 2 would result in the highest overall number of seasonal houses constructed and, subsequently, the highest associated visitors.	• Local jurisdictions would revise their comprehensive plans and policies to reflect the adopted Office of Financial Management high series 2020 population allocations and modify comprehensive plan elements accordingly. • The Office of Financial Management would evaluate the proposed uses within the Cle Elum UGA and the MPR as part of the next forecast update. • Cumulative seasonal population impacts would be mitigated through proposed accommodations and recreational facilities inherent to proposed uses within the Cle Elum UGA and the MPR. • A monitoring program would be established to assess how much housing is available, being produced in the area, and/or required to meet demand. • Trendwest would implement a Housing Mitigation Program to prevent significant employment and population related impacts to housing.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 3 Expanded Residential	• Potential population and housing impacts associated with development of Alternative 3 would be similar to those described for Alternative 2. • At full buildout, Alternative 3 would result in the highest increase in residential housing capacity and would accommodate the largest permanent resident population. This is due primarily to the absence of a Horse Park in Alternative 3. Alternative 3 would account for 97% of Cle Elum's projected 2020 population increase. • This alternative would provide fewer seasonal units than Alternative 2.	• Mitigation measures under Alternative 3 would be the same as described for Alternative 2.
Alternative 4 Reduced Residential	• Potential population and housing impacts associated with development of Alternative 4 would be similar to those described for Alternative 2. • Alternative 4 would result in the lowest comparative increase in residential housing capacity. Alternative 4 would account for 57% of Cle Elum's projected 2020 population increase. • Alternative 4 would provide more single-family units but fewer seasonal units than Alternative 2, and would result in lower numbers of visitors.	• Mitigation measures under Alternative 4 would be the same as described for Alternative 2.
Alternative 5 Preferred Alternative	• Construction-related impacts to population and housing resulting from worker in-migration would be the same as those for Alternative 2. • Operational employment under Alternative 5 is limited to the Business Park. • Population capacity under Alternative 5 (Trendwest residential) would be approximately 2,945 at buildout. • The average daily population increase in Kittitas County overall during the peak season of June through August could approach 12,369. • Development in the MPR and Cle Elum UGA under Alternative 5 would contribute to the addition of permanent and seasonal housing capacity in Kittitas County. • The most significant potential cumulative impact to housing would likely be a continuing demand for rental housing (including multifamily) and house-ownership opportunities suitable for all household sizes at rates affordable to the mid- to lower-income economic sector.	• Mitigation would include those inherent to project development and future planning processes, similar to Alternative 2. • As part of its conditions of approval for the Master Site Plan, the City of Cle Elum would require Trendwest to implement an Affordable Housing Mitigation Program.
Aesthetics/Light and Glare		
Alternative 1 No Action	• No significant visual impacts would occur under Alternative 1.	• No mitigation measures related to construction or operation are proposed for Alternative 1.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 2 Preliminary Master Plan	• Construction activities in areas adjacent to the Laurel Hill Memorial Park (cemetery) and School District campus would be noticeable by viewers. • Changes to the visual landscape would occur due to development proposed under Alternatives 2, 3, and 4. The primary visual impact would be caused by the conversion of forested area to neighborhood areas and recreational facilities. Proposed development would not block any important vistas from offsite locations. However views of a mostly uniform canopy from higher-elevation vantage points would change. With tree clearing, more of the power lines could become visible. • If evening Horse Park events were held and/or if evening ballgames occurred at the ballfields associated with the Community Recreation Center, these activities would represent additional sources of light. Glare produced by headlights following evening events at the Horse Park could temporarily impact residences along SR 903.	• No mitigation measures related to construction are proposed for Alternative 2. • Tree preservation would buffer the visual impacts of dense development. • Architectural design and materials guidelines for residential and other structures would be established • Segregated planning areas would be based, in part, on existing topographic features. This would reduce the perceived scale of the overall project for viewers at ground level. • The golf course would be located at the core of the UGA, reducing the perceived scale of the development. • Natural open space buffers along I-90 and Bullfrog Road would screen or diffuse views to the interior of the UGA. • Adoption of standards/recommendations for exterior lighting intensity consistent with the Illuminating Engineering Society of North America.
Alternative 3 Expanded Residential	• Impacts related to aesthetics/light and glare under Alternative 3 would be the same as those described for Alternative 2.	• Mitigation measures under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Impacts related to aesthetics/light and glare under Alternative 4 would be the same as those described for Alternative 2.	• Mitigation measures under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Aesthetic, light, and glare impacts under Alternative 5 would be similar to those described for Alternatives 2, 3, and 4. • Visual impacts to the landscape of Alternative 5 would be similar to those of Alternatives 2 through 4. • Light and glare impacts under Alternative 5 would be lower than those identified for the other development alternatives based on the lower number of recreational facilities, a reduction in residential development by 865 units, and on agreement by Trendwest to implement lighting standards.	Mitigation measures for Alternative 5 include those identified in Alternatives 2, 3, and 4. More specific mitigation measures incorporated into the project design include: • Natural open space buffers 150 feet wide along I-90, 100 feet wide along Bullfrog Road, and 50 feet wide adjacent to SR 903. • Adoption of standards/recommendations for roadway lighting intensity consistent with the Illuminating Engineering Society of North America. • Implementation of lighting designs according to the International Dark Sky Association (IDA) Zone E1 standards. • Development of specific architectural design guidelines for residential structures according to the outline contained in the Master Site Plan Application.
Cultural Resources		
Alternative 1 No Action	• Ground disturbing activity during construction could result in damage to cultural resources or the unearthing of additional unknown resources. However, because of the low density and intensity of land use that would occur under Alternative 1, the comparative risk of impacts to cultural resources would be lower. • Ongoing property maintenance practices that disturb the ground, such as landscaping and road improvements could result in the unearthing of additional unknown resources.	• No mitigation measures related to construction or operation are proposed for Alternative 1.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 2 Preliminary Master Plan	• The extent of the developed area, the extensive infrastructure required, and the numerous land uses proposed under Alternative 2 would result in a greater potential for construction and operation impacts than for Alternative 1. Ground-disturbing activity during construction could result in damage to cultural resources or the unearthing of additional unknown resources. Ongoing property maintenance for residential and non-residential areas, landscaping, and road improvements would occur with greater frequency and cover larger areas. • The development and the land uses proposed within the Cle Elum UGA would change the setting of currently identified cultural resources as well as yet undiscovered cultural resources. • Because of the limited extent of cultural resources within the UGA, it is not anticipated that leaving cultural resources in place and creating a buffer around them would limit development of the proposed uses. Some project components might require reorientation to avoid the cultural resources.	• Within a designated constraint area, subsurface probing would be required prior to any land disturbing activities. If a significant cultural resource could be impacted, further mitigation would be initiated in consultation with the Office of Archaeology and Historic Preservation and the Yakama Nation. • To the extent reasonably possible, all known cultural resources throughout the Cle Elum UGA would be avoided; a 50-meter buffer would be established around the perimeter of the known cultural resources to protect them. • If a cultural resource could not be reasonably avoided, limited testing would be conducted on the cultural resource to determine its significance and boundaries, pursuant to criteria for the National Register of Historic Places. • If it is determined that a known significant cultural resource could not be avoided, consultation with archaeologists and the Yakama Nation would be required and further mitigation measures could be initiated.
Alternative 3 Expanded Residential	• Impacts to cultural resources under Alternative 3 would be the same as those described for Alternative 2.	• Mitigation measures proposed to protect cultural resources under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Impacts to cultural resources under Alternative 4 would be the same as those described for Alternative 2.	• Mitigation measures proposed to protect cultural resources under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Potential construction-related impacts to historic and cultural resources would be lower than under Alternatives 2, 3, and 4. The majority of development is proposed in the northern two-thirds of the property, out of the geomorphic floodplain and the area in the southern one-third of the property designated Reserve. • The extent of the developed area and intensity of land uses proposed under Alternative 5 would result in a lower potential for operational impacts than under Alternatives 2, 3, and 4. However, similar to the other development alternatives, ongoing property maintenance, landscaping, road improvements, recreational activities, potential illegal collecting, and vehicular and pedestrian traffic could result in damage to extant cultural resources or the unearthing of additional unknown resources.	Mitigation for potential impacts to historic and cultural resources outlined in the City of Cle Elum's Draft Conditions of Approval include. • No measures that encourage access or discovery of significant cultural resource sites within the Cle Elum River undeveloped open space area will be permitted. • Consistent with City code requirements, the City will give the Yakama Nation notice and opportunity to comment on all proposed preliminary plats or binding site plans, or building or grading permits on all lands within the cultural resource areas identified in *A Land Use History of the Proposed MountainStar Resort: The Results of a Cultural Resource Survey along the Lower Cle Elum River* (Churchill and Griffin 1998). • Compliance with all applicable requirements of RCW 27.44, Indian Graves and Records and RCW 27.53, Archaeological Sites and Resources, will be required. • Contractors will be trained in the appropriate techniques for recognizing artifacts during construction activities and in the proper notification steps.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Parks and Recreation		
Alternative 1 No Action	• No construction or operational impacts to park and recreation resources would occur under Alternative 1.	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• The capacity at RV parks could be exceeded during summer weekends depending on the level of construction worker demand. • The increased permanent and seasonal population within the Cle Elum UGA would create a greater demand for park and recreation facilities, including ballfields. Regional resources, such as camping, fishing, and hiking areas would experience an increase in the number of users. Increased demands for regional equestrian trails and facilities would also occur. • The Cle Elum UGA contains adequate space to meet the residential housing targets of the alternative and provide park and recreation space consistent with City of Cle Elum LOS standards that may be adopted in the future.	• A twelve-acre parcel would be dedicated for future construction of a community recreation center. • A total of about 230 acres would be dedicated for undeveloped open space. • Development of the UGA would include regional recreational facilities such as the golf course. • The specific locations and sizes of pocket and neighborhood parks would be identified on the final site plan for Trendwest properties within the Cle Elum UGA in conformance with adopted LOS standards. • Under RCW 82.02, the City of Cle Elum could institute a funding mechanism such as park impact fees.
Alternative 3 Expanded Residential	• Demand-related impacts to parks and recreation under Alternative 3 would be slightly higher than for Alternative 2 due to a greater population base. The Horse Park would not be constructed under this alternative.	• Mitigation measures related to park and recreation resources under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Impacts to parks and recreation under Alternative 4 would be the same as those described for Alternative 2.	• Mitigation measures related to park and recreation resources under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Construction-related impacts to park and recreation resources would likely be lower than Alternatives 2, 3, and 4. • As with Alternatives 2, 3, and 4, the increased permanent population within the Cle Elum UGA under Alternative 5 would increase the demand on park and recreation resources in Kittitas County.	• Mitigation measures for impacts to park and recreational resources are similar to those identified for Alternatives 2, 3, and 4 and include facilities proposed as part of Alternative 5 (identified in section 3.13 under Operational Impacts). The specific details of mitigation would be stipulated in the Development Agreement and Conditions of Approval for the master planned development. • Mitigation measures inherent to the project also include those provisions in the Cooperative Agreement between Trendwest, the WDFW and the Yakama Nation and in the RIDGE Settlement Agreement that apply to potential cumulative impacts from the MPR and Cle Elum UGA developments.
Transportation		
Alternative 1 No Action	• No construction impacts would occur under Alternative 1. Under Alternative 1, LOS at intersections of West First Street/Oakes Avenue and West First Street/South Cle Elum Way would exceed the County standard of LOS D on weekdays and weekends at Project Years 5 and 10.	• No mitigation measures related to construction are proposed for Alternative 1.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Alternative 2 Preliminary Master Plan	• Alternative 2 would generate construction-related traffic on the County's roadway system over the 30-year buildout period. The majority of construction-related traffic impacts would occur during the initial 5-year construction period and would include truck trips, delivery trips, and construction worker trips to and from the UGA. The most likely truck routes would include I-90, SR 903, Bullfrog Road, and portions of First Street and Oakes Avenue. • Results of the LOS analysis indicate that by Project Year 5, the intersections of West First Street/Pine Street, First Street/South Cle Elum Way, and First Street/Oakes Avenue would exceed the standard of LOS D on weekdays. LOS would be exceeded for either the entire intersection or for a particular movement within the intersection. On weekends, the same three intersections as well as the SR 903/Bullfrog Road intersection would be adversely affected. In Project Year 10, the same four intersections would exceed LOS D on both weekdays and weekends for either the entire intersection or for a particular movement within the intersection. The intersection of Second Street/Oakes would not exceed the standard at Project Years 5 and 10. • A "peak" event such as an international competition at the potential Horse Park, a holiday weekend, or an event in the local communities or the MPR would likely increase traffic substantially during those time periods and would require a traffic management plan for the area.	• A CTMP would be prepared. The CTMP would identify traffic controls to ensure that employee and truck traffic have minimal impact on existing traffic and UGA residents and visitors. As identified in a Traffic Mitigation Plan for the MPR: • Trendwest would be responsible for costs associated with the design and construction of all onsite transportation improvements necessary to serve the UGA development. • Trendwest would be responsible for all costs associated with construction of new intersections with existing county, state, and private roads that would provide access to the UGA. • Trendwest would be responsible for its proportionate share of any offsite improvements identified through a monitoring program. ▪ A traffic monitoring program would be conducted to assess the most appropriate time for implementing intersection improvements. ▪ For special events that would occur at the Horse Park, the MPR, local communities, or peak holiday weekends, a separate Transportation Management Plan would be developed in cooperation with Kittitas County, the City of Cle Elum, and WSDOT. • The intersections of First Street/South Cle Elum Way, First Street/Oakes Avenue. SR 903/Bullfrog Road, and West First Street/Pine Street would be evaluated to determine if they met warrants for the installation of traffic signals at Project Years 5 and 10.
Alternative 3 Expanded Residential	• Potential transportation impacts associated with development of Alternative 3 would be similar to those described for Alternative 2.	• Mitigation measures related to transportation under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Potential transportation impacts associated with development of Alternative 4 would be the same as those described for Alternative 2.	• Mitigation measures related to transportation under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• As in Alternatives 2, 3, and 4, the majority of construction-related traffic impacts would occur during the initial 5-year construction period and would include truck trips, delivery trips, and construction worker trips to and from the UGA. • Trip generation under Alternative 5 is most comparable to Alternative 3. • The number of vehicle trips on analyzed roadway segments is similar among the alternatives, with the exception of Bullfrog Road and SR 903 (east of Bullfrog Road), which would carry a larger percentage of UGA trips under Alternative 5 as compared to the other alternatives. The increase under Alternative 5 on these roadway segments is attributed primarily to changes in the access points to the UGA and locations of land uses within the UGA.	• It is recommended that Trendwest, in association with Kittitas County, the City of Cle Elum, and WSDOT, coordinate a traffic monitoring program for the UGA with any MPR traffic monitoring. It would include both regular traffic counts and safety studies at predetermined locations in the UGA vicinity. The monitoring program would also serve as a tool to assess the most appropriate time and/or necessity for implementing intersection improvements. • A Construction Transportation Management Plan (CTMP) would be prepared to identify traffic controls to ensure that employee and truck traffic have minimal impact on existing Cle Elum area residents, existing traffic/circulation patterns; and UGA residents and visitors, as the UGA is developed. The CTMP would be revised to correspond with each phase of development.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	In Project Year 5: • The SR 903/Bullfrog Road intersection would operate at LOS F during weekdays and weekends for all alternatives. • On weekends, the EB I-90 Ramps @ Bullfrog would fall from an LOS C to an LOS D. Note: Under Alternatives 2, 3, and 4, the intersection volumes were very near the threshold between LOS C and D. • LOS F at the intersection of First Street/S Cle Elum Way reflects conditions that would occur under the No Action Alternative. In Project Year 10: • The SR 903/Bullfrog Road intersection would operate at LOS F during weekdays and weekends for all alternatives. • First Street/Oakes would operate at a LOS F during weekdays and weekends under all alternatives. • The Second Street/South Cle Elum Way intersection would operate at LOS D on weekdays and LOS F on weekends. • The West First/Pine Street intersection would operate at LOS B on weekdays and LOS F on weekends. • The I-90 Eastbound Ramp/Bullfrog Road intersection would operate at LOS D on weekdays under Alternative 5 and LOS F on weekends. The weekend 95% queue length would be approximately 40.1 vehicles. This means that during the afternoon peak hour, there is a 95% probability of a queue 40 vehicles in length.	• The following intersections would be evaluated to determine if they meet warrants for the installation of traffic signals at Project Year 5: First Street and South Cle Elum Way, and SR 903 and Bullfrog Road. • The following intersections would be evaluated to determine if they meet warrants for the installation of traffic signals at Project Year 10: Second Street/South Cle Elum Way; and West First/Pine Street. • The I-90 eastbound off-ramp intersection with Bullfrog Road, which would operate at LOS D on weekdays and LOS F on weekends, could be improved by changing the stop-controlled movement to northbound-southbound from eastbound. The intersection LOS would improve to LOS C. This would be a significant improvement from the LOS F weekend condition.
Public Services		
Alternative 1 No Action	• No significant construction or operation related impacts on law enforcement, fire protection/EMS, or schools are anticipated to occur under Alternative 1.	▪ No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Law enforcement and fire protection agencies, and Hospital District No. 2 would likely experience additional calls for service related to construction site theft, vandalism, injury, and fire incidences, particularly during the initial construction phase. • KITTCOM would experience increases in calls for dispatch during construction. KITTCOM is near maximum dispatch capacity and would not be able to handle an increase in service calls over existing conditions without additional personnel.	• Mitigation measures for service providers would include a monitoring program and shortfall mitigation payments to address fiscal impacts identified (see Fiscal, below). • A comprehensive Construction Plan would be developed. This Plan would include, in part, a Fire and Life Safety Plan, a snow management plan, and provisions for fencing and signing the construction site.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• Development of the Cle Elum UGA would continue to generate additional service calls for dispatch, as population increased throughout the buildout period. • Development of the Cle Elum UGA would generate additional school age children within the Cle Elum-Roslyn School District. Enrollment impacts would result in the need for a new K-12 facility within five to 10 years from the initiation of housing unit construction. The 25-acre site set aside under this alternative would easily accommodate projected enrollment.	• An onsite security presence could be provided during the initial construction phase of the Cle Elum UGA. • All equipment and vehicles would be inspected regularly by the WDNR to assure compliance with Fire Protection Regulations. • Worker safety measures would be implemented consistent with OSHA/WISHA. • Construction activities would occur consistent with WDNR's Fire Protection Regulations. • A comprehensive Fire Protection Plan would be developed to facilitate construction during the dry season, as allowed by the WDNR. • Roadway design within the Cle Elum UGA would conform to UFC requirements. • Community education regarding domestic and recreational fire protection measures could help reduce the potential for wildfires. • Trendwest would encourage fire training and volunteer fire service among its employees for UGA fire coverage.
Alternative 3 Expanded Residential	• Potential impacts to public services associated with development of Alternative 3 would be similar to those described for Alternative 2. The greater population proposed under this alternative would generate proportionately higher number of calls for services and larger school enrollments.	• Mitigation measures proposed under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Potential impacts to public services associated with development of Alternative 4 would be similar to those described for Alternative 2. The smaller population proposed under this alternative would generate proportionately fewer calls for services and smaller school enrollments.	• Mitigation measures proposed under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Construction-related impacts of Alternative would be similar to those of Alternative 2. • Under Alternative 5, five additional police officers would be required by Project Year 30. This is within the range of total officers identified for Alternatives 2, 3, and 4. • The Cle Elum Fire Department would require a guarantee of an additional trained firefighter prior to construction. This could increase to 3 FTE firefighters by Year 5 and thereafter. The paid firefighters would need to be supported by 15 volunteer firefighters by Year 30. • For Hospital District No. 2, the two paramedics and one EMT needed by Project Year 5 would be supplemented in Project Year 10 by a third EMT. By Project Year 30, a total of three paramedics and two EMTs are anticipated to be needed. Hospital District No. 2 has also identified a need for an additional ambulance.	• Mitigation agreements have been negotiated in principle between Trendwest and primary service jurisdiction including the City of Cle Elum, Cle Elum-Roslyn School District #404, and Kittitas County Hospital District No. 2. • Provisions in the RIDGE Settlement Agreement provide mitigation to the City of Roslyn for capital improvements. • Mitigation agreements provide specific guidelines for identifying shortfalls by monitoring costs and revenue flows. • Trendwest and the City of Cle Elum will execute a fiscal mitigation/shortfall arrangement that accurately tracks projected revenues and expenses from UGA development. • Under Alternative 5, 25-30 acres would be set aside for the Cle Elum-Roslyn School District #404 to accommodate future growth in the region. This is up to five acres larger than the 25 acres proposed under Alternatives 2, 3, and 4.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• Capital outlays for fire protection would include a brush/rescue vehicle in Project Year 1, a Class A pumper in Project Year 6 and a fire station as early as Project Year 2 to accommodate the vehicles. • An arrangement for a water tender would be necessary to serve the UGA until water mains and hydrants are installed. • Project school enrollment under Alternative 5 would be similar to that for Alternative 3.	• RCW 82.02 authorizes counties, cities, and towns to impose impact fees on development activity as part of the financing for public facilities that are addressed by a capital facilities plan element of a comprehensive land use plan. Public facilities that qualify include: public streets and roads, publicly owned parks, open space, and recreation facilities, school facilities, and fire protection facilities in jurisdictions that are not part of a fire district.
Utilities		
Alternative 1 No Action	• Water supply for residential lots on the Cle Elum UGA under Alternative 1 would be provided by new individual wells. Wastewater treatment would be accomplished by construction of onsite wastewater systems (septic tanks). Utility service could be provided by the City in the future as its service area expanded. • No significant construction-related impacts to solid waste services would occur under Alternative 1. Quantities of construction and demolition debris generated as a result of residential development would be minor, and accommodated within the existing Ryegrass construction and demolition debris landfill. • Electrical power, natural gas and telecommunication lines would be extended to residents in the Cle Elum UGA upon demand and as available. • Annual water demand for Alternative 1 is estimated at about 162 acre-feet. Net groundwater withdrawal is not anticipated to create a significant decline in groundwater levels.	• No mitigation measures related to construction or operation are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• The City of Cle Elum would supply treated water to dwelling units and commercial uses within the UGA. An untreated water system would provide irrigation water to the proposed golf course, larger public landscaped areas, and the Horse Park. Distribution pipelines would be constructed primarily under transmission line and road rights-of-way. • Wastewater generated under Alternative 2 would be routed to the new regional wastewater treatment plant. The regional facility would be sized and designed to treat wastewater from Trendwest-owned properties.	• Trendwest, the City of Cle Elum, and Town of South Cle Elum would negotiate a cost Agreement regarding the regional water and wastewater treatment plants. • Trendwest would coordinate with utility service providers for electricity, natural gas, and telecommunications regarding construction schedules and proposed utility corridors. • Electrical and telecommunications cables would be installed underground to minimize disruption to the natural environment. Alignments disturbed by construction activities would be restored as soon as possible to preconstruction conditions.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• Puget Sound Energy has not yet determined routes for natural gas pipelines. Lines from US West would need to be extended from the west end of the City of Cle Elum, where they currently terminate. • For Trendwest facilities, average daily water demand would peak in the summer months when visitor numbers and irrigation demands are highest. Alternative 2 would create the largest demand for untreated water. • Solid waste generation would significantly affect the capacity of the existing Cle Elum Transfer Station. • No operational impacts on electricity, natural gas, or telecommunications are anticipated.	• Construction and demolition debris would be hauled to the existing 5-acre inert and demolition landfill, located at the site of the Ryegrass Landfill. • For construction under Trendwest control, Trendwest would coordinate with the Kittitas County Solid Waste Program to separate recyclable materials before disposing construction debris. • Upgrades and expansion of the existing Cle Elum Transfer Station proposed as part of the development agreement between Kittitas County and Trendwest would accommodate projected quantities of solid waste generated by the proposed uses on Trendwest properties within the Cle Elum UGA. • Compliance with the City of Cle Elum's water policy would be required. • Indoor water conservation measures would be carried out in all residences and the lodge.
Alternative 3 Expanded Residential	• Potential utility impacts associated with development of Alternative 3 would be similar to those described for Alternative 2. • Alternative 3, characterized by the largest permanent residential population, would generate the highest average daily demand for treated water. Demand for untreated water under Alternative 3 would be less than under Alternative 2 and more than under Alternative 4.	• Mitigation measures related to utilities under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Potential utility impacts associated with development of Alternative 4 would be similar to those described for Alternative 2. • Trendwest uses under Alternative 4 would generate a lower demand for treated and untreated water than Alternatives 2 and 3.	• Mitigation measures related to utilities under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• Potential utility impacts would be similar to those described for Alternative 2.	• Water conservation fixtures would be installed in residential and non-residential buildings. • Residents would be encouraged to install water conserving appliances. • The City of Cle Elum is in the process of preparing a Regional Sewerage Facilities Plan, consistent with the requirements for engineering reports stated in WAC 173-240-060. Following preparation of the Facilities Plan, the City will prepare an environmental impact statement (EIS), which will analyze potential water quality impacts to the Yakima River from the regional plant. • The existing Cle Elum transfer station would need to be expanded in capacity to accommodate the MPR and UGA. However, the exact timing of the expansion has not been determined. Design of the expanded facility is currently underway. • A project-specific amendment would be developed for the SWMP to address solid waste management.

H-01

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
Economic		
Alternative 1 No Action	• No significant economic impacts would be generated by development of the UGA under Alternative 1	• No mitigation measures are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Demand for construction employment would peak in Project Year 3 at an estimated 320 persons. Construction employment demand would be significantly higher in the initial construction phase. • For all construction positions across all years, roughly 49% would be filled locally while the remainder would require non-local labor. • The local labor pool within Kittitas County is expected to fill the great majority of operations positions for Trendwest Facilities within the Cle Elum UGA. Approximately 80% of all operations jobs would be filled by the existing labor force within Kittitas County for all years of operation. The non-local positions would require specialized operations and management skills underrepresented within the existing Kittitas County economy. • Existing services and retail sectors will likely see the greatest employment impact with the construction of lodging, restaurants and recreational facilities. • Employment impacts generated by the Business Park would ultimately depend on the composition of uses.	• No mitigation measures are proposed for Alternative 2 as no significant adverse impacts to economic conditions would be anticipated.
Alternative 3 Expanded Residential	• Potential economic impacts associated with development of Alternative 3 would be similar to those described for Alternative 2. The smaller size of the Business Park would generate a lower demand for operational employees compared to Alternative 2.	• As for Alternative 2, no mitigation measures are proposed for Alternative 3.
Alternative 4 Reduced Residential	• Potential economic impacts associated with development of Alternative 4 would be similar to those described for Alternative 2. The smallest relative size Business Park would generate the lowest demand for operational employees, compared to Alternatives 2 and 3.	• As for Alternative 3, no mitigation measures are proposed for Alternative 4.
Alternative 5 Preferred Alternative	• Demand for construction employment would peak in Project Year 3. • Potential for the local labor supply to meet local demand generated by Trendwest-related development of the UGA under Alternative 5 would be the same as identified for Alternatives 2, 3, and 4. • Operational employment under Alternative 5 is essentially limited to the Business Park due to the absence of Trendwest tourist facilities and the Horse Park. • Business Park employment demand is directly determined by the size of the Business Park and as such would be the same under Alternative 5 as identified for Alternative 2, or approximately 1,647 employees at buildout.	• As for Alternative 2, no mitigation measures are proposed for Alternative 5.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• Alternative 5 would generate significantly lower levels of spending compared to Alternatives 2, 3, and 4 due to the lack of commercial, non-Business Park development. • Alternative 5 is expected to generate significantly fewer spending-induced jobs than the other alternatives due to the removal of all non-Business Park commercial elements.	
Fiscal		
Alternative 1 No Action	• Under Alternative 1, jurisdictions providing direct services to the Cle Elum UGA would not experience revenue impacts in excess of historical growth patterns experienced in Kittitas County. Service expenditures compared to revenues collected from development are not expected to vary significantly from existing conditions.	• No mitigation measures are proposed for Alternative 1.
Alternative 2 Preliminary Master Plan	• Affected jurisdictions are projected to experience revenue shortfalls during the initial construction period. Following receipt of property tax revenues, fiscal shortfalls would be eliminated for all jurisdictions, with the exception of Hospital District #2 and KITTCOM. Hospital District #2 is projected to experience a positive net fiscal impact by Project Year 10. • Over the long-term, affected jurisdictions would experience a net positive fiscal impact, with the possible exception of KITTCOM. Long-term fiscal impacts to KITTCOM could be reduced and/or eliminated by a change in their fee structure.	• Trendwest would coordinate with the City of Cle Elum, School District #404, Hospital District #2, and KITTCOM to monitor population growth, associated service costs, and tax revenues. • When necessary, shortfall mitigation agreements would be implemented to address fiscal impacts identified. • Cost sharing agreements would be negotiated for construction of water and wastewater treatment plants. • Trendwest would enter into a Municipal Facilities and Services Expansion Plan with the City of Cle Elum. • RCW 82.02 authorizes counties, cities, and towns to impose impact fees on development activity as part of the financing for public facilities including publicly owned parks, open space and recreation facilities, school facilities, and fire protection facilities in jurisdictions that are not part of a fire district.
Alternative 3 Expanded Residential	• Fiscal impacts associated with development of Alternative 3 would be similar to those described for Alternative 2.	• Mitigation measures related to fiscal conditions under Alternative 3 would be the same as those described for Alternative 2.
Alternative 4 Reduced Residential	• Fiscal impacts associated with development of Alternative 4 would be similar to those described for Alternative 2.	• Mitigation measures related to fiscal conditions under Alternative 4 would be the same as those described for Alternative 2.
Alternative 5 Preferred Alternative	• The primary differences between Alternative 5 and Alternatives 2, 3, and 4 relate to housing mix and recreational facilities. Under Alternative 5, visitor/tourist facilities (i.e., timeshare condominiums, lodge, RV Park, and the golf course) have been eliminated. Construction of the Washington State Horse Park is also not included in this alternative.	• Mitigation agreements have been negotiated in principle between Trendwest and primary service jurisdiction including the City of Cle Elum, Cle Elum-Roslyn School District #404, and Kittitas County Hospital District No. 2. • Provisions in the RIDGE Settlement Agreement provide mitigation to the City of Roslyn for capital improvements. • Mitigation agreements provide specific guidelines for identifying shortfalls by monitoring costs and revenue flows. • Trendwest and the City of Cle Elum will execute a fiscal mitigation/shortfall arrangement that accurately tracks projected revenues and expenses from UGA development.

Table 1-2: Continued

Alternative	Direct Construction and Operation Impacts	Mitigation Measures
	• *Tourist Spending:* Elimination of tourist facilities and consequently tourist spending under Alternative 5 greatly reduces the potential for retail sales tax revenues as a result of UGA development. Permanent residents spend significantly less per day than do tourists, who tend to eat at restaurants for every meal, buy gifts and souvenirs, and spend a greater daily amount on recreation and entertainment. In addition, there will be no hotel/motel tax generated by Alternative 5. • *Property Tax Revenue:* The combination of the highest residential development (similar to Alternative 3) with a 950,000 square foot Business Park would increase property tax revenues for affected jurisdictions. • *Real Estate Excise Tax and Shared Revenues:* Residential development proposed under Alternative 5 will generate greater real estate excise tax revenues due to sale transactions, as well as shared revenues due to higher permanent population growth. • *Public Service Costs:* The higher permanent population associated with residential development could result in an increase in emergency service needs and would generate higher general government service costs. • *School Service Requirements:* Residential development under Alternative 5 will increase potential public school enrollment relative to the other development alternatives.	• RCW 82.02 authorizes counties, cities, and towns to impose impact fees on development activity as part of the financing for public facilities that are addressed by a capital facilities plan element of a comprehensive land use plan. Public facilities that qualify include: public streets and roads, publicly owned parks, open space, and recreation facilities, school facilities, and fire protection facilities in jurisdictions that are not part of a fire district.

2. Description of the Alternatives



2. DESCRIPTION OF THE ALTERNATIVES

The City of Cle Elum will adopt a Subarea Plan and zoning regulations for the UGA that will take effect upon annexation of the property, consistent with RCW 35A.14.330. Trendwest proposes to develop approximately 1,100 acres of property it owns within the Cle Elum UGA into a master planned community consistent with goals and requirements for urban growth areas as stated in the Washington State Growth Management Act (RCW 36.70A). Policies, regulations, and conditions of approval would be identified in a Development Agreement, consistent with RCW 36.70B.170. The Subarea Plan, Development Agreement, and zoning regulations will govern City review of any proposed development in the UGA.

Five alternatives are analyzed in the EIS (Draft and Final):

- Alternative 1: No Action
- Alternative 2: Preliminary Master Plan
- Alternative 3: Expanded Residential
- Alternative 4: Reduced Residential
- Alternative 5: Master Site Plan Application (Preferred Alternative)

Table 2-1 summarizes the number of acres and units associated with proposed uses in each of the proposed development alternatives. A description of the alternatives follows. Alternative 5 is now the Preferred Alternative. An updated discussion of uses proposed for the entire UGA, including the Trendwest property, is presented in the description of Alternative 5.

2.1 ALTERNATIVE 1 - NO ACTION

The No Action Alternative evaluated in the Draft EIS analyzed future development of Trendwest properties in the Cle Elum UGA consistent with the current Forest and Range 20 (20 acre lots) zoning designation (Kittitas County Zoning Code (KCC 17.56)). Under Forest and Range zoning, Trendwest properties within the UGA could accommodate from 19 to 106+ single-family residential lots. Since publication of the Draft EIS, approximately 23 acres of a 50 acre property in the UGA under separate ownership has been rezoned from Forest and Range 20 to Suburban 1 (one acre lots). The rezoned property is located north of Interstate 90 and east of the Cle Elum River, adjacent to Trendwest-owned property within the UGA. Figure 2-1 identifies zoning designations within the Cle Elum UGA. Kittitas County issued a SEPA Determination of Non-Significance on the rezone (a non-project action) on October 10, 2001, with conditional language stating that any future development proposal would be subject to additional environmental review at the time development was proposed. Development of this property would occur independent of Trendwest's UGA properties.

Table 2-1: Summary – UGA Subarea/Development Alternatives

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Acres	Units	Acres	Units	Acres	Units	Acres	Units	Acres	Units
Single-family	1,106	19–106+	203	324	374	709	250	418	213	810
Apartments			44	325	55	350	44	200	23	184
Condominiums			62	249	33	148	62	92	57	340
Timeshare Condos			25	130	25	102	25	102	---	
Lodge – Rooms			6	100	6	50	6	75	---	
Horse Park/RV Park Sites			200	300	43[1]	275	200	200	---	
Reserve			---		---		---		175	
Undeveloped Open Space			230		234		230		418	
Golf Course/Facilities			196		196		196		---	
Community Center			12		12		12		12	
Neighborhood Clubhouse			---		---		---		18	
Business Campus			80		80		40		80	
Fac./Maint./Expansion			48		48		41		104	
Total Acres/Units[2, 3] (Trendwest Residential)[4]	1,106	19–106+	1,106	1,028	1,106	1,309	1,106	812	1,100	1,334

1 Under Alternative 3, the Horse Park would not be developed and the RV Park would be located within Planning Area D.
2 Does not include RV campground sites or lodge rooms.
3 For Alternative 5, the Trendwest property boundary adjacent to the Cle Elum River has been corrected. Total acreage in Trendwest ownership is 1,100 acres.
4 The balance of the UGA contains approximately 145 acres containing an estimated 123 residential units.

H-01

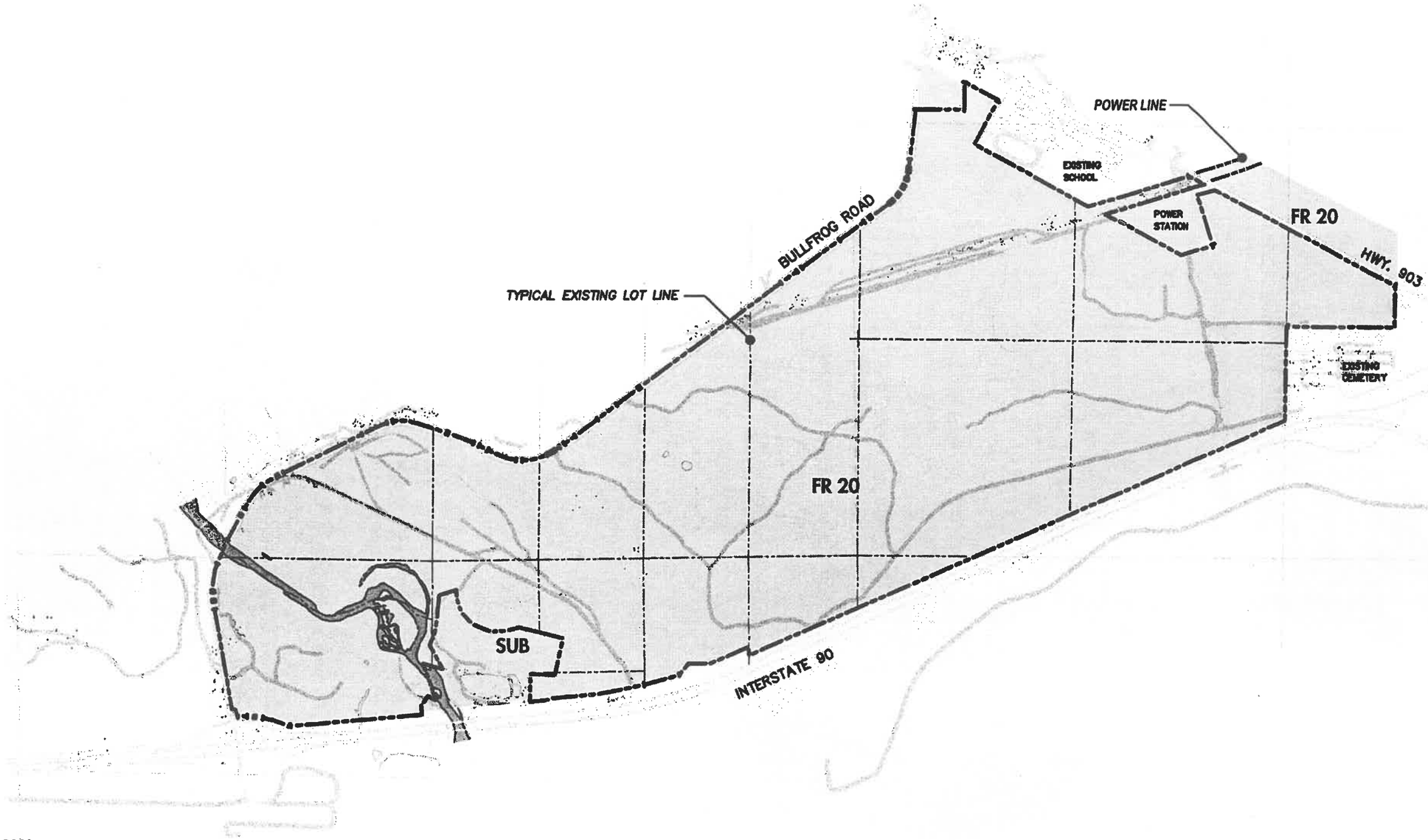
Impact analyses conducted for the No Action Alternative contained in the EIS support adoption of a Subarea Plan for the entire UGA and development of a master planned community proposed by Trendwest. In general, the rezone of 23 acres within the UGA, a non-project action, would result in incremental and minor increases in potential impacts for the No Action Alternative and potential cumulative impacts evaluated for the majority of elements of the environment addressed in the EIS. As such, the majority of analyses conducted for the No Action Alternative have not been revised. The primary exceptions are updated discussions in the Land Use and Water Quality sections. As discussed above, there is currently no development proposal for this property. Any future development proposal would receive site-specific environmental review as part of the permit approval process and would be responsible for mitigating any impacts identified from that proposed development.

2.2 ALTERNATIVE 2 - PRELIMINARY MASTER PLAN

Under Alternative 2, development in the UGA would be consistent with the Preliminary Master Plan for the Cle Elum UGA, which was submitted initially to Kittitas County on January 5, 1999. In January 2001, Kittitas County withdrew its co-lead agency status and the City of Cle Elum became the sole lead agency for the *Trendwest properties: Cle Elum UGA EIS*. The Preliminary Master Plan consists of a master plan community containing residential, business park, commercial, open space, community facility, and recreational uses, including a golf course and land reserved for the Washington State Horse Park.

Alternative 2 calls for 1,028 residential units on 334 acres. Of those, approximately 30% would be single-family residences, 30% would be apartments, and 36% would be condominiums (one-third of these condominium units would be timeshare condominiums, located on 25 acres near the golf course and land reserved for the Horse Park). A Business Park would be developed on an 80-acre campus. Up to 200 acres would be devoted to the Washington State Horse Park. A RV campground able to accommodate approximately 300 campsites would be located within the Horse Park area. Approximately 196 acres would be devoted to an 18-hole golf course including a clubhouse and related facilities, and a 100-room lodge would be located near the golf course. A Community Recreation Center anticipated to contain a public indoor swimming pool, multipurpose recreation space, and ball fields would be located on 12 acres. Other features would include a 25-acre school expansion area and a 10-acre cemetery expansion area. An 11-acre site would be reserved for the City of Cle Elum's new water treatment plant. Approximately 230 acres would be designated as undeveloped open space including the Cle Elum River corridor and perimeter buffers. Additional open space in sensitive areas would be retained. Figure 2-2 is a conceptual illustration of the Preliminary Master Plan. Table 2-2 summarizes proposed land uses under Alternative 2.

Graphic Server/Projects/Shapiro/Trendwest/Current/Alternatives EA 2/Alternative 1 / 3.15.02



Source: Trendwest 2001

N

0 1800'

Approximate Scale in Feet

SUB suburban
FR 20 forest and range
Trendwest properties within the UGA
Urban Growth Area

FIGURE 2-1

ALTERNATIVE 1
NO ACTION

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

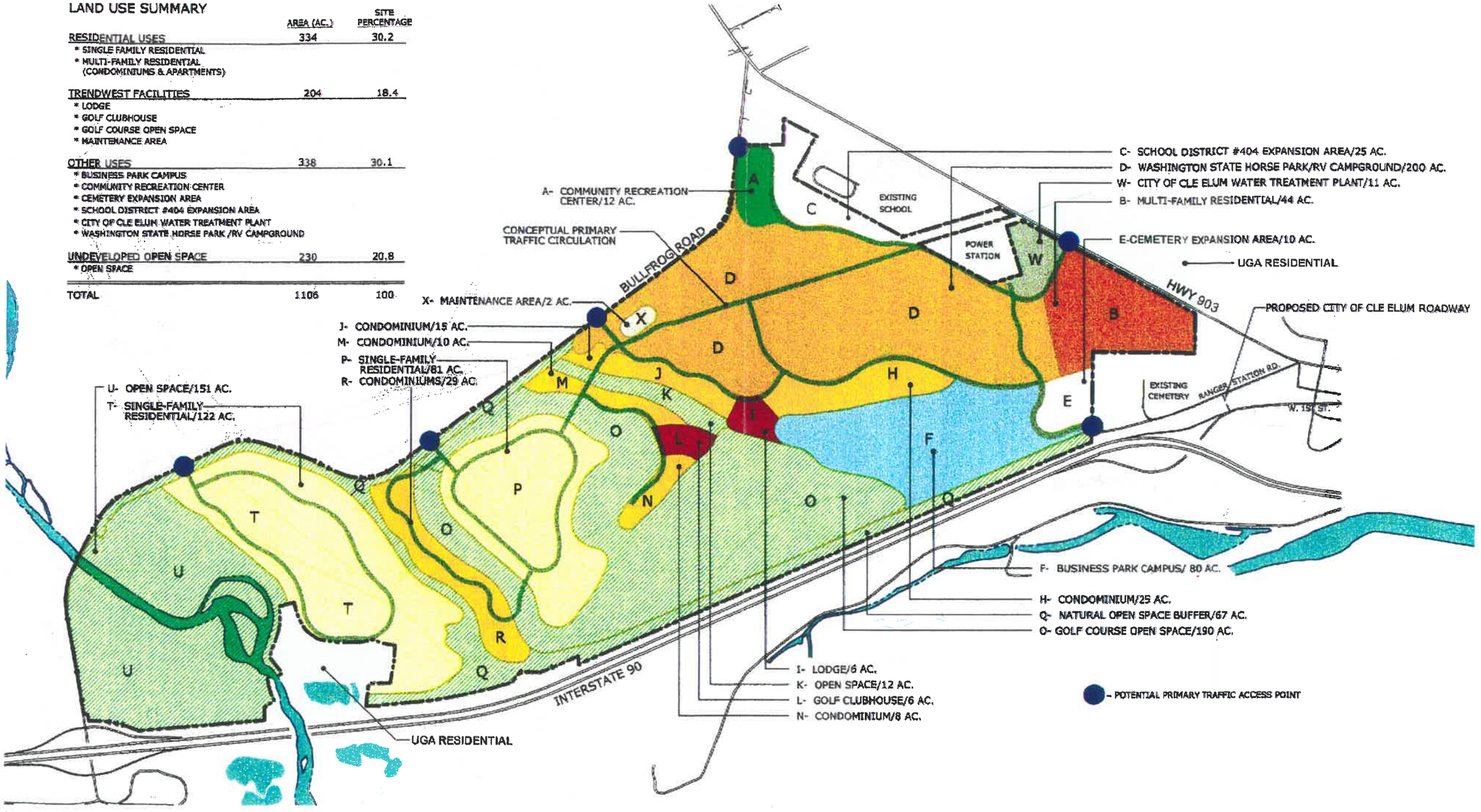
1981069

SHAPIRO & ASSOCIATES, INC.

H-01

LAND USE SUMMARY

	AREA (AC.)	SITE PERCENTAGE
RESIDENTIAL USES	334	30.2
* SINGLE FAMILY RESIDENTIAL		
* MULTI-FAMILY RESIDENTIAL (CONDOMINIUMS & APARTMENTS)		
TRENDWEST FACILITIES	204	18.4
* LODGE		
* GOLF CLUBHOUSE		
* GOLF COURSE OPEN SPACE		
* MAINTENANCE AREA		
OTHER USES	338	30.1
* BUSINESS PARK CAMPUS		
* COMMUNITY RECREATION CENTER		
* CEMETERY EXPANSION AREA		
* SCHOOL DISTRICT #404 EXPANSION AREA		
* CITY OF CLE ELUM WATER TREATMENT PLANT		
* WASHINGTON STATE HORSE PARK /RV CAMPGROUND		
UNDEVELOPED OPEN SPACE	230	20.8
* OPEN SPACE		
TOTAL	1106	100



Source: Trendwest 2001

0 1800'
Approximate Scale in Feet

Trendwest properties within the UGA

Urban Growth Area

FIGURE 2-2

ALTERNATIVE 2
PRELIMINARY MASTER PLAN

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

Table 2-2: Summary – Alternative 2

Area	Description	Units/Sq. Ft.	Area (ac.)
A	Community Recreation Center		12
B	Multifamily Units	325	44
C	School Expansion		25
D	Horse Park and RV Campground	300	200
E	Cemetery Expansion		10
F	Business Campus	950,000 sq. ft.	80
G	*(not included in this alternative)*		--
H	Wholly Owned Condominiums	75	25
I	Lodge	100	6
J	Timeshare Condominiums	60	15
K	Undeveloped Open Space		12
L	Golf Clubhouse		6
M	Fractional Condominiums	70	10
N	Wholly Owned Condominiums	50	8
O	Golf Course		190
P	Single-family Residential	154	81
Q	Buffers/Open Space		67
R	Wholly Owned Condominiums	124	29
S	*(not included in this alternative)*		--
T	Single-family Residential	170	122
U	Undeveloped Open Space		151
V	*(not included in this alternative)*		--
W	City of Cle Elum Water Treatment Plant		11
X	Maintenance Area		2
Total		1,028 Units[1]	1,106

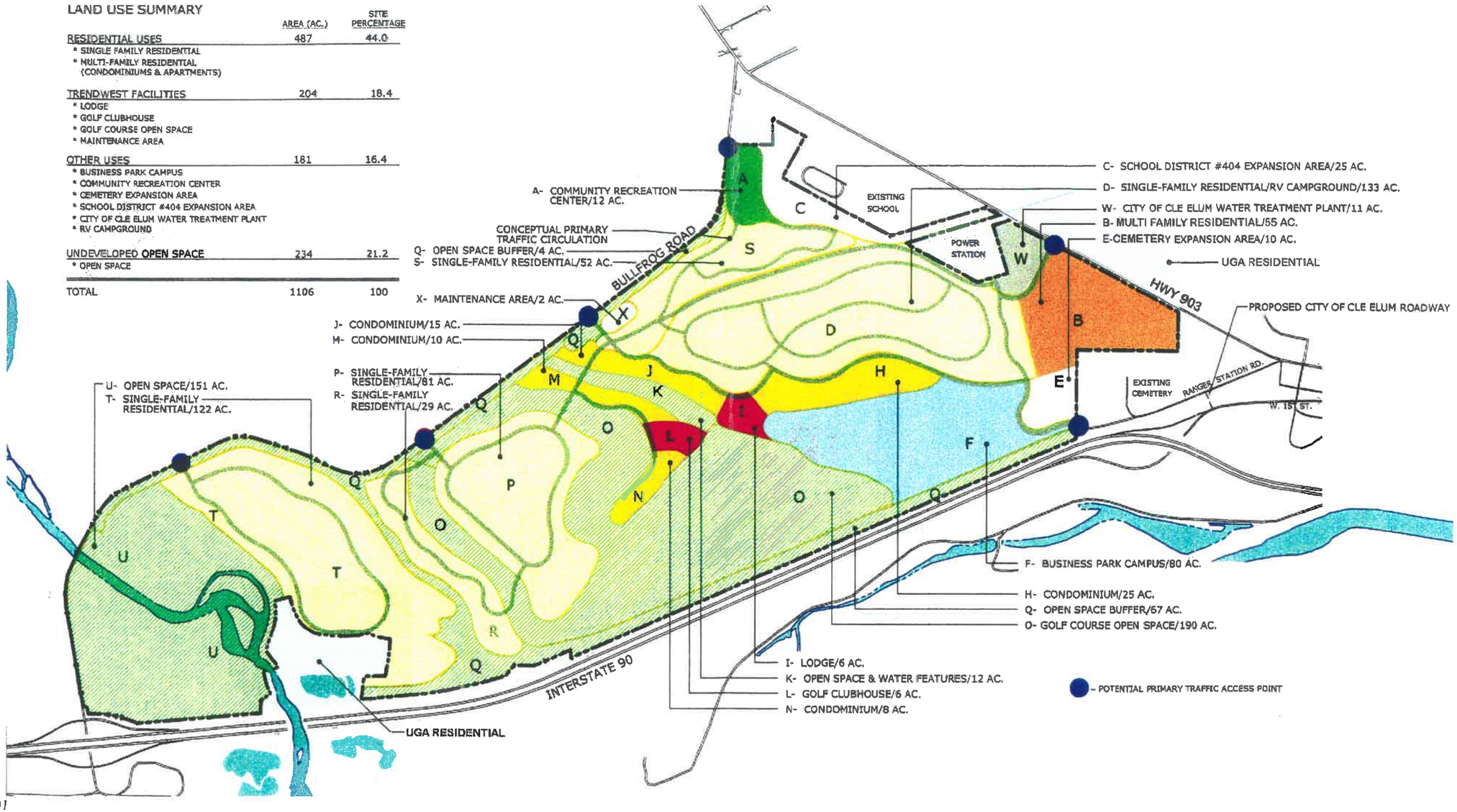
1 Does not include RV campground spaces or lodge rooms.

2.3 ALTERNATIVE 3 - EXPANDED RESIDENTIAL

Under Alternative 3, land reserved for the Washington State Horse Park would be replaced with single-family residential development. The addition of these lots would more than double the number of single-family residences, increasing the units over that proposed for Alternative 2 from 324 units to 709 units. The number of apartments would increase by 25 units and the number of condominiums would be reduced to 250 units. The capacity of the lodge would be reduced from 100 rooms in Alternative 2 to 50 rooms. The capacity of the RV campground would be reduced from 300 sites in Alternative 2 to 275 sites. The size of the Business Park would be reduced to 600,000 square feet on the same 80-acre campus. All other features under Alternative 3 would remain the same as described for Alternative 2. Figure 2-3 illustrates the conceptual land use plan for Alternative 3. Table 2-3 summarizes proposed land uses under Alternative 3.

LAND USE SUMMARY

	AREA (AC.)	SITE PERCENTAGE
RESIDENTIAL USES	487	44.0
* SINGLE FAMILY RESIDENTIAL		
* MULTI-FAMILY RESIDENTIAL (CONDOMINIUMS & APARTMENTS)		
TRENDWEST FACILITIES	204	18.4
* LODGE		
* GOLF CLUBHOUSE		
* GOLF COURSE OPEN SPACE		
* MAINTENANCE AREA		
OTHER USES	181	16.4
* BUSINESS PARK CAMPUS		
* COMMUNITY RECREATION CENTER		
* CEMETERY EXPANSION AREA		
* SCHOOL DISTRICT #404 EXPANSION AREA		
* CITY OF CLE ELUM WATER TREATMENT PLANT		
* RV CAMPGROUND		
UNDEVELOPED OPEN SPACE	234	21.2
* OPEN SPACE		
TOTAL	1106	100



Source: Trendwest 2001

0 1800'
Approximate Scale in Feet

Trendwest properties within the UGA

Urban Growth Area

FIGURE 2-3

ALTERNATIVE 3
EXPANDED RESIDENTIAL

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

Table 2-3: Summary – Alternative 3

Area	Description	Units/Sq. Ft.	Area (ac.)
A	Community Recreation Center		12
B	Multifamily Units/Wholly Owned Condos.	350/50	55
C	School Expansion Area		25
D	Single-family Residential/RV Campground	252/275	133
E	Cemetery Expansion Area		10
F	Business Campus	600,000 sq. ft.	80
G	*(not included in this alternative)*		--
H	Wholly Owned Condominiums	58	25
I	Lodge	50	6
J	Timeshare Condominiums	52	15
K	Undeveloped Open Space		12
L	Golf Clubhouse		6
M	Fractional Condominiums	50	10
N	Wholly Owned Condominiums	40	8
O	Golf Course		190
P	Single-family Residential	154	81
Q	Buffers/Open Space		71
R	Single-family Residential	59	29
S	Single-family Residential	131	52
T	Equestrian Village Cluster	113	122
U	Undeveloped Open Space		151
V	*(not included in this alternative)*		--
W	City of Cle Elum Water Treatment Plant		11
X	Maintenance Area		2
Total		1,309 Units[1]	1,106

1 Does not include RV campground spaces or lodge rooms.

2.4 ALTERNATIVE 4 - REDUCED RESIDENTIAL

Under Alternative 4 the total number of residential units would be reduced by approximately 20% compared to Alternative 2. The total number of units would decrease to 812 units from 1,028. The number of single-family residences would be higher than for Alternative 2. Of the 812 units, 418 would be single-family residences (an approximately 30% increase over Alternative 2). The number of multifamily units would decrease. Alternative 4 would provide 200 apartment units (150 fewer units than Alternative 2) and 179 condominium units (185 fewer than Alternative 2). The capacity of the RV campground would be reduced from 300 sites in Alternative 2 to 200 sites. The Business Park would be reduced to 300,000 square feet on a 40-acre business campus. The capacity of the lodge would be reduced from 100 rooms in Alternative 2 to 75 rooms in Alternative 4. The expansion area for the existing cemetery would be reduced

from 10 acres in Alternative 2 to 3 acres. As in Alternative 2, up to 200 acres would be reserved for the Washington State Horse Park. Figure 2-4 illustrates the conceptual land use plan for Alternative 4. Proposed uses under Alternative 4 are summarized in Table 2-4.

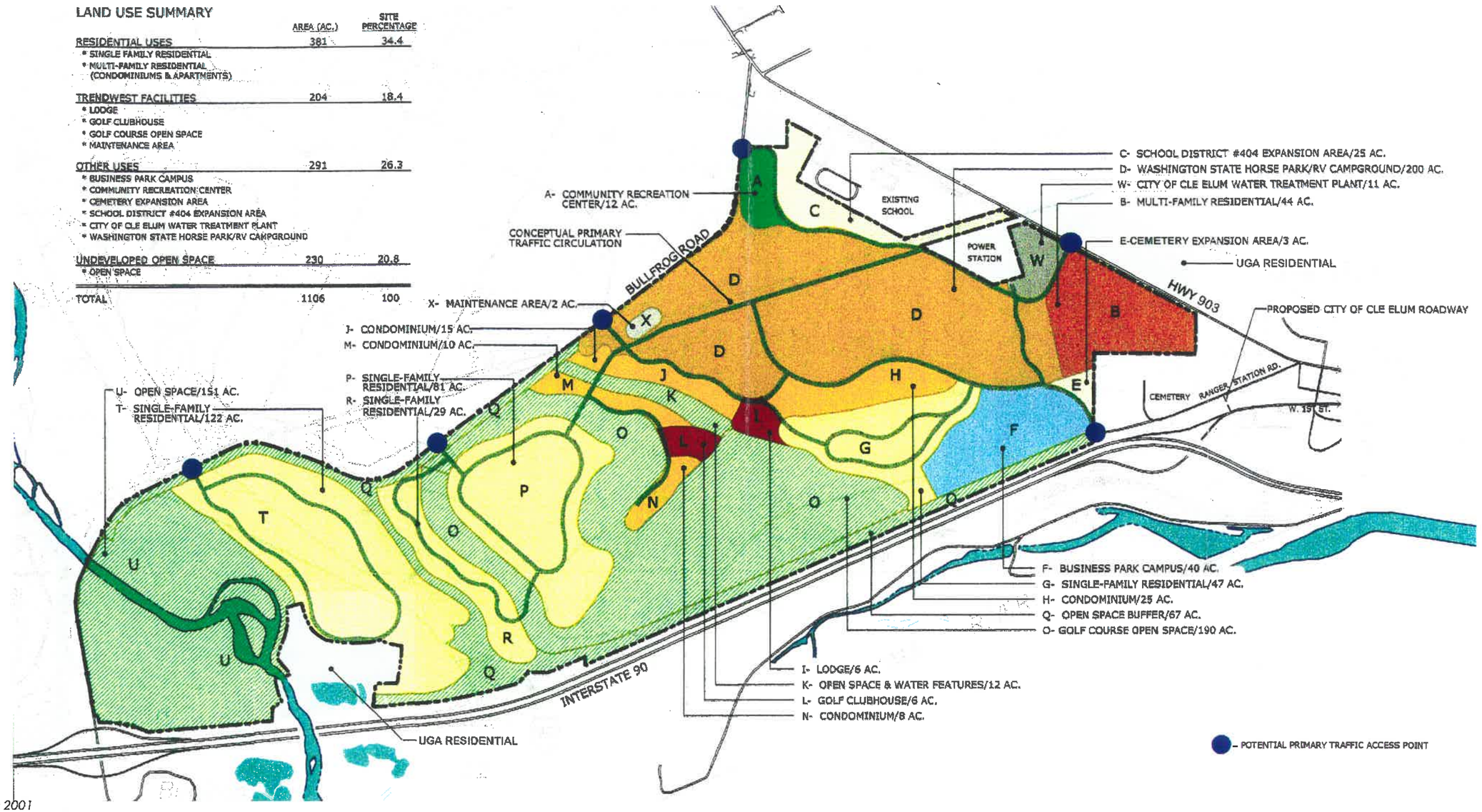
Table 2-4: Summary – Alternative 4

Area	Description	Units/Sq. Ft.	Area (ac.)
A	Community Recreation Center		12
B	Multifamily Units	200	44
C	School Expansion Area		25
D	Horse Park and RV Campground	200	200
E	Cemetery Expansion Area		3
F	Business Campus	300,000 sq. ft.	40
G	Single-family Residences	92	47
H	Wholly Owned Condominiums	64	25
I	Lodge	75	6
J	Timeshare Condominiums	52	15
K	Undeveloped Open Space		12
L	Golf Clubhouse		6
M	Fractional Condominiums	50	10
N	Wholly Owned Condominiums	28	8
O	Golf Course		190
P	Single-family Residences	154	81
Q	Buffers/Open Space		67
R	Single-family Residences	59	29
S	*(not included in this alternative)*		--
T	Single-family Residences	113	122
U	Undeveloped Open Space		151
V	*(not included in this alternative)*		--
W	City of Cle Elum Water Treatment Plant		11
X	Maintenance Area		2
Total		812 Units[1]	1,106

1 Does not include RV campground spaces or lodge rooms.

LAND USE SUMMARY

	AREA (AC.)	SITE PERCENTAGE
RESIDENTIAL USES	381	34.4
* SINGLE FAMILY RESIDENTIAL		
* MULTI-FAMILY RESIDENTIAL (CONDOMINIUMS & APARTMENTS)		
TRENDWEST FACILITIES	204	18.4
* LODGE		
* GOLF CLUBHOUSE		
* GOLF COURSE OPEN SPACE		
* MAINTENANCE AREA		
OTHER USES	291	26.3
* BUSINESS PARK CAMPUS		
* COMMUNITY RECREATION CENTER		
* CEMETERY EXPANSION AREA		
* SCHOOL DISTRICT #404 EXPANSION AREA		
* CITY OF CLE ELUM WATER TREATMENT PLANT		
* WASHINGTON STATE HORSE PARK/RV CAMPGROUND		
UNDEVELOPED OPEN SPACE	230	20.8
* OPEN SPACE		
TOTAL	1106	100



Source: Trendwest 2001

0 1800'
Approximate Scale in Feet

Trendwest properties within the UGA

Urban Growth Area

FIGURE 2-4

ALTERNATIVE 4
REDUCED RESIDENTIAL

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

2.5 ALTERNATIVE 5 - UGA SUBAREA PLAN AND ZONING/MASTER SITE PLAN APPLICATION

Housing and population capacity in the Bullfrog Subarea Plan is estimated at approximately 1,460 units and 3,500 people. Of this, Trendwest residential development in the UGA represents the large majority of future growth with a projected 1,334 units and 2,945 people at full buildout, assuming a 92% occupancy. A 100 unit capacity is projected in the approximately 65 acre area of the UGA north of SR 903. Twenty-three acres of a 50 acre property in the UGA located adjacent to the Cle Elum River floodplain has recently been rezoned Suburban 1 (one-acre lots) by Kittitas County and may also be developed in the future. The proposed Planned Mixed Use zoning designation would apply to larger parcels of land with significant development potential in the City/UGA. This designation encourages preservation of the natural environment; creation of open space; traditional building design in keeping with the rural mountain character of Cle Elum; and pedestrian access to employment, goods and services in a balanced mix of land uses. Proposed zoning for other properties within the UGA is Residential (lands north of SR 903 and the NE corner parcels), Residential 1 acre (area zoned Suburban), and Public Reserve (Puget Sound Energy substation).

Under the site plan for Alternative 5, the total number of residential units would be virtually the same as Alternative 3 at 1,334. The number of single-family residences would be the highest of all the alternatives at 810. Alternative 5 would provide a lower number of multifamily units, as there are no timeshare condominiums as part of this alternative. This alternative proposes 184 apartment units, the lowest of all the alternatives and 340 condominium units. There would be no lodge or permanent RV campground. The Business Park would be the same as Alternative 2, 950,000 square feet on an 80-acre campus. A temporary RV Park may be constructed to accommodate employees in the initial construction period. Figure 2-5 is conceptual illustration of the Master Site Plan Application. Table 2-5 summarizes proposed land uses under Alternative 5.

Table 2-5: Summary – Alternative 5

Area	Description	Units or/Sq. Ft.	Area (ac.)
A	Community Recreation Center		12
B	Multifamily Residential	150	23
C	School Expansion		35
D	Reserve	275	175
E	Cemetery Expansion		10
F	Business Campus	950,000 sq. ft.	80
G	*(not included in this alternative)*		--
H	*(not included in this alternative)*		--
I	*(not included in this alternative)*		--
J	Multifamily Residential	164	23

Table 2-5: Continued

Area	Description	Units or/Sq. Ft.	Area (ac.)
K	Undeveloped Open Space		41
L	Neighborhood Clubhouse		22
M	Multifamily Residential	210	32
N	*(not included in this alternative)*		--
O	*(not included in this alternative)*		--
P	Single Family Residential	566	142
Q	Buffers/Open Space		126
R	*(not included in this alternative)*		--
S	Single Family Residential	244	71
T	Undeveloped Open Space		92
U	Undeveloped Open Space		154
V	Powerline R.O.W.		28
W	City of Cle Elum Water Treatment Plant		12
X	Maintenance Area		2
Y	Powerline/Road ROW		9
Z	Recreation Expansion Area		11
Total		1,334	1,100

Following is a description of project elements proposed under Alternative 5.

2.6 DESCRIPTION OF MASTER SITE PLAN

Since publication of the Draft EIS in March 2001, and in response to public and agency comments on that document, Trendwest and the City of Cle Elum have developed a fifth alternative for development in the UGA. Alternative 5 is now the preferred alternative for the purposes of SEPA review. This alternative incorporates many of the land uses evaluated under Alternatives 2, 3, and 4 in the Draft EIS. Further, Alternative 5 has been designed to result in a level of environmental impact that falls within the range of environmental impacts evaluated in the Draft EIS.

The proposal calls for a master planned community containing single family and multifamily housing, employment, and recreational uses. Recreational facilities would include a proposed Community Recreation Center, a neighborhood clubhouse located on a lake, pocket parks, and a trail system. Alternative 5 features large areas of undeveloped open space including 246 acres along the Cle Elum River corridor. In addition, land would be set aside for the City of Cle Elum Water Treatment Plant, expansion areas for Cle Elum-Roslyn School District #404 and the existing cemetery, and a Reserve on the lower bench of the property.

LAND USE SUMMARY

	AREA (AC.)	SITE PERCENTAGE
RESIDENTIAL USES	293	26.6
* SINGLE FAMILY RESIDENTIAL		
* MULTI-FAMILY RESIDENTIAL		
TRENDWEST FACILITIES	38	3.5
* NEIGHBORHOOD CLUBHOUSE		
* LAKES		
* MAINTENANCE AREA		
* RECREATION EXPANSION		
OTHER USES	351	31.9
* BUSINESS PARK CAMPUS		
* COMMUNITY RECREATION CENTER		
* CEMETERY EXPANSION AREA		
* SCHOOL DISTRICT #404 EXPANSION AREA		
* CITY OF CLE ELUM WATER TREATMENT PLANT		
* RESERVE		
* POWERLINE RIGHT-OF-WAY		
UNDEVELOPED OPEN SPACE	418	38.0
* CLE ELUM RIVER CORRIDOR		
* PERIMETER BUFFERS/STEEP SLOPE AREAS		
TOTAL	1100	100%



Source: Hackworth/Dawson Associates 2001

0 2000'
Approximate Scale in Feet

Trendwest properties within the UGA

Urban Growth Area

FIGURE 2-5

ALTERNATIVE 5
MASTER SITE PLAN

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

To integrate the development with the Cle Elum community, new and expanded public facilities, as well as a Business Park with ancillary retail, would be located at the east end of the site, adjacent to the SR 903 corridor and the historic city. The preservation of large areas of undeveloped open space, including environmentally sensitive areas and perimeter/internal buffers, would contribute to a generally wooded character of the community.

2.6.1 Single Family Units

Approximately 810 single family lots would be developed. These lots would be sold to individual homeowners or builders. Lot sizes would range from a minimum of 5,000 square feet to over 8,400 square feet and be clustered into neighborhoods separated by wooded buffers to preserve undeveloped open space. Densities of the individual neighborhoods would range from two to seven units/acre. Housing sizes could range from 1,500 to 3,500 square feet (or larger) with two to five bedrooms. Most units would have attached or detached two-car garages and would be one to two stories high. Some of the homes would front on wooded greenbelts or large areas of undeveloped open space. Others would front on, or be near to, small pocket parks or the neighborhood clubhouse and lake.

2.6.2 Multifamily Units

Alternative 5 calls for development of 524 multifamily residential units. Of those units, 184 would be apartments and 340 would be wholly-owned condominiums. The units would be developed in a variety of townhouse and flat configurations. Buildings would typically be 2-3 stories in height with two to twenty-four units each. Unit types would range from one to four bedrooms, including studios.

2.6.3 Business Park

The Business Park campus would be approximately 80 acres in size and accommodate up to 950,000 square feet of floor space. Potential uses could include light industrial, research and development, warehousing, offices, and ancillary retail. The Business Park would be located adjacent to SR 903 near downtown Cle Elum, with access from existing and new residential developments and the existing retail core.

2.6.4 Parks and Trails

Pocket parks from 0.25 to 0.5 acre would be located in each planned residential area. A trail system including a combination of soft-surface and hard-surface trails or other pathways is planned to provide uninterrupted bicycle and pedestrian routes through the UGA that link to road and/or trail systems outside the UGA.

2.6.5 Community Recreation Center

A 12 acre site adjacent to the Cle Elum-Roslyn School District #404 campus would be set aside for construction of a public Community Recreation Center. Access would be from SR 903 or Bullfrog Road through the school property, or from the main arterial/collector road that extends through the UGA. Sidewalks and a trail system would connect other land uses within the UGA to the recreation center site.

The facility could include a sports court, fitness facilities, indoor swimming pool, and ball fields. The swimming pool could be available to the School District for competitive swimming practices and events. Parking would be provided. Final design and elements of the recreation center would depend on financing obtained through a non-profit, tax-exempt organization.

2.6.6 Neighborhood Clubhouse

A neighborhood clubhouse and lake located near the main entrance to the residential areas of the UGA would feature passive and active recreation areas. The clubhouse could include a lobby and offices, a general use lounge, a multipurpose room for community events, a catering kitchen, a snack bar, a swimming pool with showers and restrooms, an exercise area, and restrooms. The grounds could include a children's play area, a sport court, a barbecue pavilion, and/or a fishing pier.

2.6.7 Lakes and Ponds

The site plan for Alternative 5 includes a number of small lakes or ponds to provide landscape and recreational amenities for the community. From four to eight ponds and lakes with a total surface area of 15 acres are proposed. The largest lake would be about 10 acres in size and would be part of the neighborhood clubhouse complex. The remaining lakes and ponds would average three-quarters of an acre in size.

The lake could be used for non-motorized boating, swimming and fishing. A pedestrian trail would border the lake's perimeter for recreational walking and nature viewing, and could provide access to picnic areas. The trail system and a park area would enable public access around the lake. The lake would be 10 to 15 feet deep and lined to prevent leakage into the groundwater system. To protect the water quality of the lake, stormwater would not be discharged to the lake. Grading adjacent to the lake would be designed to direct shoreline runoff away from the lake.

For the smaller lakes, walking and nature viewing on perimeter trails would be the principal intended use. Some of the small lakes could include wetland areas to attract waterfowl and other bird life. These lakes would also be lined.

2.6.8 School Expansion Area

A 25 to 35 acre site is proposed for expansion of the Cle Elum-Roslyn School District #404 campus. The parcel is located directly west of the existing school property. Development would be screened from Bullfrog Road by a 100-foot buffer. Access would be from SR 903 through the existing school property, and from a street connection within the development to Bullfrog Road. The site would also be accessible from the main arterial that extends through the UGA. Likely uses in the expansion area include additional classrooms, parking, baseball and soccer fields, new tennis courts, and a new bus storage facility.

2.6.9 Cle Elum Water Treatment Plant Site

A 12 acre site would be set aside for the Cle Elum Water Treatment Plant. Access would be from SR 903.

2.6.10 Cemetery Expansion Area

A 10 acre site would be set aside for future expansion of the Laurel Hill Memorial Park cemetery.

2.6.11 Reserve

A 175 acre parcel adjacent to I-90 would be set aside and could potentially be developed as an equestrian facility by the Washington State Horse Park Authority. A description of the conceptual plan for the Horse Park is included in Chapter 2 of the Draft EIS. Under the terms of an agreement between Trendwest and the Authority, the site would be donated to the Horse Park Authority subject to conditions described in Chapter 1, Summary of the Final EIS.

3. Affected Environment, Significant Impacts, and Mitigation Measures



3.1 EARTH

This section analyzes earth impacts under Alternative 5 and compares them to potential impacts under Alternatives 2, 3, and 4, which are discussed in Section 3.1 of the Draft EIS. Mitigation measures designed to limit those impacts also are identified. Potential impacts from the No Action Alternative are described in the Draft EIS. Information on clearing and impervious area, and estimated earthwork quantities are summarized from the Site Engineering Technical Report, included as Appendix E of the Final EIS.

3.1.1 Affected Environment

Existing geologic and soil conditions on Trendwest properties within the Cle Elum UGA are the same for all alternatives and are described in Section 3.1 of the Draft EIS.

3.1.2 Impacts

Direct Construction

Construction-related impacts on earth from development of the UGA under Alternative 5 would be similar to impacts identified for Alternatives 2, 3, and 4. As with Alternatives 2, 3, and 4, earthwork activities for Alternative 5 would involve clearing and grading to a significantly greater extent than under the No Action Alternative.

Table 3.1-1 identifies the amount of cleared areas and impervious surfaces that would occur under Alternatives 2 through 5. Alternative 5 would result in approximately 403 acres of cleared area and 247 acres of impervious surface. The amounts of cleared and impervious area fall within the range of estimates for the other development alternatives. Alternative 5 would require the least amount of cleared acreage due primarily to the absence of the Horse Park and golf course.

Table 3.1-2 estimates earthwork quantities for Alternatives 2 through 5. Alternative 5 would require substantially less cut and fill than Alternatives 2 through 4 primarily because of the absence of the Horse Park and golf course.

As for Alternatives 2, 3, and 4, if onsite materials are not processed for construction, imported materials would be required. Materials would include gravel, crushed rock, asphalt concrete, and bedding material for pipelines. The total volume of these materials would be similar for all alternatives, estimated at 204,000 cubic yards. Construction-related potential erosion impacts would be the same as those described in Section 3.1 of the Draft EIS. A detailed description of potential construction-related water quality impacts is included in Section 3.3 of the Final EIS.

Table 3.1-1: Estimated Cleared and Impervious Areas in Acres

Land Use	Alternative 2		Alternative 3		Alternative 4		Alternative 5[1]	
	Area Cleared	Impervious Area	Area Cleared	Impervious Area	Area Cleared	Impervious Area	Area Cleared	Impervious Area
Residential	75	53	111	75	65	45	161	104
Lodge	6	5	6	5	6	5	0	0
Golf Course	154	12	154	12	154	12	0	0
Roads	65	32	87	43	70	35	122	61
Public Facilities	5	3	5	3	5	3	23	4
Community Recreation Center	4	2	4	2	4	2	10	6
School Expansion Area	14	12	14	12	14	12	17	8
Cemetery Expansion Area	5	1	5	1	2	0	8	1
Business Park	78	60	56	44	28	22	62	63
Horse Park/RV Park	145	100	12[2]	10[2]	145	100	0	0
Total[3]	550	279	453	205	492	235	403	247

1 Excludes Reserve Area.
2 Acreage includes only the RV Park because a Horse Park is not proposed under Alternative 3.
3 Numbers may not sum to totals because of rounding.
Source: W&H Pacific 2001

H-01

Table 3.1-2: Estimated Earthwork Quantities in Cubic Yards

Land Use	Alternative 2		Alternative 3		Alternative 4		Alternative 5[1]	
	Cut	Fill	Cut	Fill	Cut	Fill	Cut	Fill
Residential	110,000	67,000	142,000	88,000	88,000	54,000	116,000	75,000
Lodge	22,000	18,000	22,000	18,000	22,000	18,000	0	0
Golf Course	310,000	372,000	310,000	372,000	310,000	372,000	0	0
Roads	74,000	14,000	113,000	149,000	80,000	17,000	79,000	16,000
Public Facilities	4,000	3,000	4,000	3,000	4,000	3,000	82,000	15,000
Community Recreation Center	6,000	6,000	6,000	6,000	6,000	6,000	19,000	19,000
School Expansion Area	23,000	23,000	23,000	23,000	23,000	23,000	37,000	37,000
Cemetery Expansion Area	4,000	9,000	4,000	9,000	1,000	3,000	8,000	16,000
Business Park	313,000	250,000	226,000	181,000	113,000	90,000	303,000	242,000
Horse Park/RV Park	234,000	234,000	19,000[2]	19,000[2]	234,000	234,000	0	0
Total	1,100,000	996,000	869,000	868,000	881,000	820,000	584,000	420,000

1 Excludes Reserve Area.
2 Estimates include only the RV Park because a Horse Park is not proposed under Alternative 3.
Source: W&H Pacific 2001

Direct Operation

Operational impacts related to erosion and landslide potential would be the same as described for Alternatives 2, 3, and 4 in the Draft EIS. Cleared areas or areas near slopes would be vulnerable to erosion that could increase with surface water runoff during storms. Clearing on and above moderate to steep slopes could increase landslide potential by removing vegetation that would normally moderate runoff and infiltration volume and rates.

The Cle Elum UGA is located in an area of relatively low historical seismicity. The potential is low that development within the Cle Elum UGA would experience seismic hazards such as landslides, soil liquefaction, and ground motion.

The potential for future coal mine subsidence in the Cle Elum UGA is low because of the age of the mining operations, mining methods, depth below ground, low probability of groundwater withdrawal, the lack of timber chutes and air shafts, and limited seismic activity. Abandoned mine workings within the UGA are located more than 200 feet underground and are considered low hazard areas (Icicle Creek Engineers 1999).

Indirect

Indirect impacts under Alternative 5 would be the same as described for Alternatives 2, 3, and 4 in Section 3.1 of the Draft EIS. In general, growth induced by development would result in additional ground disturbance. All development would be subject to jurisdictional regulation.

Cumulative

Cumulative impacts under Alternative 5 would be the same as described for Alternatives 2, 3, and 4 in Section 3.1 of the Draft EIS. Significant cumulative impact on soil and geology resulting from construction within the Cle Elum UGA in conjunction with the MPR and other regional growth is not anticipated.

3.1.3 Mitigation

Mitigation measures for potential erosion and landslide-related impacts under Alternative 5 would be the same as those identified for Alternatives 2, 3, and 4. A comprehensive Temporary Erosion and Sediment Control Plan would be developed to outline erosion-control practices. Cleared areas would be revegetated immediately after construction and final grading to minimize long-term erosion or landslide potential. Appropriate setback distances from steep slopes would be implemented for new construction and infiltration facilities. Refer to Section 3.1.4 in the Draft EIS for additional detail on proposed mitigation measures.

3.1.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are anticipated under Alternative 5.

3.2 AIR QUALITY

This section analyzes potential air quality impacts under Alternative 5 compared to Alternatives 2, 3, and 4, which are discussed in Section 3.2 of the Draft EIS. Mitigation measures designed to limit those impacts also are identified. Potential impacts from the No Action Alternative are described in the Draft EIS.

3.2.1 Affected Environment

The Cle Elum UGA is located in a region that is currently designated by EPA and the state of Washington as being in attainment with the National Ambient Air Quality Standards (NAAQS). Air pollutants of potential concern are fine particulate matter less than 10 micrometers in size (PM-10) primarily from residential heating and outdoor burning, and carbon monoxide (CO) primarily from vehicular traffic and outdoor burning. PM-10 and CO concentrations generally are the highest in late fall and winter during temperature inversions, when pollutants are trapped near the ground and can accumulate in residential areas. A detailed description of pollutants of concern, existing air quality, and air quality standards is included in Section 3.2 of the Draft EIS.

Existing CO concentrations at locations adjacent to potentially congested roadways were modeled with EPA-approved computer programs based on 1999 traffic volumes and congestion. These existing CO concentrations are well below the one-hour and eight-hour CO standards. Air quality computer modeling is described in detail in Section 3.2 of the Draft EIS.

Additional information on land clearing and burning, which was not presented in the Draft EIS, is described as follows:

Land Clearing and Burning

Outdoor burning of land-clearing debris is regulated in Washington under the Department of Ecology's outdoor burning regulations (WAC Chapter 173-425). These regulations define "land clearing burning" as the outdoor burning of trees, stumps, shrubbery, or other natural vegetation from land-clearing projects, and "outdoor burning" as the combustion of material in an open fire or outdoor container without controlling combustion or emissions. The Washington outdoor burning regulations prohibit land-clearing burning in large urban areas and require a permit in all other areas of the state.

3.2.2 Impacts

Direct Construction

Construction-related air quality impacts under Alternative 5 would be the same as those described for Alternatives 2, 3, and 4 in the Draft EIS. Site preparation and construction activities would temporarily generate dust, fine particulate (PM-10), and small amounts of CO from earth moving and construction equipment exhaust. Construction activities within the UGA would comply with Ecology regulations for particulate emissions, and construction impacts would be mitigated with fugitive dust controls and emission-control devices on equipment. With

the particulate and emission-control mitigation measures to be included under Alternative 5, air quality impacts during construction would not be significant.

Land-clearing burning could be permitted in the Cle Elum UGA, subject to a permit from the Department of Ecology. Other options for disposal of land clearing debris identified in the RIDGE Settlement Agreement include onsite chipping, donating it as free firewood to offsite users, hauling it offsite, and/or abandoning debris to provide wildlife habitat (see Section 3.2.3, Mitigation Measures).

The Washington outdoor burning regulations allow land-clearing burning until December 31, 2006, in urban growth areas for incorporated cities having a population of fewer than 5,000 people that are neither within nor contiguous with other urban growth areas (WAC 173-425-040[2]). Because the City of Cle Elum has a population of fewer than 5,000 people, land-clearing burning could be allowed within the Cle Elum UGA.

Direct Operation

Operational impacts on air quality would be the same as described in the Draft EIS. Vehicle emission would be the primary source of air pollutants. Residential wood burning and yard waste burning would be restricted and prohibited, respectively, within the Cle Elum UGA.

Additional vehicular traffic to and from the proposed residential and commercial development within the Cle Elum UGA would be a long-term source of air pollutants, particularly CO during winter. Future CO concentrations at potentially congested intersections were predicted in the Draft EIS with EPA-approved computer models. The future CO concentrations under Alternatives 2, 3, and 4 would be substantially below the NAAQS, with the highest one-hour CO concentration at 19% of the one-hour standard and the highest eight-hour CO concentration at 51% of the eight-hour standard. Additional vehicular traffic also would emit "greenhouse" gases, primarily carbon dioxide (CO_2), which would vary among alternatives in a similar pattern to CO emissions. Because CO concentrations are predicted to be well below the standards under Alternatives 2, 3, and 4, future CO concentrations under Alternative 5 are expected to be within the one-hour and eight-hour NAAQS for CO.

Residential fireplaces and woodstoves for space heating and aesthetics are currently sources of particulate in Kittitas County, and can contribute to air pollution during winter inversions. Alternative 5 would prohibit woodburning fireplaces and woodstoves in all individual residential units within the Cle Elum UGA. Any fireplace in individual residential units would be fueled by natural gas or propane, which emits substantially lower emissions of PM-10 and CO. Pursuant to the RIDGE Settlement Agreement, contractors and lot owners would be prohibited from burning debris created by lot clearing or maintenance activities.

Indirect

Indirect impacts on air quality would be similar to those described in the Draft EIS. Population, housing, and employment growth in the Cle Elum area induced by Alternative 5 would incrementally increase traffic volumes and associated air pollutants, particularly CO. Some of the

residential growth induced by Alternative 5 would also likely contain woodstoves or fireplaces, which would incrementally increase future wood smoke emissions in the region.

Cumulative

As identified for the other development alternatives, construction of the MPR concurrent with the UGA would temporarily increase total regional dust loads in the atmosphere. The geographic separation between construction activities is anticipated to minimize aggregated air pollutant concentrations.

Development within the UGA under Alternative 5 and the MPR would prohibit woodburning fireplaces and woodstoves in all individual residences. As described above, contractors and lot owners would be prohibited from burning debris created by lot clearing or maintenance activities in both the MPR and UGA. Some of the offsite residential development induced by Alternative 5 and the MPR likely would contain woodstoves or fireplaces, which would incrementally increase future wood smoke emissions in the region.

Cumulative impacts on air quality would be primarily related to cumulative increases in traffic volumes and congestion from the combined traffic under Alternative 5, growth in background traffic, and the MPR. CO concentrations at intersections operating at the lowest level-of-service under Alternatives 2, 3, and 4 are predicted to be well below the CO standards. As such, CO concentrations at these same intersections with cumulative traffic are not expected to exceed the one-hour and eight-hour NAAQS for CO. Any traffic mitigation measures to reduce traffic volumes or improve intersection level-of-service would reduce cumulative traffic air pollution (see Section 3.14, Transportation).

3.2.3 Mitigation Measures

Mitigation measures for construction-related impacts on air quality would include those described in the Draft EIS. Construction activities under Alternative 5 would include mitigation measures to reduce fugitive dust, fine particulate, and engine exhaust. Specific mitigation measures to control PM-10, deposition of particulate matter, and emissions of CO are identified in Section 3.2.4 of the Draft EIS.

Mitigation would also include fire safety measures to be coordinated with the Kittitas County Department of Building and Fire Safety and the Cle Elum Fire Department. These fire safety items would include providing industrial fire safety equipment for construction vehicles, limiting smoking to prescribed smoking areas, and following Department of Natural Resources industrial precautions for open flames/spark-emitting equipment.

Because the future CO concentrations under all alternatives are expected to be well below the NAAQS, air quality mitigation measures would not be required for air pollutants from traffic emissions.

Implementing alternative methods to dispose of land clearing debris either in lieu of, or in conjunction with, burning would reduce potential emissions. Alternative measures for disposal

are described in the RIDGE Settlement Agreement and include: onsite chipping for use as mulch, in landscaping, or for offsite use; donating appropriate sized debris as free firewood to offsite users; hauling material offsite; and/or abandoning forest residue onsite to provide wildlife habitat.

3.2.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on air quality are anticipated under Alternative 5.

3.3 WATER QUALITY

This section quantitatively analyzes surface and groundwater quality under Alternative 5. Mitigation measures designed to limit potential impacts are identified. Information in this chapter is summarized from the Water Quality Technical Report, included as Appendix A to the Final EIS.

3.3.1 Affected Environment

Hydrologic Setting

The regional hydrologic setting is described in Section 3.3 of the Draft EIS. The proposed Cle Elum UGA lies within the Upper Yakima River drainage basin, which is designated as Water Resource Inventory Area (WRIA) 39 (Washington Department of Fisheries 1975). The UGA is adjacent to the lower portion of the Cle Elum River between Bullfrog Road and I-90. The Cle Elum River runs along the western boundary of the site and joins the Yakima River at river mile (RM) 185.6. The Yakima River and I-90 run along the southern boundary of the site. Approximately 750 acres of the UGA is topographically located within the Yakima River basin, and approximately 350 acres is topographically within the Cle Elum River basin. Because of the nature of surface soils on the site, natural drainage occurs through infiltration and subsurface groundwater flow. The Cle Elum River flows are controlled at the Cle Elum Dam, operated by the U.S. Bureau of Reclamation (USBR). The dam is upstream of the project at RM 8.2. Water impounded by the dam forms Cle Elum Lake, which the USBR uses primarily for storing fall, winter, and spring flows to supply late spring through early fall irrigation demands in the Yakima Valley. A secondary function of the dam is flood control.

Surface Water Quality

The Cle Elum River from the mouth to Cle Elum Dam (RM 8.2) is identified as water body segment WA-39-1050 and designated as Class AA (extraordinary) for water quality (Chapter 173-201A WAC). Water quality standards are described in detail in Appendix A.

The Yakima River is designated as Class A (excellent) water quality from its mouth to the confluence with the Cle Elum River, and is Class AA (extraordinary) for the reach from the Cle Elum River confluence (RM 185.6) to its headwaters (Chapter 173-201A-130 WAC). A special condition is applied in this reach (RM 185.6 to the headwaters of the Cle Elum River) in that the temperature shall not exceed 21.0°C due to human activities.

Cle Elum River

Water quality data for the Cle Elum River collected by the U.S. Geological Survey (USGS), Ecology, and Associated Earth Sciences, Inc. (AESI) are summarized in the Draft EIS.

Yakima River

Water quality data from 1997 and 1998 are described in the Draft EIS. Ecology's ambient water quality monitoring program collected data from 1989 through September 2000 (Ecology 2001a).

To characterize the existing Yakima River water quality for this report, the Draft EIS data set was updated to include all of Ecology's data collected from October 1994 through 2000. Ecology collected monthly water quality samples from October 1994 through September 2000 at RM 191 upstream of the UGA (72 samples).

Yakima River temperatures at RM 191 averaged 6.8°C and ranged from 0.20°C to 19.8°C. Two samples exceeded the Class AA standard of 16°C. Dissolved oxygen (DO) ranged from 8 milligrams per liter (mg/L) to 13 mg/L and averaged 11.1 mg/L. Twelve samples within the 1994 to 2000 time frame did not meet the 9.5 mg/L DO minimum criterion. The lower DO values occurred in the summer months of July through September. The pH in the Yakima River ranged from 6.4 to 8.3. One sample was below the minimum 6.5 pH criterion (June 1996). Fecal coliform concentrations averaged 11.1 colonies/100 milliliters (mL) and ranged from 1 to 160 colonies/100 mL. The Class AA standard of 50 colonies/100 mL as a geometric mean was met.

Nutrient concentrations in the Yakima River at RM 191 were low. Total phosphorous (TP), nitrate+nitrite nitrogen, and ammonia-nitrogen averaged 0.07 mg/L, 0.04 mg/L, and 0.10 mg/L, respectively. Total suspended solids (TSS) were variable, ranging from less than 1.0 mg/L to 62 mg/L. The average TSS was 5.6 mg/L. Turbidity averaged 3.4 nephelometric turbidity units (NTU) and ranged from 0.60 NTU to 30 NTU. Ecology is targeting the Yakima River upstream of Yakima to its headwaters for study and cleanup due to high levels of suspended sediment, turbidity, and pesticides (Ecology 2001b). The Yakima River below the project at RM 80.4 (segment WA-37-1010) has a total maximum daily load (TMDL) for turbidity and the pesticide DDT (see the 303[d] discussion below).

Ecology analyzed dissolved metals in the Yakima River at RM 191 to verify previously measured violations of state water quality standards from historic USGS survey data (Johnson 2000). All dissolved metals complied with chronic standards when measured six times between March 1999 and January 2000 (Johnson 2000). Dissolved lead was less than the detection level of 0.02 micrograms per liter (µg/L). Dissolved copper averaged 0.19 µg/L and dissolved zinc averaged 0.75 µg/L. The average hardness at this station was 27 mg/L $CaCO_3$ (calcium carbonate).

Section 303(d) Threatened and Impaired Water Bodies

Section 303(d) of the 1972 Federal Clean Water Act (CWA) requires states to identify and list threatened and impaired water bodies (Ecology 1998). The CWA requires that the list be updated and submitted for review and approval to the U.S. Environmental Protection Agency (EPA) every two years. The purpose of the listing is to identify segments that—even with technology-based pollution control measures—are not expected to meet the applicable standards for the listed water quality parameters. EPA allowed states to skip the 2000 303(d) list due to the ongoing development of new federal rules affecting the listing process and the TMDL program. The 2002 303(d) list is due in April of 2002. Under the amended CWA, the list is now required every four years instead of every two years.

EPA approved the 1998 limited water quality list for Washington on January 28, 2000, and it is the current active listing. The 1998 303(d) list identifies the Cle Elum River as limited for temperature (Ecology 1998). The temperature listing was based on 26 excursions beyond the

criterion from the mouth of the river to Cle Elum Lake (segment WA-39-1050). The 1998 303(d) list includes the Yakima River from RM 147 upstream to the Cle Elum River confluence at RM 185.6 for DDT, mercury, copper, cadmium, and the herbicide 4.4'-DDE (dichloroethane) (segment WA-39-1030). The Yakima River upstream of the site (segment WA-39-1060) is listed as limited for DO and temperature. The 1998 303(d) list includes additional parameters for the Yakima River downstream of RM 147.

EPA approved a TMDL for TSS and DDT for the Yakima River, segment WA-37-1010, on November 25, 1998. This water body segment extends from the Yakima River's mouth at the Columbia River to RM 80.4, which is approximately 100 RM downstream from the UGA. Ecology conducted a TMDL evaluation of the Lower Yakima River basin in 1994 and 1995, in cooperation with the EPA and the Yakama Indian Nation. The TMDL evaluation focused on TSS and associated DDT loads from irrigated fields. Consequently, it is limited to the Lower Yakima River basin during irrigation season. Turbidity targets for the mainstem Yakima and tributary sites are being implemented on a schedule spanning 15 years (Joy 1997).

Washington State Water Quality Assessment 305(b) Report

Section 305(b) of the 1972 CWA requires all states to prepare biennial reports assessing the water quality of defined water bodies within the state. The 1998 report has been adopted, but it is generic in scope with no specific water body information. Therefore, the 1994 report is used to characterize specific water bodies. The 1994 report prepared by Ecology addresses supported and impaired uses, sources, and causes of documented impairments of the Yakima River upstream and downstream of the project site (Ecology 1995). Yakima River-supported uses upstream and downstream of the project include rearing, harvesting, and other fish spawning; salmonid spawning; and salmonid and other fish migration. Yakima River-supported uses upstream of the project include primary and secondary contact recreation. Salmonid spawning is cited as impaired upstream and downstream of the project (Ecology 1995).

The Yakima River is listed as impaired for rearing, harvesting, salmonid and other fish spawning, and migration approximately 39 RM downstream of the site (water body segment WA-39-1030). The source of this impairment is attributed to unspecified agriculture, irrigated crop production, unspecified hydro- or habitat-modification, and riparian vegetation removal. Specific causes of the impairment are pesticides, priority organics, ammonia, pH, DO/organic enrichment, thermal modifications, and flow and habitat alterations (Ecology 1995).

Groundwater Quality

Groundwater quality standards are described in detail in Appendix A. Groundwater quality also is described in the Draft EIS, based on results from four drilled wells (OW-7, OW-1, OW-4, and OW-9) for the MPR. OW-9, OW-7, and OW-4 were sampled eight times between October 1998 and September 1999 (AESI 1999b). OW-1 was dry during five of the eight sampling events; therefore, it was sampled on three occasions (October and November 1998 and April 1999) (AESI 1999b).

3.3.2 Impacts

This section describes the potential construction, operation, indirect, and cumulative impacts on surface water and groundwater from Alternative 5 (Preferred Alternative). Alternative 5 does not include a golf course, Horse Park, or other equestrian features evaluated under Alternatives 2, 3, and 4 in the Draft EIS. In addition, Alternative 5 proposes more stormwater treatment for water quality prior to infiltration than was proposed for alternatives evaluated in the Draft EIS. The water quality evaluation of Alternatives 2, 3, and 4 in the Draft EIS does not include a quantitative water quality analysis. If a golf course or equestrian feature were proposed in the future, that proposal would receive site-specific environmental review as part of the permit approval process and would be responsible for mitigating any impacts identified from that proposed development.

Since publication of the Draft EIS, approximately 23 acres within the Cle Elum UGA has been rezoned from Forest and Range 20 (20-acre lots) to Suburban 1 (1-acre lots). The property is located north of I-90 and east of Bullfrog Road adjacent to the western boundary of Trendwest-owned property within the UGA. Kittitas County issued a SEPA Determination of Non-Significance on the non-project action on October 10, 2001, with conditional language stating that any future development proposal would be subject to environmental review at the time development is proposed. As such, potential impacts on water quality under the No Action Alternative and under cumulative impacts from the development are addressed qualitatively in this EIS.

No Action Alternative

Direct Construction

Potential construction-related water quality impacts under the No Action Alternative are discussed in Section 3.3 of the Draft EIS. In general, based on the lower density development that would occur under this alternative, the risk of impacts to receiving waters from contaminated runoff and accidental spill would be lower than the other development alternatives. The property zoned Suburban is located in the Cle Elum River corridor of the UGA, which is geologically and proximally determined to be at highest risk among all the areas within the MPR and UGA study areas (see Appendix A). The risk for construction-related impacts on this property is higher because it is located where the Cle Elum River is in direct continuity with an underlying shallow alluvial aquifer.

Clearing, grading, and construction of residential and supporting infrastructure (access roadway and utilities) could potentially deliver fine sediments, accidental spills of petroleum products, or construction waste such as concrete leachate to the river by way of the underlying alluvial aquifer. Short-term impacts would likely be localized, but could include increased turbidity or direct localized toxicity to aquatic organisms from accidental spills or releases of fuels, hydraulic fluids, or concrete wash water or leachate.

Future development that may be proposed within the Suburban-zoned portion of the UGA would be responsible for acquiring the necessary National Pollutant Discharge Elimination System (NPDES) permit for construction, if such were required. Through February of 2003, construction

of property under single ownership and less than 5 acres in size would not require an NPDES permit from Ecology. After March 2003, that size exemption would be reduced to less than 1 acre. If required, the NPDES permits would include provisions for stormwater pollution prevention plans. If NPDES permits were not required due to the size exemption, which could occur if individual lots were sold to builders before construction, then building and grading permits would be required.

Direct Operation

Operational impacts under the No Action Alternative are discussed in Section 3.3 of the Draft EIS. The rezone of 23 acres to 1-acre maximum lots near the Cle Elum River would increase the potential for operational water quality impacts. This property is located where the Cle Elum River is in direct continuity with an underlying shallow alluvial aquifer and is labeled as the highest risk area of the UGA for development (see Appendix A, Section 3.2.3). Stormwater contaminants would contribute stormwater runoff and possibly treated effluent from onsite septic systems to the underlying shallow alluvial aquifer.

Residential development would add nutrients from fertilizers and increase the risk of pesticide introduction to stormwater runoff from landscaping chemicals. Along with nutrients, a rural residential land use designation could result in increases in contaminants such as fecal coliforms and biological oxygen demand (BOD), if livestock were held on the property. Very low automobile use would be expected in association with any future project at this density, and impervious surfaces that generate runoff also would be very low in this area. Low level automobile traffic would likely mean that heavy metals and combustible products in stormwater would be inconsequential, certainly on a regional scale.

If residential development on the Suburban-zoned property were served by onsite septic systems, they would be required to comply with the Kittitas County Department of Health regulations for septic drainfield density and septic installation. If future environmental or Department of Health review resulted in a need for mitigation beyond standard septic installation, various enhanced septic systems or connection to the UGA sewer system would be feasible. The latter could not occur until after approval and construction of the UGA Trendwest proposal.

Indirect

No indirect impacts under the No Action Alternative are anticipated.

Cumulative

Development of the UGA under Alternative 1 concurrent with the MPR and other regional growth would not result in significant cumulative increases in water quality impacts on the Cle Elum and Yakima rivers. Potential impacts on area drainage basins from septic systems associated with cumulative indirect growth are discussed under Indirect Impacts, below.

Alternative 5

Direct Construction

Alternative 5 lowers construction risk by avoiding development near the Cle Elum River in the highest risk portion of the UGA. This area labeled Management Zone C is described in the section entitled Stormwater Management Zones below. By avoiding development near the Cle Elum River, sediment introduction to the river as a result of clearing and grading would likely be prevented. Infrastructure and building construction would expose erodible soils and could increase the rate of surface water runoff from storms as a result of exposure and compaction. Although the site currently infiltrates stormwater without generating surface runoff under normal conditions, localized erosion from surface water flows could occur if temporary erosion and sedimentation control (TESC) measures were not implemented, or if they were implemented but failed. Uncontrolled sediment release to onsite wetlands could decrease water quality and fill localized portions of the wetlands if water is channelized and contains silts and sands. Risk of these impacts would increase during construction in the wet season; however, rare summer storms could also have the same result. Minor turbidity and minor sediment-related impacts on wetlands are generally not severe and long-lasting, since wetlands are naturally deposition environments. However, short-term water quality impairment and resulting habitat degradation could occur if sediment inputs were sustained. Short-term water quality impacts on wetlands could include increases in turbidity, suspended and settleable solids, and phosphorus loading from eroded soils.

The use of heavy equipment during construction requires fueling and often limited storage of petroleum hydrocarbon products, which creates a risk of accidental spills. Unintended release of fuels, oil, or hydraulic fluid could contaminate soils and, if unintended or uncontrolled, migrate to groundwater or into surface water resources. Such water quality impacts, although locally severe, can typically be prevented with adequate construction site control measures and spill response planning required by the NPDES permit.

Direct Operation

Stormwater Facilities Changes

Stormwater facilities for the UGA were previously described in Section 3.3 of the Draft EIS and in the Master Drainage Plan (MDP) (American Engineering Corporation 1999). Since the Draft EIS was published, the proposal for water quality treatment of stormwater runoff has been modified, in most cases increasing treatment prior to infiltration. For this purpose, the UGA was subdivided into stormwater management zones based on underlying geology and groundwater flow paths (Figure 3.3-1). Treatment is now proposed in accordance with the water quality risk in each zone (flow route, infiltration soil type, groundwater receptors, and receptor proximity). The project has also incorporated provisions of the 2001 Department of Ecology Stormwater Management Manual (Ecology 2001c) produced since the Draft EIS was published, which has altered treatment requirements. The facilities proposed at the time of the Draft EIS are summarized below, along with the basis for the change in treatments proposed in the Final EIS

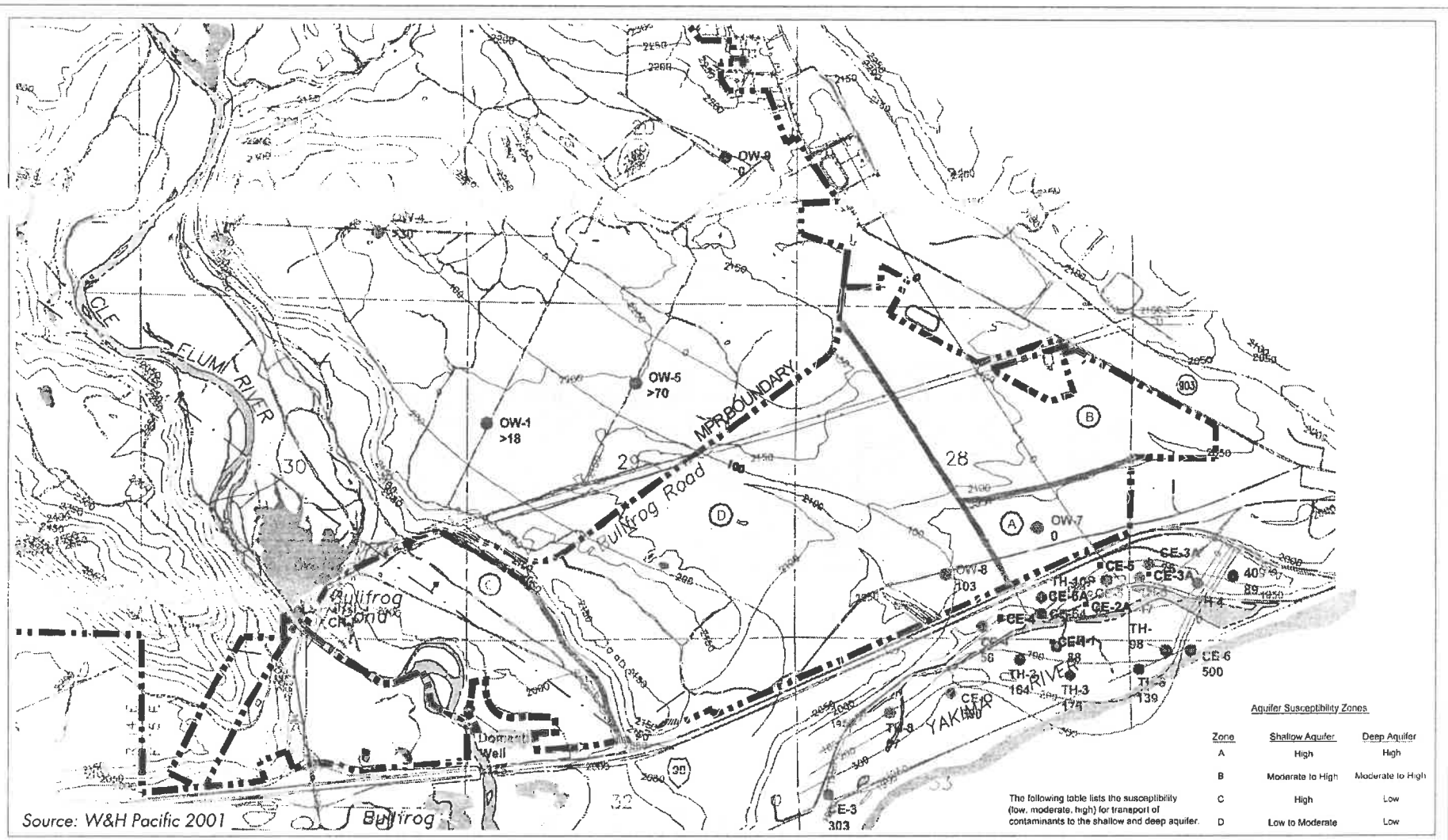


FIGURE 3.3-1

MANAGEMENT ZONES AND AQUIFER SUSCEPTIBILITY

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

Table 3.3-1: Changes to the Draft EIS Stormwater Treatment Proposal for the Cle Elum UGA

Draft EIS and MDP Treatment Category	Land Uses Served	Treatment Proposed in Draft EIS	Basis for Treatment Changes Incorporated in this Final EIS
Level I	Roof, Golf[1]	Natural Infiltration	1. "Basic Treatment Menu" options from the 2001 Department of Ecology Stormwater Management Manual (for all land uses) in the lower risk Management Zones (Zones C and D as described below). These options are intended for projects that discharge to the ground. (Note: No development is proposed in Zone C under Alternative 5.) 2. "Enhanced Treatment Menu" options from the 2001 Department of Ecology Stormwater Management Manual (for all land uses) in the higher risk Management Zones (Zones A and B as described below). These options are intended for projects that discharge to waters that are tributaries to fish-bearing streams. Although Management Zones A and B would discharge to the ground, the groundwater path is close to the drawdown Yakama Hatchery wells. Thus, these areas are proposed for a higher level of treatment where development is proposed.
Level II	Residential Driveways	Filter Strip Treatment and Natural Infiltration	
Level III	Roadways	Filter Strip Treatment and Natural Infiltration	
Level IV	Parking Lots, High Density	Bioswale Treatment and Natural Infiltration	

1 No golf course is proposed under Alternative 5.

Stormwater Management Zones

The proposed UGA is divided into four water quality management zones—A, B, C, and D, based on underlying geology, groundwater flow patterns, and proximity to water features (AESI 2001) (Figure 3.3-1). The Cle Elum River lies to the west of the UGA, and is in direct continuity with a shallow aquifer in alluvial soils immediately adjacent to the river. Management Zone C is the portion of the site that overlays these alluvial deposits. Underneath the shallow alluvial aquifer, the Cle Elum River, and the main central portion of the UGA, an aquitard approximately 200 feet or more deep is formed of silt and clay lacustrine deposits. This aquitard protects the underlying deep aquifer from surface influences. The main central portion of the UGA is Management Zone D, which has outwash soils at the surface. Till soils occur over the outwash on the highest elevations of Management Zone D to the north, closest to Bullfrog Road. The outwash supports a shallow aquifer, which again is separated from the deep aquifer by the same very deep lacustrine aquitard as occurs under Management Zone C. Farther east under Management Zones A and B, the surface soils are the same as for Management Zone D. However, Zones A and B are distinguished from D because the thick lacustrine aquitard is absent. Thus, the deep aquifer is more vulnerable to surface activity. Zone A is closer to the Yakima River and the Yakama Hatchery intake wells than Zone B, which is why they were separately distinguished.

- Management Zone A is at high risk for transport of contaminants to the underlying deep aquifer and thus to the Yakama Hatchery wells due to proximity and the lack of an intervening aquitard. The portion of the Reserve within Management Zone A is not included in this analysis. Future development in the Reserve would require separate environmental review.

- Management Zone B is at high to moderate risk for transport of contaminants to the underlying deep aquifer; the geology is the same as Management Zone A, but B is farther away from the Yakama Hatchery wells.
- Management Zone D is at low to moderate risk to the shallow aquifer due to soils and a very low risk to the deeper aquifer due to an intervening aquitard.
- Management Zone C is at high risk to the shallow alluvial aquifer and the Cle Elum River, which is in direct continuity, but at a very low risk to the deeper aquifer.

Under Alternative 5, no new development is proposed in Management Zone C. Zone C has approximately 1.4 acres of impervious surface consisting of an existing gravel road. Zone C is not discussed further in this section because Alternative 5 would not influence groundwater quality in this zone.

Stormwater Facilities Proposed

Treatment of Management Zone D runoff would meet the Ecology Stormwater Management Manual requirements for a site proposing to infiltrate stormwater more than 1/4 mile from a fish-bearing stream, a tributary to a fish-bearing stream, or a lake (Ecology 2001c). This basic level of treatment would be provided prior to infiltration in Zone D, which can be satisfied by biofiltration swales, filter strips, basic wet ponds, wet vaults, stormwater wetlands, combined detention and wet ponds, or sand filters. Stormwater wetlands are recommended, and for the purpose of this analysis are assumed to be the treatment type that would be used. The Ecology Manual does not consider roof runoff a pollution generator; the runoff could be infiltrated directly.

Zones A and B have less natural filtration afforded by the underlying sediments. Runoff from Zones A and B under Alternative 5 would have enhanced treatment to further reduce dissolved metals and other contaminants prior to infiltration. This proposed level of treatment would exceed the Ecology Manual requirements for water quality treatment (Ecology 2001c). The "Enhanced Treatment Menu" (Volume V) in the Ecology Manual incorporates two-facility treatment "trains" for enhanced dissolved metals removal. The "Enhanced Treatment Menu" provides a variety of facilities to satisfy this objective.

A treatment train consisting of a wet pond followed by a basic sand filter is recommended and for the purpose of this analysis was evaluated for all runoff from Management Zones A and B.

Stormwater Quality Analysis

Stormwater quality was predicted for each of the three management zones (A, B, and D) that would contain development under Alternative 5. Untreated stormwater quality was predicted by dividing the site into land use categories, and using literature-based data for each category (Appendix A, Section 3.2.4). Runoff from each land use category was proportionately mixed within each Management Zone on the basis of impervious surface. Untreated water quality was improved by transit through either a stormwater wetland (Zone D) or paired wet pond and sand filter facility (enhanced treatment in Zones A and B) (Table 3.3-2).

Table 3.3-2: Alternative 5 Untreated and Treated Stormwater Runoff Quality

Parameter	Untreated Runoff Concentrations from Management Zones A and B	Untreated Runoff Concentrations from Management Zone D	Predicted Runoff Concentrations from Management Zones A and B after Enhanced Treatment	Predicted Treated Runoff Concentrations from Management Zone D after Stormwater Wetland Treatment
Copper (µg/L)				
Total	10	8.0	3.0	3.7
Dissolved	4.0	3.2	1.2	1.5
Lead (µg/L)				
Total	9.0	4.0	2.3	1.8
Dissolved	4.8	2.1	1.2	0.97
Zinc (µg/L)				
Total	127	39	6.4	19
Dissolved	51	15	2.6	7.2
Nitrate+Nitrite Nitrogen (mg/L)	0.45	0.40	0.22	0.27
Ammonia-Nitrogen				
Total (µg/L)	130	140	43	77
Un-ionized (µg/L)	0.30	0.30	0.10	0.20
Total Phosphorus (mg/L)	0.09	0.14	0.02	0.07
TSS (mg/L)	16	11	0.80	5.2
Fecal Coliforms (colonies/100 mL)	695	643	382	308
Oil and Grease (mg/L)	2.9	2.1	0.73	0.53

Removal efficiencies were derived from the literature for stormwater wetland and wet pond plus sand filter systems (see Appendix A, Section 3.2.3). The resulting discharge quality was compared to background groundwater concentrations, water quality standards, and fisheries sublethal limits (Tables 3.3-3, 3.3-4, and 3.3-5). Fisheries sublethal effects include water chemistry-induced changes in physiology and/or behavior that affects the competitive vitality or reproductive potential of a fish population. Fish sensitivity to water quality changes was assessed by evaluating literature data for behavioral and physiological fish responses to sublethal concentrations of typical stormwater runoff contaminants (Appendix A, Section 3.2.5).

Groundwater Impacts

The predicted water quality results described in Table 3.3-3 assess both the stormwater discharge quality prior to entering the infiltration pond (this column in Table 3.3-3 does not account for the additional natural removal that would occur in outwash soils) and the predicted stormwater quality after additional treatment (this column in Table 3.3-3 credits infiltration with the contaminant removal that would occur naturally in onsite outwash soils). The additional pollutant removal by infiltration in Table 3.3-4 is conservative, based on the fact that the minimum treatment efficiency (percent removal) is based on filtration by outwash soils, and excludes the filtration that would naturally occur through the lacustrine aquitard, which is present in Management Zone D.

Table 3.3-3: Alternative 5 Predicted Stormwater Quality

Parameter	Treated Stormwater Discharged to Infiltration (no treatment credit for infiltration)		Treated Stormwater After Infiltration, but Before Aquifer Mixing (infiltration credited with treatment)			Existing Groundwater Quality[1]	Groundwater Quality Standards
	Zones A and B	Zone D	Min. Treatment (%)	Zones A and B	Zone D		
Copper (µg/L)							
Total	3.0	3.7	50	1.5	1.9	3.0	1000
Dissolved	1.2	1.5		0.60	0.80	1.2	NA
Lead (µg/L)							
Total	2.3	1.8	60	0.92	0.72	1.8	50
Dissolved	1.2	0.97		0.48	0.39	0.95	NA
Zinc (µg/L)							
Total	6.4	19	80	1.3	3.8	76	5000
Dissolved	2.6	7.2		0.52	1.4	30	NA
Nitrate+NitriteNitrogen (mg/L)	0.22	0.27	5.0	0.21	0.26	0.20	10
Ammonia-Nitrogen							
Total (µg/L)	43	77	45	19	42	4.0	NA
Un-ionized(µg/L)	0.10	0.20		0.10	0.10	0.0	NA
Total Phosphorus (mg/L)	0.02	0.07	65	0.01	0.02	0.02	NA
TSS (mg/L)	0.80	5.2	50	0.40	2.6	3.0	NA
Fecal Coliforms (colonies/100 mL)	382	308	100	<1	<1	13	1
Oil and Grease (mg/L)	0.73	0.53	0.0	0.73	0.53	NA	NA

1 Groundwater quality results for OW-1, OW-4, OW-7, and OW-9, December 1998 through September 1999 (AESI 1999b).

Note: Water quality forecasts and baseline conditions were reported in total metals and converted to dissolved metals. To obtain dissolved concentrations, approximately 40% of total copper and total zinc and 53% of total lead were assumed to be in dissolved form (King County 1995).

Table 3.3-4: Alternative 5 Proportionately Mixed, Treated Stormwater Compared to Existing Groundwater Quality

Parameter	Treated Stormwater After Infiltration, but Before Aquifer Mixing (infiltration credited with treatment)		Proportionately Mixed Groundwater Quality Resulting from the UGA [1]	Existing Groundwater Quality [2]	Groundwater Quality Standards
	Management Zones A and B	Management Zone D			
Copper (µg/L)					
Total	1.5	1.9	1.8	3.0	1000
Dissolved	0.60	0.80	0.71	1.2	NA
Lead (µg/L)					
Total	0.92	0.72	0.82	1.8	50
Dissolved	0.48	0.39	0.43	0.95	NA
Zinc (µg/L)					
Total	1.3	3.8	2.6	76	5000
Dissolved	0.52	1.4	0.98	30	NA
Nitrate+NitriteNitrogen (mg/L)	0.21	0.26	0.24	0.20	10
Ammonia-Nitrogen					
Total (µg/L)	19	42	31	4.0	NA
Un-ionized (µg/L)	0.10	0.10	0.10	0.0	NA
Total Phosphorus (mg/L)	0.01	0.02	0.02	0.02	NA
TSS (mg/L)	0.40	2.6	1.5	3.0	NA
Fecal Coliforms (colonies/100 mL)	<1	<1	<1	13	1
Oil and Grease (mg/L)	0.73	0.53	0.63	NA	NA

1 Proportionate analysis for Management Zones B and D is in Appendix A.

2 Groundwater quality results for OW-1, OW-4, OW-7, and OW-9, December 1998 through September 1999 (AESI 1999b).

Note: Water quality forecasts and baseline conditions were reported in total metals and converted to dissolved metals. To obtain dissolved concentrations, approximately 40% of total copper and total zinc and 53% of total lead were assumed to be in dissolved form (King County 1995).

Analyses Results Not Crediting Additional Treatment from Infiltration

Stormwater quality after treatment is predicted to have higher concentrations of most stormwater constituents than the existing background groundwater quality, when considered prior to infiltration, but after treatment at the surface. TSS, total and dissolved zinc, and total and dissolved lead are exceptions, and would have concentrations at or below existing groundwater quality (see Appendix A for a more detailed discussion). However, prior to any added treatment from infiltration to the native soils, all treated discharge to the infiltration areas would conform to groundwater quality standards.

Table 3.3-5: Yakima River Water Quality Resulting from the UGA Analysis

Parameter	Proportionately Mixed Stormwater Quality Resulting from the UGA Before Aquifer Mixing	Average Yakima River Water Quality[1]	Acute and Chronic State Water Quality Standards Class A	Literature-based Sublethal Limits
Copper (µg/L) Dissolved	0.71	0.19	3.02/2.37	2.4
Lead (µg/L) Dissolved	0.43	0.01	8.38/0.33	11 to 16
Zinc (µg/L) Dissolved	0.98	0.75	24.2/22.1	12
Ammonia-Nitrogen (mg/L)				
Total	31	10	24,000 [2]	7,300
Un-ionized	0.0	0.0	66	20
Nitrate+Nitrite Nitrogen (mg/L)	0.24	0.04	None	Less than 250
Total Phosphorus (mg/L)	0.02	0.07	None	--
TSS (mg/L)	1.5	5.6	None	Less than 80
Fecal Coliforms (CFU/100 mL)	<1	11	100 [3]	--

1 Average Yakima River water quality sampled at RM 191 by Ecology from October 1994 through September 2001.
2 Un-ionized ammonia criterion for 15°C and pH of 7.0 and based on the EPA Gold Book (EPA 440/5-86-001).
3 The standard is for a geometric mean of multiple samples with no more than 10% exceeding 100 CFU/100 mL.

Infiltration Credited with Additional Treatment

After crediting additional treatment (infiltration) in native onsite soils, all parameters would remain within groundwater quality standards. Nitrate+nitrite nitrogen, and ammonia-nitrogen concentrations in the recharging stormwater are predicted to be higher than the background groundwater concentrations. (Only 5% denitrification and no conversion of ammonia to nitrate-nitrogen was assumed as a very conservative assumption; in actuality, almost all ammonia would convert to nitrate-nitrogen.)

All treated stormwater in Management Zones A, B, and D would infiltrate through moraine and outwash soils, which have a silty sand component. This component of the onsite soils would more than add the functional equivalence of sand filtration to all the stormwater catchments. An 18-inch depth of sand is one criterion Ecology references to credit infiltration to native soils with water quality treatment (Ecology 2001c), which is more than exceeded by soils in the UGA. Lesser treatment depths also are credited under the Ecology Manual if sufficient vertical removal and pollutant removal capacity is available in the soil. Ecology considers pollutant removal capacity to occur where there is at least 5 milliequivalents (meq)/100 grams (gm) dry weight soil

cation exchange capacity. As reported in the Draft EIS, samples of MPR onsite soils had greater than 15 meq/100 gm dry soil cation exchange capability (Land Profile, Inc. 1998).

Fecal coliform bacteria values in Table 3.3-3 are predicted to average over 300 colonies/100 mL before infiltration. A minimum of 3.9 feet of soil has been shown to provide sufficient filtration to prevent fecal coliform contamination (Brown et al. 1979). Fecal coliforms would not reach the groundwater at a concentration greater than the maximum standard of 1 colony/100 mL because they have limited survival and mobility in soils. Also, the average vertical transit times of infiltrated stormwater to the aquifer in Management Zones A, B and D would be approximately 120 to 200 days (AESI 2001). Particles such as fecal coliforms move much more slowly than water through the vadose zone due to physical interference with movement or by electrical charge attraction to the soil particles. Particles also can be trapped altogether by filtration.

Infiltration is also advantageous in phosphorous removal because phosphorus binds to iron and aluminum in soils in a mineralized form, which effectively removes soluble phosphorus from groundwater.

Results from Proportionately Mixed Treated Stormwater Compared to the Existing Groundwater Quality

Groundwater impacts also were evaluated by proportionately mixing the treated stormwater from Management Zones A, B and D and comparing the results to existing groundwater quality prior to any mixing or dilution in the underlying aquifer (Table 3.3-4). In order to proportionately mix the management zones, the percentage of impervious acreage for Management Zones A, B and D were calculated (see Appendix A). This number was multiplied by the constituent concentration to achieve the combined (mixed) concentration (Table 3.3-4). The combined constituent concentrations were compared to Washington State groundwater quality standards and background groundwater quality.

The analysis results in Table 3.3-3 are interpreted to mean that TSS, TP, fecal coliforms, and total and dissolved metals from infiltrated treated stormwater would be relatively indistinguishable from background quality in the descending recharge. It is likely that the infiltrated stormwater would acquire some dissolved constituents during transit in the unsaturated zone down to the underlying aquifer, just as natural rainfall would. Analyses were performed for the MPR that used two methods of allowing stormwater contaminant loads to add to existing background constituent loads in the groundwater (A.C. Kindig & Co. 2002b). Those analyses confirmed that, even when loads were added in a conservative manner that would tend to over-estimate impacts, no adverse impacts to groundwater or surface water quality were reasonably predicted for the most intensively developed portion of the MPR. Consequently, results of the analyses in this report that show water quality constituents at or near background levels are similarly interpreted as having no adverse impact. The analyses are included in the MPR Final EIS Addendum (Kittitas County 2002).

The remaining constituents, nitrate-nitrogen, and ammonia-nitrogen concentrations would likely have slightly higher concentrations in the descending recharge than in existing groundwater. The forecast for proportionately mixed, UGA-treated stormwater concentrations after infiltration (but before any aquifer mixing) in Table 3.3-4 is very conservative because it was based on filtration

through outwash soils, but excludes the additional filtration that would naturally occur through the lacustrine aquitard, which is present under Management Zone D. The analyses are also conservative in that no conversion of ammonia to nitrate was assumed.

Surface Water Impacts

Surface water impacts from groundwater recharge were evaluated conservatively by comparing the proportionately mixed and treated stormwater resulting from the UGA (Management Zones A, B and D) directly to the existing average Yakima River water quality (Table 3.3-5) (see Appendix A). Under natural conditions, the treated stormwater from the UGA would mix with the groundwater and travel 121 to 204 days before entering the Yakima River. However, data on the rate of groundwater flow under various portions of the UGA are not available. Therefore, by comparing recharge quality to the river quality and standards directly with no dilution is the most conservative and feasible approach. Analyzed under this conservative approach, all of the water quality constituents in the UGA stormwater would meet the state surface water quality standards, except dissolved lead. The predicted dissolved lead concentration of 0.43 µg/L would be slightly elevated above the chronic surface water quality standard of 0.33 µg/L, but unlikely to be distinguishable from the existing background groundwater quality of 0.95 µg/L. Dissolved copper, lead, and zinc, as well as nitrate+nitrite nitrogen concentrations in the treated stormwater would be higher than the background concentrations in the Yakima River. However, given that: (1) the stormwater would travel through and mix in the underlying aquifer, (2) the UGA development under Alternative 5 would contribute a minimal volume to the Yakima River (less than 0.14% of average annual flow), and (3) the treated stormwater after infiltration is of overall good quality, there would be no adverse change to the water chemistry of the Yakima River.

Non-Point Water Quality Influences from Landscaping

The Draft EIS evaluates impacts of pesticides and fertilizers under Alternatives 2, 3, and 4 in Section 3.4.3. This section supplements that discussion for Alternative 5 (see Appendix A, Section 3.2.6). Non-point influences on groundwater quality would include nutrients and possibly heavy metals from fertilizers applied to landscaping; pesticides and herbicides, which could be applied to landscaping; and fecal coliforms from pet waste.

Commercial pesticides and herbicides can be transported in stormwater runoff. The mobility and persistence of pesticides vary greatly. Organic pesticides used in residential gardens are not reported as a significant problem in surface runoff treatment facilities. Where measured, their appearance tends to be sporadic and has not been associated with toxic effects on surface waters. Metro (1982) reported tentative identification of seven pesticides in five of 21 samples collected during its survey of residential and urban areas in the early 1980s. Of the seven pesticides found, all had concentrations in untreated runoff above chronic standards at least once; however, no violations of standards in receiving waters were noted and the report concluded "due to dilution, flushing, adsorption, and sediment deposition, no acute toxicity problems were discovered in the sites studied" (Metro 1982). More recently, USGS and Ecology conducted a survey of pesticides in 13 small streams in the Puget Sound basin using data collected between 1987 and 1995 (Bortleson and Davis 1997). None of the detected pesticides exceeded existing state or federal freshwater aquatic life criteria. Although no violations of state toxicity standards were found, four pesticides (diazinon, mevinphos, malathion [all insecticides], and diuron [an herbicide])

were found at levels exceeding maximum concentrations recommended by the National Academy of Sciences and National Academy of Engineering (1973) for the protection of aquatic life. As a result, these products have come under increasing scrutiny. Although there was no definite conclusion of impact in the Bortleson and Davis (1997) study, it did highlight the importance of homeowner education as a source control measure for pesticides.

In a recent study concluded in 1998, USGS, Ecology, and King County tested 10 streams in King County for pesticides. Diazinon was the only pesticide shown to be a problem, but this product was found at levels considered toxic to aquatic life in nine of the 10 streams. Diazinon is frequently used by homeowners to control European cranefly (*Tipula paludosa*) larvae in lawns. On May 19, 2000, EPA's Office of Pesticide Programs published a Federal Register notice announcing a preliminary human health risk assessment for diazinon, classified as "restricted use" by the EPA. On December 5, 2000, EPA announced it would eliminate all indoor uses of diazinon, and would phase out all lawn and garden uses. For all indoor household use, retail sales will stop by December 2002. For all lawn, garden, and turf uses, manufacturing diazinon will cease in June 2003, and all sales and distribution will stop in August 2003.

Other pesticides have also come under scrutiny and are being restricted. In June 2000, the EPA released a revised risk assessment and announced an agreement with registrants to eliminate or phase out the pesticide dursban (also known as chlorpyrifos). Chlorpyrifos is commonly found in many home and garden bug sprays and is used in some treatments of termites, as well as on some agricultural crops. The provisions of the agreement and associated EPA actions become effective for the following uses on the following dates: December 31, 2000, dursban prohibited for food and crop uses; December 31, 2001, retail stops the sale of dursban; and December 31, 2005, dursban eliminated from use as a new-home and building construction termiticide.

All the UGA stormwater would be infiltrated to soils. The relative mobility of 82 pesticides in soils was assessed, and a minority (17%) rated as having moderate or greater mobility (Erickson 1987; Kerle et al. 1996). Of the four pesticides listed above, diazinon and diuron have a moderate mobility rating in soils, and mevinphos and malathion have a low mobility rating in soil (Kerle et al. 1996). Even if a pesticide is highly mobile, factors such as application rate, rainfall patterns, soil type, organic matter content, and the adsorption and decomposition characteristics of the soil type determine whether a pesticide is likely to reach the groundwater (Erickson 1987). Pesticide movement within the soil and in the groundwater is usually low because pesticides are often adsorbed and broken down by soil organic matter and microbial biodegradation; therefore, transport through the unsaturated zone is reduced (Erickson 1987; Gold 1988).

Fertilizers are sources of nutrients, particularly nitrogen and phosphorus. Traces of heavy metals may also be included in some fertilizer blends available to homeowners. A review of the literature on nitrate-nitrogen leaching through turf to reach groundwater shows that, while variable, nitrogen losses rarely exceed 5% of the applied nitrogen fertilizer, which generally translates to about 1.6 mg/L nitrate-nitrogen concentration immediately below the turf rooted zone in well-fertilized lawns and prior to any nitrogen losses by denitrification (Balogh and Walker 1992). Ammonia products in fertilizers are rapidly converted to nitrate-nitrogen within the soil. Nitrate-nitrogen is very mobile in groundwater because it is negatively charged, and is thus not attracted to the negatively charged soils. Some nitrate-nitrogen would be eliminated by

denitrification, by which process nitrate-nitrogen is converted to gaseous nitrogen and/or volatile nitrous oxide by anaerobic bacteria during transit through the soil. Losses from denitrification typically range between 10 and 25% (Broadbent and Clark 1967) and are independent of the nitrate concentration over a broad range.

Homeowner practices, however, can be unpredictable, and over-fertilization, particularly when associated with overwatering, are the key triggers to nitrate-nitrogen leaching. Consequently, nitrogen loadings from homeowner fertilizer use could be much greater than for professionally managed turf, not only because homeowners can over-apply fertilizer, but they can also compound the problem by overwatering, which can cause leaching of the over-applied amount. Fertilizer application from residential landscaping would be dispersed in space and time over the developed lots, and will generally occur during the drier growing and irrigation season, when leaching from precipitation is less likely. Landscaped areas could locally raise infiltrating groundwater by approximately 1.0 mg/L in nitrate-nitrogen concentration assuming that: (1) the highest average turf-zone concentration for fertilized landscaping would be 1.6 mg/L, (2) 75% of landscaping is well fertilized in the long term, (3) the remainder of the areas are not fertilized but receive some rainfall with 0.4 mg/L nitrate-nitrogen (from the National Atmospheric Deposition Program station at LaGrande, Washington, in Pierce County; winter and spring 1998 maximum), and (4) 10% denitrification occurs. This concentration is much greater than in infiltrated stormwater collected by the storm drainage and treatment system, but nonetheless is well under the 10 mg/L groundwater quality standard and literature-based sublethal limits for fisheries, even before any further mixing with other sources of recharge or the underlying aquifer. No surface water quality standards exist for nitrate-nitrogen (Chapter 173-201A-030 WAC) because it is virtually non-toxic. Consequently, no adverse impact from nitrogen fertilizers would occur to groundwater or the Cle Elum or Yakima rivers.

There are no maximum contaminant levels for phosphorus in drinking water (Chapter 246-290 WAC), or groundwater maximum standards for phosphorus (Chapter 173-200 WAC). No maximum water quality standards for phosphorus in surface waters exist (Chapter 173-201A WAC). Phosphorus binds readily to iron, aluminum, and calcium to form mineralized compounds in soils, and thus is not readily transported subsurface through soils. A number of investigations on the movement of phosphorous applied to soil in effluent from wastewater treatment plants have shown that phosphorous binds to sorption sites in the soil. Even under high phosphorous loading to infiltration basins, for example wastewater treatment plant discharges, the soluble phosphorous front advances only very slowly as sorption sites are occupied. Phosphorus in effluent at various depths below a six-year-old septic drainfield trench was measured to see how it was distributed in the unsaturated soils immediately under the drainfield (Sawhney and Starr 1977). As phosphorus-sorption sites in this horizon were occupied and saturated, soluble inorganic phosphorus in effluent 15 centimeters (about 6 inches) immediately below the drain trench rapidly reached a concentration equivalent to the septic effluent in the trench. Soluble inorganic phosphorus concentrations at a 30 centimeter depth (about 1 foot) throughout the 13 months of monitoring showed a very large fraction of the phosphorus was removed between 15 and 30 centimeters, even though the septic system had been in operation for six years. At a 60-centimeter depth below the infiltration trench (about 2 feet), soluble organic phosphorus was reduced from an average 13.2 mg/L in the effluent to 0.5 mg/L, which is an approximately 96% reduction. Sawhney and Starr (1977) also examined sorption regeneration, and showed that where septic systems flow to drainfields on an intermittent basis, allowing

alternate drying and wetting of the drainfield soils, sorption capacity of the unsaturated soils was increased.

Wilhelm et al. (1994) studied an operating 13-year-old single-family septic system to evaluate the geochemical processes occurring below the drainfield, including processes affecting soluble phosphorus transport in the effluent. This drainfield included evaluations in both unsaturated and saturated zones within the underlying shallow aquifer. While soluble phosphorus was removed in both zones, Wilhelm et al. (1994) found that phosphate decreased to near-background concentrations quickly in the saturated zone within the shallow aquifer, which was attributed to sorption onto $CaCO_3$ and precipitation with Ca^{++}(calcium ion). In five-day laboratory experiments, Wilhelm et al. (1994) measured a soil sorption capacity of 5 mg/L of soluble phosphorus per 100 grams of soil. However, long-term experiments and field studies show soils typically sorb with twice this capacity, pointing to the importance of regeneration. Wilhelm et al. (1994) found that relative to the initial septic tank effluent, the groundwater plume that traveled from the domestic septic system was locally and quickly depleted of soluble phosphorus, even after 13 years of operation.

The conclusion that phosphorus is locally reduced to background levels because of its rapid inorganic adsorption and precipitation to iron, aluminum, and calcium is supported by Reneau and Pettry (1976), Gilliom and Patmont (1983), and Weiskel and Howes 1992. Given that very high loading sources of phosphorus do not contribute phosphorus above background levels to the groundwater basin, phosphorus from landscaping activity would not affect groundwater quality.

Metals in trace amounts could be contained in some fertilizers; however, they are also largely immobilized in soils. Metals diffusion in ponds used to treat interstate freeway runoff was measured at less than 0.1 cm^2 per year, and over 95% of the total metals were contained in the pond sediments (Yousef et al. 1984). That situation had orders of magnitude for metal concentrations higher than what could occur with landscaping fertilizers. Therefore, any metals in fertilizers are not expected to migrate with groundwater and result in a measurable change to groundwater quality.

Artificial Water Bodies

The conceptual site plan for Alternative 5 includes a number of artificial water bodies (small lakes or ponds) to provide landscape and recreational amenities for the community. None of the lakes would discharge to or be connected with a natural surface water. A total surface area of 15 acres is proposed for 8 to 10 ponds or lakes. The largest lake would be approximately 10 acres in size, and located as a part of a neighborhood clubhouse complex. The remaining lakes and ponds would average around three-quarters of an acre in size.

For the large lake, uses would include swimming, non-motorized boating, canoeing, fishing, and waterfowl viewing. A pedestrian trail would border the lake's perimeter to allow for recreational walking and nature viewing. The lake would be 10 to 15 feet deep and lined to prevent leakage into the groundwater system. To protect the water quality of the lake, stormwater would not discharge to the lake. Grading adjacent to the lake would be designed to direct shoreline runoff away from the lake (refer to Appendix E, the Site Engineering Technical Report for additional information).

A lake management and maintenance program is proposed for all artificial lakes. One or more community or property-owner associations would operate the program for individual lakes. The program would be modeled after existing volunteer lake management and monitoring programs, such as presented in EPA's *Volunteer Lake Monitoring: A Methods Manual.* For the large lake, coliform bacteria monitoring would be required to ensure safe water quality conditions for swimming.

Indirect

Development of the UGA would attract additional growth to the region and would result in more impervious surface, surface water runoff, septic systems, and pollutant introductions to the Yakima River basin. Potential offsite cumulative septic impacts on water quality are described in detail below under Cumulative Impacts.

Cumulative

Construction

Erosion control and spill prevention measures for construction associated with Alternative 5, the MPR, and other development within the UGA, including within the Suburban-zoned property, would be implemented independently. No regional construction measures or runoff control measures are anticipated for all three areas combined.

Operation

The MPR EIS provided a detailed impact analysis for a higher-density MPR plan than what is currently proposed. MPR operational impacts described in the EIS were all negligible with regard to water quality, and this conclusion was reached after evaluating a proposal with greater impact potential than the current Reduced Density MPR proposal. Similarly, operational impacts described in this analysis for Alternative 5 are negligible. For both, the reasons for no impact resulted from: (1) treating stormwater with current best management practices (BMPs) or better, (2) proposing source-control measures (most notably a golf course management plan on the MPR), and (3) proposing to infiltrate nearly all stormwater (excluding surface discharge to Stream C for a small portion of the MPR). With the single exception of Stream C on the MPR, no surface discharge from either the MPR or the UGA would occur outside of emergency overflows in excess of the 100-year storm. Consequently, treated and infiltrated water from both sides would reach and mix with underlying groundwater, then recharge the Cle Elum and Yakima rivers on a time-attenuated basis (AESI 2001). While the MPR and the UGA projects represent independent loading sources to the underlying aquifer, on a per-acre basis the quality of the infiltrated water reaching the aquifer was shown for both projects to be well within groundwater beneficial use standards. In addition, the quality of the infiltrated stormwater was shown to be well within surface water beneficial use standards and fish sublethal evaluation criteria on a concentration basis for each project independently, even under a very conservative assumption in that it directly reached the Yakima or Cle Elum rivers without any prior groundwater mixing. When actual diffusion, groundwater or river mixing, and time-attenuated recharge are accounted for, no adverse change to water quality is predicted.

In addition, a re-analysis of groundwater quality for the most intensively built MPR subbasin was performed using alternative methods of analysis requested by Ecology. Two additional analyses, each increasingly conservative in terms of tending to over-estimate impacts, were requested by Ecology to verify the conclusions drawn in the MPR Draft EIS. Results of the two additional analyses confirmed no adverse impacts from the MPR (A.C. Kindig & Co. 2002b). These analyses are contained in the MPR Final EIS Addendum (Kittitas County 2002).

The MPR, Trendwest's UGA Alternative 5, and other development within the UGA would all drain stormwater by subsurface routes to the Cle Elum or Yakima rivers. The MPR and UGA proposals offer treatment to 2001 Ecology Manual standards, and infiltration through soils suitable for further water quality treatment. It is less likely that development within other areas of the UGA, including the Suburban-zoned property, would treat to that standard because Kittitas County and the City of Cle Elum have yet to adopt the more stringent 2001 Ecology Manual. As such, impacts from development of the MPR and Alternative 5 cumulatively with other development that may occur within the UGA could be higher than that of the MPR and UGA alone. Specific surface and groundwater impacts resulting from future development would be subject to environmental review for permits and approvals.

Indirect

Development of the Reduced Density MPR and UGA would result in offsite rural employment-induced housing, which would use septic systems. The potential for adverse impact on surface water or groundwater from these added septic systems was evaluated (see Appendix A, Exhibit 1) and no adverse impact was found to occur. Septic-induced nitrate-nitrogen loadings to groundwater were analyzed by reviewing available literature and by quantified analysis using the method of Hantzsche and Finnemore (1992) for 5-acre and 20-acre rural lots. With conventional septic treatment, and under the conservative assumption that the septic effluent plus precipitation recharge comprised the total groundwater volume under each lot, a nitrate-nitrogen concentration of 1.28 mg/L and 0.62 mg/L are predicted for 5-acre and 20-acre parcels with single households, respectively. This result, which assumes no mixing with any underlying aquifer, is well within the 10 mg/L nitrate-nitrogen groundwater and drinking water standards. As expected at these densities, no adverse impact on groundwater would likely occur. No adverse impacts from septic-origin phosphorus are expected, given the binding potential of phosphorus to native soils (see Appendix A, Exhibit 1).

The evaluation of nitrate-nitrogen on a regional subbasin (e.g., tributary basin) scale shows that the maximum change in any of the subbasins would be 35 µg/L nitrate-nitrogen. This change would not have any adverse implications to beneficial uses of surface or groundwater in any basin.

The City of Cle Elum is planning to construct a regional wastewater treatment plant at the location of the existing plant at the east end of the City. Please refer to Section 3.16, Utilities, for identification of potential effluent flows and pollutant loads to the Yakima River from Trendwest residential development and from the regional plant.

3.3.3 Mitigation Measures

- A Stormwater Pollution Prevention Plan (SPPP) that uses applicable portions of Volume II of Ecology's 2001 *Stormwater Management Manual for Western Washington* would be prepared. This exceeds the minimum standards for the 1992 Ecology Manual, which is required by the City of Cle Elum and Kittitas County.
- A TESC Plan would be implemented. Proposed measures are described in Section 3.3.4 of the Draft EIS.
- A Master Drainage Plan would be prepared, including provisions for monitoring the progress of the proposed stormwater program (City of Cle Elum draft Conditions of Approval 2002).
- Infiltration is feasible and proposed after stormwater treatment for all areas. Rooftop runoff would be infiltrated without needing water quality treatment.
- Stormwater infiltration facilities would be sited to avoid increasing the potential for landslides in any steep slope or landslide hazard area.
- Stormwater infiltrated in Management Zones A and B would be treated with a wet pond and a sand filter to give enhanced treatment. This exceeds the treatment required in the 2001 Ecology Manual.
- Stormwater infiltrated in Management Zone D would be treated with a stormwater wetland meeting the basic treatment requirements in the 2001 Ecology Manual.
- External copper (unsealed) and galvanized metal would be avoided in structures in Management Zones A and B to control sources of zinc and copper.
- Native vegetation could be encouraged for commercial and multifamily landscaping. This would minimize the need for landscape chemicals. If chemicals must be used, slow-release fertilizers low in phosphorus are recommended. Also, herbicide or pesticide would be used on a minimal "as-needed" basis, selected for minimal transport and persistence potential.
- Educational materials for water quality and habitat/resource protection could be provided to new homeowners to minimize the use of pesticides and lawn and landscape fertilizers.
- Covered parking, parking garages, or carports could be installed in multifamily and office areas to reduce vehicular contaminants in stormwater runoff from commercial development.

3.3.4 Significant Unavoidable Adverse Impacts

Impacts on water quality or wetlands, if any, would be short term with no broad or cumulative effects. If isolated and localized releases of turbid water occurred in onsite wetlands or the Cle Elum River, or if isolated spills of petroleum products occurred from construction equipment, potentially significant unavoidable impacts on water quality would occur. Implementation of a comprehensive TESC plan and SPPP could adequately provide for containment and cleanup within construction areas.

Heavy metals and fecal coliforms would increase in stormwater runoff as a result of the conversion to urban residential density, even after treatment by BMPs. With the proposed treatments for water quality, no adverse direct or indirect changes to aquatic habitat value are anticipated.

The Younger Ditch diversion is located on the north bank of the Yakima River approximately 6,600 feet downstream of the East Fourth Street bridge in South Cle Elum. The diversion consists of a side channel diversion from the river, which directs flow into a channel leading approximately 200 feet to an intake structure. The intake includes a rolling drum fish screen, several gated diversion openings, and a return flow bypass to the Yakima River. Downstream of the intake structure, diverted flows pass over a measurement weir and enter the Younger Ditch irrigation canal.

The Wallace Ranch (Bristol Flats) diversion is located on the northeast bank of the Yakima River approximately 7.5 miles downstream from the City of Cle Elum. The diversion consists of a backwater channel off the Yakima River that allows flow into a pump intake. The diversion channel is approximately 20 feet wide and 80 feet long.

The Westside Irrigation Company diversion is located on the south bank of the Yakima River approximately 2,000 feet upstream of the Burlington Northern railroad bridge, and approximately 5,700 feet upstream of the Thorp Highway bridge. The diversion consists of a gated intake structure on the right bank of the Yakima River, which directs flow into a channel leading approximately 1,500 feet to a second hydraulic control structure. The second facility includes a rolling drum fish screen with a return flow bypass to the Yakima River and several gated openings leading to irrigation canals.

The Thorp diversion is located on the south bank of the Yakima River approximately 2.8 miles downstream of the Thorp Highway bridge. The diversion consists of an ungated side channel off of the river, which directs flow into a four side-by-side box culverts that pass under the Burlington Northern railroad track.

The Packwood diversion is located on the west bank of the Yakima River approximately 2,000 feet downstream of the Burlington Northern railroad bridge near Thorp. The diversion consists of an ungated side channel that directs flow into the Ellensburg canal.

The Cascade Irrigation Co. diversion is located on the north bank of the Yakima River approximately 4,000 feet downstream of the Burlington Northern railroad bridge near Thorp. The diversion consists of an intake structure on the left bank of a side channel off the Yakima River. The intake structure comprises four independently operable gates that direct flow into a large irrigation canal. Another hydraulic control structure and measurement flume, and a pump station, are located approximately 100 feet along the irrigation canal.

The Mill Ditch diversion is located on the north bank of the Yakima River near Ellensburg. The diversion consists of a lateral channel off of a side channel of the Yakima River. Flow diverted from the Yakima River side channel is directed into a ditch leading approximately 100 feet to twin culverts crossing under Interstate 90. Approximately 500 feet downstream of the freeway crossing, the diversion ditch joins with flow from a small groundwater fed lake and with discharges from Dry Creek. From there, flow passes approximately 1,750 feet before reaching the Mill Ditch diversion intake structure. A rock weir across the channel maintains water levels at the diversion structure with return flows bypassing to the Yakima River via another channel under Interstate 90. The intake includes several gated diversion openings. Downstream of the

intake structure diverted flows pass over a measurement weir and then enter the Mill Ditch irrigation system.

The Ellensburg Water Company (EWC) diversion structure consists of a diversion dam extending completely across the Yakima River. This structure has the capacity to divert EWC's full water entitlement (which ranges from 63 cfs to 125 cfs), regardless of Yakima River streamflow conditions. The structure also includes large head gates and fish screens. It is located immediately west of Highway 10.

Subbasin Tributaries

Information on Big Creek, the Teanaway River, and Swauk Creek is summarized from the *Big Creek Basin Hydrologic Analysis*, the *Teanaway River Basin Hydrologic Analysis*, and the *Swauk/First Creek Basin Hydrologic Analysis* (Pacific Groundwater Group 2002). These are included in Appendix B, Exhibit G. Information presented below supplements descriptions of these tributaries contained in the Draft EIS.

Big Creek

Big Creek is approximately 12 miles long and enters the Yakima River from the south near Easton. Big Creek has a drainage area of about 263 square miles. Big Creek has two diversions. A small (2 to 3 cubic foot per second [cfs]) diversion exists about 0.7 miles from the mouth, which has a flat screen across the ditch. The Lund/Darling diversion dam, located about 2.1 miles above the mouth, is an impassable 5-foot barrier to fish. There are two unscreened diversion ditches collecting water from the pool above the dam. There is clean sand and gravel under Big Creek, which Ecology's consultants named the Big Creek Alluvium. Water level data collected by Ecology show that Big Creek loses flow to the alluvial aquifer over much of its course below the Lund/Darling diversion dam down to the Yakima River. Seepage into the alluvial aquifer below Big Creek, and from irrigated areas adjacent to the creek, ultimately enters the Yakima River, rather than returning to Big Creek.

Teanaway River

The Teanaway River is the second largest tributary to the Yakima River. The Teanaway River is approximately 61 miles long and has a drainage area of about 210 square miles. The river crosses a broad, flat floodplain and exhibits very little channel incision, which indicates the river actively migrates across its floodplain. The lower river downstream of Red Bridge Road is underlain by soils ranging in composition from cobbles and gravel to fine-grained clay. Bedrock, occasionally exposed at the surface, is present at variable depths underneath the soils. The floodplain alluvial aquifer under the Teanaway River at its mouth is part of an ongoing groundwater study conducted by the University of Montana and sponsored by the U.S. Bureau of Reclamation. Data from the USBR study show that groundwater conditions vary throughout the year without a discernable, direct correlation to streamflow.

Several government agencies are working to restore Teanaway River instream flows. The USBR and the National Resources Conservation Service have implemented water conservation measures for several irrigation users. In addition, the Bonneville Power Administration funded

moving some diversions downstream, leaving 13 cfs of irrigation flow in the Teanaway River for an additional 3 miles. The USBR's Yakima River Basin Water Enhancement Project (YRBWEP) is working with landowners interested in selling conservation easements, land, or water rights, to provide additional riparian shade and instream flow.

Swauk Creek

Swauk Creek is approximately 24 miles long and enters the Yakima River from the north between Cle Elum and Thorp. The drainage area is fairly large (about 106 square miles), but dry, so natural summer stream flows are very low. Upper Swauk Creek flows through a narrow valley until approximately 1.5 miles above its confluence with First Creek. Below the First Creek confluence, Swauk Creek is no longer confined by bedrock, and opens onto a wide floodplain named Hidden Valley. At the lower end of Hidden Valley, the creek is again confined within a narrow bedrock canyon about 4 miles in length, opening just above the stream's confluence with the Yakima River. The shallow aquifer beneath Swauk Creek in Hidden Valley likely contributes flow to Swauk Creek in the lower portions of the valley, where the valley is constricted causing groundwater elevations to rise relative to the land surface.

First Creek, a tributary to Swauk Creek, flows through a narrow, bedrock-confined valley. This narrow valley limits the amount of water infiltrating from First Creek to the groundwater, down to within approximately a mile of Swauk Creek. A dam owned by the First Creek Water Users Association (FCWUA) diverted almost the entire flow of First Creek into the FCWUA Ditch (formerly known as the Wold-Munson ditch) which conveys water into the Reecer Creek sub-basin, north of Ellensburg.

2001 Monitoring and Field Investigations

Streamflow data were collected by Ecology's consultants during the 2001 irrigation season from Yakima River tributaries and irrigation ditches where Trendwest proposes the transfer of existing water rights to instream flows. The 2001 monitoring program consisted of either continuous or non-continuous water level recording, depending upon the station. Where non-continuous, the monitoring occurred either weekly or bi-weekly. Monitoring stations were established on Big Creek, Swauk Creek, First Creek, Reecer Creek, and Mill Ditch. Seepage surveys and weekly monitoring of irrigation diversions were performed on the Mill, FCWUA, and Lund irrigation ditches. Refer to Appendix B for additional information on stream monitoring activities.

The survey data were used to estimate water losses and/or gains in selected reaches of the ditches, and water depths at key turnouts. This information was used to update the water balance model (see discussion under Cumulative Impacts, below).

Yakima Reclamation Project

The Yakima Reclamation Project (Yakima Project) and Total Water Supply Available (TWSA) is described in the Draft EIS. This section elaborates on management of the Yakima Project. The USBR has regulated the Upper Yakima River's streamflow since the early twentieth century by the operation of Keechelus, Kachess, and Cle Elum dams. The USBR has described its flow management strategy for the Upper Yakima River as follows:

"Releases from the storage reservoirs of the Yakima River system are made for three purposes: (1) irrigation demand, (2) flood control, and (3) instream flows. Throughout the late March through October irrigation season, release of water from all six Yakima Project reservoirs is made to meet diversion demands. In the fall, winter, and spring months, releases are made in conjunction with system flood control guidelines, and as the reservoirs are filled, the spring freshet effect on streamflow is significantly modified below the dams.

Each year, as unregulated runoff recedes and irrigation demand increases, a point is reached where irrigation demand exceeds unregulated flow (usually late June or early July), and the system is put on storage control. Early season increases in natural flows below the reservoirs can delay storage control and increase TWSA. During the period of storage control before September, USBR emphasis is placed on meeting lower basin irrigation demands from Cle Elum Lake, and most of the demands above the Cle Elum River are met from Keechelus Lake.

After September 10 and into early October, most of the upper basin demand is met from Kachess Lake. An objective of these releases, beyond continued diversion delivery, is to have spring chinook spawn low in the channel at Martin, Easton, and Roslyn. The target flow goal during this period is to maintain the wetted perimeter of the Yakima River at a minimum width during the so-called "flip-flop" period (see Table 3-1 in Appendix B). When the spring chinook spawn low in the channel, winter flows to incubate their eggs can also be lower without danger of exposing and drying eggs, which allows greater storage for the next year's irrigation supply. "Reduced" spawning flows with "flip-flop" are generally at or above the historic flow levels.

After mid-October, natural runoff is usually sufficient to meet any diversion demands without storage release. During mid-October through March, a portion of reservoir inflow is allowed to pass through to avoid dewatering redds [nests of fish eggs]" (USBR 1999)."

Since 1981, the USBR's System Operations Advisory Committee (SOAC) has assisted USBR on fish-related issues associated with YRBWEP implementation. Flows for maintaining fish life in the Yakima Basin are determined by the USBR, according to the annual prevailing conditions, and in consultation with SOAC, irrigation district managers, and others (USBR 1999). Since 1995, targets for instream flows during the irrigation season have been set annually by SOAC at Parker and Prosser, based on prevailing conditions, to meet flow targets at Parker and Prosser from April through October.

Water Rights

Elements of a water right include the following:

- The water source,
- The water right priority date,
- The purpose of use,
- The point of diversion or withdrawal,
- The period of use,

- The place of use, and
- The maximum annual volume (Q_a) and instantaneous peak rate (Q_i) of water authorized for diversion.

The water right Q_a and Q_i limits how much water can be diverted. The Q_a is described in acre-feet (ac-ft) per year. This volume can only be diverted during the specified period of use. The Q_i for surface water rights is measured in cfs. At any time, the maximum diversion rate must not exceed the Q_i specified in the water right.

City of Cle Elum Water Supply

As described in the Draft EIS, Cle Elum withdraws water from two surface water sources in the Upper Yakima River basin. Cle Elum diversion facilities are located at RM 7.0 of the Cle Elum River and at RM 183 of the Yakima River. Operationally, the City relies on both diversion facilities (intakes). The Yakima River intake is currently the City's primary source; the Cle Elum River intake is currently used as a secondary source. The City is in the process of developing a new treatment plant and water system improvements, including new diversion works associated with both the Cle Elum and Yakima Rivers, designed to serve both the City of Cle Elum and Town of South Cle Elum (described below under Impacts). The new Cle Elum diversion works will function as a source of supply when Cle Elum River flows exceed a specified amount, to be determined annually by USBR and the SOAC.

At present, the City relies on two sources for its municipal supply: (1) a water right owned by the City with a priority date of June 30, 1896 (confirmed by a Conditional Final Order in *State v. Acquavella,* and thereafter modified by Ecology in 2001) in the amount of up to 1,100 ac-ft per year and 3 cfs from the Cle Elum and Yakima Rivers; and (2) a series of water supply agreements with the USBR, beginning in 1932, for a municipal supply derived from the Yakima River system of up to 2,170 ac-ft per year and 3 cfs (based on water rights of the United States). In conjunction with the processing of *Acquavella*, the City is now negotiating the latest in the series of USBR water supply agreements. In the context of *Acquavella* processing, the maximum to be withdrawn by the City pursuant to its 1896 priority right and the USBR agreement is 2,375 ac-ft per year. The yearly amounts of the City's water use have ranged between 3,100 ac-ft per year to 800 ac-ft per year. The latter amount is based on most recent withdrawal experience after the upgrading of the water supply facilities and has yet to be verified in light of longer-term experience.

Trendwest Water Rights

Trendwest owns three surface water rights on the Yakima River and eleven surface water rights on four tributaries between Easton and Ellensburg. A portion of Trendwest's Yakima River water rights is for year-around stockwater use. The remainder of the Yakima River water rights and all of the tributary water rights are for seasonal irrigation. Since being acquired by Trendwest, these fourteen water rights have either remained in use for irrigation or have been temporarily approved for instream flow purposes by the Yakima County Superior Court. Table 3.4-1 summarizes these Trendwest-owned surface water rights (see Appendix B for additional information on Trendwest's surface water rights).

Table 3.4-1: Summary of Trendwest Surface Water Rights

Source	Annual Water Quantity[1,2] (ac-ft)	Instantaneous Quantity (cfs)
Yakima River	4,783	23.4
Big Creek	390	1.5
Teanaway River	1,016	3.8
Swauk Creek/First Creek	1,886	12.0
Total	8,075	40.7

1 Annual water quantity represents the total volume of diversion specified under the water rights.
2 Figures are rounded to the nearest acre-foot.
Source: Trendwest 2001.

3.4.2 Impacts

This section summarizes the potential water supply impacts resulting from implementation of Trendwest's proposed water rights transfer. Since publication of the Draft EIS, the water balance model was updated to reflect changes in the MPR and UGA proposals, recent monitoring data, additional information on onsite (MPR and UGA) irrigation return flow, and tributary irrigation and alluvial return flow information developed by Ecology. The water supply model changes are summarized below, under Cumulative Impacts. A detailed description of the water supply model is included in Appendix B.

The water supply model assesses potential environmental impacts from the proposed transfer of all the water rights. As such, potential direct impacts to tributary streamflows, tributary third party diverters, Yakima River streamflow and mainstem third party diverters are discussed under Cumulative Impacts, below. This analysis supports the intent of Trendwest to supply water for both the MPR and UGA projects. Impacts attributable solely to the UGA would be less than the cumulative impacts described below (consumptive use available to the UGA is calculated as one-third of the consumptive quantity of water available under Trendwest's water rights).

Water Supply Plan

Trendwest proposes to transfer its Yakima River water rights so that they may be exercised for beneficial uses within the MPR and UGA. Trendwest has filed water transfer applications with Ecology and the Kittitas County Water Conservancy Board (KCWCB). The applications filed with the KCWCB seek to transfer Trendwest's mainstem Yakima River irrigation and stock water rights from their current place of use near Ellensburg to diversions year-around at the City of Cle Elum's Yakima and Cle Elum River water supply diversion works. The three mainstem water rights have six water rights transfer applications pending, three of which would serve the MPR and three would serve the UGA. Three mainstem water rights would provide for recreation, irrigation, and domestic beneficial uses within the MPR, and three mainstem water rights would provide for municipal supply purposes within the City of Cle Elum. Trendwest has also filed applications with Ecology to transfer Trendwest's 11 tributary water rights to instream flows. These 11 rights have 22 water rights transfer applications pending, 11 of which would to serve to offset consumptive uses on the MPR and 11 to serve to offset consumptives uses within the UGA. The tributary water rights could be conveyed to Ecology under RCW 90.38, or could be retained by Trendwest as private instream flows. Nearly all of the mainstem and tributary water rights proposed for transfer are seasonal irrigation rights, although a portion of some water rights

are authorized for use for year-around stock watering. All of the proposed transfers would require changes in purpose and place of use; additionally, transfer of the mainstem rights would also require a change in the season of use and points of diversion.

City of Cle Elum

As previously noted, the City of Cle Elum is developing a regional water supply system to serve the needs for the City and its UGA and the Town of South Cle Elum, as well as provide water to the MPR. The City of Cle Elum is in the process of establishing new surface water supply diversion works at one location each on the Cle Elum River and the Yakima River. The new Yakima River intake will be the primary source of supply, with the new Cle Elum River intake also functioning as source of supply. The Yakima and Cle Elum Rivers in the area of Cle Elum's existing diversion works were evaluated, and both require modifications to work satisfactorily under present standards (Geomax 2002). The changes to the new diversion works include: (1) moving the Yakima River diversion works directly downstream of the existing intake, and utilizing the new pipelines located in the Yakima River bed that were installed during emergency stabilization work involving the South Cle Elum bridge over the Yakima River; and, (2) moving the Cle Elum River diversion works approximately 4.9 miles downstream to the vicinity of the Bullfrog Pond area. Both diversion works will include appropriate fish screens. Water transmission lines will connect the two intakes to a new water treatment facility located on property provided by Trendwest in the UGA. The City will own and operate the diversion works and the new water treatment facility.

The City of Cle Elum would supply water for the Business Park; the Community Recreation Center; the school expansion area; and, the cemetery expansion area uses within the UGA from its Yakima River system existing water rights or water supply bases. These UGA uses are hereafter referred to as "non-residential" UGA uses. These are distinguished from all other UGA uses, which are hereafter referred to as "residential." Water users within the UGA residential development would become customers of the City's water utility and receive water service from the City of Cle Elum. Property within the UGA would be included within the City's water supply service area. Under the terms of the City's recently adopted Water Supply Policy, Trendwest and the City have executed a water supply agreement under which Trendwest will convey water rights to the City associated with Trendwest's residential development activities in the UGA. Upon Ecology's final approval of the transfer applications, Trendwest would convey approximately one third of its mainstem water rights to the City of Cle Elum for municipal use within the UGA. The Trendwest water rights would be added to the City's existing municipal water supplies and would provide a year-round water supply for new customers within the UGA in an amount equal to the quantity of the Trendwest water rights that were conveyed to Cle Elum for municipal use applied to the residential portion of the UGA, pursuant to the aforementioned agreement.

Alternative 5

This section describes the balance of water between supply and consumptive use for Alternative 5. The net consumptive use plus return flows represent the water diversion demand side of the analysis. The water rights that Trendwest has purchased represent the water supply side of the analysis. Total and monthly net consumptive use associated with Trendwest development under

Alternative 5 is identified and compared to the consumptive use available to the UGA (calculated as one-third of the consumptive quantity of water available under Trendwest's water rights). Consumptive use for uses for which the City would provide water is also identified.

As described under Impacts, above, the water supply model assesses potential environmental impacts from the proposed transfer of all of Trendwest's water rights. Potential direct impacts to tributary streamflows, tributary third party diverters, Yakima River streamflow and mainstem third party diverters are discussed in the context of cumulative impacts, below. Impacts attributable solely to the UGA would be less than the cumulative impacts described below, because the water rights allocated to the UGA would be one-third of the total Trendwest water rights transferred.

Construction

As described for Alternatives 2, 3, and 4, construction water for development of the UGA under Alternative 5 would likely be acquired from private or public water sources and either trucked into the construction site or diverted from existing utility lines for untreated water (e.g., the MPR untreated water main, if constructed). Use of untreated water during the initial peak construction phase is estimated as ranging from 80,000 to 100,000 gallons per day (gpd) (Shelstad 2000).

Operation

Consumptive Use

The estimated UGA water demands at full buildout are expressed as a total monthly diversion in ac-ft. This is the total amount of water per month that would be diverted from the Yakima River and the Cle Elum River by the City of Cle Elum to supply the UGA demand for treated and untreated water. A portion of the total water volume diverted would return to the rivers, either as treated wastewater or through irrigation or leakage infiltration to groundwater. The difference between the total diversion amount and the return flow amount is the net consumptive use amount, i.e., the actual quantity of water "consumed."

Trendwest has calculated water demands for the UGA at 302 gpd per equivalent residential unit (ERU). Refer to Section 3.16, Utilities, and to the Site Engineering Technical Report (Appendix E) for a detailed discussion of the derivation of water demand per ERU. The total diversion requirement assumes a 100% occupancy rate at full buildout. Table 3.4-2 shows net annual water requirements for Alternative 5 at 302 gpd per ERU.

In accordance with the City of Cle Elum's adopted water policy for the UGA, the City would initially issue certificates of water availability for the project based on the water use rate set forth in the City's Comprehensive Water Plan (October 1997), which is currently 610 gallons per ERU. Cle Elum would monitor the use of both the City's current water customers and new UGA customers so that, when appropriate, adjustments may be made to the ERU average daily demand in the future. The Washington State Department of Health (DOH) design criteria require a minimum of three years of historical consumption data be used to establish ERU average demand. Consequently, the intent of the City would be to re-examine Trendwest's estimated demands once units are constructed and water meter records reflecting water use are available.

Following the three-year data collection period, updated ERU water demands would be incorporated into future required updates of the City's Water Comprehensive Plan. These updated ERU demands may result in the City issuing additional water availability certificates for the UGA from the water initially required by the City for each ERU beyond Trendwest's estimated demands. Alternatively, if the calculated ERU value for development within the UGA underestimates water demand, additional water rights would need to be provided to the City by Trendwest before full buildout of the UGA could be achieved.

Table 3.4-2: Estimated Water Demand at Residential Buildout, 302 gpd/ERU, Annual Ac-Ft, Alternative 5

	Water Demand at 302 gpd per ERU		
	Total Diversion Requirement[1,2] (ac-ft)	Total Return Flows (ac-ft)	Net Water Requirement (Consumptive Use) (ac-ft)
Alternative 5	500.1	370.9	129.2

1 Water demands are calculated based on 100% occupancy at full buildout, and includes allowance for 10% miscellaneous public uses and system losses, based on *Analysis of Water Distribution Systems* (Walski, T. 1984).

2 Water demands do not include the school and cemetery expansion areas, Community Recreation Center, Business Park, or the Reserve area.

Source: W&H Pacific 2002.

Table 3.4-3 identifies total diversion requirement, estimated return flows, and net consumptive use associated with Alternative 5 on a monthly basis. As described above, Trendwest would transfer approximately two-thirds of the water available under its water rights for use within the MPR and the remaining approximate one-third for use within the UGA. This allocation is based upon the approximate quantities of consumptive use estimated for each project, and the quantities of consumptive use available for transfer under the combined water rights. Monthly water requirements would fluctuate on a seasonal basis with the highest consumptive use between June and September (due to irrigation).

Table 3.4-4 compares estimated monthly and total annual demand to net consumptive use in the UGA. For this comparison, the total crop net consumptive use on the UGA was assumed to occur only during the irrigation season in order to evaluate the highest impact scenario.

Table 3.4-4 shows, based on this initial assessment, that the annual net reduction in consumptive use for the UGA would increase the TWSA on an annual basis by approximately 422 to 469 ac-ft. On a seasonal basis, consumptive use deficits attributable to Alternative 5 only could occur outside of the irrigation season between November and February.

Table 3.4-3: Monthly Water Requirements at UGA Residential Buildout in Ac-Ft, Alternative 5

Month	Total Diversion Requirement[1] (ac-ft)	Return Flows[2] (ac-ft)	Net Consumptive Use (ac-ft)
Jan	34.04	30.97	3.07
Feb	31.10	29.39	1.70
Mar	34.04	32.26	1.79
Apr	33.93	31.36	2.57
May	37.41	32.08	5.33
Jun	51.62	30.77	20.85
Jul	67.50	31.47	36.03
Aug	59.33	31.27	28.05
Sep	49.96	29.74	20.22
Oct	34.04	30.90	3.15
Nov	33.06	29.79	3.27
Dec	34.04	30.76	3.28
Total	500.08 ac-ft	370.77 ac-ft	129.31 ac-ft

1 Refer to Section 3.16, Utilities, and to Appendix E for a detailed discussion of the derivation of water demand. Total diversion requirements are summarized in Appendix B, Exhibit E.

2 The return flows are summarized in Appendix B, Exhibit E. However, monthly return flows shown in Exhibit E that would travel subsurface back to the Cle Elum and Yakima Rivers were time delayed and "smoothed" (attenuated) through time. The methods for calculating the groundwater-routed return flows are described in Appendix B, Exhibit F.

Source: W&H Pacific 2001.

Table 3.4-4: Comparison of UGA Consumptive Use and Average Available Consumptive Use in Ac-Ft, Alternative 5

Month	UGA Net Consumptive Use	Likely Range of Average Available Consumptive Use to UGA[1]	Difference
Jan	3.1	1.2 to 2.4	-1.9 to -0.7
Feb	1.7	1.1 to 2.1	-0.6 to 0.4
Mar	1.8	1.2 to 2.4	-0.6 to 0.6
Apr	2.6	51.3 to 51.3	48.7 to 48.7
May	5.3	118.0 to 120.2	112.7 to 114.9
Jun	20.8	108.3 to 121.6	87.5 to 100.8
Jul	36.0	107.4 to 123.0	71.4 to 87.0
Aug	28.1	92.1 to 97.1	64.0 to 69.0
Sep	20.2	50.2 to 53.2	30.0 to 33.0
Oct	3.1	17.9 to 20.4	14.8 to 17.3
Nov	3.3	1.1 to 2.3	-2.2 to -1.0
Dec	3.3	1.2 to 2.4	-2.1 to -0.9
Annual	129.3 ac-ft	551.0 to 598.4 ac-ft	421.7 to 469.1 ac-ft

1 Consumptive use available to the UGA is calculated as one-third of the consumptive quantity of water available under Trendwest's water rights. Long-term, average year, water supply availability would most likely occur within the range shown in this column, calculated from the model balance model's middle and lower bound output (see Water Balance Model, below).

Source: W&H Pacific 2001, and Brown and Caldwell 2002.

City of Cle Elum

As described above, the City of Cle Elum has agreed to provide water from the City's existing water supply to serve non-residential UGA water demands (Water Supply Agreement for Bullfrog UGA, June 19, 2001). Water demand at full buildout for non-residential uses in the UGA is shown in Table 3.4-5. Future provision of water to the school district would be negotiated between Trendwest, the City of Roslyn, and the City of Cle Elum.

Table 3.4-5: Annual Average Water Demand at Buildout, Non-Residential Uses, Annual Ac-Ft[1]

	Treated Water Demand [2] Annual Total (ac-ft)	Untreated Water Demand [3] Annual Total (ac-ft)	Total Water Demand Annual Total (ac-ft)
Alternative 5	100	98	198

1 Includes allowance for 10% miscellaneous public uses and system losses, based on *Analysis of Water Distribution Systems* (Walski, T. 1984).

2 Non-Residential treated water demands include the Business Park and Community Recreation Center. Treated water demand for future school district expansion not included. Future demand would depend on student populations to be determined.

3 Non-Residential untreated water demands include irrigation for the Business Park, Community Recreation Center, and cemetery and school expansion areas.

Source: W&H Pacific 2002.

Indirect Impacts

Indirect impacts of future consumptive use on lands from which Trendwest's water rights would be transferred (fallowed lands) and from induced growth (employment) are discussed in the context of cumulative impacts. Impacts attributable solely to the UGA would be lower than the cumulative impacts identified.

Cumulative Impacts

Since publication of the Draft EIS, the water balance model has been updated. The model was developed to assess potential changes in streamflows in the Yakima River and tributaries where water rights transfers are proposed (see Table 3.4-1). The model was updated to reflect changes in the MPR and UGA proposals, recent monitoring data, additional information on onsite (MPR and UGA) irrigation return flow, and tributary irrigation and alluvial return flow information provided by Ecology.

Trendwest proposes to transfer its Yakima River and tributary water rights for use within the MPR and UGA and has filed water transfer applications with Ecology and the Kittitas County Water Conservancy Board. Trendwest would transfer approximately two-thirds of the water available under its water rights for use within the MPR and the remaining approximate one-third for use within the UGA. Potential impacts to water supply were modeled to reflect the cumulative impact to the environment from development of a Reduced Density MPR and Alternative 5 (see Chapter 2, Description of Alternatives).

Water Balance Model

The water balance model computes mean daily changes in Upper Yakima River basin streamflows due to the proposed transfers of, and changes in, Trendwest irrigation and stockwater water rights. On a daily basis, the model determines changes in Yakima River streamflow by accumulating changes in inflows and outflows, from upstream to downstream. These include changes from the transfer of Trendwest's mainstem Yakima River water rights, and from converting irrigation diversions to instream flows for Trendwest's tributary water rights. The model results are evaluated as monthly average changes. The model was used to analyze and separate the effects of: (1) changes resulting from the shift of consumptive uses and return flows to the UGA and MPR sites (described below, and see Appendix B for details); and (2) changes resulting from converting former irrigation return flows to instream flows at the former points of diversion (these results are described below and in Appendix B, Exhibit A). These effects were evaluated under both average (long-term) and drought year conditions.

The model was used to characterize representative conditions using the best available estimates of streamflow, climate, surface and subsurface flow routing, diversions, and other factors. Nonetheless, as for any model, uncertainty in its predictions does exist. An uncertainty analysis was performed to calculate reasonable bounds to the model's predictions (Appendix B, Exhibit B).

The proposed diversions to supply onsite MPR and UGA consumptive uses and return flows would result in a reduction in Cle Elum River flow below the Cle Elum River diversion (when active) and in Yakima River streamflow at Cle Elum. Irrigation on the MPR and UGA properties would add return flows to the Cle Elum and Yakima Rivers. Other return flows would occur, most significantly from the wastewater treatment plant and from water supply systems leakage. The onsite return flows (MPR and UGA) infiltrating as groundwater would be delayed and "spread" through time (attenuated) before reaching the Cle Elum or Yakima Rivers. These delays and attenuating effects were estimated and are described in detail in Appendix B, Exhibit F. Wastewater treatment plant return flows were considered to be immediate for the purposes of analysis on a monthly average basis. Thus no time delays for wastewater return flows were put into the model. The difference between diversions and return flow (delayed and non-delayed) at any given time would be the net change in mainstem streamflow due to onsite water consumption by the MPR and residential UGA.

Since Trendwest purchased tributary and mainstem water rights, irrigation diversions to, return flows from, and crop evapotranspiration (consumption) within the formerly appurtenant properties ceased. Tributary and mainstem streamflows have already changed due to the water right purchases, which left water formerly diverted to irrigation as instream flow. Subsequently, one result of the transfers is to move Big Creek, First Creek, Swauk Creek, the Teanaway River and, to a lesser extent, the Yakima River in the direction of a more normative condition. The normative flow concept stresses the importance of natural flow paths and hydrology to sustain the conditions to which naturally spawning salmon have adapted over centuries of evolution (see Poff et al, 1997). The water balance model results are summarized to show the mean monthly UGA and MPR water rights transfer changes in Yakima River flow, from the mouth of Big Creek to just downstream of the mouth of Reecer Creek.

For the purpose of assessing impacts to mainstem Yakima River flow, the model was run under average and drought year conditions with only the consumptive portion of the tributary water rights transfers. Although changes in timing of irrigation return flows from the formerly appurtenant properties also change flows as a result of leaving irrigation diversions instream, they were excluded from this series of model runs. This distinction was made to account for the changes in mainstem flow that would result in impacts from the consumptive portion of the water rights transfers, compared to termination of the man-caused irrigation delays which also cause flow changes (see Appendix B, Exhibit A).

The simulation period for the model includes water years 1991 through 1995 and 2001. The period of water years 1992 through 1994 was the worst continuous drought on record for the Yakima River basin. Water availability in 1994 was the worst of these three continuous drought years. Model results from four of the six water years are averaged on a monthly basis to represent long-term, average conditions. Those four years include the relatively average years of 1991 and 1995, and the dry years of 1992 and 1993, so the representation of the long term average by the model is likely conservatively dry. The worst simulated drought years (1994 and 2001) were removed when computing the long-term, average conditions. Mean monthly changes in Yakima River streamflow are computed for water year 2001 to exemplify drought condition results. Water year 2001 was the worst single year drought since 1977. 1977 was the worst single year drought on record in the Yakima River basin.

Cumulative Consumptive Use

Combined water supply requirements for the UGA and MPR are shown in Table 3.4-6. As described above, return flows are primarily a combination of wastewater discharges, leakage, and irrigation return flows. Net consumptive use requirements are the difference between total diversion requirements and return flows. Aside from the stockwater component of Trendwest's mainstem water rights (which are authorized for continuous year-around use), all other water rights owned by Trendwest are seasonal, for use during the irrigation season (which varies by water right). The model was used to determine the extent to which UGA and MPR consumptive use outside the irrigation season was counterbalanced by (1) the consumptive use component of the year-around stockwater rights, (2) the non-delayed return flows (i.e., wastewater discharge) from the UGA and MPR sites, and (3) the time-delayed and attenuated return flows from irrigation and leakage on the MPR and UGA, which would enter the Cle Elum and Yakima Rivers year around. During the irrigation season, the model calculated the extent to which UGA and MPR consumptive use was counterbalanced by the three components described above, plus a fourth component consisting of transferring Trendwest's tributary water rights to instream flows. Monthly water requirements fluctuate on a seasonal basis with the highest consumptive use occurring between June and September (within the irrigation season). The comparison of the cumulative UGA and MPR consumptive use and water availability from Trendwest's water rights is shown in Table 3.4-7. The effects of the UGA and MPR water requirements on tributary and mainstem flows and third-party users are evaluated below.

Table 3.4-6: Monthly Water Requirements in Ac-Ft, UGA Residential and MPR at Buildout

Month	Total Diversion Requirement	Return Flows	Net Consumptive Use
Jan	159.3	158.4	0.9
Feb	145.5	146.3	-0.8
Mar	159.4	157.9	1.5
Apr	170.6	151.8	18.8
May	200.7	155.2	45.5
Jun	369.7	151.0	218.7
Jul	511.5	155.8	355.7
Aug	422.7	154.3	268.4
Sep	338.7	153.7	185.0
Oct	179.7	159.6	20.1
Nov	154.8	155.5	-0.6
Dec	159.5	157.9	1.5
Total	2,971.9 ac-ft	1,857.2 ac-ft	1,114.7 ac-ft

Source: Brown and Caldwell 2002.

Table 3.4-7: Comparison of UGA Residential and MPR Net Consumptive Use and Average Available Consumptive Use in Ac-Ft

Month	Net Consumptive Use (UGA and MPR)	Likely Range of Average Available Consumptive Use to UGA and MPR[1]	Difference
Jan	0.9	3.5 to 7.1	2.6 to 6.2
Feb	-0.8	3.2 to 6.4	4.0 to 7.2
Mar	1.5	3.5 to 7.1	2.0 to 5.6
Apr	18.8	154.0 to 154.0	135.2 to 135.2
May	45.5	354.1 to 360.5	308.6 to 315.0
Jun	218.7	324.8 to 364.9	106.1 to 146.2
Jul	355.7	322.1 to 369.1	-33.6 to 13.4
Aug	268.4	276.3 to 291.3	7.9 to 22.9
Sep	185.0	150.6 to 159.7	-34.4 to -25.3
Oct	20.1	53.6 to 61.2	33.5 to 41.1
Nov	-0.6	3.4 to 6.9	4.0 to 7.5
Dec	1.5	3.5 to 7.1	2.0 to 5.6
Annual	1,114.7 ac-ft	1,652.5 to 1,795.2 ac-ft	537.9 to 680.6 ac-ft

1 Actual availability of water under the water rights varies by year with streamflow. Long-term, average year, water supply availability would most likely occur within the range shown in this column, calculated from the model balance model's middle and lower bound output.

Source: W&H Pacific 2001, and Brown and Caldwell 2002.

Cumulative Tributary Flow Changes

Table 3.4-8 shows the mean monthly changes in tributary streamflows (cfs) for the long-term average year at each point of diversion associated with water rights owned by Trendwest. The flow increases that occur at the points of diversion may not extend all the way downstream to the tributaries' confluences with the Yakima River.

Tributary Third-Party User Impacts

Water right transfers cannot be approved if they impair third-party water rights. Ecology investigated impacts that would result from the full transfer of Trendwest's water rights transfers for the MPR and the UGA to tributary third party water users that take their water downstream of Trendwest's water rights, or share irrigation ditches with Trendwest (Appendix B, Exhibit J). These analyses used streamflow changes over two-week periods calculated by Ecology's consultant, Pacific Groundwater Group (PGG), at the various diversion locations. The locations and averaged time periods for flow changes used by Montgomery Water Group (MWG) differ from the streamflow changes summarized in Table 3.4-8 for the Trendwest points of former diversion, as described in Appendix B, Exhibit J. In general, downstream diverters taking water from the tributaries would experience higher flows during the irrigation season as a result of Trendwest's transfers of irrigation diversions to instream flows. Third party diverters sharing irrigation ditches with Trendwest could experience reductions in flow during the irrigation season, because Trendwest would no longer divert water into the ditches.

Table 3.4-8: Summary of Mean Monthly Changes in Tributary Streamflow under Long-term Average Year Conditions that would Occur from Leaving Trendwest Tributary Water Rights as Instream Flows (Study Years 1991-1993, 1995)[1]

	Big Creek at Lund Ditch Diversion (cfs)	Teanaway River at Walker (cfs)	First Creek at FCWUA (cfs)	Swauk Creek at Hartman[2] (cfs)
Jan	0.0	0.0	0.0	0.0
Feb	0.0	0.0	0.0	0.0
Mar	0.0	0.0	0.0	0.0
Apr	0.0	0.0	1.7	2.5
May	0.9	3.0	3.1	4.6
Jun	1.1	3.1	2.8	4.3
Jul	1.5	3.7	1.8	2.6
Aug	1.5	3.2	1.0	1.1
Sep	0.0	1.1	0.8	0.9
Oct	0.0	0.0	1.0	1.0
Nov	0.0	0.0	0.0	0.0
Dec	0.0	0.0	0.0	0.0

1 Streamflow changes are shown for the tributaries immediately below the Trendwest-owned former diversion points.
2 The change in streamflow in Swauk Creek at Hartman includes the increase in streamflow from First Creek.
Source: Brown and Caldwell 2002.

Hydraulic effects determined by MWG on the tributaries and diversion ditches that would remain in use are presented below. MWG estimated impacts on tributary water elevations, and on ditch diversion water elevations that would be caused by transfer of Trendwest's water rights. MWG's findings are based on field observations, flow measurements, cross-sectional geometry surveys, and continuous monitoring data from the associated tributaries. Seepage analyses were conducted on three of the ditches where Trendwest holds water rights: Lund/Gentry ditch; FCWUA ditch; and Mill Ditch. No flow measurements or monitoring occurred on the Burke-Hartman ditch during 2001 because the ditch was not in use.

Big Creek. MWG determined the hydraulic effects of the Trendwest Big Creek tributary transfer using data MWG collected in Big Creek and at the Darling and Lund diversion ditches during 2001. In Big Creek below the Darling/Lund diversion dam, the change in stage resulting from the transfer of Trendwest's Big Creek water right to instream flow would be graduated, rising from about 0.00 ft in early May to 0.05 ft in the last half of August. These changes in stage would persist downstream to the West Nelson Siding Road. The change in stage in Big Creek at the Ensign Ranch would be less, rising by about 0.04 ft in the last half of August.

Big Creek: Lund/Gentry Ditch. MWG monitored irrigation diversions in the Lund/Gentry ditch weekly over the 2001 irrigation season. A seepage survey was conducted on July 12, 2001. Measurements were taken at side ditches (laterals) used by other irrigators on the ditch. From these activities, MWG estimated that depths in the upper and lower Lund ditches would be lowered by about 0.2 to 0.3 ft after the Trendwest water rights transfer. Lund ditch users have a number of laterals that serve the irrigated properties on the lower end of the ditch as well as a number of storage ponds and irrigation pumps. Changes in flow and depth in the Lund/Gentry ditch during the 2001 season, when Trendwest's water rights were not diverted, did not appear to affect the remaining water users' ability to divert water from the main ditch and associated laterals.

Teanaway River. MWG determined the hydraulic effects of the Trendwest Teanaway River tributary transfers by using USBR data collected during 2001. A rise in water elevation of about 0.01 to 0.16 ft from May to September 15 is predicted. For about one month after the end of the irrigation season (September 16 through October 15), a decrease in flow and a corresponding decrease in water level of 0.01 to 0.02 ft would be expected, because irrigation return flows associated with the Walker properties would be left instream, ending their delayed return to the Teanaway River.

Swauk Creek. MWG determined the hydraulic effects of the Trendwest Swauk Creek and First Creek tributary transfers on Swauk Creek using data collected in Swauk Creek during 2001. The increase in streamflow as a result of the Trendwest water rights transfers on Swauk and First Creeks would be greater than the previous average flows in the creek, especially in late summer. The estimated increase in water level would range from about 0.05 ft to 0.20 ft.

Swauk Creek: Burke-Hartman Ditch. Drought transfers on the Burke-Hartman ditch during the 2001 irrigation season prevented flow measurements at key points along the ditch. Consequently, no data were available to evaluate changes in hydraulic conditions within the Burke-Hartman ditch. Given that Trendwest's water right is a majority of the water allowed to be diverted to the ditch, adverse impact is reasonably assumed, but could not be quantified during the study period.

First Creek. MWG determined the hydraulic effects of the Trendwest tributary transfers on First Creek using data collected during 2001. Increased water levels ranging from about 0.17 ft to 0.39 ft are predicted at the upper First Creek station and from about 0.14 ft to 0.28 ft at the lower First Creek station. Trendwest water rights transfers to First Creek from mid-June to mid-October would cause more flow than previously occurred in the creek, and therefore would result in a modest increase in water level.

First Creek: FCWUA Ditch. MWG monitored weekly irrigation diversions on the FCWUA ditch over the irrigation season. Weekly measurements were taken at the FCWUA flume just downstream of the irrigation diversion and at the Roan/Olsen weir split near the end of the ditch in the Reecer Creek basin. In addition, several seepage surveys were conducted on the ditch during the irrigation season to evaluate seasonal changes in hydraulic conditions along the ditch. Depths in the FCWUA ditch at Green Canyon and upstream of the Roan/Olsen weir are estimated to change by about 0.1 to 0.5 ft and about 0.2 to 0.5 ft, respectively. Changes in depth did not appear to affect the ability of other water users to take water from the FCWUA ditch during the 2001-irrigation season when the Trendwest water rights were not diverted.

Reecer Creek. Water used by the FCWUA is imported into the Reecer Creek subbasin from the Swauk Creek subbasin. Reecer Creek water users are not entitled under state law to rely on the continuation of return flows from water rights imported from another basin. Nevertheless, MWG determined the hydraulic effects of the Trendwest First Creek tributary transfers on Reecer Creek upstream of Dolarway Road using data collected in Reecer Creek during 2001. MWG estimated the reduction in Reecer Creek water level would be approximately 0.6 ft at the Reecer Creek station. This estimate is based on the check structure configuration present from July 11, 2001 to September 26, 2001. Diverters on Reecer Creek change the check structures throughout the irrigation season and from year to year based on daily irrigation needs.

Yakima River/Reecer Creek: Mill Ditch. MWG's analysis of how hydraulic conditions in Mill Ditch would change as a result of the proposed Trendwest water rights transfer were complicated by the relocation of a quarter mile section of Mill Ditch upstream of Hwy 97 in June 2001. This relocation changed both the channel hydraulics and the seepage characteristics in the ditch. These changes, as well as leasing of other water rights during the 2001 irrigation season, preclude the ability to separate the effects of the water rights transfer from the effects of the ditch relocation. In addition, there are a number of check structures on Mill Ditch and on Reecer Creek below the Mill Ditch confluence that facilitate water users' ability to alter water depths and improve delivery to their laterals. Field observations of Mill ditch during 2001 indicate that manipulation of the check structures allow adequate delivery to the remaining water users, even without flows from Trendwest's water right.

Cumulative Impacts to Yakima River Streamflow

This section describes the potential effect of flow changes resulting from Trendwest's water right transfers for the UGA and MPR on USBR operations and impacts to third-party users of mainstem water. As discussed in the Draft EIS, changes in Yakima River streamflow would begin with an increase at the mouth of Big Creek, followed by a reduction at the City's diversions at Cle Elum. The net change downstream of Cle Elum's diversions would be a reduction in streamflow. This net reduction would diminish downstream as contributions from the transferred Teanaway River, First and Swauk Creeks, and Yakima River water rights entered the Yakima River. The change in Yakima River streamflow would vary from month to month and year to year, depending on tributary water supply and project consumptive use, as well as by seasonal variations in the timing of irrigation return flows to the Yakima River.

The water balance model was run for a Reduced Density MPR plus UGA Alternative 5. In order to isolate the effects of consumptive use from leaving former time-lagged tributary irrigation

return flows instream, the non-consumptive tributary irrigation return component was taken out of the equation for some model simulations. These series of simulations were labeled "consumptive use model" runs. This is equivalent to assuming that subsurface irrigation return flows continued as they had prior to the water rights transfers. Diversions are limited by water availability; therefore, actual crop consumptive use is assumed by the model to be less in some circumstances than the potential crop consumptive use would be if an adequate water supply was continuously available throughout the irrigation season.

Consumptive Use Model Run

The long-term, average year impacts and drought year impacts due only to the consumptive use component of the proposed water right changes are shown in Tables 3.4-9 and 3.4-10, respectively. The downstream combined effects of the proposed onsite water use and discontinued offsite irrigation is shown in the right-most column of each table. Mill Ditch is the lowest point in the Yakima River at which the water right transfers to instream flows under the Trust mitigate for consumptive uses on the MPR and UGA site. A negative value in the table in this column indicates a reduction in mean monthly Yakima River system streamflow. A positive value indicates an increase.

There would be no reductions in Yakima River flow outside of the irrigation season below Ellensburg (downstream of Mill Ditch) due to transfer of Trendwest's water rights. The cumulative changes outside of the irrigation season would be about +0.1 cfs, which are relatively small. During lower flow periods of 2001, a drought year, the observed streamflows were often lower than the model-predicted flows in Big Creek, First Creek, and Swauk Creek, though above the lower 90% confidence bounds (see Figures 4.2, 4.4, and 4.6 in Appendix B). Thus, accurate characterization of streamflow during the driest portion of the irrigation season is expected to occur between the middle and lower bound simulations that were run with the model (see the complete results in Tables B.1 and B.3 in Appendix B, Exhibit B). The middle and lower-bound simulations give a relatively narrow range of results for the most probable flow changes. For example, below Mill Ditch the most probable range of change in the spring is a +5.0 to +5.1 cfs in May. The most probable ranges of change during the dry season below Mill Ditch are -0.5 to +0.2 cfs (July), +0.1 to +0.4 cfs (August), and -0.6 to -0.4 cfs (September). All other months showed flow increases for the lowest bound simulations.

During a severe drought such as occurred in water year 2001, a decrease in Yakima River streamflow would occur in July and September below Ellensburg. The September decrease would be about the same as the long-term average. This shows that under both drought and long-term average conditions, water is insufficient at the end of the dry season to fulfill many of Trendwest's water rights. Thus there is little difference between average and drought conditions late in the season. The difference between long-term average and severe drought conditions in July is a reduction of 0.4 cfs, from a 0.2 cfs increase under average conditions to a 0.2 cfs decrease under drought conditions below Ellensburg. The maximum springtime increase in Yakima River flow during a drought year such as 2001 would be 5.0 cfs, which is about 0.1 cfs less than would occur under long-term, average conditions.

Table 3.4-9: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under Long-term Average Year Conditions (Study Years 1991-1993, 1995)[1]

	Downstream[2] Big Creek (cfs)	Downstream Cle Elum River (cfs)	Downstream City of Cle Elum (cfs)	Downstream Teanaway River (cfs)	Downstream Swauk Creek (cfs)	Downstream Mill Ditch Diversion (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.1
Feb	0.0	0.7	0.0	0.0	0.0	0.1
Mar	0.0	0.6	0.0	0.0	0.0	0.1
Apr	0.0	0.6	-0.3	-0.3	0.9	2.3
May	0.4	1.0	-0.3	0.9	3.1	5.1
Jun	0.5	1.1	-3.2	-1.8	0.3	2.5
Jul	0.6	1.2	-5.2	-3.6	-2.3	0.2
Aug	0.6	1.2	-3.8	-2.5	-2.0	0.4
Sep	0.0	0.6	-3.1	-2.7	-2.3	-0.4
Oct	0.0	0.7	-0.3	-0.3	0.1	0.7
Nov	0.0	0.7	0.0	0.0	0.0	0.1
Dec	0.0	0.7	0.0	0.0	0.0	0.1

1 The middle and lower bound simulation results are shown in Tables B.1 and B.3 in Appendix B, Exhibit B.
Source: Brown and Caldwell 2002

Table 3.4-10: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001)

	Downstream Big Creek (cfs)	Downstream Cle Elum River (cfs)	Downstream City of Cle Elum (cfs)	Downstream Teanaway River (cfs)	Downstream Swauk Creek (cfs)	Downstream Mill Ditch Diversion (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.1
Feb	0.0	0.7	0.0	0.0	0.0	0.1
Mar	0.0	0.6	0.0	0.0	0.0	0.1
Apr	0.0	0.6	-0.3	-0.3	0.9	2.2
May	0.4	1.0	-0.3	1.0	3.2	5.0
Jun	0.5	1.1	-3.2	-1.9	0.0	2.1
Jul	0.6	1.2	-5.1	-3.6	-2.6	-0.2
Aug	0.6	1.2	-3.7	-2.5	-2.0	0.3
Sep	0.0	0.6	-3.1	-2.7	-2.4	-0.4
Oct	0.0	0.7	-0.3	-0.3	0.1	0.7
Nov	0.0	0.7	0.0	0.0	0.0	0.1
Dec	0.0	0.7	0.0	0.0	0.0	0.1

Source: Brown and Caldwell 2002

Mainstem Yakima River flows between the City of Cle Elum's diversion downstream to Reecer Creek are reduced at various points between April and September, under both average year and drought year conditions (Tables 3.4-9 and 3.4-10, respectively). In an average year, the greatest monthly reduction in mainstem flow would be 5.2 cfs between the City of Cle Elum diversion and the Teanaway River. Under 2001 drought year conditions, the greatest monthly reduction in mainstem flow due to the proposed transfers would be 5.1 cfs downstream of the City of Cle

Elum diversion. Flow reductions tapering to 0.3 cfs would continue into October between Cle Elum's diversion and Swauk Creek under both average year and drought year conditions.

Combined Model Run

The water balance model was also run to show the flow changes resulting from the consumptive use transfers of the water rights in combination with the change in return flow timing (resulting from leaving formerly diverted water in the tributary channels). These model simulations were named "combined model" results. These "combined" effects are simulated for average and drought years. For the combined model, the long-term, average cumulative change in Yakima River streamflow would be continuously negative from August through the following March below Ellensburg, due to the transfer of irrigation return flows (which were delayed in reaching the Yakima River) to instream tributary flows (which quickly reach the Yakima River and were not time-delayed in the model). During the first half of the irrigation season, the increase in mainstem flow is greater than the consumptive use increase for similar water year conditions. Tables 3.4-11 and 3.4-12 show the results of simulations with these combined effects under long-term average and drought year conditions. As for the "consumptive use" model simulations, the combined model simulations were also run to estimate upper, middle, and lower bounds. Late in the irrigation season the most likely flows would be between the middle and lower bound simulations. The middle and lower bound simulations for the long-term average fit define a narrow range (see Tables B.4 and B.6 in Appendix B Exhibit B). The greatest range of predicted flow change, expressed as a percentage of the range mid-point, is in August, when the most likely range in flow change is predicted to be -1.2 to -0.1 cfs below Reecer Creek.

Table 3.4-11: Mean Monthly Changes in Yakima River Flow from the "Combined Model" (Includes Tributary Irrigation Return Flow Timing Effects) under Long-term Average Year Conditions (Study Years 1991-1993, 1995)[1]

	Downstream Big Creek (cfs)	Downstream Cle Elum River (cfs)	Downstream City of Cle Elum (cfs)	Downstream Teanaway River (cfs)	Downstream Swauk Creek (cfs)	Downstream Mill Ditch Diversion (cfs)	Downstream Reecer Creek (Ellensburg) (cfs)[2]
Jan	-0.2	0.4	-0.2	-0.2	-0.2	-0.1	-0.7
Feb	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Mar	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Apr	-0.1	0.5	-0.5	-0.5	2.3	3.7	3.1
May	0.9	1.5	0.2	3.4	8.2	10.2	9.6
Jun	1.2	1.8	-2.4	-1.1	3.0	5.2	4.6
Jul	1.2	1.8	-4.6	-2.8	-0.5	2.1	1.5
Aug	0.9	1.5	-3.5	-2.5	-1.9	0.5	-0.1
Sep	-0.5	0.1	-3.6	-4.6	-4.1	-2.2	-2.8
Oct	-0.4	0.3	-0.7	-1.4	-0.9	-0.3	-0.9
Nov	-0.3	0.4	-0.3	-0.3	-0.4	-0.3	-0.9
Dec	-0.3	0.4	-0.3	-0.3	-0.3	-0.2	-0.8

1 The middle and lower bound simulation results are shown in Tables B.4 and B.6 in Appendix B, Exhibit B.

2 Inclusion of tributary return flow effects in the "Combined Model" simulations causes a flow difference downstream of Reecer Creek, whereas under the "Consumptive Use Model" simulations no further changes to Yakima River flow occur downstream of the Mill Ditch Diversion.

Source: Brown and Caldwell 2002

Table 3.4-12: Mean Monthly Changes in Yakima River Flow from the "Combined Model" (Includes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001)

	Downstream Big Creek (cfs)	Downstream Cle Elum River (cfs)	Downstream City of Cle Elum (cfs)	Downstream Teanaway River (cfs)	Downstream Swauk Creek (cfs)	Downstream Mill Ditch Diversion (cfs)	Downstream Reecer Creek (Ellensburg) (cfs)
Jan	-0.2	0.4	-0.2	-0.2	-0.2	-0.1	-0.7
Feb	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.6
Mar	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Apr	-0.1	0.5	-0.4	-0.4	2.2	2.9	2.3
May	1.1	1.7	0.3	3.7	8.8	9.6	9.0
Jun	1.4	2.0	-2.2	-1.3	1.9	3.6	3.0
Jul	1.5	2.1	-4.3	-1.9	-0.5	0.9	0.3
Aug	0.7	1.2	-3.7	-3.0	-2.4	-0.2	-0.8
Sep	-0.5	0.1	-3.6	-4.6	-4.3	-2.4	-3.0
Oct	-0.4	0.3	-0.7	-1.3	-0.3	0.2	-0.4
Nov	-0.3	0.4	-0.3	-0.3	-0.4	-0.3	-0.8
Dec	-0.2	0.4	-0.3	-0.3	-0.3	-0.2	-0.8

Source: Brown and Caldwell 2002

Winter Streamflows

Mean monthly mainstem Yakima River flows are either unchanged or slightly increased between Big Creek and Reecer Creek as a result of the consumptive use water rights transfers from November through March, in both average and the 2001 representative drought years (Tables 3.4-9 and 3.4-10). Below the Mill Ditch, Yakima River flows are increased every month during the winter under the long-term average year, and every month during the 2001 representative drought year for both the middle and lower bound simulations (see Table B.1 and B.3 in Appendix B Exhibit B). Thus, there are no reductions in mainstem Yakima River winter streamflows that would result from the proposed transfer as determined by the consumptive use simulations.

Winter flows would be reduced as a result of transferring waters diverted to irrigation returns to instream flows, because the time-delay for water from those irrigation returns to reach the Yakima River would no longer occur. Some of those returns were delayed to return year-around, including during the winter. These reductions in winter flows are shown in Tables 3.4-11 and 3.4-12.

Total Water Supply Available and Reservoir Storage Impacts

TWSA represents the total water supply available for irrigation and other uses. The USBR includes three components in its TWSA calculations:

- Reservoir Storage on April 1
- Natural Streamflow between April 1 and September 30

- Irrigation return flow between April 1 and September 30.[1]

Two components of TWSA are natural streamflow and irrigation return flow between April 1 and September 30. These components of Trendwest's potential TWSA impacts are determined by estimating changes in flow from April 1 through September 30. To evaluate Trendwest's potential TWSA impact, Brown and Caldwell compared the combined effects of Trendwest's proposed water transfers, together with flow timing changes that would result from transferring Trendwest's tributary water rights to instream flows. The analysis was performed over the study period 1991 through 1995 and 2001, the years for which Trendwest had a simulated record incorporating the entire storage control period. Changes in Yakima River mainstem volumes and flows below Reecer Creek were totaled from monthly averages calculated from the model's simulated daily output. The combined water balance model describes mean monthly changes in Yakima River flow during both average year (characterized by 1991, 1992, 1993, and 1995) and drought year (characterized by 2001) conditions. For the average year, the model was also used to establish the most likely and reasonable range of flows to be expected (see Tables B.4 and B.6 in Appendix B, Exhibit B). In an average year, there would be a surplus of approximately 962 to 979 ac-ft during the period from April 1 through September 30, and in a drought year there would be a surplus of approximately 356 ac-ft.

The third component of TWSA is reservoir storage on April 1. Reservoir storage consists of carry over from the previous year together with accumulated runoff. The amount of water in storage also varies because of winter reservoir releases for flood control and to maintain fish egg incubation flows. Reservoir storage is utilized during periods of time when reservoir outflows are greater than reservoir inflows. This period is referred to as the storage control period. Changes in stream flows after October 1 caused by Trendwest's proposed transfers could affect the amount of water in storage at the beginning of the next irrigation season. That is because stream flow deficits from October 1 until the end of that year's storage control period[2] could reduce reservoir storage that is available for TWSA on April 1 of the following year if there is insufficient reservoir refill during the intervening period. Stream flow deficits following the end of storage control until April 1 could only affect reservoir storage if USBR determined it was necessary to release water from storage to compensate for streamflow reductions caused by the instream flow transfers. However, USBR would not operate to release flow as a result of any changes caused by Trendwest's water rights transfers from the beginning of flip-flop until the beginning of the next year's irrigation season. At that time of year, releases from the reservoirs are made to maintain flow targets to incubate salmon eggs. Flows in the Cle Elum River and in the Yakima River below Cle Elum are more than sufficient to meet those targets every year.[3]

When all three TWSA components are taken into consideration, the proposed water transfers would have a positive impact on TWSA. Under long-term average conditions, there would be an annual surplus of approximately 557 to 689 ac-ft. In a drought year (as represented by 2001), there would be an annual surplus of 121.2 ac-ft.

---

[1] See Yakima River Basin Conservation Advisory Group, Draft Basin Conservation Plan for the Yakima River Basin Water Conservation Program, Appendix III-B, page 1 (1997).

[2] For the purposes of this analysis, the storage control period is assumed to end when reservoir inflow again exceeds outflow, which occurs on or about October 20 or each year.

[3] Late season flows in the Yakima River below Cle Elum are a function of reservoir releases to maintain incubation flows in the Easton Reach (C. Lynch, Chief Hydrologist, Yakima Project, USBR, July 18, 2001)

Storage control begins later in a wet year than in a dry year. In a dry year, the transfers could result in a net increase in water supplies available during the storage control period. In a wet year, storage control begins later in the irrigation season, and the early-season surpluses that would result from Trendwest's water rights transfers would not add directly to reservoir storage. Nevertheless, early season increases in natural flows below USBR project reservoirs can delay storage control, and thus benefit TWSA indirectly.[4] In addition, the wetter the year, the more likely it is that flood control releases would occur before the beginning of the next irrigation season. If the following year is a dry year, storage control would begin earlier in the season, and the early irrigation season surpluses from Trendwest's water rights transfers would provide a benefit to the system.

On a year-to-year basis and seasonally within any given year, changes in reservoir storage and TWSA due to Trendwest's proposed transfers would vary because of climatic variation and associated changes in USBR's operations. Even though analysis of conditions over Trendwest's study years of 1991 through 1995 and 2001 indicate no adverse impact is reasonably expected to TWSA, all future circumstances cannot be identified at this time. For that reason, to ensure that TWSA would be protected in any given year in the future, there would be a need for water management, involving coordination with the USBR, City of Cle Elum, and other water users, and an ongoing commitment from both Ecology and the USBR. Water management would ensure that, on an operating basis, Trendwest's consumptive uses and hydraulic impacts to TWSA and other water users are neutral or positive (see Monitoring in Section 3.4.3, Mitigation Measures).

Mainstem Third-Party Users

To evaluate the effect of Trendwest's combined UGA and MPR projects on third-party diverters, the combined model was used to calculate long-term average year and drought year flow simulations to analyze the hydraulic impact potential between Cle Elum and Ellensburg (see Tables 3.4-11 and 3.4-12).

Changes to water levels were evaluated for diversions from the mainstem Yakima River reach between Cle Elum and Ellensburg in the report *Review of Yakima River Diversion Intakes – Cle Elum to Ellensburg Reach; Analysis of Potential Hydraulic Impacts of Proposed Relocation of Trendwest Point of Diversion* (Northwest Hydraulics Consultants, Inc, 2002) (Appendix B, Exhibit K). Water elevation differences were estimated from the model's calculated mainstem flow changes at each of the tributary inflow locations. Hydraulic impacts were evaluated (from upstream to downstream) for Younger Ditch, Wallace Ranch (Bristol Flats), Westside Irrigation Diversion, Thorp Diversion, Packwood Diversion, Cascade Irrigation Diversion, Mill Ditch, and the Ellensburg Water Company Diversion (Figure 3.4-2). Results of the analysis showed the following:

Younger Ditch Diversion Site. Water levels at the inlet of the diversion channel would be lowered by 0.00 to 0.01 feet as a result of the Trendwest water rights transfers. The greatest difference would occur in September when the diversion as a percentage of flow is the highest.

[4] Yakima Field Office, U.S. Bureau of Reclamation, *Draft Yakima Field Office Project Operations Outlook: 2001 Irrigation Season* 8 (May 2, 2001).

Wallace Ranch (Bristol Flats) Diversion Site. The water levels at the inlet of the diversion channel after the Trendwest water rights transfers would range from 0.01 feet higher early in the irrigation season to 0.01 feet lower in September, when the diversion as a percentage of total flow is the highest.

Westside Irrigation Diversion Site. The Trendwest water rights transfers would result in water level changes ranging from a rise of 0.02 feet to a lowering of 0.01 feet at the diversion site if ecology blocks (large concrete blocks) are not in place. With the ecology blocks in place the simulated differences in water levels at the diversion site would range from an increase of 0.03 feet to a lowering of 0.01 feet in September, when the diversion as a percentage of flow is the highest.

Thorp Diversion Site. Water levels at the inlet to the Thorp side channel diversion from the Yakima River would increase by 0.02 feet early in the irrigation season and fall by 0.01 feet in September, when the diversion as a percentage of total mainstem flow is the highest. Based on this water level change, the water rights transfers may result in a small increase or decrease in water levels at the Thorp diversion channel, but the largest computed reductions would be 0.01 feet or less.

Packwood Diversion Site. Yakima River water levels at the inlet to the side channel diversion after the water rights transfers would increase by 0.04 feet early in the irrigation season and decrease by 0.02 feet later in the season in September, when the diversion as a percentage of total flow is the highest. Based on this analysis the Trendwest water rights transfers may result in less than a 0.02-foot drop in water levels at the inlet to the Packwood diversion channel over the irrigation season.

Cascade Irrigation Company Diversion. Considering the ongoing geomorphic processes at this site, the history of human induced modifications to this reach of the river, and Cascade Irrigation's current program of in-channel structure placement, the impact of Trendwest's proposed diversion cannot be reasonably estimated at this time. However, any potential impacts would be minimal compared to changes that are occurring due to natural river processes.

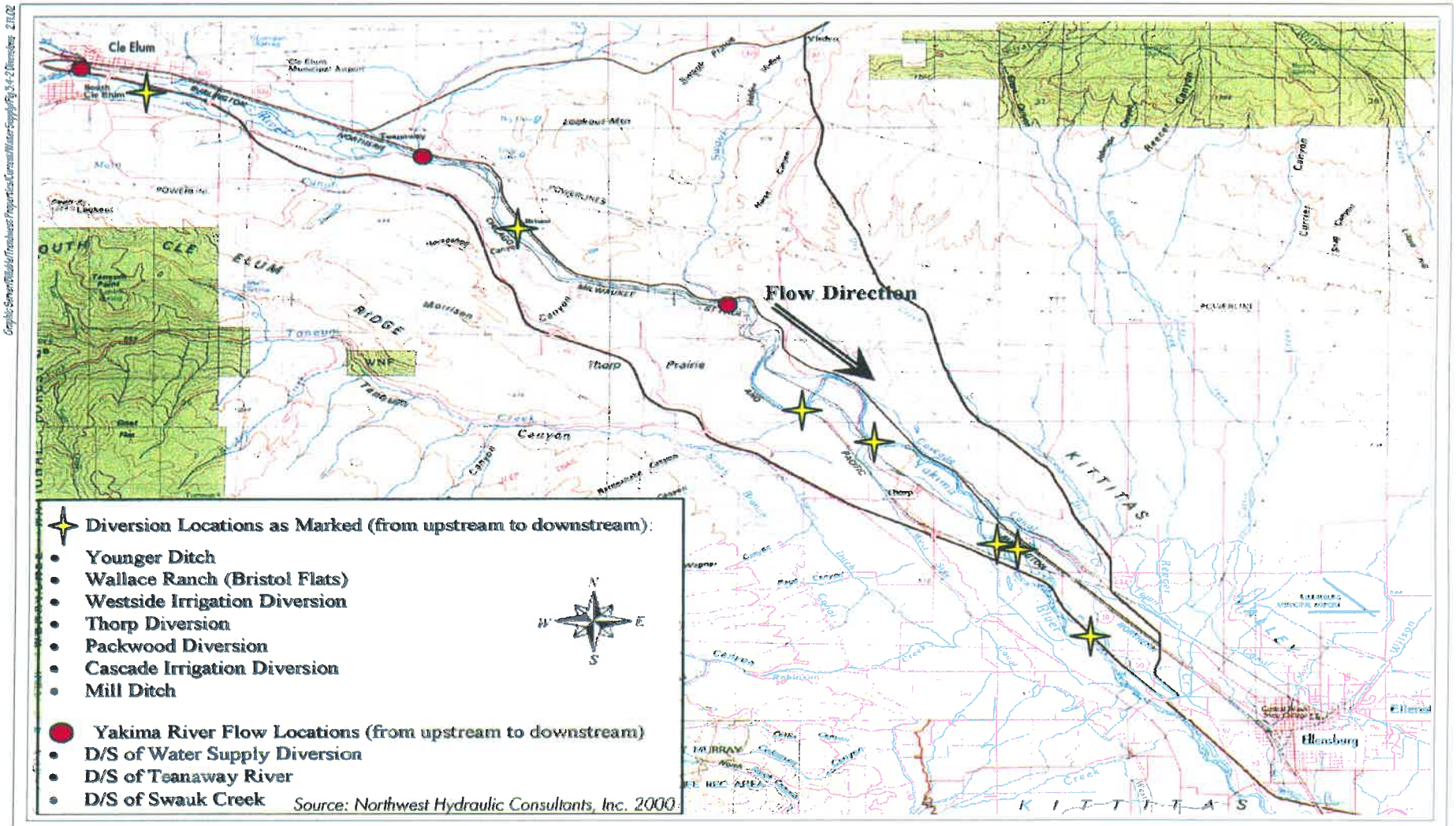
Mill Ditch. Because flows downstream of the Mill Ditch diversion would theoretically be the same in both the current and proposed conditions it seems unlikely that the Trendwest proposal would result in any significant impacts.

Ellensburg Water Company Diversion. Because of the diversion dam across the Yakima River and the design of this diversion structure, the potential for impacts from a small flow reduction at this location is negligible.

Cumulative Indirect Impacts

Cumulative Groundwater Table Elevation Changes

Third parties who divert water from groundwater wells could experience lower groundwater elevations caused by ending irrigation return flow recharge to groundwater beneath lands fallowed by Trendwest's water rights transfers. Ecology examined effects that third parties with



Not To Scale

FIGURE 3.4-2

YAKIMA RIVER DIVERSION LOCATIONS, CLE ELUM TO ELLENSBURG

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

SHAPIRO & ASSOCIATES, INC.

1981059

H-01

wells near lands fallowed by the water rights transfers might experience (Appendix B, Exhibit I). Impacts to groundwater levels are evaluated below for Big Creek, Teanaway, First/Swauk, and Reecer basins. The evaluation of impacts is limited to general observations about wells but does not estimate impacts to any particular well.

Big Creek Basin

PGG, Ecology's consultant, estimated the maximum seasonal decline in groundwater resulting from Trendwest's water rights transfers would be 1.5 to 2.0 feet. This area of maximum decline would be roughly circular with a diameter of approximately 1.5 miles, centered in the northern half of Section 28, Township 20, Range 14 East, Willamette Meridian, however groundwater level declines of this order are small relative to the ability of most wells to gather water. Wells extending only a small distance into the top of the aquifer could experience greater impact.

Teanaway River Basin

PGG estimated the maximum seasonal decline in groundwater resulting from Trendwest's water rights transfers would be 1.6 feet. This maximum decline is predicted to occur in Section 26, Township 20 North, Range 16 EWM. Impacts to most vicinity well yields from this level of change would range from none to very minor at some times of the year. Very shallow (hand dug) wells may already be marginal and these changes in groundwater elevation could have a greater impact.

First/Swauk Creek Basin

PGG estimated the maximum seasonal decline in groundwater resulting from Trendwest's water rights transfers would range from 3.0 feet to 7.0 feet, depending on the ease of water movement through the soils (hydraulic conductivity). Coarser soils would have less seasonal decline. The change would be confined to an area approximately 1.25 miles in length in Hidden Valley. Impacts to vicinity well yields from this level of change would range from none to very minor at some times of the year, although shallow wells extending only into the upper portion of the aquifer could experience greater impact.

Reecer Creek Basin

The maximum seasonal decline in groundwater resulting from the Trendwest water rights transfers in the Reecer Creek subbasin could not be determined. Drilling information from area well logs was too vague and other sources of hydrogeologic information were not available. The change in field/ditch seepage from the formerly irrigated properties associated with Trendwest water rights would be approximately 1 cfs during the irrigation season. This translates to an annual average recharge of 0.56 cfs. Seepage from the FCWUA main ditch would also reduce by about 0.1 cfs. Some localized reduction in groundwater elevations could be reasonably expected to occur, but related effects could not be assessed from available information.

Cumulative Housing Consumptive Use

Construction and operation of the MPR and UGA would generate local (within Kittitas County) and non-local (outside Kittitas County) employment demand. The increased economic activity would produce a ripple effect through the Kittitas County economy and result in induced job opportunities. Employment in-migration would occur to meet demand and new households would locate in Kittitas County. The new households would increase consumptive use. These impacts would accrue both from Trendwest residential development within the MPR and UGA and from the Business Park within the UGA and are analyzed in detail in the *Employment-Induced Water Demand Analysis*, included as Appendix C of the Final EIS.

Projected in-migrant households were distributed within the County based on the Kittitas County Council of Government's 20-year population allocation projections (Kittitas County Countywide Planning Policies (CWPP) as amended, 1999). To be conservative, this analysis reflects a study area determined most likely to accommodate future population based on existing growth patterns and the location of the MPR and UGA. The study area extends from Snoqualmie Pass to Ellensburg. Households are not distributed to the area east of Ellensburg, including Kittitas and its UGA. As such, the identified in-migrant households allocated to Kittitas and its UGA in Table 3.4-13 are proportionally reallocated to the four other incorporated jurisdictions and UGAs. The distribution of projected in-migrant households is shown in Table 3.4-13.

Table 3.4-13: Distribution of In-Migrant Households within Kittitas County Jurisdictions excluding Kittitas/UGA

Jurisdiction	Allocation Percentage (1999 CWPP percentages after redistribution of Kittitas/UGA)	Number of In-Migrant Households (MPR Reduced Density and UGA Alternative 5)[1]	Number of In-Migrant Households (Business Park)[2]
Cle Elum/UGA	19.84%	231.1	158.7
South Cle Elum/UGA	1.57%	18.3	12.5
Roslyn/UGA	1.04%	12.1	8.4
Ellensburg/UGA	36.55%	425.8	292.4
Kittitas/UGA	0.0%	0	0
Unincorporated County	26.0%	302.9	208.0
Urban Growth Nodes	15.0%	174.8	120.0
Total	100.0%	1,165.0	800.0

1 Project Year 10 is the year used to calculate projected consumptive use. Employment in-migration is projected to stabilize after Year 10.

2 Project Year 30 represents full buildout conditions and is the year used to calculate projected water demand for the Business Park.

Source: Kittitas County CWPP 1999; Johnson-Gardner, 2001; Mentor Law Group, PLLC 2001.

As described in the Draft EIS, total water consumption would be influenced by the distribution of households between incorporated and unincorporated areas in Upper and Lower Kittitas County. This is because consumptive use varies throughout the County based on factors including different domestic water consumption rates among utility districts and climate variations that affect irrigation demands for crops and lawns.

In-Migrant Household Consumptive Use - Unincorporated Areas

Consumptive use for unincorporated in-migrant households was estimated by applying the same method for "per household" consumptive use as was used for the Cle Elum UGA Draft EIS, Water Supply Technical Report. Table 3.4-14 shows consumptive use estimates from Trendwest-related in-migration by subbasin within the unincorporated study area. Table 3.4-15 shows consumptive use estimates from Business Park in-migration by subbasin within the unincorporated study area.

Table 3.4-14: Consumptive Use, In-migrant Households Associated with Trendwest Employment—Unincorporated Areas

Households	Percent		Total Consumptive Use in ac-ft/yr
302.9	26%	Subbasins	
13.3	1.1	Subbasin No. 1 (Cle Elum)	10.7
43.3	3.7	Subbasin No. 2 (Easton)	35.0
36.0	3.1	Subbasin No. 3 (Teanaway)	29.1
12.1	1.0	Subbasin No. 4 (Swauk)	9.79
20.9	1.8	Subbasin No. 5 (Elk Heights)	16.9
10.0	0.9	Subbasin No. 6 (Taneum)	13.6
40.3	3.5	Subbasin No. 7 (Reecer)	55.0
21.5	1.8	Subbasin No. 8 (Thorp)	29.3
100.3	8.6	Subbasin No. 9 (Wilson-Naneum)	137
6.4	0.5	Subbasin No. 12 (Shushuskin)	8.68
		Total Subbasins	345
174.8	15%	Growth Nodes	
41.2	3.5	Subbasin No. 1 (Cle Elum) (Ronald) [1]	
90.9	7.8	Subbasin No. 2 (Easton) (Snoqualmie Pass & Easton)	73.5
42.5	3.6	Subbasin No. 8 (Thorp) (Thorp)	57.9
		Total Growth Nodes	131
		Total Unincorporated Areas	476

1 Consumptive use from the Ronald Urban Growth Node is calculated as incorporated consumptive use because Ronald receives water from Kittitas County Water District #2, which wholesales water from the City of Roslyn.

Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

Table 3.4-15: Consumptive Use, In-migrant Households Associated with Business Park In-Migration—Unincorporated Areas

Households	Percent		Total Consumptive Use in Ac-Ft/yr
208.0	26%	Subbasins	
9.2	1.1	Subbasin No. 1 (Cle Elum)	7.4
29.7	3.7	Subbasin No. 2 (Easton)	24.0
24.8	3.1	Subbasin No. 3 (Teanaway)	20.0
8.3	1.0	Subbasin No. 4 (Swauk)	6.7
14.4	1.8	Subbasin No. 5 (Elk Heights)	11.6
6.9	0.9	Subbasin No. 6 (Taneum)	9.4
27.7	3.5	Subbasin No. 7 (Reecer)	37.8
14.8	1.8	Subbasin No. 8 (Thorp)	20.2

Table 3.4-15: Continued

Households	Percent		Total Consumptive Use in Ac-Ft/yr
68.8	8.6	Subbasin No. 9 (Wilson-Naneum)	94.0
4.4	0.5	Subbasin No. 12 (Shushuskin)	6.0
		Total Subbasins	237
120.0	15%	Growth Nodes	
28.3	3.5	Subbasin No. 1 (Cle Elum) (Ronald) [1]	
62.4	7.8	Subbasin No. 2 (Easton) (Snoqualmie Pass & Easton)	50.4
29.2	3.6	Subbasin No. 8 (Thorp) (Thorp)	39.8
		Total Growth Nodes	91.2
		Total Unincorporated Areas	327

1 Consumptive use from the Ronald Urban Growth Node is calculated as incorporated consumptive use because Ronald receives water from Kittitas County Water District #2, which wholesales water from the City of Roslyn.
Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

In-Migrant Household Consumptive Use - Incorporated Areas

Tables 3.4-16 and 3.4-17 show consumptive use estimates from Trendwest-related in-migration and Business Park in-migration in incorporated areas. Consumptive use for in-migrant households in incorporated areas was determined based on estimates of "per household" water use from each jurisdiction's latest water system comprehensive plan. In many cases, data for these water systems are based on estimates from the early to mid-1990s (see Appendix F for details). Where data were available for per capita, per day consumption, a factor of 2.4 was applied to reach a per-household number.

Table 3.4-16: Consumptive Use, In-migrant Households Associated with Trendwest-Related In-Migration, Incorporated Areas

Households	Percent	Trendwest-Related In-migration (MPR and UGA)	Total Consumptive Use Ac-Ft/yr
687	59%	Incorporated Areas [1]	
231.1	19.84	Cle Elum / UGA	26.3
18.3	1.57	South Cle Elum / UGA	3.0
415.8	36.55	Ellensburg / UGA	56.3
12.1	1.04	Roslyn / UGA	1.7
41.2		Ronald UGN [2]	2.4
		Total Incorporated Areas	89.7

1 The households allocated to the Kittitas UGA by the KCCOG were reallocated across the other UGAs because Kittitas was not a likely location for the in-migrant households.
2 Consumptive use from the Ronald Urban Growth Node is calculated as incorporated consumptive use because Ronald receives water from Kittitas County Water District #2, which wholesales water from the City of Roslyn.
Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

Table 3.4-17: Consumptive Use, In-migrant Households Associated with Business Park In-Migration, Incorporated Areas

Households	Percent	Business Park-Related In-migration	Total Consumptive Use Ac-Ft/yr
472.0	59%	Incorporated Areas[1]	
158.7	19.84	Cle Elum / UGA	18.1
12.5	1.57	South Cle Elum / UGA	2.1
292.4	36.55	Ellensburg / UGA	38.6
8.4	1.04	Roslyn / UGA	1.2
28.3		Ronald UGN[2]	1.6
		Total Incorporated Areas	61.6

1 The households allocated to the Kittitas UGA by the KCCOG were reallocated across the other UGAs because Kittitas was not a likely location for the in-migrant households.

2 Consumptive use from the Ronald Urban Growth Node is calculated as incorporated consumptive use because Ronald receives water from Kittitas County Water District #2, which wholesales water from the City of Roslyn.

Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

Trendwest. Trendwest has agreed to mitigate for increases in the consumptive use of water in the Upper Yakima Basin caused by Trendwest's development activities, including increased water consumption from induced offsite housing. The City of Roslyn was projecting a water right deficit in meeting its projected future water demand without the Trendwest projects. As part of the RIDGE Settlement Agreement, Trendwest has agreed to mitigate for increased water demands on Roslyn resulting from induced offsite development within Roslyn (see Appendix B and Mitigation Measures, below).

City of Cle Elum. Table 3.4-15 identifies that portion of in-migration that would be attributable to the Business Park development, and distributes that induced growth throughout the County. Of that induced growth, approximately 59% (472 out of 800) of the induced household growth would locate within existing UGAs and be served by the applicable water purveyors (Table 3.4-17). Approximately 20% of that induced growth is allocated to the City of Cle Elum's UGA and would be served by a combination of existing City water supply and the Trendwest water rights that will be transferred to the City. The remaining 41% (328) households would locate in the unincorporated county or within unincorporated growth nodes (Table 3.4-15). Projected consumptive use of these Business Park-induced households (total unincorporated area) is projected to be approximately 327 ac-ft per year. Water supply for these households would not be within the City of Cle Elum water service area and would have to come from other water purveyors or other existing, confirmed water rights—either onsite, or properly transferred from some other existing right.

The households locating in unincorporated areas of the county would most likely rely on small public water systems or individual wells. Any use of surface water to meet this demand would necessarily have to rely on existing water rights (as opposed to new water rights) because the Yakima River system has been, by every practical measure, fully appropriated during the latter half of the irrigation season since the early 1900s. Additionally, all remaining water that might be available for appropriation under new water rights has been withdrawn from appropriation, pursuant to RCW 90.40.030, by various actions of the United States.

Small ground water withdrawals for non-commercial irrigation and domestic purposes up to 5,000 gallons per day can be anticipated as a way of meeting the projected needs in unincorporated areas of the county. The effects on the Yakima River system would depend on the degree to which the ground water aquifer is connected to the river, and would vary in accordance with the distance from the well to the river, the aquifer characteristics, and the rate and volume of water pumped to meet the demand. For these reasons, no new surface water permits for year-round residential use and only ground water withdrawals that are exempt from permitting (see RCW 90.44.050) can be reasonably expected to meet this demand.

The City of Cle Elum's water rights are not available or proposed to meet the needs on this in-migration induced growth, other than for that portion located within the Cle Elum UGA and water service area.

Groundwater Consumptive Use and Stream Base Flow Comparison

Consumptive use associated with in-migrant households in unincorporated areas are compared with the estimated mean annual subbasin base flows in Table 3.4-18. In-migrant households associated with the Business Park are included in consumptive use estimates.

Mean annual subbasin baseflow was estimated at 13% of the mean annual precipitation in the subbasin times the total area of the subbasin. The 13% estimate is consistent with information contained in Ecology's Water Supply Bulletin 60 - *Estimated Baseflow Characteristics of Selected Washington Rivers and Streams* (Ecology 1999).

Table 3.4-18: Subbasin Groundwater Consumptive Use and Base Flow Comparison, MPR Reduced Density and UGA Alternative 5, including Non-Residential UGA Uses

Subbasin Number	Total Consumptive Use from In-Migrant Households ac-ft/yr[1]	Mean Annual Base Flow ac-ft/yr	Total Consumptive Use as a Percentage of Base Flow
Subbasin No. 1 (Cle Elum)[2]	18.2	115,076	0.02%
Subbasin No. 2 (Easton)[2]	183	143,986	0.13%
Subbasin No. 3 (Teanaway)	49.1	66,687	0.07%
Subbasin No. 4 (Swauk)	16.5	23,624	0.07%
Subbasin No. 5 (Elk Heights)	28.5	13,116	0.22%
Subbasin No. 6 (Taneum)	23.0	29,542	0.08%
Subbasin No. 7 (Reecer)	92.7	13,248	0.70%
Subbasin No. 8 (Thorp)[2]	147	7,099	2.07%
Subbasin No. 9 (Wilson-Naneum)	231	22,144	1.04%
Subbasin No. 12 (Shushuskin)	14.6	2,033	0.72%
Total	804	436,555	0.18% Avg. Annual[3]

Source: Brown & Caldwell 2001.

1 Consumptive use calculated for in-migrant households includes those associated with the Business Park.

2 Consumptive use calculations for Subbasin Nos. 2 and 8 reflect water use from both unincorporated and urban growth node households. UGN households for Subbasin 1 (Ronald) are reflected in incorporated consumptive use because Ronald receives apart of its water from the City of Roslyn.

3 Average annual percentage was calculated by summing the total consumptive use for all of the subbasins and dividing this by the mean annual basin flow for all the subbasins.

The analysis shows that groundwater consumptive use represents a small percentage of mean annual base flows in individual subbasins and an average annual percentage of approximately 0.18% (MPR and UGA Alternative 5, including the Business Park) for the basins combined (see Appendix C). This percentage is small and supports a reasonable conclusion of no significant adverse impact.

The potential impact on tributary streamflow is dependent on many factors such as the amount of base flow that discharges to an individual tributary stream, whether hydraulic continuity exists between the groundwater and the tributary, distance of groundwater withdrawals from the tributary, and the specific number, location, depth, and screened interval of future groundwater withdrawals within a basin. Where hydraulic continuity exists, the magnitude of this impact would depend on the percentage of groundwater base flow that would be pumped and consumed. Due to the complexity and uncertainty related to any analysis that would attempt to quantify all these variables, average annual values of consumptive groundwater use and tributary baseflow were used to provide a basis for assessing potential magnitude of impact to tributary streamflows for all the basins. This analysis concludes there is no significant or measurable impact on tributary streams. It is not likely that the conclusion of no adverse impact would be affected by speculating about the placement of future exempt wells and their hydraulic continuity to the streams draining each basin. However, some portion of the total groundwater base flow within each subbasin would discharge into tributaries where hydraulic continuity exists, and some portion of the wells associated with indirect/induced households within unincorporated Kittitas County could withdraw groundwater that is in hydraulic continuity with tributaries. Potential impacts on tributary streamflow would likely be lower during the high flow season and would be greater during the later summer months, when streamflows are more dependant on baseflow and instantaneous rates of baseflow are lower than the average annual baseflow. Summer low flows measured in the Teanaway River from 1999 to 2001 at the Forks gage ranged from 8 to 16 cfs, which is about 9% to 17% of the annual average baseflow of 92 cfs. Summer baseflow can be substantially lower than average annual baseflow. Consequently, the relative impact of reduced groundwater availability can be greater during the summer flow-flow season.

On the Teanaway River, where the lower Teanaway is known to be in hydraulic continuity with groundwater, a worst-case scenario was assumed for the purposes of evaluating potential magnitude of impact during the summer low flow season. All of the in-migrant wells were assumed to be shallow and located next to the lower reach of the river, even though the available land supply would not support this intensity of development. In that case, the consumptive use as a percentage of base flow during the summer low-flow season would be approximately 0.57%. This more specific "worst case" seasonal analysis shows a higher consumptive use impact during the low flow season due to the assumed well placement and due to seasonally high consumptive water use for irrigation of lawns and gardens.

Fallowed Lands

Trendwest purchased water rights appurtenant to approximately 888.3 acres of land in upper Kittitas County. Most of the property from which Trendwest purchased water rights has been or is being converted from agricultural use and subdivided to residential use, as described in Appendix B, Exhibit E.

Development of land from which Trendwest purchased water rights is functionally independent from Trendwest's development proposals; however, development of the properties from which Trendwest has transferred water rights might possibly result in new groundwater withdrawals within the basin in the form of small wells exempt from permitting. Use of these small groundwater withdrawals would result in an increase in the consumptive use of water in the basin.

Table 3.4-19 shows consumptive use from residential development of formerly irrigated properties in unincorporated areas. Increased consumptive use was calculated based on the average per household domestic water use less domestic return flows plus irrigation of one-half acre of lawn or garden, as allowed for groundwater withdrawals exempt from permitting under RCW 90.44.050. The average per household domestic water use assumes a domestic diversion of 240 gallons per household (100 gallons per person per day times 2.4 persons per household), less 80% return flows.

Table 3.4-19: Consumptive Use from Future Use of Fallowed Lands

Subbasin	Lots[1]		Total Consumptive Use (Ac-Ft/yr)
	Less than 20 acres	More than 20 acres	
Big Creek (Gentry)	4	0	3.3
Teanaway R (Walker)	15	1	17.3
Swauk Creek (Martin)	6	2	12.5
First Creek (Nelson)	4	4	15.0
First Creek (Roan)[2]	0	0	0.0
Total[3]	29	14	48.1

1 Consumptive use for parcels 20 acres or larger was doubled, in keeping with the Kittitas County land use code, which allows two residential units on parcels of that size.
2 The current owner of this property anticipates maintaining its use as range land for the foreseeable future.
3 Excludes the City of Ellensburg-owned fallowed lands, discussed below.
Source: Brown & Caldwell 2001; Mentor Law Group 2001.

The City of Ellensburg now owns the 291 acres previously irrigated under the Pautzke water rights now held by Trendwest. This land is within the city limits and is not presently being used. Although the City has not formalized any plans for its use and has contemplated its sale, it has been proposed that approximately 96 acres be used for the development of a public baseball and recreation complex, 81 acres of which would be irrigated. Additionally, the City has prepared a *Comprehensive Flood Management Hazard Plan,* February 1999. The City proposes that approximately 60 acres in the northerly two-thirds of this property be retained by the city as flood way and that the dike presently east of Reecer Creek be relocated to the westerly edge of the built-up portion of West Ellensburg. It is anticipated that the 81 irrigated acres will obtain water through the exercise of existing rights from the City's municipal water system, in an amount estimated to be 216 ac-ft per year in terms of consumptive use.

Sum of Cumulative Direct and Indirect Consumptive Impacts

This section describes cumulative impacts to consumptive uses of water that would directly or indirectly arise from the MPR and the UGA. The sum of cumulative direct and indirect

consumptive uses were evaluated from annual water demands and monthly diversion entitlements of other water users, and considered the effect of Trendwest's cumulative development proposals on USBR's ability to meet its water delivery requirements.

Return flows from upper basin water diversions are available for use further downstream, but water consumed anywhere in the Yakima system is lost to other downstream water users. For this reason, this section evaluates the balance between water consumption associated with currently authorized uses of Trendwest's water rights against water consumption for the UGA (residential uses) and MPR, together with water consumption on fallowed lands and from induced development. Trendwest has agreed to obtain water to mitigate for some indirect uses in excess of what typically could be required under SEPA, through various agreements as follows:

- The Cooperative Agreement between Trendwest, the Washington Department of Fish and Wildlife (WDFW), and the Yakama Nation (described below) obliges Trendwest to provide funding to acquire additional water rights to augment instream flows, in part to compensate for indirect water usage on lands fallowed by transfer of Trendwest's mainstem water rights, and also in part to compensate for water used by direct housing growth in unincorporated areas (households of construction workers and employees directly related to the MPR and residential UGA).

- The RIDGE Settlement Agreement obliges Trendwest to provide water rights to augment instream flows, in part to compensate for indirect water usage on lands fallowed by transfer of Trendwest's tributary water rights, and also in part to compensate for water used by indirect housing growth in unincorporated areas; to provide water to Roslyn for induced housing within Roslyn's municipal service area; and to provide water for expansion of the Cle Elum-Roslyn School District #404.

The maximum possible direct and indirect consumptive uses associated with Trendwest's water rights exceed the quantity of water physically available to meet the combined obligations Trendwest has agreed to as described above (Table 3.4-20). Indirect consumptive use from fallowed lands and induced offsite housing are approximately equal to the consumptive use associated with Trendwest's development proposals. The net water supply (i.e., annual quantity of water available for consumption under Trendwest's water supplies, less the amount consumed by the development proposals and indirect water demands) creates a deficit of approximately 146 to 288 ac-ft. Table 3.4-20 shows a water balance for the proposals. Available water supply figures were estimated from the central values for an average period characterized by two dry and two average years. However, as with all other model simulations, and as described above, uncertainty exists.

Table 3.4-20 Trendwest's Average Annual Consumptive Use and Supply Balance for Direct and Indirect Uses, in Ac-Ft

Net Consumptive Use		Available Water Supply[1]		
Direct Consumptive Use		Water Rights	Most Probable Lower Range[2]	Most Probable Upper Range[2]
		Tributary Water Rights		
Reduced Density MPR	981.7	Big Creek	124.7	126.5
UGA Alt. 5 (Residential)	129.2	Teanaway River	349.9	351.8
Direct Subtotal	*1,110.9*	Swauk Creek	366.8	486.6
Indirect Demands		*Tributaries Subtotal*	*841.4*	*965.0*
Fallowed Lands[3]	264.1	Mainstem Water Rights		
Induced Housing	565.7	Yakima River	811.1	830.2
Indirect Subtotal	*829.8*	*Mainstem Subtotal*	*811.1*	*830.2*
Cumulative Demands	***1,940.7***	***Total Supply***	***1,652.5***	***1,795.2***
Average Net Water Supply Likely Range			[-288.2]	[-145.5]

1 Model-predicted water supply for Trendwest's water rights incorporating water availability under the long-term average year conditions (Appendix B).

2 Long-term, average year, water supply availability would most likely occur within the range shown in these two columns, calculated from data in Tables B.1 and B.3 in Appendix B, Exhibit B.

3 Includes the City of Ellensburg-owned fallowed lands (216 ac-ft) and the fallowed lands listed in Table 3.4-20.

Source: Brown & Caldwell 2002; W&H Pacific 2001; Mentor Law Group 2001

3.4.3 Mitigation Measures

Mitigation measures for potential water supply impacts that could occur from implementation of Trendwest development within the UGA are described below. Mitigation measures involving tributary water rights, maintenance of instream flows, and third-party water users also apply to potential cumulative direct and indirect impacts from providing water supply to the proposed MPR and UGA developments combined. Additional mitigation measures for impacts related to water demand are addressed in Section 3.16, Utilities.

As discussed above, Trendwest has entered into two environmental stewardship agreements affecting water supply and consumptive use in the Yakima River Basin. These are the following:

Washington Department of Fish and Wildlife and Yakama Nation Cooperative Agreement

As part of its water supply strategy, Trendwest has entered into a Cooperative Agreement with WDFW and the Yakama Nation to address agency and tribal concerns about environmental impacts from Trendwest's development proposals for the MPR and UGA. The parties have agreed to work toward the goal of no net loss of fish and wildlife habitat, as well as the protection of the environmental, scenic, historical, cultural, and recreational values associated with the Trendwest property through the creation of a non-profit organization known as the MountainStar Conservation Trust. The Cooperative Agreement provides a mechanism to provide measures to protect against environmental impacts off of the Trendwest property. The Cooperative Agreement is contingent on approval by Kittitas County of all permits and approvals necessary to develop the MountainStar Resort. The provisions of the Cooperative Agreement also are contingent on final approval by Ecology of transfer applications for each of the Trendwest Yakima River and tributary water rights, authorizing use of the water in connection with the Trendwest property. Among other provisions, the Cooperative Agreement

establishes that Trendwest will provide funding for the MountainStar Conservation Trust to acquire water rights from the Upper Yakima River and its tributaries, to increase instream flows and to reduce consumptive uses of water within the upper basin. The purpose for this funding is to protect aquatic resources and downstream water users from impacts resulting from activities that are indirectly related to Trendwest's development activities. The water rights to be purchased under the agreement are in addition to the water rights Trendwest has purchased to serve the projected water demand for the MPR and UGA development projects.

RIDGE Settlement Agreement

In September 2001, Trendwest entered into a settlement agreement with RIDGE, a non-profit organization. Among other provisions, this agreement had the result of reducing the MPR density and increasing open areas within the MPR and UGA (see Section 1.6), and obliging Trendwest to secure water rights to mitigate for the indirect effects described above..

Alternative Trendwest Water Supply Mitigation Options

Trendwest has identified three feasible options, in addition to monitoring, to mitigate for the cumulative water supply impacts identified in this Final EIS during average year conditions. The three options are not mutually exclusive, and could be feasibly employed in isolation, or together in any combination, to fully mitigate impacts. The three options are groundwater infiltration, onsite storage releases, and water right acquisition(s).

Groundwater Infiltration

A deficit occurs in September under average conditions, but substantial surpluses occur in April through June. Trendwest could divert water during the three months in which surpluses occur, and use stormwater infiltration facilities to infiltrate surplus diversions into groundwater. Subsurface returns of infiltrated water during the late spring and early summer would increase project streamflow contributions throughout the remainder of the year and, depending on the amount of water used for groundwater infiltration and the proximity of infiltration facilities to the Cle Elum River, could eliminate September streamflow deficits (Appendix B, Exhibit F).

Onsite Storage Releases

Trendwest is designing seven golf course water features on the MPR. Trendwest would circulate golf course irrigation water through some or all of these water features in order to provide storage and maintain water quality. It is feasible to use approximately 165 ac-ft of storage in the golf course lakes to satisfy the approximate mean monthly September deficit of 24 ac-ft. Trendwest could use storage from these water features during the later part of the season, and replace that storage with surplus water available in April through July. Trendwest has sufficient water supply to refill these water features before each irrigation season.

Water Right Acquisition

Trendwest could acquire additional water rights and transfer them to instream flows to offset late irrigation season irrigation deficits. Additionally, under the environmental stewardship

agreement described above, Trendwest has agreed to mitigate for increases in the consumptive use of water in the upper Yakima basin caused by Trendwest development activities, including increased water consumption from induced offsite housing.

Drought Management

Under drought conditions, in addition to the above options, Trendwest could employ demand management by reducing irrigation on the MPR golf courses.

Third-Party Water System Improvements

Mainstem Water Users

Trendwest consulted owners of each of the mainstem diversions on the bypassed reach to identify needs for mitigation, if any, arising from the cumulative mainstem flow changes from the water rights transfers. Trendwest has reached an agreement in principle and anticipates signing agreements with most of those diversions as to appropriate mitigation measures and fully anticipates agreements with all users in the near future.

Tributary Water Users

RCW 90.030.380 protects third-party water users from impairment of their water rights resulting from water right transfers. Trendwest's water rights formerly were used by water right owners who shared irrigation ditches with other water users. Trendwest has entered agreements with several Kittitas County irrigators who shared irrigation diversions with Trendwest's predecessors-in-interest to ensure their diversion rights are not affected.

On Big Creek, Trendwest is working with the remaining water users on the Gentry/Lund ditch to address concerns of the remaining landowners on the Gentry/Lund ditch. A mitigation agreement is expected in the near future. In addition to ongoing negotiations with the remaining water users, Trendwest in its agreement with RIDGE agreed to invest in upstream passage improvements and performance-based enhancements on Big Creek.

On Swauk Creek, Trendwest is working with the remaining water user on the Burke-Hartman diversion to provide system improvements to prevent impairment of that party's water right caused by conveyance water reductions, as required under RCW 90.03.380.

On First Creek, following the purchase of the First Creek water rights, Trendwest worked with the remaining water users during the 2001 irrigation season to rebuild portions of the remaining canal, and construct on-farm system improvements to reduce conveyance losses.

At this time, there does not appear to be an impact on Mill Ditch from the transfer of the Pautzke water right; however, Trendwest has agreed that if impacts are later discovered from the transfer of the Pautzke water right Trendwest will negotiate the appropriate mitigation. If impacts are later identified due to the loss of the Pautzke right from the ditch, there remains the option of transferring Trendwest's Supplemental Reecer Creek water right to Mill Ditch as additional carriage water.

Monitoring

Trendwest would rely on compensatory transfers of tributary water rights to instream flows to ensure no net direct or indirect impacts on TWSA and no increase in consumptive use of water under its mainstem water rights. While the model runs performed were used to characterize the anticipated magnitude of impacts, actual water availability from year to year cannot be forecast by the model. Water is not always physically available to satisfy Trendwest's tributary water rights, even though these rights generally are senior to the rights of most other tributary water users. Furthermore, Trendwest's tributary water rights could be subject to interception by intervening diverters, including those whose rights are junior in priority to those Trendwest has acquired.

An ongoing monitoring program would be established to ensure Trendwest and other water users that (1) the amount of water that would be used in connection with the MPR and UGA proposals is consistent with the water available under the several water rights that have been acquired by Trendwest and (2) the collective operations described in the water supply plan for the Trendwest resort are protective of other water users' rights on the Yakima River's tributaries and mainstem. This tributary monitoring program would include installation of equipment and data reporting consistent with existing state requirements to ascertain availability of water from Trendwest's proposed tributary water rights transfers. The program would also include installation of approved measuring devices and reporting of data by Cle Elum and Trendwest in connection with the Cle Elum water diversion and water use on the MPR and UGA properties. The data would be used, when necessary, to adjust the quantity of Trendwest's diversions to prevent any increase in the amount of water diverted under Trendwest's water rights over the amount actually available for diversion under its water rights, with allowance for other Trendwest obligations under the RIDGE Settlement Agreement and the Cooperative Agreement with WDFW and the Yakama Nation.

Monitoring Water Use by Trendwest

As described earlier in this report, Trendwest would receive water from a diversion on the mainstem Yakima River owned and operated by the City of Cle Elum. Under certain streamflow conditions, Trendwest also may receive water from Cle Elum's proposed Cle Elum River diversion works. Cle Elum's diversions will include in-line flow meters capable of recording both the instantaneous flow rate and the total annual volume diverted. Cle Elum will report its diversions for Trendwest to the appropriate agencies. Currently, Cle Elum must report its water diversion data to USBR and Ecology weekly during the irrigation season (March 1 to October 30), and monthly during the off-irrigation season (November 1 to February 28). These requirements would remain in effect, and would provide the basis for adjustments in water deliveries to Trendwest to account for water availability under the proposed tributary transfers. In response to monitoring information gathered, Cle Elum could adjust the amount of water delivered to Trendwest as necessary to adjust for water availability data according to information collected from tributary gauges described below.

Monitoring Streamflow

Streamflow monitoring is proposed for each tributary on which Trendwest has water rights. The mainstem river flow in the reach between Cle Elum and Ellensburg also would be monitored. The monitoring program would consist of several stations designed to acquire water surface stage (elevation) data to be correlated to flow and to cumulative diversion volumes. Monitoring would occur on Big Creek, the Teanaway River, Swauk Creek, and First Creek as described in Appendix B.

Monitoring and Reporting Diversions

When an acquired water right is one of two or more that are diverted at a common point, or share a ditch or canal, provision for monitoring the other water user diversions on their ditch, pipe, or pump would be developed specifically to address the situation. Periodic monitoring of the other water users on the tributary streams that are downstream of stream gauges would be necessary to ensure that the tributary water rights are not diverted by junior appropriators. These data may be obtained by Ecology in the field in addition to any other measuring and reporting requirements that may exist. Diverters on Big Creek, Teanaway River, and the Yakima mainstem are already required to report water use to USBR under interim Court Orders in *Acquavella*.[5] USBR then is required to provide the records to Ecology. These reporting requirements are consistent with RCW 90.03.360, which requires all persons with surface water diversions over one cfs to install a measuring device. Ecology may require water users to report data describing the volume of water diverted.[6]

Monitoring Frequency

Operational measurement of Cle Elum's diversions of water would be needed on a daily basis. Measurement of hydrologic conditions on the tributaries also would be recorded on at least a daily basis. Monitoring of other tributary water users will depend on compliance with applicable monitoring and reporting orders. Mainstem hydrologic conditions in the Cle Elum to Ellensburg reach of the Yakima River should be obtained at least weekly, consistent with information required to support USBR's TWSA calculations. The hydrologic monitoring by Trendwest and Cle Elum would be incorporated into USBR's monitoring network, either directly or through Ecology, and the two agencies will make the data available to one another and the public upon request.

Trendwest Monitoring and Reporting Institutional Requirements

The water rights transferred to the Yakima Trust Water Rights Program as a part of the Trendwest water supply plan will be managed by Ecology in accordance with Chapter 90.38 RCW. Coordination with the USBR, Cle Elum, and other water users would require an ongoing commitment from both Ecology and the Bureau. As compared to historic institutional needs, the

5 Order Pendente Lite Re: Metering, Measuring and Reporting Requirements (Oct. 13, 1994); Order Pendente Lite Re: Metering, Measuring and Reporting Requirements, Teanaway River and Big Creek, Kittitas County (Aug. 27, 1998).

6 It should be noted that the *Acquavella* court has on other occasions required monitoring and reporting as a condition to entry of a subbasin Conditional Final Order. See Conditional Final Order for Subbasin No. 15 (Wenas Creek) (Nov. 12, 1998).

water supply plan requires additional coordination between the tributary water users, Cle Elum, Trendwest, Ecology and USBR in order to ensure on an operating basis that consumptive uses and hydraulic impacts to TWSA and other water users are neutral or positive. Data from Trendwest's monitoring stations, the Bureau's existing Teanaway River stations, and periodic field observations by Ecology staff would be used to gain that assurance. In general, Ecology would be responsible for management of tributary water rights transfers into the Yakima Trust Water Program until water available under the transferred rights reaches the mainstem of the Yakima River. At that point, water transferred to the Yakima Trust Water Program would be managed by the USBR as part of TWSA. Tributary water rights that would not be transferred to the Yakima Trust Water Program would be managed by Trendwest as private instream flow rights to the confluence of each affected tributary stream with the mainstem Yakima River. Thereafter, water available under the transferred water rights would become part of TWSA and managed by the USBR. Cle Elum's and Trendwest's use of water under Trendwest's proposed water supply plan would be altered to reduce diversion or implement a pre-approved mitigation plan during periods when the diversion would conflict with USBR operations.

3.4.4 Significant Unavoidable Adverse Impacts

Groundwater elevations under and near properties appurtenant to the Trendwest water rights are raised by irrigation returns during, and for a period following, the irrigation season. Transferring irrigation water rights to instream flows will reduce the groundwater table under and near properties appurtenant to the Trendwest water rights. Lowering of groundwater tables in areas formerly influenced by those returns is an unavoidable change. Shallow wells extending into the upper portion of the groundwater aquifer would be susceptible to interference from the lowered groundwater tables if they are located where groundwater was raised by the irrigation returns.

Small reductions in mainstem flows would occur during the irrigation season at various points between the Cle Elum diversion and Reecer Creek downstream, as a result of the combined transfer of consumptive rights by Trendwest and from termination of time lags resulting from former irrigation returns on the tributaries, which would be left instream under transfer to the Trust. While mainstem flows would remain sufficient to supply all irrigation needs between Cle Elum diversion and Reecer Creek, diversion systems employed by these diverters are in many cases marginal in their ability to collect their allotted water from the river. Thus, any change in flow or head pressure past their headgates could adversely affect their ability to withdraw water.

Mitigation described above (groundwater infiltration, onsite storage, and/or water right acquisition) in conjunction with monitoring described above would prevent significant adverse impacts to net flow in the Yakima River.

3.5 PLANTS AND ANIMALS

This section evaluates potential impacts on upland vegetation communities and habitat for wildlife and threatened and endangered species for Alternative 5 compared to Alternatives 2, 3, and 4 in the Draft EIS. Mitigation measures also are identified. The No Action Alternative is analyzed in Section 3.6 of the Draft EIS. Fisheries and wetlands are addressed separately in this document in Sections 3.6 and 3.7, respectively.

3.5.1 Affected Environment

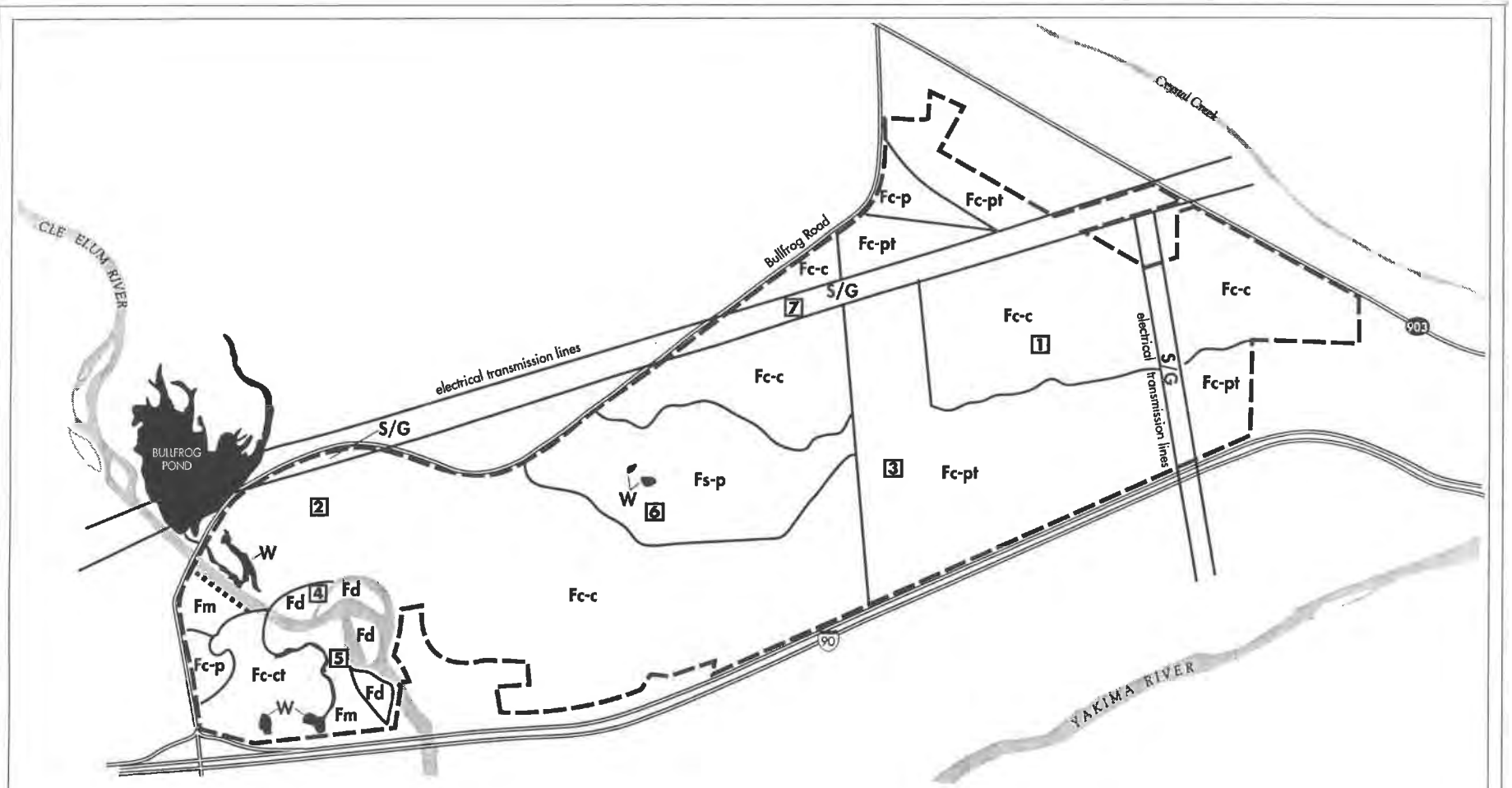
Existing habitat and vegetation distribution, wildlife communities, and priority habitats and critical areas within the Cle Elum UGA are summarized below and described in detail in Section 3.6 of the Draft EIS. Agency information on potential threatened and endangered species near or within the Cle Elum UGA has been updated. Agencies contacted include the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and Washington Department of Natural Resources (WDNR). Agency correspondence letters are included as Appendix G of the Final EIS.

In response to comments on the Draft EIS, the following documents were reviewed: *Final Report on the I-90 Snoqualmie Pass Wildlife Habitat Linkage Assessment* (WSDOT 2000); *The Biological Case for Preserving Lands in the Interstate 90 Corridor* (Cascade Conservation Partnership 2000); and the *Snoqualmie Pass Adaptive Management Area Plan Final EIS* (U.S. Forest Service 1997). Information from the wildlife assessments is incorporated in this section.

Vegetation

Upland vegetation communities within the Cle Elum UGA were evaluated in Section 3.6 of the Draft EIS in terms of stand structure, species composition, cover type, and special habitat features. Upland vegetative cover types identified in the Cle Elum UGA include ponderosa pine forest, early successional ponderosa pine forest, mixed coniferous forest, mixed coniferous/deciduous forest, deciduous forest, and mixed shrub/grassland communities. A comprehensive list of plant species observed in the Cle Elum UGA and the results of the vegetation surveys are included in Appendix E of the Draft EIS. Vegetation cover types and the location of sampling stations within the Cle Elum UGA are identified in Figure 3.5-1. Table 3.5-1 summarizes the percentages of vegetative cover types within the UGA.

Graphics Server/Graphics/Wildlife/Trendwest/current/Plants and Animals/3.5-1 plants-animals 3.15.02



Source: Raedeke Associates, Inc. 1999a

N

0 1100'

Approximate Scale in Feet

TRENDWEST PROPERTIES:
CLE ELUM UGA FINAL EIS

- Trendwest Properties
- wildlife and vegetation sampling stations
- **Fc-c** forested coniferous: mixed coniferous species, open canopy (thinned)
- **Fc-p** forested coniferous: Ponderosa Pine dominant, closed canopy
- **Fc-pt** forested coniferous: Ponderosa Pine dominant, open canopy (thinned)
- vegetation community boundary
- **Fs-p** forested early successional: Ponderosa Pine dominant
- **Fd** forested deciduous: mixed deciduous species
- **Fm** forested mixed: mixed deciduous and coniferous species
- **S/G** shrub/grassland: shrub and grass species
- **W** wetland areas

FIGURE 3.5-1

VEGETATION COVER TYPES AND SAMPLING STATIONS

SHAPIRO & ASSOCIATES, INC.

1981069

H-01

Table 3.5-1: Percentages of Vegetative Cover Types within the Cle Elum UGA

Cover Type	Cover Type Symbol	Existing Habitat (Acres)	Percentage of Cover within Cle Elum UGA
Mixed Coniferous Forest	Fc-c	569.3	51%
Ponderosa Pine Forest	Fc-p	320.4	29%
Ponderosa Pine Forest (Early Successional)	Fs-p	114.0	10%
Mixed Coniferous/Deciduous Forest	Fm	25.0	2%
Deciduous Forest	Fd	17.2	2%
Grassland	G	38.8	4%
River	R	17.3	2%
Wetland	W	3.9	<1%
Total		1106	100%

Source: Raedeke Associates, Inc.; W&H Pacific

Threatened and Endangered Plant Species

For the Draft EIS, databases of the USFWS, the WDFW Priority Habitat and Species, and the WDNR Natural Heritage Program were consulted to determine the potential occurrence, presence, or absence of threatened and endangered plant species near and within the Cle Elum UGA. A comprehensive list of all plant species with federal and/or state status within Kittitas County provided by the WDNR, including plant species under USFWS jurisdiction, is located Appendix E of the Draft EIS. A description of these plant species, preferred habitat characteristics, results of systematic plant surveys, any documented use in the UGA and/or surrounding area, and the potential for occurrence within the UGA are presented in Section 3.6 and Appendix E of the Draft EIS.

For the Final EIS, Shapiro and Associates, Inc. consulted with the USFWS and WDNR in October 2001 to confirm that the list of plant species in the Draft EIS is current and accurate. No change in species status has occurred since the Draft EIS was prepared. Table 3.6-2 in the Draft EIS presents a list of all plant species with federal and/or state status discussed in the Draft and Final EISs. Agency correspondence letters are provided in Appendix G of the Final EIS.

Priority Habitats and Critical Areas

Critical areas identified in the City of Cle Elum's Critical Areas Ordinance include wetlands, riparian corridors, fish and wildlife conservation areas, frequently flooded areas, and geologically hazardous areas. A summary of these is provided in the Draft EIS. The following is a summary of WDFW priority habitats located in the UGA that would fall under the jurisdiction of the City of Cle Elum.

Edge habitats between different vegetation communities are a special habitat feature used by a variety of wildlife species. The most distinct edge habitat in the UGA is located between the wetland, riparian, and forested vegetation communities.

Snags and downed woody material provide nesting, feeding, and roosting habitat for a variety of wildlife species, including raptors, woodpeckers, amphibians, reptiles, and small mammals. The majority of snags in the UGA are located within the riparian, wetland, and steeply sloped areas. The highest concentration of snags in the upland habitats occurs in the steeply sloped areas.

Instream habitat is valuable for a variety of fish and wildlife, including invertebrate, amphibian, fish, bird, and mammal species that have evolved aspects of their respective life cycles in conjunction with instream resources. Instream habitat in the UGA includes the Cle Elum River.

Riparian habitat encompasses the area beginning at the ordinary high water mark and extends to the portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic system. Riparian habitat includes the entire extent of the floodplain and riparian areas of wetlands, which are directly connected to stream courses (WDFW 1996). Riparian and freshwater wetland habitats within the UGA are included within the floodplain of the Cle Elum River. Bullfrog Pond is located north of Bullfrog Road within the MPR.

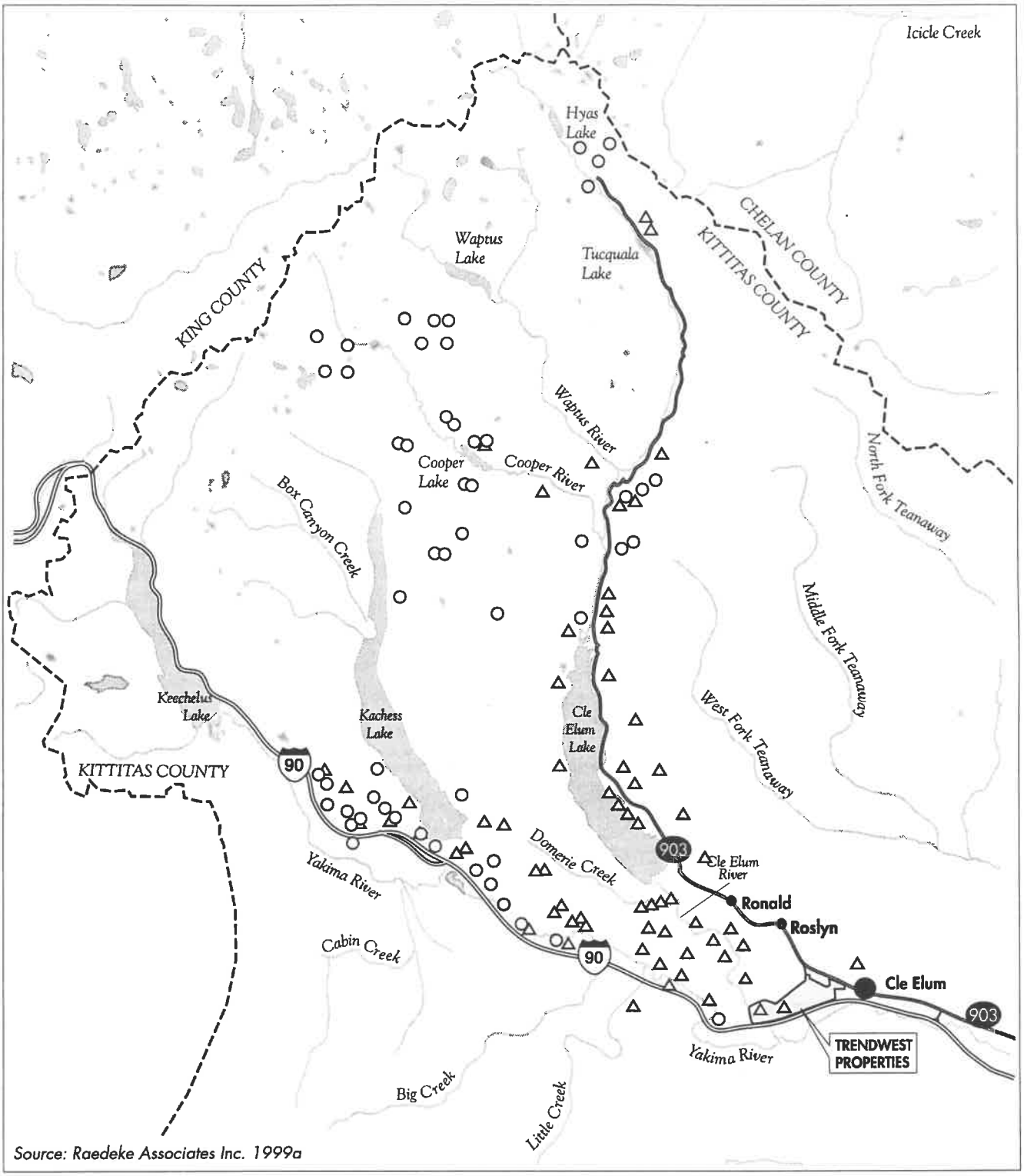
Wildlife Communities

Wildlife communities that use the Cle Elum UGA include: amphibians and reptiles; avian species, including herons, spruce, ruffed grouse, woodpeckers, passerines, and raptors; and mammals including, in part, the pocket gopher, snowshoe hare, chipmunk, Douglas squirrel, beaver, porcupine, raccoon, skunk, coyote, black bear, bobcat, deer, and elk. Section 3.6 of the Draft EIS includes the results of surveys for amphibians, reptiles, breeding birds, and mammal species within the Cle Elum UGA and a description of wildlife species that were observed or are likely to use the UGA. A comprehensive list of wildlife species observed in the UGA, or known to occur in similar habitats in Washington State, is provided in Appendix E of the Draft EIS. Figure 3.5-1 shows the location of wildlife survey sampling stations within the UGA.

Elk

Based on the combination of radiotelemetry data and direct observations, Raedeke Associates, Inc. (1999) identified the winter range of elk within the UGA as primarily the riparian corridor of the Cle Elum River. Elk herd size, behavior, use in the UGA and surrounding area, based on WDFW database information, radiotelemetry studies, and field surveys are described in the Draft EIS. Figure 3.5-2 shows elk distribution in Upper Kittitas County.

Graphics Server\Corel\mics\Billable\Trendwest\current\Plants and Animals\Fig 3.5-2.elk distribution 3.15.02



0 4
Approximate Scale in Miles

○ summer elk
△ winter elk

FIGURE 3.5-2

SEASONAL ELK DISTRIBUTION IN UPPER KITTITAS COUNTY

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

SHAPIRO & ASSOCIATES, INC.

1981089

Wildlife Habitat Assessments

The Cle Elum UGA is located within an area of the I-90 corridor that was part of two large-scale wildlife habitat assessments. *The Final Report on the I-90 Snoqualmie Pass Wildlife Habitat Linkage Assessment* (WSDOT 2000) addresses the nature of highway and road barrier effects on animal movements and populations. It presents a landscape-scale methodology for integrating wildlife conservation and human safety in transportation corridors. *The Biological Case for Preserving Lands in the Interstate 90 Corridor* (Cascade Conservation Partnership 2000) identifies priorities for acquiring parcels of land in Washington's Central Cascades to protect fish and wildlife habitat and improve outdoor recreation activities. Information from the wildlife habitat assessments not included in the Draft EIS is presented below.

The Final Report on the I-90 Snoqualmie Pass Wildlife Habitat Linkage Assessment

The primary objectives of this study were to determine the nature of highway and road barrier effects on animal movements and populations and develop a landscape-scale methodology for integrating wildlife conservation and human safety in transportation corridors. The major reach of the study area is from milepost (MP) 55 at Keechelus Lake to MP 81 near Cle Elum. Some of the wildlife surveys extended to areas east and west of these mileposts. Bullfrog Road and the Cle Elum UGA are located near MP 81.

Deer and elk road-kill distribution was mapped from MP 35 to MP 89. Overall monthly peaks for deer kill rates occurred in June and July. Monthly peak periods for elk kill rates occurred in April and October. The Cle Elum River area (MPs 79 to 83) had the highest overall road-kill density for deer collisions with fewer elk collisions in this area relative to other areas of the survey. The Easton Hill area (MPs 67 to 69.5) had the highest amount of elk kill rates. The report concluded that high deer kill rates and low elk kill rates were a reflection of higher degrees of human disturbance. In addition, the distribution of crossing attempts by elk as represented by road-kill locations is likely to be an effective estimator of crossings for other species sensitive to human disturbance, such as large carnivores.

Snow tracking surveys were performed to identify wildlife crossing locations and animal distribution. Ten species were identified in the highway section between MPs 69.5 to 81. In order of most to least observations, these species included coyote, domestic dog, bobcat, elk, domestic cat, raccoon, deer, porcupine, and striped skunk. Of the five sections of highway where surveys were conducted, this section had the fourth highest number of total observations (44 of 237). Detection rates of coyote and bobcat were significantly lower in this reach than the average across the study area.

All underpasses, overpasses, and culverts (greater than 18 inches in diameter) along I-90 from MPs 48 to 81 were monitored for animal movement. Monitoring techniques included cameras, track plates, and tracking beds. Over the entire survey, four wildlife taxa—mice, chipmunks, squirrels, and striped skunk—and humans constituted 81% of the recorded crossings. No

carnivores larger than raccoon and no elk were recorded crossing the highway under bridges. Species detected using structures between MPs 71 and 81 included domestic dog, domestic cat, raccoon, deer, porcupine, striped skunk, mice, weasel, and squirrel. Black bear were not detected at any camera stations within a mile of the highway in this section.

Three broad connectivity areas were identified in the report: Snoqualmie Pass (MPs 52 to 55.5), Keechelus Ridge and Amabalis Mountain (MPs 60.5 to 64 and MPs 64 to 67), and Easton Hill (MPs 67 to 69.5). The bridge over the Cle Elum River at MP 81 is identified as a structure that provides potential animal passage with a generally high level of human disturbance.

The study area reach of MPs 71 to 81 has low wildlife connectivity because of the level of development and lack of connected forest habitat. Potential management strategies for this reach include the installation of fences and underpasses in the Bullfrog area to minimize the relatively high frequency of collisions with deer in this area.

The Biological Case for Preserving Lands in the Interstate 90 Corridor

This study is an analysis to identify priorities for acquiring more than 70,000 acres of land in Washington's Central Cascades. The majority of key parcels in the analysis are associated with an area of the Cascade Range from King County to the Upper Yakima River in Kittitas County that is bisected by I-90. This area provides a "critical connectivity link in the north-south movement of wildlife in the Cascade Range." The report identifies four "critical corridors" in this portion of the Central Cascades that satisfy the habitat criteria for more threatened, endangered, or species of concern than any other area. Species under consideration include spotted owl, marbled murrelet, bald eagle, northern goshawk, gray wolf, Canada lynx, grizzly bear, and salmon, among others. Habitat criteria include large forested areas without roads that provide solitude, old-growth remains in medium-sized patches, and an adequate prey base with suitable foraging/cover areas.

Parcels deemed critical for connectivity were included in the prioritization process and identified for potential acquisition. Sixty-one percent of the identified parcels include land within Kittitas County. These parcels are located north, south, and west of the Cle Elum UGA; however, none of the proposed parcels is located within the same township and range as the Cle Elum UGA (Township 20 North, Range 15 East).

Threatened and Endangered Wildlife Species

Section 3.6 and Appendix E of the Draft EIS list and describe wildlife species, including those with federal and/or state status, identified within and near the Cle Elum UGA.

For the Final EIS, Shapiro and Associates, Inc. contacted the USFWS and WDFW in October 2001 to identify any changes or omissions in the wildlife species addressed in the Draft EIS (Appendix G). USFWS adjusted the status or the geographic range of five wildlife species that

were not previously identified in the Draft EIS. Table 3.6-3 in the Draft EIS presents a list of all wildlife species with federal and/or state status that were identified at that time. The additional five wildlife species are listed in Table 3.5-2 and discussed below.

Table 3.5-2: Wildlife Species Identified by Federal and State Agencies as Potentially Occurring near the Cle Elum UGA since the Draft EIS was Prepared

Scientific Name	Common Name	Federal Status	Wash. State Status
Canis lupus	Gray wolf	Endangered	Endangered
Lynx canadensis	Canada lynx	Threatened	Threatened
Ursus arctos	Grizzly bear	Threatened	Endangered
Brachyramphus marmoratus marmoratus	Marbled murrelet	Threatened	Threatened
Coccyzus americanus	Western yellow-billed cuckoo	Candidate	Candidate

Source: USFWS 2001; WDFW 2001

Federal Endangered Species

Gray Wolf

Habitat requirements for gray wolf include an adequate prey base, denning and rendezvous sites, travel corridors, minimal human disturbance, and a large home range containing hundreds of acres of undisturbed, forested habitat (Boise National Forest 1981). Wolves prefer tundra and forested habitat, and normally feed on large mammals, such as deer, elk, and moose, and small mammals including mice. According to the WDFW database, gray wolf has not been documented within 2 miles of the UGA. Although the habitat in the UGA is mostly forested and potential prey species are prevalent, the forest is fragmented with dirt roads and trails and, in the past, has been subject to year-round recreational activity. Gray wolves typically avoid fragmented, forested areas with high human contact (USFWS 1980). Gray wolves are not expected to use the immediate vicinity of the UGA because of the lack of undisturbed habitat, lack of suitable denning habitat, and heavy human influence.

Federal Threatened Species

Grizzly Bear

Grizzly bears require large tracts of undisturbed, forested habitat (Ingles 1965). Very few grizzly bears are known to exist in the Washington Cascades. The UGA is outside of the defined recovery zone for grizzly bear. No key grizzly bear areas, including den sites, are likely within the study area (Wenatchee National Forest 1997). According to the WDFW database, grizzly bears have not been documented within 2 miles of the UGA. Grizzly bears avoid areas with human activity. Because of the fragmented, forested habitat and high human activity, grizzly bears are not expected to use the immediate vicinity of the UGA.

Canada Lynx

Canada lynx occur in mesic coniferous forests that have cold, snowy winters, and tend to use habitats where snowshoe hares are most abundant (Ruggiero et al. 2000). Lynx generally occur in favorable habitats above 4,000 feet in elevation (Koehler and Brittell 1990). In Washington, lynx denning sites are typically in lodge-pole pine, spruce, and subalpine forests more than 200 years old, with northern and northeastern aspects, and a high density of downed logs (Koehler 1990). Lynx have been observed (by snow tracking) avoiding large openings, either natural or created, during daily movements within their home range (Ruediger et al. 2000). They are considered moderately tolerant of human disturbance and even continued presence (Mowat et al. 2000). According to the WDFW database, lynx have not been documented within 2 miles of the UGA. Because of the fragmented, forested habitat, elevation below 4,000 feet, and high human activity, Canada lynx are not expected to use the immediate vicinity of the UGA.

Marbled Murrelet

Marbled murrelets occur in many areas of western Oregon and Washington where suitable forested habitat occurs within approximately 50 miles of Puget Sound or the Pacific Ocean (Hamer 1991). The marbled murrelet forages almost exclusively in the nearshore marine environment (mainly within a few miles of shore), but flies inland to nest in mature and old growth conifer forests (USDA 1995). Potential marbled murrelet habitat has been described as mature coniferous forest, coniferous forest with an old-growth component, old-growth forest, or younger coniferous forests that have deformations or structures suitable for nesting. Nest trees are typically large-diameter conifers (32 inches in diameter at breast height or larger) found in inland forest stands, with large-diameter limbs. Nest stands in Oregon and Washington are composed of low-elevation conifers with average sizes of 19 inches diameter at breast height, multiple canopy layers, overstory canopy height of 210 feet, and canopy closure of 56%. Average nest stand age is 641 years, and the average stand size is 996 acres (USFWS 1992). WDFW has not documented any marbled murrelets or occupancy sites within 3 miles of the UGA. The fragmented, forested habitat of the UGA does not include potential breeding habitat typically associated with marbled murrelet. Marbled murrelet are not expected to use the immediate vicinity of the UGA.

Federal Candidate Species

Western Yellow-Billed Cuckoo

Western yellow-billed cuckoo breed in riparian areas with deciduous forests typically 25 to 100 acres in area (Stokes and Stokes 1996). According to the WDFW database, western yellow-billed cuckoo have not been documented within 2 miles of the UGA. Potential breeding habitat within the UGA for western yellow-billed cuckoo (riparian) would be retained as undeveloped open space.

3.5.2 Impacts

This section evaluates the potential direct, indirect, and cumulative impacts on plants, animals, and threatened and endangered species compared to Alternatives 2, 3, and 4 in the Draft EIS.

Direct environmental impacts are associated with construction and operation activities that would cause habitat loss, conversion, and/or disturbance. Indirect impacts would occur offsite from growth and increased recreational use induced by development of the UGA. Cumulative impacts are effects on plants and animals caused by development of the UGA concurrent with the MPR and other regional growth.

Direct Construction

Development of the Cle Elum UGA would convert existing vegetation communities within the 1,106 acres to developed land uses, including single-family and multifamily residential, commercial, and recreational. Under Alternatives 2, 3, and 4, at least 50% (556 acres) of the total 1,106 acres would be retained as undeveloped open space. Under Alternative 5, areas within the Cle Elum River corridor retained as undeveloped open space would be expanded to the boundary of the geomorphic floodplain (west ridge). Construction impacts on wildlife habitat from clearing and converting habitat to developed land uses under Alternative 5 would be 50 to 150 acres lower than under Alternatives 2, 3, and 4, depending on alternative (see Section 3.1, Earth, of the Final EIS).

Vegetation, Priority Habitats, and Critical Areas

The primary direct impact the proposed uses would have on vegetation communities is the removal of vegetation. Native vegetation cleared under Alternative 5 would include the same upland vegetative cover types as under Alternatives 2, 3, and 4 (mixed coniferous forest, ponderosa pine forest, early successional ponderosa pine forest, and grassland) (Figure 3.5-1).

As described for Alternatives 2, 3, and 4, development of the Cle Elum UGA would require clearing within existing thinned stands of mixed conifers, leaving small stands or patches of trees within selected residential and recreational areas. All mixed coniferous/deciduous forest, deciduous forest, and wetland habitat would be retained as undeveloped open space (Figure 3.5-1). A significantly larger area of forested habitat associated with the riparian corridor of the Cle Elum River also would be retained. The types of impacts associated with clearing vegetation under Alternative 5 (invasive species colonization and soil compaction) would be the same as described for Alternatives 2, 3, and 4.

Based on revisions to the site design, development of the Cle Elum UGA under Alternative 5 would retain more of the critical area habitats within the UGA (floodplain, riparian, wetland, and

steep slope habitat) than Alternatives 2, 3, and 4. Downed woody material and snags within the riparian, wetland, and steeply sloped habitats within the Cle Elum UGA would also be retained.

Development under Alternative 5 would also result in the fragmentation, alteration, and removal of wildlife habitat. The amount of habitat loss would be lower than under the other development alternatives. A detailed description of impacts associated with fragmentation, alteration, and removal of wildlife habitat is discussed in Section 3.6 of the Draft EIS.

Threatened and Endangered Plant Species

Development of the Cle Elum UGA under Alternative 5 would not likely have significant adverse impacts on federally listed plant species. Potential habitat typically associated with federally listed plant species is not located within the UGA or is located in habitats that would be retained as undeveloped open space (wetland, floodplain, and riparian habitats). Potential impacts on federal species of concern and Washington State threatened, endangered, and sensitive species would be the same under Alternative 5 as discussed in Appendix E of the Draft EIS.

Wildlife

Under Alternative 5, impacts associated with disturbance caused by construction activities would be similar to those described for Alternatives 2, 3, and 4. Construction within the UGA under Alternative 5 would occur within the vegetation cover types identified under Alternatives 2, 3, and 4. Types of impacts on wildlife associated with construction disturbance would include visual and audible impacts and wildlife mortality associated with higher traffic levels. These are discussed in detail in Section 3.6 of the Draft EIS.

Elk

Construction activities associated with Alternative 5 would likely have a lower impact on the elk population as discussed in the Draft EIS. In the Draft EIS, subplanning areas T and U were identified as part of the elk winter range. Under Alternative 5, no construction would occur in subplanning areas T and U.

Threatened and Endangered Wildlife Species

As with Alternatives 2, 3, and 4, construction activities under Alternative 5 would not likely have significant adverse impacts on federally listed wildlife species discussed in the Draft EIS (spotted owl and bald eagle). Alternative 5 also would not likely have significant adverse impacts on the five additional wildlife species addressed in this analysis (gray wolf, Canada lynx, grizzly bear, marbled murrelet, and western yellow-billed cuckoo) because they are not documented within a 2- to 3-mile radius of the project (WDFW 2001).

The Cle Elum UGA does not contain breeding and foraging habitat characteristics, and is not characterized by a low level of human activity. These characteristics are typically associated with gray wolf, Canada lynx, grizzly bear, and marbled murrelet. Potential breeding habitat for the western yellow-billed cuckoo does exist in the riparian habitat of the Cle Elum River. This would be retained as undeveloped open space.

Potential impacts on federal species of concern and Washington State threatened, endangered, and sensitive species for Alternative 5 would be the same as those discussed in Appendix E of the Draft EIS.

Direct Operation

Vegetation

Operational impacts on vegetation and associated habitats occur immediately after construction. There would be less vegetation and associated habitats as the project becomes operational and human activities begin. Lawns or ornamental vegetation could replace native vegetation in the individual lots.

Wildlife

Impacts from Human Disturbance

Under Alternative 5, impacts associated with operation of the project and associated human disturbance would be similar to those described for Alternatives 2, 3, and 4. Once construction activities are complete, wildlife would resume use of the area, but to a lesser extent because of increased human disturbance associated with residential development. Impacts on wildlife associated with human disturbance would include visual and audible impacts, the introduction of domestic dogs and cats in association with residential development, and wildlife mortality associated with higher traffic levels. These are discussed in detail in the Draft EIS.

Elk

Development of areas currently used by elk could cause conflicts between humans and elk. In the Draft EIS analysis, development parcels were assumed to have no elk habitat value because human disturbance would deter most elk from using these areas. However, elk can habituate to human activities, and some of the retained open space and landscaping in developed areas might be attractive to elk during periods of winter stress, especially since elk hunting on the property has been eliminated.

The elk winter range analysis in the Draft EIS estimated a 43% reduction in the total elk forage score under Alternatives 2, 3, and 4. Because Alternative 5 would preserve more acres of

potential elk winter range habitat (Cle Elum River corridor), less elk forage area would be lost compared to Alternatives 2, 3, and 4.

UGA development under Alternative 5 would also have less of an impact on elk cover and movement corridors than Alternatives 2, 3, and 4 because of the expanded area adjacent to the riparian corridor. Retaining the riparian corridor as undeveloped open space allows continued movement to offsite habitat in the MPR, surrounding lands, and other seasonal range areas (e.g., summer range).

Threatened and Endangered Wildlife Species

As with Alternatives 2, 3, and 4, Alternative 5 would not likely have significant adverse operational impacts on the federally listed wildlife species of spotted owl and bald eagle. The Cle Elum UGA does not contain breeding nests for spotted owls or bald eagles. Bald eagle wintering areas occur along the riparian corridor of the Cle Elum and Yakima rivers, more than a mile from the UGA. The removal of upland forested habitat in the UGA would decrease potential perching habitat for bald eagles; however, upland forests provide lower quality foraging habitat than riparian corridors.

Alternative 5 would not likely have a significant adverse effect on the five additional wildlife species addressed in this analysis (gray wolf, Canada lynx, grizzly bear, marbled murrelet, and western yellow-billed cuckoo) because they are not documented within a 2- to 3-mile radius of the project (WDFW 2001).

Potential impacts on federal species of concern and Washington State threatened, endangered, and sensitive species would be the same under Alternative 5 as discussed in Appendix E of the Draft EIS.

Wildlife Habitat Analysis

For the Draft EIS, a separate quantitative analysis of habitat value was conducted for 16 representative wildlife species detected within, or expected to use, the UGA (Raedeke Associates, Inc. 2000). Collectively, the species used in the analysis are those that: use the full range of different habitats (cover types) present in the UGA; use a variety of habitat elements for breeding or feeding; reflect the full range of different taxonomic groups, including some federal species of concern and state priority species; and would be sensitive to a conversion from native or undeveloped habitats to commercial/residential uses. This report is included in Appendix E and summarized in Section 3.6 of the Draft EIS.

Results of the wildlife habitat analysis conducted for Alternatives 2, 3, and 4 in the Draft EIS can be qualitatively applied to development-related impacts that would occur under Alternative 5 since development under Alternative 5 would affect the same vegetation cover types (Figure 3.5-1). No vegetative cover types within the Cle Elum UGA would be developed under Alternative 5

that were not modeled for development under Alternatives 2, 3, and 4 in the wildlife habitat analysis.

Results of the wildlife habitat analysis indicate that species adapted to aquatic and riparian habitats (habitats that would be protected from development), such as Columbia spotted frog, sharp-tailed snake, great blue heron, and beaver, or those species that are more tolerant to some level of disturbance generally would be the least affected by development. Those species adapted to upland habitats that are susceptible to disturbance or degradation, such as northern goshawk, orange-crowned warbler, and Douglas squirrel, would likely be most affected by development.

Indirect

Indirect impacts would be the same as those described for Alternatives 2, 3, and 4. Indirect impacts on area habitat and wildlife would occur as a result of additional induced growth within Kittitas County and concurrent impacts on habitats and wildlife communities outside the UGA. Increased human use of the area would likely increase the risk of disturbance to native wildlife and plant species. Continued fragmentation and reduction in native habitat, along with increased human activity in the vicinity, would favor wildlife species adapted to artificially created edges. Increasing regional development would affect the long-term capability of the area to support diverse wildlife communities.

Cumulative

Cumulative impacts under Alternative 5 would be similar to those described in the Draft EIS, although to a smaller degree based on the Reduced Density MPR and the revised site plan for the UGA.

Development of the MPR and UGA under Alternative 5 would clear less vegetation than under Alternatives 2, 3, and 4. The vegetative cover types that would be cleared (upland forest) and retained (deciduous forest, river, and wetland habitats) in the UGA and MPR would remain the same. Table 3.6-7 in the Draft EIS shows cumulative reductions in vegetative cover types from the development of the MPR in conjunction with Alternatives 2, 3, and 4. Cumulative reduction in cover types would be less under Alternative 5.

Since publication of the Draft EIS, 23 privately owned acres of the UGA located within the geomorphic floodplain have been rezoned from Forest and Range to Suburban. Any proposed development in that area would be subject to separate environmental review and permit approval. Conversion of native habitat to suburban and rural development in the geomorphic floodplain could potentially eliminate habitat used by listed and priority species. This would incrementally add to impacts for these species. Adequate mitigation would be required for any significant potential adverse impacts on plants and animals.

Residential development in the Cle Elum UGA would contribute to an increase in population growth and environmental impacts associated with human activity, as described above. Areas of forest near this development would become more fragmented, favoring wildlife species adapted to artificially created edges. Clearing habitat will result in displacement and reductions in wildlife populations.

Impacts on offsite vegetation from additional recreational activities in surrounding lands would likely involve increased use of offsite trails and roads for hiking, horseback riding, and vehicular traffic during the summer, as well as snowmobile traffic in the winter. These activities can cause increased disturbance of understory vegetation (both herbaceous and woody) and soil compaction. It is difficult to predict the locations or relative magnitude of impact on specific vegetation communities.

3.5.3 Mitigation Measures

Mitigation measures would include those described in the Draft EIS relating to: retaining existing native vegetation where possible; revegetating disturbed soils with native species; implementing construction BMPs; and implementing measures to deter elk from developed areas, among others.

Mitigation measures inherent to the project include those provisions in the Cooperative Agreement among Trendwest, WDFW, and the Yakama Nation, and in the RIDGE Settlement Agreement that apply to potential cumulative impacts from the MPR and Cle Elum UGA developments. For example, the Settlement Agreement identifies use restrictions within the stream corridor to protect the value of wildlife.

Programmatic elements of those agreements include:

- MountainStar Conservation Trust. Trendwest, WDFW, and the Yakama Nation have agreed to participate in this non-profit organization for the purpose of owning and managing conservation easements in the Cle Elum River corridor and West Side Open Space Areas (in the MPR).

- Offsite Conservation Easement. The MountainStar Trust will acquire a Conservation Easement on, or development rights to, an additional 1,500 acres outside of lands owned by Trendwest.

- Development/Implementation of a Land Stewardship Plan. This plan is intended to promote the effective management of open space areas on Trendwest land with a primary focus on: (1) healthy aquatic and upland ecosystems, (2) maintaining and enhancing forest health, and (3) protecting and enhancing fish and wildlife habitat.

- Donation to Conservation Trust. Trendwest will donate funds to a land conservation trust to be established by RIDGE. RIDGE and Trendwest will cooperate to identify lands for acquisition as permanent forested lands adjacent to Roslyn and Cle Elum.

3.5.4 Significant Unavoidable Adverse Impacts

As described in the Draft EIS, development within the Cle Elum UGA would result in the permanent loss of native vegetation communities and wildlife habitat because of clearing, grading, landscaping, and construction of proposed uses and associated impervious surfaces. Retained native vegetation communities among the developed areas of the Cle Elum UGA would be fragmented, and increased human activity would affect the native forested habitat retained onsite and on adjacent lands. These impacts would cause displacement and reduction of wildlife species and populations, particularly species that do not tolerate disturbance well. Increased traffic volumes also would encourage disturbance-sensitive species to avoid the roadway areas. Potential perching habitat in the forested upland areas for avian species such as bald eagles would be cleared and fragmented. Restricting access to the Cle Elum River corridor and acquiring additional land for conservation would help mitigate for these impacts.

3.6 FISHERIES

This section evaluates existing conditions, potential impacts, and mitigation measures for fish and aquatic resources under Alternative 5 compared to Alternatives 2, 3, and 4, which are analyzed in Section 3.7 of the Draft EIS. Potential impacts from the No Action Alternative also are described in the Draft EIS.

3.6.1 Affected Environment

Existing fish resources and aquatic habitats are described in Section 3.7, Fisheries, of the Draft EIS. Also included is a description of threatened, endangered, sensitive, and other priority fish species, the Cooperative Agreement among the Washington Department of Fish and Wildlife, the Yakama Nation, and Trendwest, a discussion of the National Marine Fisheries Service (NMFS) 4(d) rule, and County and City Critical Areas Ordinances.

The proposed Cle Elum UGA project area lies within the Upper Yakima River drainage basin, and is within WRIA 39 (Washington Department of Fisheries 1975). The UGA site is adjacent to the lower portion of the Cle Elum River between Bullfrog Road and I-90. The Cle Elum River runs along the western boundary of the site and joins the Yakima River at RM 185.6. The Yakima River and I-90 run along the southern boundary of the site. Approximately 750 acres of the UGA site is topographically located within the Yakima River basin, and approximately 350 acres is topographically located within the Cle Elum River basin.

Water Quality and Quantity

Since the Draft EIS was published, additional analysis of water quality and water supply has been conducted for Alternative 5. Information on current surface and groundwater characteristics of Alternative 5 (the Preferred Alternative) is included in the Water Quality Technical Report (Appendix A of the Final EIS). Table 3-10 of Appendix A provides data for Yakima River background water quality parameters, surface water quality standards, and guidance for sublethal fish effect avoidance. A recent literature review of pollutant effects of fish is also presented.

Water supply has been modeled again to analyze potential impacts from development of the Reduced Density MPR and Alternative 5. The analysis of Yakima River diversions, which characterizes water levels near current water supply intakes for the reach of the Yakima River between Cle Elum and Ellensburg, has also been updated since the Draft EIS was published. These analyses are included in the Water Supply Technical Report Supplement (Appendix B of the Final EIS).

Regional Fish Habitat Characteristics

The water supply plan and projected increases in human activity may affect the aquatic resources not only in the Cle Elum and Yakima rivers, but in other streams as well. These include

the Teanaway River and Big, First, Reecer, and Swauk creeks, as well as other rivers that receive recreational use. The habitat elements of the Cle Elum River, Teanaway River, and Big, First, Reecer, and Swauk creeks were characterized in a technical memorandum *Existing Fish Habitat Conditions in Yakima River Tributary Reaches Affected by the MountainStar Resort Development* (Parametrix 2002). The surveys of these habitat elements were performed based on recommendations from a June 2001 meeting with Ecology, Trendwest, Parametrix, the Yakama Nation, and WDFW. The following summarizes the findings for each stream.

Big Creek

Habitat Characteristics

Ecology (2000) identified Big Creek in its Clean Water Act Section 303(d) list as not meeting state water quality standards for water temperature and in-stream flows. Big Creek flows are seasonally depleted by two diversions that, during low flow periods, remove most of the water from this stream (Ecology 2000).

There is a small (2-3 cfs) berm diversion at river mile (RM) 0.7, and a larger (10-15 cfs, 5-foot head) impassable diversion dam at RM 2.1. The lower diversion dam (Ensign Ranch Flume) is easily passable to adult salmonids, but the upper dam (the Darling/Lund dam) almost completely blocks fish passage. Big Creek has significant perennial flow (7 to 11.2 cfs during August 1988 and 2001) upstream of the upper diversion, but flow is much less downstream. Most of the surface flow at I-90 may be removed at the lower diversion, and the stream is usually totally dry at some point below I-90 in the late summer. The dewatered (or dry) mouth area limits upstream and downstream fish movement from mid-July through September.

Historically, erosion resulting from landslides and fires has significantly affected Big Creek. Lack of adequate riparian vegetation from logging, road clearing, and fire is reflected in seasonally high water temperatures, despite relatively high elevation (Yakima River Basin Watershed Planning Unit 2001). Big Creek is being heavily channelized downstream of RM 3.0, with associated channel instability and bedload deposition in the lowermost 0.25 mile (WDFW 1998).

Big Creek provides potentially fair to high quality spawning and rearing habitat for salmonids in the upper reaches. There is substantial large woody debris (LWD) present (>18 pieces/mile), and excellent LWD recruitment potential. Average wetted width in late August 2001 was 30.5 feet. Big Creek provides good cover for fish and patches of excellent spawning gravels. The quality of habitat decreases downstream. Land use changes from forest to mixed residential and agricultural uses. LWD frequency and recruitment potential decrease substantially. In the lower three reaches, the frequency of suitable spawning gravel patches decreases. Much of the substrate is cobble. The stream channel is more incised, with vertical banks 10 to 13 feet high in some sections. The streambank shows greater armoring and several large rock groins are present in the lower reaches.

Fish Use

Distribution of steelhead (*Oncorhynchus mykiss*) is from the confluence of the Yakima River to 0.4-1.2 mile upstream, and distribution of spring chinook salmon (*O. tshawytscha*) is 0.4 to 0.7 mile upstream (Fast et al. 1991; Pearsons et al. 1996; Northwest Power Planning Council 2001). In recent years, steelhead have occasionally been observed spawning in Big Creek (Fast et al. 1991). Some steelhead and spring chinook juveniles rear near the mouth when it is not dewatered by irrigation diversions. Rainbow trout (*O. mykiss*) are common in both the canyon and upper flats areas. Cutthroat trout (*O. clarki lewisi*) are also present. The period of dewatering at the stream mouth overlaps with the timing of spring chinook appearance in the Upper Yakima River. Chinook use of Big Creek, therefore, is limited by the timing of reconnection with the Yakima River.

Teanaway River

Habitat Characteristics

The Teanaway River mainstem reach extends upriver about 3.9 miles to the area where the three major branches (North, Middle, and West fork) meet. The lower Teanaway valley supports pasture and hay crops. No storage dams block fish migration in this drainage.

Seasonal flow restrictions to fish movement, channel siltation, channelization, depletion of LWD in riparian areas, and low pool frequencies are cited as reasons for reduced fish productivity in the Teanaway River. Ecology (2000) listed the length of the mainstem Teanaway River as being noncompliant for instream flow and water temperature. Water temperatures in the low 20s have been observed in the lower mainstem in early September of 1998 (Yakima Nation, unpublished data, 1998).

The lower 4 miles of the Teanaway River have significant low flows during late summer and early fall because of irrigation withdrawals and seasonal climate effects. Extremely low base flows presently occur, with the minimum mean daily flow over years 1994-2000 ranging from 6 to 15 cfs. These flows reduce or eliminate adult salmon access from the Yakima River and strand or isolate juveniles in small pools where they are vulnerable to both predators and increased temperature (Hindmam et al. 1991) Little or no beneficial side channels exist. Those side channels observed in the field or in aerial photographs were dry, or nearly so, during the low flow period.

Fish Use

The Teanaway supports spring chinook, hatchery released coho (*O.kisutch*) salmon, steelhead, and bull trout (*Salvelinus confluentus*) as well as a number of other salmonid and non-salmonid species (WDFW 1998). Spring chinook currently spawn in low numbers in the mainstem, and in the North Fork as far as Stafford Creek (RM 3.2). Resident and fluvial bull trout occur and spawn upstream of De Roux Campground in the North Fork in 1997, and juveniles have been

observed in Jack Creek, Jungle Creek, and De Roux Creek, although spawning has only been observed in De Roux Creek (WDFW 1998).

Swauk Creek

Habitat Characteristics

Swauk Creek has significant fish habitat problems related to low flow, lack of LWD, and low pool frequency. Stream gravels are abundant in the subbasin but commonly have excessive amounts of embedded fine sediment. Water quality concerns include elevated water temperatures, and high turbidity levels during snow melt events (Yakima River Basin Watershed Planning Unit 2001). Ecology (2000) has identified two reaches of the mainstem as not meeting state water quality standards for temperature. The low flows throughout the system and the absence of surface flow in the lower 2.5 to 5 miles in the fall limit steelhead and chinook production, and totally preclude coho production (Bonneville Power Administration 1990). The streambed remains dry through early fall, precluding adult anadromous salmonid access into the upper watershed (WDFW 1998). Upstream of RM 3.1, where the stream enters a forested zone, flows are marginally adequate through the summer. The Burke diversion (RM 2.7) is relatively small and is the only diversion on Swauk Creek. Flows below the diversion point are, however, so low that the water withdrawn may be the difference between low flow and no flow downstream.

Fish Use

Fish use in Swauk Creek includes spring chinook salmon, steelhead trout, cutthroat trout, rainbow trout, brook trout, and bull trout (Pearsons et al. 1996). Non-game species present include redside shiner (*Richardsonius balteatus*), northern pikeminnow (*Ptychocheilus oregonensis*), and various species of dace (*Rhinichthys* spp.), sucker (*Catostomidae* spp.), and sculpin (*Cottidae* spp.).

The last report of bull trout in Swauk Creek was a single specimen, captured in a fish trap 650 feet upstream of the mouth (Pearsons et al. 1996). Despite fluvial bull trout being blocked in most years in July and August when they are typically moving into spawning areas from the Yakima River, suitable spawning and rearing habitat still exists in Swauk Creek tributaries. Steelhead spawn in Swauk Creek up to the vicinity of the mouth of Iron Creek (StreamNet 2001). Spring chinook have historically spawned in Swauk Creek (Washington Department of Fisheries et al. 1993). Spawning coho were observed in the creek as late as the early 1960s (StreamNet 2001).

First Creek

Habitat Characteristics

Much of First Creek is composed of a series of step pools and low to moderately steep riffles. Pools were associated with LWD jams were most numerous in upper reaches. The upper 1.1 miles downstream of the diversion consists of moderate gradient step-pool/riffle habitat. Riparian vegetation consists of thick brush with an overstory of ponderosa pine with occasional fir. In other locations, the riparian community consists of vine maple, alder, and scattered conifers. There was abundant LWD present with very high LWD recruitment potential. Nearly all of the upper reach is step-pool and riffle, interspersed with LWD jams. Many of these jams are probable fish passage barriers. These jams have created a variety of pools, which may be suitable for fish.

Compared to upstream reaches, the middle and lower reaches are of lower gradient. There were no fish passage barriers in these reaches. The LWD that was present was functionally marginal. This trend increases downstream. There were several small patches of spawning gravel, but most were less than 10 square feet in area. Cattle damage was apparent on some of the stream banks and within the creek. Stream cover was noticeably less than upstream, and the riparian vegetation alternated between grass pasture and mixed deciduous and coniferous forest. The 1,000 feet of First Creek upstream from the mouth appeared to have been recently been dredged for flood control, perhaps in the last 5 to 10 years.

Overall, spawning habitat appears to be extremely limited in First Creek. Substrate size is mostly cobble with very few areas of material suitable for salmon spawning Patches of smaller material occurs in the upstream step-pool habitat, which could be used by trout. There is abundant rearing area in the upper creek for small trout.

Good riparian cover along much of First Creek maintains a temperature regime that would support bull trout. Upstream step-pool habitat could support either resident or fluvial bull trout. The lower half of the creek has few deep pools preferred by char for holding before spawning, and has very limited spawning gravel. Much of the substrate in the lower creek is also embedded, offering relatively poor winter refuge habitat for juvenile salmonids.

The main limiting factors for anadromous fish in First Creek are lack of spawning gravel and the presence of multiple LWD-formed fish passage barriers. Currently, flow conditions in Swauk Creek and fish passage barriers on First Creek make anadromous fish use unlikely above RM 2.0. In the past, flow in First Creek has been reduced in late summer to the point of little or no surface flow at its confluence with Swauk Creek.

Fish Use

Cutthroat trout, ranging in size from 1 to 4 inches, were observed in the irrigation canal just downstream of the diversion. The presence of cutthroat in the headwaters and rainbow at the mouth in Swauk Creek is consistent with observations made by WDFW (Anderson, pers. comm., 2001). WDFW has found a transition from cutthroat near Swauk Pass to rainbow trout near Lauderdale, and a zone of species mixing and hybridization at an intermediate elevation in the upper Swauk Creek basin.

Reecer Creek

Habitat Characteristics

The headwaters of Reecer Creek drain small areas of Douglas fir, grand fir, and ponderosa pine, but the watershed is dominated by rangeland grass and irrigated cropland that extends southward to the Yakima River (Yakima River Basin Watershed Planning Unit 2001). Nitrate and phosphate levels are moderately high due to fertilizers in irrigation return flow. Fish passage barriers are reported to be numerous along Reecer Creek, where check structures are used to divert water to cropland (Yakima River Basin Watershed Planning Unit 2001). Local irrigation canals divert water from the Yakima River into Reecer Creek, which is used for irrigation flow drainage. Much of Reecer Creek is heavily channelized and sedimented. Channel complexity is very low and ditch-like, with a lack of pools formed by woody debris. Much of the riparian vegetation consists primarily of grasses and scattered willows

Pool frequency has been reduced in the upper reaches due to diversions, and in the lower reaches due to check structures. Although reaches of lower Reecer Creek have been straightened and channelized through agricultural cropland areas, the channel and instream flow is relatively stable due to summer flows being maintained by canal releases. The streambed of Lower Reecer Creek is comprised of a silt substrate, with a few patches of suitable spawning gravel. Shading riparian vegetation and functional LWD is lacking in many areas. Side channel habitat is also absent throughout much of Reecer Creek.

The reach of Reecer Creek immediately above I-90 is characterized by a diked, channelized stream, with almost uniform depth across the cannel width. Wetted width was 28 feet, and the maximum depths ranged from about 14 to 16 inches across the channel. The streambed is highly silted, but there are occasional patches of gravel sills or riffles.

Fish Use

Yakima River Basin Watershed Planning Unit (2001) refers to Washington Department of Fisheries, et al. (1993) as documentation of chinook use of the mouth area of Reecer Creek. The StreamNet database (StreamNet 2001) lists the lower mile of Reecer Creek as supporting spring chinook and summer steelhead. Gravel in the lower reach confirms this potential anadromous fish

use. The Yakima River Basin Watershed Planning Unit (2001) report states that Reecer Creek does not support migratory salmonids due to barriers in its lower reaches. Resident rainbow trout are believed to be a significant component of the fish community in lower Reecer Creek (Cummins, pers. comm., 2001). A general lack of quality spawning gravel, moderate to high stream temperatures, and a lack of channel complexity (instream refugia) are likely limiting factors for salmonid production in lower Reecer Creek.

Reecer Creek probably supports a more diverse fish community than that found in the colder, less silted streams such as Big Creek. Other species likely to be present include redside shiner, northern pikeminnow, bridgelip sucker (*Catostomus columbianus*), various dace species, three-spine stickleback (*Gasterosteus aculeatus*), and various species of sculpin (Yakima River Basin Watershed Planning Unit 2001).

Recreational Fishing and Management

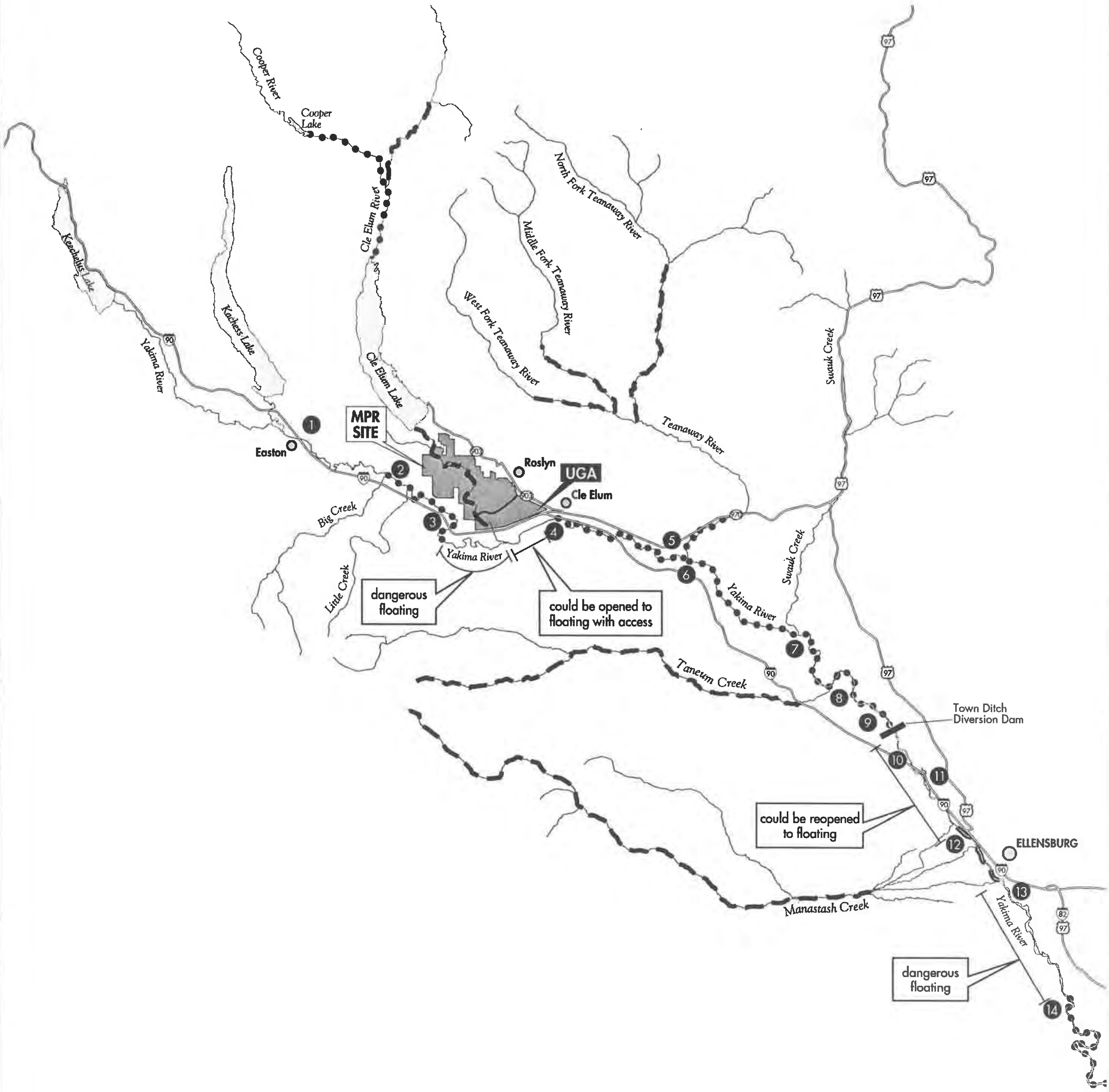
Information on recreational fishing and management is summarized from the *Trendwest MPR and City of Cle Elum UGA Fishing Pressure Analysis* (Cedarrock Consultants, Inc. 2002) and from conversations with WDFW staff. The fishing pressure analysis was prepared to respond to comments submitted by Ecology on the Draft EIS. Anglers living and recreating in the Cle Elum area typically fish in the Yakima River and its major tributaries including the Cle Elum, Taneum, and Teanaway rivers. Existing Yakima River access sites are presented in Figure 3.6-1. Smaller tributaries and lakes also receive considerable use.

WDFW tracks fishing license sales by county. Table 3.6-1 shows the number of fishing licenses sold by dealers in Kittitas County that allow freshwater fishing in 1998 and 1999. License types include those that were sold as annual or two-day licenses. Licenses sold reflect a combination of those sold to residents and non-residents combined. Data entry for fishing licenses for the year 2000 has not yet been completed.

Table 3.6-1: Kittitas County Freshwater Fishing License Sales

Year	Number of Freshwater Fishing Licenses [1]
1998	7,370
1999	8,055

1 Number of licenses reflects all license types that allow freshwater fishing.
Source: WDFW 2001



1 Easton access (RM 201.4)
2 E. Nelson Siding access/launch (RM 194.2)
3 Three Bridges access/launch (RM 189.9)
4 S. Cle Elum Bridge access/launch (RM 183.2)
5 WDFW East Cle Elum access/launch (RM 177.6)
6 Teanaway River access (RM 176.1)
7 Swauk Creek access (RM 170.2)
8 Thorp Bridge access/launch (RM 165.4)
9 River Raft Rental access (RM 162.3)
10 Town Ditch division dam (RM 161.3)
11 Gladmer access (RM 160.2)
12 KOA Campground access/launch (RM 155.8)
13 Rinehart Park access/launch (RM 153.1)
14 Ringer access/launch (RM 148.2)

Source: Cedarock Consultants 2002; Parametrix 2002; Woorlybugger Fly Co. 2002

0 5
Approximate Scale in Miles

●●●●●●●● potential high fishing pressure reach/area
— — — potential moderate fishing pressure reach/area
1 existing mainstream access/launch site

FIGURE 3.6-1

RECREATIONAL FISHING ACCESS AND USE

SHAPIRO & ASSOCIATES, INC.

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

Graphics Server/Graphics/Billable/Trendwest/current/Fishing impact/ Figure 3.6-1 Rec Fishing Access 3.14.02

H-01

Based on readily available data, the total number of people that fish in the Upper Yakima River system, and the total number of days fished in the system, can not be precisely quantified. However, it is reasonable to estimate that the number of angler-days (sum of the number of days spent fishing by all anglers) greatly exceeds the number of licenses sold in Kittitas County (assuming multiple trips by local anglers each year and visits by non-residents with licenses purchased in other counties).

Management Regulations

The WDFW currently implements four types of regulations to protect the fish resource in the state, including the project area: seasonal restrictions, closures, gear restrictions, and catch limits (both size and number). The following is a discussion of the types of regulations and examples of how they apply to the project vicinity. WDFW should be consulted for specific current regulations.

Seasonal restrictions limit fishing to certain times of the year. These vary by species and location as necessary to protect sensitive life history stages. Some areas are open year-round for some species, while other areas are permanently closed to all fishing for all species. There is no open season on bull trout, steelhead, or salmon in the Upper Yakima River basin. Fishing is allowed on other species of trout from June 1 to October 31 in the lower Cle Elum River, Swauk Creek, Teanaway River, and Yakima River.

In some cases, when it is necessary to protect a species in a certain area, a reach or entire water body can be closed to all fishing. Alternatively, the reach can be closed to all fishing for selected species. An example is an area where fish congregate and are especially vulnerable to capture. The reach of the Yakima River below Easton Dam is an area closed to all fishing

Research has found that some fishing tackle is more physically damaging to fish than others. This is especially important when fish are released after capture (catch-and-release). Selective gear rules are implemented in the Upper Yakima basin to reduce hooking mortality. Where selective gear rules are applied, only unscented artificial flies or lures with one barbless hook are allowed; bait is prohibited; no one may fish from any floating device equipped with a motor; and fish must be kept if hooked in the eye, gill, or tongue.

Catch limits are implemented to control the number of fish an angler can take each day, as well as in successive days. For example, in the Cle Elum River, there is a two-trout fish limit for species other than steelhead and bull trout. Some catch limits affect the size of fish that may be kept. Where fishing is allowed, protected species must be released.

Because of the high fishing pressure this area currently receives, a number of special regulations (in addition to statewide regulations) for the Upper Yakima basin have been adopted. Special regulations for the Yakima River and its tributaries between Roza Dam and Easton Dam include being closed to fishing for all steelhead, being limited to selective gear rules for all species, and

being catch-and-release for all trout. Selective gear rules apply to the Cle Elum River downstream of Cle Elum dam and to the Taneum and Teanaway Rivers. Normal statewide regulations apply upstream of Cle Elum dam, where fishing for trout is allowed all year-round.

Based on communications with WDFW (Roger, pers. comm., 2001), very little poaching has occurred on the Cle Elum River and upper tributaries of the Yakima River in recent years. Most violations are in the lower Yakima River. Violations are generally using live bait, barbed hook, and fishing without a license.

3.6.2 Impacts

Potential impacts related to water quality, water quantity, and regional growth are reevaluated based on updated analyses produced since the Draft EIS was issued.

Direct Construction

Construction-related impacts to fisheries resources from Alternative 5 would be the same as those identified for Alternatives 2, 3, and 4 in the Draft EIS. Physical loss or degradation of habitat features associated with the active stream channel, riparian area, or active floodplain of the Cle Elum River is not expected. Alternative 5 lowers construction risk by avoiding development within the geomorphic floodplain in the highest risk portion of the UGA (Management Zone C as described in Section 3.3, Water Quality). As such, the introduction of sediment and contaminated stormwater to the river as a result of clearing and grading would not be expected. Construction would occur east of the West Ridge, which separates the floodplain from the proposed development.

Direct Operation

Water Quality

Stormwater

Stormwater facilities for the UGA are described in Section 3.3 and Appendix A of the Final EIS. After the Draft EIS was published, the proposal for water quality treatment of stormwater runoff to protect aquatic resources was modified, in most cases increasing treatment prior to infiltration from what was proposed at the time the Draft EIS was prepared. Stormwater runoff from impervious surfaces would be directed to infiltration facilities; no discharge to the Cle Elum or Yakima rivers would occur. The potential risk to fisheries is through groundwater contamination.

The quality of water discharged is compared to background groundwater concentrations, water quality standards, and fish sublethal limits (Tables 3.3-3, 3.3-4, and 3.3-5 of Appendix A). Fish sensitivity to water quality changes is assessed by evaluating literature data for behavioral and

physiological fish responses to sublethal concentrations of typical storm runoff contaminants (Appendix A, Section 3.2.5).

Based on this evaluation, all of the water quality constituents in the UGA stormwater recharging the aquifer are predicted to meet the state surface water quality standards, except dissolved lead. The predicted dissolved lead concentration of 0.44 µg/L would be slightly elevated above the chronic surface water quality standard of 0.33 µg/L, but it is unlikely to be significantly distinguishable from the existing background groundwater quality of 0.95 µg/L. Dissolved copper, lead and zinc, as well as nitrate+nitrite-nitrogen concentrations in the treated stormwater recharging the aquifer, would be higher than the background concentrations in the Yakima River. However, given (1) the transit and mixing through the underlying aquifer, (2) that Alternative 5 would contribute a small volume of water to the Yakima River (less than 0.14% of average annual flow), and (3) the overall good quality of the treated stormwater after infiltration, adverse impacts to the water chemistry of the Yakima River are not expected. Therefore no significant adverse impacts to fish are expected.

Non-point Water Quality: Landscaping

The impacts of pesticides and fertilizers are discussed for Alternative 5 in Section 3.2.7 of Appendix A. As described above, all the UGA stormwater would be infiltrated to soils. The relative mobility of 82 pesticides in soils was assessed, and a minority (17%) rated as having moderate or greater mobility. In addition to mobility, factors such as application rate, rainfall patterns, soil type, organic matter content, and the adsorption and decomposition characteristics of the soil type determine whether a pesticide is likely to reach the groundwater (Erickson 1987). Pesticide movement within the soil and in the groundwater is usually low because pesticides are often adsorbed and broken down by soil organic matter and microbial biodegradation, therefore transport through the unsaturated zone is reduced (Appendix A).

There are no surface water quality standards for nitrate-nitrogen (Chapter 173-201A-030 WAC), because it is virtually non-toxic. Consequently, there is no reasonable expectation of adverse impact from nitrogen fertilizers to groundwater or the Cle Elum or Yakima Rivers. Given that very high loading sources of phosphorus do not contribute phosphorus above background to the receiving groundwater basin, there is no reasonable expectation that phosphorus from landscaping activity would have any influence on groundwater quality. Any metals in fertilizers are not expected to migrate with groundwater and result in a measurable change to groundwater quality. Based on this analysis, no adverse impacts to fish are expected.

Population Impacts on Fish and Aquatic Habitat

Potential impacts on fish, streams, and riparian function (e.g., fishing, wading, etc.) could be caused by human activities that occur near or in the Cle Elum River as well as nearby streams that include the Yakima and Teanaway rivers, and Big, First, Swauk, and Reecer creeks. Potential fishing pressure impacts on the Yakima River and Upper County tributaries from increased

population from the MPR and UGA are evaluated cumulatively in a technical memorandum, Trendwest MPR and City of Cle Elum UGA Fishing Pressure Analysis (Cedarrock Consultants, Inc. 2002), and are discussed under Cumulative Impacts, below. Impacts from the development of the UGA alone would be lower as the UGA would not generate the magnitude of visitors and tourists that the MPR would.

Water Supply

Under the water supply plan for Alternative 5, Trendwest would change the point of diversion of approximately one-third of its mainstem water rights from its current place of use near Ellensburg to the City of Cle Elum's Yakima and Cle Elum River intakes. Approximately one-third of its tributary water right are proposed for transfer to Ecology, to be managed as instream flows. The other two-thirds of the mainstem and tributary water rights would be transferred in the same way for use by the MPR.

Impacts to flows in the mainstem Yakima River and tributaries from implementation of the water supply plan for the MPR and UGA are analyzed cumulatively in the Water Supply Technical Report (Appendix B). As such, potential impacts to fish from changes to flows are described under Cumulative Impacts below.

Impacts to Yakima River flows attributable solely to the UGA would be less than the cumulative impacts described below, based on transfer of one-third of the water rights. Transfer of the tributary water rights to Ecology would result in a cessation of irrigation diversions and would restore instream flows. This impact would not be adverse to fish resources in the tributaries.

Indirect

Water Quality

The Washington Department of Ecology raised offsite rural area groundwater quality impacts from added septic systems arising from indirect population growth as a potential issue in their comments on the Draft EIS. Ecology requested Trendwest evaluate whether nitrate and phosphorus concentrations in groundwater would rise as a result of increases in rural Kittitas County populations and household septic tanks. This analysis is included as Exhibit 1 of the Appendix A of the Final EIS.

As described above, there is no maximum standard for nitrate-nitrogen in surface waters (Chapter 173-201A WAC). Because nitrate-nitrogen is virtually non-toxic to aquatic organisms this potential impact was not considered for further evaluation. Conclusions regarding the potential for increases in levels of phosphorus indicated that legally placed septic systems would not result in export of phosphorus above background conditions to groundwater, or via groundwater to surface waters. As such, impacts to fisheries from potential increases in watershed phosphorus concentrations would not be considered significant and adverse.

Cumulative

Water Quality

The MPR and the UGA projects would represent independent loading sources to the underlying aquifer, however on a per-acre basis the quality of the infiltrated water reaching the aquifer was shown for both projects to be well within groundwater beneficial use standards (see Section 3.3, Water Quality and Appendix A of the Final EIS). In addition, the quality of the infiltrated stormwater was also shown to be well within surface water beneficial use standards and fish sublethal evaluation criteria on a concentration basis for each project independently, even under a very conservative assumption in that it directly reached the Yakima or Cle Elum rivers without any prior groundwater mixing. When actual diffusion, mixing with groundwater, time-attenuated recharge, and mixing with Yakima River or Cle Elum River waters is accounted for, no adverse change to water quality is reasonably forecast (Appendix A).

Population Impacts on Fish and Aquatic Habitat

As described above, potential impacts on fish, streams, and riparian function (e.g., fishing, wading, etc.) could be caused by human activities. Whether these potential impacts actually occur, and to what degree, would depend on the effectiveness of the land stewardship mitigation measures and the enforcement of these measures. Potential population impacts under Alternative 5 would likely be lower than under Alternatives 2 and 4 (as they have the highest seasonal population component). Potential impacts under Alternatives 5 and 3 would be similar.

Projected Increase in Fishing Pressure from MPR and UGA. The estimated population increase in Kittitas County as a result of development associated with the MPR and Cle Elum UGA is provided in Table 3.6-2. The data are presented as daily average population increase by season. Based on the information in Table 3.6-3, the average increase in daily population would be approximately 11,000 people. Seasonal variations reflect changes in numbers of resort guests and day visitors, which are expected to reach peak numbers during the summer.

It can be assumed that new residents to the area will be composed of nearly the same percentage of anglers as the population as a whole. The number of new permanent residents is based on the sum of the Cle Elum UGA, MPR Permanent, and Indirect/Induced growth numbers, or 6,644 residents. According to information provided by the U.S. Department of Interior (1996), approximately 11% of the population in Washington State fishes. Applying the 11% estimate to the increase in permanent residents would result in about 728 new anglers in the MPR, Cle Elum UGA, and other areas of Kittitas County overall.

Table 3.6-2: Expected Population Increase in Kittitas County associated with Trendwest at Full Build out

	Season			
	Spring	Summer	Fall	Winter
Population Category	March - May	June - August	Sept.-Oct.	Nov. - Feb.
Cle Elum UGA	3,166	3,166	3,166	3,166
MPR Permanent Resident	1,570	1,570	1,570	1,570
MPR Seasonal Visitor	4,207	5,504	4,868	3,364
Indirect/Induced Growth	1,886	1,886	1,886	1,886
Day Visitors	121	243	166	52
Total[1]	10,950	12,369	11,656	10,038

1 Total average daily population increase in Kittitas County associated with Trendwest related development at full buildout.

Source: Trendwest 2001

MPR guests will be drawn, in part, by the world class fishing opportunities in the Upper Yakima River and associated tributaries. However, the resort will also offer other amenities including golfing, hiking, hunting, equestrian, snowmobiling, and skiing. Approximately 5,036 guests per day will come to the resort during the normal fishing season from mid-February through late-November. Estimation of how many guests will be anglers, how many days each angler will fish, or how many fish they will catch cannot be accurately quantified based on the lack of existing information and the speculative nature of these topics. However, if it is assumed that 11% of the guests are anglers (same as the resident population), on any given day, with development of the MPR and UGA there will be approximately 28% more anglers present and potentially fishing in the Upper Yakima basin.

It is probable that a higher percentage of the guests than the resident population will be anglers, and that the guest population will fish more frequently than the resident population (especially given that the guest population renews itself on approximately a weekly basis). If these factors are taken into account, it could reasonably be assumed, based on discussions with regional WDFW habitat biologists and professional river guides, that the number of angler-days spent fishing the Upper Yakima River and its tributaries will increase by a minimum of 50%. This represents a significant potential increase in fishing pressure.

New resident anglers and guests are likely to increase fishing pressure at locations already used by existing anglers. Areas likely subject to fish and habitat impacts are presented in Table 3.6-3 and Figure 3.6-1 and are based on field observation in the fall of 2001 (Parametrix 2002) and on discussions with a professional river guide.

Table 3.6-3: Potential Fishing Impact Areas

Stream	Risk of Overfishing [1]			
	None	Low	Medium	High
Middle Yakima River			√	
Taneum Creek		√	√	
Manastash Creek		√	√	
Swauk Creek		√		
Lower Teanaway River			√	√
West Fork Teanaway River	√	√		
Middle Fork Teanaway River		√	√	
North Fork Teanaway River			√	√
Lower Cle Elum River				√
Upper Cle Elum River			√	
Cooper River			√	√
Big Creek		√		
Upper Yakima River			√	
Box Canyon Creek			√	√
Mineral Creek	√	√		
Gold Creek		√		

1 Checks in adjacent columns is interpreted as, for example "Low to Medium."
Source: Parametrix 2002, Woorleybugger Fly Co. 2002; Cedarrock Consultants, Inc. 2002

Most Upper Yakima basin anglers fish along the Yakima River and major tributaries where adjacent roads facilitate access. A number of launch sites provide float access to three main portions of the upper river between the East Nelson Siding access near RM 194.2 and Rinehart Park (RM 153.1) (Kittitas County Field and Stream Club 1993). Figure 3.6-1 shows access locations and launch sites along the Yakima River. The highest use occurs between the WDFW's East Cle Elum launch (RM 177.6) and the River Raft Rental access (RM 162.3) (Worley, pers. comm., 2002). Areas not generally floated due to heavy accumulations of large woody debris are found just upstream of the Cle Elum River confluence and in the area known locally as the Tree Farm between RM 149 and RM 150 (see Figure 3.6-1). Two other areas that receive little use due to poor boat access are located between the confluence of the Cle Elum River downstream to South Cle Elum Bridge Launch (RM 186 to RM 183.2) and downstream of the Town Ditch Diversion Dam to the KOA campground (RM 161.3 to RM 155.8) (see Figure 3.6-1). An historic launch at the diversion dam site was badly damaged during the 1996 flood reducing its use for launching boats. Bank fishing occurs almost everywhere along the river but is generally concentrated near the major access points due to parking availability.

The upper Cle Elum, Cooper, Teanaway, Taneum, and Manastash rivers are among the major tributaries currently receiving the heaviest fishing pressure (Worley, pers. comm., 2002). Portions of these rivers have good trout populations and are readily accessible due to roads within a few hundred yards of the river.

Although few people currently fish the lower Cle Elum River, development of the resort in the immediate vicinity is likely to increase use of this area. Factors limiting current fishing include poor access, frequent woody debris jams that impede boating, and high flows experienced during the summer irrigation season.

Based on conversation with a local WDFW enforcement officer (Roger, pers. comm., 2002), the rate of fish poaching could actually decrease with development of the MPR and UGA. In general, visitors and new residents who could afford residence in the new developments may also be more environmentally aware and likely to flyfish.

As a result of the increasing fishing pressure in the Upper Yakima basin, and in anticipation of further increased development around Cle Elum, the WDFW is currently considering adoption of new fishing regulations for the Cle Elum River between Cle Elum Lake (reservoir) and the Salmon La Sac campground bridge, and for the Cooper River (a tributary to the Cle Elum River). Implementation of selective gear rules has been proposed by the regional program manager and is being considered in Olympia. If adopted, new regulations would become effective with publication of the 2002/2003 sport fishing rules pamphlet.

Water Supply

Northwest Hydraulic Consultants (2002) analyzed the impacts of implementation of the water supply plan for the MPR and UGA on water levels at diversions between Cle Elum and Ellensburg. For the selected diversions in the study reach, predicted effects ranged from increasing water levels by 0.5 inch during the early part of the irrigation season to decreasing water levels by 0.25 inch during September. These small fluctuations would not be expected to have any measurable impact on fish or aquatic resource habitats.

3.6.3 Mitigation Measures

Mitigation measures for identified significant impacts associated with Alternative 5 would include those described in the Draft EIS that relate to: prevention of construction and operational impacts to water quality; prevention of construction within the Cle Elum River corridor; placement of instream woody debris; restriction of equestrian access near streams; and, opportunities to offset human disturbance to fisheries habitat.

As described in the *Trendwest MPR and City of Cle Elum UGA Fishing Pressure Analysis*, technical memorandum (Cedarrock Consultants, Inc. 2002), the WDFW would continue to manage the regional fishery in much the same way it currently does. Fishing in regional rivers

would be monitored and local fish populations evaluated. If a problem or potential problem were encountered, the WDFW would likely implement selective gear rules in appropriate locations. These rules continue to allow public recreational game fishing opportunities while limiting the impact on the fish population. WDFW program managers have observed significant benefits to fish populations in the past when these types of rules were applied (Easterbrooks, pers. comm., 2001). If the population continued to decline, catch-and-release regulations might be applied to additional areas. Public fishing would still be allowed but the ability to take fish home would be curtailed. The fishing season might also be narrowed if a clear advantage was expected. Finally, and as a last resort, select closures to all fishing would be applied on a reach-by-reach or species-by-species basis. This is currently in effect for species listed under the federal Endangered Species Act (steelhead, bull trout) and could be expanded to other species if the need arose.

Additional potential Trendwest-related mitigation measures include:

- Exploring angler management options with the WDFW and Yakama Nation, such as increased angler education, dispersing angling pressure to underused areas, and providing alternatives to traditional fishing opportunities. Progress would be evaluated at specified intervals.
- Implementation of creel surveys (coordinated with WDFW) to address issues related directly to angler fishing presence. Creel surveys would be conducted during fishing season to count the number of anglers fishing, identify fishing locations, identify the number and types of species caught, and address the overall change in fishing experience.
- Implementation of population surveys (coordinated with WDFW) to assess quantitative changes in discrete stream reaches. Surveys would address issues such as overall population numbers of resident trout, hooking mortality, size class changes, and changes in distribution of various species. It is not expected that the survey results would provide significant statistical information with the ability to identify project-related impacts. Rather, the data might help explain anomalies observed in the creel census data, or help WDFW and Tribal fishery managers identify stocking or restoration opportunities.

3.6.4 Significant Unavoidable Adverse Impacts

The increases in population associated with development of the UGA and MPR would increase the risk of potentially significant adverse impacts on fisheries in the Cle Elum River as well as rivers and lakes in the region. Potential impacts would be primarily related to an increase in human activity and greater potential for harassment of spawning and rearing salmonids by humans and pets, fishing, and minor modifications of habitat. Mitigation measures identified above would reduce these potentially significant unavoidable adverse impacts.

3.7 WETLANDS

This section analyzes wetland impacts under Alternative 5 compared to Alternatives 2, 3, and 4, which are discussed in Section 3.8 of the Draft EIS. Mitigation measures designed to limit those impacts also are identified. Potential impacts from the No Action Alternative are described in the Draft EIS. Aquatic wildlife species are addressed separately in Section 3.5, Plants and Animals.

The discussion of potential impacts is based on a review of the conceptual site plans for Alternative 5. They are subject to change depending on final engineering designs and are subject to verification by the agencies with jurisdiction. Wetland categories and buffer requirements are identified using the Cle Elum Critical Areas Ordinance (CAO) because annexation of the UGA would invoke regulation under the City of Cle Elum's jurisdiction.

3.7.1 Affected Environment

Based on the *Wetland Assessment Technical Report* and the Shapiro and Associates, Inc. wetland reconnaissance, five wetlands were identified and delineated within the Cle Elum UGA (Figure 3.7-1). A total of 4.4 acres of wetland habitat were delineated within the UGA boundary. Wetlands located on Trendwest properties within the Cle Elum UGA are described in Section 3.8 of the Draft EIS. A summary of these wetlands is provided below.

Wetland 1 is a 0.6-acre palustrine open water/emergent system that is a closed depression created as a result of roadway construction. Under the Cle Elum CAO, Wetland 1 likely would be designated as Category IV with a buffer of 25 feet.

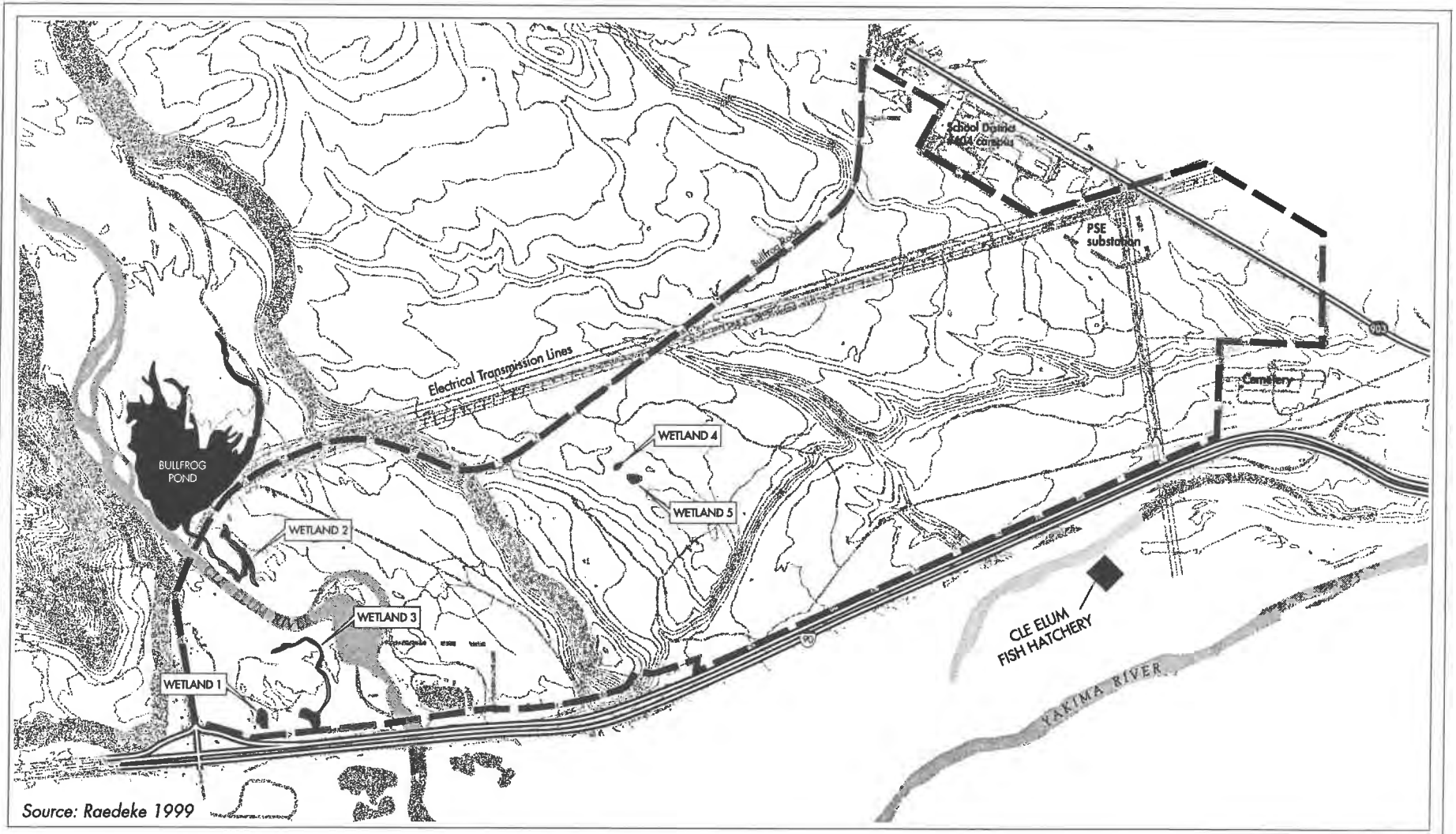
Wetland 2 is a 2-acre system dominated by palustrine emergent and scrub-shrub habitats with a narrow band of forested wetland around the edge. Under the Cle Elum CAO, Wetland 2 likely would be designated as Category II with a buffer of 100 feet.

Wetland 3 is a 1.4-acre system with a pond at the south end that discharges to the north through what appears to be an abandoned overflow channel. Wetland 3 is predominately a scrub-shrub and forested system around the edge with open water and emergent components in the pond and channel. Under the Cle Elum CAO, the wetland likely would be designated as Category II with a buffer of 100 feet.

Wetlands 4 and 5 are hydrologically isolated depressional scrub-shrub wetlands. Wetland 4 is 0.1 acre and Wetland 5 is about 0.3 acre. Precipitation is the sole source of water. Both of these wetlands likely would be identified as Category III systems under the Cle Elum CAO, with a buffer of 50 feet.

Of the five wetlands located within the Cle Elum UGA, Wetland 2 appears to provide generally moderate to high natural biological support, hydrologic support, stormwater storage, floodwater attenuation, and water quality protection functions. This is because of the relatively dense, multi-layered vegetation structure and its hydraulic continuity with the Cle Elum River. Wetlands 1, 3, 4, and 5 appear to provide generally low functions because of their relatively small size, simple structure, and/or isolation.

Graphics Server\Graphics\Illustrator\Transfmwest\current\Wetlands\Fig 3.7-1 Wetlands 6.5x11 3.14.02



Not To Scale

City of Cle Elum UGA

FIGURE 3.7-1

WETLANDS

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

3.7.2 Impacts

Direct Construction

Potential impacts on wetlands under Alternative 5 would be similar to those described for Alternatives 2, 3, and 4 in the Draft EIS because no development is proposed within any of the identified wetlands or wetland buffers within the UGA. Wetlands 1, 2, and 3 are within the Cle Elum River corridor, which is designated as undeveloped open space. Wetlands 4 and 5, per the Cle Elum CAO, would be protected by buffers a minimum of 50 feet wide.

As described in Section 3.8 of the Draft EIS, any impacts during construction are anticipated to be minor because the construction industry's best management practices would be in effect and erosion and sedimentation mitigation measures would be required to control stormwater runoff. If uncontrolled sediment release occurred in onsite wetlands, short-term water quality impairment could occur (see Section 3.3, Water Quality, and Appendix A of the Final EIS).

Direct Operation

Operational impacts on wetlands would likely be minor. As with Alternatives 2, 3, and 4, the location of land uses under Alternative 5 would be subject to City of Cle Elum CAO regulations. Encroachment on wetlands and wetland buffers from buildings, landscaped areas, and access roadways would not be allowed. As described in Section 3.8 of the Draft EIS, some increase in human access to the wetlands and associated disturbance would be anticipated because of increased human activity in the vicinity. This disturbance is not expected to be significant because these wetlands do not have a significant wildlife habitat value.

As discussed in the Draft EIS for Alternatives 2, 3, and 4, all proposed stormwater management facilities would meet or exceed all applicable detention and water quality standards. Development regulations requiring adequate wetland buffers would be implemented and the buffers would remain in their natural state to protect wetland hydrology maintained primarily through precipitation. No impacts are anticipated. A description of proposed stormwater facilities under Alternative 5 is included in Section 3.3, Water Quality, and Appendix A of the Final EIS.

Under Alternative 5, potential impacts on wetlands within the UGA from pesticides and herbicides associated with maintenance of residential landscaping are expected to be minor because of the required wetland buffers. Large-scale maintenance practices associated with the golf course under the other development alternatives would not occur under Alternative 5.

Indirect

Offsite growth induced by development in the Cle Elum UGA under Alternative 5, similar to Alternatives 2, 3, and 4, would lead to a greater influx of people and construction in the region, which would increase the possibility that wetlands and wetland buffers outside the UGA would be adversely affected.

Cumulative

Development of the Cle Elum UGA under Alternative 5 in conjunction with the MPR would not contribute to the cumulative reduction of wetlands or wetland buffers.

3.7.3 Mitigation Measures

Mitigation measures designed to reduce or eliminate potential impacts on wetlands and wetland buffers would be the same under Alternative 5 as those described for Alternatives 2, 3, and 4 in Section 3.8 of the Draft EIS. This would include modifying the site design to avoid and/or minimize construction and operational impacts. Federal, state, and local authorities are not expected to require compensatory mitigation because Alternative 5, as with Alternatives 2, 3, and 4, would not encroach on any wetlands or wetland buffers.

Mitigation measures related to water quality impacts are described in Section 3.3, Water Quality, of the Final EIS.

3.7.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on wetlands are anticipated under Alternative 5.

3.8 NOISE

This section analyzes noise impacts under Alternative 5 compared to Alternatives 2, 3, and 4, which are discussed in Section 3.9 of the Draft EIS. Mitigation measures designed to limit those impacts also are identified. Potential impacts from the No Action Alternative are described in the Draft EIS.

3.8.1 Affected Environment

Section 3.9.1 of the Draft EIS provides a detailed description of noise characteristics, noise descriptors, noise regulations and impact criteria, and measured ambient noise levels. A summary of these topics is provided below.

The range of magnitude from the faintest to the loudest sound humans can hear is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). The commonly used frequency weighting for environmental noise is A-weighting or dBA, which estimates how an average person hears sound. In general, constant exposure above 90 decibels can endanger hearing. Because of the logarithmic decibel scale, a doubling of noise sources increases noise levels by 3 dBA. For example, a noise source emitting a level of 60 dBA combined with another noise source of 60 dBA results in a combined noise level of 63 dBA.

Noise levels decrease with distance from the noise source. For a roadway, noise levels will decrease by 3 dB over hard ground (concrete or pavement) or 4.5 dB over soft ground (grass) for every doubled distance between the source and the receptor. For a point source, such as stationary construction equipment, noise levels will decrease between 6 and 7.5 dB for every doubled distance from the source.

The equivalent sound level (L_{eq}) is a descriptor for environmental noise. The L_{eq} can be considered a measure of the average noise level during a specified period of time. It is a measure of total noise during a time period. As such, it places more emphasis on occasional high noise levels than accompanying general background noise levels.

The Cle Elum UGA is undeveloped, vacant land and currently is not a major noise source. The primary source of noise in the area is vehicular traffic. Existing equivalent sound levels (L_{eq}) measured along Bullfrog Road, SR 903, and I-90 range from 58 to 76 dBA, with the highest noise levels along I-90.

Sensitive receptors adjacent to the Cle Elum UGA include Laurel Hill Memorial Park (cemetery) and the Cle Elum-Roslyn School District #404 campus. Laurel Hill Memorial Park is located about 500 feet north of the I-90 interchange to SR-903. Noise levels at the cemetery are dominated by traffic noise on I-90. The school district campus and several single-family residences are located along SR-903, where the major noise source is traffic. Forested and undeveloped lands exist along Bullfrog Road.

3.8.2 Impacts

Direct Construction

Construction noise levels under Alternative 5 would be similar to those described under Alternatives 2, 3, and 4. Site preparation and construction activities would temporarily generate noise during the construction period. Construction noise sources would include earth-moving equipment, generators, trucks, and impact equipment. Onsite construction noise would be audible at times at offsite locations, depending on the type, number, and location of equipment and the distances to receptors.

Maximum noise levels from construction equipment could range from 69 to 95 dBA at 50 feet and as high as 80 dBA at 200 feet (EPA 1971). Average L_{eq} noise levels during the day would likely be less than the predicted maximum noise levels because various equipment would be turned off at any one time and equipped with noise abatement devices. At the adjacent cemetery and Cle Elum-Roslyn School District campus, noise from construction activities would exceed existing noise levels at times, and could temporarily disrupt activities.

Construction trucks hauling materials are not anticipated to increase noise levels along roadways that access the Cle Elum UGA. The primary truck route for borrow materials would be through the MPR and across Bullfrog Road, which would avoid sensitive receptors and reduce noise impacts from construction trucks. Alternative 5 would include a Construction Transportation Management Plan, which would address truck haul routes to minimize impacts.

Direct Operation

Noise levels from within the UGA under Alternative 5 would be similar to Alternatives 2, 3, and 4, except that Alternative 5 would not include a Horse Park. Vehicular traffic to and from the Cle Elum UGA would be the primary source of noise.

Traffic noise during the evening rush hour at receptors along the primary access roadways were predicted with Federal Highway Administration (FHWA)-approved computer models. The future traffic noise levels under Alternatives 2, 3, and 4 are predicted to be well within FHWA noise impact guidelines for highway noise (see Tables 3.9-3 and 3.9-5 in the Draft EIS). Note: predicted noise levels at receptors may be lower than existing measured levels along perimeter roadways because the receptor was located in areas expected to experience frequent human use.

Traffic volumes on SR-903 and Bullfrog Road would be approximately 18 to 24% higher in Project Year 30 under Alternative 5 (see Section 3.14, Transportation, of the Final EIS). Under the logarithmic scale used to describe noise levels, an increase in traffic volumes of 18 to 24% would increase traffic noise levels by less than 1 dBA at receptors along these roadways (including the School District #404 campus). The human ear cannot distinguish an increase of this magnitude. Noise levels would remain well within FHWA noise impact guidelines. Traffic volumes on I-90 in Project Year 30 under Alternative 5 would increase by less than 1% on weekends and decrease by 2% on weekdays. Noise levels at the cemetery, which is dominated by

traffic noise from I-90, would not increase above FHWA guidelines or differ from those identified for the other development alternatives.

In the wintertime, development could result in increased snowmobile use and associated noise. Snowmobiles could be allowed in undeveloped portions of the UGA. They are currently allowed on city streets in Cle Elum. The City of Cle Elum's snowmobile ordinance requires functioning mufflers and restricts speeds to 20 mph during the day and 10 mph from 10 p.m. to 8 a.m. (City of Cle Elum Municipal Code, Chapter 10.20).

Indirect

Population, housing, and employment growth in the Cle Elum area induced by Alternative 5 would incrementally increase traffic volumes and associated traffic noise. Predicted traffic noise levels described under operation impacts, above, reflect traffic volumes that include indirect growth.

Cumulative

Construction of Alternative 5 concurrently with the MPR would temporarily increase noise levels at sensitive receptors near construction activities. Both the UGA and the MPR would include limitations on nighttime noise, quieter construction equipment, and truck haul routes to avoid sensitive receptors.

Cumulative noise impacts would be related to cumulative increases in traffic volumes under Alternative 5, growth in background traffic, and the MPR. Noise modeling conducted for the Draft EIS included predicted impacts for increases in cumulative traffic, which are predicted to be within FHWA guidelines for traffic noise (see Table 3.9-6 of the Draft EIS). Cumulative traffic volumes on SR-903 and Bullfrog Road would be approximately 12 to 16% higher in Project Year 30 under Alternative 5. An increase in traffic volumes of 12 to 16% would increase cumulative traffic noise levels by less than 1 dBA at receptors along these roadways. Noise levels at the cemetery would be the same under Alternative 5 as predicted for the other development alternatives because cumulative traffic volumes on I-90 in Project Year 30 under Alternative 5 would increase by less than 1% on weekends and decrease by approximately 2% on weekdays.

Development of the Cle Elum UGA and MPR would cumulatively increase general snowmobile use in the area, which would intermittently generate noise in the area when snow is present in winter. Snowmobile noise would be mitigated by restricting snowmobile use within the MPR to designated trails and by limiting speeds.

3.8.3 Mitigation Measures

Mitigation for construction noise under Alternative 5 would be the same as identified for Alternatives 2, 3, and 4 and would include incorporation of best management practices into construction plans and contractor specifications. These could include limitations on construction

hours, noise abatement equipment for construction machinery (e.g., mufflers, intake silencers, and engine enclosures), and provisions for turning off equipment when not in use.

To mitigate potential site-specific noise impacts on the cemetery and school, nearby construction activities could be coordinated to avoid scheduled memorial services and school activities.

3.8.4 Significant Unavoidable Adverse Impacts

With the possible exception of snowmobile noise during certain periods of heavy use during the wintertime on the MPR and portions of the UGA, no significant unavoidable adverse noise impacts would occur under Alternative 5.

3.9 LAND USE

This section evaluates potential impacts related to land use under Alternative 5 compared to Alternatives 2, 3, and 4, which are analyzed in the Draft EIS. The consistency of Alternative 5 with relevant adopted land use plans and policies is also discussed. Potential impacts from the No Action Alternative are described in the Draft EIS.

3.9.1 Affected Environment

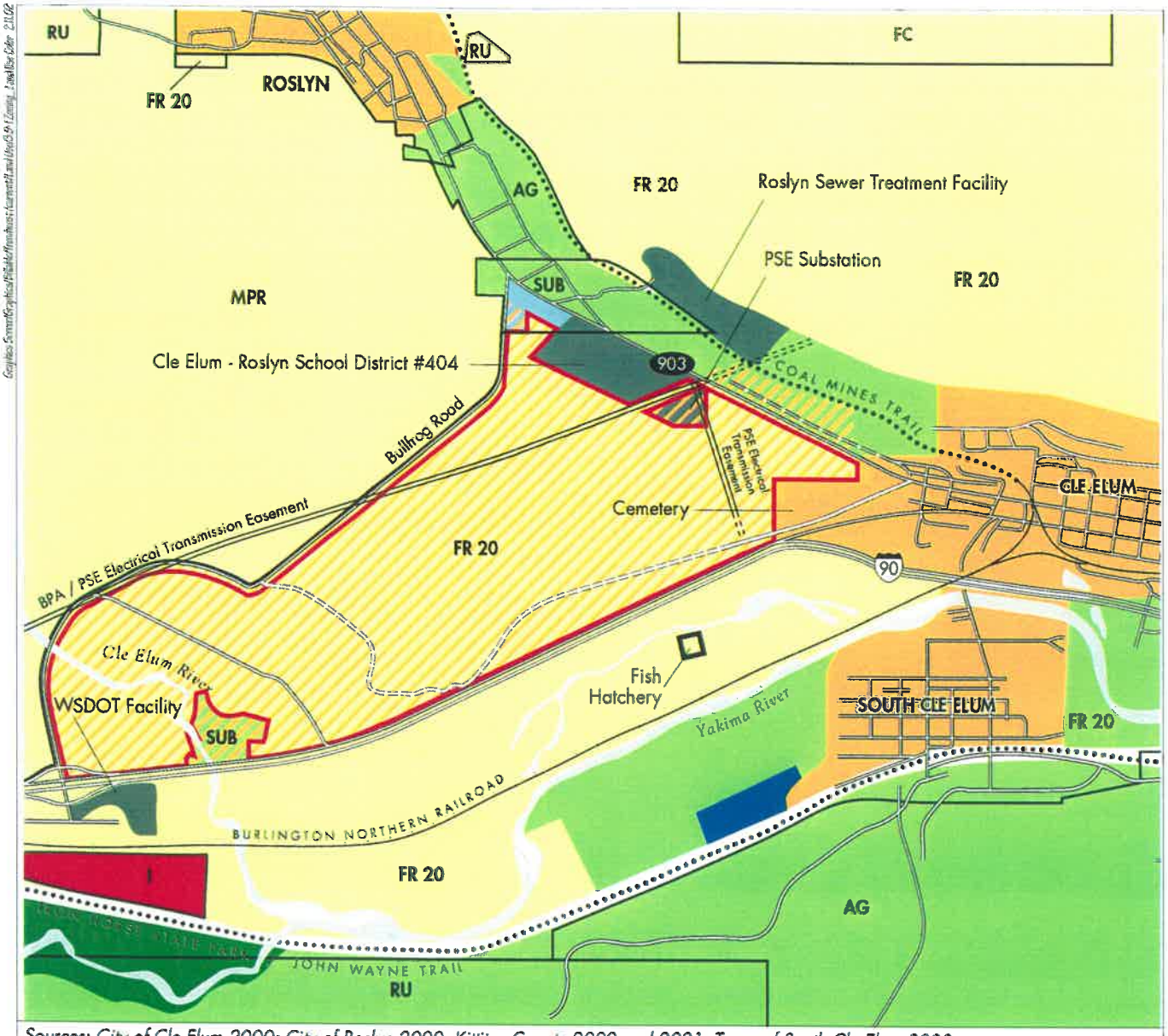
Existing land use and zoning in Kittitas County, the cities of Cle Elum and Roslyn, and Town of South Cle Elum are discussed in Section 3.10 of the Draft EIS. The Cle Elum UGA is located immediately west of the City of Cle Elum and is bounded on the north and west by Bullfrog Road, on the east by SR 903, and on the south by I-90. Alternative 5 proposes development of approximately 1,100 acres of undeveloped, vacant land within the UGA.

Land uses immediately east of the UGA are primarily public in nature and include a municipal cemetery, the school district campus, a Puget Sound Energy substation, a solid waste transfer station, and a sewer treatment facility. In addition, a small group of single-family homes is situated along the northeastern boundary of the Cle Elum UGA. Land uses immediately north and west of the Cle Elum UGA are either undeveloped, forested areas or low-density residential. Bullfrog Road runs along the northern border of the UGA. The site of the proposed MPR extends northwest from Bullfrog Road. Land uses immediately south of the Cle Elum UGA include two major transportation corridors: I-90 and the Burlington Northern-Santa Fe rail line. The Cle Elum Salmon Hatchery, operated by the Yakama Nation, is next to the Yakima River. Figure 3.9-1 depicts generalized existing land use and zoning designations for the UGA and surrounding lands.

Existing and Planned Zoning

The Cle Elum UGA is primarily designated Forest Multiple Use in the *Kittitas County Comprehensive Plan* (1997) and is zoned Forest and Range (F&R) in the *Kittitas County Zoning Code*. This zoning allows a wide range of permitted and conditional land uses generally related to resource management. Several residential uses are allowed in the F&R zone including single-family residences, duplexes, and cluster subdivisions (KCC 17.56.020). The minimum lot size is 20 acres. Lot sizes may be reduced to one-half acre if they are in an approved cluster subdivision served by public water and sewer, and to one-quarter acre if served by public water and sewer and located within a UGA or Urban Growth Node (UGN).

Since publication of the Draft EIS, approximately 23 acres of the UGA under separate ownership has been rezoned from Forest and Range 20 to Suburban 1. The rezoned property is located north of I-90 and east of the Cle Elum River, adjacent to Trendwest-owned property within the UGA (see Figure 3.9-1). The intent of the suburban zone is to provide for and protect low-density, semirural residential development in outlying transitional areas where a mixture of residential and traditionally rural land uses will be compatible. The Suburban zoning allows single-family houses (not including mobile homes or trailers), duplexes, agriculture, ranching (in an area of an acre or more), and uses similar to these described with County approval. The minimum lot size is 1 acre. Lot sizes in platted subdivisions may be reduced to three-quarters of an acre.



Sources: City of Cle Elum 2000; City of Roslyn 2000; Kittitas County 2000 and 2001; Town of South Cle Elum 2000

ZONING KEY

	Cle Elum Urban Growth Area
I	Industrial
FR 20	Forest and Range
AG	Agriculture
UF	Urban Forest
RU	Rural
SUB	Suburban
FC	Commercial Forestry
MPR	Master Planned Resort

LAND USE KEY

- Trendwest Properties Boundary
- Public Park / Trail
- Urban
- Private Forest / Undeveloped Land
- Rural Residential / Small Scale Agriculture
- Public Forest Land
- Mining
- Commercial
- Public
- Industrial

N

0 0.5

Scale in Miles

FIGURE 3.9-1

GENERALIZED EXISTING LAND USE AND ZONING

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

Additional land within the UGA and not in Trendwest ownership includes the area north of SR 903 (zoned F&R), the Puget Sound Energy substation (zoned F&R), and several small parcels located in the northeast corner of the UGA (zoned General Commercial).

The City of Cle Elum is planning on annexing the UGA prior to construction proposed under Alternative 5 and has drafted a Planned Mixed Use zoning regulation. This zoning would apply to large parcels of land with significant development potential and would take effect upon annexation of the property. Trendwest properties within the UGA would be covered under this regulation. Proposed zoning for other properties within the UGA is Residential (lands north of SR 903 and the northeast corner parcels), Residential 1 acre (area zoned Suburban), and Public Reserve (Puget Sound Energy substation).

3.9.2 Impacts

No Action Alternative

Potential impacts from development under the No Action Alternative under F&R zoning is discussed in Section 3.10 of the Draft EIS. The number of lots that could be created under this zoning would range from 19 (existing parcels) to more than 106, assuming buildout in cluster subdivisions. The rezone of 23 acres to Suburban 1 would not generate significant additional density or result in incompatible uses because both zoning designations allow similar residential development. Kittitas County issued a SEPA Determination of Non-Significance on the rezone (a non-project action) on October 10, 2001, with conditional language stating that any future development proposal would be subject to additional environmental review at the time development was proposed. Development of this property would occur independent of Trendwest's UGA properties.

Alternative 5

Direct Construction

For purposes of this analysis, construction-related land use impacts are defined by the phasing of development within the UGA. As with Alternatives 2, 3, and 4, an analysis of development phasing (in terms of land demand) was conducted for Alternative 5. The analysis focuses on the buildout rate for each of the project uses within designated planning areas as shown on the site plan (Figure 2-5) and is based on the same assumptions as used in the analysis of Alternatives 2, 3, and 4 in Section 3.10 of the Draft EIS.

Conversion to proposed higher intensity land uses under Alternative 5 would occur in the project's initial construction phase, similar to the other development alternatives. The common use facilities, 39% of the single-family units, and nearly 90% of the multifamily units would be constructed by the end of Project Year 5. Approximately half of the total acreage devoted to residential units would be developed in the first five years of the project.

By Project Year 20, 85% of the single-family units and 100% of the multifamily units would be constructed, similar to the other development alternatives. Table 3.9-1 summarizes development phasing for Alternative 5 by use (in acres) at Project Years 5, 20, and 30.

Table 3.9-1: Alternative 5 Land Demand (in Acres) at Years 5, 20, and 30

Use	Year 5	Year 20	Year 30
Single-Family Residential	89.8	181.6	213
Multifamily Residential	71.6	80	80
Total Residential	161.4	261.6	293
Business Park[1]	8.6	51.4	80
Total Commercial/Industrial	8.6	51.4	80
Recreation Expansion	14	14	14
Neighborhood Clubhouse	22	22	22
Community Recreation Center	12	12	12
Total Recreation	48	48	48
Water Treatment Plant/Maintenance	14	14	14
School/Cemetery Expansion	35	35	35
Utility Rights-of-Way	37	37	37
Reserve Area	175	175	175
Total Facilities/Other Uses	261	261	261
Buffers/Open Space[2]	131	131	131
Undeveloped Open Space[3]	287	287	287
Total Open Space	418	418	418
Total Acres	897	1,040.1	1,100

1 Land use demand for the Business Park at Project Years 5, 20, and 30 assumes a buildout in even increments over 27 years.
2 Buffer areas include land designated as perimeter buffers.
3 Undeveloped open space includes land within the Cle Elum River corridor's geomorphic floodplain, the east ravine, and central ridge areas.

Direct Operation

For purposes of this analysis, operational land use impacts are related to the proposed development density. As with Alternatives 2, 3, and 4, net residential density is calculated as the total number of units in a planning area divided by the total number of acres in that area, less a 25% allowance for road and utilities rights-of-way. For the calculation of residential buildout and density, multifamily residential includes condominiums. Table 3.9-2 summarizes net residential density under Alternative 5 at Project Years 5, 20, and 30.

Table 3.9-2: Alternative 5 Residential Buildout and Net Density at Years 5, 20, and 30

	Year 5			Year 20			Year 30		
Housing Type	Units	Acres	Net Density[1]	Units	Acres	Net Density[1]	Units	Acres	Net Density[1]
Single Family	319	89.8	4.7	685	181.6	5.0	810	213.0	5.1
Multifamily	469	71.6	8.7	524	80.0	8.7	524	80.0	8.7
Total Residential	788	161.4	6.5	1,209	261.6	6.2	1,334	293.0	6.1

1 Net density calculations assume a 25% allowance for road and utilities rights-of-way.

Under Alternative 5, overall net residential density would be 6.5 dwelling units per acre (du/acre) at Year 5, decreasing to 6.2 du/acre at Year 20 and to 6.1 du/acre in Year 30. Overall density is higher than that analyzed for Alternatives 2, 3, and 4 because of the relatively greater number of residential units planned for a relatively smaller residential land base under Alternative 5. The residential density at buildout under Alternative 5 would be from 49% to 118% greater than Alternatives 2, 3, and 4, depending on the alternative.

Indirect

Indirect land use impacts under Alternative 5 would be similar to those discussed for Alternatives 2, 3, and 4, and primarily associated with increases in population generated by development within the UGA that would create additional demand for goods and services in the project area. This additional demand would likely result in additional development pressures on undeveloped land in areas neighboring the UGA. As with Alternatives 2, 3, and 4, development of the Business Park would likely result in a demand for supporting commercial uses. However, because Alternative 5 would not include a golf course, RV Park, or Horse Park, this alternative would not generate the indirect pressures for land use conversion to support these recreational uses.

Cumulative

Development of the approximately 6,225-acre Reduced Density MPR concurrent with the UGA would significantly increase the total developed area in Upper Kittitas County over the 20-year planning and the 30-year buildout periods. It also represents a significant change in land use compared with existing conditions. Cumulative impacts on land use occurring from development of the MPR concurrent with the UGA and other development in the Upper County would include conversion of land use from primarily resource based to resort and residential.

Construction of a Reduced Density MPR (3,785 units compared to 4,650 units originally proposed) would decrease the overall density of the developed area compared to the cumulative development scenario analyzed in the Draft EIS.

3.9.3 Consistency with Plans and Policies

An assessment of the consistency of Alternatives 2, 3, and 4 with adopted land use plans and policies is included in Section 3.10.4 of the Draft EIS. Plans and policies evaluated for consistency include: the Growth Management Act; Shoreline Management Act; Kittitas County Shoreline Master Program; Kittitas County Comprehensive Flood Management Plan; comprehensive plans for Kittitas County, the cities of Cle Elum and Roslyn, and Town of South Cle Elum; the Draft Bullfrog Subarea Plan; and the Mountains-to-Sound Greenway Plan. Development proposed under Alternative 5 falls within the range of uses evaluated for consistency in the Draft EIS and would not conflict with any of the provisions outlined in the respective plans and policies.

3.9.4 Mitigation Measures

Mitigation measures for potential land use impacts associated with Alternative 5 would be the same as those identified in the Draft EIS that are inherent to the site design under all the alternative development scenarios. These include properties set aside for school and cemetery expansion, the City's water treatment plant, and a Community Recreation Center.

In August of 2001, Trendwest submitted a Master Site Plan Application to the City for development of 1,100 acres of the UGA in a master planned community (Alternative 5). Changes in site design are, in part, in response to public comments. Alternative 5 calls for significantly more open space when compared to Alternatives 2, 3, and 4; Trendwest development has been eliminated from the entire Cle Elum River corridor west of the west ridge. Perimeter buffers along I-90 and SR 903 have been increased. The Business Park has been relocated from adjacent to I-90 to adjacent to SR 903. Residential development has been consolidated and shifted east and north.

Both the Cooperative Agreement among Trendwest, WDFW, and the Yakama Tribe, and the RIDGE Settlement Agreement contain provisions to acquire offsite conservation easements, including permanent forested lands adjacent to Roslyn and Cle Elum (RIDGE Agreement). This is intended to mitigate for conversion of property within the MPR and UGA.

The City of Cle Elum will adopt the Bullfrog Subarea Plan and proposed zoning for the UGA that will take effect upon annexation of the property, consistent with RCW 35A.14.330. Policies, regulations, and conditions of approval will be identified in a development agreement consistent with RCW 36.70B.170. The development agreement, Bullfrog Subarea Plan, and zoning regulations will govern the City's subsequent review of any proposed development in the UGA.

3.9.5 Significant Unavoidable Adverse Impacts

Development proposed under Alternative 5 would convert approximately 1,100 acres from undeveloped forest land to a master plan community, which is consistent with City of Cle Elum land use and zoning designations. With the mitigation measures in place, no significant land use impacts would occur. However, those that oppose growth in this area would likely view the development itself as a significant unavoidable adverse impact.

3.10 POPULATION AND HOUSING

This section characterizes housing and population in Kittitas County and the jurisdictions surrounding the Cle Elum UGA. It analyzes potential population and housing impacts associated with Alternative 5 compared to Alternatives 2, 3, and 4, which were analyzed in the Draft EIS. Mitigation measures also are identified. The No Action Alternative is analyzed in Section 3.11 of the Draft EIS. Impacts on property values are discussed in Section 3.17, Economic Conditions.

3.10.1 Affected Environment

Since the Draft EIS was published in March 2001, updated population figures have been published that reflect the 2000 Census. This information is incorporated in the Final EIS and updates tables presented in the Draft EIS. Refer to Section 3.11 of the Draft EIS for a discussion of household characteristics, demographic trends, housing availability, and housing value and cost.

Population

Table 3.10-1 summarizes the updated population data by jurisdiction for the years 1980, 1990, and 2000, and the percentage of population increase by decade.

Table 3.10-1: Kittitas County Population, 1980 to 2000

Jurisdiction	Population			Percent increase 1980-1990	Percent increase 1990-2000
	1980	1990	2000		
Kittitas County, Unincorporated	9,109	10,418	13,614	14%	31%
Kittitas County, Incorporated	15,768	16,307	19,748	3%	21%
Cle Elum	1,773	1,778	1,755	0%	-1%
South Cle Elum	449	457	457	2%	0%
Roslyn	938	869	1,017	-7%	17%
Ellensburg	11,755	12,360	15,414	5%	25%
Kittitas	853	843	1,105	-1%	31%
Kittitas County, Total	24,877	26,725	33,362	7%	25%

Source: OFM 1982, 2001.

Approximately 46% of the population in the County resides within the City of Ellensburg. Another 41% reside in the unincorporated areas of Kittitas County, with the majority of this population located in the Lower County. The remaining 13% of the population resides in the smaller incorporated municipalities of Cle Elum, South Cle Elum, Roslyn, and Kittitas.

Between 1980 and 1990, total population in the County increased by 7%. This was followed by a 25% increase between 1990 and 2000. The overall unincorporated area, including the Urban Growth Nodes (Ronald and Easton in the Upper County and Thorpe and Vantage in the Lower County), experienced the largest population increase between 1990 and 2000 (31% or 3,196

people). The cities of Ellensburg and Kittitas also experienced large gains, expanding by 25% (3,054 people) and 31% (262 people), respectively. The City of Roslyn's population increased by 17% (148 people). The growth rate in the cities of Cle Elum and South Cle Elum was the lowest, with a net loss of approximately 23 people between 1990 and 2000.

Housing

The following discussion of housing reflects updated figures from the 2000 Census. Table 3.10-2 summarizes the number of housing units in Kittitas County overall, in the unincorporated areas, and in individual municipalities. The increase in housing units is displayed for two time periods: 1980 to 1990 and 1990 to 2000.

Table 3.10-2: Housing Units - 1980 to 2000[1]

Jurisdiction	Number of housing units			Percent increase	Percent increase
	1980	1990	2000	1980-1990	1990-2000
Kittitas County, Unincorporated	4,845	6,129	7,444	27%	21%
Kittitas County, Incorporated	6,864	7,085	9,031	3%	27%
Cle Elum	885	887	956	0%	8%
South Cle Elum	191	210	210	10%	0%
Roslyn	580	606	623	4%	3%
Ellensburg	4,892	5,015	6,732	3%	34%
Kittitas	316	368	510	16%	39%
Kittitas County, Total	11,709	13,214	16,475	13%	25%

1 Percentages are rounded and may vary slightly from those stated in other documents.
Source: Kittitas County Comprehensive Plan 1997; OFM 2001.

Kittitas County experienced significantly greater housing growth between 1990 and 2000 (25%) compared to the previous decade (13%). Also, between the years 1980 and 1990, the number of housing units in Kittitas County increased 3% in incorporated areas, compared to 26% in unincorporated areas. This trend was reversed between 1990 and 2000, with new housing in incorporated areas increasing 27%, compared to 21% in unincorporated areas.

In 2000, approximately 81% of the housing units in Kittitas County were occupied and 19% were vacant. Of the occupied units, 58% were owner-occupied and 42% were renter-occupied. Approximately 11% of all units were seasonally vacant (for recreational or occasional use).

Population Projections

Under the Growth Management Act, Kittitas County and its cities use population forecasts from the Office of Financial Management (OFM) to determine the need for future housing. The OFM produces three levels (series) of population forecasts: low, medium, and high. For individual counties, the medium series usually represents the most likely anticipated growth rate.

Kittitas County and its municipalities indicate in their comprehensive plans that the medium series OFM projections for year 2015 as allocated by the Countywide Planning Policies (CWPP) underrepresented the current growth rate and anticipated future population influx. OFM's high series predicted approximately 4,700 more people in the County by 2015 than the medium series. The City of Cle Elum docketed a request with Kittitas County to amend the CWPP to reflect the high range population projections and to increase the population allocation to the City of Cle Elum and its UGA. After review and recommendation by the Kittitas County Council of Governments on December 21, 1999, the Board of County Commissioners approved this request.

Under the amended CWPP using the high series projections, Kittitas County's population is projected to increase by 14,470 by 2020. Table 3.10-3 shows how that increase is allocated to local jurisdictions under the CWPP amendment. The highest growth is allocated to the City of Ellensburg and unincorporated Kittitas County. The second highest growth is allocated to the City of Cle Elum and its UGA. In general, population that was previously allocated to unincorporated Kittitas County was shifted to the City of Cle Elum and its UGA. As a result, the City and UGA are projected to receive 19% of the county's 20-year population growth.

Table 3.10-3: Allocation of Projected Population – 2020

Jurisdiction	Allocation Percentage (1999 CWPP)	Population Allocation Based on OFM 2020 High Series
Unincorporated Kittitas County		
Unincorporated[1]	26.0%	3,762
Urban Growth Nodes	15%	1,707
Incorporated Kittitas County		
Cle Elum/UGA	19.0%	2,750
South Cle Elum/UGA	1.5%	217
Roslyn/UGA	1.0%	145
Ellensburg/UGA	35.0%	5,064
Kittitas/UGA	2.5%	362
Total	100%	14,470

1 Unincorporated Kittitas County excluding UGAs and UGNs.
Source: Kittitas County CWPP, as amended, 1999.

Housing Projections

Individual jurisdictions determined their future housing needs, in most cases, using different methodologies from the County Comprehensive Plan and from each other. Table 3.10-4 estimates the number of housing units required for each jurisdiction based on the population increases identified in Table 3.10-3 using the County formula, which assumes a vacancy rate of zero for existing housing stock. This shows the maximum number of potential housing units needed to accommodate population. Applying this methodology, a total of 5,918 additional housing units would be required by 2020.

Table 3.10-4: Housing Needs (Number of Units)

Jurisdiction	Projected Housing Needs in 2020[1]
Unincorporated Kittitas County	
Unincorporated	1,615
Urban Growth Nodes	931
Incorporated Kittitas County	
Cle Elum	1,201
South Cle Elum	90
Roslyn	60
Ellensburg	1,876
Kittitas	145
Total, Kittitas County	5,918

1 Projected housing needs are based on the CWPP, as amended (1999), and are calculated using the Kittitas County formula, stated as follows:

- Projected population increase/average number of persons per household = total number of dwellings needed.
- Total number of dwellings needed minus existing vacancies = the number of additional units needed. Existing vacancies are assumed to be zero.

Source: Kittitas County 1996, 1999

3.10.3 Impacts

Direct Construction

Construction-related impacts on population and housing would result from workers moving to the area, also called in-migration. The evaluation of potential housing impacts from construction employment reflects a labor analysis performed by Economics Research Associates (2000).

Construction Employment In-Migration

Similar to Alternatives 2, 3, and 4, construction within the Cle Elum UGA under Alternative 5 would be accomplished using a combination of local and non-local construction labor. The largest demand for construction employees would occur during the first five years, when the majority of multifamily and non-residential facilities would be built. Table 3.10-5 summarizes local and non-local construction labor demand and projected in-migrant construction workers associated with development of the UGA.

Table 3.10-5: Local and Non-local Construction Labor Demand, Cle Elum UGA

	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
Annual Construction Jobs[1]	123	318	113	11	18	7
Local Labor Demand[2]	65	155	55	5	8	3
Non-local Labor Demand[3]	58	163	58	6	10	4
Total In-migrant Construction Workers[4]	46	130	46	5	8	3

1 Yearly totals are cumulative.
2 Local labor is defined as labor from within Kittitas County.
3 Non-local labor is defined as workers from outside Kittitas County.
4 Projected in-migration assumes that 20% of the non-local labor would commute.
Source: Trendwest 1999; Economics Research Associates 2000.

In-migrant construction workers would peak in Project Year 3 and are anticipated to fill positions requiring specialized skill categories not represented in the current labor market. Construction worker in-migration associated with the UGA drops to nearly zero after Project Year 5, reflecting the completion of the majority of non-residential facilities and the ability of the local labor force to meet demand for the continuing construction of residential units.

As with Alternatives 2, 3, and 4, the majority of non-local construction workers attributed to commuters would likely come from King County, based on the concentration of employment and specialized labor available in the Seattle metropolitan area.

Housing needs for in-migrant workers would depend on household status (i.e., single, roommate, or family) and accommodation desires (i.e., rental or ownership). Peak demand for housing would occur in Project Year 3 concurrent with the highest non-local employment demand.

Impacts on the housing market would likely occur in the initial stages of construction until the market responded to increased demand. Potential housing impacts in the cities of Cle Elum and Roslyn, and Town of South Cle Elum could initially include lower vacancy rates, housing shortages, and increased housing costs. It is likely that some in-migrant workers would locate in the Ellensburg area where there is a greater amount of available housing. The ability of the in-migrant construction employee to afford housing is not anticipated to be a significant issue. Non-local construction workers are anticipated to fill positions requiring specialized skill categories that pay above the average construction wage.

Direct Operation

Employment

Operational employment under Alternative 5 is limited to the Business Park. Unlike Alternatives 2, 3, 4, this alternative does not include Trendwest-owned facilities (e.g., golf course and timeshare condominiums) or the Horse Park (Alternatives 2 and 4).

Business Park

Employment in the Business Park is based on a composition profile of light industrial, research and development, warehouse, office, and retail uses. Employment demand also reflects an even, incremental buildout starting in Project Year 4, which was used for purposes of analysis, because no market studies on the capacity of the region to absorb the identified square footages of business park have been completed.

Table 3.10-6 identifies local and non-local employment demand for the Business Park under Alternative 5, based on Economics Research Associates' labor analysis relative to the composition of uses identified above. Because the size of the Business Park under Alternative 5

is the same as that for Alternative 2, projected employment impacts are the same. Employment demand under Alternatives 3 and 4 would be lower due to smaller square footage.

Assuming in-migrant households reflect the Washington household workforce participation rate of 1.34 workers per household, population in-migration due to development of the Business Park could result in an influx of approximately 357 households by full buildout. (The workforce participation rate is the ratio of Washington's 2000 labor force of 3,045,200 and Washington's household count in 2000 of 2,271,398.)

Table 3.10-6: Direct Employment Impacts of Business Park Operation under Alternative 5 (Annual FTEs)[1]

	Year 4	Year 5	Year 10	Year 20	Year 30
Alternative 5 (950,000 sf)					
Employment Demand	61	122	427	1,037	1,647
Locally Filled Jobs[2]	43	86	303	735	1,167
Non-locally Filled Jobs[3]	18	35	124	302	479

1 Yearly employment totals are cumulative. FTE = full-time equivalents.
2 Local labor is defined as labor from within Kittitas County.
3 Non-local labor is defined as workers from outside Kittitas County.
Source: Economics Research Associates 2000.

Population Capacity

Permanent and seasonal housing and population impacts are evaluated according to the number of units projected for construction at the 5-, 20-, and 30-year time points and assume immediate occupancy according to identified occupancy rates. The actual rate of population influx to the Cle Elum UGA would vary, depending on the rate of sale, development of proposed lots, and changes in occupancy rates and persons per household ratios.

Table 3.10-7 compares the demand for permanent housing units and potential population under Alternative 5 with Alternatives 2, 3, and 4 at Project Years 5, 20, and 30. Population capacity is calculated using a persons per household ratio of 2.4 and an occupancy rate of 92% (8% vacancy).

Housing and population capacity resulting from Trendwest residential development in the UGA is projected at 1,334 units and 2,945 people at full buildout. An additional 100-unit capacity is projected in the area of the UGA north of SR 903. Twenty-three acres of the UGA adjacent to the Cle Elum River floodplain has recently been rezoned to Suburban and may also be developed in the future.

The greatest impacts on housing capacity and population could potentially occur during, and immediately following, the initial five-year construction phase. Under Alternative 5, 60% of the

total units would be constructed during that period. Similar to Alternatives 2, 3, and 4, all the apartments would be constructed in the first five years of construction.

At Project Year 20, permanent population capacity under Alternative 5 would account for 97% of the 20-year population growth allocated to Cle Elum. By comparison, Alternatives 2, 3, and 4 would reach 67%, 87%, or 51% of the 20-year capacity, respectively.

Table 3.10-7: Population Capacity in Permanent Residential Housing Units

Year	Alternative 2 Preliminary Master Plan	Alternative 3 Expanded Residential	Alternative 4 Reduced Residential	Alternative 5 Preferred Alternative
Year 5				
Single Family	115	266	142	319
Apartments	325	300	200	184
Condominiums	156	82	92	285
Permanent Residential Units (Year 5)	*596*	*648*	*434*	*788*
Population Capacity (Year 5)[1]	*1,316*	*1,431*	*958*	*1,740*
Year 20				
Single Family	264	588	341	685
Apartments	325	350	200	184
Condominiums	249	148	92	340
Permanent Residential Units (Year 20)[2]	*838*	*1,086*	*633*	*1,209*
Population Capacity (Year 20)	*1,850*	*2,398*	*1,398*	*2,669*
Year 30 (Buildout)				
Single Family	324	709	418	810
Apartments	325	350	200	184
Condominiums	249	148	92	340
Permanent Residential Units (Year 30)	*898*	*1,207*	*710*	*1,334*
Population Capacity (Year 30)	*1,983*	*2,665*	*1,568*	*2,945*

1 Population capacity is calculated based on 2.4 persons per household and a unit occupancy rate of 92%.
2 Yearly totals are cumulative.

Housing Affordability

Price information on types of housing to be developed by Trendwest has not been finalized at this time. Rents for apartments would likely be comparable or higher than rental units in the area because they would be newly constructed. Houses developed on UGA lots would be larger than most of the existing in-city houses. While it isn't possible to predict the selling price of these houses, it can be assumed that they would be consistent with market rates for newer houses and vacation properties in the Upper County, and above current prices for in-city housing stock.

Indirect

Development of the Cle Elum UGA under Alternative 5 would result in indirect population growth and a related demand for housing capacity. The increase in permanent residents would likely draw new economic activity and, to the extent that the induced economic activity

represented new business and job opportunities filled by in-migrants, additional population growth would occur (see Section 3.17, Economic Conditions).

An analysis of where potential MPR and UGA employment-induced households (direct and indirect) would locate was performed to evaluate potential employment-induced water demands. The results of this analysis are included in Appendix C. Allocated households included in-migrant employees (from direct construction and operational employment demand) and potential induced households from increased economic activity.

The induced households were all considered to be in-migrant. In reality, a portion of the employment opportunities induced by development of the MPR and UGA would be filled by existing residents. Trendwest development of the Reduced Density MPR and properties within the UGA would result in a maximum projected 290 induced households (Project Year 10). Development of the Business Park would result in a projected 442 induced households at full buildout. The analysis allocated households to Kittitas County consistent with the CWPP.

The CWPP allocates 19% of future population to Cle Elum and its UGA. It is anticipated that much of the population drawn to the area and its amenities would locate within the UGA or MPR. However, not all indirect growth would settle in the UGA and MPR, and depending on the magnitude and location choices of in-migrants, there could be an increase pressure on the housing markets in the unincorporated areas of Kittitas County and municipal jurisdictions.

Cumulative

Population

Development of the UGA, Reduced Density MPR, and other regional growth would result in significant increases in population and housing capacity over the 30-year buildout period.

With development of the MPR, the County would likely experience more defined seasonal patterns of use, with the highest visitor use occurring in the summer months and peaking on weekends. Table 3.10-8 estimates the average daily seasonal population increase in Kittitas County overall associated with development of the Reduced Density MPR and Cle Elum UGA at full buildout.

Table 3.10-8: Estimated Average Daily Seasonal Population Increase in Kittitas County, Project Year 30

Population Category	Spring March-May	Summer June-August	Fall Sept.-Oct.	Winter Nov.-Feb.
Cle Elum UGA	3,166	3,166	3,166	3,166
MPR Permanent Resident	1,570	1,570	1,570	1,570
MPR Seasonal Visitor	4,207	5,504	4,868	3,364
Indirect/Induced Growth	1,886	1,886	1,886	1,886
Day Visitors	121	243	166	52
Total[1]	10,950	12,369	11,656	10,038

1 Total average daily population increase in Kittitas County associated with Trendwest residential development at full buildout.
Source: Trendwest 2001

Housing

Development in the MPR and Cle Elum UGA under Alternative 5 would contribute significantly to the permanent and seasonal housing capacity in Kittitas County. These units are expected to accommodate future growth generated by the two projects and, particularly in the case of the Cle Elum UGA, are also intended to accommodate future growth as projected by the OFM. Housing types in the MPR are consistent with the legislative intent under RCW 36.70A.360 of a primary focus on "short-term visitor accommodations." Approximately 80% of the approximately 3,785 MPR units (3,074) are proposed as short term, with the remaining 20% (711) assumed to house permanent residents. In the UGA, the 1,434 housing units are assumed to be permanent and occupied on a year-round basis.

The most significant potential cumulative impact on housing may be a continuing demand for rental housing (including multifamily), and house-ownership opportunities suitable for all household sizes at rates affordable to the mid- to lower-income economic sector. The ability of the individual housing markets in the County to absorb direct employment-related population influxes would depend on a number of factors, including the characteristics and supply of the housing stock, vacancy rates, selling price and/or rental costs, and availability of housing assistance programs. Measures identified in the mitigation section would contribute to reducing adverse cumulative impacts on housing associated with employment in-migration.

3.10.4 Mitigation Measures

Mitigation measures identified in the Draft EIS include those inherent to project development and future planning processes. Population growth in the County would be addressed, in part, through land use decisions made by jurisdictions in updating their comprehensive plans. The definition and responsibilities for an MPR under RCW 36.70A.360, and as stipulated in the Kittitas County Comprehensive Plan, are intended to mitigate for cumulative impacts on adjacent jurisdictional growth scenarios. The Draft EIS summarizes key elements of the Housing Mitigation Program approved by the County. Since the Draft EIS was published, the City has

prepared a draft Conditions of Approval document that also addresses potential affordable housing impacts on the City. Provisions include:

- Conveyance to the City of Cle Elum, or other public or non-profit entity approved by the City, of 7.5 useable acres to develop housing units affordable to those earning less than 60% of the median income for Kittitas County.
- Construction of access, water, and sewer, consistent with the development standards, up to the parcel boundaries, as with every other parcel in the master plat.
- Participation by Trendwest, at its option, to assist in the selection process for potential owners/developers of the affordable housing.
- Maintaining a minimum of 150 residential units in the UGA as rental units for at least 20 years.
- Periodic monitoring and inventory of the existing supply of affordable housing in Upper Kittitas County and advocacy if necessary to help ensure that a continuous supply of housing in the area is affordably priced for those earning the wages paid at the MountainStar Resort.
- Active recruitment, hiring, and contracting with the existing local labor pool to minimize in-migration employment and associated housing impacts. Trendwest would support and participate in the school training programs described in the RIDGE Settlement Agreement to further promote local hiring of existing residents.
- Allowance to construct a maximum of 100 temporary RV sites in the reserve tract to house temporary construction workers from the MPR and UGA. The RV park would not be allowed in any portion of the required open space or buffers, and would be designed with a minimum 75% visual screen from views from I-90. The RV sites would count against the maximum residential unit count until removed or unless the RV park is permitted as part of a future approved and permitted Horse Park.

3.10.5 Significant Unavoidable Adverse Impacts

Development of the Cle Elum UGA would increase the permanent population in the Upper County. Increases in population could be considered an adverse impact by those opposed to growth and/or opposed to the idea of the Cle Elum-Roslyn area becoming more of a tourist destination. With implementation of identified mitigation measures, significant impacts on affordable housing are not anticipated.

3.11 AESTHETICS/LIGHT AND GLARE

This section analyzes impacts on aesthetics, light, and glare under Alternative 5 compared to Alternatives 2, 3, and 4, which are discussed in Section 3.12 of the Draft EIS. Mitigation measures are identified to limit those impacts. Potential impacts from the No Action Alternative are described in the Draft EIS.

3.11.1 Affected Environment

The City of Cle Elum and its UGA are located in the Middle Cascade Mountain region on the north side of I-90. Mountainous ridges and relatively flat river valleys typify this region. The majority of the UGA is forested, with mostly ponderosa pine on the upland portions, and deciduous trees such as cottonwood along the Cle Elum River in the southwest portion of the site. Built features within the UGA include the School District campus, an electrical power substation, and two power transmission line corridors that bisect the western and northeastern portions of the UGA. A detailed description of the existing conditions, including photographs, views, and light and glare, is presented in Section 3.12 of the Draft EIS.

Additional information on the Mountains-to-Sound Greenway and I-90 as a National Scenic Byway that was not included in the Draft EIS is presented below.

Mountains-to-Sound Greenway

The Mountains-to-Sound Greenway Trust (Greenway) is a non-profit organization formed in 1991 to promote protection of a regional greenway. The Greenway extends along I-90 from Seattle, on the Puget Sound, to the town of Thorp, in the Kittitas Valley. The Cle Elum UGA lies within the delineated corridor of the Greenway.

The Greenway developed a concept plan that identifies goals, objectives, and strategies for preservation of the greenway. One of the goals of the plan is to "protect and enhance scenic beauty along I-90 and its byways." The concept plan addresses Bullfrog Flats in the Cle Elum UGA and recommends that new development be designed for maximum preservation of the natural forested character of the lands, scenic qualities, and wildlife habitat.

National Scenic Byway

The U.S. Department of Transportation designated Interstate 90 as a National Scenic Byway in 1998. Roads so designated possess outstanding qualities that exemplify the regional characteristics. Designation as a National Scenic Byway is based on scenic, historic, recreational, cultural, archaeological, or natural features that are considered representative, unique, irreplaceable, or distinctly characteristic of an area. For the stretch of I-90 through Kittitas County, regional characteristics include mountains, forests, and rivers as well as ranches, farms, and small towns.

3.11.2 Impacts

Primary factors considered in determining aesthetic impacts are viewing opportunities, distance from the site, visual contrast, and visual dominance. Viewing opportunities take into account the number of viewers and duration of view, including the travel speed of those driving on area roads. Environmental factors that can affect viewing opportunities include topography, vegetation, and structures. Viewer perception is affected by distance. As the distance from a site increases, the details of the site and its apparent size diminish. Visual contrast or harmony relates to whether a facility blends or contrasts with its environment. Building mass and scale, as well as materials and colors used in design, can be primary factors in determining visual contrast. Visual dominance pertains to the development's size as it relates to its surrounding environment. Both relative visual dominance within the landscape and the presence of prominent visual elements or structures are considered.

Direct Construction

Aesthetic, light, and glare impacts resulting from construction under Alternative 5 would be the same as described for Alternatives 2, 3, and 4 in the Draft EIS. Construction activities would likely be noticeable from Bullfrog Road, SR 903, and/or I-90 at different times throughout the initial five-year construction phase with varying duration. Construction activities in areas adjacent to the Laurel Hill Memorial Park (cemetery) and the Cle Elum-Roslyn School District campus would also be noticeable by viewers. Clearing and grading work would be phased and would occur inside the perimeter buffers of preserved trees. This would help block lines of sight from the surrounding roadways. Not all of the construction activities would be visible from any one location, which would also help minimize construction impacts.

Under Alternative 5, Trendwest would be allowed to construct a maximum of 100 RV sites in the reserve tract to house temporary construction workers from the MPR and UGA. The RV Park would not be allowed in any portion of the required open space or buffers, and would be designed with a minimum 75% visual screen for views from I-90.

Direct Operation

Alternative 5 is shown in Figure 2-5 of the Final EIS. Significant differences between the site plan for Alternative 5 and the other development alternatives are outlined as follows:

- Residential development has been consolidated and shifted east and north.
- The Horse Park, golf course, and RV Park are removed from the site plan.
- The undeveloped open space around the Cle Elum River corridor is expanded to the west ridge.
- The southern third of the UGA is designated as a Reserve.
- The Business Park has been relocated from adjacent to I-90 to adjacent to SR 903.

- The school expansion area, Community Recreation Center property, and recreation expansion parcel are contiguous.

Regional Landscape

As with Alternatives 2, 3, and 4, changes to the visual landscape would occur from development proposed under Alternative 5. The primary visual impact would be the conversion of forested area to neighborhoods. Proposed development would not block any important vistas from offsite locations; however, views of a mostly uniform canopy from higher elevation points would change. Relative visual dominance would be low because of the existing urban centers along the I-90 corridor and because the UGA is contiguous with the Cle Elum/Roslyn urban development. No high-rise structures are proposed.

To reduce visual impacts, Alternative 5 calls for protection of vegetated buffers along major roads on the perimeter of the Cle Elum UGA. Retention of vegetated buffers would minimize visual impacts on regional characteristics important to the Greenway and the National Scenic Byway programs. Specific protection measures are described below under Mitigation Measures.

Cle Elum UGA

As with Alternatives 2, 3, and 4, viewers most affected by changes in the visual landscape would be the frequent users of Bullfrog Road and SR 903. Any views of the developed portion of the UGA from I-90 would be experienced in the larger context of the highway corridor, which includes views of Cle Elum and South Cle Elum. The opportunity for views of the surrounding ridges and distant peaks from the UGA would increase with development.

Visual contrast and harmony within the UGA between the built and natural environments would largely be a product of tree preservation, revegetation, the siting of structures, and design standards. Building mass, colors, and materials would determine the degree to which the structures visually blend with the natural settings and adjacent uses.

Light and Glare

Light and glare impacts under Alternative 5 would be lower than those identified for the other development alternatives based on the lower number of recreational facilities, a reduction in residential development by 865 units, and an agreement by Trendwest to implement lighting standards (see Section 3.11.3, Mitigation Measures). Primary sources of light and glare would include accumulated building and landscape lighting, or possibly, evening events at ballfields in the UGA. Increased lighting under Alternative 5 is not anticipated to significantly increase light levels of nearby offsite properties, which are mostly undeveloped. Vegetative buffers within and around the perimeter of the UGA would diminish light visibility.

Similar to Alternatives 2, 3, and 4, development under Alternative 5 would create "skyglow," which is artificial light that reflects off the nighttime sky and reduces the clarity of astronomical observation. Skyglow would be minimized by implementing the lighting design according to the International Dark Sky Association's Zone E1 standards (see Section 3.11.3, Mitigation Measures).

Indirect

Indirect impacts would be the same as described for Alternatives 2, 3, and 4 and could include changes in the character of the surrounding land use from growth induced by development of the UGA.

Cumulative

Cumulative light and glare impacts from the UGA would be lower than those identified for the UGA in the Draft EIS and the adjacent MPR. In the UGA, several potential sources of light and glare have been eliminated. These include the Horse Park, the golf course, and the RV Park. In the MPR, development densities have been reduced. Both the MPR and UGA would implement lighting design according to the International Dark Sky Association's Zone E1 standards.

3.11.3 Mitigation Measures

Mitigation measures for Alternative 5 include those identified for Alternatives 2, 3, and 4 in Section 3.12 of the Draft EIS. These measures consist of tree preservation to buffer visual impacts, architectural design guidelines, segregated planning areas, lighting standards, and landscaping with native plants. More specific mitigation measures incorporated into the project design include:

- Use of natural open space buffers 150 feet wide along I-90, 100 feet wide along Bullfrog Road, and 50 feet wide adjacent to SR 903 to screen or diffuse views to the interior of the UGA from those roadways. In addition, undeveloped open space would be preserved within the Cle Elum River corridor, including the northeast quadrant of the Bullfrog/I-90 interchange (to the extent of Trendwest ownership).
- Adoption of standards/recommendations for roadway lighting intensity consistent with the Illuminating Engineering Society of North America.
- Implementation of lighting designs according to the International Dark Sky Association's Zone E1 standards. These standards are recommended for use in "areas with intrinsically dark landscapes. Examples are national parks, areas of outstanding natural beauty, areas surrounding major astronomical observatories, or residential areas where inhabitants have expressed a strong desire that all light trespass be strictly limited."
- Development of specific architectural design guidelines for residential structures according to the outline contained in the Master Site Plan Application.

3.12.4 Significant Unavoidable Adverse Impacts

Development of the UGA would result in additional ambient light from accumulated buildings and landscape lighting. This would be mitigated through implementation of International Dark Sky Association lighting designs; however, the additional light would contribute to existing regional skyglow.

3.12 CULTURAL AND HISTORIC RESOURCES

This section identifies and describes known cultural resources within the UGA, evaluates potential impacts for Alternative 5 compared to Alternatives 2, 3, and 4, and identifies mitigation measures to limit those impacts. Potential impacts from the No Action Alternative are described in Section 3.13 of the Draft EIS. Information in this section is summarized from *A Land Use History of the Proposed MountainStar Resort: The Results of a Cultural Resource Survey along the Lower Cle Elum River* (Churchill and Griffin 1998). Properties surveyed in the report include the land within the Cle Elum UGA.

3.12.1 Affected Environment

Existing prehistoric, historic, and cultural resources within the Cle Elum UGA are described in Section 3.13, Cultural Resources, of the Draft EIS.

A total of six known prehistoric resources are located within the UGA and consist of four sites and two isolated finds. The Washington State Office of Archaeology and Historic Preservation (OAHP) has not determined the significance of these resources, which are located within areas proposed as undeveloped open space in the western portion of the UGA and designated as Reserve under Alternative 5. However, they are all potentially eligible for inclusion in the National Register of Historic Places under Criterion D on the basis of the site's ability to yield potential information about settlement and subsistence patterns that are significant to the understanding of regional prehistory (Churchill and Griffin 1999).

Seventeen historic resources are situated within the Cle Elum UGA, 14 of which are designated as refuse scatters associated with property boundaries, roadsides, and waterlines and dating from the mid-nineteenth to twentieth centuries. Potential subsurface components at these sites may be eligible for inclusion in the National Register of Historic Places (NRHP) under Criterion D.

The three historic resources that are not refuse scatters include the Cle Elum Chlorination Building, sections of the old Cle Elum waterline, and an isolated find. The Cle Elum Chlorination Building dates from 1906-1930 and is located in an area designated for residential development. Sections of the old Cle Elum waterline are historic-period waterlines that run along the western boundary of the Cle Elum UGA in Bullfrog Flats, pass underneath I-90, and re-emerge in the project area along its southern border. An additional unnamed waterline segment appears in the northeast portion of the Cle Elum UGA near Bullfrog Road and the transmission line corridor (Churchill and Griffin 1999). The isolated find consists of a single, complete aqua glass mason jar, which may be as old as 1858. The property owner curated the isolate, and no additional historic materials were associated with it (Churchill and Griffin 1999).

The possibility exists that an extant segment of the Yakama Trail is located within an area designated as undeveloped open space and, therefore, the area could have significance as a Traditional Cultural Property.

3.12.2 Impacts

Direct Construction

Potential construction-related impacts on historic and cultural resources under Alternative 5 would be lower than under Alternatives 2, 3, and 4. The majority of development is proposed in the northern two-thirds of the property, out of the geomorphic floodplain, and the area in the southern one-third of the property designated Reserve. As described above, the majority of prehistoric and historic sites/isolated finds are located in the undeveloped open space and Reserve area. Construction impacts would depend on the specific location of ground-disturbing activities with respect to the locations of known, and potentially undiscovered, prehistoric and historic cultural resources within the Cle Elum UGA. Impacts could include disturbance from excavation, increased pedestrian and vehicular traffic, compaction of sediments associated with project staging areas, erosion, illegal collecting, and spiritual diminution of possible Traditional Cultural Properties. Construction impacts on the Cle Elum Chlorination Building, which is located in an area of residential development, could include destruction of the structure and/or an alteration to the property's setting.

Direct Operation

The extent of the developed area and intensity of land uses proposed under Alternative 5 would result in a lower potential for operational impacts than under Alternatives 2, 3, and 4. However, similar to the other development alternatives, ongoing property maintenance, landscaping, road improvements, recreational activities, potential illegal collecting, and vehicular and pedestrian traffic could result in damage to existing cultural resources or the unearthing of additional unknown resources.

Indirect

Indirect impacts under Alternative 5 would be similar to those identified under Alternatives 2, 3, and 4. Population increases induced by development under Alternative 5 would lead to increased construction in the region, which would increase the possibility of impacts on cultural resources outside the Cle Elum UGA. Impacts would include deterioration of resources from erosion, loss of landscape integrity, trampling, and illegal collecting.

Cumulative

Cumulative impacts under Alternative 5 would be similar to Alternatives 2, 3, and 4. Development within the MPR and the Cle Elum UGA in conjunction with other planned regional growth would contribute to the cultural resource impacts of past land use activities, ongoing natural resource management, and future development in the surrounding area.

3.12.3 Mitigation Measures

Mitigation measures identified in Section 3.13.4 of the Draft EIS include subsurface assessments of the prehistoric and historic resources prior to land-disturbing activities, and significance

evaluation and determination of eligibility for listing in the NRHP by OAHP. If properties are determined to be significant, measures would be developed to protect them from ground-disturbing activities, such as the creation of buffer zones. If this is not feasible, professional archaeologists should recover data of the materials at these sites after consultation with OAHP and the Yakama Nation. An architectural description of the Cle Elum Chlorination Building should be provided to OAHP for evaluation and determination of the property's eligibility for listing in the NRHP.

Mitigation for potential impacts on historic and cultural resources outlined in the City of Cle Elum's draft Conditions of Approval includes:

- No measures that encourage access or discovery of significant cultural resource sites within the Cle Elum River undeveloped open space area will be permitted.
- Consistent with city code requirements, the City will give the Yakama Nation notice and opportunity to comment on all proposed preliminary plats, binding site plans, or building and grading permits on all lands within the cultural resource areas identified in *A Land Use History of the Proposed MountainStar Resort: The Results of a Cultural Resource Survey along the Lower Cle Elum River* (Churchill and Griffin 1998).
- Compliance with all applicable requirements of RCW 27.44, Indian Graves and Records, and RCW 27.53, Archaeological Sites and Resources, will be required.
- Contractors will be trained in the appropriate techniques for recognizing artifacts during construction activities and in the proper notification steps.

3.12.4 Significant Unavoidable Adverse Impacts

With the implementation of identified mitigation measures, no significant unavoidable adverse impacts on cultural and historic resources are anticipated.

3.13 PARKS AND RECREATION

This section analyzes parks and recreation impacts under Alternative 5 compared to Alternatives 2, 3, and 4, which are discussed in Section 3.14 of the Draft EIS. Mitigation measures also are identified to limit those impacts. Potential impacts from the No Action Alternative are described in the Draft EIS.

3.13.1 Affected Environment

Kittitas County has many natural areas available for both formal and informal recreational activities. The Upper Yakima River basin has a rugged terrain of mountains and canyons, extensive forested areas, and abundant rivers and lakes. This landscape, coupled with a varied climate, allows for year-round recreation opportunities. Section 3.14, Parks and Recreation, of the Draft EIS describes recreational resources and facilities managed under the U.S. Forest Service, U.S. Bureau of Reclamation, Washington State Parks and Recreation Commission, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, local jurisdictions, and private ownership.

Additional information on the Alpine Lakes Wilderness that was not included in the Draft EIS is presented below.

Alpine Lakes Wilderness

The Alpine Lakes Wilderness is located in the Central Cascades (see Figure 3.14-1 of the Draft EIS) and is jointly administered by the Mt. Baker-Snoqualmie and Wenatchee National Forests. Alpine Lakes was created when Congress passed the 1976 Alpine Lakes Wilderness Act. The wilderness encompasses approximately 394,000 acres that are accessible by 47 trailheads and 615 miles of trail.

With nearly 150,000 visitors each year, Alpine Lakes is one of the most popular natural areas in the Northwest. More than half of Washington State's population lives within a one-hour drive of the wilderness. Because of the Alpine Lakes' popularity, the Forest Service found it necessary to impose restrictions on access and use in many areas. That restriction may include party size, campsite location, or length of stay.

3.13.2 Impacts

Direct Construction

Section 3.14 of the Draft EIS identifies the potential for construction employees moving to the area to live in local RV campgrounds, which could affect the number of sites available for recreational users during the summer months, particularly on the weekends.

Construction-related impacts on park and recreation resources would likely be lower than described in the Draft EIS for Alternatives 2, 3, and 4. Under Alternative 5, a temporary RV park with up to 100 units may be constructed in a portion of the UGA for the primary purpose of housing construction workers during Trendwest's initial development phase. This would reduce potential construction worker demand on RV campgrounds in the Upper Kittitas County area.

Direct Operation

As described for Alternatives 2, 3, and 4, the increased permanent population within the Cle Elum UGA under Alternative 5 would increase the demand on park and recreation resources in Kittitas County. Existing regional resources such as camping, fishing, and hiking areas within the Wenatchee National Forest and Alpine Wilderness Area would experience an increase in the number of users. Demand for playfields (e.g., soccer, baseball) would also likely increase due to the increases in population. The greater use of recreational resources would place additional demands on responsible agencies to manage and maintain them.

Draft Bullfrog Subarea Plan

Since the Draft EIS was published, the *Draft Bullfrog Subarea Plan* was revised to identify the National Recreation Park Association's (NRPA) level-of-service standards for classifications of parks, open space, and recreational facilities as a goal, rather than a minimum standard. The purpose of this change is to allow for a flexible and community-tailored approach in both determining and providing park, recreation, and open space facilities. This change is consistent with the revised 1995 *NRPA Park, Recreation, and Open Space and Greenway Guidelines*, which outlines an approach to community planning that is "responsive to locally-based needs, values, and conditions, provides an appealing and harmonious environment, and protects the integrity and quality of the surrounding natural systems" (Mertes 1995). The 1995 NRPA guidelines also consider recreation facilities provided by other jurisdictions (such as school districts) and private facilities that serve residents.

Brief descriptions of the park classifications identified in the *Draft Bullfrog Subarea Plan* are listed below.

- Pocket Parks serve limited populations, isolated areas, and unique recreational needs. Pocket parks often serve as play areas for children. A typical pocket park would be between 0.25 and 0.5 acre in size with a service area of approximately 0.25 mile. The City's goal for pocket parks is 0.5 acre per 1,000 people.
- Neighborhood Parks are small areas used for both informal and structured activities. Typically, they are 3 to 6 acres in size and may contain sports fields, children's playgrounds, multipurpose paved areas, and/or picnic areas. They are generally geared toward the needs of residents within a 0.5-mile radius service area. The City's goal for neighborhood parks is 2.5 acres per 1,000 people.

- Community Parks serve a broader area and more interests than a neighborhood park. They are located on an arterial road system that serves the entire community and are 10 to 20 acres in size. In addition to sports fields, they contain a wide range of facilities geared toward active use, such as specific-purpose court areas, recreation centers, play areas, trails, restrooms, and parking. The City's goal for community parks is 5 acres per 1,000 people.
- Regional/Open Space in the Draft Subarea Plan is defined as "larger facilities serving the entire Upper County, with interconnecting trails, natural open space, etc." The City's goal is 25 acres per 1,000 people.

Table 3.13-1 summarizes the Draft Subarea Plan goals for parks and open space at full buildout of the UGA. In the plan, "standards may be adjusted to meet specific development situations and the provision of private facilities serving some portion of the identified need. Standards should be reviewed periodically in the process of updating the City's Comprehensive Plan to assure they are meeting the needs of a changing population" (City of Cle Elum 2002).

Table 3.13-1: Park Acreage Need Based on City of Cle Elum Draft Subarea Plan

Park Type	UGA Population (Full buildout)[1]	Standard per 1,000 People (Acres)	Goal for UGA (Acres)
Pocket	3,166	0.5	1.68
Neighborhood		2.5	8.40
Community		5.0	16.8
Open Space		25.0	84.0

1 Population is estimated for the entire UGA and assumes 1,434 units at 2.4 persons per household and a 92% occupancy rate.
Source: Draft Bullfrog Subarea Plan, City of Cle Elum 2001

The Draft Subarea Plan calls for parks within residential and Business Park areas, a Community Recreation Center, and a trail system within the subarea that links to existing and planned trail systems outside the UGA.

Table 3.13-2 summarizes the Draft Subarea Plan goals for recreation facilities at full buildout of the UGA. Facilities would be developed in conjunction with adjacent residential development or possibly within a Business Park area to serve employees.

Park and recreation facilities proposed under Alternative 5 would be consistent with Subarea Plan goals and policies for recreational resources. The expected contribution of parks, open space, trails, and facilities is presented as follows:

Table 3.13-2: Recreation Facility Needs Based on City of Cle Elum Draft Subarea Plan

Recreation Facility	UGA Population, (Full buildout)[1]	Standard per Population	Facilities Needed for UGA
Courts (Multipurpose)	3,166	1 / 2,500	2.7
Baseball/Softball Fields		1 / 750	2.2
Soccer/Multipurpose Fields		1 / 1,500	2.25

1 Population is estimated for the entire UGA and assumes 1,434 units at 2.4 persons per household and a 92% occupancy rate.

Source: Draft Bullfrog Subarea Plan, City of Cle Elum 2001

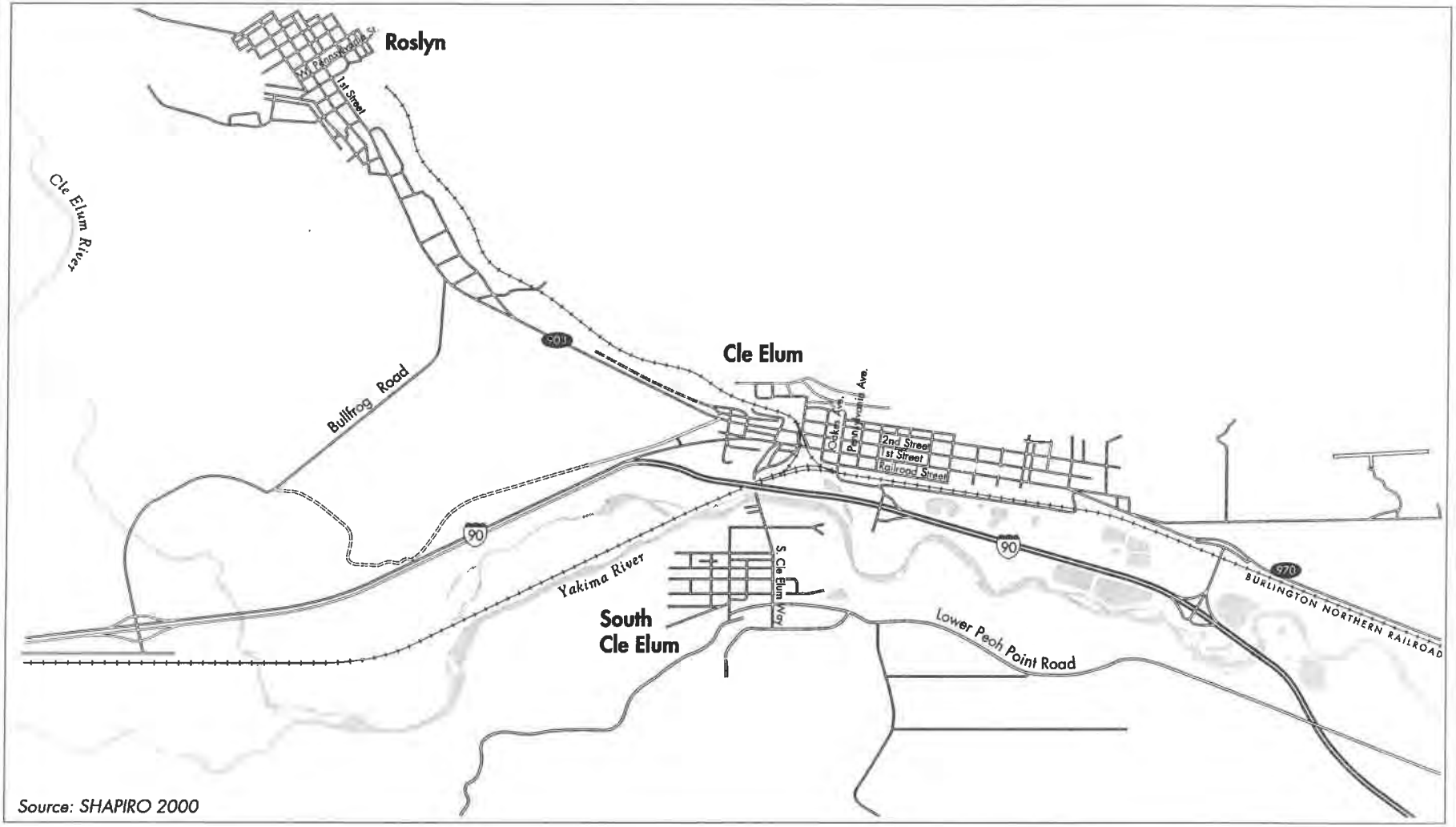
Similar to Alternatives 2, 3, and 4, park and recreation resources proposed under Alternative 5 would provide the community with a greater amount, and a wider array, of recreational opportunities than currently exists. Parks currently proposed within the UGA include 0.25 to 0.5-acre pocket parks in each planned residential area. Proposed trails include a combination of soft surface and hard surface trails or other pathways to provide uninterrupted bicycle and pedestrian routes through the UGA that link to road and/or trail systems outside the UGA. Facilities proposed under Alternative 5 include a Community Recreation Center, a neighborhood clubhouse and lake that would allow for passive recreation uses, and two soccer fields planned as part of School District expansion. Community Recreation Center facilities could include a sports court, fitness facilities, a swimming pool, and ball fields. Construction responsibilities and timing considerations are outlined in the City's draft Conditions of Approval for the project. Development of the UGA under Alternative 5 does not include the Horse Park, golf course, or RV park that were proposed under Alternatives 2, 3, and 4.

Alternative 5 includes significantly more undeveloped open space than Alternatives 2, 3, and 4. Under Alternative 5, an additional 95 acres is designated as undeveloped open space west of the West Ridge, expanding the area that is dedicated to the Cle Elum River corridor to approximately 246 acres. Open space represented by perimeter buffers and steep slope areas would increase by approximately 80 acres to 172 acres total.

MountainStar Conservation Trust (as part of the Cooperative Agreement among Trendwest, WDFW, and the Yakama Nation) will manage a conservation easement covering the open space within the Cle Elum River corridor. Additional provisions for acquisition and management of open space and forestlands contained in the Cooperative Agreement and in the RIDGE Settlement Agreement are described in Mitigation Measures, below.

Indirect

Indirect impacts would be the same as described for Alternatives 2, 3, and 4. Additional residential and commercial growth induced by development under Alternative 5 would increase the demand on offsite resource-based recreation areas.



0 0.5

Approximate Scale in Miles

FIGURE 3.14-1

EXISTING ROADWAY NETWORK

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

H-01

Table 3.14-1 summarizes LOS criteria for two-way, stop-controlled intersections.

Table 3.14-1: LOS Criteria for Two-Way Stop-Controlled Intersections

LOS	Average Total Delay (seconds per vehicle)
A	≤ 5.0
B	>5.0 and ≤ 10.0
C	>10.0 and ≤ 20.0
D	>20.0 and ≤ 30.0
E	>30.0 and ≤ 40.0
F	> 45.0

Source: 1994 Highway Capacity Manual.

Table 3.14-2 summarizes the range of delay in seconds for each LOS designation at signalized intersections and describes the most common associated traffic conditions.

Table 3.14-2: Level-of-Service Criteria for Signalized Intersections

LOS	Stopped Delay (seconds per vehicle)	Description of Traffic Conditions
A	≤ 5.0	Traffic is light. Most vehicles arrive when the light is green and do not stop.
B	> 5.0 and ≤ 15.0	Conditions are similar to LOS A, with more vehicles slowing or stopping for the light.
C	> 15.0 and ≤ 25.0	The number of stopped vehicles is significant and individual cycle failures may occur.
D	> 25.0 and ≤ 40.0	Longer delays result from longer cycle lengths, poor progression, and/or more traffic. Many vehicles stop and cycle failures occur.
E	> 40.0 and ≤ 60.0	This is the limit of acceptable delay. Cycle failures occur frequently.
F	> 60.0	Delays are unacceptable to most drivers. This often occurs when arrival rates exceed the capacity of the intersection.

Source: 1994 Highway Capacity Manual

Cle Elum Area Intersections

The *Kittitas County Comprehensive Plan* (1997) identifies LOS D as the minimum acceptable LOS at intersections. The standard states, "intersections which fall below level-of-service C in rural areas and D in urban areas shall be considered deficient." The City of Cle Elum and Town of South Cle Elum do not currently identify LOS standards for road systems in their comprehensive plans. The City of Cle Elum anticipates adopting LOS standards in its updated plan. Because neither municipality currently identifies specific LOS standards, the Kittitas County standard was used to define the adequacy of intersection operations.

Table 3.14-3 summarizes existing levels-of-service for selected intersections near the Cle Elum UGA and within the City of Cle Elum during summer weekday and weekend traffic conditions. All of the identified intersections (signalized and unsignalized) currently operate at LOS A or B.

Table 3.14-3: Existing Summer Weekday and Weekend PM Peak-Hour Level-of-Service Summary

Intersection	Weekday		Weekend	
	LOS	Delay (seconds)	LOS	Delay (seconds)
Signalized				
First Street/Pennsylvania Avenue	B	5.8	B	5.8
Unsignalized				
I-90 Eastbound/Bullfrog Road	A	3.9	B	5.5
I-90 Westbound/Bullfrog Road	A	0.5	A	0.8
SR 903/Bullfrog Road	A	2.4	B	5.2
SR 903/Pennsylvania Avenue	A	1.3	A	2.0
First Street/Oakes Avenue	A	3.2	B	6.2
First Street/South Cle Elum Way	A	2.3	NA	NA
I-90 Westbound off-ramp/Oakes Avenue	A	0.9	A	0.6
I-90 Eastbound off-ramp/Oakes Avenue	A	1.7	A	1.4
SR 903/SR 970	A	1.5	A	1.9
I-90 Westbound ramps/SR 970	A	0.7	A	0.9
I-90 Eastbound ramps/SR 970	B	9.4	B	8.2

Source: Transportation Solutions, Inc 2000
NA = Not available

Parking Supply and Demand

Through the Cle Elum downtown area, the City provides mostly parallel curbside parking along First Street and adjacent streets. Angle parking is located on the north side of First Street between Oakes Avenue and Stafford Avenue and on some side streets. Parking is characterized by moderate turnover rates and vehicles left in parking spaces for a long period of time. As part of its downtown revitalization plan, the City is proposing to convert parking on First Street and Railroad Street to angle parking. This may add an additional 355 parking spaces in the downtown area.

A parking supply and demand survey was performed in the downtown areas of the cities of Cle Elum and Roslyn on a Friday and a Sunday in late August 2000 (Transportation Solutions, Inc 2001). Table 3.14-4 summarizes the results of that survey.

Table 3.14-4: Roslyn and Cle Elum Parking Supply and Demand

Location (Downtown)	Parking Supply	Friday (August 25, 2000)		Sunday (August 27, 2000)	
		Demand	% Supply Occupied	Demand	% Supply Occupied
Roslyn	157	77	49%	100	64%
Cle Elum	320	192	60%	114	36%

Source: Transportation Solutions, Inc 2001

Pedestrian Safety

Transportation Solutions, Inc (2000) observed vehicle and pedestrian circulation patterns at the Cle Elum-Roslyn School District #404 campus and indicates that all of the students were transported to and from school by school bus or private vehicle. No pedestrian or bicycle activity was observed.

3.14.2 Impacts

Model Overview

Forecasted traffic volumes for Alternative 5 are based on results of modeling conducted by TModel Corporation, similar to that performed for Alternatives 1 (No Action), 2, 3, and 4, which are evaluated in the Draft EIS. The modeled transportation network is generally bounded as follows:

- North of Ronald along SR 903;
- South of the intersection of Mountainview Road with Lower Peoh Point Road;
- East of the interchange with SR 970 and I-90; and
- West of the interchange with I-90 and Bullfrog Road.

The transportation network and the model's traffic analysis zones are included in Appendix F (Figures F-1 and F-2).

The modeling for Alternative 5 reflects the following project and non-project changes since the Draft EIS was published:

Project Related

- Locations of land uses proposed for Alternative 5
- Change in access points into the Cle Elum UGA
- Change in the internal roadway network
- Reduction in density of the MPR (applies to cumulative impacts)

Non-Project Related

- Approval of new development projects in Cle Elum
- Reduction in lanes from five to three of proposed connector between West First Street and Ranger Station Road
- Updated traffic volumes
- Zone-splitting and network changes to enable the traffic model to be more sensitive to land use changes in West Cle Elum
- Correction of a coding error related to travel speed on Pine Street

Assumptions for Background Growth

Background growth in traffic volumes reflects the increase in traffic that would occur from indirect population and employment increases. The Office of Financial Management produces three series of state and county growth projections: low, medium, and high.

The 25-year (1995-2020) medium series growth projection for the County is 1.6% annually; the high series is 2.4% annually. Based on analysis conducted for the proposed MPR, development of the MPR could add 0.4% to the annual population growth rate. Annual growth rates would then range between 2% (medium series) and 2.8% (high series). An annual population growth rate of 2.5% (non-compounded) was selected as the background growth rate to accommodate indirect/induced population growth that could occur because of development in the Cle Elum UGA. This rate was used for the 30-year buildout period.

The state of Washington also prepares 10-year forecasts for employment growth. Kittitas County currently uses an annual employment growth rate of 1.8%, non-compounded. This rate was assumed for the 30-year buildout period in the UGA.

Since the Draft EIS was published in March 2001, 12 new development projects approved by the City of Cle Elum were incorporated into the model (Table 3.14-5). The City anticipates that the identified projects would be complete by Project Year 5. These projects were incorporated in the model to refine trip origins and trip distribution throughout the network.

Table 3.14-5: City of Cle Elum Approved Development Projects

Project	Land Use	Size
Westview Villa	Apartments	26 apartments
Cle Elum Pines	Single-family subdivision	51 homes
Hotel	Hotel	50 rooms
Gas station	Service station, with retail	Approx. 4,000 square feet
Subway	Sandwich shop	NA
Sales	Commercial	864 square feet
Safeway station	Gas station	NA
Convenience store plus office	Retail and commercial	4,240 square feet
Coffee sales	Retail	200 square feet
Commercial	Retail	896 square feet
Senior center	Senior center	7,500 square feet

Source: City of Cle Elum 2001

Trip Generation and Intersection LOS

Trip generation associated with development of the UGA under Alternative 5 is summarized and compared to the other development alternatives. Appendix F contains detailed vehicle trip generation tables, a figure showing the location of the 32 intersections analyzed (Figure F-5),

turning movement traffic volumes for these intersections, and the corresponding LOS at those identified intersections.

LOS analyses were conducted for Project Years 5 and 10, consistent with City of Cle Elum recommendations and analyses conducted for the Draft EIS. A LOS analysis was not conducted for later time periods due to the speculative nature of future forecasts. Instead, a Project Year 30 analysis of traffic volumes on selected roadway segments was conducted to show impacts at full buildout, similar to Alternatives 2, 3, and 4.

Projected LOS is shown for the intersections or intersection movements that would exceed the Kittitas County LOS standard of D during the weekdays and weekends. LOS designations for all intersections that were analyzed are included in Appendix F (Tables F-5 through F-12).

Alternative 1: No Action

As part of the modeling effort, Alternative 1 (No Action) was rerun to allow a comparison against similar baseline conditions. The results presented below reflect the inclusion of the non-project changes to the model identified above under Model Overview. Since the model was run, approximately 23 acres of the property has been rezoned from Forest and Range 20 (20-acre lots) to Suburban 1 (1-acre lots). This would slightly increase the number of PM peak hour trips generated under the No Action Alternative. However, because the overall number of trips is small, no change in impact would occur for area roadways.

Direct Construction

No construction-related transportation impacts would occur under Alternative 1.

Direct Operation

PM Peak Hour Trip Generation

Under the No Action Alternative, trip generation during the PM peak hour would be the same as presented in the Draft EIS. Table 3.14-6 shows the number of weekday and weekend vehicle trips that would be distributed to the area's roadway system in Project Years 5, 10, and 30.

Table 3.14-6: Cle Elum UGA PM Peak Hour Trip Generation for Project Years 5, 10, and 30[1]

	Alternative 1		
	Enter[2]	Exit[2]	Total
Year 5			
Weekday	12	7	19
Saturday	9	7	16
Sunday	8	6	14
Year 10			
Weekday	12	7	19
Saturday	9	7	16
Sunday	8	6	14
Year 30			
Weekday	64	36	100
Saturday	50	42	92
Sunday	45	39	84

1 Trip generation reflects Forest and Range 20 zoning.
2 The number of vehicle trips entering and exiting the UGA is from all access points.
Source: Institute of Transportation Engineers Trip Generation Manual 1997

Turning Movement Volumes

Forecasted turning movement volumes at key intersections during the PM peak hour under Alternative 1 are included in Appendix F (Figures F-3 and F-4) for Years 5 and 10.

Intersection LOS

Table 3.14-7 presents the projected LOS for the intersections or intersection movements that would exceed the Kittitas County LOS standard of D during the weekdays and weekends.

Table 3.14-7: Revised Alternative 1 Intersection LOS in Project Years 5 and 10

	Weekdays	Weekends
Project Year 5		
First Street/Oakes Avenue	B	F
First Street/South Cle Elum Way	F	F
Project Year 10		
First Street/Oakes Avenue	C	F
• Northbound	F (128.0)	
SR 903/Bullfrog Road	C	C
• Northbound[1]	E (37.2)	F (61.1)
First Street/South Cle Elum Way	F	F

1 Identifies individual turning movement below LOS D and the delay in seconds per vehicle.

Table 3.14-7 shows that the First Street/Oakes Avenue intersection would operate at LOS F on weekends in Years 5 and 10, but at LOS B and C on weekdays in Years 5 and 10, respectively.

The exception is the northbound movement in Year 10, which would operate at LOS F. Under the No Action Alternative, the First Street/South Cle Elum Way intersection would operate at LOS F on both weekdays and weekends in Years 5 and 10.

The lack of adequate gaps in the traffic flow on SR 903 also would cause delays to the northbound Bullfrog Road traffic, resulting in a below standard LOS. Northbound movements on Bullfrog Road at its intersection with SR 903 are projected to operate at LOS E on weekdays and LOS F on weekends in Year 10. The entire intersection is projected to operate at LOS C on both weekdays and weekends in Year 10.

Other Issues

No significant impacts on parking or pedestrian safety would occur under the No Action Alternative.

Indirect

Indirect impacts from background growth in population and employment are reflected in the modeled forecast volumes.

Cumulative

Cumulative impacts under the No Action Alternative with the revised model results would be the same as described in the Draft EIS. Development in the UGA under Alternative 1 would not contribute significantly to traffic volumes along area roadways or to decreased LOS at intersections in Project Years 5 and 10.

Alternative 5

Direct Construction

Similar to Alternatives 2, 3, and 4, the majority of construction-related traffic impacts would occur during the initial 5-year construction period and would include truck trips, delivery trips, and construction worker trips to and from the UGA.

The preliminary estimated volume of imported materials under all development alternatives is 204,000 cubic yards (Appendix E). Assuming a six-month construction season (May-October), approximately 6,800 cubic yards per month would be delivered to the UGA during the 5-year construction period. Assuming 12-cubic-yard capacity trucks are used, the importing activity would generate approximately 570 roundtrip truck trips per month, or 1,140 one-way trips. Based on an average of 21.67 workdays per month (Monday-Friday), and assuming an even distribution of truck trips per day, there would be approximately 52 one-way truck trips per workday during the construction season. Most of the material is expected to come from the

MPR. The suggested truck route for this material is on roadways internal to the MPR and across Bullfrog Road to the UGA. It is also possible some construction-related traffic would use South Cle Elum Way and First Street to convey gravel and concrete to the UGA. It is assumed that all construction employee vehicle parking would be provided onsite. Heavy vehicle traffic, which includes construction-related truck trips, would account for approximately 5% of all vehicle trips.

Direct Operation

Operational impacts on the transportation system under Alternative 5 are discussed below compared to Alternatives 2, 3, and 4. Impacts are presented for the PM peak hour during the summer months, when traffic volumes would be highest.

Vehicle Trip Generation

Vehicle trip generation rates for the Cle Elum UGA are based on the Institute of Transportation Engineers *Trip Generation Manual, An Informational Report, 6th Edition* (1997). Trip generation rates were determined for each proposed land use category within the UGA based on trip purpose. Refer to the Transportation Model Report Summary in Appendix F of the Draft EIS for additional detail.

Table 3.14-8 summarizes the vehicle trip generation rates during the PM peak hour for proposed land uses within the UGA. Trip generation rates are shown for a typical weekday, Saturday, and Sunday.

Table 3.14-8: PM Peak Hour Trip Generation Rates, Cle Elum UGA Land Use Types

Land Use Type	Variable	Trip Generation Rates		
		Weekday	Saturday	Sunday
Residential				
Single Family	Dwelling Unit	1.02	0.94	0.86
Multifamily				
Whole Interest Condominium	Dwelling Unit	0.54	0.47	0.45
Apartment	Dwelling Unit	0.67	0.52	0.51
Non-residential				
Community Recreation Center/Clubhouse	1,000 SF	2.26	1.25	1.48
Business Park	Employees	0.39	NA	NA

Source: Institute of Transportation Engineers Trip Generation Manual 1997

Table 3.14-9 summarizes total projected PM peak hour vehicle trips at Project Years 5, 10, and 30 for Alternatives 2, 3, 4, and 5 on weekdays and weekends. Detailed data for vehicle trips generated by specific land uses under Alternative 5 are contained in Appendix F (Tables F-1 through F-3). The number of vehicle trips generated in Alternative 5 at Project Years 5, 10, and

30 would vary depending on the same factors identified for the other alternatives: (1) phasing of the proposed Business Park, and (2) phasing of residential unit construction.

Table 3.14-9: Total PM Peak Hour Trip Generation, Alternative 5

Project Year/Day	Alternative 2 Total	Alternative 3 Total	Alternative 4 Total	Alternative 5 Total
Year 5				
Weekday	820	793	668	701
Saturday	1140	675	1025	559
Sunday	1135	667	1018	530
Year 10				
Weekday	921	1036	1107	966
Saturday	1224	825	1091	692
Sunday	1213	807	1085	652
Year 30				
Weekday	1757	1648	1115	1826
Saturday	1361	1111	1267	1046
Sunday	1339	1068	1245	977

1 The number of vehicle trips entering and exiting the UGA is from all access points.
Source: Institute of Transportation Engineers Trip Generation Manual 1997

Trip generation under Alternative 5 is most similar to Alternative 3. This is primarily because Alternatives 2 and 4 include a proposed Horse Park, which increases weekend trip generation. By Year 30, Alternative 5 would generate slightly higher weekday trips than the other build alternatives because of development of the largest proposed Business Park (950,000 square feet under Alternatives 2 and 5) in combination with the greatest number of residential units (1,334, similar to 1,309 with Alternative 3).

Vehicle Distribution and Assignment

TModel uses a multi-path assignment method to forecast traffic volumes. In addition to the base assumption that allocates trips to the shortest route between an origin and destination point, this method allocates trips to alternate travel routes based on travel speed and roadway capacity that would likely be used as traffic volumes incrementally increase on area roadways.

Tables 3.14-10 and 3.14-11 summarize total UGA PM peak hour vehicle trips per hour for weekday and weekend conditions during the summer months on key selected roadway segments that would be used as primary access routes to the UGA. The number of vehicle trips on these roadway segments is similar between alternatives, with the exception of Bullfrog Road and SR 903 (east of Bullfrog Road), which would carry a larger percentage of UGA trips under Alternative 5 than the other alternatives. The increase under Alternative 5 on these roadway segments is attributed primarily to the project-related changes in the access points to the UGA and locations of land uses within the UGA.

Table 3.14-10: Weekday Projected PM Peak Hour Vehicle Trips in Vehicles per Hour, Alternatives 2, 3, 4, and 5

Road Segment/Project Alternative	Year 5 Alternatives				Year 10 Alternatives				Year 30 Alternatives			
	2	3	4	5	2	3	4	5	2	3	4	5
I-90 westbound on-ramp from Bullfrog Road	41	35	36	32	48	49	41	36	69	71	54	49
I-90 eastbound on-ramp from Bullfrog Road	12	10	5	6	18	14	14	10	35	29	30	30
Bullfrog Road north of I-90 interchange	148	147	134	162	189	201	162	185	297	332	271	316
Bullfrog Road south of SR 903	95	93	85	123	114	110	97	176	136	160	119	328
SR 903 east of Bullfrog Road	53	48	38	65	72	64	48	104	131	107	78	239
SR 903 west of Bullfrog Road	96	90	82	70	120	115	94	96	203	191	139	206
First Street west of Oakes Avenue (Cle Elum)	157	163	147	136	209	189	159	151	288	240	190	188

Source: TModel Corporation 2001

Table 3.14-11: Weekend Projected PM Peak Hour Vehicle Trips in Vehicles per Hour, Alternatives 2, 3, 4, and 5

Road Segment/Project Alternative	Year 5 Alternatives				Year 10 Alternatives				Year 30 Alternatives			
	2	3	4	5	2	3	4	5	2	3	4	5
I-90 westbound on-ramp from Bullfrog Road	76	30	73	26	75	34	72	30	79	49	74	44
I-90 eastbound on-ramp from Bullfrog Road	13	10	10	6	18	14	15	9	33	27	28	27
Bullfrog Road north of I-90 interchange	168	135	154	139	194	167	175	162	267	272	249	293
Bullfrog Road south of SR 903	132	82	123	115	147	97	133	150	167	139	162	284
SR 903 east of Bullfrog Road	45	30	38	52	53	40	43	80	72	55	62	182
SR 903 west of Bullfrog Road	134	83	126	60	150	100	138	72	180	140	176	120
First Street west of Oakes Avenue (Cle Elum)	193	149	177	80	187	130	175	88	209	135	185	88

Source: TModel Corporation 2001

Under Alternative 5, the main UGA entrance on Bullfrog Road is closer to the I-90 interchange than in Alternatives 2, 3, and 4, which makes Bullfrog Road a more attractive route and increases traffic volumes using the eastbound I-90 off-ramp at Bullfrog Road. Land uses in the UGA have shifted to the north portion of the UGA toward Bullfrog Road, increasing the tendency to use Bullfrog Road to access the UGA. Under Alternatives 2, 3, and 4, the Business Park is adjacent and north of I-90, making access via the First Street ramps and Ranger Station Road more likely.

Projected Traffic Volumes – Project Year 30

The Project Year 30 analysis compares total projected traffic volumes, including trips generated by the UGA and trips associated with background growth, to existing volumes on Bullfrog Road and SR 903. Table 3.14-12 shows projected weekday and weekend traffic volumes for Project Year 30 under Alternative 5, compared with existing conditions and Alternatives 2, 3, and 4.

Table 3.14-12 shows that the forecasted PM peak hour volumes along Bullfrog Road and SR 903 are highest under Alternative 5, consistent with the reasoning stated above under *Trip Distribution and Assignment*. However, peak hour volumes are well under roadway design capacities. Under Alternative 5, traffic on these roadways would increase between approximately 150% and 325% on weekdays and between approximately 78% and 150% on weekends by Year 30.

Table 3.14-12: PM Peak Hour Roadway Traffic Volumes in Project Year 30, Alternatives 2, 3, 4, and 5

Roadway	Design Capacity[1]	Weekday Volumes					Weekend Volumes				
		Existing Volumes	Project Alternatives				Existing Volumes	Project Alternatives			
			2	3	4	5		2	3	4	5
Bullfrog Road											
North of I-90	2150	249	735	797	750	745	365	737	790	727	828
South of SR 903	2150	207	640	675	663	883	348	641	656	644	880
SR 903											
East of Bullfrog	2450	392	960	948	945	1050	585	945	963	945	1390
West of Bullfrog	2310	541	1335	1358	1340	1385	843	1418	1451	1419	1419

1 Traffic volume capacity is calculated from standards in the 1994 Highway Capacity Manual.
Source: TModel Corporation 2001

Level-of-Service

LOS analyses for 32 identified intersections in the cities of Roslyn, Cle Elum, and key intersections on SR 903, Bullfrog Road, and I-90 were performed for Project Years 5 and 10. The method for LOS analysis is consistent with the *1994 Highway Capacity Manual*. Turning movement volumes are the primary input data in calculating intersection LOS. Forecasted PM peak hour turning movement volumes at the 32 intersections selected for analysis are included in Appendix F (Table F-4).

Table 3.14-13 summarizes the LOS for typical weekday and weekend conditions at intersections with whole or individual turning movements that would exceed the Kittitas County standard of LOS D. LOS designations for all intersections that were analyzed are included in Appendix F (Tables F-5 through F-12). Intersections not shown in Table 3.14-13 did not have a LOS that exceeded the Kittitas County standard of LOS D.

Table 3.14-13: Weekday and Weekend Intersection LOS, Alternatives 2, 3, 4, and 5

Intersection	Weekday Project Alternative				Weekend Project Alternative			
	2	3	4	5	2	3	4	5
Project Year 5								
SR 903/Bullfrog Road Northbound[1]	B	B	B	C E (34.2)	C E (34.80)	B	C E (33.9)	C E (43.0)
First Street/South Cle Elum Way	F	F	F	F	F	F	F	F
First Street/Oakes Avenue	F	F	F	B	F	F	F	F
Project Year 10								
SR 903/Bullfrog Road Northbound	C F (48.4)	C F (47.3)	C F (43.7)	F	D F (87.2)	D	D F (83.1)	F
First Street/South Cle Elum Way	F	F	F	F	F	F	F	F
First Street/Oakes Avenue Northbound[1]	F	F	F	D F (171.8)	F	F	F	F

1 Identifies individual turning movement below LOS D; delay identified in seconds per vehicle.

Results of the LOS analysis indicate that by Project Year 5, the intersection of First Street and South Cle Elum Way would exceed the County standard of LOS D on weekdays. On weekends, both the First Street/South Cle Elum Way and First Street/Oakes Avenue intersections would exceed LOS D. In Project Year 10 under Alternative 5, the intersection of SR 903 and Bullfrog Road would also exceed LOS D on weekdays and weekends. This reflects the larger volumes projected on Bullfrog Road for Alternative 5 based on the shift in UGA access points and land uses discussed previously.

Other Issues

Parking. The cities of Roslyn and Cle Elum would experience increases in parking in the downtown areas. Based on recent monitoring (see Table 3.14-4), there is parking capacity in both cities in excess of current demand. Impacts on parking will continue to be evaluated as part of the traffic monitoring program.

Pedestrian Safety. Development of the UGA would increase the number of students attending the Cle Elum-Roslyn School District campus. Travel to and from the campus would occur along residential streets and would not require crossing SR 903 or any other major roadway. Significant impacts on the safety of school children traveling to and from school is not anticipated.

Indirect

Indirect traffic volumes generated by background growth in population and employment were incorporated into the model and are reflected in the direct and cumulative impact discussions.

Cumulative

The cumulative impact analysis addresses the Reduced Density MPR traffic volumes for Project Years 5 and 10 for LOS analysis, and Project Year 30 for a comparative analysis of road segment volumes. For the cumulative analysis, the MPR was modeled with development in the UGA, and the combined vehicle trips were assigned to the study area's street system. The PM peak hour trip generation rates for the MPR are shown in the Transportation Model Summary Report, Appendix F of the Draft EIS.

Projected Traffic Volumes – Project Year 30

Table 3.14-14 shows cumulative PM peak hour roadway traffic volumes on Bullfrog Road and SR 903 for all development alternatives.

Cumulative PM peak hour traffic volumes would increase significantly over existing conditions. However, those volumes would not exceed roadway design capacity. Compared with the existing volumes, the 30-year UGA with MPR volumes are approximately two to four times greater, depending upon location.

Table 3.14-14: PM Peak Hour Roadway Traffic Volumes in Project Year 30 with MPR, Alternatives 2, 3, 4, and 5

Roadway	Design Capacity	Weekday Volumes					Weekend Volumes				
		Existing Volumes	Project Alternatives				Exiting Volumes	Project Alternatives			
			2	3	4	5		2	3	4	5
Bullfrog Road											
North of I-90	2150	249	1066	1118	1088	1029	365	1139	1232	1135	1229
South of SR 903	2150	207	928	955	1016	1161	348	967	979	969	1161
SR 903											
East of Bullfrog	2450	392	1393	1382	1379	1564	585	1425	1449	1426	1564
West of Bullfrog	2310	541	1246	1447	1426	1470	843	1553	1578	1553	1470

Source: TModel Corporation 2001

Cumulative Level-of-Service

Cumulative LOS analyses were conducted at the same intersections as those for the UGA. As presented for UGA-only impacts above, the LOS tables display only those intersections (or those with individual turning movements) that exceed the Kittitas County standard of LOS D.

The LOS for all analyzed intersections is contained in Appendix F. Table 3.14-15 shows LOS for project alternatives with the MPR for weekday and weekend conditions.

Table 3.14-15: Weekday and Weekend Intersection LOS with MPR, Alternatives 2, 3, 4, and 5

Intersection	Weekday				Weekend			
	Project Alternative with MPR				Project Alternative with MPR			
	2	3	4	5	2	3	4	5
Project Year 5								
SR 903/Bullfrog Road	F	F	F	F	F	F	F	F
First Street/South Cle Elum Way	F	F	F	F	F	F	F	F
First Street/Oakes Avenue	F	F	F	B	F	F	F	F
Project Year 10								
SR 903/Bullfrog Road	F	F	F	F	F	F	F	F
First Street/South Cle Elum Way[1]	F	F	F	F	F	F	F	F
First Street/Oakes Avenue	F	F	F	C	F	F	F	F
• Northbound[2]				F (98.2)				
Second Street/South Cle Elum Way	A	A	A	D	A	A	A	F
I-90 Eastbound Ramp at Bullfrog Road	C	C	C	D	C	E	C	F
West First/Pine Street	F	F	F	B	F	F	F	F

1 LOS F at the intersection of First Street/South Cle Elum Way reflects conditions that would occur under the No Action Alternative.

2 Identifies individual turning movements for intersections below LOS D; delay is shown in seconds per vehicle.

It should be noted that improvements in LOS at several intersections under Alternative 5 are the result of a coding error in the transportation model that was corrected for the Alternative 5 analysis. The model runs for Alternatives 2, 3, and 4 assigned a higher than normal travel speed on Pine Street with the results being that traffic traveling on SR 903 was routed via Pine Street into downtown Cle Elum, rather than remaining on SR 903/Second Avenue. The modeling of Alternative 5 reassigned traffic from Pine Street to Second Avenue. This explains LOS improvements in Year 5 at the West First Street/Pine Street and First Street/Oakes Avenue intersections. It also explains why the LOS gets worse at the Second Street/South Cle Elum Way intersection.

Table 3.14-15 indicates that, with the inclusion of MPR traffic volumes, several changes would occur to the area's transportation system under the Alternative 5 development scenario.

In Project Year 5

- The SR 903/Bullfrog Road intersection would operate at LOS F during weekdays and weekends.
- On weekends, the eastbound I-90 Ramps at Bullfrog would fall from a LOS C to a LOS D. Note: Under Alternatives 2, 3, and 4, the intersection volumes were very near the threshold between LOS C and D. Changes to the model identified at the beginning of the section increased intersection volumes slightly resulting in a degradation of LOS.

In Project Year 10

- The SR 903/Bullfrog Road intersection would operate at LOS F during weekdays and weekends.
- First Street/Oakes Avenue would operate at a LOS C during weekdays and LOS F during weekends.
- The Second Street/South Cle Elum Way intersection would operate at LOS D on weekdays and LOS F.
- The West First Street/Pine Street intersection would operate at LOS B on weekdays and LOS F on weekends.
- The I-90 eastbound ramp/Bullfrog Road intersection would operate at LOS D on weekdays under Alternative 5 and LOS F on weekends. The weekend 95% queue length would be approximately 40.1 vehicles. This means that during the afternoon peak hour, there is a 95% probability of a queue 40 vehicles long.

Tables 3.14-16 and 3.14-17 show weekday and weekend vehicle trip composition at intersections that exceed the LOS D standard as a result of cumulative impacts from Alternative 5 and the MPR. Vehicle trip composition percentages are shown for the MPR, UGA, Business Park, and residential components of the UGA. For example, at the I-90 eastbound ramp/Bullfrog Road intersection, 37% of the vehicles are traveling to or from the MPR while 21% are traveling to or from the UGA. Of the UGA trips, all are residential.

Table 3.14-16: Vehicle Trip Composition at Affected Intersections, Weekday, Entering Volumes

Location/Intersection	Year 5			Year 10		
	MPR	UGA		MPR	UGA	
		Business Park	Residential		Business Park	Residential
I-90 eastbound ramp/Bullfrog Road	37%	0%	21%	40%	0%	20%
SR 903/Bullfrog Road	29%	1%	11%	34%	2%	11%
West First Street/South Cle Elum Way	10%	1%	8%	13%	3%	8%
West First Street/ Oakes Avenue	10%	1%	7%	12%	2%	7%
West Second Street/South Cle Elum Way	20%	2%	18%	24%	5%	16%
West First Street/Pine Street	7%	1%	4%	9%	3%	5%

Notes: Trip composition tables do not show background or external trips. Percentages are rounded to nearest whole number.
Source: TModel Corporation 2001

Table 3.14-17: Vehicle Trip Composition at Affected Intersections, Weekend, Entering Volumes

Location/Intersection	Year 5			Year 10		
	MPR	UGA		MPR	UGA	
		Business Park	Residential		Business Park	Residential
I-90 eastbound ramp/Bullfrog Road	37%	0%	16%	40%	0%	16%
SR 903/Bullfrog Road	31%	0%	8%	35%	1%	9%
West First Street/South Cle Elum Way	9%	0%	5%	11%	1%	5%
West First Street/ Oakes Avenue	8%	0%	4%	11%	1%	5%
West Second Street/South Cle Elum Way	21%	0%	13%	25%	1%	13%
West First Street/Pine Street	5%	0%	3%	8%	1%	3%

Notes: Trip composition tables do not show background or external trips. Percentages are rounded to nearest whole number.
Source: TModel Corporation 2001

3.14.3 Mitigation Measures

This section identifies mitigation measures to address potential impacts from development in the Cle Elum UGA under Alternative 5 and cumulative impacts from development of the UGA concurrent with the MPR and other regional growth. Mitigation measures specific to LOS impacts at particular project years are identified. Identified mitigation measures for particular project years are based on the existing transportation network and do not reflect future changes in the network, such as the completion of the Oakes interchange, listed in the Washington State Department of Transportation (WSDOT) 20-year Transportation Improvement Plan.

In transportation planning, mitigation is typically developed for entire intersections that may fall below the level-of-service standard for a weekday. Remediation for intersections with an individual movement(s) operating below the adopted minimum threshold is not identified below.

Traffic Mitigation Plan

A Traffic Mitigation Plan was developed for the MPR. Many of the proposed mitigation measures in that plan would also be appropriate for and coordinated with development of the UGA. These include the following:

- *Onsite Transportation Improvements*. Trendwest would be responsible for all costs associated with the design and construction of all onsite transportation improvements necessary to serve its development within the UGA.
- *UGA Access Improvements*. Trendwest would be responsible for all costs associated with construction of new intersections of onsite improvements with roads that would provide access to the UGA.
- *Bullfrog/SR 903 Intersection*. This is discussed later in this section.

- *Proportionate Share*. Trendwest shall be responsible for its proportionate share of any offsite improvements identified through a monitoring program.
- *Concurrency*. As required under the Washington State Growth Management Act.

General Measures

Monitoring

It is recommended that Trendwest, in association with Kittitas County, the City of Cle Elum, and WSDOT, coordinate a traffic monitoring program for the UGA with any MPR traffic monitoring. It would include both regular traffic counts and safety studies at predetermined locations in the UGA vicinity. The monitoring program would also serve as a tool to assess the most appropriate time and/or necessity for implementing intersection improvements.

As part of the monitoring program, it is recommended that the City of Cle Elum and Kittitas County ask WSDOT to reactivate, manage, and maintain the permanent traffic count location on I-90 at milepost (MP) 80.12 on the west side of the Bullfrog interchange. WSDOT used to collect traffic count data on each side of the Bullfrog interchange at MP 80.12 and MP 80.48. The state's permanent traffic counter #B04 now takes the place of data sampling for MP 80.48. The collection of traffic count information on both sides of the Bullfrog interchange would be useful.

Construction Transportation Management Plan

A Construction Transportation Management Plan (CTMP) would be prepared. The CTMP would identify traffic controls to ensure that employee and truck traffic have minimal impact on existing Cle Elum area residents, existing traffic/circulation patterns, and UGA residents and visitors, as the UGA is developed. The CTMP would be revised to correspond with each phase of development.

For special events that would occur in the MPR, local communities, or during peak holiday weekends, a separate Transportation Management Plan could be developed. Such a plan could include the following:

- Traffic management within the UGA development.
- Pedestrian-friendly zones and traffic-calming methods to be used on special event days.
- Provisions for extra traffic police.
- Satellite parking contingencies with shuttle service.

UGA - Project Year 5

Traffic Signal Warrants

Criteria that determine if a traffic signal is warranted (called traffic signal warrants) are identified in the publication, *Manual on Traffic Control Devices* (MUTCD), prepared by the Federal Highway Administration. The MUTCD states that traffic control signals should not be installed unless one or more of the signal warrants are met. Further, when a traffic control signal is indicated as being warranted, it is presumed that the signal and all related traffic control devices and markings are installed according to the standards set forth in the MUTCD. The MUTCD lists 11 warrants:

1. Minimum vehicular volume
2. Interruption of continuous traffic
3. Minimum pedestrian volume
4. School crossings
5. Progressive movement
6. Accident experience
7. Systems
8. Combination of warrants
9. Four-hour volumes
10. Peak-hour delay
11. Peak-hour volume

A detailed description of these warrants is contained in Appendix F. The minimum vehicular volume warrant is the warrant that would most strongly support the installation of a traffic signal. Briefly, the major street must have a minimum of 500 vehicles per hour (total of both approaches) for each of eight hours of an average day. The minor street must have a minimum approach volume of 150 vehicles per hour during the same eight hours. An average day is defined as a weekday with normal and repeated traffic volumes at a given location.

The following intersections would be evaluated to determine if they meet warrants for the installation of traffic signals:

- First Street and South Cle Elum Way
- SR 903 and Bullfrog Road

If new signals are required, Trendwest would be responsible for a proportionate share of the cost of plans, specifications, surveys, construction estimates, project construction, and associated project inspection. If the local agency does not have sufficient funds for a traffic signal or other improvement and to ensure the appropriate scheduling of Trendwest projects, Trendwest may be required to complete the improvement and recapture costs from other affected developments or from grants that are received for improvements.

The SR 903/Bullfrog Road intersection northbound turning movement is projected to operate at LOS E on weekdays and weekends. The geometry of the intersection could be improved by realigning it to a right angle and improving channelization to include separate northbound right- and left-turn lanes, an eastbound right-turn lane or right-turn taper, and a westbound left-turn lane.

UGA - Project Year 10

Traffic Signal Warrants

Recommended evaluations for traffic signal warrants for Project Year 10 are the same as those for Project Year 5.

Cumulative - Project Year 5

Traffic Signal Warrants

Recommended evaluations for traffic signal warrants would be the same as those identified for the UGA only.

Cumulative - Project Year 10

Eastbound I-90 at Bullfrog Road

The I-90 eastbound off-ramp intersection with Bullfrog Road, which would operate at LOS D on weekdays and LOS F on weekends, could be improved by changing the stop-controlled movement to northbound-southbound from eastbound. The intersection LOS would improve to LOS C with an average delay of 12.3 seconds per vehicle. This would be a significant improvement from the LOS F weekend condition (average delay of 107.2 seconds per vehicle). The southbound left-turn movement would experience increased delays that would average 65.2 seconds per vehicle (LOS F) for a PM peak hour volume of 61 vehicles. However, movement volumes are significantly lower (less than 5% of the ramp volumes). Without this change, the projected eastbound weekend delay would be 129.9 seconds per vehicle for a projected volume of 515 vehicles during the afternoon or PM peak.

An additional mitigation measure at the interchange would include evaluation for signal warrants.

Second Street/South Cle Elum Way

The Second Street/South Cle Elum Way intersection could be improved to an overall LOS C with an average delay of 15.3 seconds per vehicle by adding the following features:

- Northbound left-turn and right-turn lanes
- Eastbound right-turn lanes
- Westbound left-turn lane

With this mitigation, the intersection would improve to an overall LOS C, which is considered acceptable. However, the northbound left-turn movement would remain at LOS F with an average delay of 42.6 seconds per vehicle.

Mitigation at this intersection could include the preparation of a downtown circulation plan that would investigate traffic patterns, storage and queue lengths, and signalization at intersections that are identified as having potential future problems. This would assist future transportation planning.

West First Street/Pine Street

The West First Street/Pine Street intersection could be improved to an overall LOS C with an average delay of 18.3 seconds by adding the following features:

- Southbound left-turn lane
- Eastbound and westbound left-turn lanes

With this mitigation, the intersection would improve to an overall LOS C. However, the southbound left-turn movement would remain at LOS F with an average delay of 94.2 seconds per vehicle.

3.14.4 Significant Unavoidable Adverse Impacts

Development of the UGA and concurrent development of the UGA and MPR would significantly increase traffic volumes and circulation patterns on area roadways. LOS analyses for Project Years 5 and 10 show that the intersections of I-90/Bullfrog Road, Bullfrog Road/SR 903, and several intersections within the city limits would exceed LOS standards. With implementation of the identified mitigation measures, the majority of these impacts could be resolved; however, isolated left-turn movements would still experience congestion.

3.15 PUBLIC SERVICES

This section analyzes potential impacts on public services under Alternative 5, including law enforcement, fire protection, emergency medical service (EMS), and schools. Impacts are comparatively analyzed to Alternatives 2, 3, and 4 (discussed in Section 3.16 of the Draft EIS). Public service agencies include those analyzed in Section 3.18, Fiscal Conditions and Appendix D of the Final EIS. For additional related information and detail on fiscal impacts to affected jurisdictions, please refer to those sections. Potential impacts from the No Action Alternative are discussed in Section 3.16 of the Draft EIS.

3.15.1 Affected Environment

Section 3.16 of the Draft EIS provides information on law enforcement, fire protection services, emergency medical services, and public schools. Incident history and current level of service is characterized for the Kittitas County Sheriff's Department, the City of Cle Elum-Roslyn-South Cle Elum Police Department, Fire District No. 7, City of Cle Elum Fire Department, Kittitas County Hospital District No. 2, and the Cle Elum-Roslyn School District #404.

3.15.2 Impacts

Since publication of the Draft EIS, the City of Cle Elum has updated its Subarea Plan and prepared draft land use and zoning designations consistent with its intent to annex the UGA. As such, the discussion of direct impacts is limited to those agencies with primary jurisdiction. Impacts on County agencies are discussed in the context of indirect impacts. Personnel and capital outlay needs are summarized from the City of Cle Elum's Municipal Facilities and Services Expansion Plan (MFSEP), also prepared since publication of the Draft EIS, and are based on assumptions of UGA development outlined in Appendix D.

The Kittitas County Communication Center (KITTCOM) provides emergency telephone services and dispatch for Kittitas County. KITTCOM receives revenues from grant monies, excise taxes on all telephone lines, and subscriber fees billed to jurisdictions. KITTCOM would experience increases in calls for dispatch during construction and operation of the project. However, potential impacts from increased calls would be mitigated through subscriber fees billed to the City of Cle Elum and Hospital District No. 2 on a per call basis. Fees would likely be set to fill the gap between service costs and grant and tax revenues. As such, impacts to KITTCOM from increased calls are not discussed in this section. Additional information on potential impacts to KITTCOM is provided in Section 3.18, Fiscal Conditions and Appendix D of the Final EIS.

Direct Construction

Law Enforcement/Fire Protection/EMS

Types of construction-related impacts to law enforcement, fire protection, and emergency service providers under Alternative 5 would be the same as identified for Alternatives 2, 3, and 4 in the Draft EIS. These would include possible increases in calls to the City of Cle Elum's police and

fire departments for incidents related to construction site theft, vandalism, injury, and fire, particularly during the initial five-year construction phase.

The projected demand for new police department personnel is estimated at three officers by Project Year 5 based on a ratio of two officers per 1,000 UGA residents (1:500 ratio), consistent with a 1997 survey of Washington city police department staffing levels with populations ranging from 2,500 to 10,000.

The City of Cle Elum would require greater assurance of weekday fire fighter response when construction commences in the UGA. This could be accomplished by either guarantees of additional trained volunteers from UGA employees or construction workers, or from funding one trained full-time equivalent (FTE) firefighter. This is projected to increase to three paid trained FTE firefighters by the time construction has commenced on 60% of the residential units (projected as approximately Year 5 in Appendix D).

Capital outlays are projected to include: a brush/rescue vehicle when construction commences in the UGA; a Class A pumper at the time construction has commenced on 67% of the residential units (projected as approximately Year 6 in Appendix D) (or, alternatively, when greater than 50% of the Business Park is occupied, if that occurs sooner); and a fire station in Year 2 to accommodate the vehicles. The City of Cle Elum Fire Department would either enter an arrangement to share use of the fire tender provided to District 7 as part of the MPR mitigation, or the City would have to acquire a fire tender when construction commences in the UGA. Vehicles would be leased during the useful lifetime.

Hospital District No. 2 currently maintains a full-time EMS crew of one paramedic and one emergency medical technician with advanced life support capability available to respond to emergency calls as well as 24-hour onsite medical coverage. Based on current service ratios for paramedics and EMTs, development under Alternative 5 would require two additional paramedics and one EMT by Project Year 5.

Public Schools

To the extent that construction of the UGA under Alternative 5 brings new households with school-age children to the area, the Cle Elum-Roslyn School District #404 would experience additional enrollment. Refer to Section 3.10, Population and Housing, for more information on projected construction-related in-migration. Impacts to the Cle Elum-Roslyn School District would depend, in part, on the range of grade levels of new students. Construction-related enrollment is considered to represent a portion of projected enrollment identified in the *Cle Elum-Roslyn School District #404 Capital Facilities Plan* (2001) that would be accommodated in portable classrooms, if necessary. Trendwest would pay a percentage of the cost of new portable classrooms and school buses. Detailed information on future school expansion is provided in Section 3.18, Fiscal Conditions.

Direct Operation

Similar to Alternatives 2, 3, and 4, Alternative 5 would result in urban-level densities and significant increases in permanent populations compared to existing conditions (see Section 3.10, Population and Housing of the Final EIS). This would generate additional calls to public service agencies.

Law Enforcement

Based on a ratio of two officers per 1,000 UGA residents (1:500 ratio) (described above under Construction Impacts), a total of five officers is estimated by Project Year 30 (buildout conditions). This is within the range of total officers identified for Alternatives 2, 3, and 4.

Fire Protection/EMS

As described above under Construction Impacts, the need for additional full-time personnel under Alternative 5 was evaluated in the City of Cle Elum's MFSEP. The 3 FTE firefighters identified as needed by Project Year 5 are anticipated to be able to serve the UGA through Project Year 30. The paid firefighters would need to be supported by 15 volunteer firefighters by project buildout. This level of staffing represents a significant increase over that identified in the Draft EIS for Alternatives 2, 3, and 4 and is a result of additional research and interviews conducted by the City for its MFSEP.

For Hospital District No. 2, the two paramedics and one EMT needed by Project Year 5 would be supplemented in Project Year 10 by a third EMT. By Project Year 30, a total of three paramedics and two EMTs are anticipated to be needed. Hospital District No. 2 has also identified a need for an additional ambulance.

Level-of-Service

Level-of-service impacts relating to potential increases in fire protection and EMS response times under Alternative 5 would be lower than those identified for the other development alternatives, based on permanent staff increases that would occur at earlier time points than identified in the Draft EIS.

In the Draft EIS, response time is defined as a function of the travel time and three primary factors: (1) the time required to receive and process the emergency call through the dispatch center; (2) the time required to don the appropriate gear and equipment and depart the station; and (3) the time required for the volunteer personnel to travel to the fire station (as current staff is exclusively volunteers) (Hughes Associates 1998).

The Draft EIS estimates representative travel distances and times from the City of Cle Elum's fire station and from Hospital District No. 2 to two UGA access points: along Bullfrog Road midway between I-90 and SR 903; and along SR 903 midway between Bullfrog Road and I-90. Travel time was estimated using an average speed of 45 mph, based on conversations with service providers and current speed limits on Bullfrog Road and SR 903. Actual travel times would vary

from these estimates depending on factors such as where the incident is located and the amount of traffic congestion. Table 3.15-1 identifies representative travel times to the Cle Elum UGA.

Table 3.15-1: Representative Travel Times, Cle Elum UGA

Fire Station	Approximate Distance/Travel Time to Bullfrog Road Access Point (45 mph)	Approximate Distance/Travel Time to SR 903 Access Point (45 mph)
Cle Elum, Station No. 1	2.25 miles/3 minutes	1.0 miles/1.3 minutes
Hospital District No. 2	2.5 miles/3.3 minutes	0.7 miles/1 minute

Source: Hughes Associates, Inc. 1998.

Under Alternatives 2, 3, and 4, minimum response time estimates ranged from 3.3 minutes to 5 minutes for the City of Cle Elum Fire Department. Response times under Alternative 5 would undoubtedly be shorter and closer to actual travel time to the incident based on a fulltime onsite fire crew.

The Hospital District maintains an onsite EMS crew and is able to depart immediately upon receiving dispatched calls.

Capital Facilities

Capital facilities for fire protection are identified under Construction Impacts, above.

Access, Fireflow, Building Standards

As described for Alternatives 2, 3, and 4, access roads within the UGA would conform to design specifications (e.g., dimensions, grade, surface, turning radius, dead ends) identified in the 1997 Uniform Fire Code (UFC). The circulation plan for Alternative 5 would provide two access points along Bullfrog Road, one access point on SR 903 and an access point from Ranger Station Road. Two options for access or departure would be provided for all phases of development.

Minimum fireflow requirements under the 1997 UFC are dependent, in part, on type and square footage of proposed buildings. The proposed water supply system would be designed to meet fireflow requirements as determined by the County and/or City of Cle Elum. Commercial and residential buildings would be constructed consistent with Kittitas County Building and Fire Safety Code standards to minimize the risk of structural fires (see Section 3.15.3, Mitigation). Appendix E, the Site Engineering Technical Report for additional discussion of fireflow standards.

Wildfires

Potential wildfire impacts would be the same as described for Alternatives 2, 3, and 4. After the initial construction phase, the potential for igniting wildfires within the UGA is anticipated to be

minor. Roadways bounding the UGA property would operate as a fuel brake, as would the designated tracts proposed for open space around the perimeter of the residential areas and between neighborhoods. A water tender would be needed to serve the UGA until water mains and hydrants are installed. The water tender proposed for Fire District No. 7 for MPR coverage could also serve the Cle Elum UGA.

The majority of fires in the Cle Elum Ranger District since 1981 have been caused by lightning and campfires, with campfires being the primary cause (U.S. Forest Service 1999). Other causes include equipment, smoking, debris burns, and incendiary devices. The greatest potential for occurrence of wildfires would likely result from increased recreational activity in the neighboring Wenatchee National Forest.

Cle Elum-Roslyn School District #404

Development of the Cle Elum UGA would add additional school age children within the Cle Elum-Roslyn School District #404. Future enrollment at School District No. 404 induced by UGA development is projected similarly to that for Alternatives 2, 3, and 4. Specifically, methodology is based on statistics on school-aged children per household as determined by the 1999 Washington State Population Survey (Office of Financial Management, 1999).

- *Enrollment from For-Sale Residences:* It was assumed that the minimum income required for house ownership within the UGA was $60,000 annually[1]. Washington families earning greater than $60,000 annually have an average of 0.71 school aged children each.
- *Enrollment from Rental Apartments:* It was assumed that families earning less than $60,000 annually, and choosing to reside within the Cle Elum UGA, would choose a rental apartment unit. Washington families earning less than $60,000 annually have an average of 0.53 school-aged children each.

Projected student enrollment impacts at Project Years 5, 20, and 30 are summarized in Table 3.15-2 and described in more detail in Appendix D. Projected enrollment under Alternative 5 is closest to that of Alternative 3; the increases in enrollment over Alternative 3 are primarily due to the greater numbers of permanent residents under this alternative.

Table 3.15-2: Projected Student Enrollment Impacts, Cle Elum UGA

Project Year[1]	Alternative 2	Alternative 3	Alternative 4	Alternative 5
5	365	406	272	527
20	536	708	413	826
30	579	794	468	914

1 Yearly totals are cumulative
Source: Johnson-Gardner 2002

[1] Ownership eligibility based on the least expensive residential unit, a wholly-owned condominium at $150,000. Eligibility based on a 30-year loan at 8% interest with 10% property tax and $100 monthly homeowner association dues.

Projected enrollment identified above in Table 3.15-2 assumes immediate occupancy (100%) of housing after construction. It is likely that the rate of occupancy would occur more gradually, reducing the initial magnitude of impacts to the school district. Students would be accommodated in portable classrooms until the district property tax base is able to support new school construction costs. Potential new classroom and bus costs are discussed in Section 3.18, Fiscal Conditions and in detail in Appendix D of the Final EIS. Under Alternative 5, 25-35 acres would set aside for the Cle Elum-Roslyn School District #404 to accommodate future growth in the region.

Indirect

Indirect impacts are defined as impacts to public service agencies not having primary jurisdiction and additional public service calls resulting from indirect and induced population growth. In general, calls for service would increase; adjacent jurisdictions could also experience an increase in calls for service under mutual aid agreements. Costs associated with these calls would be retrieved through the fee structure of the Upper County mutual aid agreement.

In addition to direct enrollment impacts, development of the UGA would result in indirect enrollment impacts from construction-in-migration and from growth associated with UGA induced jobs. Precise enrollment impacts on the School District from indirect growth cannot be predicted with certainty. However, potential cumulative direct employment-related enrollment impacts to the County as a whole are identified below under Cumulative Impacts.

Cumulative

Similar to the other development alternatives, cumulative impacts to public services would result from development within the UGA concurrent with development of the MPR and other regional growth. Concurrent development of the MPR and UGA would create additional demand for law enforcement, fire protection, and EMS response at the County and municipal level. The Washington State Patrol and County typically provide specialized law enforcement capabilities beyond basic patrol, including investigations of crime scenes, detective work, and hazardous material spills.

Development of the Reduced Density MPR and UGA would result in the Upper County becoming more of a destination point for summer and winter recreational activities. The number of incidents requiring search and rescue operations would most likely increase as permanent resident and visitor populations increase.

Additional indirect enrollment impacts would occur from employment-related households settling within the School District. As described above under Indirect Impacts, the exact number of students within the District is impossible to accurately predict. However, estimates for the County as a whole indicate that the County could experience an average of 75 new students (assuming the ratio of enrolled children per household above) in the initial ten years associated with construction employment. Operational employment (primarily MPR related) could generate an estimated 270 students at full buildout (Johnson Gardner 2002).

Refer to Section 3.18, Fiscal Conditions, and Appendix D for additional information on cumulative public service impacts to local jurisdictions.

Table 3.15-3: Projected Student Enrollment Impacts, Reduced Density MPR and Cle Elum UGA[1]

Project Year[2]	Alternative 2	Alternative 3	Alternative 4	Alternative 5
5	385	426	292	547
20	592	764	469	882
30	649	864	538	984

1 Projected UGA enrollment is estimated based on the methodology described for Table 3.15-2, above. MPR project enrollment assumes an average of 0.26 students per permanent resident household, based on average enrollment generated by destination resorts in Central Oregon (Hobson Johnson Assoc. 1996).
2 Yearly totals are cumulative
Source: Johnson-Gardner 2002

3.15.4 Mitigation

Since publication of the Draft EIS, mitigation agreements have been negotiated in principle between Trendwest and primary service jurisdictions including the City of Cle Elum, Cle Elum-Roslyn School District #404, and Kittitas County Hospital District No. 2. Additional agreements associated primarily with development of the MPR that would apply to potential cumulative impacts have been negotiated with Kittitas County, Fire District No. 7, and KITTCOM. The features of those agreements related to public services are described in Section 3.18, Fiscal Conditions and are not repeated here.

Mitigation agreements provide specific guidelines for identifying shortfalls by monitoring costs and revenue flows. The agreements outline Trendwest's funding responsibilities for expected or identified shortfalls, which may include personnel, operation and maintenance, and capital facilities costs as negotiated by the respective jurisdictions. Shortfall mitigation payments are used to address identified fiscal impacts as appropriate.

Development would be constructed according to approved development standards and provisions outlined in the Conditions of Approval for the project. These documents are currently in the process of development.

3.15.4 Significant Unavoidable Adverse Impacts

Alternative 5 would generate additional significant unavoidable demands for public services through increases in permanent population within the UGA and due to indirect and induced population growth. Mitigation agreements have been put in place with affected jurisdictions to address identified impacts. Development would be guided by approved development standards and project Conditions of Approval. As such, no significant unavoidable adverse impacts to public service agencies are anticipated.

3.16 UTILITIES

This section analyzes potential impacts on utilities under Alternative 5 compared to Alternatives 2, 3, and 4. Utilities analyzed include those related to water supply, wastewater, solid waste, electricity, natural gas, and telecommunications. The No Action Alternative is evaluated in Section 3.17, Utilities, of the Draft EIS. The water supply plan for the UGA is discussed in Section 3.4, Water Supply. Stormwater facilities are discussed in Section 3.3, Water Quality.

3.16.1 Affected Environment

Utility services and facilities are not currently supplied to the Cle Elum UGA. Section 3.17 of the Draft EIS describes existing facilities and planned facility expansions and/or improvements for municipal and/or county utilities that would serve UGA. This section presents updated information on utility service and planning since publication of the Draft EIS.

Water Supply

Water Supply System

The City of Cle Elum is developing a regional water supply system to satisfy a Washington Department of Health Agreed Order to provide water treatment in accordance with the federal Safe Drinking Water Act. The water supply system will serve the needs for the City and its UGA, the Town of South Cle Elum, and Trendwest's development activities in the MPR. A new water treatment plant would be constructed to replace the existing treatment plant located on the south bank of the Yakima River. The new water treatment plant site is a 12-acre site located east of the Puget Sound Energy Cascade substation on property within the Cle Elum UGA (see Figure 2-5). Water treatment process would include filtration and sediment removal and disinfection by chlorination. The initial production capacity of the plant will be 4 million gallons per day (mgd), estimated to meet the City of Cle Elum and Town of South Cle Elum water supply needs for the next 20 years (Huibregtse, Louman Associates, Inc. et al., 2001).

The City of Cle Elum is proposing to develop surface water supply intakes at one location each on the Cle Elum River and the Yakima River. The Yakima River intake would be the primary source of supply. The City would own and operate the intakes and the new water treatment facility. Water users within the UGA development would become customers of the City's water utility and receive water service from the City of Cle Elum.

The regional water system improvements and treatment plant are being funded, in part, by federal Rural Development Funds and underwent separate environmental review to comply with both SEPA and NEPA regulations. The City of Cle Elum issued a Mitigated Determination of Non-significance and associated SEPA checklist on January 18, 2001. The City of Cle Elum and Town of South Cle Elum's Water System Improvements Environmental Report, in accordance with the National Environmental Policy Act (NEPA), was issued in August of 2001.

Wastewater

Regional Wastewater Treatment Plant

The City of Cle Elum is planning to construct a regional wastewater treatment plant at the location of the existing plant at the east end of the City. Treated effluent would be discharged to the Yakima River through an upgraded outfall. The proposed treatment process involves constructing a sequencing batch reactor on a filled pad in one existing lagoon cell. Additional UV lamps may be installed for added capacity and the existing constructed wetland would be retained as an effluent polishing pond. The service area of the regional wastewater treatment plant includes the City of Cle Elum and its UGA, the Town of South Cle Elum, the City of Roslyn, Ronald, existing units in Pine Loc III (a residential development adjacent to Ronald), and the MPR. Based on preliminary regional facility planning for a 30-year planning horizon, the proposed capacity of the wastewater treatment plant is 3.6 mgd.

The City is in the process of preparing a Regional Sewerage Facilities Plan. Following preparation of the Facilities Plan, the City will prepare an EIS, which will analyze potential water quality impacts to the Yakima River from the regional plant. In response to comments received on the Draft EIS, the Final EIS identifies potential effluent flows and pollutant loads to the Yakima River from the treatment plant, including Trendwest development, and describes proposed wastewater treatment and disposal alternatives. This discussion is included under Cumulative Impacts, below.

Solid Waste

Kittitas County Solid Waste Management Plan

The *Kittitas County Solid Waste Management Plan* (SWMP) (Kittitas County 1997) establishes a coordinated regional approach to solid waste handling in Kittitas County. The SWMP was developed by the Kittitas County Solid Waste Programs Office (KCSW) and the Solid Waste Advisory Committee (SWAC) to guide short- and long-term solid waste management decisions for a 20-year planning period (1997-2017). The SWMP was adopted by all local municipalities through an interlocal agreement in 1998. All collected municipal solid wastes in the County must be routed through a transfer station before disposal. For new developments, the SWMP Recommended Action is stated as follows:

> The County should require new developments to incorporate solid waste disposal and issues within their plans. Any issues and disposal options should be reviewed with the Solid Waste Advisory Committee prior to adoption within their own development plans.

Project-specific amendments to the SWMP for Trendwest development are being developed.

3.16.2 Impacts

Information on the proposed Cle Elum UGA water and sewer plans is summarized from the updated Site Engineering Technical Report for the Cle Elum UGA (W&H Pacific 2002), included as Appendix E to this Final EIS.

Direct Construction

Water Supply

Two water systems are proposed for construction within the UGA: a treated water system and an untreated water system. The preliminary water system design is consistent with Department of Health (DOH) performance criteria. In accordance with the City's water policy, Cle Elum would supply domestic (treated) water to dwelling units and commercial uses within the UGA. The untreated water system would provide irrigation water to public landscaped areas and evaporation make-up water to the neighborhood lake and other artificial water bodies.

The preliminary water plan for Alternative 5 is shown in Appendix E (Figure 3-5). Facilities constructed for UGA domestic water supply distribution will include a storage tank, pumps, transmission lines, distribution lines, and pressure reducing stations (between pressure zones). A 0.5-million-gallon regional storage reservoir recently constructed by the City of Cle Elum would also serve a portion of the UGA.

The UGA is split into two pressure zones: Zone 3 (upper elevation pressure zone) and Zone 2 (lower elevation pressure zone). The storage tank would serve Zone 3, which encompasses the majority of proposed development in the north portion of the UGA. The City's regional storage reservoir would serve the lower pressure zone (Business Park area and Reserve, if developed in the future). Treated water storage requirements would be greatest under Alternative 5 at 1,335,000 gallons; fire suppression storage was based on 1,500 gpm for four hours. Operational storage would be determined during project design. The UGA Zone 3 storage tank and water distribution system would be supplied by pumps at the water treatment plant. The pumps will be sized as a part of the treatment plant design.

Transmission lines will convey water from the Yakima River intake to the water treatment plant and to irrigation storage ponds. The distribution systems are looping water distribution pipe networks of 8 to 12 inch diameter pipes.

Wastewater

Wastewater generated under Alternative 5 would be routed to the new regional wastewater treatment plant. The preliminary sewer plan for Alternative 5 is shown in Appendix E (Figure 4-4). Preliminary sizing of the collection system was conducted in accordance with the requirements outlined in Ecology's *Criteria for Sewage Works Design*. The sizes of the gravity sewer lines range from 8 to 12 inches in diameter. The sizes of the force mains range from 4 to 6 inches in diameter.

Development under Alternative 5 relative to the topography would require would only one lift station (with input horsepower value of 5 or greater) versus between 3 and 5 for the other development alternatives. Collection and conveyance pipelines would be primarily constructed under proposed roads using open trench construction.

Two temporary onsite septic tank and drainfield systems would be constructed to serve the sales office and maintenance facility in advance of sewer connection. These systems will be abandoned after connection to the UGA collection system in accordance with Kittitas County Health Department requirements.

Solid Waste

Table 3.16-1 identifies projected residential and nonresidential generation rates for construction and demolition debris (CDL) (in tons per year) for Alternatives 2, 3, 4, and 5 at Project Years 1 through 5, 10, 20, and 30. The total quantity of CDL produced for the 30-year period is also identified for each alternative. Residential CDL is produced through construction of residential units. Nonresidential CDL is produced through construction of the other proposed uses, including, for example, the neighborhood clubhouse, Community Recreation Center, and Business Park. CDL quantities are estimated from rates published in *Characterization of Building-Related Construction and Demolition Debris in the United States* (EPA 1998).

Inert CDL would be collected onsite and hauled to the Ryegrass landfill. Currently, 4 of the 5 acres are available for CDL disposal (Mifflin, personal communication, 1999). The landfill has an Operations Permit issued by the DOH. At the time the landfill reaches 60% capacity, the County would apply to the DOH for an expansion of the landfill. Non-inert CDL wastes will be collected onsite and hauled to the Cle Elum transfer station for disposal. A CDL recycling program approved by the Kittitas County Solid Waste Department will be developed for contractors working in the UGA prior to construction. Refer to Appendix E for additional detail on onsite. CDL management

Electricity, Propane, and Natural Gas

Cables for electrical power could be installed underground in future utility corridors. Propane providers include A-1 Petroleum, Norhtern Energy, and Ameri-Gas. Puget Sound Energy has not yet determined routes for natural gas pipelines.

Telecommunications

Telecommunication cables would be installed underground. Lines from Qwest (current service provider to the City) would need to be extended from the west end of the City of Cle Elum, where they currently terminate. Internet capabilities and/or high-speed data transfer for the Business Park would be possible through a high-speed analog circuit. In the future, a digital subscriber line (DSL) could be provided (Qwest would need to upgrade the central switching office). Cable or satellite television service would be available (current service provider to the City is Charter Communications).

Table 3.16-1: Projected CDL Generation Rates (tons/year) and Total Quantity Produced (tons) at Full Buildout, Cle Elum UGA

Buildout Year[1]	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Residential	Nonresidential	Residential	Nonresidential	Residential	Nonresidential	Residential	Nonresidential
Year 1	369	108	444	108	464	108	378	47
Year 2	503	88	643	88	457	88	876	24
Year 3	511	606	745	51	453	561	890	76
Year 4	523	606	500	51	295	561	526	76
Year 5	315	95	419	71	134	50	416	66
Year 10	38	66	76	42	50	21	99	66
Year 20	54	66	134	42	66	21	120	66
Year 30	22	66	41	42	28	21	22	62
Buildout Total (tons)[2]	3,661	3,151	5,666	1,411	3,327	1,887	5,955	1,938

1 Generation rates are specific to years identified.
2 Buildout total represents the cumulative total quantity of CDL produced over the 30-year buildout period.
Source: W&H Pacific 2002.

Direct Operation

Water Demand

The regional water treatment plant would provide operational water supply to the Cle Elum UGA under Alternative 5. Compliance with City of Cle Elum Municipal Code and policies relating to the provision of water supply and utility service in the Cle Elum UGA would be required. (For more information, see Section 3.16.4, Mitigation.)

Operational impacts are discussed below for treated and untreated water demands. Table 3.16-2 summarizes unit demands for the primary proposed residential and commercial facilities under Alternative 5. Water use standards featuring conservation objectives for both indoor and outdoor use would be implemented (see Section 3.16.3, Mitigation Measures).

Table 3.16-2: Unit Demand Criteria for Interior Treated Water in the Cle Elum UGA, Alternative 5

Unit Type	Unit Demand
Single-Family and Multifamily Units[1]	100 gallons/day/capita (gpdpc)
Business Park	.085 gpd/square feet of office space
Community Recreation Center	20 gpdpc

Source: W&H Pacific 2002.

The DOH uses the concept of Equivalent Residential Units to compare nonresidential or multifamily water usage to a specific number of single-family residences. W&H developed an ERU value for the UGA, which was used as the basis for calculating the residential treated water demand. Residential water demand represents a portion of the total water demand estimates presented in Tables 3.16-3, 3.16-4, and 3.16-5.

Because neither metered records nor an analogous system are available, the ERU value was based on an analysis of internal residential demands, external (irrigation) demands, and peaking factors to adjust from Average Daily Demand (ADD) to Maximum Day Demand (MDD). Based on this method, the calculated ERU value for the UGA is 302 gpd/ERU ADD and 750 gpd/ERU MDD. Refer to Appendix E for a detailed explanation of the ERU value.

In accordance with the City of Cle Elum's adopted water policy for the UGA, certificates of water availability will be issued based on the rate established for the City. The water policy also requires that the City be provided with an amount of water equivalent to that needed for development of the UGA. As such, fewer units than proposed could initially be constructed. If water meter records show a lower rate, the City could re-examine demands. No impact on utility service providers would occur. Impacts on water supply are described in greater detail in Section 3.4, Water Supply.

Treated Water Demand

Table 3.16-3 summarizes the average daily treated water demand at full buildout by month, for all months combined, and for annual total demand in acre-feet. Water demand is separated between Trendwest and non-Trendwest uses. Non-Trendwest (i.e., City) demands include the Business Park, Community Recreation Center, and school and cemetery expansion areas.

The water demand summary tables are based on full buildout of all proposed units, assuming 2.4 persons per household and an occupancy rate of 92%, consistent with occupancy projections by Hobson Johnson Associates, Inc. (It should be noted that for the purposes of wastewater planning and analysis of water supply (Section 3.4), an occupancy rate of 100% was used.)

Table 3.16-3: Treated Water Demand at Buildout, Trendwest Residential and Non-Residential[1] Uses

Alternatives	Trendwest		Non-Trendwest	
	Annual Average (mgd)	Annual Total (acre-feet)	Annual Average (mgd)	Annual Total (acre-feet)
Alternative 2	0.34	379	0.09	100
Alternative 3	0.40	452	0.06	63
Alternative 4	0.27	304	0.03	32
Alternative 5	0.39	442	0.09	100

1 Non-residential treated water demands include the Business Park and Community Recreation Center.
Source: W&H Pacific 2002.

Tables 3.16-4 and 3.16-5 identify average daily, maximum daily, and peak-hour demand for the projected peak month treated water demands by alternative at full buildout. Peaking factors for maximum daily (1.5) and hourly (2.2) demands are relative to maximum monthly averages. Equalizing storage would be provided to accommodate hourly peak requirements. Peaking factors are applicable only to the treated water demands.

Table 3.16-4: Maximum Monthly Treated Water Demand, Trendwest Residential Uses

	Average Daily Demand	Maximum Daily Demand	Peak-Hour Demand
Alternative 2	0.53 mgd (370 gpm[1])	0.78 mgd (540 gpm)	1.13 mgd (780 gpm)
Alternative 3	0.63 mgd (440 gpm)	0.92 mgd (640 gpm)	1.34 mgd (930 gpm)
Alternative 4	0.42 mgd (290 gpm)	0.61 mgd (420 gpm)	0.88 mgd (610 gpm)
Alternative 5	0.60 mgd (417 gpm)	0.88 mgd (611 gpm)	1.27 mgd (882 gpm)

1 gpm = gallons per minute
Source: W&H Pacific 2002

Table 3.16-5: Maximum Monthly Treated Water Demand, Non-Residential Uses

	Average Daily Demand	Maximum Day Demand	Peak Hour Demand
Alternative 2	0.09 mgd (60 gpm[1])	0.13 mgd (90 gpm)	0.19 mgd (130 gpm)
Alternative 3	0.06 mgd (40 gpm)	0.08 mgd (60 gpm)	0.12 mgd (80 gpm)
Alternative 4	0.03 mgd (20 gpm)	0.04 mgd (30 gpm)	0.06 mgd (40 gpm)
Alternative 5	0.09 mgd (60 gpm)	0.13 mgd (90 gpm)	0.19 mgd (130 gpm)

1 gpm = gallons per minute
Source: W&H Pacific 2002

Untreated Water Demand

Untreated water demand consists of irrigation requirements for recreational spaces, public landscaped areas, and artificial water body evaporation makeup.

Evaporation from artificial water bodies (i.e., lakes and ponds) within the UGA under Alternative 5 was calculated from net unit monthly evaporation rates. Net evaporation is calculated as lake evaporation less precipitation. Net evaporation occurs only during the months of April through September. In other months of the year, precipitation exceeds lake evaporation. Monthly net evaporation rates are summarized in Table 3.16-6.

Table 3.16-6: Monthly Net Lake Evaporation (Inches), Artificial Water Bodies, Cle Elum UGA

April	May	June	July	August	September	Total
0.7	2.7	3.9	5.2	4,3	1.9	18.7

Source: W&H Pacific 2002.

Tables 3.16-7 and 3.16-8 summarize potential untreated water demand by alternative for Trendwest and non-Trendwest uses for the months in which a demand is present. Untreated water demand under Alternative 5 would be significantly lower than for the other development alternatives due to the absence of the Horse Park (Alternatives 2 and 4) and the golf course (Alternatives 2, 3, and 4).

Table 3.16-7: Untreated Water Demand Summary (in Acre-Feet/Month) Trendwest Residential Uses[1]

Alternative	April	May	June	July	August	September	October	Annual Total[2]
2	6	12	106	182	135	98	9	548
3	7	14	81	128	95	68	10	403
4	7	14	117	199	148	107	10	603
5	1	3	6	8	7	3	0	28

1 No untreated water demands are anticipated between the months of November and March.
2 Water demands are calculated for buildout conditions.
Source: W&H Pacific 2002

Table 3.16-8: Untreated Water Demand Summary (in Acre-Feet/Month), Non-Residential Uses[1, 2]

Alternative	June	July	August	September	Annual Total[3]
2	14	27	20	14	75
3	11	21	15	11	58
4	6	12	9	6	33
5	18	35	26	19	98

1 No untreated water demands are anticipated between the months of October and May.
2 Non-Trendwest untreated water demands include irrigation for the Business Park, Community Recreation Center, and school and cemetery expansion areas.
3 Water demands are calculated for buildout conditions.
Source: W&H Pacific 2002

Wastewater

Wastewater generation is a function of water use (or demand). Wastewater generation is calculated between 80% and 90% of water demand respectively, for single family and multifamily units. Wastewater generation is calculated at 80% of water demand for the Business Park. Projections of wastewater generation account for seasonal fluctuations and include an infiltration and inflow component (see discussion in Appendix E). Table 3.16-9 summarizes projected average monthly wastewater flows for Alternatives 2, 3, 4, and 5 with and without infiltration/inflow (I/I).

Table 3.16-10 summarizes projected combined loadings of BOD and TSS in pounds per day for Alternatives 2 through 5 at Project Years 5, 20, and 30 (full buildout).

Table 3.16-9: Average Monthly Wastewater Flow with and without Infiltration/Inflow (in mgd)[1]

Alternative	Average Monthly with I/I[2]	Average Monthly without I/I[2]
Alternative 2	0.33	0.29
Alternative 3	0.35	0.30
Alternative 4	0.22	0.19
Alternative 5	0.28	0.25

1 Includes wastewater flows from non-residential located in the UGA.
2 Monthly averages are calculated for full buildout conditions.
Source: W&H Pacific 2002

Table 3.16-10: Projected UGA Wastewater Loadings - Alternatives 2, 3, and 4 and 5 in Pounds per Day

Alternative	BOD and TSS (lbs/day)[2]	Year 5	Year 20	Year 30
Alternative 2	Annual Average	540	640	660
	Max. Month Average (Aug.)	570	670	690
Alternative 3	Annual Average	480	660	690
	Max. Month Average (Aug.)	510	700	700
Alternative 4	Annual Average	330	420	450
	Max. Month Average (Aug.)	360	440	470
Alternative 5	Annual Average	510	670	720
	Max. Month Average (Aug.)	530	700	760

1 Includes wastewater flows for non-residential demands located in the UGA.
2 Based on 0.2 lb/capita/day for BOD and TSS per Table G2-1 of Criteria for Sewage Works Design, Washington State Department of Ecology 1998.
Source: W&H Pacific 2002.

Loadings for BOD and TSS at Project Year 5 represent a substantial increase over existing conditions. It is anticipated that the regional wastewater treatment plant would be operating by the end of the 5-year Cle Elum UGA construction phase. BOD and TSS loadings during the construction phase would increase gradually and would be treated by the interim wastewater treatment plant.

Wastewater is currently treated by a three-lagoon cell system composed of two aerated lagoons and a constructed wetland. Ultraviolet (UV) lamps provide disinfection. Effluent is discharged through an outfall to the Yakima River. NPDES permit limits are currently being met (Wilson, personal communication, 2002). A discussion of regional wastewater flows, treatment, and disposal alternatives is included under Cumulative Impacts, below.

Solid Waste

Table 3.16-11 summarizes projected solid waste that would be generated by proposed uses on Trendwest properties within the Cle Elum UGA at Project Years 1 through 5, 20, and 30. Projected rates of solid waste reflect permanent and seasonal populations, and Trendwest and Business Park employees. Rates are based on Kittitas County records and guidelines published in solid waste management and engineering publications.

Table 3.16-11: Solid Waste Production (tons/year), Cle Elum UGA

Buildout Year	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Project Year 1				
Municipal Waste[1]	292	310	335	305
Yard Waste[2]	21	24	26	24
Hazardous Waste[3]	6	7	8	7
Total (tons/year)	319	341	369	336
Project Year 2				
Municipal Waste	763	711	703	587
Yard Waste	55	55	54	45
Hazardous Waste	16	16	16	13
Total (tons/year)	834	782	773	645
Project Year 3				
Municipal Waste	1,135	1,109	993	1,097
Yard Waste	83	85	76	88
Hazardous Waste	24	25	23	26
Total (tons/year)	1,242	1,219	1,092	1,211
Project Year 4				
Municipal Waste	1,512	1,394	1,148	1,662
Yard Waste	110	107	88	128
Hazardous Waste	32	32	26	38
Total (tons/year)	1,654	1,533	1,262	1,828
Project Year 5				
Municipal Waste	2,150	2,037	1,495	1,917
Yard Waste	157	156	114	148
Hazardous Waste	46	46	34	44
Total (tons/year)	2,353	2,239	1,643	2,109
Project Year 20				
Refuse (tons/year)	2,756	3,052	1,958	3,018
Yard Waste	200	233	150	231
Hazardous Waste	59	69	44	68
Total (tons/year)	3,015	3,354	2,152	3,317
Project Year 30				
Refuse	2,929	3,340	2,147	3,363
Yard Waste	211	255	163	256
Hazardous Waste	62	75	48	76
Total (tons/year)	3,202	3,670	2,358	3,695

1 Generation rate for permanent residents is 5.45 lb/capita/day. Generation rate for visitors and employees is 0.16 lb/capita/day. Generation rate for street and alley cleaning is 0.25 lb/capita/day.
2 Yard waste generation rate is 0.44 lb/capita/day.
3 Hazardous waste generation rate is 0.13 lb/capita/day.
Source: W&H Pacific 2002

Solid waste generated under Alternatives 2 through 5 is not reflected in the County's solid waste projections contained in its 1997 SWMP. Expansion of the Cle Elum transfer station would accommodate this increased waste stream (see Section 3.16.3, Mitigation).

Electricity, Propane and Natural Gas

No significant operational impacts on electricity or natural gas are anticipated under Alternative 5. Based on preliminary projections, electricity to service the UGA could be provided at Puget Sound Energy's substation located adjacent to the Cle Elum-Roslyn School District #404 campus on SR 903. Natural gas would be available pending Puget Sound Energy's expansion of distribution pipelines into the Upper County.

Telecommunications

No operational impacts to telecommunications are anticipated. Trendwest would negotiate formal service agreements with the service providers.

Indirect

No indirect impacts on utility service providers for adjacent regions are anticipated.

Cumulative

Cumulative impacts to utility service providers would consist of increases in the demand for water and wastewater treatment, solid waste disposal, electrical power, natural gas, and telecommunication services generated by the Cle Elum UGA, the MPR, and future growth in the Upper County.

Regional water and wastewater treatment plants would be designed to accommodate future demands, and no long-term cumulative impacts would occur. In response to comments submitted by Ecology on the Draft EIS, a discussion of potential regional wastewater flows, loadings, and disposal alternatives has been added to the Final EIS. As described above, the City is in the process of preparing a Regional Sewerage Facilities Plan. Following preparation of the Facilities Plan, the City will prepare an EIS, which will analyze potential water quality impacts to the Yakima River from the regional plant.

Regional Wastewater Treatment and Disposal Alternatives

The proposed treatment process involves constructing a sequencing batch reactor on a filled pad in one existing lagoon cell. Additional UV lamps may be installed for added capacity and the existing constructed wetland would be retained as an effluent polishing pond. Note: options for treatment process, effluent disposal, and sludge management were first evaluated in the *Cle Elum Regional Sewerage Facilities Plan, Preferred Alternatives Report* (Earth Tech 2001).

Projected Regional Wastewater Flows and Pollutant Loads

Essentially all new development projected to date within the region is some form of residential land use. As such, new connections are essentially all domestic sewage. No industrial connections are planned, and relatively few commercial connections.

Table 3.16-12 shows maximum monthly wastewater design flows for the service area of the regional wastewater treatment plant for Year 30.

Table 3.16-12: Regional Wastewater Flows at Planning Horizon Year 30

Condition	Maximum Month Flow (mgd)
Winter (March)	
Average	3.6
Peak Hour	10.7
Summer (August)	
Average	2.3
Peak Hour	8.0

Source: Cle Elum Regional Sewage Facilities Plan, Earth Tech, November 2002.

The portion of the regional wastewater summer and winter flows attributed to the MPR and the Cle Elum UGA would be 1.3 mgd.

Pollutant load estimates were developed from calculations of ERU anticipated in the service area over the 30 year planning horizon (approximately 7,154 total ERUs including the MPR, UGA, and regional infill) (Earth Tech 2001).

Pollutant loads were estimated based on historical experience for a single family home as one ERU contributing about 0.5 pounds per day of BOD and about 0.4 pounds per day of TSS. These rates were rounded either up or down slightly to reflect estimated household sizes and or commercial land uses (e.g. Business Park), and multiplied by the number of ERUs and associated occupancy rate(s). Projected unit loads from new ERUs were added to existing Cle Elum/South Cle Elum/Roslyn system loads. Existing wastewater record data from the Roslyn and Cle Elum systems was used to define the pollutants expected from these existing communities.

Table 3.16-13 is a summary of biological oxygen demand and total suspended solids pollutant loads in Year 30.

Table 3.16-13: Summary of Effluent Pollutant Loads in Year 30

Parameter		BOD	TSS
August			
Average Day mgd	2.232		
Average Day influent pounds		4767	4388
Influent Concentration mg/l		256	236
Effluent Concentration mg/l		15	15
Effluent pounds		279	279
Percent Removal		94	94
March			
Average Day mgd	3.604		
Average Day influent pounds		3979	3775
Influent Concentration mg/l		132	126
Effluent Concentration mg/l		15	15
Effluent pounds		451	451
Percent Removal		89	88

Source: Earth Tech 2002

The portion of the regional wastewater loadings attributed to the MPR are:

Average influent BOD: Winter 2198 lbs/day, Summer 2,685 lbs/day
Average influent TSS: Winter 1,685 lbs/day, Summer 2,123 lbs/day

Disposal Alternatives

The City has been evaluating three alternatives for a sewage outfall: reconstruction of the existing outfall at its location downstream of Hanson Pond No. 1; construction of a new outfall at a location downstream of the I-90 interchange south of the wastewater treatment plant; and construction of a new outfall at the proposed rock drop dam just upstream of Hanson Pond No. 2, which is the current preferred location. An outfall study would be conducted for the Facilities Plan and would include analysis of the following:

Alternative locations for an upgraded outfall. The outfall study will describe the three alternative locations, discuss feasibility for each of the sites, and identify the preferred location, which will be evaluated in detail. River morphology at each of the locations will be evaluated as part of the alternatives discussion.

River Design Criteria. Physical data from the Yakima River will be collected in accordance with Ecology protocol to define the mixing zone and the related parameters associated with a low flow river condition. Because controlled releases from reservoirs by the Bureau of Reclamation essentially define the flow regime, river design criteria will be coordinated with Ecology and the Bureau of Reclamation.

Water Quality Data. Ambient water quality data for the modeling will be derived from the closest Ecology River Station to the proposed outfall and other studies conducted for the 303(d) list and TMDL evaluations.

Dilution Modeling. Dilution modeling will be conducted for two conditions: an open pipe end some distance from the shoreline, and a multi-port diffuser submerged in the river channel. Modeling results will define the acute and chronic dilution factors.

Water Quality Modeling. The impacts at the edge of the acute and chronic mixing zones will be evaluated for conventional parameters in accordance with the EPA statistical approach, which Ecology will use to establish effluent limits for future NPDES permits. Farfield impacts will be modeled.

Outfall Evaluation. Preliminary design analysis will be performed to define the general outfall configuration at peak effluent discharge during high and low river flow conditions.

Fisheries Support. Potential effects of outfall discharge on fisheries habitat will be analyzed at the two alternate sites to the existing location. Evaluation of potential effects on fisheries habitat will be coordinated with the Yakama Nation and Washington Department of Fish and Wildlife.

The segment of the Yakima River receiving discharge is a freshwater Class A water body as defined in Chapter 173-201A WAC. It is currently considered to meet all Class A water quality criteria:

Fecal Coliform	100 colonies/100 mL maximum geometric mean
Dissolved Oxygen	7.8 mg/L minimum (via natural conditions)
Temperature	21 degrees C maximum (special conditions)
pH	6.0 to 9.0 standard units
Turbidity	less than 5 NTU above background
Toxics	No toxics in toxic amounts

The wastewater treatment plant would be designed to meet effluent limits specified in the future NPDES permit.

Capacity from the interim upgrades to the existing treatment plant is dependant on the performance of the upgrades. The ability for Trendwest to use the existing treatment plant will also be limited by the performance of the upgrades.

Other Utilities

It is anticipated that the planned expansion and proposed upgrades to the Cle Elum transfer station would account for future anticipated solid waste quantities from both the UGA and MPR. Management of solid waste would be defined in project-specific amendments to the SWMP for both the MPR and UGA. No significant cumulative impacts on electricity, natural gas, or telecommunications are anticipated.

3.16.3 Mitigation

Mitigation measures identified in the Draft EIS relating to compliance with the City of Cle Elum's water policy and implementation of indoor and outdoor water conservation measures would apply to Alternative 5. Since publication of the Draft EIS, Trendwest, the cities of Cle Elum, Roslyn, and Town of South Cle Elum have continued the process of negotiating cost allocation agreements for construction of the regional wastewater treatment plant. A standalone wastewater plant is no longer being considered as an option at this time.

Additional information on indoor and outdoor water use standards (i.e. conservation measures) included in the draft development standards for Alternative 5 is summarized below and described in greater detail in Appendix E.

- Water conservation fixtures would be installed in residential and non-residential buildings, including 1.6-gallon low-flush toilets, 2.5 gpm low-flow showerheads, 2.5 gpm faucet aerators, and 1.0 gpm per flush urinals.
- Residents would be encouraged to install water conserving appliances
- Limitations would be set on the area allowed for irrigation for each type of residential unit.
- Irrigation efficiency would be promoted through educating and recommending a landscaping principle called Xeriscape™ to residential and commercial property owners. This process includes seven steps: planning and design, soil improvement, inclusion of mulch areas, low flow irrigation systems, use of low water demand plants, and proper maintenance.

Solid waste mitigation will include:

- Development of a project-specific amendment to the SWMP. The amendment will address management of solid waste, including recycling and land clearing.
- Development of a CDL recycling program that would require contractor participation and would be approved by the Kittitas County Solid Waste Department prior to the start of construction.
- Expansion of the Cle Elum transfer station. The exact timing of the expansion has not been determined. Design of the expanded facility is currently underway by Kittitas County, and will take into account the capacity needs of the UGA. Trendwest would be responsible for its fair share of the costs of transfer station expansion.

3.16.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to wastewater and water treatment facilities or telecommunications are anticipated as a result of development under Alternative 5. Potential significant unavoidable adverse impacts to solid waste will be avoided through mitigation measures identified above.

3.17 ECONOMIC CONDITIONS

This section evaluates economic impacts generated by employment demand and income under Alternative 5 compared to Alternatives 2, 3, and 4, which are analyzed in the Draft EIS. Mitigation measures also are identified. Potential impacts from the No Action Alternative are discussed in Section 3.18 of the Draft EIS.

3.17.1 Affected Environment

Existing employment conditions in Kittitas County are described in Section 3.18.1 of the Draft EIS. Economic information presented below has been updated to reflect newly released data by the Washington Employment Security Department, Office of Financial Management, Department of Revenue, and Kittitas County.

Income, Wages, and Expenditures

This section has been revised and updated since publication of the Draft EIS, and is presented in its entirety.

Sources of Income

Table 3.17-1 summarizes sources of personal income in Kittitas County. Wage and salary income accounted for 43% of total income in Kittitas County in 2000. Following wage/salary income, investment and retirement income each comprised about one-fifth of the total county income. Comparative with Washington State, wages and salaries comprised a smaller percentage of total income in Kittitas County. Kittitas County offset this with a higher relative contribution from investment and retirement income. Proprietors' income consistently contributes approximately 11% of the total income for all areas (Kittitas County 2000).

Table 3.17-1: Personal Income by Source, 2000

	Kittitas County		Washington State	
	($ millions)	Percentage of Total	($ millions)	Percentage of Total
Wage/Salary	$280	43%	$103,478	58%
Investment	$157	24%	$32,265	18%
Retirement	$50	8%	$8,759	5%
Income Maintenance	$8	1%	$1,708	1%
Unemployment Insurance	$5	1%	$983	1%
Other Income	$74	11%	$19,078	11%
Proprietor's Income	$72	11%	$13,388	7%
Total[1]	$646	100%	$179,659	100%

1 Amounts may not total due to rounding.
Note: Numbers do not sum due to rounding.
Source: Washington State Employment Security Department 2001

Wages

Table 3.17-2 identifies average annual wages by industry sector in Kittitas County and Washington State in 1999. Average wage data is based on business establishment location; wages paid to Kittitas County residents who commute outside the county are not reflected in the calculation.

The average wage in Kittitas County has historically been lower than that of Washington State. For the last quarter century, the difference between the two has averaged approximately $7,000 (Washington State Employment Security Department 2001). In 1999, the difference was approximately double that at $14,000.

Table 3.17-2: Average Annual Wage by Industry Sector, Kittitas County and Washington State, 1999

Industry Sector	Kittitas County	Washington State
Agriculture and Forestry	$15,236	$17,139
Construction	$23,202	$35,515
Manufacturing	$27,924	$44,521
TCU	$33,042	$43,101
Wholesale Trade	$26,883	$40,688
Retail Trade	$12,542	$19,371
Services	$15,570	$41,621
Government	$29,949	$34,736
Total	$21,643	$35,743

Source: Washington State Employment Security Department 2001

Expenditures

Total expenditures are a measure of the size of the local economy. Between 1995 and 2000, total taxable retail sales in Kittitas County grew from $280 million to $387 million, corresponding to an annual rate of growth of 6.7% (WSDR 2000). Table 3.17-3 summarizes growth in taxable retail sales among sub-county jurisdictions.

Table 3.17-3: Taxable Retail Sales with Kittitas County, 1995-2000 ($1,000s)

Taxing District	1995	1997	2000	Average Annual % Increase (1995-2000)
Unincorporated Kittitas County	$64,735	$85,697	$91,522	7.1%
Cle Elum	$30,115	$35,430	$42,931	7.3%
Ellensburg	$179,511	$236,395	$247,187	6.6%
Roslyn	$4,638	$4,213	$4,367	-1.2%
South Cle Elum	$888	$776	$1,179	5.8%

Source: Washington State Department of Revenue 2001

Between 1995 and 2000, retail expenditures grew at a healthy pace in all jurisdictions except Roslyn. In unincorporated Kittitas County, Cle Elum, and Ellensburg, retail sales grew at an average annual rate of 7.0%. South Cle Elum retail sales increased by nearly 6% annually. Roslyn was the only jurisdiction experiencing declining retail sales between 1995 and 2000.

Property Value

According to property assessments made by the Kittitas County Assessor's Office, between 1990 and 1998, property and improvements within Cle Elum, South Cle Elum, and Roslyn taxing districts more than doubled in assessed value. Table 3.17-4 summarizes increases in total assessed property value for Kittitas County, Cle Elum, South Cle Elum, and Roslyn.

Table 3.17-4: Total Assessed Property Value, 1990-1998

Taxing District	1990[1]	1998	% Increase (1990-1998)	Average Annual % Increase (1990-98)
Kittitas County	$827,835	$1,947,003	135%	17%
Cle Elum	$44,674	$99,563	123%	15%
South Cle Elum	$10,010	$22,231	122%	15%
Roslyn	$20,369	$49,928	145%	18%

1 Year taxes are collected. Assessments are made the previous year.
Source: Kittitas County 2001

As discussed in the Draft EIS, areas of large assessed value increases typically were newer residential areas and vacant lots of 20 acres or less. The highest increases likely occurred for newer recreational areas and lakefront property.

3.17.2 Impacts

This section evaluates the potential direct, indirect, and cumulative impacts of Alternative 5 on select economic measures. The two primary areas of potential economic impacts include: employment and spending by permanent resident and visitors.

Employment

Direct Construction

Employment Demand – Trendwest Residential Development

Table 3.17-5 summarizes estimates of full-time equivalents for residential construction, along with estimated wage distribution for selected Project Years. Estimates for construction employment are measured in FTEs. One FTE represents one full-time position for a year.

Table 3.17-5: Construction Employment by Annual Wage or Salary, Alternative 5 (Annual FTEs)

Annual Wage	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
$18,000-$20,000	2	0	2	0	0	0
$20,000-$25,000	7	15	7	0	0	0
$25,000-$30,000	27	44	12	1	2	1
$30,000-$35,000	7	30	16	2	3	1
$35,000-$40,000	54	130	34	4	6	2
$40,000-$50,000	18	67	28	2	4	1
$50,000 plus	9	32	14	1	2	1
Total	123	318	113	11	18	7

Source: Trendwest 1999; Economic Research Associates 2000

Demand for construction employment would increase by approximately 100 employees per year between Project Years 1 and 3. Employment would peak in Project Year 3. Construction employment would be significantly higher in the first five-year construction phase when infrastructure, multifamily housing, and Trendwest-related facilities would be constructed. Construction employment would decrease by approximately 70% following Project Year 5.

Employment Demand - Business Park

As for Alternative 2, Alternative 5 includes a 950,000-square-foot business park. Construction of the Business Park is projected to begin in Project Year 3, following installation of utility infrastructure. Estimates of Business Park employment estimates are summarized from the *Employee Housing Needs Analysis* (Economic Research Associates 2000).

Estimates of construction worker demand and construction costs under Alternative 5 would be identical to those for Alternative 2 (see Section 3.18 of the Draft EIS). Estimated Business Park construction employment for Project Years 3 through 30 was estimated at approximately 21 (construction demand related to infrastructure is included Table 3.17-5, above).

Unlike the majority of residential construction, Business Park construction would require specialized trade categories particular to commercial projects. Table 3.17-6 summarizes wage ranges and associated representative construction occupations.

Table 3.17-6: Wage Range by Construction Occupations

Annual Wage	Representative Construction Categories
$18,000-$20,000	Apprentice Laborer
$20,000-$25,000	Apprentice Roofers, Painters, Framers
$25,000-$30,000	General Labor, Excavation, Landscaping
$30,000-$35,000	Compactors, Electrical Administrators
$35,000-$40,000	Specialized Construction, Development Occupations
$40,000-$50,000	Carpenters, Architects, Foremen, Masons
$50,000 plus	Plumbers, Project Managers, Supervision

Source: Trendwest 1999; Economic Research Associates 2000

Impacts to Construction Labor Supply – Trendwest Residential Development

Potential for the local labor supply to meet local demand generated by Trendwest residential development of the UGA under Alternative 5 would be the same as that identified for the other development alternatives in the Draft EIS. Local labor is defined as labor supply residing within Kittitas County prior to UGA construction. This applies to both construction employment and operations employment. The method used for the following analysis is modeled after that used in the EIS for the MountainStar MPR (Kittitas County 2000). Employment impacts identified in Table 3.17-7 assume that up to one-third of total labor supply would be able to work at the UGA/Trendwest development without causing an unnatural tightening of the local labor market, (i.e., the local unemployment rate dipping below 4%). The supply surplus is simply the difference between local labor demand and supply available to the UGA, if the difference is positive. A supply deficit would be indicated by demand exceeding available supply.

Table 3.17-7: Local Construction Employment Impacts from the Cle Elum UGA

	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
Annual Construction Jobs	123	318	113	11	18	7
Non-Local Demand	58	163	58	6	10	4
Local Labor Demand	65	155	55	5	8	3
Construction Labor Supply (1997)	*636*	*675*	*716*	*830*	*1,115*	*1,498*
Supply Available to UGA[1]	212	225	239	277	372	499
Supply Surplus[2]	147	70	184	272	364	496

1 Reflects one-third of the construction labor supply in Kittitas County.
2 The supply surplus is the difference between supply available and local labor demand from the UGA.
Source: Johnson-Gardner 2001

The analysis indicates that the Kittitas County construction labor pool would adequately fill all positions where local labor would be needed. With a construction unemployment rate of 6% and a natural unemployment rate of 4% (as estimated in the MountainStar MPR EIS), local labor available to the UGA would grow from 212 construction workers to approximately 500 workers by Project Year 30. Such a supply would be ample, as labor surpluses are estimated to grow from approximately 150 workers to nearly 500 by Project Year 30, with a slight dip in Project Year 3 when construction is at a maximum.

Depending on the timing of UGA start-up, construction jobs may be filled by a greater portion of local workers than estimated. The unemployment rate of 6% could climb, depending on economic conditions in the State of Washington. To the extent that unemployment in the local construction sectors increases, UGA development would be able to tap a larger available pool of applicants from within Kittitas County.

Overall, construction impacts would be short-term since construction expenditures would be finite. Construction firms could increase employment to satisfy short-term demand but would ultimately return to sustainable employment levels once construction activities were complete. The level considered sustainable, however, would likely increase. Impacts to housing from construction worker migration are discussed in Section 3.10 - Population and Housing.

Impacts to Construction Labor Supply – Business Park

The majority of general or standard Business Park construction jobs needed would be filled locally by positions paying less than $40,000 annually. However, jobs requiring greater specialization, project management, or experience from projects similar to those proposed for the UGA not seen in Kittitas County would require labor brought in from outside the local area. For all positions in all years, approximately 49% would be filled locally while the remainder would require labor from surrounding areas.

Some types of construction firms and labor would be needed that are not currently present within Kittitas County. Accordingly, both Kittitas County residents and individuals from outside of the County would fill likely construction labor demand. Table 3.17-8 illustrates the proportion of local labor expected to fill UGA construction jobs over the course of buildout, based on the wage scales described above (Table 3.17-6).

Table 3.17-8: Local Proportion of Construction Demand by Wage Range

Annual Wage	Proportion of Construction Jobs Filled Locally
$18,000-$20,000	100%
$20,000-$25,000	90%
$25,000-$30,000	75%
$30,000-$35,000	45%
$35,000-$40,000	45%
$40,000-$50,000	40%
$50,000 plus	30%

Source: Trendwest 1999; Economic Research Associates 2000

Although the results of the analysis point to a fair amount of employment originating from outside Kittitas County, the estimates assume a worst-case scenario and do not factor in learning and training conducted by Trendwest and non-local firms. Although the construction labor force would reach a maximum in Year 3 and decline thereafter, coordination of projects between local and non-local employment would likely allow exposure of local labor to new skill sets and experience. To the extent that this occurs, the proportion of local employment would increase. Further, Trendwest has committed to hiring as much local labor as possible. This would likely have positive impacts on the local labor share as the UGA is developed.

Direct Operation

Employment Demand – Trendwest Residential Development

Operational employment under Alternative 5 is essentially limited to the Business Park due to the absence of Trendwest tourist facilities and the Horse Park. A very minor amount of operational employment could exist, however no operational employment impacts from Trendwest residential development are anticipated.

Employment Demand – Business Park

Similar to analysis of the other development alternatives in the Draft EIS, it was assumed that construction of the Business Park under Alternative 5 would occur in even increments throughout the buildout period, beginning in Project Year 3.

A profile of likely business park uses was completed for the Draft EIS in order to estimate of space use as the facility is constructed (Economic Research Associates 2000). The greatest proportion of employment at the Business Park would be professional in nature. Light industrial uses, most often associated with light manufacturing, would likely account for the greatest share of space usage at 60% of gross area. Combined, warehouse, research, and development uses closely related to light industrial industry would likely account for 25% of all space. Office, retail, and restaurant space combined should not exceed 15% of all park space constructed under each of the development alternatives. Table 3.17-9 identifies potential industries that may locate in the Business Park.

Table 3.17-9: Distribution of Business Park Employment, Alternative 5

Business Park Use	Share of Total Space	Average Sq. Ft. per Employee[1]
Light Industrial	60%	624
Research & Development	10%	485
Warehouse	15%	2,746
Office	8%	347
Retail	4%	197
Restaurant	3%	388
Total/Total Avg. Sq. Ft.	100%	577

1 Urban Land Institute 1988.
Source: Economic Research Associates 2000

Business Park employment demand is directly determined by the size of the Business Park and as such would be the same under Alternative 5 as identified for Alternative 2 in Section 3.18 of the Draft EIS. Table 3.17-10 summarizes operational impacts resulting from the UGA Business Park under Alternative 5 based on full buildout. Annual Business Park employment is calculated based on average square foot for employee divided into total projected square footage at a given timepoint.

Table 3.17-10: Direct Operations Employment Impacts from the Cle Elum UGA Business Park Alternative 5 (Annual FTEs)

	Year 4	Year 5	Year 10	Year 20	Year 30
Alternative 5 (950,000 sf)	61	122	427	1,037	1,647

Source: Economic Research Associates 2000

Like Alternative 2, Alternative 5 would create the greatest employee demand because it proposes the largest Business Park. Ultimately, employment demand created by the Business Park would depend on the rate of absorption of completed business space. This analysis assumes the Business Park would develop in even phases through Year 30 and that full absorption would occur each year of construction. To the extent that vacant space exists each year, operational employment at the Business Park would be less than projected.

As shown in Table 3.17-9, the majority of employment at the Business Park would be professional with some light manufacturing and blue-collar employment. Accordingly, salary ranges for Business Park employment are expected to be significant. Nearly 70% of all created jobs are expected to pay upwards of $30,000 annually. Nearly 40% of all employment would likely pay between $30,000 and $40,000 annually. Approximately 30% of all Business Park employment would pay over $40,000 annually (Economic Research Associates 2000). In contrast, 30% of employment is expected to fetch less than $30,000, with 15% of Business Park employment earning less than $18,000. Lower-paying positions would likely be due to retail and restaurant development expected at the Business Park.

Impacts to Operational Labor Supply - Trendwest Residential Development

As described above, operational employment under Alternative 5 is essentially limited to the Business Park. As a result, no impacts to operational labor supply would occur.

Impacts to Operational Labor Supply - Business Park

Impacts to operational labor supply under Alternative 5 would be the same as described for Alternative 2 in Section 3.18 of the Draft EIS. An analysis of the Kittitas County labor supply was conducted to determine the likely proportion of Business Park employment filled by local residents versus jobs filled by individuals from other areas (Economic Research Associates 2000). Results of that analysis are summarized in Table 3.17-11. The split between local and non-local Business Park employment is reported by expected annual salary ranges.

Table 3.17-11: Local Proportion of Business Park Operational Employment Demand by Wage Range

Annual Wage	Proportion of Construction Jobs Filled Locally
Less than $15,000	95%
$15,000-$18,000	90%
$18,000-$20,000	90%
$20,000-$25,000	85%
$25,000-$30,000	80%
$30,000-$35,000	70%
$35,000-$40,000	60%
$40,000-$50,000	60%
$50,000 plus	60%

Source: Trendwest 1999; Economic Research Associates 2000

Employment at the Business Park is anticipated to be composed primarily of Kittitas County labor, with every income category attracting at least half of required employment locally. For all years across all wage ranges, the local labor pool is qualified to fill 71% of projected jobs at the Business Park.

Projections of likely future Business Park employment are shown in Table 3.17-12. The projections were derived by applying the local employment distribution summarized above in Table 3.17-11 to the total employment projections as summarized in Table 3.17-10.

Table 3.17-12: Direct Operations Employment Impacts from the Cle Elum UGA Business Park Alternative 5 (Annual FTEs)

Business Park, Alternative 5	Year 4	Year 5	Year 10	Year 20	Year 30
Employment Demand	61	122	427	1,037	1,647
Locally Filled Jobs	43	86	303	735	1,167
Non-locally Filled Jobs	18	35	124	302	479

Source: Economic Research Associates 2000

Business Park employment under Alternative 5 would be identical to that described for Alternative 2 in the Draft EIS. In Project Year 30, total employment could reach over 1,600 jobs. Kittitas County labor force participants could fill approximately 70% of Business Park jobs. Workers from outside of Kittitas County would be required to fill the remaining 30%. As years pass, jobs filled by non-local labor could be considered local given the likely residence change needed for the job. The non-local figure is meant to reflect net impact upon the current Kittitas County labor force.

Expenditures

Direct Expenditures

The second major economic impact from UGA development under Alternative 5 would be expenditures by permanent residents at the UGA. Because commercial development is essentially limited to the Business Park, tourist spending would be minimal compared to the other alternatives. The vast majority of expenditure impacts would be limited to spending by permanent residents.

In addition to expanding the existing tax base for local jurisdictions, these expenditures would create jobs in a number of different local industries. Expenditures by permanent residents were divided into four general categories: Eating and Drinking; Recreation; Retail Sales; and Food Store purchases. For each of those four categories, permanent residents would spend money in the UGA, off-site within the City of Cle Elum, or elsewhere in Kittitas County. Residents at the UGA would undoubtedly spend money outside of Kittitas County. However, expenditure leakage is projected to be insignificant compared to spending within Kittitas County (Johnson-Gardner 2001). A detailed discussion of assumptions guiding spending projections, geographical distribution, and timing, as well as detailed annual estimates, is found in Appendix D (Johnson-

Gardner 2001). Spending estimates for selected years, by category, are summarized in Table 3.17-13.

Table 3.17-13: Cle Elum Permanent Resident and Visitor Expenditures with Resulting Employment, Alternative 5 (in Thousands of 2000 Dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30
Alternative 5					
Eating and Drinking	$433	$3,213	$3,936	$5,011	$5,537
Resulting Employment	*11*	*85*	*104*	*132*	*146*
Recreation	$120	$891	$1,091	$1,389	$1,535
Resulting Employment	*2*	*12*	*15*	*19*	*21*
Retail Sales	$926	$6,876	$8,422	$10,721	$11,847
Resulting Employment	*6*	*41*	*51*	*65*	*71*
Food Stores	$425	$3,154	$3,863	$4,918	$5,435
Resulting Employment	*2*	*18*	*23*	*29*	*32*
Total Expenditure	$1,904	$14,134	$17,312	$22,039	$24,354
Total Employment	*21*	*156*	*193*	*245*	*270*

Note: Numbers may not sum due to rounding.
Source: Johnson-Gardner 2001

Alternative 5 would generate significantly lower levels of spending compared to Alternatives 2, 3, and 4 due to the lack of commercial, non-Business Park development. Permanent resident spending would increase steadily through Year 30, though at a slower pace than under the other development alternatives. Retail Sales, and Eating and Drinking expenditures would be the two categories of greatest spending.

Alternative 5 is expected to generate significantly fewer spending-induced jobs than the other alternatives due to the removal of all non-Business Park commercial elements. Jobs created by spending are estimated to grow to approximately 270 positions by Project Year 30 under Alternative 5. Eating and Drinking jobs are estimated to comprise the greatest share of spending-induced jobs, reaching between 50% and 60% of projected employment by Project Year 30. Positions generated would likely be in the Retail Trade and Services standard industrial code (SIC) sectors. The great majority of such jobs would be adequately filled by the qualifications of the local labor supply.

Indirect Impacts

While UGA development is expected to create significant construction and Business Park operations employment, economic impacts are not limited to jobs created. Direct economic impacts produce a ripple effect through an economy in the form of indirect impacts and induced impacts. Indirect and induced impacts represent the second and third stages of job creation, respectively, as a result of any direct activity, in this case the development of the UGA. For example, the start of a new restaurant within an area is a direct impact. The employment created by that restaurant purchasing supplies and ingredients from a wholesaler is an indirect impact. In turn, new employment created by food wholesalers purchasing replacement inventory is an

State Input/Output Model (Kittitas County 2000) was used to estimate indirect employment impacts shown in Table 3.17-17. Of all the development alternatives, Alternative 5 would generate the second lowest number of indirect and induced jobs. As with direct jobs created by spending, indirect and induced employment would likely fall into retail, wholesale and services sectors.

Table 3.17-17: Summary of Indirect, and Induced Employment Impacts Generated by Permanent Resident and Visitor Spending, Alternative 5

Spending-Induced Employment, Alternative 5	Year 1	Year 5	Year 10	Year 20	Year 30
Total Direct Employment[1]	21	156	193	245	270
Local Indirect/Induced Employment[2]	4	31	39	49	54

1 Includes both local and non-local employment.
2 Local defined as within Kittitas County.
Source: Johnson-Gardner 2001

Property Values

Impacts to the value of existing property and improvements in the vicinity of the Cle Elum UGA can be divided into potential negative impacts and potential positive impacts. Each is discussed below.

Despite recent growth, it is expected that development in the UGA would not accelerate property value growth beyond the historical rate. While economic growth can been shown to positively affect property values in proximity to a new development, the argument is less plausible in the specific instance of the Cle Elum UGA. As described in Section 3.10 - Population and Housing, with very few exceptions, existing development is dated and limited compared to the orientation of development proposed for the UGA. Acceleration of property value is most likely where new and existing property are similar or are easily substituted in the minds of owners. This is presently not the case.

Accelerated property values would have property tax ramifications. All else being equal, higher property values translate into higher annual tax bills for owners. However, this is constrained by a number of factors. First, as stated above, existing property is not likely to be deemed a good substitution for new development at the UGA and, therefore, value growth is not likely to be spurred for existing property. Second, property tax laws within the State of Washington regulate the amount of spending growth allowed for government jurisdictions. If value growth accelerates, property tax levy rates must be adjusted so as not to enable government spending to exceed the rate of inflation (Johnson-Gardner 2001). Under Initiative 747, levy rates may have to be adjusted to keep annual property tax revenues from growing by greater than 1%, or less than the rate of inflation (see Appendix D). Finally, as UGA development reaches maturity, most jurisdictions affected by development are expected to run fiscal surpluses if property tax rates are not reduced at a comparable rate. Thus individual tax bills are not likely to increase if property values rise, but rather potentially decrease or hold constant.

Cumulative Impacts

Cumulative economic impacts would result from construction and operation of the UGA concurrently with the MPR and other regional growth.

Construction

Employment Demand

Table 3.17-18 below summarizes cumulative construction employment demand in Project Years 1 through 30, assuming concurrent construction of the MPR and UGA. MPR construction employment assessed in the Draft EIS was proportionately reduced by a factor of 18.6% to reflect the Reduced Density MPR. Cumulative construction employment impacts are the sum of construction jobs at both the MPR and UGA work sites for each year of buildout.

Table 3.17-18: Cumulative Construction Employment from the Reduced Density MPR and UGA Development, Alternative 5 (Annual FTEs)

Construction Employment	Project Year					
	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
Total, UGA	123	318	113	11	18	7
Total, MPR	276	461	306	278	163	152
Total	399	779	419	289	181	159

Source: Trendwest 1999; Johnson-Gardner 2001

Combined employment with the MPR would sustain over 150 workers through full buildout due to the extended scale of residential construction at the MPR. Salary levels for construction jobs would closely mirror the income distribution shown in Table 3.17-6. The projected 21 Business Park construction workers at any given timepoint would not create significant additional cumulative impacts.

Impacts to Labor Supply

The method used to estimate UGA construction labor supply impacts was also used to project cumulative labor supply impacts from joint UGA and MPR construction. Table 3.17-19 summarizes the results of that analysis. Approximately 35% to 40% of all construction jobs created by the MPR and UGA could be adequately filled by the existing skill sets and experience of the Kittitas County construction labor force (Economic Research Associates 2000).

Table 3.17-19: Local Construction Employment Impacts from the Reduced Density MPR and UGA, Alternative 5, (Annual FTEs)

	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
Annual Construction Jobs, MPR and UGA	399	779	419	289	181	159
Non-local Demand, MPR and UGA	227	444	243	173	113	100
Local Labor Demand, MPR and UGA	172	335	176	116	68	59
Construction Labor Supply (1997)	*636*	*675*	*716*	*830*	*1,115*	*1,498*
Supply Available to UGA[1]	212	225	239	277	372	499
Supply Surplus/(Deficit)[2]	40	(110)	63	161	304	440

1 Reflects one-third of the construction labor supply in Kittitas County.
2 The supply surplus/deficit is the difference between supply available and local labor demand from the MPR and UGA.
Source: Johnson-Gardner 2001

For most years, the existing Kittitas County construction labor force is projected to adequately fill needed construction jobs as the UGA and MPR are simultaneously developed. In fact, with a reduced number of residential units planned for the MPR, fewer jobs would require laborers from outside the local area. Between Project Years 1 and 5, the existing labor supply would likely not meet demand and additional labor would need to be brought into Kittitas County.

As described above under impacts for Alternative 5 alone, the incidence of training and experience gained may likely reduce the need for non-local labor. Because MPR construction labor needs would not wane by Year 30, a concentrated effort to train local labor would likely be prevalent. Depending on the timing of MPR and UGA start-up, the recession in the state of Washington would increase unemployment in Kittitas County, thus increasing the pool of potential local laborers eligible to take construction jobs at either project.

Operation

Cumulative development impacts would be limited mostly to MPR operations employment as no significant operational employment would exist under Alternative 5. Table 3.17-20 provides a summary of operational impacts from the Reduced Density MPR.

Table 3.17-20: Operations Employment, Reduced Density MPR and UGA, Alternative 5 (Annual FTEs)

Operations Employment	Project Year					
	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
Total, UGA[1]	0	0	0	0	0	0
Total, MPR	85	681	943	1,218	1,329	1,328
Total	85	681	943	1,218	1,329	1,328

Source: Trendwest 1999; Johnson-Gardner 2001

Cumulative operational employment impacts would occur from operation of the Business Park in conjunction with the MPR. At the time the 950,000-square-foot Business Park is fully built out,

approximately 1,647 employees are projected (the same as Alternative 2). The addition of the Business Park employment would increase operational employment at the MPR and UGA by over 100%.

Indirect and Induced Impacts

Cumulative indirect and induced construction and operational employment would be significantly greater through Year 30 than for the UGA alone, similar to that identified for Alternatives 2, 3, and 4. Construction of the MPR would sustain sizeable indirect and induced employment and business through Year 30. A significant amount of cumulative operational indirect and induced employment would also likely occur through Project Year 30.

Expenditures

Combined development of the Reduced Density MPR and UGA under Alternative 5 would dramatically increase annual resident and visitor expenditure figures, similar to that described in Section 3.18 of the Draft EIS. Adding MPR-induced expenditures would amount to a 563% increase in UGA-induced spending under Alternative 5. Accordingly, employment generated by such expenditures would increase by the same proportions over estimates expressed for the UGA alone in Table 3.17-25.

Rather than peaking at 270 jobs under Alternative 5, cumulative development would create over 2,000 jobs by Project Year 30. A diversification of retail, services, wholesale, and other industries would occur. Salaries for the majority of new jobs would likely be $35,000 and less. The greater tourism focus of the MPR would likely create jobs with greater seasonal orientation, and therefore, lower pay.

Accordingly, indirect and induced jobs created by expenditures would increase by proportions similar to direct job growth or by an average annual factor of approximately 250%. Salary ranges and likely industries affected would mirror those for UGA spending and indirect and induced employment growth. While no local sector would be unaffected, the majority of employment expansion would occur in retail, wholesale, services, and construction. With the exception of construction jobs, salaries for cumulative indirect/induced jobs would more often than not pay $30,000 or less. The tourist nature of the MPR may weight indirect/induced job growth and salary ranges slightly downward compared to the UGA alone.

Property Values

Property values are not likely to be measurably affected by combined MPR and UGA development. In the unlikely event that property value growth is accelerated, thus affecting assessed value for property tax purposes, the Washington State tax code has voter-approved safeguards to protect individual tax bills from rapid growth in property values. For further discussion of property tax regulations affecting both UGA and MPR development, see Appendix D (Johnson-Gardner 2001).

3.17.3 Mitigation Measures

Economic development of Kittitas County, particularly the Upper County, would be the consequence of the scope and scale of proposed UGA development. The nature of the impacts would include increased employment opportunities, higher potential personal income, lower unemployment rates, a diversified workforce, and new business commerce. No mitigation for economic impacts is anticipated to be necessary.

3.17.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse economic impacts under Alternative 5 have been identified.

3.18 FISCAL CONDITIONS

This section analyzes impacts to fiscal conditions under Alternative 5 compared to the other development alternatives. It identifies potential impacts on revenues and expenditures for the jurisdictions that would provide public services to, and receive revenues from, development of Alternative 5. Mitigation measures to address impacts are identified, including provisions in mitigation agreements negotiated between Trendwest and public service providers after publication of the Draft EIS. Information in this section is summarized from the *Fiscal and Economic Impact Analysis of Proposed Development of Cle Elum Urban Growth Area Alternative 5 in Upper Kittitas County, Washington* (Johnson-Gardner 2002), included as Appendix D of the Final EIS.

The analysis assumes that the City of Cle Elum would annex the UGA prior to construction, and that the City would assume primary service and taxing jurisdiction starting in Project Year 1. Additional assumptions used to estimate projected revenues and costs are related to timing of residential and commercial construction, unit type, pricing and sales, occupant characteristics, and visitor spending patterns. A detailed discussion of assumptions and methods used to estimate projected revenues and costs for each affected jurisdiction and/or agency is provided in Appendix D of the Final EIS.

Dollar figures presented in this section reflect constant 2000 dollars to provide a consistent index of comparison to current price levels over the 30-year buildout period. By using constant 2000 dollars, growth is measured in "real activity," eliminating the effects of changing price levels. They also facilitate clarity in comparing results presented for the 5-, 10-, 20-, and 30-year timepoints.

3.18.1 Affected Environment

Existing fiscal conditions for affected jurisdictions are described in Section 3.19 of the Draft EIS. After publication of the Draft EIS, Washington voters passed Initiative 747 in November 2001. The initiative alters property tax collection in Washington by limiting annual increases in general property taxes to 1% annually, unless otherwise approved by voters in their respective public services jurisdiction. A discussion of Initiative 747's potential ramifications to the City of Cle Elum, the primary jurisdiction serving potential development within the UGA, is included in the impact discussion.

3.18.2 Impacts

This section describes the potential direct, indirect, and cumulative impacts of Alternative 5 on the fiscal status of jurisdictions that would serve development in the Cle Elum UGA. Quantified fiscal impacts are presented for the City of Cle Elum, which would have primary jurisdiction following annexation, and for agencies that would provide substantial public services to the UGA, including the Cle Elum-Roslyn School District #404 and Hospital District No. 2. Fiscal impacts for agencies not providing substantial public services, including the State of Washington, Kittitas County, cities of Roslyn, South Cle Elum and Ellensburg, Fire District No. 7, and Hospital District No. 1 are analyzed qualitatively in this chapter. Additional quantitative fiscal information is contained in Appendix D.

Direct fiscal impacts are discussed in terms of one-time revenues received and costs incurred, and recurring revenues and expenditures incurred as a result of the proposed residential and commercial development. One-time revenues and costs are usually associated with construction and represent fees or taxes levied once. Recurring revenues and costs are typically ongoing, such as property taxes assessed annually or public service costs. Indirect impacts involve the fiscal effects of development on nearby municipalities that would not be responsible for providing direct public services to the Cle Elum UGA but may be affected (e.g., by increased visitor population). Cumulative impacts are quantified to assess the effect of development of the Reduced Density MPR and Alternative 5 on the fiscal status of potentially affected jurisdictions.

The cost estimates included in the impact summary are for Project Years 5, 10, 20, and 30, and a total for all years. Cost summaries for each year of the 30-year buildout period are included in Appendix D for each jurisdiction. Because fiscal impacts are highly dependent on various factors that cannot be predicted with absolute certainty (such as the exact timing of construction, assessed value of the constructed product, and cost of government facilities and services in future years), these "snapshots" of fiscal impacts are intended as illustrative to identify the general direction and order of magnitude of impacts, and to assist in community planning for actual future impacts. They are not intended to establish precise dollar amounts or exact duration of projected impacts. To address impacts more precisely, many of the suggested mitigation measures include a monitoring component.

Alternative 5

The primary differences between Alternative 5 and Alternatives 2, 3, and 4 relate primarily to housing mix and recreational facilities. Under Alternative 5, visitor/tourist facilities (i.e., timeshare condominiums, lodge, RV Park, and the golf course) have been eliminated. Construction of the Washington State Horse Park is also not included in this alternative. Residential development is composed of single-family homes and multi-family condominium and apartment units at a similar scale as analyzed under Alternative 3 (Expanded Residential). With the elimination of visitor facilities, analysis of Alternative 5 assumes that all residential development is occupied by permanent residents. Alternative 5 includes development of a 950,000-square-foot Business Park, which was analyzed as part of Alternative 2 in the Draft EIS. The development design changes under Alternative 5 affect the following primary fiscal areas:

- *Tourist Spending:* Elimination of tourist facilities and consequently tourist spending under Alternative 5 greatly reduces the potential for retail sales tax revenues as a result of UGA development. Permanent residents spend significantly less per day than do tourists, who tend to eat at restaurants for every meal, buy gifts and souvenirs, and spend a greater daily amount on recreation and entertainment. In addition, there will be no hotel/motel tax generated by Alternative 5.
- *Property Tax Revenue:* The combination of the highest residential development (similar to Alternative 3) with a 950,000-square-foot Business Park would increase property tax revenues for affected jurisdictions.
- *Real Estate Excise Tax and Shared Revenues:* Residential development proposed under Alternative 5 will generate greater real estate excise tax revenues due to sale transactions, as well as shared revenues due to higher permanent population growth.

- *Public Service Costs:* The higher permanent population associated with residential development could result in an increase in emergency service needs and would generate higher general government service costs.
- *School Service Requirements:* Residential development under Alternative 5 will increase potential public school enrollment relative to the other development alternatives.

In the analysis of Alternative 5, cost estimates for the police and fire departments and for Hospital District No. 2 do not reflect the KITTCOM service and billing agreement that has been revised since publication of the Draft EIS. In the new agreement, the City of Cle Elum would pay higher subscriber fees for "911" dispatch service. New fees cannot be determined at this time, as details have not yet been elaborated. However, to the extent that subscriber fees would increase, the City of Cle Elum police and fire departments would face higher annual service costs than projected in the fiscal impact analysis. The higher service costs would be included in the City's fiscal cost monitoring. For Hospital District No. 2, EMS calls attributable to UGA development routed by KITTCOM would also be monitored. For both the City and Hospital District No. 2, these service costs would be subject to the shortfall mitigation agreements with Trendwest, as negotiated.

Direct Construction and Operation

State of Washington

The state of Washington provides governmental services including law enforcement, land management, ecological regulation, interstate and state highway maintenance, public education oversight, social health and human services, economic development, and other general government services.

The state of Washington would receive both one-time and recurring revenues. One-time revenue sources would include timber excise tax, development review fees, retail sales tax on construction contracts, Business and Occupation (B&O) tax, and real estate excise tax (REET). Sources of recurring revenues would include food, recreation, and retail sales tax; tax on overnight lodging; property tax; and motor vehicle fuel tax.

The state would also incur one-time and recurring costs. An example of one-time costs is traffic light installation. An example of recurring costs would include ongoing services provided by state agencies to the Cle Elum-Roslyn School District #404. Appendix D provides additional detail on state agencies potentially affected and services provided by these agencies.

The net fiscal impact to the state under Alternative 5 is expected to be positive. Average annual net revenues are projected to range from $750,000 to $800,000. Compared to the other development alternatives, Alternative 5 is projected to result in the lowest positive net impact on the state due primarily to the lower sales tax received (i.e., absence of tourist-related facilities) and the larger distributions to the School District from greater enrollment impacts.

Like the other development alternatives, more than 90% of early revenue flow from Alternative 5 is projected to be one-time receipts, due largely to retail sales tax on the value of initial construction contracts. One-time revenues would decrease over the buildout period reflecting the

projected gradual decrease in the rate of residential construction. By Project Year 30, annual one-time revenue inflow is estimated to be less than 10% of total annual revenues to the state. Recurring revenues, composed largely of retail sales tax and property tax, would increase over the buildout period as population and residential units increased. Recurring costs would also increase and would be composed primarily of state distributions to the Cle Elum-Roslyn School District #404.

Kittitas County

Although the UGA would be under the jurisdiction of the City of Cle Elum, development within the UGA would require inspections and permits from the County according to the contracted agreement between Cle Elum and Kittitas County. Received revenues would be split between the City and County. One-time revenues received by the County would largely be from development permit and review fees, including commercial and residential building permit, plan review, and sprinkler system fees. (The City of Cle Elum is exploring the establishment of a Building Department, which would assume permitting and inspection duties from Kittitas County on construction within its jurisdiction. Until that time, Kittitas County would receive fee revenues for reimbursement of inspection and permitting costs.) A small portion of revenue would come from REET collection fees. Sources of recurring revenues would include retail sales tax, property tax, solid waste disposal fees, and shared revenues (taxes collected by the state and redistributed to jurisdictions).

Costs for the County include development review and inspection (one-time) as contracted by the City of Cle Elum, and recurring costs from general services (e.g., courts, property assessment, general administration) and law enforcement. As described above, if the City of Cle Elum assumes responsibility for these activities, revenues and costs would shift to the City.

Solid waste disposal fees, and associated costs for solid waste disposal, are not separately treated in the Final EIS. It was assumed that service fees would be set to fully compensate for service costs. Trendwest is participating with the City of Cle Elum and the County in revising the Kittitas County SWMP to address the projected waste streams from the UGA development. This effort is coordinated with efforts to revise the SWMP to address waste streams and programs for the MPR development. Trendwest would contribute a pro rata share of the costs to construct a new or expanded transfer station, as necessary, to handle projected waste streams.

Recurring revenues, composed largely of property and retail sales tax, would continue to increase over the buildout period. Actual net fiscal impacts to the County will be highly dependent upon the nature of County general service costs required for UGA development. The higher concentration of permanent residential development under Alternative 5 could result in greater initial expenditures for functions such as Treasury, Auditing, Clerk, Assessor, auxiliary planning and other general administrative functions supporting these and other departments. As Kittitas County grows and economies of scale are realized, general service costs would be distributed across an increasing scale of development within the County, thus lowering the average general services cost for future development. The County's general service cost burden would also decrease as incorporated communities grow and annex previously unincorporated areas (e.g., the Cle Elum UGA).

Sheriff deputies are hired on a County population basis, including incorporated areas. Although the County will not have primary jurisdiction, the County is typically relied on for aspects of law enforcement beyond basic patrol. This includes detective work, homicide, tactical enforcement, etc. Over time, as Cle Elum's police department expands and experience is gained, these capabilities could shift to the City of Cle Elum.

City of Cle Elum

After annexation, the UGA would fall under the direct jurisdiction of the City of Cle Elum. Similar to those described for the State and County, one-time revenues to the City would include fees from development permits and review, REET, and retail sales tax on construction contracts. The City would receive recurring revenues from retail sales tax due to permanent resident expenditures, property tax, and shared revenues. The City could also receive service and tax revenue from water and wastewater utility service to the UGA. Conditions for utility service are not yet finalized and, as such, are not assessed quantitatively for the fiscal analysis. Although still in negotiations, utility agreements would have no positive or negative net impact on the City of Cle Elum. The Pre-Annexation Agreement between Trendwest Properties and the City of Cle Elum requires Trendwest to contribute its fair share of capital expenses so as not to impose any negative financial impact on the City, its existing residents, or ratepayers as a result of Trendwest UGA development.

One-time costs to the City would primarily include development review and inspections. These costs are assumed to be covered through the respective development/permit fees; the fiscal analysis assumes that costs would be equal to revenues generated. As part of the draft Conditions of Approval, Trendwest has agreed to fund a City Planner. Recurring costs would be incurred primarily through the provision of public services, including personnel and capital purchases related to law enforcement, fire protection, emergency medical service, and public works.

One-time revenues, largely induced by sales tax on construction contracts, would represent 97% of total revenue inflow from the UGA between Project Years 1 and 3, gradually decreasing to about 8% by Project Year 10. Recurring revenues, largely composed of property tax and retail sales tax, would gradually increase over the buildout period. Property tax revenues would represent increasingly larger proportions of total revenues received over the buildout period. Property tax revenues would account for approximately 33% of total revenues in Project Year 5, 60% of total revenues in Project Year 10, 70% of total revenues in Project Year 20, and 80% of total revenues in Project Year 30.

In the initial buildout years, recurring costs (primarily reflecting capital equipment leases for road maintenance and fire service as well as payroll for full-time firefighters) would account for the majority of total costs and represent the primary reason for identified net fiscal shortfalls during those years. Net fiscal shortfalls would be eliminated once a certain threshold of property and sales tax revenues are received. Sales tax receipts fall behind those of other development alternatives due to the absence of the Horse Park and all other tourist facilities from the UGA under Alternative 5. On average, tourists spend a larger amount per day than do permanent residents.

Over the long term, law enforcement, the fire department and public works would likely be the greatest sources of recurring expenditures to the City. Impacts on selected city departments under Alternative 5 are summarized further, below. Additional detail is provided in Section 3.15, Public Services, of the Final EIS and Appendix D.

Table 3.18-1 provides a summary of projected city revenues and costs for Alternative 5 for selected project years over the projected 30-year buildout period.

Table 3.18-1: City of Cle Elum Revenue and Cost Summary, Cle Elum UGA, Alternative 5 (in thousands of constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	Total, All Years
Alternative 5						
Total Revenues	$336	$591	$781	$1,311	$2,014	$33,289
One-time Revenues	$332	$241	$102	$120	$94	$4,671
Recurring Revenues	$4	$350	$679	$1,191	$1,919	$28,618
Total Costs	$368	$702	$826	$1,003	$1,075	$26,139
One-time Costs	$66	$30	$12	$13	$8	$596
Recurring Costs	$302	$671	$814	$990	$1,067	$25,544
Net Fiscal Impact	($32)	($110)	($45)	$307	$939	$7,149

Note: Figures may not sum due to rounding.
Source: Johnson-Gardner 2001.

In the early years of UGA development, the City of Cle Elum faces a strong likelihood that new service costs would exceed UGA-induced revenues. Law enforcement and fire/EMS costs would be immediate with initial UGA construction. Revenues such as property taxes won't be received right away. Accordingly, shortfalls are projected in Years 1 through 11 under Alternative 5. Deficits may average between $50,000 and $60,000 for the first 11 years. To cover revenue shortfalls, the City and Trendwest are negotiating a shortfall mitigation process. Average annual net surpluses are projected to start in Project Year 12, and to increase to between $900,000 and $950,000 by Project Year 30.

Initiative 747

Washington voters approved I-747 in November 2001, limiting general levy property tax revenue growth to 1% annually without a vote of the people. The practical effect of I-747, assuming voters do not approve greater increases, would be smaller increases in annual City property tax revenues coinciding with a growing City tax base due to new development, including the Cle Elum UGA, and inherent real estate value growth. The result is accelerated downward pressure on the City levy rate. Under I-747, the levy rate would undoubtedly drop at a faster rate than the historical 2% decline witnessed over the last decade.

Because the levy rate is ultimately determined by the total City assessed value and the City's annual property tax need, projecting future City levy rates is difficult, particularly since voters may in fact approve property tax revenues in excess of the cap dictated by I-747. In summary, the effective City levy rate is projected to decline faster under I-747 than without the tax measure by an average of 1.3% annually. After one decade, the City levy rate could be as much as 13%

lower under I-747 than it would otherwise, and by extension, so would City property tax revenues. A preliminary analysis of possible effects upon the levy rate and revenues is found in Appendix D.

I-747-induced decreases in property tax revenues from the Cle Elum UGA, resulting from accelerated drops in levy rate, would have the greatest effect during the first 10 years of development, given lags in the receipt of property taxes. If Cle Elum voters do not approve tax increases above 1%, Initiative 747 would have measurable negative impacts to property tax revenues generated by Cle Elum UGA development.

At this point, quantification of net impacts to the City under I-747 would be speculative for the following reasons:

- *Long-term Prospects of I-747:* If I-747 causes noticeable, undesirable impacts to City finances and service provision, Washington voters may repeal or reform I-747 to allow for greater revenue capacity.
- *Local Voter Approval:* I-747 does allow for property tax growth to exceed 1% if voters approve. As such, the City levy may act very much like a special levy in the future. Future voter sentiment would then be a significant revenue determinant.
- *Altered Fiscal Cost Landscape:* If Cle Elum voters do not approve higher property tax growth, current city service budgeting would likely be altered significantly to meet required service standards within acceptable budget.
- *Altered Fiscal Revenue Landscape:* With constant service levels to uphold and revenues not keeping pace with inflation, the City may have to look for new or altered revenue sources to afford future service costs.

Although I-747 would alter the existing and future fiscal situation for the City of Cle Elum, the City will monitor annual, actualized costs and revenue flow due to Trendwest development. Whether or not I-747 ultimately affects Cle Elum, monitoring is designed to trigger any appropriate mitigation requirement as it may actually occur (see Section 3.18.3, Mitigation Measures).

City of Cle Elum-Roslyn Police Department

The projected demand for new Police Department personnel is based on a ratio of two officers per 1,000 UGA residents (1:500 ratio), consistent with a 1997 survey of Washington city police department staffing levels with populations ranging from 2,500 to 10,000. Under Alternative 5, five additional officers would be required by Project Year 30. This is within the range of total officers identified for Alternatives 2, 3, and 4.

Average annual cost to the City of Cle Elum-Roslyn Police Department under Alternative 5 at full buildout is estimated to range between $250,000 and $300,000 (includes capital as well as operations and maintenance [O&M] expenditures).

City of Cle Elum Fire Department

The Cle Elum Fire Department is an all-volunteer department, with approximately 58 staff members who respond to both fire protection and emergency medical service calls. The need for additional full-time personnel was evaluated based on the City of Cle Elum's projected population and information included in its Municipal Facilities and Services Expansion Plan (MFSEP), prepared subsequent to the Draft EIS. The MFSEP identified a problem with consistently achieving prompt volunteer response (particularly during the weekday) and identified a possible solution of a transition during the weekday to partially paid firefighters.

The City of Cle Elum would require greater assurance of weekday firefighter response when construction commences in the UGA. This could be accomplished by either guarantees of additional trained volunteers from UGA employees or construction workers, or from funding one trained FTE firefighter. This is projected to increase to three paid trained FTE firefighters by the time construction has commenced on 60% of the residential units (projected as approximately Year 5 in Appendix D). The paid firefighters would need to be supported by 15 volunteer firefighters by project buildout (projected to be Year 30 in Appendix D).

Capital outlays are projected to include: a brush/rescue vehicle when construction commences in the UGA; a Class A pumper at the time construction has commenced on 67% of the residential units (projected as approximately Year 6 in Appendix D) (or, alternatively, when greater than 50% of the Business Park is occupied, if that occurs sooner); and a fire station in Year 2 to accommodate the vehicles. Average annual costs for the fire department would range from $150,000 to $200,000 (includes personnel, O&M, capital, and existing KITTCOM fee expenditures). Cost differences between Alternative 5 and Alternatives 2, 3, and 4 would be negligible.

The City of Cle Elum Fire Department would either enter an arrangement to share use of the fire tender provided to District 7 as part of the MPR mitigation, or the City would have to acquire a fire tender when construction commences in the UGA. Vehicles would be leased during the useful lifetime.

Under all of the development alternatives, the City is not projected to have enough new UGA property value to support a bond issue for a three-bay fire station, estimated to cost between $550,000 and $650,000 (see Appendix D). By Year 2, as a result, funding will likely require a combination of grants, bonds, and possible shortfall contributions if the UGA share of revenues is not sufficient to cover the UGA share of costs. As described above for the City of Cle Elum Police Department, annual costs to the fire department do not reflect the new billing agreement between the City of Cle Elum and KITTCOM. Higher fire department fees attributable to UGA development would be included in UGA fiscal cost monitoring and would be subject to the shortfall mitigation agreement with Trendwest.

City of Cle Elum Public Works

The City of Cle Elum could incur average annual road maintenance costs ranging from $150,000 to $200,000. Costs would gradually increase as equipment is leased. Costs for capital equipment are projected in the City's MFSEP. Under those projections, a snowplow, front-end loader, and a

dump truck/sander would be required prior to the first snowfall in the year the City assumes responsibility for UGA road maintenance. A street sweeper would be required in the first season when street sweeping is required after the City has assumed responsibility for road maintenance. A mower would also be required in the first season the City assumes maintenance responsibility for parks or landscaped areas in the UGA. The cost of equipment is based on a lease arrangement, at a rate of 4% across the useful lifetime of the vehicle. In addition, one FTE position would be required when the City assumes any road maintenance responsibility. That person would be shared between park and road maintenance. The MFSEP also identifies the need for a lean-to storage facility for the above-mentioned capital equipment needs. The water treatment plant is proposed as a location for capital equipment.

Parks and Recreation

Parks and Recreation impacts are identified in Chapter 3.13 of the Final EIS. The Upper Kittitas County Community Center non-profit organization would be responsible for operational costs of that facility and associated recreational facilities. Private park and recreation facility maintenance costs within the UGA could be funded by UGA homeowner association fees. Park and recreation facilities dedicated to the City would be operated and maintained by the City of Cle Elum.

General City Services

The General Services category of City costs includes all those functions of the City not related to permit/development review, law enforcement, fire service, public works, and parks and recreation. General City services includes City Hall, the Clerk/Treasurer, civil service, the cemetery fund, and other general functions. The higher concentration of permanent residential development under Alternative 5 would likely require greater initial expenditures for functions such as Treasury, Auditing, Clerk, auxiliary planning, and other general administrative functions supporting these and other departments, comparative to the other development alternatives. As part of the draft Conditions of Approval, Trendwest has agreed to fund a City Administrator. As the City of Cle Elum grows and economies of scale are realized, general services cost for future development could decrease.

Utilities

City of Cle Elum is developing a regional water supply system and a planning a regional wastewater treatment plant to serve the City, the UGA, the Town of South Cle Elum, and the MPR (refer to Section 3.16, Utilities, of the Final EIS for additional information). Trendwest Properties would contribute to funding for construction costs of the water and wastewater treatment facilities, in addition to providing a site on its property within the UGA for the water treatment facility. The City and Trendwest entered into a Water Supply System Project Development Agreement on June 2001. The agreement on the regional wastewater project is not yet finalized; construction costs would be prorated among parties in a yet undetermined manner (Telephone interview with Mike Moyer, 1999). Specific revenue estimates resulting from the utility agreements have not been estimated.

Cle Elum-Roslyn School District #404

The Cle Elum-Roslyn School District #404 would provide K-12 education to the full-time residents of the UGA and families that migrated to the school district. Fiscal impacts to School District #404 would occur in two expense/revenue categories: O&M and capital. Subsequent to publication of the Draft EIS, the School District issued the *Cle Elum-Roslyn School District Capital Facilities Plan, 2001-2020* (March 26, 2001). Information from this plan has been used to update and expand both the impact analysis for Alternative 5 and the cumulative impact analysis for the UGA and MPR, below.

Operation and Maintenance

O&M is best characterized as annual, non-capital costs for instruction, materials, and upkeep of existing facilities. Net impact projections for this category reflect local costs only. According to School District #404, approximately 85% of all non-capital facility and vehicle expenditures are covered by redistributed funds from the state. As such, a local school district proportion of 15% was applied to all future enrollment-driven O&M costs.

One-time revenues attributed to ongoing operations include the timber excise tax from the clearing of various parcels within the UGA. Revenues would be limited to $2,000 to $3,000 in Project Years 1 through 3, depending on alternative. Sources of recurring revenues would include the school district O&M levy in addition to distributions from the State of Washington, as discussed previously.

Table 3.18-2 provides a summary of local O&M cost impacts from projected enrollment increases over the 30-year buildout period. Specific enrollment numbers are summarized in Appendix D and Section 3.15, Public Services, of the Final EIS.

Table 3.18-2: Cle Elum-Roslyn School District #404 Revenue and Cost Summary, Cle Elum UGA, Alternative 5 (thousands of constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	Total, All Years
Alternative 5						
Total Local Revenues[1]	$19	$364	$807	$1,402	$2,349	$33,967
Total Local Costs (15%)[2]	$41	$312	$383	$489	$540	$12,439
Recurring Costs	$41	$312	$383	$489	$540	$12,439
Net Fiscal Impact[3]	($24)	($67)	$202	$479	$1,008	$10,902

1 Includes both O&M and bond levy revenues.
2 Cost estimates represent the 15% share of school cost not subsidized by the state of Washington.
3 O&M revenue less total local costs.
Note: Figures may not sum due to rounding.
Source: Johnson-Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan (2001).

In the early years of UGA development, School District #404 is projected to incur greater operation costs than revenues. This is because property taxes on UGA construction won't be received right away. Annually, shortfalls may be more severe under Alternative 5 than under the other development alternatives. In addition to delayed property tax revenues, services with

greater local choice and discretion (intramural programs, special education, etc.) are expected to significantly affect potential shortfalls. To the extent that the 15% local share of costs includes programs with greater local discretion such as special education, local costs may not increase at a constant proportion.

Beginning in Project Year 7, the School District is projected to have fiscal surpluses. Although enrollment impacts would be greatest with Alternative 5, residential development and associated property value is projected to significantly outweigh local operations costs after Project Year 6. Average annual net revenues are projected to grow to $1 million in Project Year 30.

Many factors could affect revenue projections either positively or negatively. For the fiscal analysis, projected positive net revenues are contingent upon the assumption of constant proportional increases in annual expenditures as mentioned above. Furthermore, voter approval of all O&M and bond fund levies is crucial to revenue potential. By State of Washington law, school levies and bond measures can only be passed by a supermajority vote of at least 60%. Failure to approve either would result in adverse fiscal impacts. Other factors affecting net revenues could include service or capital deficiencies and levy rates reduced at a greater rate than estimated.

Capital Expenses and Revenues

Capital facility and vehicle impacts would take the form of new school space for UGA-induced enrollment and new school buses for those students.

School District #404 would incur capital expense for new school space and buses as a result of increased enrollment generated by population increases in the UGA. While buses would be required as enrollment increases, new school construction would not necessarily be immediate due to the likely use of portable classrooms in the short term. According to the *Cle Elum-Roslyn School District Capital Facilities Plan, 2001-2020*, portables most likely would be purchased and used to house pupils through Project Year 7. Trendwest would pay a percentage of the cost of new portable classrooms, as agreed to with the School District (see Section 3.18.3, Mitigation Measures). Table 3.18-3 summarizes potential portable classroom expenses due to UGA development under Alternatives 5 through Project Year 7.

Table 3.18-3: Potential Portable Classroom Costs for the Cle Elum UGA, Alternative 5

Cle Elum UGA Alternative	Year 7 UGA Enrollment[1]	Pupils per Classroom[2]	Portables Required	Total Cost (Local)[3]
Alternative 5				
Elementary (K-5)	260	17	7 dbl, 1 sgl	$933,849
Middle School (6-8)	156	21	3 dbl, 1 sgl	$444,765
High School (9-12)	187	22	3 dbl	$366,813
Total				1,745,427

1 Reflects projected UGA-induced enrollment by Year 7.
2 Includes space for special programs, as required by the School District Capital Facilities Plan.
3 The State of Washington does not match school district expenses for portable classrooms.
Source: Johnson-Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan, 2001.

Over the long term, portable classrooms would not be sufficient for housing enrollment growth due to UGA development. The Cle Elum-Roslyn School District would require new, permanent school space as required by its capital facilities expansion plan. Table 3.18-4 provides a summary of potential classroom space costs due to UGA development under Alternative 5 at Project Year 30. Classroom space costs are a function of enrollment in excess of current District #404 capacity, as determined in Appendix D and *Cle Elum-Roslyn School District Capital Facilities Plan, 2001-2020* (Cle Elum-Roslyn School District #404 2001).

Table 3.18-4: Potential Classroom Construction Costs for the Cle Elum UGA, Alternatives 5

Cle Elum UGA Alternative	Year 30 UGA Enrollment[1]	Square Feet Allocation[2]	State Cost[3]	Local Cost
Alternative 5				
Elementary (K-5)	394	43,340	$1,124,228	$6,786,494
Middle School (6-8)	236	31,725	$929,392	$5,928,375
High School (9-12)	284	41,180	$1,209,421	$8,940,615
Total			3,263,041	21,655,484

1 Reflects projected UGA-induced enrollment by Year 30.
2 Elementary, middle school, and high school require 110 sq. ft., 135 sq. ft., and 145 sq. ft. per pupil, respectively.
3 State matching dollars are estimated at $26 per sq. ft., $29 per sq. ft., and $29 per sq. ft. for elementary, middle school, and high school space, respectively.
Source: Johnson-Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan, 2001.

Development under Alternative 5 is estimated to have the greatest potential classroom cost among the alternatives, reflecting the greatest number of residential units. New school construction costs not matched by state funds could reach as much as $21.7 million to house all pupils residing within the UGA by Project Year 30.

Table 3.18-5 provides a summary of potential school bus costs resulting from UGA development under Alternative 5. Bus costs would be a function of enrollment in excess of current District #404 enrollment, as analyzed in Appendix D.

Table 3.18-5: Potential New Bus Costs for the Cle Elum UGA, Alternative 5, Project Year 30

Cle Elum UGA Alternative	UGA Elementary Enrollment, Year 30	New Buses Needed	Total Cost[1]
Alternative 5	394	4	$380,000

1 Cost for each new bus is projected as $95,000 (Cle Elum-Roslyn School District #404, 2001)
Source: Johnson-Gardner 2001

The timing of vehicle purchases would largely depend upon when enrollment is actually realized. The above figures could vary depending upon the extent of additional enrollment from families new to the area. However, initial bus expenses would likely be required in Project Year 2 for

Alternative 5, the same as projected for the other alternatives. By Year 4, a second bus could be needed.

Capital costs would be paid by voter-approved bond obligations. With voter approval, School District #404 has the ability to issue a bond obligation and/or seek a capital fund levy for future capital expenses. However, capacity for a new bond measure is somewhat constrained by the current School District bond obligation scheduled for full repayment in 12 years (the 1999 District O&M levy of $1.272 per $1,000 of assessed value and the 1999 bond fund levy rate of $1.1836 per $1,000 of assessed value). Without causing current residents to pay a higher combined tax rate to School District #404, new bond capacity would be created as the existing bond levy rate declines with growth in UGA-assessed value. Assuming the 1999/2000 bond levy rate as an effective cap, Table 3.18-6 below illustrates projected annual new bond capacity for Alternative 5 for Project Years 5 through 30.

Table 3.18-6: Projected New Bond Capacity from the Cle Elum UGA, Alternative 5

	Year 5	Year 10	Year 15	Year 20	Year 30
Alternative 5					
Excess Rate Capacity [1]	0.2016	0.3541	1.1836	1.1836	1.1836
x Total Assessed Value (000s) [2]	$792,636	$940,072	$1,081,762	$1,246,932	$1,671,333
= Excess Bond Revenue Capacity (000s)	$160	$333	$866	$998	$1,338
+ Excess M&O Revenue Capacity	$0	$202	$326	$479	$1008
= Maximum Bond Capacity (000s)	$160	$535	$1,192	$1,477	$2,346

1 Defined as the current, 2000 levy rate of $1.1836 less the projected levy rate in the respective year of UGA development.
2 The sum of current School District assessed value and annual assessed value of UGA development.
Source: Johnson-Gardner 2001

Analysis of Alternative 5 indicates that by Project Year 12, School District #404 would likely have the capacity to acquire one-half of total new school space and all new buses needed for the entire 30-year buildout period (Johnson Gardner 2001).

Decreases in bond levy rates could also be more gradual or accelerated, depending on levels of true growth outside the UGA, budget decisions by the School District, and voter sentiment. This analysis assumes bond levies would be approved by voters when necessary. Rejection of a new bond measure would adversely affect the School District's ability to acquire needed school space and buses. Furthermore, new bond capacity projections do not reflect potential indirect or other growth within the School District (considered too speculative to accurately project). Growth will undoubtedly occur, and as it does, projections in Table 3.18-7 understate new bond capacity for the School District. The School District has expressed interest in implementing impact fees to offset potential school construction costs, however this is not presently a School District policy.

Kittitas County Hospital District No. 2

Emergency medical response in Upper Kittitas County is under the primary jurisdiction of Kittitas County Hospital District No. 2, which provides paramedic and ambulance service.

Hospital District No. 2 participates in a mutual aid agreement with regional fire jurisdictions for emergency medical service.

Hospital District No. 2 would receive recurring revenues through its general and EMS property tax levies. Additional revenues would be received through patient fees. Incurred costs would include personnel, O&M, and capital outlays, such as ambulances. All projected costs are expressed as recurring, including annual contributions to capital funds for additional or replacement ambulances.

Table 3.18-7 provides a summary of projected Hospital District No. 2 tax revenues and costs for Alternative 5 over the 30-year buildout period. Revenues for the Hospital District come from a regular property tax levy, a special option EMS property tax levy and patient service fees. Alternatively, costs are attributed to personnel, O&M, and capital expenditures. Hospital District No. 2 is projected to incur costs in excess of revenues for nine years under Alternative 5. Average annual shortfalls are estimated to reach $50,000 to $60,000. Thereafter, Hospital District No. 2 revenues are projected to exceed service costs.

Table 3.18-7: Kittitas County Hospital District No. 2, Revenue and Cost Summary, Cle Elum UGA, Alternative 5 (in Thousands of Constant 2000 Dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	Total, All Years
Alternative 5						
Total Revenues	$3	$86	$169	$323	$570	$7,842
Total Costs	$64	$148	$169	$202	$218	$5,422
Recurring Costs	$64	$148	$169	$202	$218	$5,422
Net Fiscal Impact	($61)	($62)	$0	$121	$352	$2,420

Note: Figures may not sum due to rounding.
Source: Johnson-Gardner 2001

Initial costs in Project Year 1 would represent an 8% increase in total 1999 Hospital District costs of approximately $833,000. Personnel expenditures are projected to comprise 90 to 95% of annual Hospital District costs under Alternative 5, similarly to the other alternatives.

Based on current service ratios for paramedics and emergency medical technicians (EMTs), Alternative 5 would require two additional paramedics and one EMT by Project Year 5. By Project Year 30, three paramedics and two EMTs would be required. Personnel impacts under Alternative 5 are similar to those projected for the other development alternatives. The District has identified an additional ambulance as a capital equipment need. EMS calls attributable to UGA development routed by KITTCOM would be monitored and subject to shortfall mitigation payments by Trendwest.

Kittitas County Communications Center

KITTCOM is the sole provider of "911" emergency telephone services and dispatch for Kittitas County. KITTCOM would provide dispatch service for the City of Cle Elum Police and Fire

Departments, and Hospital District No. 2. The fiscal analysis assumes that KITTCOM would continue to be the sole service provider over the 30-year buildout period.

KITTCOM revenues fall into two recurring categories: fees billed to emergency service jurisdictions (subscribers) on a per-call basis and monthly excise taxes on all telephone lines in the County. Revenues from subscriber fees are dedicated solely to KITTCOM operations expenditures, including personnel. Revenues from telephone tax are applied toward capital equipment expenditures. KITTCOM also receives grants from various sources to fund operations or equipment upgrades as necessary. The grant process is independent of normal revenue mechanisms (it is not generated by growth within the county). Incurred costs would include personnel and O&M.

The Draft EIS discussed KITTCOM as a separate public service agency and projected deficits throughout the 30-year buildout period. In reality, costs to KITTCOM would be mitigated through the structure of its revenue acquisition. It is anticipated that the subscriber fees will be set to cover costs not covered through the telephone surcharge or grant monies. Subscriber fees (per-call basis) will be billed to affected public service providers (City of Cle Elum and Hospital District No. 2). Charges attributable to UGA development will be included in the shortfall monitoring and shortfall payment agreements between Trendwest and the City of Cle Elum and Trendwest and Hospital District No. 2.

Net Fiscal Impact Summary

Table 3.18-8 provides a summary of estimated average annual net fiscal impacts for primary service jurisdictions.

Table 3.18-8: Net Fiscal Impact Summary Cle Elum UGA, Alternative 5 (average annual constant 2000 dollars)

Jurisdiction	Net Fiscal Summary, Alternative 5
City of Cle Elum[1]	($50,000) - ($60,000)
City of Cle Elum[2]	$400,000 - $500,000
School District #404[3]	($80,000) - ($90,000)
School District #404[4]	$400,000 - $500,000
Hospital District 2[5]	($50,000) - ($60,000)
Hospital District 2[6]	$100,000 - $150,000

Note: Net deficits reported in Table 3.18-9 illustrate potential impacts if there were no mitigation agreements between Trendwest and public service providers.

1 Figures represent net deficits in Years 1-11 for Alternative 5.
2 Figures represent net surplus in non-deficit years for Alternative 5.
3 Figures represent net deficits in Years 1-6 for Alternative 5 assuming the School District modifies the O&M levy to capture excess bond levy capacity (see discussion under Cumulative Impacts, below).
4 Figures represent positive net revenues excluding bond levy revenue and uncertain capital facilities costs.
5 Figures represent net deficits in Years 1-9 for Alternative 5.
6 Represents average annual surplus in non-deficit years for Alternative 5.

Source: Johnson-Gardner 2001

Indirect

This section assesses potential indirect fiscal impacts to adjacent jurisdictions with the development of the Cle Elum UGA. Potential revenues were estimated based on tourist and resident expenditure patterns within Washington State. Individual city shares are "weighted" based on the distribution of area food stores, restaurants, etc. Potential impacts on services including public works, law enforcement, and emergency medical cannot be reliably estimated and, as such, are discussed qualitatively.

City of Roslyn

Sources of revenues to the City of Roslyn under all alternatives would consist primarily of sales tax on offsite expenditures by UGA residents and visitors. Sources of sales tax would include food and drink, recreation, and retail sales.

Annual sales tax revenues under Alternative 5 are expected to average between $4,000 and $5,000 across the entire 30-year build-out. During the initial five-year construction phase, revenues are expected to be in the $3,000 to $4,000 range annually. Alternative 5 would generate the lowest sales tax revenues, as compared to the other development alternatives, due to the absence of tourist facilities proposed for the UGA. Additional indirect revenue sources not quantified would be associated with sales, property, and REET taxes on purchase or construction of homes.

Indirect service costs to the City of Roslyn would include those associated with visitor traffic by residents at the UGA. This would include primarily road and park maintenance, and potential fire service (mutual aid). Increased police service costs would likely occur, which would be answered by the joint City of Cle Elum-Roslyn Police Department. The City of Roslyn has expressed concern that growth within the Cle Elum UGA may induce a need for Roslyn to expand existing capital facilities. The RIDGE Settlement Agreement provides for assistance to the City of Roslyn in funding any needed capital facilities costs as a result of development (see Section 3.18.3, Mitigation Measures).

Direct and indirect revenues, predominantly sales tax on purchases by UGA residents and construction-related trips in Roslyn, are expected to offset additional non-capital facilities costs. Accordingly, it is anticipated that the City of Roslyn would experience either positive or neutral net fiscal impacts as a result of development of the UGA and Roslyn's mitigation agreement with Trendwest.

Town of South Cle Elum

Potential indirect revenues and service costs for the Town of South Cle Elum under Alternative 5, as under Alternatives 2, 3 and 4, are anticipated to be minor and have not been quantified. South Cle Elum is primarily a residential community. Therefore, its character and proximity to the City of Cle Elum would likely limit its attraction for visitor trips and offsite expenditures from the UGA. Similar to the City of Roslyn, South Cle Elum could receive indirect revenues associated with the purchase or construction of homes associated with employment and/or induced growth.

Service costs would likely be limited, given that South Cle Elum contracts with Cle Elum for police services. Emergency fire service may be indirectly affected through mutual aid incidence. However, the regional mutual aid agreement would guide such incidences and outlines a procedure for cost reimbursement. It is not expected that the Town of South Cle Elum would experience any net negative fiscal impacts.

City of Ellensburg

Sources of revenue to the City of Ellensburg under all project alternatives would be similar to those described for the City of Roslyn in that they would consist primarily of sales tax on offsite expenditures by UGA residents and visitors. Annual average revenues under Alternative 5 are projected to range between $40,000 and $50,000 over the 30-year buildout period.

Types of indirect service costs for the City of Ellensburg under Alternative 5 would also be similar to those described for the City of Roslyn. The City's relative distance from the UGA would likely limit the scope and scale of incidental costs. It is expected that the City of Ellensburg would experience positive or neutral net fiscal impacts during the UGA buildout period and that average annual city revenues would offset any indirect public service costs.

Hospital District No. 1

Kittitas County Hospital District No. 1, which operates the Kittitas Valley Community Hospital in Ellensburg, would provide emergency medical and hospital services to UGA residents and employees. However, potential visits are not expected to result in significant impacts to the Hospital District. Because there is no reliable method available to estimate UGA-related service demands and costs for the Hospital District, a quantified analysis was not conducted. The Hospital District would not receive direct tax revenue under any of the alternatives.

Kittitas County Fire District No. 7

Net fiscal impacts to Fire District No. 7 are expected to be negligible. Indirect impacts would likely be limited to mutual aid fire response calls. Costs associated with these calls could be retrieved through the fee structure for the Upper County mutual aid agreement.

Cumulative

The concurrent construction of the Reduced Density MPR and Cle Elum UGA would result in cumulative impacts to the public service jurisdictions included in the fiscal analysis. Cumulative net fiscal impacts reflect the annual sum of revenues and public service costs for the Reduced Density MPR, based on proportionate reductions in impacts summarized in the MountainStar MPR EIS (Kittitas County 2000), and fiscal impacts on public service providers as described for the UGA under Alternative 5. Cumulative impact estimates assume that the MPR and the UGA would be constructed concurrently.

Development of the MPR in conjunction with the Cle Elum UGA under all alternatives would result in a permanently enhanced tax base (e.g., retail sales and property tax). Potential average annual net revenues for the State of Washington, Kittitas County, City of Cle Elum, and School

District #404 would increase substantially. Additional property tax revenues associated with the MPR would greatly reduce the amount of patient fee revenues needed to eliminate potential net fiscal shortfalls identified for Hospital District No. 2.

In general, trends identified for one-time and recurring revenues and costs would hold true for cumulative impacts as well, albeit at a greater magnitude. The majority of early revenues to the state, County, and City would comprise one-time development fees and receipts on construction contracts. Recurring revenues, primarily comprising sales tax and property tax receipts, would continue to increase over the buildout period. Fiscal shortfalls, as experienced during the initial construction years, would result primarily from service demands exceeding initial revenue inflow from property taxes (i.e., the two-year lag time between assessment and receipt of revenues). Recurring costs associated primarily with personnel and as-needed capital facility purchases, would also continue to increase over the buildout period. A detailed breakdown of cumulative fiscal impacts for each jurisdiction at Project Years 1, 5, 10, 20, and 30 is included in Appendix D.

Table 3.18-9 identifies cumulative average annual net fiscal impacts for the primary service jurisdictions.

Table 3.18-9: Cumulative Net Fiscal Impact Summary, MPR and Cle Elum UGA, Alternative 5 (average annual constant 2000 dollars)

Jurisdiction	Net Fiscal Summary, MPR and UGA (Alternative 5)
City of Cle Elum[1]	($40,000) - ($50,000)
City of Cle Elum[2]	$400,000 - $500,000
School District #404[3]	($100,000) - ($125,000)
School District #404[4]	$1.5 - $2.0 million
Hospital District 2[5]	($100,000) - ($125,000)
Hospital District 2[6]	$450,000 - $500,000

Note: Net deficits reported in Table 3.18-10 illustrate potential impacts if there were no mitigation agreements between Trendwest and public service providers.

1 Figures represent cumulative net deficits through Year 7.
2 Figures represent cumulative average annual surplus in non-deficit years.
3 Figures represent cumulative net deficits in Years 1-4.
4 Figures represent cumulative positive net operating revenues, which exclude bond levy revenue and capital facilities costs.
5 Figures represent cumulative net deficits in Years 1-7.
6 Figures represent cumulative average annual surplus in non-deficit years.

Source: Johnson-Gardner 2001

State of Washington

Shortfall

No shortfalls are projected.

Tax Revenue Shift

Residential and tourist development in the MPR and Cle Elum UGA would result in a shift in some state tax revenue generation to Kittitas County from other areas in Washington State. This would likely be true of state retail sales tax revenues over time. Two primary sources would include the permanent relocation of some residents of the Puget Sound region to Upper Kittitas County, and the shift of in-state tourist spending from other areas to the Upper County region. Net new state retail sales tax revenues would be limited largely to visitors and new residents to the area and net increases in tourist traffic from within the state.

Decreasing State Property Tax Levy Rate

An effective increase in total tax revenue for the state levy would occur, coinciding with consistently decreasing levy rates for individual residential tax bills.

Increased State Regulatory Services

The conversion of selected parcels of undeveloped forest land to high-density residential and tourist development would require a permanently greater state regulatory presence and expenditure.

Net Cumulative Impact

Net surpluses are expected to start in the range of $3 million to $3.5 million in Year 1 and grow to between $13 million and $13.5 million in Year 30, for an average annual net surplus of $11to $11.5 million (Appendix D).

Kittitas County

Shortfall

No shortfalls are projected.

Decreasing Property Tax Levy Rates

An effective increase in total tax revenue for the County general and road levies would occur, coinciding with consistently decreasing levy rates for individual residential tax bills.

Increased Upper County Service Needs

Service needs for the Upper County would increase. Impacts could include accelerated addition of county satellite offices in the Upper County.

Net Cumulative Impact

Net surpluses are expected to be approximately $194,000 in Year 1 and grow to $3.1 million in Year 30. Average annual net revenue would be approximately $2 million dollars. (Appendix D).

City of Cle Elum

Shortfalls

Shortfalls are projected for the first seven years under construction of both projects, as compared to 11 years for construction of the UGA only.

Increased Service Needs

Development of the MPR in conjunction with the Cle Elum UGA would potentially contribute to increased service demands from additional population. This could affect various city departments, including those involved in general administrative functions, emergency service provision, and public works. The City of Cle Elum-Roslyn Police Department would also respond to calls for Roslyn.

Increased Economies of Scale

Combined development would result in the City of Cle Elum providing more services than those provided historically. As a result, with the near doubling of the city population, economies of scale in service provision may be achieved as growth occurs and pushes individual costs per resident downward.

Net Impacts

Cumulative development is projected to cause shortfalls through Year 7 averaging around $50,000 annually, to be mitigated by shortfall payments. The City is projected to receive net surpluses in the range of $10,00-$20,000 in Year 8, increasing to roughly $1 - $1.5 million by Year 30. For all years, Alternative 5 is projected to generate the greatest positive net cumulative impact to the City of Cle Elum from all development alternatives with an annual average of between $300,000 and $350,000. (Appendix D).

Cle Elum-Roslyn School District #404

Shortfalls

Shortfalls are projected for four years under construction of both projects, as compared to six years for construction of the UGA only.

Decreased Residential Share of Revenues

The tax burden of full-time residential property owners within School District #404 would likely decrease given that commercial and non-primary residential property would not generate enrollment but would generate tax revenues.

Declining Levy Rates

The cumulative increase in development, particularly commercial and non-primary residential property, would significantly increase the School District's assessed value, thus potentially decreasing levy rates over the project construction period.

Permanent Expense Increases

Development would permanently increase enrollment and associated personnel and facility costs.

Capital Expenses

Cumulative enrollment from residences in the MPR and within the Cle Elum UGA would likely be of significant magnitude to necessitate the purchase of portable classrooms, construction of additional school space and the acquisition of buses. While buses would be required as enrollment increases, new school construction would not necessarily be immediate due to the likely use of portable classrooms in the short term. According to *Cle Elum-Roslyn School District Capital Facilities Plan, 2001-2020*, portables most likely would be purchased and used to house pupils through Project Year 7. Trendwest would pay a percentage of the cost of new portable classrooms, as agreed to with the School District (see Section 3.18.3, Mitigation Measures). Table 3.18-10 summarizes potential portable classroom expenses due to combined MountainStar MPR and UGA development through Project Year 7. Enrollment impacts generated by the MPR and UGA would result as much as $2.0 million in portable classroom costs.

Table 3.18-10: Potential Portable Classroom Costs for MountainStar MPR and the Cle Elum UGA, Alternative 5

Cle Elum UGA Alternative	Year 7 UGA and MPR Enrollment[1]	Pupils per Classroom[2]	Portables Required	Total Cost (Local)[3]
Alternative 5				
Elementary (K-5)	272	17	8 dbl	$978,168
Middle School (6-8)	163	21	4 dbl	$489,084
High School (9-12)	196	22	3 dbl	$366,813
Total				$1,834,065

1 Reflects projected UGA and MPR induced enrollment by Year 7.
2 Includes space for special programs, as required by School District capital facilities expansion plans.
3 The State of Washington does not match school district expenses for portable classrooms.
Source: Johnson-Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan.

Over the long term, School District #404 would require new, permanent school space consistent with that identified in the Capital Facilities Plan. Table 3.18-11 provides a summary of potential classroom space costs due to MPR and UGA development at Project Year 30. Classroom space costs are a function of enrollment in excess of current District #404 capacity, as discussed in Appendix D. Combined development of the MPR and the UGA would generate the greatest new school construction costs for School District #404. Local costs (those construction costs not reimbursed by the state of Washington) could reach as much as $23.3 million by Project Year 30.

Table 3.18-11: Potential Classroom Construction Costs for MountainStar MPR and Cle Elum UGA Enrollment, Alternative 5

Cle Elum UGA Alternative	Year 30 UGA and MPR Enrollment[1]	Square Feet Allocation[2]	State Cost[3]	Local Cost
Alternative 5				
Elementary (K-5)	424	46,555	$1,210,438	$7,306,904
Middle School (6-8)	254	34,506	$1,000,661	$6,382,982
High School (9-12)	306	44,902	$1,302,163	$9,626,210
Total			3,513,262	23,316,096

1 Reflects projected MPR and UGA induced enrollment by Year 30.
2 Elementary, middle school, and high school require 110 sq. ft., 135 sq. ft., and 145 sq. ft. per pupil, respectively.
3 State matching dollars are estimated at $26 per sq. ft., $29 per sq. ft., and $29 per sq. ft. for elementary, middle school, and high school space, respectively.
Source: Johnson-Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan.

Table 3.18-12 provides a summary of potential school bus costs due to combined MPR and UGA development. Bus costs are a function of MPR and UGA induced enrollment, as discussed in Appendix D.

Table 3.18-12: Potential New Bus Costs, MPR and Cle Elum UGA, Alternative 5

Cle Elum UGA Alternative	UGA and MPR Year 30 Elementary Enrollment[1]	New Buses Needed	Total Cost[2]
Alternative 5	424	4	$380,000

1 Cost for each new bus is projected as $95,000 (Cle Elum-Roslyn School District #404, 2001)
Source: Johnson-Gardner 2001

The timing of vehicle purchases would largely depend upon when enrollment is actually realized. However, it is likely that the School District would require half of all needed buses within the first 10 years of construction. The above figures could vary depending upon the extent of additional enrollment from families new to the area.

Enrollment impacts from in-migration of MPR and UGA construction and operational employees would also occur.

New Bond Capacity

Joint development of the MPR and UGA would further increase School District #404 assessed value, thus pushing current bond obligation levy rates down faster than expressed for non-cumulative School District fiscal impacts. The result would be a faster, larger, new bond capacity for School District #404 to build new school space and acquire needed buses. By Project Year 8, the School District would have new bond capacity to construct one-half of the 30-year space needs and all needed buses (Johnson Gardner 2001). Ultimately, however, new capacity and the ability to issue bonds will depend upon local voter approval.

Hospital District No. 2

Shortfalls

The duration of shortfalls for the Hospital District is projected to decrease from nine years to seven years with construction of both the MPR and the UGA developments.

Decreased Residential Share of Revenues

The tax burden of full-time residential property owners within Hospital District No. 2 would likely decrease as a result of the increased assessed valuation in the district.

Declining Levy Rates

The cumulative increase in development, particularly commercial and non-primary residential property, could further decrease levy rates.

Permanent Expense Increases

Combined development would permanently increase emergency incidences and personnel costs. Greater per-call subscriber fees to KITTCOM generated by Trendwest development would be categorized as Trendwest-induced costs, thus subject to the shortfall mitigation agreement.

Bond Issues

There would be a greater probability of issuing bonds to cover future capital improvements needed for medical service. The discussed increase in the property tax base could facilitate the enhancement of existing and future facilities. Existing local share of such bond levy burden would be reduced with the addition of commercial and non-primary residential property planned for the MPR and the Cle Elum UGA in the medium to long term.

KITTCOM

Shortfalls

No shortfalls are projected. A new billing agreement between the City of Cle Elum and KITTCOM will increase revenues. Subscriber fees will be set to fill the gap between service costs and grant and tax revenues. UGA-generated subscriber fees will be categories as UGA-induced costs, subject to fiscal monitoring and shortfall mitigation agreements between Trendwest and appropriate public service jurisdictions. New subscriber fees as a result of the agreement have not been estimated at this time.

Emergency Calls and Costs

The cumulative increase in emergency calls would generate additional costs for staff and equipment. As part of MPR approval, Trendwest has agreed to fund a dispatcher according to a pre-agreed schedule as Trendwest residential development generates emergency service calls.

Enhanced Facility in Upper County

Cumulative development between the MPR, Cle Elum UGA, and inherent regional growth would likely accelerate the need for an enhanced KITTCOM facility in the Upper County. Trendwest has agreed to the location of a radio-tower onsite at the MPR.

Town of South Cle Elum, City of Roslyn, City of Ellensburg

The cities of Roslyn and Ellensburg could receive significant additional revenues impacts through retail sales tax on visitor and occupant expenditures and additional incidental impacts from offsite trips by MPR visitors and UGA residents.

The City of Roslyn anticipates that it would incur capital facilities expansion costs as a result of cumulative Trendwest development. The RIDGE Settlement Agreement provides funds to the City of Roslyn to mitigate possible capital facilities expenses so induced.

Cumulative annual revenues to the cities of Roslyn and Ellensburg are projected to be significant under development of Alternative 5. Due to the absence of tourist facilities under Alternative 5, spending in offsite communities would be lower annually due to lower average daily spending by permanent residents compared to tourists.

Visitor trips to the Town of South Cle Elum are anticipated to be significantly lower than that of the City of Roslyn or Ellensburg, and the Town would likely only receive incidental revenues and service costs. Revenues and costs are expected to be minor and cannot be reliably estimated at this time.

3.18.3 Mitigation Measures

Mitigation agreements have been negotiated in principle between Trendwest and primary service jurisdiction including the City of Cle Elum, Cle Elum-Roslyn School District #404, and Kittitas County Hospital District No. 2. Additional agreements associated primarily with development of the MPR that would apply to potential cumulative impacts have been negotiated with Kittitas County, Fire District No. 7, and KITTCOM. Provisions in the RIDGE Settlement Agreement provide mitigation to the City of Roslyn.

Mitigation agreements provide specific guidelines for identifying shortfalls by monitoring costs and revenue flows. The agreements outline Trendwest's funding responsibilities for expected or identified shortfalls, which may include personnel, O&M, and capital facilities costs as negotiated by the respective jurisdictions. Shortfall mitigation payments are used to address identified fiscal impacts as appropriate.

Mitigation measures identified below address potential fiscal impacts identified in the analysis and summarize key provisions outlined in negotiated mitigation agreements.

City of Cle Elum

Subject to the Pre-Annexation Agreement between the City of Cle Elum and Trendwest Properties, the proposed UGA development is not permitted to cause existing citizens and ratepayers to suffer negative financial impacts as a result of dealing with Trendwest development activities within the UGA. As such, Trendwest and the City would execute a fiscal mitigation/shortfall agreement, consistent with the Conditions of Approval for the project, that accurately tracks projected revenues and expenses from UGA development.

- A Municipal Facilities and Services Expansion Plan would guide necessary capital and services expansion for the City regarding future UGA development.
- Monitoring of fiscal costs and revenues would occur to identify timing of costs relative to Trendwest-related revenue inflow in order to determine shortfall mitigation payments.
- Trendwest would pay for its share of planning and construction of water and wastewater treatment plants.
- Trendwest would pay for all reasonable staff and consultant fees related to City review and processing of development permits including those items in the Conditions of Approval.
- A process for coordination between MPR security forces and Cle Elum-Roslyn police and Cle Elum fire service provision would be determined.

City of Roslyn

Consistent with the Settlement Agreement between the applicant and RIDGE, mitigation provisions for potential fiscal impacts would include the following:

- Trendwest would donate an agreed-to total dollar amount in annual increments for four years beginning upon the first anniversary of the recording of the first final plat for the MPR.
- The funds shall be used by Roslyn for capital improvements, which shall be selected by the City of Roslyn based on the results of a Trendwest-funded survey of Roslyn citizens and business owners.
- RIDGE and Trendwest shall mutually determine the content and methodology for such a survey, the analysis of the survey, and interpretation of the results.

Cle Elum-Roslyn School District #404

The applicant would work with the District through a mutually agreed-to mitigation agreement until Trendwest-related cumulative development reaches an agreed-to assessed value ceiling. The agreement provides for, in part:

- A 25 acre site to be granted to the School District;
- A detailed student survey mechanism to count Trendwest development-related enrollment in order to determine necessary mitigation response;
- A payment-matching system for portable classrooms and buses until the Trendwest residential development reaches the pre-agreed-to assessed value ceiling.

Kittitas County Hospital District No. 2

The following criteria would be used to negotiate a final mitigation agreement:

- Hospital District No. 2 will track property tax revenues and patient fees attributable to MPR and UGA development, as well as service costs due to dispatch calls to combined Trendwest development.
- To the extent that property tax revenues and patient fees, combined with a contribution already made by Trendwest to Hospital District No. 2, do not cover the calculated cost of service to Trendwest development, Trendwest will make monthly mitigation payments to avoid fiscal shortfalls.
- Capital expenses, most likely ambulance purchases, will either be leased or purchased with bonds.
- Capital costs will be included as part of operating expenses calculated for Trendwest development and will be subject to the monthly mitigation arrangement.
- Appropriate space will be provided for Hospital District No. 2 and necessary capital equipment at the proposed emergency services center to be funded by Trendwest.

Kittitas County Fire District No. 7

- Trendwest has agreed to fund a water tender for Fire District No. 7 to be dispatched by the Fire District to the UGA before water mains and hydrants are installed.
- Trendwest would encourage fire training and volunteer fire service among its employees for UGA fire coverage.

General

- RCW 82.02.060 authorizes counties, cities, and towns to adopt ordinances imposing impact fees on development activity as part of the financing for public facilities that are addressed by a capital facilities plan element of a comprehensive land use plan. Public facilities that qualify under RCW 82.02.090 include: public streets and roads, publicly owned parks, open space, and recreation facilities, school facilities, and fire protection facilities in jurisdictions that are not part of a fire district.

3.18.4 Significant Unavoidable Adverse Impacts

Temporary shortfalls due to a projected lag in revenues to cover initial costs are projected to occur. Mitigation agreements, however, would be put in place as a condition of any project approval with affected jurisdictions to address both specific and general fiscal impacts that may occur. Because it is impossible to predict absolutely what the fiscal impact to jurisdictions would be, a large component of proposed mitigation is fiscal monitoring to determine appropriate mitigation measures. No significant unavoidable adverse fiscal impacts are anticipated, based on the mitigation agreements.

Although indirect impacts are not quantified because incidental costs cannot be estimated, Appendix D of the Final EIS concludes that the City of Roslyn and the Town of South Cle Elum should experience no net negative fiscal impacts. Trips into the two communities would likely

result in surplus (or offsetting) sales tax revenues to Roslyn and trips to South Cle Elum are anticipated to be minor. The RIDGE Settlement Agreement would mitigate any adverse impacts to Roslyn capital facilities.

3.12 CULTURAL AND HISTORIC RESOURCES

This section identifies and describes known cultural resources within the UGA, evaluates potential impacts for Alternative 5 compared to Alternatives 2, 3, and 4, and identifies mitigation measures to limit those impacts. Potential impacts from the No Action Alternative are described in Section 3.13 of the Draft EIS. Information in this section is summarized from *A Land Use History of the Proposed MountainStar Resort: The Results of a Cultural Resource Survey along the Lower Cle Elum River* (Churchill and Griffin 1998). Properties surveyed in the report include the land within the Cle Elum UGA.

3.12.1 Affected Environment

Existing prehistoric, historic, and cultural resources within the Cle Elum UGA are described in Section 3.13, Cultural Resources, of the Draft EIS.

A total of six known prehistoric resources are located within the UGA and consist of four sites and two isolated finds. The Washington State Office of Archaeology and Historic Preservation (OAHP) has not determined the significance of these resources, which are located within areas proposed as undeveloped open space in the western portion of the UGA and designated as Reserve under Alternative 5. However, they are all potentially eligible for inclusion in the National Register of Historic Places under Criterion D on the basis of the site's ability to yield potential information about settlement and subsistence patterns that are significant to the understanding of regional prehistory (Churchill and Griffin 1999).

Seventeen historic resources are situated within the Cle Elum UGA, 14 of which are designated as refuse scatters associated with property boundaries, roadsides, and waterlines and dating from the mid-nineteenth to twentieth centuries. Potential subsurface components at these sites may be eligible for inclusion in the National Register of Historic Places (NRHP) under Criterion D.

The three historic resources that are not refuse scatters include the Cle Elum Chlorination Building, sections of the old Cle Elum waterline, and an isolated find. The Cle Elum Chlorination Building dates from 1906-1930 and is located in an area designated for residential development. Sections of the old Cle Elum waterline are historic-period waterlines that run along the western boundary of the Cle Elum UGA in Bullfrog Flats, pass underneath I-90, and re-emerge in the project area along its southern border. An additional unnamed waterline segment appears in the northeast portion of the Cle Elum UGA near Bullfrog Road and the transmission line corridor (Churchill and Griffin 1999). The isolated find consists of a single, complete aqua glass mason jar, which may be as old as 1858. The property owner curated the isolate, and no additional historic materials were associated with it (Churchill and Griffin 1999).

The possibility exists that an extant segment of the Yakama Trail is located within an area designated as undeveloped open space and, therefore, the area could have significance as a Traditional Cultural Property.

3.12.2 Impacts

Direct Construction

Potential construction-related impacts on historic and cultural resources under Alternative 5 would be lower than under Alternatives 2, 3, and 4. The majority of development is proposed in the northern two-thirds of the property, out of the geomorphic floodplain, and the area in the southern one-third of the property designated Reserve. As described above, the majority of prehistoric and historic sites/isolated finds are located in the undeveloped open space and Reserve area. Construction impacts would depend on the specific location of ground-disturbing activities with respect to the locations of known, and potentially undiscovered, prehistoric and historic cultural resources within the Cle Elum UGA. Impacts could include disturbance from excavation, increased pedestrian and vehicular traffic, compaction of sediments associated with project staging areas, erosion, illegal collecting, and spiritual diminution of possible Traditional Cultural Properties. Construction impacts on the Cle Elum Chlorination Building, which is located in an area of residential development, could include destruction of the structure and/or an alteration to the property's setting.

Direct Operation

The extent of the developed area and intensity of land uses proposed under Alternative 5 would result in a lower potential for operational impacts than under Alternatives 2, 3, and 4. However, similar to the other development alternatives, ongoing property maintenance, landscaping, road improvements, recreational activities, potential illegal collecting, and vehicular and pedestrian traffic could result in damage to existing cultural resources or the unearthing of additional unknown resources.

Indirect

Indirect impacts under Alternative 5 would be similar to those identified under Alternatives 2, 3, and 4. Population increases induced by development under Alternative 5 would lead to increased construction in the region, which would increase the possibility of impacts on cultural resources outside the Cle Elum UGA. Impacts would include deterioration of resources from erosion, loss of landscape integrity, trampling, and illegal collecting.

Cumulative

Cumulative impacts under Alternative 5 would be similar to Alternatives 2, 3, and 4. Development within the MPR and the Cle Elum UGA in conjunction with other planned regional growth would contribute to the cultural resource impacts of past land use activities, ongoing natural resource management, and future development in the surrounding area.

3.12.3 Mitigation Measures

Mitigation measures identified in Section 3.13.4 of the Draft EIS include subsurface assessments of the prehistoric and historic resources prior to land-disturbing activities, and significance

evaluation and determination of eligibility for listing in the NRHP by OAHP. If properties are determined to be significant, measures would be developed to protect them from ground-disturbing activities, such as the creation of buffer zones. If this is not feasible, professional archaeologists should recover data of the materials at these sites after consultation with OAHP and the Yakama Nation. An architectural description of the Cle Elum Chlorination Building should be provided to OAHP for evaluation and determination of the property's eligibility for listing in the NRHP.

Mitigation for potential impacts on historic and cultural resources outlined in the City of Cle Elum's draft Conditions of Approval includes:

- No measures that encourage access or discovery of significant cultural resource sites within the Cle Elum River undeveloped open space area will be permitted.
- Consistent with city code requirements, the City will give the Yakama Nation notice and opportunity to comment on all proposed preliminary plats, binding site plans, or building and grading permits on all lands within the cultural resource areas identified in *A Land Use History of the Proposed MountainStar Resort: The Results of a Cultural Resource Survey along the Lower Cle Elum River* (Churchill and Griffin 1998).
- Compliance with all applicable requirements of RCW 27.44, Indian Graves and Records, and RCW 27.53, Archaeological Sites and Resources, will be required.
- Contractors will be trained in the appropriate techniques for recognizing artifacts during construction activities and in the proper notification steps.

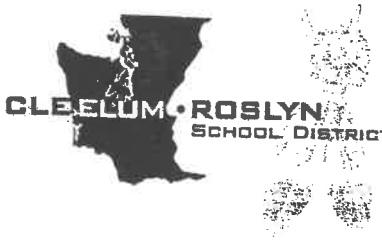
3.12.4 Significant Unavoidable Adverse Impacts

With the implementation of identified mitigation measures, no significant unavoidable adverse impacts on cultural and historic resources are anticipated.

4. Response to Comments



4.1 Public Comment Letters and Responses



received
4/24/2001

April 18, 2001

TO: Cle Elum City Council
Cle Elum Planning Commission

FROM: Evelyn Nelson, Superintendent
Cle Elum-Roslyn School District

RE: Cle Elum UGA Environmental Impact Statement (EIS)

The Cle Elum-Roslyn School District would like to take this opportunity to express concerns regarding the published EIS for the Cle Elum UGA. Upon reviewing the document we are left with a number of concerns. Those include:

1. Appendix H, Fiscal and Economic Impact Analysis, page 110 states, "The 25-acre land donation to the school by the applicant has been deemed adequate to accommodate such growth." Four major limitations to this statement include:

   a. Not all of the acreage is useable as required in state law (WAC 180-26-020) for a school site. (See diagram on page 2-5, main text) — 1

   b. The value of the parcel does not offset the local fiscal impact. The fiscal aspects of anticipated growth in student enrollment and subsequent housing are references on pages 3.19-15 and table 3.19-6. The information cites an 80% state match for construction costs. Those construction costs are also listed as $110.00 per square foot. These statistics do not match the school district's capital facilities plan data. The findings resulting from the school district's research on school facilities construction reveal a current state match of 30.73% of those items which the state will match or 13.23% of the total cost for constructing a new school. The current cost of construction is $182.58 per square foot for an elementary school, $214.96 per square foot for a middle school and $246.70 per square foot for a high school. — 2

   c. The cost for interim housing for students is borne totally by the local community; state matching funds are not available for such costs. — 3

   d. The total fiscal impact of space needs is estimated on page 114, Appendix H to be $1.5 million in excess of state matching funds. The — 4

Partnering with our community to create the future
2690 SR 903 Cle Elum, Washington 98922 509.649.2393 • Fax 509.649.2404

CLE ELUM • ROSLYN
SCHOOL DISTRICT NO. 404

school district's research indicates that the space needs will cost $25,647,114, of which $3,088,670 is state match and $22,558,444 is local responsibility. Eighty percent of these costs are the result of anticipated student enrollment from the Cle Elum UGA and MountainStar Resort. 4 (cont.)

2. School district concerns not addressed in the EIS include:

   a. Anticipated growth in student population will far exceed the district's current septic capacity. 5

   b. Anticipated growth in student population and expansion of facilities will cause an increase in water usage. Availability of water resources to meet these needs is a concern. Questions remain concerning the district's use of potable water as a source of irrigation. 6

   c. The current UGA boundary may create a fiscal impact to the school district if necessary services must be purchased from a neighboring municipality. 7

   d. Increased assessed valuation is seen in the EIS as a solution to local fiscal impacts. However, increased assessed valuations tend to follow the arrival of new students by a period of 2.5 to 3 years. How should the district offset the impact of interim housing needs during this time period? 8

   e. For a district to realize any increase in revenue from increased assessed valuation, it must first successfully validate and pass a levy or bond measure by a supermajority vote (60%). Thus, increased assessed valuation does not guarantee increased revenue. 9

The aforementioned limitations cause concern by school officials on behalf of the district, its children and the local community. Therefore, we strongly encourage county and city officials to support the district's position that a signed mitigation agreement must be in effect prior to issuance of any permits or approvals. 10

Evelyn Nelson

Evelyn Nelson
Superintendent and Secretary to the Board of Directors

Cc City of Roslyn

Partnering with our community to create the future
2690 SR 903 Cle Elum, Washington 98922 509.649.2393 • Fax 509.649.2404

Comment 1

Comment noted. Land for school mitigation would be required to meet state law (WAC 180-26-020). Since the Draft EIS was published, a mitigation agreement between Trendwest and the Cle Elum-Roslyn School District has been negotiated. The agreement includes dedicating a 25-acre site to the School District suitable for new construction. The donation would occur upon the recording of the first plat in either the MPR or the UGA. Refer to Section 3.18, Fiscal Conditions, of the Final EIS for additional information.

Comment 2

Comment noted. The analysis of potential enrollment-induced impacts on the School District, including capital facilities cost projections, has been revised to reflect the state of Washington capital facilities matching rate and school construction costs identified in the Cle Elum-Roslyn School District Capital Facilities Plan, which was published after the Draft EIS was issued. Refer to Section 3.18, Fiscal Conditions, and Appendix D of the Final EIS.

Comment 3

Comment noted. Section 3.18 of the Final EIS and Appendix D have been revised to reflect costs of single and double portable classrooms identified in the Cle Elum-Roslyn School District Capital Facilities Plan. Purchase of portable classrooms and Trendwest's fiscal responsibility are outlined in the mitigation agreement between Trendwest and the Cle Elum-Roslyn School District.

Comment 4

Refer to the responses to Comments 2 and 3, above.

Comment 5

The Cle Elum-Roslyn School District is included in the regional wastewater service area. The School District is included in flow projections for the regional wastewater treatment plant.

Comment 6

Comment noted. As part of the RIDGE Settlement Agreement, Trendwest has agreed to mitigate for increased water demands on the City of Roslyn. Updated language was added to Section 3.4 of the Final EIS.

Comment 7

Comment noted. Mitigation for potential fiscal impacts on the School District is outlined in the agreement between Trendwest and the School District. Refer to the responses to Comments 1, 2, and 3 above and to Section 3.18 and Appendix D of the Final EIS for updated analysis and discussion of impacts and mitigation.

Comment 8

Refer to the response to Comment 3, above.

Comment 9

Yes, local voters can reject a School District levy. However, inherent in the statement that the School District would operate throughout the project development period is the assumption that future revenue potential would include local bond funds and operations and maintenance (O&M) levies. This reflects the fact that the School District has historically been funded, at least in part, by such local levies. Section 3.18 of the Final EIS identifies any failure to pass these levies as potentially creating adverse fiscal impacts. The mitigation agreement between Trendwest and the School District mitigates for potential shortfalls in revenue necessary for capital facilities construction only.

Comment 10

Comment noted. Since the Draft EIS was published, a mitigation agreement between Trendwest and the School District has been negotiated.





Kittitas County Solid Waste Programs
925 Industrial Way, Ellensburg, WA 98926
Telephone: (509) 962-7070 Fax: (509) 962-7087

April 17, 2001

Mr. Brian Carrico, Planner
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

RE: Solid Waste Comment on the Draft EIS for the City of Cle Elum Bullfrog UGA

Dear Mr. Carrico:

Kittitas County Solid Waste staff reviewed the Cle Elum UGA Internal Review Draft EIS and provided written comments by letter dated January 12, 2001. We have reviewed the Draft EIS and find that Solid Waste issues have not been adequately addressed.

The document, as submitted, is not in compliance with RCW 70.95, the 1997 Kittitas County Solid Waste Management Plan or the Kittitas County Board of Health Ordinance #1999-01. 1

The following are issues for consideration and are not to be considered all-inclusive but address the discrepancies and inconsistencies noted:

1. **Solid Waste Management Plan** – At this time, a project specific amendment to the Kittitas County Solid Waste Management Plan has not been received in this office. Impacts to the Solid Waste System can not be determined until such time as that plan has been received and reviewed in accordance with the rules and regulations as set out in the Countywide Solid Waste Management Plan. This project was specifically excluded from the 1997 Countywide Solid Waste Management Plan, adopted by all entities in Kittitas County, due to the unavailability of information relative to the proposed project. Until such time as a plan amendment for this project is received and reviewed, the EIS has inadequately addressed impacts to the Solid Waste System. 2

2. **Fiscal and Economic Impacts** – Solid Waste is not addressed in this document, we therefore consider the document inadequate and are unable to determine the fiscal and economic impacts to the Solid Waste System. 3

3. **Inert/Demolition Debris** – We can find no mention of how Inert and Demolition Debris will be handled during the construction phases of this project. How does Trendwest intend to handle this waste stream? What quantities are expected? What manner of recycling will be done and when? Where will it be disposed? 4

4. **Moderate/Hazardous Risk Waste** – How will this waste stream be tracked and handled during construction or occupancy? What quantities are expected? Where will it be disposed? 5

5. **Yardwaste** – How will this waste stream be tracked and handled from the project? What quantities are expected? Where will it be disposed? Will it be composted? 6

6. **Waste Reduction/Recycling** – Not addressed in the Draft EIS. What recycling services will be offered in this development? What commodities will be recycled? What quantities are expected? Where will the recyclables go? How will this waste stream be tracked? 7

7. **Municipal Solid Waste** – Not adequately addressed in the Draft EIS. What quantities are expected from the project? What impacts will be faced at the Upper Kittitas County Transfer station in order to handle this waste stream? What infrastructure will need to be added in order to accommodate this waste stream? What level of service will be provided to the residents and guests of this project? 8

8. **Septage** – Will there be septage generated from this project? If so, how much and where will it be disposed of? 9

9. **Stall Wastes** – What quantities will be generated? What permits are required? Where is the approved compost site? Where and how will it be disposed of? 10

Thank you for the opportunity to comment. We look forward to working with your office and Trendwest staff to address the inadequacies noted above for inclusion in the final EIS document. If you have any questions, or concerns, please feel free to contact me.

Sincerely,

Wendy Mifflin
Director

Cc: SWAC Members

Comment 1

Trendwest is participating with the City of Cle Elum and the County in a project-specific amendment to the Kittitas County Solid Waste Management Plan (SWMP) to address the projected waste streams from the UGA development. This amendment is coordinated with efforts to revise the SWMP to address waste streams and programs for the MPR development. A project-specific amendment to the SWMP for Trendwest-related development in the UGA has been drafted and is being reviewed by the City of Cle Elum. The City will define the solid waste management plan for other uses in the UGA, which include the Business Park, Community Recreation Center, cemetery, school expansion areas, and the water treatment plant. Refer to Section 3.16 of the Final EIS and Section 5 of Appendix E for estimated solid waste loadings (including estimates for the Business Park) and measures for solid waste management.

Comment 2

Refer to the response to Comment 1, above.

Comment 3

Solid waste disposal fees and associated costs for solid waste disposal were not separately addressed in the Draft or Final EIS. It is assumed that service fees would be set to fully compensate for service costs. This is identified in Section 3.18, Fiscal Conditions, of the Final EIS. As described above, Trendwest would contribute a pro-rata share of the costs to construct a new or expanded transfer station, as necessary, to handle projected waste streams. Refer to the response to Comment 1, above.

Comment 4

Inert construction and demolition debris (CDL) is quantified and discussed in Section 3.17 of the Draft EIS. CDL that is not recycled would be collected onsite and hauled to the Ryegrass landfill. Refer to Section 3.16 and Appendix E of the Final EIS for additional discussion of onsite CDL management under Alternative 5.

Comment 5

Hazardous waste generation is quantified in Section 3.17 of the Draft EIS (Alternatives 2, 3, and 4) and in Section 3.16 of the Final EIS (Alternative 5). Residents and commercial operators/tenants would dispose of hazardous waste at local community-sponsored disposal events (see Appendix E).

Comment 6

Yard waste production is quantified in Section 3.17 of the Draft EIS (Alternatives 2, 3, and 4) and in Section 3.16 of the Final EIS (Alternative 5). Yard waste disposal will either be handled by Waste Management of Ellensburg or its successor or by self-haul to an approved transfer station (see Appendix E).

Comment 7

Recycling within the UGA will be encouraged. Refer to the mitigation measures in Section 3.16 and Appendix E of the Final EIS for additional discussion of recycling.

Comment 8

Municipal waste generation is quantified and potential impacts are discussed in Section 3.17 of the Draft EIS (Alternatives 2, 3, and 4). Impacts associated with Alternative 5 are discussed in Section 3.16 and Appendix E of the Final EIS. Waste Management of Ellensburg or its successor will collect UGA waste. Refer to the response to Comments 1 and 3 above for additional information.

Comment 9

Septage waste is discussed in Appendix E of the Final EIS. Septage waste under Alternative 5 would be minor. Septic tanks associated with a temporary sales and maintenance facility (prior to the availability of sewer service) and a maximum of three permanent comfort stations (serving trails and/or a golf course, depending on the alternative) would be pumped as needed every three to five years and hauled to the County evaporation lagoons at Ryegrass landfill. The regional wastewater treatment plant may include a septage receiving facility that could accommodate waste from the UGA.

Comment 10

Stall wastes for the Horse Park are discussed in Section 3.17 of the Draft EIS. Under Alternative 5, the Horse Park is not part of the proposed project. Under the terms of its agreement with Trendwest, the Washington State Horse Park Authority will be responsible for all environmental compliance related to that facility.

Received 4/25/2001 City of Cle Elum

March 25, 2001
POB 622
Roslyn, WA 98941

To: The City of Cle Elum
RE; Comments of the DEIS of the proposed Cle Elum UGA

"What do we want? We want more school houses and less jails, more books and less guns, more learning and less vice, more leisure and less greed, more justice and less revenge... we want more opportunities to cultivate our better natures." So said Samuel Gompers decades ago.

What do we want here, what do we all want:

+ jobs.
+ Cle Elum as a vibrant community, not simply an "easy drive through", and we want this for all the Upper County municipalities and communities.
+ clean air and water.
+ some peace and quiet.
+ community (human and natural).
+ affordable services that meet our needs and that have predictability in rates and what's delivered.
+ an ability to know what exactly all this development is, before it happens.

1

what are we getting?

+ a non-specific "phased environmental review" of a variety of aspects of development that are really part of one huge development. There are a lot of projects that should be in this DEIS. Examples include the MPR, the Horsepark, the water supply for the UGA and the MPR, related impacts on other water consumption and quality, the water delivery system (including intakes), the sewer and stormwater systems, Cle Elum's proposed re-do of its zoning code, the range of secondary development and speculation that is occurring in the Cle Elum Lake and River corridor and elsewhere in the county, I could go on and on.

2

+shifting corporate entities that will be involved in all this development (JeldWen, Trendwest Resources, Trendwest Investments, Trendwest Properties, MountainStar Resources, WorldMark, and whatever comes next).

3

+ unidentified water use.
+ private residential development (long and short-term occupancy) vs. integrated community housing (check out the golfcourse lots and "equestrian village" vs. apartment house sitings, compare the MPR development types to those in the UGA).

4

+ how many equestrian centers? So far I can count the Horse Park, the "temporary equestrian area," and another equestrian center in its own "village." How many of these convert to snowmobiles in the winter?

5

+ storm water run-off from both MPR and UGA that contaminates surface water (water that is contiguous with the Cle Elum River).

6

+ jammed traffic. Think about Bullfrog road, including its freeway entrance and exit with both the MPR and UGA in place. Think about 903 through Ronald and Roslyn coming into this. Consider the part of Cle Elum between the UGA and where anyone can exit or enter I90 east.

7

March 25, 2001
POB 622
Roslyn, WA 98941

I could go on and on about what is not addressed in this DEIS, nor in the MPR EIS. I could write pages on what is not addressed in the proposed POSSIBLE mitigation for those impacts that are identified. RIDGE will do this in writing. Tonight, in the very few minutes I am allowed, I want to speak to what will be lost and destroyed with Trendwest's development.

Respect for this place will be destroyed. The piecemeal quantification of impacts into what can be measured in a few weeks of monitoring does not begin to address this. The various corporate entities that include Trendwest or Mountainstar in their names have no respect for the property they currently hold title to.

What do I mean by "this place?"

The property Trendwest currently holds title to is a grand living place that is more of the natural world than not: you can see the stars at night and the weather during the day, you can smell the river, the trees, the wetlands, the mushrooms. You can hear the wind and such trees as are left, and animals, and the river. You can sometimes even hear the land, as I have, when spring melt loosens rocks in some of the cliffs and there are rockfalls, or when rains whispers on the rocks. This place right now is bigger than what humans have done to it. 8

When TW "builds out" and the entire development on all this property is "operational" this place will no longer be. There will be lots of buildings and roads and right of ways and golfcourse holes. There will be a comfortable way to tour virtually every foot of the physical location. There will not be a a grand living place that is more of the natural world than not.

When Trendwest has "had its way" with this place, much will be destroyed. Not lost, because it will have been right here until it is gone.

Then, when I come from behind, toward an older gentleman, we will not be following a game trail. We will not be on one of the benches above the Cle Elum River. I will not need to make extra noise so he is not unduly startled. He will not jump and be surprised to see another human; nor will he say, "Jeez, I thought you were a big old elk."

Mitigate that.

Ellie Belew.
Ellie Belew

Comment 1

Comment noted.

Comment 2

Under certain circumstances, phased environmental review is authorized under the State Environmental Protection Act (SEPA) (WAC 197-11-060[5]). The Horse Park was programmatically analyzed in the Draft EIS; however, the site design has since been changed. Alternative 5 does not include a Horse Park proposal and instead sets aside a Reserve tract. Trendwest has offered to donate land for a Horse Park contingent, in part, on the Washington State Horse Park Authority completing all required environmental review and having funds available for the project.

As discussed in Section 1.6 of the Draft EIS, the UGA and MPR are independent projects. The purpose and need for the two projects are different, and the two projects fall under different legislative mandates and local code requirements. Indirect impacts from induced growth and cumulative impacts from construction of the UGA and MPR are addressed under each element of the environment in the Draft and Final EISs.

The water and wastewater treatment plants currently in the design and planning phases are facilities proposed by the City of Cle Elum to implement the City's water and wastewater comprehensive plans. Some upgrades of those treatment plants, and accompanying environmental evaluations, would have been necessary to meet the City's projected demand even without the Trendwest project in the UGA. The City of Cle Elum is lead agency on construction of both the water and wastewater treatment plants, and is responsible for environmental review and compliance for those projects. A discussion of potential water quality impacts from the regional wastewater treatment plant is included in Section 3.16 and Appendix E of the Final EIS.

The proposed action includes adoption of a subarea plan and zoning regulation for the UGA that will take effect upon annexation of the property.

Comment 3

Comment noted.

Comment 4

Comment noted. Alternative 5 does not include timeshare condominiums, a lodge, or a golf course.

Comment 5

Comment noted. Alternative 5 does not contain a Horse Park or an equestrian village.

Comment 6

Stormwater runoff would not contaminate the Cle Elum River. Refer to Section 3.3, Water Quality, of the Final EIS for an expanded analysis of potential water quality impacts.

Comment 7

Transportation impacts of both the UGA and MPR are addressed in Section 3.15 of the Draft EIS for Alternatives 2, 3, and 4 and are addressed in Section 3.14 and Appendix F in the Final EIS for Alternative 5. The study area extends from northwest of Ronald to (and including) the I-90/SR 970 interchange. Figure F-5 of Appendix F shows intersections that were analyzed for level-of-service impacts. Mitigation for identified traffic impacts in Years 5 and 10 is in Section 3.14 of the Final EIS and in the Conditions of Approval for the project.

Comment 8

Comment noted.

1)Trendwest has not obtained approval to move water up to the Cle Elum area. Whether they will be able to move water, how much, and the time frame, is highly speculative at this point.

For example, Department of Ecology consultants have raised questions about whether there is a true environmental benefit that comes from TW's tributary (eg, Teanaway. Big Creek) water rights that it proposes to leave instream as mitigation for all this development. TW offers, as mitigation for its water right impacts, to "not divert water from the Yakima River if flows are insufficient to meet Yakima River target flows." UGA DEIS at p. 3.5-35. If TW is not diverting, where will the water come from to serve the UGA and the MPR? 1

2) We continue to disagree with the cumulative effects analysis. The impact of the UGA, combined on the MPR, is likely to be much greater than predicted. The ancillary buildup - already with speculation around the resort - will only intensify with the full buildout of your UGA. Take a drive up Rt. 903 thru Roslyn and Ronald to see what the future will bring. Are the County's lax oversite of development your problem? You bet – as there will not be enough water to go around. TW keeps insisting that folks who work at the resort will live elsewhere in the County. This is unrealistic. So what water will be used to serve all these people? Exempt wells, Roslyn's water, and CE and So. CE water? This is going to put a huge burden on local communities. 2

Because TW has been in litigation over this, they refuse to admit how great the impacts are actually going to be. The MPR analysis was inadequate and underestimated impacts. But they continue to defend that analysis and use the same assumptions because they are still in court. This means that important impacts are not being considered. 3

For example, TW proposes to move water from properties in other places. But many of those "sending" properties are being developed. Example – the [redacted] Teanaway is being logged and will be divided up and sold in the coming years. The DEIS refuses to acknowledge that the impacts associated with moving that water is really connected to the UGA and the MPR. See DEIS at 3.5-37. This is short-sighted and incorrect. 4

With all these people moving into the area, there will be water quality impacts related to impervious surfaces, people pouring bad things down their drains, run-off from road and bridge surfaces, increased use of pesticides and herbicides, etc. It's inevitable. How does CE propose to maintain the relatively pristine environment in those circumstances? 5

Increased population will mean more people will want to go to the rivers. This will put pressure on fish species at the brink of extinction. How are you going to keep people from fishing, walking around in the rivers, etc.? 6

3) Are we not factoring in swings in precipitation in the region? Here we are in the middle of a drought year – as significant as any we have had in the last 25 years - and there is no mention, from my reading – of options related to low water years. Correct me if I am wrong – but hasn't CE been under a water hookup moratorium for the last several years. Where do you think all of this water will come from in low water years and in competition with downstream irrigators and ranching interests? These questions continue to be left unanswered. I believe it is bordering on criminal for these questions to go unanswered. 7

4) Where will the water come from for the Horse Park, Com Ctr., School Expansion – Condo to be donated by Trend West? 8

Len Nowicky
PO Box 775
Roslyn WA
98941

Comment 1

In December 2000, Trendwest entered into a contract with the Department of Ecology for the purpose of conducting additional environmental review and processing of Trendwest's water rights transfer applications. Additional analysis of the impacts of the transfer of Trendwest's water rights on the Yakima River target flows has been conducted and mitigation measures for these impacts have been identified.

The Water Supply Technical Report Supplement in the Final EIS includes additional analyses prepared by Ecology's Consultant Team, the Department of Ecology, Trendwest, and the City of Cle Elum's consultant team. Proposed mitigation has been expanded since the Draft EIS was published. Trendwest also has withdrawn its request for water rights processing under the Hillis Rule, which requires a determination by Ecology of environmental "benefit." Refer to Section 3.4, Water Supply, and Appendix B for additional detail and an updated discussion of mitigation measures.

Comment 2

Comment noted. Since the Draft EIS was published, an analysis of where employment-induced households might locate was conducted to assess potential indirect water demand impacts. Refer to Section 3.4, Water Supply, and Appendix C of the Final EIS for additional detail.

Comment 3

Comment noted. As part of the RIDGE Settlement Agreement, the proposed density of the MPR was reduced by approximately 18%. Cumulative impacts from the Reduced Density MPR and Alternative 5 of the UGA are analyzed in the Final EIS.

Comment 4

An analysis of fallowed lands was conducted as part of the expanded water supply analysis. This analysis is Exhibit H of the Water Supply Technical Report. Trendwest has agreed to mitigate for these indirect impacts (see Section 3.4, Water Supply, Mitigation Measures).

Comment 5

A quantitative water quality analysis for the UGA under Alternative 5 is included in Section 3.3 of the Final EIS. Mitigation measures addressing stormwater runoff, herbicides, and pesticides are identified. In addition, the City is incorporating mitigation for stormwater, including monitoring, as part of the Conditions of Approval for the project.

Comment 6

Fishing pressure and mitigation measures for increased human use of streams is addressed in Section 3.7 of the Draft EIS. A more specific fishing pressure analysis was conducted for the Final EIS and is summarized in Section 3.6. The Washington Department of Fish and Wildlife

(WDFW) would continue to manage the regional fishery. Trendwest would explore additional angler management options with the WDFW and Yakama Nation.

Comment 7

The drought of 2001 and the continuous drought period from 1992 through 1994 are factored into the water availability analysis contained in Section 3.4, Water Supply, and in the Water Supply Technical Report Supplement, included as Appendix B to the Final EIS. Section 3.4 describes actual water availability compared with cumulative water demands from the UGA and MPR as well as indirect and offsite demands from employment-induced in-migrant housing and from lands fallowed by Trendwest's water rights transfers. Mitigation to ensure there is no net increase in consumptive use of water in the Yakima River basin as a result of the combined Trendwest proposals is also described in Section 3.4.

Comment 8

Water demand for the Washington State Horse Park is discussed in Section 3.5 of the Draft EIS. Alternative 5 (Preferred Alternative), submitted since the Draft EIS was published, does not include the Horse Park. The capacity of the City of Cle Elum to provide water to the Community Recreation Center and the school expansion area is described in Section 3.4, Water Supply, of the Final EIS. As part of the RIDGE Settlement Agreement, Trendwest has agreed to provide Roslyn with water for induced growth (see Mitigation Measures in Section 3.4).

Received 4/25/2001
City of Cle Elum

At the Crossroads of Washington State

PHOENIXGROUP
ECONOMIC DEVELOPMENT

April 25, 2001

Mr. Brian Carrico, Planning Director
City of Cle Elum
119 W First Street
Cle Elum, WA 98922

Dear Mr. Carrico,

As Chair of the Kittitas County contracted Associate Development Organization, the Phoenix Economic Development Group, I would like to address the economic and fiscal impacts of the Cle Elum Urban Growth Area as detailed in the Draft Environmental Impact Statement.

It is heartening that so many jobs will be created by the UGA project. I was pleased to see that the local labor pool can fill half of the construction jobs and 80% of the operation jobs on the UGA. Even those who are hired from outside the area will be spending some of their dollars here which is certain to give our economy a much needed boost.

As a distressed, timber impacted county I recognize the importance of creating and retaining family wage jobs such as those this project will create. The business park truly has unlimited potential for our area. While existing services and retail sectors will benefit from the construction of lodging, restaurants and recreational facilities, the business park will greatly enhance our expansion and recruitment efforts to bring light manufacturing and high tech businesses to our community. 1

In terms of fiscal impacts, the city will benefit from the cost sharing approach to the construction of state of the art water and wastewater treatment plants. Finally, the shortfall mitigation agreements that Trendwest is willing to commit to will certainly ensure that local jurisdictions are fully funded if the impacts of the project are greater than expected.

The Cle Elum Urban Growth Area development is positively a win-win for Cle Elum, Kittitas County and Trendwest. Let's move it forward now.

Sincerely,

Ellen Murray Howe
Chair

PO Box 598 Ellensburg, WA 98926-0598 (509) 962-7244 Fax (509) 962-7141 ebdainc@kvalley.com

Letter 6

Comment 1

Your support of the project is noted.

Received
4/25/2001
City of Cle Elum

REBOUND
• The Seattle/King County Building & Construction Trades Council •

April 25th, 2001

Comments on Cle Elum UGA DEIS
By Brian Carpenter
Research Analyst
REBOUND
3049 S. 36th, #208
Tacoma, WA 98409

Good evening and thank you for the opportunity to comment on the DEIS. I am here speaking on behalf of REBOUND, an organization representing the interests of skilled construction trade workers. REBOUND and its affiliates have many members who live in the area and would be affected by the proposed UGA expansion. We appreciate the extensive efforts the City has made to mitigate the proposed resort but continue to believe that more can and should be done. While many impacts have been studied, others have not been addressed.

My comments will be limited to the section on traffic impacts.

Generally, increased growth and development puts severe strains on local transportation infrastructures. The lack of upfront improvements leads to growth occurring before local roads can accommodate it. The results are traffic jams, automobile accidents and accidents between pedestrians and automobiles. Accompanying this is a general decline in the 'quality of life' of the region.

Furthermore, cities and counties face a severely restricted and limited source of transportation funding. 695's passage eliminated a major source of transportation funding for cities and counties. Kittitas County's entire road budget for 2001 is $14.7 million. The County's 6-year Transportation Plan contains only one item in the UGA area and that is a deck rehab for the Cle Elum River bridge on Bullfrog Road. No capacity improvements are planned. 1

Cle Elum's total 2001 street budget is $302,882.000 with an additional $101,764 for arterial work. This situation is not likely to improve any time soon as the state legislature is unwilling to implement any kind of transportation tax increase without voter approval.

The end result, as seen in many formerly small, rural communities on the west side of the mountains, will be increased traffic and accidents, calls for road improvements, a lack of action by the city and county due to inadequate funding and a growing frustration by the public due to a lack of understanding of the fiscal constraints cities and counties face.

3049 S. 36thSt., #208 Tacoma, Washington 98409 (253) 472-0470

Lack of Public Transit Heightens transportation impacts

The lack of public transportation alternatives in the area increases the impacts of the resort, as automobiles will be the main source of transportation. Resort visitors will be forced to use their cars for all trips to and from the resort and Cle Elum, Roslyn and nearby recreational opportunities. Visitors from out of the county will have no choice but to drive to the resort. This situation cannot be avoided but should be understood as increasing the impacts on the transportation infrastructure. 2

Trip Generation

Peak hour trip generation figures are likely underestimated. Table 3.15-10 on page 3.15-21 of the DEIS shows trip generation figures based on each type of dwelling. A single-family residence is listed as generating slightly less than 1 trip on Saturday and on Sunday.

Condominiums are also listed as generating less than 1 trip both on weekdays and weekends.

These numbers seem suspect given the likely use of many such dwellings as weekend getaways. Such use will generate many additional trips related to arrival and departure for the weekend, while engaging in recreational activities, travel to and from town for purposes of shopping and eating and running errands. Furthermore, each dwelling is likely to generate multiple automobiles, either within individual families or from friends and family members who visit for the weekend. The prevalence of multiple car families and modern schedules mean that different family members will be coming and going to different times. Additionally, when one family purchases a vacation home, it then becomes a magnet for all of their friends and associates, who will be driving as well. 3

We believe the trip generation figures underestimate the number of trips that will be generated by the resort and thus underestimate the total impacts on the local transportation infrastructure.

Page 3.15-25 says:

> "The component of traffic not reflected in Table 33.15-17 is a 'peak' event such as an international competition at the Horse Park, a holiday weekend or an event in the local communities or the MPR. The additional volumes would increase traffic substantially during those time periods and would require a traffic mitigation plan for the area." 4

Unfortunately the mitigation plan is not discussed in great detail, nor is there any discussion of who is responsible for paying for it or for implementing it. The impacts of such 'peak' times or events are left unstudied. These should be looked at in advance, planned for in advance and mitigated in advance. Otherwise the impacts on the transportation infrastructure will be again understated.

Parking

UGA-generated traffic could make parking in downtown Cle Elum and Roslyn problematic due to a lack of current parking restrictions, absence of meters and lack of space.

If the Cities increase parking restrictions in the central downtown core, this could cause overflow of parking into surrounding residential areas, particularly in the area one or two blocks around the central downtown cores. Why feed a meter or worry about a parking limit if you can simply park a block farther out on some residential street? This will cause problems for the residents of the area. 5

Other than a brief mention in the development agreement of studying parking, parking problems are an unmitigated impact not addressed by the EIS or any of the development agreements.

Pedestrian Safety

Bullfrog Road, SR 903 and 1st Street in Cle Elum could all become more hazardous to pedestrians. The lack of signed crosswalks in many locations combined with unsignalled intersections and increased traffic could result in pedestrian-auto accidents.

The downtown Cle Elum and Roslyn areas will see increased foot and car traffic and the lack of clearly signed crosswalks as well as the lack of controlled intersections in several places could result in serious and dangerous accidents from pedestrians dashing across the road. 6

Of particular concern is the stretch of SR 903 that passes next to the schools. This road will see greatly increased traffic and the likelihood of children in or near the vicinity of the road as well as the likelihood of children crossing the road could lead to serious and dangerous problems.

Pedestrian safety is briefly mentioned as an item of study and possible mitigation, but should be addressed in more detail with specific mitigation measures required.

I-90

WSDOT's web site points out the obvious fact that I-90 already suffers congestion, especially on weekends: 7

> "On many weekends traffic volumes are approaching or exceeding 50,000 vehicles a day. When traffic is this heavy the freeway cannot get enough vehicles through and traffic slows to a crawl."

I have experienced this myself, especially on Sunday afternoons.

WSDOT does not currently have the money to address this situation and given the political climate in Olympia, which is currently unwilling to make the tough decisions needed to fix our statewide transportation system by raising taxes, there will not be any improvements made anytime soon. The proposed UGA development will only increase this congestion. **7 (cont.)**

I-90/Bullfrog Rd. Intersection (exit 80)

This intersection will require additional improvements to avoid congestion. Congestion points include the turns onto I-90 westbound and eastbound due to the lack of turning lanes or pockets. Unless the entire overpass is widened and the entrances to I-90 widened, this intersection will become congested. No funds have been identified to address this problem. **8**

I-90/First St. Intersection (exit 84)

This intersection has a very narrow, one-lane overpass over the freeway. Unless widened, this intersection will become congested. Traffic exiting the highway here is deposited onto 1st Street and if 1st Street is backed up due to traffic, then traffic will likely back up onto the overpass and part or all of the exit ramp. This could be hazardous to cars attempting to exit the freeway here. **9**

No money has been identified to address this situation and this impact is not addressed by the EIS or any of the development agreements.

With both intersections, even if Trendwest were to provide a proportionate share of the cost, the state, city and county would be hard pressed to meet their proportionate shares.

SR 903

State Route 903 will face additional traffic loads that it is not designed to handle. In addition to the UGA, two churches are planned on the opposite side of SR 903. The lack of turn pockets in various places, especially in front of the middle and elementary schools, will cause traffic to stack up behind turning vehicles. In Roslyn and on the outside of Cle Elum, many houses have driveways that lead directly on to the highway. Residents will face increasing difficulty and likelihood of accidents while trying to turn onto or off of the highway. **10**

The short distance between the Bullfrog Road/SR 903 intersection and the cities of Roslyn and Cle Elum will likely lead to frequent traffic jams the entire length of SR 903 between the Bullfrog Rd. intersection and the towns. The fact that the highway has one lane either direction with no center lane could lead to dangerous passing attempts on the shoulder or in opposite lanes. In winter of course the shoulder will not an option. **10 (cont.)**

While Trendwest is being required to update the intersection of Bullfrog Road and SR 903, this intersection will need a signal right away to avoid huge traffic backups on SR 903 and Bullfrog Rd. A traffic signal should be required and paid for by Trendwest prior to development of the UGA and not after the fact. **11**

Appealing to the state for help with SR 903 will not work either because as previously noted, WSDOT faces a money shortage and the local grant programs such as the CRAB or TIB are under-funded and any request would have to compete with projects all over the state.

While the development agreement calls for a study of SR 903 and possible ways to improve it, it is silent on how or who is to pay for such improvements. This should be spelled out in more detail, as the Cities, County and State do not currently have the money to fund improvements to the road. **12**

Bullfrog Road

Where turnoffs are located to access the UGA, pockets and turn lanes should be required and paid for by Trendwest. Otherwise traffic will back up behind turning vehicles. Also, the main entrance to the resort will require a traffic signal to avoid head-on collisions with oncoming vehicles and provide smooth traffic flow. This intersection with Bullfrog Rd. and the entrance to the UGA located across from it should be combined into one signalized intersection. If they are staggered, traffic backed up at one intersection will tie up the other intersection on a regular basis. **13**

The intersection with SR 903 is to be paid for by Trendwest, but the development agreement specifically leaves out the cost of signalization, saying that if it is warranted, it will be treated as an off-site improvement subject to the proportionate share provision. The traffic signal should be installed at the same time the intersection is reconfigured to avoid having to later rip up pavement. Installing the signal at the same time as the other intersection work is done will save money. Also, UGA and resort traffic will be responsible for the backups at the intersection, therefore Trendwest should be required to pay 100% of the cost of signalization and NOT a proportionate share. **14**

Unless these actions are taken before the UGA and resort are developed, Bullfrog Rd. will be routinely backed up due to vehicles turning into and out of the UGA and resort. **15**

Proportionate Share

Trendwest and the City have agreed to a cost-reimbursement mechanism for some transportation improvements related to the UGA and the resort. This agreement calls for Trendwest to pay either a proportionate share of the cost of necessary improvements or, if the County does not have it's part of the proportionate share, then Trendwest is to pay the entire cost of the project and seek reimbursement from the County.

It is this reimbursement mechanism that could be problematic and should be clarified. The development agreement with Trendwest states that the County should seek to reimburse Trendwest for its share of the cost of traffic improvements by imposing fees on new development that benefits from the traffic improvements.

Even if the County share is small, in the range of 5-10% of the project's total cost, the amount of money is still large. Any kind of intersection with turn lanes and/or signals will cost at least a million dollars. If the County share is $100,000, then it will have to go recover this from others who come along and develop after the fact. Thus we have a built in requirement for some sort of "growth tax" on people to pay for Trendwest's traffic impacts. Also, we face the problem that if the County share is to be paid only by those who develop in the immediate vicinity, each person's 'tax' will have to be quite large, thus imposing a significant burden on and hindrance to other new development. If we expand the area to include a larger area then we run the risk of unfairly taxing development that does not benefit from the improvements. Either way is unfair and could result in a hidden subsidy of Trendwest. 16

Furthermore, this agreement appears to only include the County. If the City has to pay a share of a traffic improvement related to the UGA or resort, where will the City get its share? Again, the city share may be a small percentage, but when you have a $400,000 street budget, any amount is significant. Again, we face the possibility of the City ending up subsidizing the UGA development and its traffic impacts.

Some certainty surrounding the payment of any state share should be determined in advance. Given the fiscal restraints facing the state transportation budget, expecting the state to kick in money for a project is not a sure thing. Should Trendwest end up paying the state share up front, how will it reimburse itself, from the state or from the County or City? No method exists that I know of whereby private developers pay the costs of a project up front and then get reimbursed by the state. There may or may not even be a legal mechanism whereby a developer can recover such costs from the state. Waiting for the state to kick in its share of a project would likely mean that the improvement is delayed at least several years. In the meantime, the community suffers.

The agreement with Trendwest that deals with proportionate share and paying for traffic improvements requires additional thought and study. It should be clarified and strengthened to avoid any hidden or unfair subsidies of the UGA development. Trendwest is quite capable of paying for its impacts, if it is required to do so. The

residents of the area should not have to pay for growth they may not necessarily want or benefit from. 16 (cont.)

Conclusion

It is clear that many traffic impacts were not addressed in the EIS and are not dealt with in the development agreement with Trendwest. Additional mitigation should be required of Trendwest or the size of the resort shrunk to fit what the local roads are capable of handling. Otherwise the result will be many years of traffic congestion, accidents and a decline in the quality of life. I don't think anybody lives here or moved here so they could sit in traffic like in Seattle. 17

Thank you for the opportunity to comment.

Respectfully Yours,

Brian Carpenter
Research Analyst

opeiu8/afl-cio

Comment 1

Comment noted. Traffic improvements/mitigation is addressed in Section 3.15 of the Draft EIS. Mitigation associated with Alternative 5 is identified in Section 3.14 of the Final EIS and in the City's Conditions of Approval for the project. Traffic monitoring would occur and Trendwest would be responsible for a pro-rata share of necessary offsite improvements, including several traffic signals within the city.

Comment 2

Comment noted. Public transportation does not currently operate in Kittitas County. The transportation analysis considered cumulative impacts from the MPR and UGA and identified mitigation measures to address those impacts. The analysis does not rely on public transportation, so it accurately reflects existing conditions and looks at the worst-case scenario for future impacts.

Comment 3

Comment noted. Vehicle trip generation rates were taken from the Institute of Transportation Engineer's (ITE) Trip Generation Manual, 6th Edition, and were used to estimate the magnitude of vehicle trips that may be expected from the Cle Elum UGA development. The ITE manual is the standard reference document used by transportation engineers and planners.

Comment 4

Typically, "peak events" are not analyzed as part of an operational analysis because they represent the occasional variation from normal traffic operation. Alternative 5 (Preferred Alternative) does not include the Horse Park, to which the majority of "peak events" were attributed. The Washington State Horse Park Authority will be responsible for all environmental compliance related to construction of a Horse Park, including transportation studies and preparation of a Transportation Mitigation Plan.

Comment 5

Parking capacity is not identified as a significant impact in the Draft EIS. Since the Draft EIS was published, a parking demand and supply survey was performed in the downtown areas of the cities of Cle Elum and Roslyn. On Friday and Sunday in August, between approximately 40% and 60% of the parking spaces were occupied (see Section 3.14 of the Final EIS). Impacts on parking will continue to be monitored as part of an agreed-upon monitoring program.

Comment 6

Pedestrian safety is discussed in Section 3.14 of the Final EIS. Observations of vehicle and pedestrian circulation patterns made at the School District campus indicate that all students are currently transported by bus or private vehicle. No pedestrian activity was observed.

Development of the UGA would increase travel along the residential streets and would not require crossing SR 903 or any other major roadway.

Comment 7

Comment noted. Intersections with I-90 at Bullfrog Road and at SR 970 are included in the traffic analysis prepared for the Draft and Final EISs. No level-of-service impacts are identified for the intersection with SR 970. Mitigation associated with changing intersection operation has been suggested for the I-90 eastbound off-ramp at Bullfrog Road, which could experience significant delays (LOS D on weekdays and LOS F on weekends) due to cumulative traffic impacts. This intersection could improve to LOS C by changing the stop-controlled movement to northbound-southbound from eastbound (see Section 3.14 and Appendix F of the Final EIS).

Comment 8

The I-90/Bullfrog Road westbound intersection would function at an acceptable level-of-service in future years both with the UGA and with the MPR. Refer to the response to Comment 7 above for a discussion of the eastbound off-ramp.

Comment 9

Queuing problems are not anticipated on the exit ramp from I-90 to West First Street. Since the Draft EIS was published, the proposed connector road from West First Street to Ranger Station Road has been moved east to further reduce the likelihood of any queuing problems. Also, no level-of-service problems were identified at the intersection of West First Street and the Ranger Station Road connector (Intersection 29 of the traffic forecast locations, Figure F-5, Appendix F).

Comment 10

As identified in Section 3.15 of the Draft EIS, the design capacity of SR 903 is 2,450 vehicles per hour east of Bullfrog Road and 2,310 vehicles per hour west of Bullfrog Road. Projected roadway volumes are not anticipated to exceed the design capacity of SR 903. The intersection of SR 903 and Bullfrog Road was re-analyzed for the Reduced Density MPR and Alternative 5 scenario in Section 3.14 of the Final EIS. Assuming buildout as predicted, a traffic signal would be required in Project Year 5. Construction of this traffic signal would depend on whether signal warrants were met and Trendwest would be responsible for its pro-rata share (City of Cle Elum draft Conditions of Approval).

Comment 11

The traffic analysis did not identify this location as needing a signal immediately. Refer to the response to Comment 10, above.

Comment 12

Comment noted. Refer to the response to Comment 10, above.

Comment 13

Under Alternative 5 (Preferred Alternative), the main entrances to the UGA and MPR from Bullfrog Road will be separated (see Figure 2-5). In part, this change in access was made to eliminate the potential need for a future traffic signal. Based on the traffic analysis for Alternative 5, no entrances to the UGA or MPR would require separate turn lanes (see Appendix F of the Final EIS).

Comment 14

Comment noted. Refer to the response to Comment 10, above.

Comment 15

Refer to the response to Comment 13, above.

Comment 16

Comment noted. The City is incorporating a number of traffic improvements into the Conditions of Approval for the project that Trendwest would either fund outright or by pro-rata share. Any Conditions of Approval and/or Development Agreement would include an equitable method to calculate shares. Both SEPA and impact fee statutes require the public sector and/or future developers to contribute for their share of the impacts and necessary mitigation. Refer to Section 3.14 of the Final EIS for additional discussion of traffic mitigation.

Comment 17

The cumulative impact analysis contained in the Final EIS includes the MPR and UGA, and mitigation is identified to address identified impacts (refer to the response to Comment 16, above). Since the Draft EIS was published, the total number of units in the MPR has been reduced by approximately 18% (see Section 1.6, Summary, of the Final EIS). The analysis in the Final EIS reflects this reduction in units.

COMMENT SHEET
City of Cle Elum - UGA / Trendwest Properties DEIS

4/25/2001
City of Cle Elum

Having Attended 4 different Meetings Held at the Schools, I came To one Realisation; The general audiences are NoT afforded the kindness of an adequate Sound System. The Events need better Microphones, Properly Elevated Volume levels, and Possibly Speaker Facing audience conditions. Most People, Even with good hearing could NOT Hear distinctly what The speakers were saying. The Future meetings would be better served if There was a Sound Engineer involved. The chairperson as well as The Speakers Hear Themselves both Through Their own heads and The Amplified System. The Audience doesn't get This Help, so They cannot hear Properly. The Microphones would Help if They were used better. Many people Leave The meetings because of sound Problems. To get more willing participation, it would behoove The group To address This Problem. My hearing has been tested and Found in The upper 90% of Perfect, so That is NOT The problem.

Thank you For Reading This.

1

Ken Boles | PoBox 236 | Ronald | 98140
Name | Street Address | City/Town | ZIP

Comment 1

Comment noted.



City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Upper Kittitas County Senior Center
618 B East First Street
Cle Elum, WA 98922

RE: Concerns of the Affects of Urban Growth on Senior Citizens

The seniors of this area could be greatly affected by urban growth. But what type of effect will it have? Many of the seniors in this area have lived here their lifetime and their mothers and fathers before them. Right now there is a comfortable life style in a quiet community. What would this type of growth do to their taxes? Many are on a fixed income.
What about the traffic situation? The seniors that do drive in town have minimal traffic flow to drive in and only one stoplight to deal with. With there being more traffic and congestion in town, will there also be some kind of transportation system to get the seniors where they need to go if they can't deal with the heavier traffic situation?
These are a couple of the concerns that have been mentioned to me by the senior citizens of the upper county. Will you please take this into consideration. 1

Thank You

Erin Nelson
Director
UKC Senior Center

Comment 1

Comment noted. Consistent with the terms outlined in the Pre-Annexation Agreement between the City of Cle Elum and Trendwest, existing citizens and ratepayers should not suffer negative financial impacts as a result of Trendwest development activities within the UGA. Property values are not expected to be significantly affected by combined MPR and UGA development (see Section 3.17, Economics, of the Final EIS). Mitigation for potential transportation impacts is identified in Section 3.14, Transportation, of the Final EIS and also in the City's draft Conditions of Approval.



April 28, 2001

To: Cle Elum City Council,

This letter is to show my support for lighting codes regarding the new resort development.

I am an amateur astronomer who has been observing under your dark skies for about ten years. I live in the Seattle area do to economic reasons.To go East of the mountains for star gazing is something I look forward to every new moon. I spend at least three nights at Peoh Point, Manashtash Ridge, or Table Mt., depending on the Season and snow fall. Sky glow from Yakima, Ellensburg, and Wenatchee gets brighter every year. It would be a shame to add to this light pollution.

Please do all you can to save your beautiful, night sky. It should not be taken for granted.

1

Sincerly,

Fred Hein

Fred Hein
6608 130th Ave. NE #J-102
Kirkland, Wa. 98033

Comment 1

Comment noted. All lighting for development within the MPR and UGA would meet the International Dark Sky Association's Zone E1 standards. These standards are recommended for use in "areas with intrinsically dark landscapes." Roadway lighting would be consistent with the Illuminating Engineering Society and WSDOT lighting criteria.

received
5/7/01
City of Cle Elum

DATE: May 5, 2001

TO: City of Cle Elum
119 W. 1st St.
Cle Elum, WA 98922

FROM: Shannon Cernick
P.O. Box 1381
Ronald, WA 98940

RE: City of Cle Elum Draft EIS, Bullfrog UGA

After reviewing Trendwest's DEIS for the proposed UGA, I have the following concerns:

1. Traffic-The traffic impacts on our quiet rural area will be huge. Currently, many of our elderly citizens enjoy independent lifestyles because they are able to drive themselves to the grocery store, drug store, church, etc. The immense increase in traffic will make driving more hazardous and will affect this independence . Traffic patterns resulting from the proposed UGA should have minimal impact on the existing communities. 1
2. Schools- The cost of building and maintaining the new schools accommodate the huge population increase will be staggering. Our community is sometimes reluctant to pass school levies, and this problem may increase when vacation property owners vote against levies to keep taxes down on their vacation property. Also, the property given to the school for school expansion should NOT be in close proximity to the power lines. There has been much controversy over the effects of power lines on human health, and our children deserve a better location. 2
3. Highway 903 and Bullfrog Road- These highways are currently scenic. The wooded nature of these roads provides a physical division between the cities of Cle Elum, Roslyn, and Ronald and a barrier between these communities and the freeway. The DEIS mentions that the frequent users of 903 will suffer the biggest visual impact from the UGA. Well, that includes most of the current local residents of Ronald, Roslyn, and Cle Elum. There needs to be a much bigger buffer between the UGA and these two roads. This will help to maintain the rural quality of our area and retain the individuality of the three towns. Also, these roads should remain two-lane roads. Widening them to create more lanes and accommodate the increase in traffic would also ruin the rural atmosphere, especially if trees and houses along the route were to be removed. 3
4. Coal Mine Trail- The DEIS mentions that the Horse Park will be connected to the MPR, the Coal Mine Trail, and the John Wayne Trail. With such a high volume of visitors expected to attend "regional and national competitions," I feel that this would again impose on the current trail users. The Coal Mine Trail is currently a wonderful place to walk with children or others who have a hard time getting around on rougher terrains. It is quiet and peaceful and often private. The high volume of users from the proposed horse park would ruin this local asset. Use of the trail by horse park visitors should not be encouraged. 4

5. Air Quality- The increase in population will inevitably increase air pollution. This is important at all times, but especially during our winter inversion periods. There should be strict regulations about heating sources for the homes and businesses in the UGA. Any other available precautions to preserve air quality should also be taken. 5
6. Water- The Roslyn water supply feeds the current school system. If we have to build more schools to accommodate the growth, where will the schools get the water? More generally, where will anyone get water? At a time when water shortage is a reality, we really need to think about the future. A far smaller UGA, without such wasteful uses as golf courses and horse parks, needs to be considered. 6
7. Noise- One of the greatest things about our area is the peace and quiet found here. A huge population increase also increases noise levels from things such as traffic, machinery, construction, off-road vehicle use, etc. Steps need to be taken to preserve the quiet. 7
8. Night Sky- Many people in our area value the clear night sky. It is a precious thing to be able to sit outside at night and actually see the stars, especially during August, when meteor showers are at their most spectacular. Trendwest needs to follow the recommendations of Bruce Workman and the Dark Sky Society when planning for the lighting of the proposed UGA. 8
9. Quality of Life- Many people live in a small, rural setting because they choose to. They value the closely knit community, the wide open spaces, the wildlife, the natural recreational opportunities, the history, and the tranquility of the area. Something as large and invasive as the proposed UGA will destroy many of these qualities. 9
10. Secondary Growth- Many pieces of land are already being sold and divided for future development in anticipation of the increased demand triggered by the MPR and UGA. What impacts will these developments have on the above issues, and how will Trendwest help our small communities meet our needs regarding this growth? 10

Many of the above issues would be at least partially addressed by reducing the size of the UGA, both in population and area. I consider it a privelege to live in a small town, especially one that it surrounded by such natural beauty. We really need to preserve what we have. 11

Thank you.

Sincerely,

Shannon Cernick

Comment 1

Comment noted. Growth in traffic volumes would occur, and traffic patterns would change over time. The City of Cle Elum is incorporating mitigation for future traffic impacts into the Conditions of Approval for the project. Refer to the response to Letter 9, Comment 1 for additional information.

Comment 2

Comment noted. An updated analysis of future school construction costs and revenues is included in Section 3.18 and Appendix D of the Final EIS. Regarding vacation homeowners and the uncertainty of levy passage, citizens may be registered to vote in only one location. The UGA is planned to provide primary housing, but if vacation homeowners buy in the UGA, they wouldn't be able to vote in Upper Kittitas County. For further discussion of the uncertainty of levies, refer to the response to Letter 1, Comment 9. Since the Draft EIS was published, Trendwest and the Cle Elum-Roslyn School District have negotiated a mitigation agreement (see response to Letter 1, Comment 1). The property proposed for future construction is adjacent to the School District property; the power lines currently border the eastern edge of both properties.

Comment 3

Comment noted. No widening of Highway 903 or Bullfrog Road is planned. Buffers along Bullfrog Road would be 100 feet. A buffer of 50 feet has been added along SR 903. The Business Park's building design (e.g., styles, colors, and materials) would be identified in the development standards for the UGA. Refer to Section 3.11 of the Final EIS for additional discussion of aesthetics, light, and glare impacts and mitigation associated with Alternative 5.

Comment 4

Alternative 5 (Preferred Alternative) does not include a Horse Park. The discussion on page 2-18 of the Draft EIS refers to potential linkages of the Horse Park to other trails for "less formal equestrian activities such as trail riding." In the event a Horse Park is constructed in the future, those kinds of linkages would require careful planning and coordination among local jurisdictions, Trendwest, and equestrian groups to regulate use and limit potential environmental impacts.

Comment 5

Wood-burning fireplaces and woodstoves would be prohibited in all individual residential units within the Cle Elum UGA.

Comment 6

Comment noted. Alternative 5, as analyzed in the Final EIS, is the Preferred Alternative and does not include a Horse Park or a golf course. As part of the RIDGE Settlement Agreement,

Trendwest has agreed to provide Roslyn with water for induced growth (see Mitigation Measures in Section 3.4 of the Final EIS).

Comment 7

Mitigation measures to reduce noise impacts are identified in Section 3.9 of the Draft EIS and Section 3.8 in the Final EIS.

Comment 8

Comment noted. Refer to the response to Letter 10, Comment 1 for a discussion of lighting standards.

Comment 9

Comment noted.

Comment 10

Indirect impacts on land use are discussed in Section 3.10 of Draft EIS and Section 3.9 of the Final EIS. All growth within the County would be consistent with adopted land use plans and zoning regulations. Section 3.18 and Appendix D of the Final EIS describe mitigation agreements negotiated between Trendwest and local public service providers that address potential fiscal impacts caused by UGA growth. These mitigation agreements include programs to monitor actual revenues and expenditures for each provider and shortfall mitigation payments, as may be necessary.

Comment 11

Comment noted. Development under Alternative 5 has been condensed into a smaller area than under Alternatives 2, 3, and 4. Undeveloped open space and perimeter and residential buffers have been increased (see Figure 2-5).

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Region 3 Office: 1701 South 24th Street · Yakima, Washington 98902-5720 · (509) 575-2740

May 6, 2001

City of Cle Elum
ATTENTION: Mayor Gary Berndt
119 West First Street
Cle Elum, WA 98922

Dear Mayor Berndt:

SUBJECT: WDFW Comments on Trendwest Properties: Cle Elum Urban Growth Area (UGA) Draft Environmental Impact Statement (DEIS)

Thank you for the opportunity to comment on this proposal. WDFW looks forward to working with the City of Cle Elum on the evaluation of the proposed UGA.

Water

On page 3.3-7 of the UGA DEIS under section 3.3.3 is the following statement: "Surface water quality is directly related to ground water quality because the majority of percolation and stormwater volume generated by impervious surface would infiltrate. As such, there is some overlap between surface water quality and groundwater quality discussed in Section 3.4."

Additionally, in the MountainStar Master Planned Resort (MPR) DEIS on page 7-16 is the following statement: "Because the water table aquifer beneath the floodplain is in direct hydraulic continuity with the Cle Elum River....."

Again on page 5-4 of the MPR EIS in the last paragraph it reads: "The shallow outwash aquifer is in direct hydraulic continuity with the water flowing in the Cle Elum and Yakima Rivers." 1

On page 3.3-7 of the UGA DEIS in the first complete paragraph it reads: "Although river temperatures are generally cool, temperatures above the Class AA standard of 16 degrees C were recorded during August and September 1998."

These various quotes establish the relationship between surface water, groundwater and stream flow. One of the water quality issues, temperature, is also highlighted.

Currently, the UGA and the MPR are essentially comprised of pervious surfaces throughout. Precipitation, primarily in the form of snow, falls and slowly infiltrates into the vadose and

ultimately is released in the form of groundwater to the Cle Elum and Yakima Rivers. When impervious surfaces are in place as would be the case with the proposed UGA and MPR, there are spacial and temporal disruptions to this cycle. The slow diffuse infiltration that currently exists would be replaced with an accelerated more focused infiltration generated from the impervious surfaces.

The disruptions to the existing hydrology essentially follow this pattern. Stormwater is captured and directed to the infiltration infrastructure. Infiltration then occurs over a relatively small area. What is created in these areas of infiltration is a supersaturated area of soil that acts as a conduit. This conduit delivers the surface water through the vadose to become groundwater which in turn is routed from the site in the form of surface flow to the Cle Elum and Yakima Rivers. Again, the existing slow gradual release of water that occurs is altered to a more efficient routing of the water off the site. In an area where late season flows are a major concern and the receiving bodies of water are on the 303(d) list for temperature, this more efficient routing of water off site is a highly undesirable condition.

This dynamic is further confirmed in Appendices Volume 1 of the UGA DEIS. In Appendix C groundwater is discussed. On the last page of Appendix C it reads: "As groundwater is not laterally confined within the UGA, any infiltrating water will co-mingle with the site groundwater and flow out of the UGA."

1 (cont.)

Timing is everything when it comes to the hydrology of the Yakima River Basin (YRB). If for example the timing of runoff in the YRB were markedly later, none of the infrastructure that the Bureau of Reclamation has in place would even be necessary. The modification to the local hydrology that will result from the UGA and the MPR are not water neutral. Further impacts to an impaired body of water cannot occur.

2

In the UGA DEIS at the bottom of page 3.5-36 is the following statement: "Future consumptive use of water on lands made fallow by retirement of irrigated acres in or near Ellensburg associated with Trendwest's water rights is not considered an impact." This statement is unsupported by anything presented in the DEIS. Clearly, future consumptive use of water is an issue at this location because of the direct actions taken by representatives of Trendwest to facilitate development of their property into a UGA and MPR. This is a connected action.

3

Later in the same paragraph on page 3.5-37 it reads: "Any such public or private developments pursued in the future are outside the scope of this Draft EIS as they are not interdependent with the UGA development". Again this is a connected action and this reasonably foreseeable action is a cumulative impact. There are issues here of less groundwater recharge, a net increase in consumptive use, increase in impervious surface and potential exempt wells. Conversely, in upper Reecer Creek, there is a modest but insufficient qualitative attempt to address groundwater

4

recharge impacts as a result of the developments. This can be found on page 3.5-36. This area that is referred to as in or near Ellensburg is of similar impact, but receives no such consideration within the document. A distinction is being drawn without any real difference between the two areas. 4 (cont.)

In the UGA DEIS on page 3.5-20 winter water impacts are discussed. The following paragraph is found here. It reads: "During flip- flop, Trendwest diversions from the Yakima River would reduce flows downstream from the City of Cle Elum Yakima River diversion to Swauk Creek. This reduction would not adversely affect Yakima River stream flow because BOR's goal is to keep streamflow low in the upper Yakima River during this period. A reduction in the flip-flop streamflow would lower the flow required for winter incubation flows, enabling BOR to release less water from its reservoirs to maintain winter incubation flows from Trendwest diversions than without."

The preceding paragraph is entirely erroneous as are the assumptions that are based on it. How can removing water at a downstream location enable the BOR to have more water in their upstream reservoir? Following the logic employed here, the greater the withdrawals downstream, the fuller the reservoir becomes. The flip-flop management is to reduce flows so spawning will not occur in stream margin areas that would require large continuous releases from reservoirs to prevent de-watering of salmon redds. This management is not biologically based. It simply allows BOR to store more water over the winter and spring and prevents redd de-watering. The management objective of a more normative river flow will modify current management. Current management should not be viewed as static in nature or desirable. It is highly likely that a biological assessment of BOR operations will modify irrigation project operations. 5

In Appendices Volume 1 of the UGA DEIS on page 4-37 is section 4.3.2. Here a comparison of zero flow days with and without the project is made. In light of the federal fish listings and the illegal act that drying up streams entails, the benefits portray are overstated. 6

Groundwater Quality

On page 3.3-12 of the UGA DEIS is the following statement: "Pollutant concentrations reaching the Cle Elum and Yakima rivers are anticipated to be small and would be further reduced through instream mixing." Also on the same page is the following quote: "Frequent detections of pesticides in urban and suburban areas indicate that stormwater infiltration significantly contributes to pesticide occurrences in shallow groundwater (AESI 1999)." The Yakima and Cle Elum rivers are already on the Ecology 303 (d) list. Fecal coliform occurs in the groundwater of the proposed UGA (page 3.4-10). Ammonia, which is lethal to fish, is a byproduct of horse urine. Composting would only deal with a portion of the horse manure. The golf course will be 7

very chemically intensive. The yards and grounds of the various residences are unregulated as to private applications of fertilizers and pesticides. The dilution or mixing that the proponent refers to as mitigating circumstance is already insufficient in dealing with pollutants. Clearly, the quality of surface water via groundwater will be degraded. 7 (cont.)

Wildlife

In Appendix E of Appendices Volume 1 of the UGA EIS is a list of species from the U.S. Fish and Wildlife Service. The list is dated January 14, 1999. A current list should be incorporated into the analysis. Listings have occurred over the last two years. 8

A considerable amount information regarding wildlife was not incorporated in the DEIS of the UGA and the MPR EIS. The I-90 Land Exchange EIS and the Snoqualmie Pass Adaptive Management Area EIS are extensive studies immediately adjacent to Trendwest properties. Clearly they are relevant to the proposed projects. Additionally, the paper titled: The Biological Case for preserving Lands in the I-90 Corridor authored by Mariann Armijo should be included in the UGA analysis. This study is available over the internet at the Cascade Conservation Partnership's web site. The Wildlife Habitat Linkage Assessment authored by Peter Singleton and John Lehmkuhl out of the PNW Wenatchee Forestry Sciences Lab for the Washington State Department of Transportation (DOT) is also important information that is omitted. It is available on the DOT website. 9

Thank you for the opportunity to provide this information. If you have any questions, please contact me at (509) 457-9322.

Sincerely,

Mark S. Teske

Mark S. Teske
Area Habitat Biologist

MST:mst

cc: Clausing, WDFW
Deusen, WDFW
Doneen, Ecology

Comment 1

Neither the Reduced Density MPR nor Alternative 5 (Preferred Alternative) for the UGA propose development near the Cle Elum River corridor where the alluvial aquifer is in direct continuity with the Cle Elum River. Water infiltrated on the MPR and UGA sites after treatment would not reach the river immediately, and could have no thermal impact after subsurface transit. Refer to Section 3.3, Water Quality, for an updated analysis of potential water quality impacts for Alternative 5 and potential cumulative impacts with the MPR.

Comment 2

Comment noted. Refer to the updated analysis of impacts on Yakima River flow provided in Section 3.4, Water Supply, and in Appendix B of the Final EIS. Both of these sections contain mitigation measures to avoid adverse flow changes or an increase in net consumption of water in the Yakima River basin.

Comment 3

Comment noted. Since the Draft EIS was published, an analysis of fallowed lands as an indirect impact has been conducted; Trendwest has agreed to mitigate for these indirect impacts. Refer to Section 3.4 of the Final EIS and Exhibit H of Appendix B, the Water Supply Technical Report Supplement, for additional information.

Comment 4

Trendwest has entered into a Cooperative Agreement with the Washington Department of Fish and Wildlife and the Yakama Nation to address agency and tribal concerns about environmental impacts from Trendwest's development proposals for the MPR and UGA. The Cooperative Agreement provides measures to protect against environmental impacts outside of Trendwest property. Among other provisions, the agreement establishes that Trendwest will provide funding for the MountainStar Conservation Trust to acquire water rights from the upper Yakima River and its tributaries, to increase instream flows and to reduce consumptive uses of water within the upper basin. The purpose is to protect aquatic resources and downstream water users from impacts resulting from activities that are indirectly related to Trendwest's development activities. The water rights to be purchased under the agreement are in addition to the water rights Trendwest has purchased to serve the projected water demand for the MPR and UGA development projects.

Since the Draft EIS was published, the analysis of potential water supply impacts has been expanded and updated to reflect the current Reduced Density MPR and Alternative 5 development scenario. Additional studies have been conducted on affected basins, including potential water demand from exempt groundwater wells and the effect on baseflow. Refer to Section 3.4 and Appendix B of the Final EIS for this revised analysis.

Comment 5

Comment noted. Trendwest discussions with the U.S. Bureau of Reclamation (USBR) since the Draft EIS was published have established that USBR is not restricted by flows in the portions of the mainstem Yakima River that is affected by the MPR and UGA proposals. Rather, USBR regulates releases in the Yakima River basin based on target flow requirements upstream of the projects. The paragraph referenced in your comment has been removed. An updated discussion of potential impacts to water supply is provided in Section 3.4, Water Supply, in the Final EIS.

Comment 6

Comment noted. The number of zero flow days is not presented as a measure of impact in the updated water supply analysis contained in the Final EIS.

Comment 7

In response to comments on the Draft EIS, a quantitative analysis of potential water quality impacts has been conducted for Alternative 5 and cumulatively with the MPR. Alternative 5 (Preferred Alternative) does not contain a Horse Park or a golf course. A higher level of stormwater treatment is proposed for Alternative 5 than had been included in the Draft EIS evaluation. The stormwater treatment and benefits of infiltration through native soils are analyzed in Section 3.3 and Appendix A of the Final EIS. The analysis shows that stormwater infiltration from either the UGA or the combined UGA and MPR developments would not adversely affect groundwater quality or water quality in the Yakima River. The evaluation shows the results of treatment prior to any mixing with the groundwater or with the Yakima River, and provides a comparison of the undiluted results to background water quality, regulatory surface and groundwater standards, and sublethal data in the literature for fisheries. Non-point water quality changes from landscaping under Alternative 5 also are evaluated.

Comment 8

Comment noted. Threatened and endangered species information requested from WDFW and the USFWS in October 2001 is included in Section 3.5, Plants and Animals, of the Final EIS. Agency response letters from WDFW and USFWS are included in Appendix G of the Final EIS. Threatened and endangered species that were not identified in the Draft EIS are discussed in the Final EIS. Refer to Section 3.5, Plants and Animals, of the Final EIS for additional detail.

Comment 9

Comment noted. The following documents were reviewed and information was incorporated into Section 3.5, Plants and Animals, of the Final EIS.

- *Final Report on the I-90 Snoqualmie Pass Wildlife Habitat Linkage Assessment,*
- *The Biological Case for Preserving Lands in the Interstate 90 Corridor,* and
- *Snoqualmie Pass Adaptive Management Area Plan Final EIS.*

OSHIE & SPURGIN
ATTORNEYS AT LAW

PATRICK J. OSHIE
PATRICK D. SPURGIN

received
5/7/2001
City of Cle Elum

VIA TELEFAX & SURFACE MAIL

May 7, 2001

Honorable Gary Berndt, Mayor
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Dear Mayor Berndt:

On behalf of the Confederated Tribes and Bands of the Yakama Nation, we are submitting the following initial comments on the *Trendwest Properties: Cle Elum UGA Draft EIS* issued by the City of Cle Elum in March 2001. The Yakama Nation will continue to review the technical basis for the characterization of impacts and will provide additional comment to the city and the proponent as may be appropriate. In accordance with the cooperative agreement between the Yakama Nation, Trendwest, and the Washington Department of Fish and Wildlife, the Yakama Nation will be prepared to meet with the proponent to discuss comments and potential responses as may be appropriate.

The Yakama Nation is committed to assuring the protection of its rights as recognized in the Treaty of 1855. The proposed project is located on lands ceded to the United States by the Treaty. Yakama ancestors traveled and occupied the project area since time immemorial. The protection of cultural resources located on the subject property is a crucial objective in the review of the proposed project. Enhancement of salmonid species and associated habitat and stream flows in the Yakima River Basin is also a critical consideration. As well, the Total Water Supply Available (TWSA) in the Yakima River Basin managed by the U.S. Bureau of Reclamation to serve the Yakama Nation and its members, as well as other public and private interests, must be protected. 1

Any proposed action that has the potential to affect these values presents the potential for significant environmental impacts and must be carefully and thoroughly assessed. The environmental review of the UGA and the proposed water supply strategy must provide a satisfactory level of confidence in the technical analyses of the current conditions, predicted impacts, and effectiveness of mitigation is key issue. The Yakama Nation is particularly interested in following aspects of the project:

1. Protection of cultural resource values. The Yakama Nation considers threatened destruction of cultural resources on these ceded lands to be an inescapably significant impact. Mitigation can only be assured if appropriate identification methods are employed in property development. In 2

411 N. 2ND ST., YAKIMA, WA. • 98901
PHONE: (509) 248.4282 • FAX: (509) 575.5661

particular, it is not appropriate for the proponent to render an independent determination of the significance of newly discovered cultural resources sites without consultation with the Yakama Nation Cultural Resources Program. 2 (cont.)

2. *Fish and aquatic resource impacts that may be encountered as a consequence of the proposed new diversions near Cle Elum and the other applications.* We have previously noted the Supplemental Documentation in Support of Trendwest Resorts, Inc. Applications to the Department of Ecology (Sept. 2000). That study report focuses solely on how the Trendwest diversion would affect existing irrigation diversions downstream of the new proposed site. We have not yet been made aware of any analysis of the fisheries, wildlife or other aquatic life impacts of hydraulic changes associated with the diversion other than the characterization of hydraulic impacts as insignificant in the DEIS. In this and other uses of predictive or analytical models in the development of the DEIS, the statistical reliability of the inputs, data sensitivity of results, and model validation results must be made clear. 3 4

3 *Impact on aquatic and other resources of changing the time, place and purpose of use of water in accordance with the pending change applications.* Discontinuation of all or part of the diversions used for water rights acquired by Trendwest will have an effect on the timing and magnitude of shallow aquifer discharge and recharge, as well as potential riparian habitat in the various tributaries in the Upper Yakima Basin. These impacts and their relation to fisheries resources must be adequately understood and discussed in the EIS. 5

4. *Whether the proposed transfers impair the Yakama Nation's water rights delivered through the Wapato Irrigation Project or otherwise present implications of direct, indirect or cumulative increases in consumptive use of water in the Yakima Basin beyond current uses that may result from the proposed transfers.* As noted, protection of TWSA is fundamentally important, and project aspects that directly or indirectly affect TWSA, including purported enhancements, must be clearly understood for effective decision-making on water resources management matters. No action by the Yakama Nation should be construed as supporting a reduction in TWSA. Water reuse should not be an avenue to increase consumptive use of any transferred water rights. 6

5. *Surface and groundwater quality implications of the project.* Salmon recovery and enhancement depend on the protection of water quality in the basin, and any development must be considered in light of potential impacts to water quality. The Yakama Nation would prefer the analysis of water quality impacts from UGA development to be made in conjunction with the analysis of regionalization of the Cle Elum Wastewater Treatment Facility. Such conjoint analysis appears more defensible than awaiting a separate plant expansion environmental review. 7
The contamination of ground water that is continuous with basin surface water presents some threat to fisheries. The extent to which stormwater management techniques effectively attenuate contaminant loading from impermeable surfaces and other sources at the project site must be clearly understood and appropriate mitigation measures analyzed to minimize this risk.

6. Nonproliferation of floodplain construction aggregate mining activity. The Yakama Nation has long strived to abate the development of alluvial floodplain gravels as a source of construction aggregate. Such alluvial gravel deposits have long been preferred sources because of ease of extraction and proximity to construction sites. In view of the increasing scientific understanding of the relationship of the alluvial deposits to the ecology of the Yakima River, use of these sources must be discouraged. Trendwest has agreed to avoid using such sources for MPR development. We are not aware of any portion of the DEIS wherein the potential for UGA development to encourage alluvial floodplain gravel exploitation has not been assessed as a potential impact. 8

Thank you for your consideration of these comments. We look forward to further discussions regarding the necessary analysis of the elements of the UGA development process. Feel free to call me at (509) 248-4282 with any questions or concerns regarding this matter.

Sincerely,

Patrick D. Spurgin
Attorney at Law

Comment 1

Comment noted. The City recognizes and appreciates the Yakama Nation's willingness to assist the City in its review of the proposal, consistent with the provisions of the Cooperative Agreement among Trendwest, the Yakama Nation, and the Washington Department of Fish and Wildlife dated December 4, 2000. The Draft EIS, in Section 3.7, acknowledges the role of the Yakama Nation in implementation of the Cooperative Agreement.

An updated discussion of cultural resources protection under Alternative 5 is included in Section 3.12 of the Final EIS. Protection of cultural resources within the UGA is included in the Conditions of Approval for the project. Consultation with the Yakama Nation is included in the proposed mitigation.

The total water supply available (TWSA) in the Yakima River basin, which is managed by the U.S. Bureau of Reclamation, is discussed in Appendix D and Section 3.5 of the Draft EIS. The TWSA analysis is updated in Section 3.4, Water Supply, of the Final EIS, and evaluated in detail in Appendix B, the Water Supply Technical Report Supplement. See also the response to Comment 6, below.

Comment 2

Comment noted. Refer to the response to Comment 1, above.

Comment 3

Comment noted. Impacts on flows in the mainstem Yakima River and tributaries are cumulatively analyzed in Appendix B of the Final EIS. Changes in Yakima River water levels have been reevaluated to reflect the Reduced Density MPR and Alternative 5 development scenarios. This analysis is included as Exhibit K to Appendix B. The water rights transfer would restore more natural conditions to affected tributaries, and no significant impacts on aquatic resources are identified. For selected diversions, predicted effects range from increasing water levels slightly during the early part of the irrigation season to decreasing water levels slightly during September. The proposed water rights transfer is not expected to have any significant negative impact on fish habitat quality in the upper Yakima River basin.

Comment 4

Information on the statistical reliability of the water balance model inputs, data sensitivity of model results, and model validation results has been added to Appendix B of the Final EIS. Statistical uncertainty limits are calculated for the estimated streamflow inputs to the model. The sensitivity of model results to uncertainty in estimates of tributary streamflows, irrigation and stockwater efficiencies, and irrigation return flow lag time distributions are assessed.

Comment 5

The effect of discontinuing tributary diversions on the timing and magnitude of shallow aquifer discharge and recharge was incorporated into the updated and expanded water supply analysis conducted for the Final EIS (see Section 3.4 and Appendix B). Ecology's consultant team provided lag times of former return flows through shallow aquifers that are associated with Trendwest tributary water rights. The lag times are included in the water balance model. No significant negative impact on fish habitat quality in the upper Yakima River basin is anticipated (see response to Comment 3, above).

Comment 6

An updated analysis of total water supply available (TWSA) is provided in Section 3.4 and Appendix B of the Final EIS. Two components of TWSA are natural streamflow and irrigation return flow between April 1 and September 30. To evaluate Trendwest's potential TWSA impact, the combined effects of Trendwest's proposed water transfers and flow timing changes were calculated from the combined model results over the study period of 1991 through 1995 and 2001, the years for which Trendwest had a simulated record incorporating the entire storage release period. In both average and drought years as modeled, there would be a surplus of water resulting from Trendwest's proposed water rights transfers for the combined MPR and UGA during the period from April 1 through September 30. Trendwest's potential to affect reservoir storage is also evaluated during the TWSA storage control period in these same sections of the Final EIS.

The City of Cle Elum does not currently propose water reuse as part of its wastewater planning efforts, and impacts have not been analyzed in the Final EIS. If a proposal for reuse is considered in the future, water balance issues would be revisited at that time.

Comment 7

Stormwater treatment prior to infiltration has been increased since the Draft EIS was published. A quantified analysis of stormwater quality is included in Section 3.3, Water Quality, and Appendix A of the Final EIS. A discussion of potential loadings to the Yakima River from the regional wastewater treatment plant has been added to the cumulative impact discussion in Section 3.16, Utilities, of the Final EIS. The City of Cle Elum is the lead agency for construction of the regional treatment plant. Refer to Section 3.16 for an updated discussion on the status of the environmental review process for the treatment plant.

Comment 8

Trendwest has agreed to avoid using aggregate from the floodplain for both MPR and UGA development.

Washington State Department of Transportation
Sid Morrison
Secretary of Transportation

South Central Region
2809 Rudkin Road, Union Gap
P.O. Box 12560
Yakima, WA 98909-2560
509-577-1600

received 5/7/2001 City of Cle Elum

May 7, 2001

City of Cle Elum
119 West First Street
Cle Elum, WA 98922-1105

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2

To Brian Carrico	From John Gruber
Co. City of Cle Elum	Co. WSDOT-SCR
Dept. Planning	Phone # (509) 577-1636
Fax # (509) 674-4097	Fax # (509) 577-1603

Attention: Gary Berndt, Mayor City of Cle E

Subject: Trendwest Properties – Cle Elum Urban Growth Area Draft EIS
I-90, Bullfrog Interchange – approximately MP 79.91-83.12
SR 903, approximately MP 2.79-4.25

We have reviewed the proposed subarea planning, zoning, and master planned development review of the City of Cle Elum Bullfrog Urban Growth Area (UGA) and have the following comments.

1. The proposed project is adjacent to Interstate 90. I-90 is a fully-controlled limited access facility. No direct access to I-90, including the interchanges, will be allowed. 1

   SR 903 is a Class 4 Access Managed highway adjacent to the proposed UGA boundary. In the unincorporated area, road approach access to the highway requires approval by WSDOT. 2

2. In their traffic analysis, the applicant indicates the SR 903 (1st Street)/Oakes Avenue intersection falls to a Level of Service (LOS) F in project year 5. While we agree with this analysis, WSDOT does not have a specific project to signalize this intersection. We believe this development, the MountainStar Master Planned Resort, and other developments should be responsible for signalizing this intersection on a pro-rata share basis. Also, we believe this intersection should be signalized prior to approval of any development, and should not wait for signalization as part of a monitoring program. 3

3. In their traffic analysis, the applicant indicates the SR 903/Bullfrog Road intersection in the northbound direction falls to a Level of Service (LOS) E in project year 5. We agree with this analysis. WSDOT has no current plans to make any improvements to this intersection. Therefore, the developer, together with the MountainStar MPR, should bear the entire cost of improving this intersection. Also, we believe the intersection improvements should be constructed in conjunction with Stage I, and not wait to be constructed as part of a monitoring program. 4

4. All alternatives provide access from Ranger Station Road. Table F-4i identifies significant traffic volumes and turning traffic at the intersection of SR 903 yet no analysis was performed. The proponent needs to include this intersection with the appropriate analysis. 5

5. On page 3.15-29, the proponent acknowledges they are responsible for the construction of new intersections on state highways. Although we agree, the proponent and the City are encouraged to coordinate the access on SR 903 with WSDOT. Specifically, an unrelated development was conditioned with a traffic signal at milepost 2.90. The distance from the UGA access point to this new signal appears to be about 0.30 mile to the north. **6**

6. WSDOT has existing plans to widen I-90 to 6 lanes in the Lake Keechelus area. We believe this project will not only benefit the proposed development, but the City of Cle Elum as well. In the EIS, the developer shows an impact to the I-90 mainline. It is our position that this development and the MountainStar MPR should participate in this project on a pro-rata share basis. **7**

7. Of primary concern is the effect this proposal will have to the interstate and interchanges. The traffic summary Tables F-6 through F-12 identify the Bullfrog Road interchange as operating at an LOS of "E" by project year 10 depending on the selected alternative. This development is responsible (as acknowledged on page 3.15-30) for improvements to the interchange, as required. **8**

In summary, we believe the proponent is responsible for the total costs of improving the Bullfrog Road/SR903 intersection, and the new access road near the proposed multi-family area and SR 903 intersection. Improvements include channelization widening, traffic signals or both. We believe the proponent is also responsible for their pro-rata mitigation for the impacts to mainline I-90, the I-90/Bullfrog interchange, SR 903/Ranger Station Road, and improvements to the First Street/Oakes Avenue intersection. **9**

Due to the magnitude of this proposed development and its impacts to the transportation system, we would be interested in meeting with the proponent and the City of Cle Elum to discuss these (or other) mitigation measures. The WSDOT is willing to discuss the developer's proposal for monitoring the traffic impacts throughout the UGA's construction timelines. Thank you for the opportunity to review and comment on this proposed project. If you have any questions, please contact me at (509) 577-1630. **10**

Sincerely,

Troy A. Suing, P.E.
Regional Planning Engineer

TAS: rh/jjg
cc: File #4, SR 90
Terry Kukes, Area 1 Maintenance Superintendent

p:\planning\devrev\sr90\cle elum_trendwest uga_eis.doc

Comment 1

Comment noted. No direct access to I-90 is proposed.

Comment 2

Comment noted.

Comment 3

Improvement of this intersection has been included as a condition of approval for the MPR in Kittitas County and UGA in Cle Elum. According to state standards, traffic signals should be installed when signal warrants are met. Thus, while the need for the signal improvement has been identified for a particular year based on projections in the Draft EIS and Final EIS, a proposed monitoring program would more precisely track MPR and UGA development and the traffic signal improvement would be timed appropriately to when signal warrants are met. Refer to additional discussion of these requirements in Section 3.14 of the Final EIS.

Comment 4

Realignment of this intersection has been included as a condition of approval for the MPR in Kittitas County and UGA in Cle Elum. The MPR condition of approval obligates the developer to pay the full cost to realign this intersection at the time any MPR accommodation units are developed. The need and timing for a signal or other traffic control measures at this intersection would be subject to the requirements for meeting signal warrants, as described above in the response to Comment 3. Refer to additional discussion of this intersection in Section 3.14 of the Final EIS.

Comment 5

Level-of-service impacts for the SR 903/Ranger Station Road intersection were analyzed in the Draft EIS. Because the LOS standard did not fall below LOS D, results were shown in the Appendix only. An updated analysis of LOS impacts pertinent to Alternative 5 is presented in Section 3.14 and Appendix F of the Final EIS. This intersection is predicted to maintain a LOS A through project buildout of both the MPR and UGA.

Comment 6

Comment noted. Access to SR 903 from the UGA will be coordinated with WSDOT.

Comment 7

Comment noted. WSDOT, not the City, is responsible for all planning and funding for I-90 widening. The City is not aware of any existing WSDOT program in place for equitably obtaining pro-rata shares from all affected development and property owners for I-90 widening.

Comment 8

The Draft EIS does show the I-90 eastbound ramp intersection with Bullfrog Road operating at LOS E on weekends in Year 10 with the MPR. In the updated analysis contained in Section 3.14 and Appendix F of the Final EIS, this intersection is shown to operate at LOS D on weekdays and LOS F on weekends by Year 10 with the MPR.

The Final EIS discusses a possible mitigation measure of changing the stop-controlled movement to northbound-southbound from eastbound, which would improve the LOS to C. This would be a low-cost modification that would be funded by Trendwest.

Comment 9

Refer to the responses to Comments 2 through 8, above.

Comment 10

Comment noted. One meeting with WSDOT has taken place since the comment letter was submitted, and additional meetings will likely occur.

received
5/7/01
City of Cle Elum

RIDGE
PO Box 927
Roslyn, WA 98941
15 February, 1997

Kittitas County Planning Commission
205 W. 5th
Ellensburg, WA 98926

Larry Lewis

Re: Trendwest Development Agreement

Dear Commission Members:

Following are RIDGE's comments on Trendwest's draft Development Agreement.

This document applies only to the application process and does not contain most of the information required in a true development agreement, such as site plans, development standards, design standards, open space preservation, etc. Yet Trendwest is taking advantage of 2 very important aspects of a development agreement; a vesting period and protection from new standards, regulations and zoning ordinances. This sketchy application should not be viewed as a development agreement and the developer should not be granted the protections afford by a development agreement. Even this document states that **"this Agreement contemplates a future development agreement"** (page 9). By agreeing to the terms of this agreement, the County ties its hands on any future relevant ordinances, standards or regulations, and agrees to accept the developer's terms even though the build-out period may be 15 years or more. As RCW 36.70B.180 states.

"Unless amended or terminated, a development agreement is enforceable during its term by a party to the agreement. A development agreement and the development standards in the agreement govern during the term of the agreement, or for all or that part of the build-out period specified in the agreement, and may not be subject to an amendment to a zoning ordinance or development standard or regulation or a new zoning ordinance or development standard or regulation adopted after the effective date of the agreement. A permit or approval issued by the county or city after the execution of the development agreement must be consistent with the development agreement."

1

On page 3, in Item 5, Trendwest wants the County to accept **"such other applications as Trendwest desires to submit"**. This is unnecessarily vague and leaves the door wide open to any unspecified development, as does the comment on Page 2 that **"mixed uses, such as resort focused retail and commercial services might be included"**. This lack of specificity may in future be interpreted to allow for a mega-mall to provide commercial services to resort guests. The law

does not require the County to accept such vague, non-specific terms from the developer. As RCW36.70B.170 reads "**a development agreement shall be consistent with applicable development regulations adopted by a local government...**" Kittitas County has land-use laws in place which are applicable to all development in the County. Those laws must be considered in terms of this development also. It is also worth noting that if the developer seeks to add to their application later, the development agreement should outline the process for amendment. This document does not.

We see this vagueness again on Page 4: "**at Trendwest's option, the application review process may consider uses for the property other than, or in addition to, an MPR.**" Again, this is wide-open and allows the developer the potential to put in any sort of development. If that is so, the county may not be getting the touted benefits of a MPR; perhaps the county should rethink whether this entire process makes sense.

Page 4, paragraph 2: "**such permits will not be approved.**" Such permits should not even be submitted by the developer nor accepted by the County until the MPR application is approved.

Page 4's request that "**the application components will be vested as of the date of filing with the County**" is not at all a requirement of the law. By granting the applicant vesting at this stage of the process, the county is making a substantial give-away. In fact, the County is tying their own hands when they're not required to do so. As stated earlier, Trendwest is asking for protection with an inadequate document. **1 (cont.)**

Page 5, paragraph 2: "**Consistent with KCC 15.04, Trendwest shall propose the use of an independent consultant (the "EIS Consultant") from the County's list of approved, qualified consultants**". In order to present an appearance of fairness, the county should remain wholly responsible for the EIS process. The developer should not have any control over the selection of the EIS consultant to ensure the consultant's independence. Once the consultant is approved, the developer should have no involvement in the retention or dismissal of that consultant. The same appearance of fairness is in question on page 9 where Trendwest proposes to pay the County for their services. It's worth noting that some counties prohibit the developer paying the costs of the planning process in order to prevent a conflict of interest. If the county is to have the process paid by the developer, how can they assure the public that the process is in the best interest of the public?

Trendwest's proposed work schedule makes it obvious that the public is to receive short shrift. The developer is planning a mammoth project, yet the provisions allowing for public review and participation are inadequate. The 30 day comment period on the EIS is the minimum amount required and can be expanded to 45 days.

and even beyond that with the consent of the developer. The process is being crunched and provides for only a 10 day comment period between the issuance of the final EIS and related Planning Commission hearing, a 10 day period between that Planning Commission Hearing and the Commission's recommendations to the BOCC, while the BOCC is allowed 10 days for action on their part. Even the Planning Commission and the BOCC are being given short-shrift in the process as they are being pressured to act quickly. This project is one of the most massive ever proposed within Kittitas County, and the public and County officials should be provided with the maximum time allowable rather than the minimum as suggested by Trendwest. Even Trendwest refers to "**the scope of the proposed MPR and the large area in which it will be developed**" and requests that the area be adopted as a separate Subarea.

Page 6, paragraph 2: RIDGE requests that one alternative analyzed in the EIS be that of maintaining the lands as forest lands of long term commercial significance.

Page 7, paragraph 2: The developer's request that the county consolidate review and action to a 2-step process is an attempt to modify existing County procedure. As mentioned above, with a project of this size Trendwest should not be allowed to limit public comment or review, nor to bypass the existing process for review. The existing 3-step process of Planning Commission, BOCC, and Board of Adjustment review serves for much smaller projects and must be in all fairness apply to this developer also. After all, the County must have had good reason to establish such a process in the first place. **1 (cont.)**

RIDGE would like clarification regarding the planning report referred to on page 8 . We are concerned that a non-planning document may be termed a "planning report" and serve to dilute the EIS.

RIDGE requests that some of the hearings in this process be held on weekends to allow for more public participation. All of the hearings should be held in Upper County since this is an Upper County issue. We would also like to see any development agreements include provisions for gathering public input through public forum such as town meetings.

Despite the development agreement, the county and the developer cannot ignore GMA legislation pertaining to these lands. As we all know these lands are presently under appeal to the EWGMHB for the County's failure to designate as commercial forest lands. Both the County and Trendwest are accountable to GMA legislation and cannot avoid its requirements regarding forest lands, urban growth areas, etc.

Gayle Fop
for RIDGE

Comment 1

This is a copy of a letter from RIDGE to the Kittitas County Planning Commission dated February 15, 1997, containing comments on a draft development agreement for the MPR. As such, it is not related to the UGA development and associated decisions being considered by the City in this EIS. A development agreement, subarea plan, and zoning regulation will govern the review or proposed development in the UGA. Receipt of this letter is noted.

received
3/7/2001
City of Cle Elum

To: the City of Cle Elum

Thank you for the opportunity to respond to the proposed U.G.A. west of Cle Elum. I am of the opinion that the D.E.I.S. does not adequately address many Issues and should go under a further review.

Section 3-13, cultural resources, is one area that I feel needs to have a more complete set of mitigations to address the impacts that will occur if such a development should be passed by the city. Although American Indian Cultural sites have been listed as a studied area I feel that stronger language should be included to ensure compliance with Washington state law(see attachment "Washington"). Also, archeological finds pre-dating human habitation seem to be completely unadressed, this may seem to be of small concern at the present time, court records show that ownership of prehistoric finds can lead to costly court cases, especially when more then one controlling entity is involved (see attachment "Sue"...) I would ask the city and Trendwest to work in a pro-active wording to allow for any possible scenarios that these documents bring to attention. 1

Furthermore, Trend-west's D.E.I.S., ignores any of the cultural assets that the land has for the modern people of the valley. How does T.W. propose to mitigate for the loss of open-space, the destruction of small town America, and the destruction of critical wildlife habitat. I feel that the City of Cle Elum should encourage Trend-west to mitigate these losses through the purchase of wild lands in the upper county to be placed into permanent conservation easement (see Attachment "the conservation easement") this would be a small mitigation for the destruction of the rural character and the urban sprawl that T.W. will bring if there project is allowed to go in as proposed.(see attachment "Indications of Urban sprawl). 2

Furthermore many studies indicate that developments such as these become finical burdens to the communities that they are attached to, not the economic windfall that trend-west has purported (see attachment "of government"). I believe that a pro-active mitigation for the services that T.W. will impact are required, I.E. money for the schools, police and fire departments and roads. 3

I believe that before any approval of this project is put forth a new comprehensive D.E.I.S. should be drafted. This document should study modern culture, wildlife connectivity, secondary growth, water quality, water distribution, cost of maintaining infrastructure if Trendwest should abandon the area, impacts of the U.G.A. on the county roads of bullfrog and 903 and environmental concerns. 4

I would also like the city to request documentation that Trendwest is financially capable of addressing any mitigation that they have already offered, and any that the communities surrounding their proposed development may impose now or in the future. 5

I would also like to point out that "phased Environmental review" makes public comment nearly impossible. How can the U.G.A. be commented on if large portions such as the horse park are left out of the D.E.I.S.? 6

If the City and County are committed to turning the upper county into another strip-mall, suburbia, the people should at least be afforded the opportunity to see what kind of environmental havoc the process will reap. 7

Thank you

Larry Susich

WASHINGTON

Washington Revised Codes 27.53.010 (1991)
Declaration.
The legislature hereby declares that the public has an inte-rest in the conservation, preservation, and protection of the state's archaeological resources, and the knowledge to be derived and gained from the scientific study of these resources.

Washington Revised Codes 27.53.020 (1991)
Archaeological Resource Preservation, Etc., Declared Public Functions--Archaeological Research Center Designated State Agency--Cooperation Enjoined.
The discovery, identification, excavation, and study of the state's archaeological resources, the providing of information on archaeological sites for their nomination to the state and national registers of historic places, the maintaining of a complete inventory of archaeological sites and collections, and the providing of information to state, federal, and private construction agencies regarding the possible impact of construction activities on the state's archaeological resources, are proper public functions...

Washington Revised Codes 27.53.040 (1991)
Archaeological Resources--Declaration.
All sites, objects, structures, artifacts, implements, and locations of prehistorical or archaeological interest, whether previously recorded or still unrecognized, including, but not limited to, those pertaining to prehistoric and historic American Indian or aboriginal burials, campsites, dwellings, and habitation sites, including rock shelters and caves, their artifacts and implements of culture such as projectile points, arrowheads, skeletal remains, grave goods, basketry, pestles, mauls and grinding stones, knives, scrapers, rock carvings and paintings, and other implements and artifacts of any material that are located in, on, or under the surface of any lands or waters owned by or under the possession, custody, or control of the state of Washington or any county, city, or political subdivision of the state are hereby declared to be archaeological resources.

Washington Revised Codes 27.53.045 (1991)
Abandoned Archaeological Resources--Declaration.
All historic archaeological resources abandoned for thirty years or more in, on, or under the surface of any public lands or waters owned by or under the possession, custody, or control of the state of Washington, including, but not limited to all ships, or aircraft, and any part or the contents thereof, and all treasure trove is hereby declared to be the property of the state of Washington.

Washington Revised Codes 27.53.060 (1991)
Disturbing, etc., Archaeological Resource or Site without Written Permit or Permission Unlawful--Conditions Allowed-- Exceptions.
On the private and public lands of this state it shall be unlawful for any person, firm, corporation, or any agency or institution of the state or a political subdivision thereof to knowingly remove, alter, dig into, or excavate by use of any mechanical, hydraulic, or other means, or to damage, deface, or destroy any historic or prehistoric archaeological resource or site, or remove any archaeological object from such site, except for Indian graves or cairns, or any glyptic or painted record of any tribe or peoples, or historic graves as defined in chapter 68.05 RCW, disturbances of which shall be a class C felony punishable under chapter 9A.20 RCW, without having obtained a written permit from the director for such activities.

Washington Revised Codes 27.53.070 (1991)
Field Investigations--Communication of Site or Resource Location to Research Center.

Washington Revised Codes 27.44.020 (1991)
Examination Permitted--Removal to Archaeological Repository.
Any archaeologist or interested person may copy and examine such glyptic or painted records or examine the surface of any such cairn or grave, but no such record or archaeological material from any such cairn or grave may be removed unless the same shall be destined for reburial or perpetual preservation in a duly recognized archaeological repository and permission for scientific research and removal of specimens of such records and material has been granted by the state historic preservation officer...

Washington Revised Codes 27.44.030 (1991)
Intent.
The legislature hereby declares that...(1) Native Indian burial grounds and historic graves are acknowledged to be a finite, irreplaceable, and nonrenewable cultural resource, and are an intrinsic part of the cultural heritage of the people of Washington. The legislature recognizes the value and importance of respecting all graves, and the spiritual significance of such sites to the people of this state; (2) There have been reports and incidents of deliberate interference with native Indian and historic graves for profit-making motives; (3) There has been careless indifference in cases of accidental disturbance of sites, graves, and burial grounds; (4) Indian burial sites, cairns, glyptic markings, and historic graves located on public and private land are to be protected and it is therefore the legislature's intent to encourage voluntary reporting and respectful handling in cases of accidental disturbance and provide enhanced penalties for deliberate desecration.

Washington Revised Codes 27.44.040 (1991)
Protection of Indian Graves--Penalty.
(1) Any person who knowingly removes, mutilates, defaces, injures, or destroys any cairn or grave of any native Indian, or any glyptic or painted record of any tribe or peoples is guilty of a class C felony punishable under chapter 9A.20 RCW. Persons disturbing native Indian graves through inadvertence, including disturbance through construction, mining, logging, agricultural activity, or any other activity, shall reinter the human remains under the supervision of the appropriate Indian tribe. The expenses of reinterment are to be paid by the office of archaeology and histo-ric preservation pursuant to RCW 27.34.220. (2) Any person who sells any native Indian artifacts or - any human remains that are known to have been taken from an Indian cairn or grave, is guilty of a class C felony punishable under chapter 9A.20 RCW. (3) This section does not apply to...

Washington Revised Codes 27.44.050 (1991)
Civil Action by Indian Tribe or Member--Time for Commencing Action--Venue--Damages--Attorneys' Fees.
Apart from any criminal prosecution, an Indian tribe or enrolled member thereof, shall have a civil action to secure an injunction, damages, or other appropriate relief against any person who is alleged to have violated RCW 27.44.040...

Washington Revised Codes 27.53.060 (1991)
Disturbing, etc., Archaeological Resource or Site Without Written Permit or Permission Unlawful--Conditions Allowed-- Exceptions.
On the private and public lands of this state it shall be unlawful for any person, firm, corporation, or any agency or institution of the state or a political subdivision thereof to knowingly remove, alter, dig into, or excavate by use of any mechanical, hydraulic, or other means, or to damage, deface, or destroy any historic or prehistoric archaeological resource or site, or remove any archaeological object from such site, except for Indian graves or cairns, or any glyptic or painted record of any tribe or peoples, or historic graves as defined in chapter 68.05 RCW, disturbances of which shall be a class C felony puni- shable under chapter 9A.20 RCW, without having obtained a written permit from the director for such activities....

Washington Revised Codes 68.60.010 (1991)
Definitions.

Washington Revised Codes 68.60.020 (1991)

Dedication.
Any cemetery, historical cemetery, or historic grave that has not been dedicated pursuant to RCW 68.24.030 and 68.24.040 shall be considered permanently dedicated and subject to RCW 68.24.070. Removal of dedication may only be made pursuant to RCW 68.24.090 and 68.24.100.

Was ington Revised Codes 68.60.030 (1991)
Preservation and Maintenance Corporations.
The archaeological and historical division of the department of community development may grant by nontransferable certificate authority to maintain and protect an abandoned cemetery upon application made by a preservation organization which has been incorporated for the purpose of restoring, maintaining, and protecting an abandoned cemetery.

Was hington Revised Codes 68.60.040 (1991)
Protection of Cemeteries--Penalties.
(1) Every person who in a cemetery unlawfully or without right willfully destroys, cuts, mutilates, effaces, or otherwise injures, tears down or removes, any tomb, plot, monument, memorial, or marker in a cemetery, or any gate, door, fence, wall, post, or railing, or any enclosure for the protection of a cemetery or any property in a cemetery is guilty of a class C felony punishable under chapter 9A.20 RCW. (2) Every person who in a cemetery unlawfully or without right willfully destroys, cuts, breaks, removes, or injures any building, statuary, ornamentation, tree, shrub, flower, or plant within the limits of a cemetery is guilty of a gross misdemeanor punishable under chapter 9A.20 RCW...

Wa hington Revised Codes 68.60.050 (1991)
Protection of Historic Graves--Penalty.
Any person who knowingly removes, mutilates, defaces, injures, or destroys any historic grave shall be guilty of a class C felony punishable under chapter 9A.20 RCW. Persons disturbing historic graves through inadvertence, including disturbance through construction, shall reinter the human remains under the supervision of the cemetery board. Expenses to reinter such human remains are to be provided by the office of archaeology and historic preservation.

Wa hington Revised Codes 68.60.060 (1991)
Violations--Civil Liability.
Any person who violates any provision of this chapter is liable in a civil action by and in the name of the state cemetery board to pay all damages occasioned by their unlawful acts. The sum recovered shall be applied in payment for the repair and restoration of the property injured or destroyed and to the care fund if one is established.

Return to Index

of Government

One of the more controversial aspects of suburbanization is whether development "pays its way." Many people would have fewer concerns about land development if they believed tax revenues from new development covered the costs of providing services, particularly roads, sewers, water services, solid waste disposal, and schools. Yet several studies have found that residential development, particularly low- and middle-income housing, is a "losing proposition" financially. Policymakers, however, must take care in how they interpret the implications for land use and growth policy.

A. Does New Development "Pay Its Way"?

The fear that new development may not pay its way is partly a function of how these services are provided. Many public services—including schools—are "priced" at their average cost. For example, when a local government considers extending a water line to a new home, it often bases its fee on a citywide average, not on the actual costs of extending the hook-up to that particular site or development. In addition, the first developers must cover the full cost of extending the main trunk line to the new development based on established density guidelines or the zoning code, regardless of the number of units the developer plans to build. The initial capital costs may thus be imposed on the first property owner who wants to develop his or her property. This approach to infrastructure pricing tends to discourage infill and encourage large subdivisions so that developers do not subsidize later arrivals.

Since publicly provided infrastructure services tend to use average-cost pricing for new extensions, the potential for subsidizing new development exists. For example, a city might determine that the initial capital cost of tapping into the city's sewer system averages $4,000 and assess that fee for every building unit, regardless of the individual building type. In some cases, the actual cost to the city might exceed $4,000, but the builder or developer will not be charged for the full on-site costs, subsidizing the development through general revenues or user fees from existing users.

Public-service costs, on the other hand, may also be overstated. A single-family home in Portland, Oregon will tap into about $24,013 worth of public services when it is built, including utilities, water, sewer, roads, schools, and general government. Concentrating solely on costs, however, mischaracterizes the public policy issue surrounding financing economic growth. Richard H. Carson, former planning director for Portland Metro (the regional planning agency), notes that most of these improvements are already paid by the developer as either on-site expenses or off-site charges levied by the local government. Overall, Carson estimates that 59 percent of the total cost of extending public services to a new house in the Portland area is already paid for by the developer and, ultimately, the home owner. Another 20 percent of the cost is funded by the local government, 13 percent is unfunded by the state (including schools), and about 8 percent is easily fundable through existing local government channels. In many cases, Carson notes, local governments choose to pay for these costs from general-tax revenues. Half of the 21 cities Carson analyzed did not use "all the legally allowed development charges" to generate revenues to offset the costs of growth.

Studies have found that residential development, particularly low- and middle-income housing, is a "losing proposition" financially.

Marginal-cost pricing is typically used among privately provided services and independent public utilities to ensure costs are fully allocated to consumers using the service. Prices for new water extensions are set based on the cost of each new project, not a citywide average. In the case of a new subdivision, owners of new homes would pay the cost of providing a new elementary school. This means the marginal cost of extending the service is assessed against the user, not all citizens irrespective of whether they will use the new service. Capital costs and other costs such as debt are incorporated into the price of the service.

The fear that development will not pay its was has prompted many citizen groups and public officials to impose growth controls, moratoria on new building permits, or otherwise limit new development. Indeed, policy recommendations advocating "compact development"—putting new homes and businesses on smaller lots and land areas—is driven by the belief that reducing overall government costs should be a primary driver of land-use policy.

Should Residential Development Pay Its Way?

"Low- and mid-price single-family housing generally has a negative fiscal impact," reports a recent study from Purdue University's Department of Agricultural Economics. The study examined four residential developments in an unincorporated section of Tippecanoe County in Indiana. One development consisted of expensive homes ($327,678 per home), two developments were mid-priced ($141,896 and $90,358 per home), and the fourth was a mobile-home park ($17,554 per home). With the exception of the mobile-home park, the subdivisions were relatively small: 46 housing units in the high-income development, 52 and 66 units in the mid-priced development, and 377 in the mobile-home park. Each of the subdivisions created a net fiscal deficit for at least one level of local government (see table below).

Annual Fiscal Impact for Home in Indiana

	High-priced	Mid-priced#1	Mid-priced #2	Mobile home
County government	-$20,000 to +$90,000	-$19,000 to +$8,000	-$9,000 to -$20,000	-$45,000 to -$120,000
Local schools	+40,000 to +$50,000	+$3,800 to -$8,200	-$5,100 to -$17,000	-$21,000 to $49,000
Township government	-$130 to -$500	$230 to -$470	-$340 to -$570	-$1,500 to -$2,500

At first glance, these results make a strong case for restricting new residential development. This conclusion, however, is misleading. Local governments have to balance their budgets. If new residential development does not directly pay its way, city costs, some portion of which are fixed costs that do not vary with population size, have to be covered from other sources. One obvious source is business. Commercial and industrial properties generate revenues that can offset shortfalls in other areas, particularly schools. State governments also provide revenues to local governments, particularly for infrastructure and school-related expenditures. A third source of revenues is current or previous residents.

Requiring residential development to "pay-its-way" involves important trade-offs concerning who should pay for local public services and in what amounts. Local communities determine tax rates and "pricing" policies for services. A city or county, for example, could charge the full cost of providing services that are site specific. New subdivisions might include the cost of building a new school, incorporating parks and open space, tap-in fees for sewer and water rather than relying on subsidies from the business sector or current residents, avoiding infrastructure spending deficits.

Requiring all development to pay its own way also has equity implications for the community. If land-use plans were redesigned only to allow housing that fully pays its way using marginal-cost pricing, only high-end residential developments would be accommodated in local plans and zoning codes. In the Indiana case, housing in rural areas would be reserved for families with incomes who can afford homes (and lots) worth $300,000 or more. Middle- and low-income housing would be discouraged, creating a significant income wedge between those that could afford the new homes and those (principally low- and middle-income families) that could not.

B. Cost of Community Service Studies

Cost of Community Service (COCS) studies attempt to determine whether land development pays for itself. The American Farmland Trust promotes COCS studies as "an inexpensive, easy-to-understand way to determine the net fiscal contribution of different land uses to local budgets." Not surprisingly, these studies are becoming more frequent because they are easy to use and apply, and the results are easy to interpret.

COCS studies try to match the costs of services provided by local government to the revenues generated by land development and use. Most often, these revenues are generated from property taxes. For example, an office building uses public services such as water, sewers, roads, and fire and police protection. These services would be funded from the tax revenues and fees paid by the business.

Matching land uses to tax revenues is accomplished by first determining the pattern of land use in the local community. Often, this means determining how much land is devoted to residential use, commercial use, and agricultural use. Then, the costs of providing public services such as police, fire, water, and roads are determined. These costs are allocated to land uses based on their prevalence in the community.

Most COCS studies find that residential development fails to generate sufficient tax revenues to cover the costs of providing services to those areas. By implication, this means that other kinds of development—commercial, industrial, and agricultural—subsidize housing.

These costs are compared to revenues generated through taxes that directly result from land development. For example, property taxes are included since they reflect changing land values due to development. Other revenues, such as sales taxes, would be allocated to different land uses based on where people live and estimates of how much of the tax revenue is generated locally. A federal grant for a road improvement would not be included because the origin of the money is not tied to property development. Similarly, user fees are not included because they are assumed to cover the marginal costs of the services and do not draw from general revenues. User fees, when set correctly, require users to pay their way.

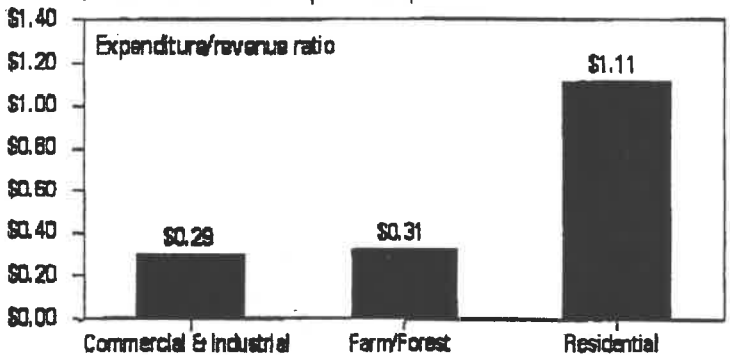
Despite flaws and limitations (see box), dozens of COCS studies have been used across the nation to determine whether various land uses are cost effective. The results have often been used to justify growth controls, particularly on residential development. Most COCS studies find that residential development fails to generate sufficient tax revenues to cover the costs of providing services to those areas. By implication, this means that other kinds of development—commercial, industrial, and agricultural—subsidize housing.

Recently, the American Farmland Trust reviewed the results of 40 COCS in 11 states. Twelve of these studies (30 percent) were performed by the American Farmland Trust, and 11 (27.5 percent) were performed by the Southern New England Forest Consortium.

For every dollar raised in revenue, according to these studies, farmland required expenditures of 31 cents (Figure 6). Commercial and industrial property were even more cost effective: just 29 cents were spent on public services for every dollar raised in revenues. Residential property was a net drain on local governments, requiring spending $1.11 for every dollar in revenues raised.

Figure 6: Cost of Community Services Based on Land Use

(Median Revenues Raised per Dollar Spent)



Source: *Cost of Community Services Studies Fact Sheet, American Farmland Trust,* Farmland Information Center, no date).

Thus, while farm, forest, and open lands generate more revenues than expenditures, COCS studies find that "residential land uses . . . are a net drain on municipal coffers: it costs local governments more to provide services to homeowners than residential landowners pay in property taxes." More importantly, from the American Farmland Trust's perspective, "in every community studied, farmland has generated a fiscal surplus to help offset the shortfall created by residential demand for public services."

Limitations of Cost of Community Service Studies

Several problems emerge if COCS studies are used to evaluate the cost effectiveness of different types of land development. These problems limit their applicability to developing and using realistic policy recommendations. Among the more important limitations are:

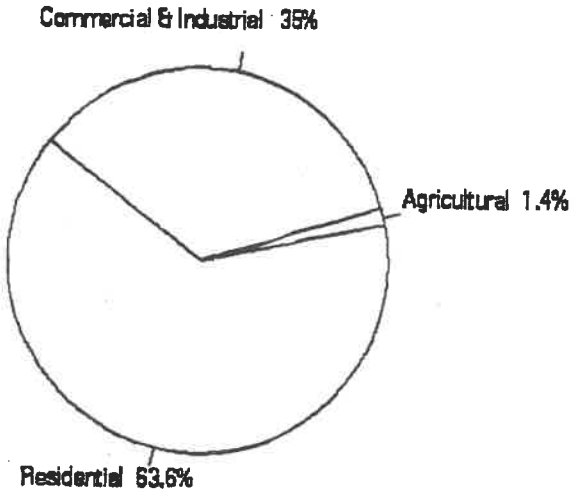
- *COCS studies are static and do not incorporate the dynamics of the land market.* They are "snapshots of a community and cannot be used to infer fiscal capacity from one year to the next or over a longer period of time.
- *COCS studies ignore nonland-use based revenue sources.* Since a COCS study attempts to determin how much revenue is generated by a specific land use, revenue sources external to land use, such as state or federal funds, are excluded. This becomes problematic when the sizs of a community may impact future revenue from public and nonpublic sources for specific projects such as parks and recreational activities.
- *COCS studies are not grounded in a concept of development.* Since they are intended to provide simple way to account for the flow of funds to and from specific land uses, these studies ignore synergistic elements that are natural parts of the development process. As communities grow, certain industries and businesses may be attracted to the community that may increase future revenue flows. A growing residential community provides a market for future businesses. As infill occurs, revenues are generated that compensate for deficiencies in other land-use categories.
- *COCS studies ignore alternative service delivery possibilities.* A COCS study presumes that the curren system of government and mix of services provided now will also be provided by the local government in the future. Alternative ways to deliver services (i.e., through private providers) or potential cost-saving management techniques (i.e., competitive bidding) could bring costs in line with revenues and alter the fiscal position of land uses.

COCS studies treat land uses as independent. The studies separate land into bro categories—agricultural, residential, commercial, industrial—and ignore the interdependencies of uses. Interdependencies of land uses are not factored in even though a mix of uses is necessary for sustainable economic growth and development. In addition, these studies often presume that land uses must be separate; mixed uses such as those found in older and smaller downtown areas do not fit well into the methodology.

C. Agriculture and the Cost of Community Services

The ratio of revenues to expenses is just one element of the broader issue of whether development pays its way. For example, a COCS study in Michigan focused on Scio Township, a largely rural area of Washtenaw County. Washtenaw County is a rapidly urbanizing area that contains Ann Arbor and the University of Michigan. Readers and policymakers are left with the impression from this COCS study, as in other studies, that agriculture pays for itself and shou d be encouraged over other land uses, particularly residential land uses. Yet, agriculture represents only 1.4 percent of the township's total revenues from general taxes on land uses (Figure 7). Agriculture generated $203,532 while commercial and industrial property generated $5 million, and residential property generated $9 million.

Figure 7: Total Revenues Generated by Land Use: Scio Township, Washtenaw County, Michigan



Source: Christopher A. Arend, Laura Priedeman Crane et al. *Southeast Michigan Agricultural Land Preservation Project.* University of Michigan, School of Natural Resources and Environment, April 1996, Table 11-9, p. 119.

Agriculture's ratio of public revenues to expenses is due to the particular nature of the industry: farms use a lot of land and require limited publicly provided services such as roads. Similarly, an acre of privately owned vacant land would

generate tax revenues and require virtually nothing in local public services. The fiscal ratios are an artifact of how they are calculated. If the fiscal impact of the farm house were the unit of analysis, rather than the acre of land used for a particular purpose, farm houses would likely generate similar net drains on local government budgets as other residential uses if they were required to tap into public sewer and water systems and the costs of educating children were included.

Similarly, residential development using the COCS analysis generated net fiscal benefits when schools were excluded and the analysis focused solely on noneducation public services. In most states, school districts are independent governmental units and have independent taxing authority. District boundaries do not necessarily conform to township or municipal boundaries. Thus, using schools to evaluate the revenue impacts on township government is inappropriate. In some states, where schools are financed from state sources, new schools may be a budget liability of the *state government*, not the local government.

If local policymakers were attempting to determine local land-use policy based on the tax and spending impacts estimated using COCS studies, they would discourage residential development and encourage agricultural, commercial, and industrial uses. An argument even could be made that housing should not be allowed on farms since it would cost more to service them with infrastructure than they would generate in revenues. In addition, if land-use decisions were made purely on net fiscal benefits, Scio Township should reserve all its land for commercial and industrial uses. This, of course, would require commuting by workers who would travel into Scio Township from other parts of the county or neighboring counties. This approach to land use would encourage sprawl-like development patterns in other townships and nearby counties.

An argument even could be made that housing should not be allowed on farms since it would cost more to service them with infrastructure than they would generate in revenues.

The push to preserve farmland and limit residential development is driven in part by the belief that *low-density* residential development is inefficient compared to *high-density* residential development. To evaluate this claim, community service studies must decompose residential land further than the broad classifications typically reported. The Scio Township COCS study provides little useful insight into the cost of public services in more- versus less-dense land developments.

D. Compact Development

One of the most-compelling arguments for limiting growth is provided by proponents of compact development. Using an approach pioneered by researchers at Rutgers University, compact-development proponents asked a simple but very important question: how would infrastructure and land costs be affected by redirecting urban development into smaller lots, clustered closer together? Houses closer together, they suggest, should reduce infrastructure costs since shorter roads, sewer lines, and water lines would be built. In addition, less land would be used for homes, leaving a larger share for forest and open space. More controversially, the authors argued that housing costs would *fall* under compact development because smaller lots would reduce land and infrastructure costs.

Despite its potential, compact development is unlikely to achieve many of the results its proponents claim. Infrastructure that provides benefits to consumers is not necessarily a net drain on local government. The potential benefits of compact development also depend on consistent, coordinated statewide implementation. The statewide application of compact development is necessary, proponents argue, because the solution is considered "regional" and must supercede parochial local government interests that favor low-density residential development to conserve land.

Several factors, grounded in the experience of states struggling with attempts to implement compact development schemes suggest this approach will have limited impact on land conservation or meet compact development goals.

1. Land Saving Benefits are Modest

Compact development will likely achieve modest reductions in overall land consumption. Compact development slows the rate of increase; it does not stop land development. The effects of slowing land development, if they appear, can vary widely from state to state and even location to location.

In Michigan, for example, one of the three states where this methodological approach has been applied, land consumption is projected to be 12.7 percent lower under the more "efficient" compact development scenario. This reduction occurs over a 25-year period. Annualized, compact development reduces the projected rate of land consumption by about 0.5 percent per year, or 5 percent per decade. If these savings were achieved statewide, compact development would slow the pace of urbanization from 12.4 percent to 11.8 percent per decade (making the tenuous assumption that past trends will continue) (Figure 8). In New Jersey, the results were expected to be more significant: urbanization was occurring at a rate of 7.3 percent per decade. This rate would have slowed to 4.1 percent. Agricultural land loss would have been reduced from 2.8 percent per decade to 2.6 percent per decade in Michigan and from 6.2 percent to 4.4 percent in New Jersey (Figure 9).

While the experiences of New Jersey appear more favorable, the case of Michigan cautions against forecasts of dramatic land-consumption benefits through compact development. Moreover, the forecast for New Jersey might have been achievable if all cities participated in the state plan. In fact, few cities are participating (see below). Thus, any slowdown in urbanization now experienced in New Jersey is likely the result of natural market forces than the implementation of the state plan.

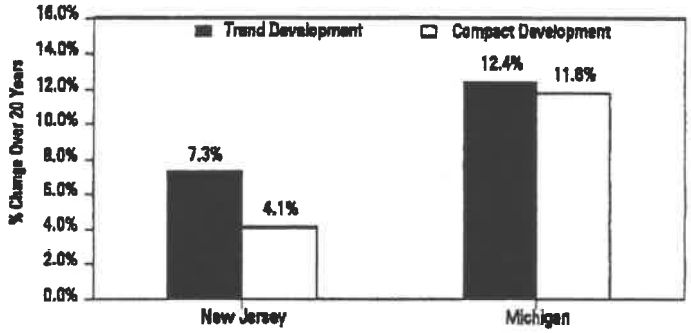
2. Infrastructure Benefits May Not Materialize

Second, infrastructure cost savings may not materialize. Compact development proponents use a static view of spending and potential savings. They presume costs for infrastructure such as road extensions will remain the same over the 25-year period and other factors (e.g., local capacity limitations or changes in technology) will not impact costs. In some cases, large-lot development could reduce infrastructure costs by using septic systems rather than expensive extensions of municipal sewer lines. Privatization of key infrastructure (e.g., waters, sewer) could dramatically reduce fiscal liabilities for local governments while ensuring full costs are charged for new development.

Compact development studies tend to reduce community development to an exercise in reducing infrastructure costs.

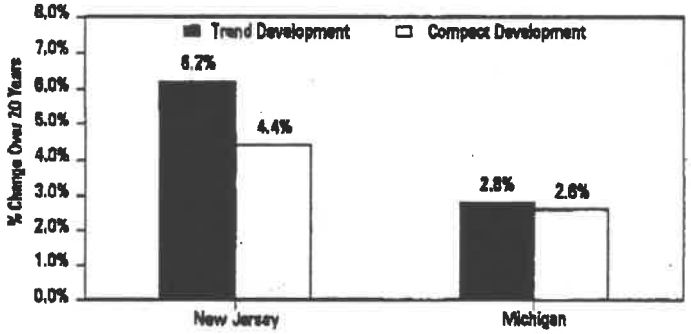
Compact development studies tend to reduce community development to an exercise in reducing infrastructure costs. Infrastructure costs are one component of housing and the quality of a community, but not the only or even primary component. If families are willing to pay the full costs of their home—including higher infrastructure costs—the market accommodates this diversity. Compact development reduces housing choice by limiting larger-lot homes from the real-estate market. "Many households," note urban planners Alan Altshuler and Jose A. Gomez-Ibanez, "would be willing to pay the modest increases in road and utility costs to gain the larger private backyards and more open space of the low-density neighborhood."

Figure 8: Projected Urbanization for Trend and Compact Development



Source: See text and footnote.

Figure 9: Projected Farmland Conversion Under Trend and Compact Development Patterns



Source: See text and footnote.

3. Real Housing Prices will Likely Rise

Real housing cost savings are unlikely to materialize either. The authors of the New Jersey and Michigan studies acknowledge that most of the work by independent scholars shows that growth controls increase housing prices. Growth controls often limit the number of houses while demand for housing continues to increase. This demand/supply mismatch increases the price of housing. On the other hand, the Rutgers University researchers argue, if the number of housing units increases, or at least stays the same, housing price inflation will not occur. Housing prices may even fall, they predict, because infrastructure and land costs will be lower.

This reasoning is flawed for at least two reasons. First, housing costs will be determined in the real-estate market by consumers *and* developers. Construction costs are not the only factors that determine housing prices. While

infrastructure costs may fall, these savings will not necessarily be passed on to consumers if the demand for housing increases, particularly in high-growth areas or "good" neighborhoods. This is becoming increasingly evident when the effects of development fees are examined. Where demand is high, developers might experience higher profit margins (therefore encouraging more development in those areas).

More importantly, the authors assume that the amount of land is not important to a consumer's decision to buy a house. The authors view larger lots as a pure cost without benefits. In essence, families will not care whether they live in a house on one-eighth acre or a house on one-half acre. While the authors kept the *number* of homes in their cost analysis the same, the *quality* of the housing changed significantly when they reduced the lot size. Based on current development trends, most families prefer detached, single-family homes on separate lots with a yard. Compact development could reduce the quality of life and standard of living for families by resulting in equal or higher housing costs for lower-quality units. For example, suppose the state- or local growth-management program limits development to quarter-acre lots (four units per acre) while current trends subdivide land into half-acre lots. A 2,000 square-foot house on a quarter-acre lot is of lower quality than a 2,000 square-foot house on a half-acre lot for most people. Most families would pay less money for the home on the quarter-acre lot than the half-acre lot if the neighborhoods are exactly the same in every other aspect (e.g., proximity to schools and parks, road access, availability of retail stores, etc.). The negative effects of housing quality are heightened if new subdivisions do not dedicate additional land for open space.

For example, Maryland implemented "Smart Growth" legislation in 1997. The legislation requires the state to identify Priority Funding Areas, or PFAs, to guide state infrastructure spending. All existing communities qualify as a PFA, but the state uses housing density to determine whether funding of sewer, water, roads, and other infrastructure should be extended to new residential development. The density criteria, and hence qualifications for state funding, are calculated solely on the amount of land developed for residential purposes. For undeveloped areas, Maryland requires a housing density of at least 3.5 units per acre to qualify for state funding as a PFA.

Mandated compact development also limits housing choices and thus opportunities. Choices about house and lot sizes are not independent of each other. Some families might prefer a bigger house on a smaller lot. Others might prefer a bigger lot for a smaller house. Reducing housing choices to building characteristics such as floor area, number of bedrooms, number of bathrooms, or kitchen size ignores the value many families place on private open space (yards).

4. Complete Implementation is Unlikely

Compact development as a statewide planning tool also promises more than it can deliver. First, state plans are not easily implemented. New Jersey implemented a comprehensive state land-use plan in 1992. The plan used compact development to steer new development into existing urban centers and suburbs using a growth-corridor or growth-node approach. In New Jersey, 36 cities and towns have applied for designation as a "center," a status that would permit them to tap into infrastructure funds after their compliance with the state plan is verified. Five years after the first plan was adopted and 12 years after the New Jersey State Planning Act was signed into law, 11.1 percent of the state's cities, towns, and villages are participating. These cities and towns make up 16.5 percent of New Jersey's population. Almost two-thirds of the state's population lives in the largest cities: Newark (270,607), Jersey City (229,108), Paterson (148,769), Elizabeth (110,198), and Camden (85,339), not the suburban areas that are targeted for compact development. Thus, the state plan is reaching a very small segment of the state's suburban and newly urbanizing populations.

Examining the types of suburban and rural communities participating in the state plan is also instructive. Several are communities with unique characteristics and attributes. Four island communities banded together to form "The Wildwoods." Known as a summer beach destination for more than 100 years, the communities petitioned to become a state-designated center so they could address revitalization on an island-wide basis. The Township of Washington in Mercer County, New Jersey, is completing a 13-year process of developing a regional Town Center. The Town Center is the first New Jersey attempt to implement neotraditional design concepts on an integrated scale. Given the voluntary nature of the New Jersey state-planning system, the plan is unlikely to have a wide impact on growth patterns in the near future.

"It turns out that density may not be the most important land-use variable after all. Density largely pays for itself, in the sense that developers pay for on-site

infrastructure and successive property owners pay for public services through their property taxes."

E. Conclusion

The question of public-service cost and efficiency is an important one for debates over suburbanization. If low-density residential development were inefficient, an argument could be made for restricting it when the costs are borne by taxpayers. The empirical evidence on infrastructure costs is mixed. Even the Rutgers studies, which represent some of the most-ambitious attempts to contain development through compact development, claim modest improvements over existing development trends. Moreover, these studies are fundamentally flawed because they ignore the benefits to families of living on larger lots.

While some infrastructure costs fall as density increases (e.g., street maintenance), other costs may increase. Cities provide more than just one public service. As densities increase, cities tend to get larger, and the level of general spending tends to rise (as well as tax rates). Thus, while infrastructure costs may go down, administrative inefficiencies increase as cities get bigger and provide a broader array of noninfrastructure-related programs such as housing and welfare. The net impact is an increase in general government costs.

A more important issue involves whether increases in infrastructure costs in and of themselves merit planning mandates for more compact development. Roads, sewers, storm water drainage, and water systems represent services to consumers. If consumers pay the full costs of providing the service (marginal-cost pricing), the service enhances community welfare. Residents are showing their preference for that type of housing and its incumbent services even when the full costs are fully disclosed and may be higher than services for other kinds of housing. In a nutshell, people (households) may rationally choose a more expensive item (houses on larger lots) if the product provides a service (neighborhood) they value. Families, for example, often choose to purchase more expensive mid-size cars such as the Ford Taurus over compact and subcompact cars such as the Ford Escort as their families mature and their driving preferences change.

The comments of Reid Ewing, a proponent of higher-density, compact development, are worth repeating: "Having said all this, it turns out that density may not be the most important land-use variable after all. Density largely pays for itself, in the sense that developers pay for on-site infrastructure and successive property owners pay for public services through their property taxes." In addition, as communities develop commercial and industrial properties which typically follow residential development, sufficient cross-subsidization occurs to minimize negative fiscal impacts on local communities.

Part 6

Flight from the Big Cities

concerns about the costs of suburbanization are, of course, broader than farmland loss and rising infrastructure costs. The decentralization of people and jobs also impacts existing communities and the quality of life for residents in old and new places. Low-density suburban development increases automobile "dependence," which increases demand for roads and may increase pollution. Sprawl is also blamed for the decline of "big cities" and older, inner-ring suburbs. By making outmigration easier and cheaper, people have "abandoned" older urban centers in favor of newer suburban communities. Jobs followed the people, eroding the tax base and robbing neighborhoods of an energetic, engaged populace. "Freeways have subtracted homes and businesses from the city and dispersed millions of U.S. citizens and businesses to the suburbs," notes Milwaukee Mayor John Norquist. "These new roads have left in their wake vast wastelands" in New York City, Cleveland, St. Paul, and numerous other cities. Vice President Al Gore echoed this interpretation before an audience at the Brookings Institution:

> *In the last fifty years, we've built flat, not tall: because land is cheaper the further out it lies, new office*

buildings, roads, and malls go up farther and farther out, lengthening commutes and adding to pollution. This outward stretch leaves a vacuum in the cities and suburbs which sucks away jobs, businesses, homes, and hope; as people stop walking in downtown areas, the vacuum is filled up fast with crime, drugs, and danger.

These arguments tend to trivialize several important complicating elements of urban revitalization. Redeveloping older, inner-city cores will take much more than using public policy to deter people from leaving.

A. Understanding Residential Migration

Urban development and redevelopment are influenced by a number of "push" and "pull" factors. Pull factors are the characteristics of a community that attract people to a city or community. The possibility of a larger house on a plot of land might attract, or "pull," someone to a suburb or rural town. The proximity to cultural and entertainment events such as professional sports or the opera might pull others into downtown areas. Providing the kinds of neighborhoods and housing opportunities people want is critical for developing, redeveloping, and rejuvenating cities of all sizes. Importantly, large cities have a number of features that attract businesses and people: roads, cultural activities, diverse and sometimes inexpensive housing opportunities, and easy access to mass transit.

Equally important, however, are the push factors. Many cities suffer from poorly functioning school systems, high tax rates, anticompetitive regulations, and a deteriorating housing stock. Upper- and middle-income households tend to be the most sensitive to these push factors because they have the wealth and income to re-locate. Rather than fight city hall, they simply move to a friendlier one and help build a new community. Middle-class migration out from the central cities is substantial. In a detailed analysis of 12 big cities, researchers at the University of North Carolina and Carnegie Mellon University found higher-income households moved out of the city at about twice the rate of similar households moving in. In cities such as Detroit and Cleveland, five households moved out for every one that moved in, prompting the authors to conclude that "a widespread back-to-the-city movement is not likely in the foreseeable future." Urban planners David Varady and Jeffrey Raffel found that suburban homebuyers were influenced mainly by things that affected their family: larger houses, more open space, efficient government, and quality schools.

Redeveloping older, inner-city cores will take much more than using public policy to deter people from leaving.

Varady and Raffel found that, for many, the poor quality of central city schools was *the* driving factor in moving out of the city. Education issues were particularly important for working-class families. Living in the city was actually preferred by neighborhood-oriented, middle-income families. Families that believed the quality of education in the cities was on par with the quality of education in the suburbs were more likely to stay in the city. Those that did not, moved out. Families that stayed in the city escape poorly performing public schools by sending their children to private schools. Not surprisingly, Varady and Raffel found that families with a child in parochial schools tended to stay in the city.

Housing is another area where many cities are not competitive. "City homes need the amenities people want," notes Mayor Norquist. In a recent tour of suburban homes, the mayor was impressed with how suburban homes were designed. Suburban "homes were the first in the Milwaukee area with work space in the middle of kitchens, wood floors in kitchens, solariums opening off kitchens, exercise rooms with floor-to-ceiling windows, and large, walk-in closets. Thirty years ago developers featured master bedrooms. Now they feature master bathrooms."

Concerns about crime and public safety also drive many people from cities. The number of serious crimes increases as people move closer to central cities. On average, metropolitan areas have crime rates more than double rural areas. In 1994, the crime rate for the nation averaged 5,374 violent and property crimes per 100,000 person. A comparison of crime rates in 72 cities with populations over 150,000 by the U.S. Federal Bureau of Investigation revealed that all except San Jose and Virginia Beach had crime rates exceeding the national average. In 18 cases, crime rates in cities were more than double the national average (Table 9). Some of these cities are commonly cited as examples of high-crime locations (e.g., Miami, Washington, D.C., Detroit, Newark, and Baltimore). Other cities—Seattle, Portland, Tampa, Oklahoma City—are not. In Michigan, crime rates were broken down by county to provide a better illustration of the relationship between crime and urbanization. The number of serious crimes per person is almost double in central-city counties compared to rural counties and almost 70 percent higher than in collar counties (Figure 10).

Indicators of Urban Sprawl

Prepared by Oregon's Department of Land Conservation and Development
May 1992

* From 1970 to 1990, the density of urban population in the United States decreased by 23 percent.

Source: Associated Press article "Census: Cities Takeover U.S.," *Statesman Journal*, December 18, 199..

* From 1970 to 1990, more than 30,000 square miles (19 million acres) of once-rural lands in the United States became urban, as classified by the U.S. Census Bureau. That amount of land equals about one third of Oregon's total land area.

Source: Associated Press article referred to above.

* From 1969 to 1989, the population of the United States. increased by 22.5 percent -- and the number of miles driven by that population ("vehicles miles traveled" or "VMT") increased by 98.4 percent.

Source: Federal Highway Administration, "Selected Highway Statistics and Charts--1 989," quoted in March 1991 *Special Trends*, by the Urban Land Institute.

* From 1983 to 1987, the population of the United States increased by 9.2 million-people -- and the number of cars and trucks increased by 20. 1 million.

Source: *Statistical Abstract of United States, 1989*, quoted in Anthony Downs' "The Need for a New Vision for the Development of Large U.S. Metropolitan Areas."

* "In the 1980s in Oregon, the number of vehicle miles traveled increased eight times faster than the population."

Source: TRI-MET Strategic Plan (Discussion Draft), April 1992, p. 3.

* From 1940 to 1970, the population of the Portland urban region doubled-and the amount of land occupied by that population quadrupled.

Source: The University of Oregon's Atlas of Oregon, 1976.

Quotations About Sprawl

"Taken together, the studies [on costs of sprawl] reach similar conclusions: development spread out at low densities increases the costs of public facilities."

Douglas R. Porter, in the foreword to
The Costs of Alternative Development Patterns,
by James E. Frank, 1989

"Studies conducted over the last 30 years have concluded that when development is spread out at low densities, the per-unit cost of constructing and maintaining public facilities increases. The reason for this is that low- density development requires more miles of roads, curbs, sewers, and water lines; and municipal services must be delivered over a greater geographic area."

The Urban Land Institute
The Case for Multifamily Housing, 1991

"For the last three decades, urban economists and city planners have recognized that unplanned sprawling residential development is very costly. As this development extends outward from the core, city infrastructure, service and maintenance costs increase exponentially . . . ."

Katherine E. Stone and Dennis Martinek
"The Economic Consequences of Unmanaged Growth"
Western City, November 1991

"By updating and standardizing the studies Frank [cited above] found that streets, utilities, and schools for a suburban single family development with 3 dwelling units per acre built 5 miles from sewage and water treatment plants in a leapfrog pattern would cost $43,381 per dwelling in 1987 dollars. Building the same development adjacent to existing development and near central facilities would reduce costs by $11,597 per dwelling unit, a 27 percent reduction."

Center for Urban Studies (PSU) and Regional Financial Advisors, Inc.
DLCD's Local Government Infrastructure Funding in Oregon, 1990

"For Loudon County, the average annual revenue shortfall or net public be approximately three times as large ($2200 per dwelling) from the lowest-density residential community projected in the study as from the highest- density community ($700 per dwelling)."

The American Farmland Trust
Density-Related Public Costs, 1986

"The results of the study . . . show a surprising consistency: 'planning' to some extent, but higher densities to a much greater extent, result in lower economic costs, environmental costs, natural resource consumption, and some personal costs for a given number of dwelling units."

Real Estate Research Corporation
The Costs of Sprawl, 1974

The Conservation Easement

Personal Finance Advisor *by Deloitte & Touche OnLine*

Sept. 28, 1998

A tax break is available for donating property for conservation.

A contribution of real property to a charitable organization for a conservation purpose ("qualified conservation easement") is eligible for a charitable deduction for federal estate, gift, or income tax purposes. The Taxpayer Relief Act of 1997 provided an additional exclusion from estate assets for real property subject to a conservation easement, if the date of the donor's death is after Dec. 31, 1997.

A qualified conservation easement is a contribution of a "qualified real property interest" to a "qualified organization" solely for conservation purposes. The easement can be created during the donor's lifetime, or upon the death of the donor. A qualified real property interest can be:

1. The donor's entire interest in real property (other than a qualified mineral interest),
2. A remainder interest in real property, or
3. A perpetual conservation restriction on the use of real property.

A qualified organization is a charity that (1) is committed to, and has the ability to, protect the conservation purpose of the donation, and/or (2) is organized primarily for a conservation purpose. Examples of a conservation purpose include:

- Preservation of farmland, forests, or open spaces for the pubslic's scenic enjoyment, or for educational or recreational uses.
- Protection of natural habitats (for example, plants, wildlife, fish).

Charitable Contribution Deduction: The charitable deduction is based on the difference between the fair market value (FMV) of the real property before the conservation easement, and the FMV after the easement is attached. The value of the property before the conservation easement should consider the property's "highest and best use" (for example, subdivision of the land). In determining the amount of the charitable deduction (as well as the estate exclusion; see below), the FMV of the property is reduced by any debt that is secured by the property.

Estate Exclusion: Beginning in 1998, there is a $100,000 maximum exclusion for estate tax purposes for a qualified conservation easement, provided at least 30% of the FMV of the property is contributed. If the value of the easement is less than 30% of the FMV, the maximum exclusion is phased out. If the value of the easement is 10% (or less) of the FMV of the property, the estate exclusion equals zero. The maximum exclusion increases $100,000 per year between 1999 and 2002 (that is, maximum exclusion will be $500,000 in 2002).

Upon the death of the donor, the FMV of the property with the conservation easement is multiplied by 40% to determine the estate exclusion amount. After Dec. 31, 1997, an executor of a decedent's estate has until the due date of the estate tax return (including extensions) to elect to use the conservation easement exclusion.

The following table illustrates the maximum estate exclusion, and the potential

The following table illustrates the maximum estate exclusion, and the potential federal estate tax savings.

Year of Contribution	FMV of Property With a Conservation Easement	Maximum Exclusion (40% of FMV)	Estate Tax Savings (55% tax rate)
1998	$250,000	$100,000	$55,000
1999	$500,000	$200,000	$110,000
2000	$750,000	$300,000	$165,000
2001	$1,000,000	$400,000	$220,000
2002 and thereafter	$1,250,000	$500,000	$275,000

To qualify for the estate exclusion, the property must be located (1) within 25 miles of a metropolitan area (as defined by the Office of Management and Budget), national park, or wilderness area, or (2) within 10 miles of an urban national forest (as defined by the U.S. Forest Service). Additionally, the donor (or a member of his/her family) must have owned the property for at least three years prior to the date of the donor's death.

Example: A taxpayer owns a home and land with a FMV of $1 million as of Sept. 30, 1998. On this date, the taxpayer places an irrevocable perpetual conservation easement on a portion of the land. Immediately after the conservation easement is in place, the FMV of the property (home and land) is $500,000. Upon the taxpayer's death in 2003, the FMV of the land with the conservation easement is $1.25 million, and the FMV of the property (home and land) without the easement is $2s million. For income tax purposes, the taxpayer is entitled to a $500,000 charitable contribution deduction in calendar year 1998 (subject to AGI limitations, csarryover allowed)-pre-contribution FMV of $1 million less $500,000 post-contribution FMV. The income tax savings will total $198,000, assuming a 39.6% federal tax rate.

For estate tax purposes, the taxpayer's estate will be entitled to a $500,000 exclusion (estate tax savings of $275,000, assuming a 55% estate tax rate).

Value of land with easement at date of donor's death	$1,250,000
Exclusion percentage	40%
Estate tax exclusion	$ 500,000
Assumed estatee tax rate	55%
Estate tax savings	**$ 275,000**

To provide reliable support for the charitable contribution deduction and the estate

To provide reliable support for the charitable contribution deduction and the estate exclusion, written appraisals should be obtained from an experienced, qualified appraiser. The appraisal should indicate the FMV of the property both before and after the conservation easement is attached to the property. Also, an appraisal should be conducted as of the date of the donor's death.

These are some thoughts to consider about conservation easements. Before any action is taken, consult your tax and financial advisors.

| Home | Personal Finance Advisor | Tax News & Views | Growth Company Services | Archives | Contact us! | Guest Registry | Site Search |

Copyright © 1998, 1999, 2000 Deloitte & Touche LLP. All rights reserved.
Copyright and Legal Information.
For feedback or suggestions contact the webmaster@dtonline.com.

"Sue" ownership court opinion

Black Hills Institute of Geological Research; Black Hills Museum of Natural History Foundation, Inc., a non-profit corporation, Plaintiffs, Joseph M. Butler, Appellant, v. South Dakota School of Mines and Technology, Appellee, United States Department of Justice, Defendant. Black Hills Institute of Geological Research; Black Hills Museum of Natural History Foundation, Inc., a non-profit corporation, Appellants, v. United States Department of Justice, Appellee.

United States Court Of Appeals For The Eighth Circuit

12 F.3d 737; 1993

October 11, 1993, Submitted
December 15, 1993, Filed

SUBSEQUENT HISTORY: Rehearing and Rehearing En Banc Denied February 2, 1994 (93-1602).

PRIOR HISTORY: Appeals from the United States District Court for the District of South Dakota. District No. CIV 92-5070. Honorable Richard Battey, District Judge.

COUNSEL: Counsel who presented argument on behalf of the appellant Butler in case No. 93-1600 was Joseph Butler of Rapid City, South Dakota. Appearing on the brief was Mark F. Marshall of Rapid City, South Dakota.

Counsel who presented argument on behalf of the appellant Black Hills Institute in case No. 93-1602 were Patrick Duffy of Rapid City, South Dakota and Mark F. Marshall of Rapid City, South Dakota.

Counsel who presented argument on behalf of the appellee School of Mines in case No. 93-1600 was Gene N. LeBrun of Rapid City, South Dakota. Appearing on the brief were Edward J. Shawaker and David C. Shilton of Washington, D.C.

Counsel who presented argument on behalf of the appellee United States in case No. 93-1602 was Edward Shawaker of Washington, D.C. Appearing on the brief were Ted L. McBride, Robert A. Mandel, Myles E. Flint, and David C. Shilton.

JUDGES: Before JOHN R. GIBSON, MAGILL, and BEAM, Circuit Judges.

OPINION:

MAGILL, Circuit Judge.

Black Hills Institute of Geological Research and Black Hills Museum of Natural History Foundation (collectively, "Black Hills") appeal the district court's[1] judgment in favor of the United States. The district court found that the United States holds title to a valuable *Tyrannosaurus rex* skeleton ("the fossil" or "Sue") in trust for Maurice Williams ("Williams"), an individual Indian who is the beneficial owner of trust land on which Black Hills discovered the fossil. Joseph M. Butler appeals separately from the district court's order imposing Rule 11 sanctions on Butler for naming an improper party as a defendant. We affirm the district court's judgment that the United States holds trust title to the fossil and reverse its Rule 11 order.

I. BACKGROUND

This case is before us for the third time. The factual background is uncomplicated. Black Hills collects and restores fossils for display in museums. In August 1990, Black Hills was excavating fossils in western South Dakota. Sue Hendrickson, a researcher working on the project, discovered Sue on Williams' ranch while on break. Since 1969, the United States has held this ranch land in trust for the sole use and benefit of Williams, an Indian. Two days after the discovery, Black Hills scientists began excavating Sue, the most complete and valuable *Tyrannosaurus rex* skeleton known to man, from Williams' land. At some point during the excavation, Black Hills purported to purchase from Williams the right to excavate Sue for $5000. After excavation, Black Hills moved the ten tons of bones to Hill City, South Dakota, where scientists began the laborious process of restoring the fossil.

In May 1992, however, federal officers seized Sue and moved her to the South Dakota School of Mines and Technology ("School of Mines"). The United States attorney for South Dakota ordered the seizure on the ground that Black Hills' removal of Sue from Williams' land violated federal criminal statutes relating to federal lands. Black Hills then brought suit in district court to quiet title to Sue. In conjunction with this action, it sought a preliminary injunction for possession of the fossil pending the outcome of the suit. After the district court denied Black Hills a preliminary injunction, Black Hills moved under Eighth Circuit Rule 8A to this court for an order granting it custody of Sue pending appeal of the injunction denial.

In Black Hills Institute of Geological Research v. United States Department of Justice, 967 F.2d 1237, 1241 (8th Cir. 1992) (Black Hills I), we found that the district court had anomalous jurisdiction over the temporary custody issue and remanded for a determination of the proper temporary custodian. The district court concluded that Sue should remain at the School of Mines pending disposition of the case on the merits. In Black Hills Institute of Geological Research v. United States Department of Justice, 978 F.2d 1043, 1045 (8th Cir. 1992) (Black Hills II), we affirmed the district court's custody order, dismissed with prejudice Black Hills' appeal of the preliminary injunction denial, and remanded the case for proceedings on the merits. Meanwhile, Black Hills amended its complaint by abandoning the quiet title theory of its case and instead seeking only an order requiring the United States to return Sue to it.

On remand, the district court found that it still had to determine ownership of Sue despite Black Hills' amended complaint because "[a] permanent possessory right to the fossil is subsumed within the context of ownership." D. Ct. Mem. Op. at 6 (Feb. 3, 1993). It then concluded that it had federal question jurisdiction under 28 U.S.C. § 1331 because the case involved the application of federal statutes relating to Indian trust lands. Reaching the merits, the district court found that Sue was an interest in land under the trust land statutes. Because Williams failed to receive the Secretary of the Interior's ("the Secretary") approval for his attempted sale of Sue to Black Hills, the court reasoned, the transaction was void and the United States retained title to Sue in trust for Williams. Black Hills now appeals.

II. DISCUSSION

A. Subject Matter Jurisdiction

The first issue we must address is the district court's basis for subject matter jurisdiction over this case. We find that the district court had general federal question jurisdiction under 28 U.S.C. § 1331. Black Hills' complaint alleged facts sufficient to bring the case within 5 U.S.C. § 702's broad waiver of sovereign immunity. Section 702 waives the federal government's sovereign immunity in cases challenging agency action--here, the Department of Justice's seizure of Sue--and seeking relief other than money damages.[2] See 5 U.S.C. § 702; Specter v. Garrett, 995 F.2d 404, 410 (3d Cir.) (holding that § 702's waiver of sovereign immunity is not limited to cases brought under the Administrative Procedure Act), cert. granted, 114 S. Ct. 342 (1993); Presbyterian Church v. United States, 870 F.2d 518, 525 (9th Cir. 1989) (holding that the term "agency action" "was clearly intended to cover the full spectrum of agency conduct"). District

for support.

In Mitchell I, individual Indians sued the United States for mismanaging timber resources on trust land of which they were the beneficial owners. The Supreme Court found that the GAA, the statute under which the Indians had received their beneficial interests in the land, did not "impose any duty upon the Government to manage timber resources." 445 U.S. at 542. Rather, the GAA created only a "limited trust relationship" that sought "to prevent alienation of the land and to ensure that allottees would be immune from state taxation." Id. at 542, 544. In Mitchell II, however, the Court found that, even though the GAA was not a basis for liability, the United States could be liable for damages for mismanaging the timber because an elaborate statutory and regulatory scheme imposed fiduciary duties on the government relating to the management of timber resources on Indian trust land. 463 U.S. at 226. Mitchell I and Mitchell II, Black Hills claims, together compel the conclusion that the trust relationship between the government and Williams does not encompass the attempted sale of Sue because the absence of a statutory scheme governing fossils means that the government has only limited trust duties where fossils are involved. The limited duty of preventing alienation of the land, it argues, does not include preventing sales of fossils.

We reject the Black Hills' argument that the Mitchell cases suggest that the government exceeded the scope of its trust relationship with Williams. First, the fiduciary duties of the government to beneficial owners of trust land, the issue that the Mitchell cases addressed, and the ability of beneficial owners to alienate trust land, the issue here, are different questions. Thus, that there are no statutes or regulations specifically governing the sale of fossils is not important. The absence of such regulation only suggests that the government could not be liable in damages to Williams for breaching alleged fiduciary duties relating to the management of fossils on his land. It does not, however, affect the validity of Williams' attempted sale of the fossil to a third party because there are statutes and regulations governing the alienation of interests in Indian trust land, such as fossils. Moreover, the Court's holding in Mitchell I that the GAA imposed only limited trust duties on the government does not help Black Hills. Indeed, Congress enacted the GAA to prevent alienation of Indian trust land. 445 U.S. at 542. Because the fossil was part of Williams' trust land and he failed to secure approval for his attempted sale of the right to excavate it, we hold that the United States' seizure of the fossil was a proper exercise of its trust status under the GAA.[6] Finally, nothing in either Mitchell case suggests that Congress intended that the goal of preventing alienation of the land not apply to interests in such land, like fossils, that become personal property when severed from the land.

Black Hills next argues in effect that holding Williams' sale invalid is bad policy. It asserts that Williams was competent to sell the fossil even if it was an interest in land and that finding the sale invalid would undermine the current legislative trend favoring tribal self-determination. These points are matters of policy for Congress to consider, not federal courts. The current statutory scheme reflects Congress's desire to protect beneficial owners of Indian trust land like Williams regarding disposition of interests in such land. See 25 U.S.C. §§ 348, 464, 483; see also Tooahnippah v. Hickel, 397 U.S. 598, 609, 25 L. Ed. 2d 600, 90 S. Ct. 1316 (1970) (explaining that the GAA's legislative history "reflects the concern of the Government to protect Indians from improvident acts or exploitation by others"). Congress may very well determine that the historic practice of shielding beneficial owners from their own improvident decisions, unscrupulous offerors, and whatever other evils the enacting Congresses contemplated decades ago is no longer wise.[7] Until it does, however, we are bound to apply the statutes and regulations forbidding such owners from alienating trust land without the Secretary's approval.

Black Hills and amici curiae the Libertarian Party of South Dakota and the National Libertarian Party make several other brief arguments. First, we reject amici's suggestion that we remand the case to the Secretary to consider nunc pro tunc approval of the sale. The statute provides that "application of the Indian owners" is a prerequisite to the Secretary's approval of conveyances of trust land. 25 U.S.C. § 483. The Secretary may not consider the transaction at issue here because Williams has never submitted an application. Moreover, we reject Black Hills' argument that the

United States lacks standing to claim trust ownership of Sue because neither the Secretary nor Williams are parties. Williams is not a necessary party, see Heckman v. United States, 224 U.S. 413, 444, 56 L. Ed. 820, 32 S. Ct. 424 (1912), and the United States may claim trust title without the Secretary because the trust patent names it as trustee.

We also reject Black Hills' claim that the district court's decision violated its due process rights because the government seized the fossil without a pre-deprivation hearing and because Black Hills added value to Sue that it will be unable to recoup. Because we find that Black Hills has no interest in Sue, we reject its claim that the lack of a pre-deprivation hearing violated its rights. Moreover, although it is unfortunate that Black Hills spent a great deal of time and resources adding value to a fossil it does not own, concluding that Black Hills' transaction with Williams is void does not deprive Black Hills of due process where it had no interest in the fossil and it could have taken any number of steps to protect itself in the first place. At the very least, for instance, that the fossil was embedded in land located within the boundaries of the Cheyenne River Sioux Indian Reservation should have alerted Black Hills to the possibility that the federal government had some interest in Sue. Because it did not, however, we hold that the United States holds Sue in trust for Williams pursuant to the trust patent.

C. Rule 11 Sanctions

Counsel for Black Hills, Joseph Butler, challenges the district court's order imposing sanctions under Fed. R. Civ. P. 11[8] on him for naming the School of Mines as a defendant in the first amended complaint. The court awarded the School of Mines attorney's fees because it found that the school was not a proper defendant to Black Hills' quiet title action,[9] reasoning that the school had "no conceivable basis to assert any rights to the fossil" and "was nothing more than a mere depository of the fossil." D. Ct. Mem. Op. and Order at 3-4 (Sept. 8, 1992).

We review the district court's imposition of sanctions under Rule 11 for an abuse of discretion. Miller v. Bittner, 985 F.2d 935, 938 (8th Cir. 1993). The district court's task is to ascertain whether the attorney met the objective reasonableness standard. Id. (citations omitted). Improperly naming a party in a suit justifies Rule 11 sanctions when "joining the party [is] baseless or lacking in plausibility." Community Elec. Serv. of Los Angeles v. National Elec. Contractors Assoc., 869 F.2d 1235, 1245 (9th Cir.) (citing Rachel v. Banana Republic, Inc., 831 F.2d 1503, 1508 (9th Cir. 1987)), cert. denied, 493 U.S. 891 (1989).

We find that Butler's decision to name the School of Mines as a defendant here was not baseless or lacking in plausibility. Initially, Black Hills framed its case as a quiet title action. At the time Black Hills named it a defendant in the first amended complaint, the School of Mines was in possession of Sue. The district court, citing 75 C.J.S. Quieting Title § 54, found that the School of Mines had no "material subsisting interest" in Sue because it possessed her merely as an agent for the government and thus was not a proper party. D. Ct. Mem. Op. and Order at 3. The court's analysis of the merits of the School of Mines' status as a proper party would have been the correct inquiry on a motion to dismiss. It was not, however, the correct inquiry on a motion for Rule 11 sanctions.

Rather, as Community Electric Service suggests, the focus in the Rule 11 context should be on the plausibility of including the School of Mines as a party at the complaint stage. We think that the School of Mines' possession of Sue, albeit as a "depository" for the government, gave Black Hills a plausible argument that the School of Mines had a sufficient interest in the property to be named as a defendant in a quiet title action. Indeed, the district court itself noted that "in some circumstances possession of the object in dispute may be enough to justify suing the possessor in a quiet title action." Id. Case law on this issue is sparse and we will not force Butler to bear the burden of Rule 11 sanctions where it is unclear precisely in what "circumstances" possession is enough to sue the possessor. Cf. Mareno v. Rowe, 910 F.2d 1043, 1047 (2d Cir. 1990) (reversing award of Rule 11 sanctions where plaintiff's claim, although ultimately unsuccessful, involved "the complexities of New York long arm jurisprudence"), cert. denied, 498 U.S. 1028, 112 L. Ed.

2d 673, 111 S. Ct. 681 (1991). Butler had a plausible claim that the School of Mines' possession gave it the "material subsisting interest" in Sue needed to render it a proper party in the case.

Moreover, regardless of whether the School of Mines asserted an ownership interest in Sue, the fact remains that it retained possession of her. There is ample authority for the proposition that the court in a quiet title action, in order to afford complete relief, may order that a defendant relinquish possession of the subject property to the plaintiff. See 74 C.J.S. Quieting Title §§ 96, 108 (1951). Thus, naming the School of Mines as a defendant here was not baseless because the school clearly had an interest in Sue--possession--that a quiet title action could affect; failure to include the School of Mines might have required Black Hills to bring an entirely different action to enforce its right to possession if the court found that it had such a right. Once the School of Mines represented in open court that it would abide by any order the district court made and would not assert any separate interest in Sue, counsel for Black Hills immediately assented to dismissal of the school from the case. See Status Conference Tr. at 16. Thus, we hold that the district court abused its discretion in imposing Rule 11 sanctions on Butler. Although naming the School of Mines as a defendant in the first amended complaint ultimately proved to be unnecessary, Butler acted reasonably under the existing facts and law.

III. CONCLUSION

For the foregoing reasons, we affirm the judgment of the district court that the United States holds Sue in trust for Williams pursuant to the trust patent, and we reverse the district court's order imposing Rule 11 sanctions on Joseph Butler.

Order Denying Petition For Rehearing And Suggestion For Rehearing En Banc

Feb. 2, 1994.

(No. 93-1602)

The suggestion for rehearing en banc is denied.

The petition for rehearing by the panel is also denied with the following explanation. In its petition for rehearing, Black Hills Institute of geological research (Black Hills) relies on United States v. Good, U.S. , 114 S. Ct. 492, 126 L. Ed. 2d 490 (1993), for the claim that it was entitled to an adversary hearing before the Department of Justice seized the fossil "Sue" from it. In Good, it was undisputed that Good owned the real property that the government had siezed without forst providing Good with an adversary hearing. See id. at, , 114 S. Ct. at 496. This fact distinguishes Good from the instant case, where the panel determined that Black Hills did not own the property in question. See Black Hills Inst. of geological research v. United States dep't of Justice, 12 F.3d 737, 742-43, (8th Cir. 1993).

FOOTNOTES:

1. The Honorable Richard H. Battey, United States District Judge for the District of South Dakota.
2. Section 702 provides that its waiver of sovereign immunity does not apply "if any other statute that grants consent to suit expressly or impliedly forbids the relief which is sought." 5 U.S.C. § 702. Under 28 U.S.C. § 2409a(a), Congress waived the government's sovereign immunity in suits seeking to quiet title to real property. Section 2409a(a), however, "does not apply to trust or restricted Indian lands." Id. Thus, § 2409a retains sovereign immunity for suits seeking to quiet title to Indian trust lands. Section 2409a(a) does not "expressly or impliedly forbid[] the relief which is sought" here because Black Hills seeks the return of what is now personal property, not a determination of title to Indian trust land.
3. The IRA ended the federal government's policy of allotting tribal land in severalty to individual Indians. See 25 U.S.C. § 461. Under 25 U.S.C. § 335, however, provisions of the GAA continue to apply "to all lands heretofore purchased or which may be purchased by

authority of Congress for the use or benefit of any individual Indian or band or tribe of Indians," "unless otherwise specifically provided." The relevant GAA provision that applies here is 25 U.S.C. § 348, which governs the trust relationship between the government and the individual Indian.

4. The Supreme Court has held that a beneficial owner of Indian trust land could sell timber from his land without violating the restraint on alienation because "the cutting was incidental to the preparation of [the] land for agricultural uses." Felix S. Cohen, Handbook of Federal Indian Law, at 539 n.94 (1982 ed.) (citing United States v. Paine Lumber, 206 U.S. 467, 473-74, 51 L. Ed. 1139, 27 S. Ct. 697 (1907)). The Court distinguished Paine, however, in Starr. In Starr, the Court found the timber subject to the restraint on alienation because the timber constituted 15/16 of the value of the land and the land was "timber land" unsuitable for farming. 208 U.S. at 534. Holding otherwise, the Court reasoned, would reduce the restraint on alienation to "small consequence." Id. Thus, Paine does not apply here because Sue was a valuable part of the land and nothing in the record suggests that she was excavated to clear the land for farming or other similar purposes.
5. There is an ongoing dispute between Williams and Black Hills regarding this transaction. We intimate no opinion as to the remedies Black Hills may have under state law as to its $5000 payment to Williams. Moreover, because Black Hills does not argue that it acquired anything less than title to Sue, we need not decide whether Williams could have leased Sue or transferred other rights to Black Hills.
6. The government seized the fossil pursuant to a search warrant as part of a criminal investigation. Black Hills argues that the government cited violations of the Antiquities Act as one basis for the seizure knowing that the Act did not apply. We need not evaluate the government's articulated rationale for the seizure, however, because we conclude that the seizure was within the scope of the trust relationship with Williams.
7. Congress has already eliminated many of the protections earlier statutes provided for Indians. Section 483 itself, for instance, allows Indians to apply to the Secretary for removal of alienation restrictions. Thus, the statutes reflect the trend toward Indian self-determination. Although it has diminished the practice of protecting Indians, however, Congress has not completely eliminated it. Williams was free to request that the government end the trust or that he be allowed to alienate his land, but he did not. Because he did not, the vestiges of protection that remain still apply.
8. The amendments to Rule 11 that went into effect on December 1, 1993, do not affect our analysis.
9. As we noted above, Black Hills' second amended complaint sought the return of Sue and abandoned the quiet title claim. At issue here is the district court's decision to sanction Butler for naming the School of Mines a defendant in the case when Black Hills was asking the court to quiet title.



Revised December 30, 1996

Comment 1

Comment noted. Refer to Section 3.12 of the Final EIS for an updated discussion of cultural resources protection.

Comment 2

Mitigation measures inherent to the project include those provisions in the Cooperative Agreement among Trendwest, WDFW, and the Yakama Nation and in the RIDGE Settlement Agreement that apply to potential cumulative impacts from the MPR and Cle Elum UGA developments. Elements of these agreements include collaborative management of onsite and offsite conservation easements, development and implementation of a Land Stewardship Plan, and financial contribution to a conservation trust established by RIDGE. Refer to Section 3.13, Parks and Recreation, in the Final EIS for additional detail.

Comment 3

Comment noted. The City has developed a Municipal Facilities and Expansion Plan that analyzes potential fiscal impacts to the City in detail. Mitigation to prevent fiscal impacts is included in the draft Conditions of Approval for the project. Refer also to Section 3.18 and Appendix D of the Final EIS for an analysis of Alternative 5 and an updated discussion of mitigation agreements and proposed mitigation measures for public service providers.

Comment 4

A second Draft EIS will not be published. However, a comparative analysis of potential impacts under Alternative 5 that also responds to comments received on the Draft EIS is included for each element of the environment as Section 3 of the Final EIS.

Comment 5

Comment noted. Any City decision, Conditions of Approval, and/or Development Agreement associated with the UGA would contain sufficient bonding or other financial assurances to support required mitigation.

Comment 6

Refer to the response to Letter 4, Comment 2.

Comment 7

Comment noted.

PUGET SOUND ENERGY

received
5/7/2001
City of Cle Elum

Brian Carrico, Planner
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Tuesday, May 01, 2001

Brian,

PSE is in full support of the expanded residential alternative 3 as outlined in the DEIS completed by Trendwest. As I stated in my comments to you and Mr. Berndt at the public hearing, I believe that this type of planning and development is far superior to the piece meal development that occurs when the property is broken up by parcel and sold and developed by individuals. As for distributing natural gas and electricity this type of planning is the most efficient use of resources. We have been working with the developer for over 4 years and they have provided excellent communication and planning activity as we have been developing our long range plans to serve the area.

PSE is also supportive of the additional units and expanded business park areas outlined in the 3rd alternative. Since bringing infrastructure to this community as a whole is based upon numbers to justify the economic cost of expansion PSE is very supportive of the plan as it helps to provide that opportunity to expand the natural gas infrastructure to the entire Cle Elum community. 1

PSE is also aware that this development will be adjacent to our transmission and distribution facilities and we believe that the development plan as outlined with the joint use of corridors and rights of way is consistent with good planning process.

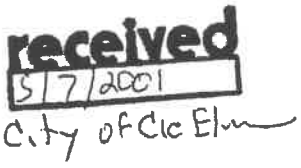
Thank You
Brian Lenz, PE
Community Relations Manager
Puget Sound Energy

Comment 1

Your support of the project is noted.

Brian Carrico, Planner
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Tuesday, May 07, 2001



Brian,

I am in full support of the expanded residential alternative 3 as outlined in the DEIS completed by Trendwest. As I stated in my comments to you and Mr. Berndt at the public hearing as a representative of Puget Sound Energy, I believe that this type of planning and development is far superior to the piece meal development that occurs when the property is broken up by parcel and sold and developed by individuals. As a county resident who has been working with community members for the last 10 years to bring new business ventures to the county, I believe that this project as planned supports the goal of increased employment and clean planned development. My interactions with Trendwest have been positive and they have demonstrated professional planning and have followed up their commitments in the community. 1

Thank You
Brian Lenz
1441 Emerson Road
Ellensburg, WA 98926

Comment 1

Your support of the project is noted.

UNIVERSITY OF WASHINGTON

Department of Astronomy

received

May 1, 2001

City of Cle Elum
UGA/Trendwest Properties Draft E.I.S.
119 W. 1st Street
Cle Elem, WA 98922

received
5/07/2001
City of Cle Elum

Dear Sirs.

It has been brought to my attention that Trendwest Properties is planning a very large development in your area and that you are currently considering the environmental impacts of this development on your community. I would like to remind you that the University of Washington is still actively running an astronomical observatory on Manastash Ridge which is not too far from this development. Dark skies are important to our operations there. We would like you to seriously consider making restrictions on the lighting from such developments in order to preserve this resource. Now is the time to think about this. It is much easier to lose a dark sky than it is to regain one that is lost. 1

Appropriate steps to insure a minimal impact on sky lighting can be found on the web pages of the International Dark-Sky Association (www.scn.ord/darksky). We would very much like to encourage you to adopt lighting standards for your area. Generations of amateur and professional astronomers will be grateful for your foresight in this area, but that is not the most important issue here. Do this for yourself. A dark sky is one of the natural beauties of your community. Don't throw it away.

Sincerely,

Dr. Jeff Morgan
Research Engineer

Jeffrey S. Morgan

Dr. Paula Szkody
Observatory Director

Paula Szkody

Box 351580 Seattle, Washington 98195-1580 (206) 543-2888 FAX: (206) 685-0403 www.astro.washington.edu
Shipping Address: C319 Physics/Astronomy Building, Stevens Way

Comment 1

Comment noted. All lighting for development within the MPR and UGA would meet the International Dark Sky Association's Zone E1 standards. These standards are recommended for use in "areas with intrinsically dark landscapes." Roadway lighting would be consistent with the Illuminating Engineering Society and WSDOT lighting criteria.

received
5/7/01 KS
City of Cle Elum

May 5, 2001

Comments by Molly Palmer on The City of Cle Elum Urban Growth Area Draft Environmental Impact Statement.

I appreciate the opportunity to comment on this D.E.I.S. This proposal will change Upper Kittitas County forever and should be planned as carefully as possible. Separating the Sepa analysis of the U.G.A. from the SEPA and NEPA analysis of the proposed water and waste water treatment plants is inappropriate. There is no doubt that converting such huge amounts of forest land to urban use will require water and waste water treatment plants. The required environmental impact

1

2

analyses should be included in this EIS.
Development of this U.G.A. along with the M.P.R.
Will increase impacts substantially. It has a
lack of REAL plans for water supply and
treatment and waste water treatment. The
area does not meet any of the criteria to be a
U.G.A. under the G.M.A. Statute. In fact the
proposal seems to encourage sprawl into this area.
A tax and land grab by Cle Elum. This proposal
and the M.P.R. should be considered as one
development

Public Services will be greatly affected by this
U.G.A. There will be increased demand for police
protection, fire protetion, and emergency medical
help. With the Concurrent development of the

2 (cont.)

3

4

5

MPR those needs further increase simultaneously and this is not addressed in the DEIS.. 5 (cont.)

The schools will also be impacted. New students will increase the need for water and SEWER at the school. The schools are now running at near capacity. Increased class sizes will reduce the quality of education. There are many fiscal impacts to the schools not clearly addressed in the DEIS. There will be a lag in any land tax benifits the school might increase, possibly 3 to 5 years. Increased assessed valuation does not gaurantee increased revenue. 6 7 8

The schools needs should be factually anticipated and a signed mitigation agreement should follow. 9

Plants, Animals, Birds, and Fish will all be impacted by turning this forest land into a UGA. The whole area of the MPR and UGA is Elk wintering ground The very things that people love about the Upper County will be threatened or gone. (drawn out.) I think the UGA is too large. The DEIS does not adequatly address impacts to animal movement and habitat. Removal of the forest will reduce habitat for birds. There are also 38 sensitive species of plants in the area. All ~~the~~ this wild life and habitat should be protected, espcially along the Cle Elum River corridor. Storm water runoff from the UGA. should be further addressed by the DEIS. Storm water runoff pollution

10

11

will adversly Effect the environment, the Cle Elum River and wetlands in the area. Wetlands #4 and #5 should have larger buffer zones to protect migratory birds from the adverse effects of human use and pets. More natural open space should be dedicated to non-motorized use, not including golf courses. 11 (cont.) 12 13

Traffic impacts will be awful. There are no funds in the Community to deal with increased Traffic demands and no funds for roads, turn lanes, signaled intersections and many other things. These impacts should be mitigated. These impacts will be year round. 14

Increased traffic will increase noise levels. 15

Construction will increase noise. There will 16

more air pollution from dust, car and diesel emissions. There will be more skyglow at night. These ~~is~~ are adverse impacts. 16 (cont.) 17

It is my belief that all of these impacts listed should be mitigated before any issuance of permits or approvals. The proponent of this new growth should pay for mitigation before development 18

Sincerely,

Molly Palmer
PO Box 1
Roslyn, Wa. 98941

Comment 1

Comment noted.

Comment 2

Refer to the response to Letter 4, Comment 2.

Comment 3

The Cle Elum UGA meets Growth Management Act criteria because it is designed to accommodate projected population growth in Kittitas County and the City of Cle Elum. The Kittitas County Board of County Commissioners approved updated population projections for Kittitas County in 1999. These population projections included a specific allocation of that future growth to Cle Elum. Kittitas County population allocations and projected housing needs are discussed in Section 3.11 of the Draft EIS. See Section 3.10 of the Final EIS for an updated discussion pertinent to Alternative 5.

Comment 4

Refer to the response to Letter 4, Comment 2.

Comment 5

Cumulative impacts on public service providers are described in Section 3.16 of the Draft EIS and with more detail in Section 3.19, Fiscal Conditions, and Appendix H of that document. Since the Draft EIS was published, mitigation agreements have been negotiated between Trendwest and local public service providers. An updated discussion of cumulative public service impacts under the Reduced Density MPR and Alternative 5 is included in Section 3.15 and Section 3.18 of the Final EIS.

Comment 6

Refer to the response to Letter 1 from the Cle Elum-Roslyn School District.

Comment 7

Refer to the response to Letter 1 from the Cle Elum-Roslyn School District.

Comment 8

An updated fiscal impact analysis for the Cle Elum-Roslyn School District under Alternative 5 that also responds to comments received on the Draft EIS is found in Section 3.18 and Appendix D of the Final EIS. Refer also to the response to Letter 1 from the Cle Elum-Roslyn School District.

Comment 9

Refer to the response to Letter 1 from the Cle Elum-Roslyn School District. Trendwest and the School District have negotiated a mitigation agreement.

Comment 10

Comment noted. Elk use and animal movement and habitat within the UGA are discussed in Section 3.6, Plants and Animals, of the Draft EIS. Raedeke Associates, Inc. (1999) identified the winter range of elk within the UGA as primarily the riparian corridor, including associated wetlands and adjoining forestland. Mitigation measures for potential human/elk conflicts are identified, and sensitive plant species are discussed in Section 3.6 and Appendix E of the Draft EIS.

Since the Draft EIS was published, the site plan has been redesigned to condense development within a smaller area and increase undeveloped open space along the Cle Elum River and for perimeter buffers. This riparian corridor connects the UGA with offsite habitat in the MPR and surrounding lands and would allow for the continued movement of wildlife to offsite properties. Refer to Section 3.5 of the Final EIS for an updated discussion of potential impacts on plants and animals under Alternative 5.

Comment 11

Stormwater treatment prior to infiltration has been increased since the Draft EIS was published. A quantified analysis of stormwater quality is included in Section 3.3, Water Quality, and Appendix A of the Final EIS.

Comment 12

As described in the Draft EIS, Wetlands 4 and 5 would likely be designated as Category III with a buffer of 50 feet under the Cle Elum Critical Areas Ordinance. The hydrological isolation and small size of Wetlands 4 (0.1 acre) and 5 (0.3 acre) limit their potential habitat value to waterfowl.

Comment 13

Since the Draft EIS was published, the site plan has been redesigned to condense development within a smaller area and increase undeveloped open space along the Cle Elum River and for perimeter buffers. The golf course was eliminated. Please see the description of Alternative 5 in Chapter 2 of the Final EIS.

Comment 14

Refer to the response to Letter 7.

Comment 15

Traffic and construction-related noise impacts are evaluated in Section 3.9, Noise, of the Draft EIS. Traffic noise levels were modeled with FHWA-approved computer models; increased traffic noise levels were predicted to be below FHWA noise impact guidelines for highway noise. Mitigation measures for construction-related noise impacts also were identified. The identified impacts and mitigation measures in the Draft EIS also apply to Alternative 5.

Comment 16

Section 3.2, Air Quality, of the Draft EIS models potential carbon monoxide (CO) concentrations with EPA-approved computer programs. CO concentrations are predicted to be well below state and federal standards. Construction-related impacts and mitigation measures also are identified. Section 3.2 of the Final EIS comparatively analyzes air quality impacts under Alternative 5.

Comment 17

Refer to the response to Letter 10, Comment 1.

Comment 18

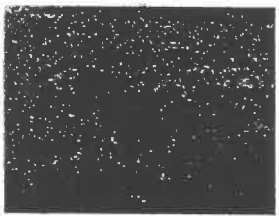
Measures to mitigate project impacts are included under each element of the environment analyzed in the Draft and Final EISs. Mitigation will be incorporated into the Development Agreement and Conditions of Approval for the project.

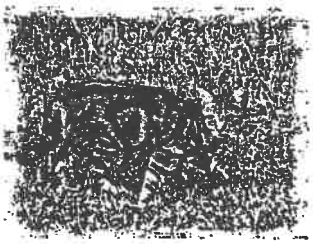
Morningstar Master Planned Resort





Impact of Growth
on the Cle Elum Pet Population
And Necessary Steps
In Animal Control





Lisa Messmer
P.O. Box 770
Roslyn WA
98941

674-5625

received
5/7/01 KS



This small building is Cle Elum's only resource to deal with stray animals-- an unstaffed "holding cell" for strays that happen to get caught. The nearest animal shelter is 30 miles away in Ellensburg.

Unavoidable Effects

Increased Population Brings Increase In Number Of Pets

The Mountainstar Resort EIS Summary reads in part:

1.9.15: Population

Significant unavoidable increases in population would occur in the County and surrounding communities as a result of the direct, indirect and induced effects of the MPR on the local economy. Evaluation of these increases as positive or adverse would depend upon individual perspectives and beliefs.

Related to section 1.9.15 is section 1.9.13 (Public Services), which reads:

Development of the MPR would cause significant unavoidable increases in the demand for law enforcement, fire protection, emergency medical, education, road maintenance and general government services. The service plans for the proposed resort and the mitigation measures identified, primarily the additional tax revenues that would provide long-term fiscal surpluses to the affected service jurisdictions, would be sufficient to minimize the net effects on these public services.

According to the 1996 Census, the percentage of households in the U.S. that have companion pets is 31.6%. Of those homes, the average number of pets per household is 1.7. The addition of companion pets into the residential areas of the MPR is a detail that must not be overlooked; as the population increases, so will the need for shelter services, veterinary care, spay and neuter facilities, and animal control staff.



More Pets, Less Wildlife

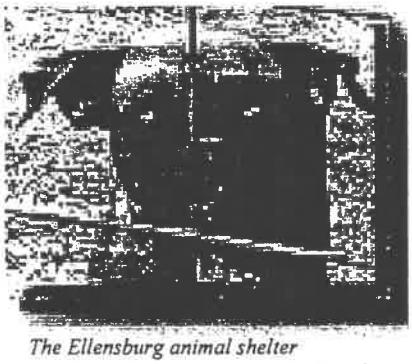
Feral cats and other animals breed often and can have a detrimental affect on native wildlife - A single pair of breeding cats, which might have two or more litters per year, can exponentially produce 420,000 offspring in a seven year period.

Based on 1990 census figures for Kittitas County, the entire county's population is just over 32,000 people. 3,200 of those people, per Washington State population records, live in Cle Elum, South Cle Elum, Ronald, and Roslyn. And according to demographic figures per household dated 4/1/2001, there are 1900 'households' in the Cle Elum area.

Considering the previously stated census statistic that cites 31.6% of households have pets and of those households the average is 1.7 pets each, a conservative estimate of companion animal pets (dogs/cats) in the Cle Elum area currently is over 1,000. This would not take into consideration stray and feral animals that get dumped in the countryside and have no owners.

With the development of this Master Planned Resort, the population could easily double and, over the years, will probably more than double. With a conservative estimate of a doubled population, which would be 6,400 people (or around 4,000 households) it is easy to see that the number of pets (dogs/cats) in the area would increase to around 2,150 -- and this still would not count stray and feral animals.

The introduction of pets can have different effects on wildlife -- especially animals that are "dumped" as strays in the country without being handled safely by a true animal shelter. Animals that are not spayed or neutered that are left to roam, breed and create packs or colonies of feral animals, which keep breeding and multiplying. Feral cats, especially, can have disastrous effects on wild populations of songbirds and rodents. Feral dogs run in packs and have been known to attack people, destroy property, or even breed with pets who have not been spayed or neutered. And feral populations of animals that are not appropriately managed can also spread disease, both amongst their own populations and to wildlife and domestic or companion animals.



The Ellensburg animal shelter receives 1400 animals a year. 950 of those animals are euthanized because they are not adopted.

A Growing Population

The Ellensburg animal shelter handles all of the county's stray or unwanted animals -- that is, the animals that actually get turned in to the shelter. The shelter in Ellensburg, with its 16 kennels, receives in excess of 1400 animals a year. Last year, 950 of the 1400 animals were euthanized -- 68%. Of the animals that are received at the shelter, 40% are from the Ellensburg city area, and 60% are from other parts of the county including Cle Elum and the surrounding area. There are no arrangements with government agencies, sheriff departments, etc., to bring in unwanted animals -- only when a citizen takes the time to turn an animal in to the shelter will it have its 32% chance for adoption. The average citizen will not take the time to capture a stray and drive it 30+ miles to Ellensburg.

Statistics for the animals received at the shelter are striking, and telling.

1400 animals received per year -- an average of 4 animals per day.

950 animals put down when they are not adopted.

60% of animals received at the shelter are from around the county.

60% of animals received (840) are cats.

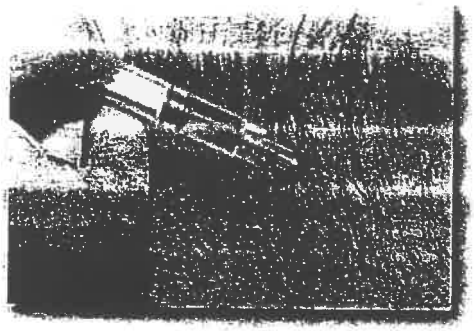
1/2 of the cats received are **feral cats,** too wild to be adopted.

40% of animals received (560) are dogs.

50% of animals received are non-neutered males.

28% of animals received are non-spayed females.

A single pair of breeding cats, which might have two or more litters per year, can exponentially produce 420,000 cats in a seven year period.



An animal shelter with a veterinary clinic could serve the community with vaccinations, spay and neuter, and other veterinary care.

Veterinarians - The Story

The story is... there aren't many.

There are currently no full time vets in Cle Elum. The area has two veterinarian offices, one of which has a vet present part-time in the mornings until noon weekdays. The other office has a vet roughly 2 days per week.

If an animal shelter were put into place for the Cle Elum area as a result of the population growth (and subsequent pet - and stray - population increase, the domestic animals in the area would have a better chance of being spayed, neutered, and vaccinated, and citizens would have another avenue to maintain the health of their pets. Vaccinations alone through a veterinary clinic would cut down on the spread of diseases -- for example, in Roslyn where they have a large feral cat population, they have had outbreaks of calicivirus which spreads rapidly to people's domestic cats and many people's pets have fallen ill or died as a result.

Animals that are adoptable at the animal shelter could get vaccinations and veterinary care, as well as spay/neuter. If adopted, these animals would be unable to reproduce should they escape or become lost, plus they would not be susceptible to health-threatening diseases.







Summary

The population of the area will increase dramatically upon completion of this Master Planned Resort. As more and more families come to the area, whether on a seasonal basis or on a permanent one, they will inevitably bring their companion pets with them as well.

Things happen. Animals get out of the house or yard, they get lost, they run scared in a storm -- these are occurrences that can happen in a household with pets. And when they get out, they can breed - they can spread disease - they can destroy property - they can become a danger to our children. If, of course, they are not handled in an appropriate manner when they are strays.

Adding an animal shelter will serve many functions - it will give families a place to look for their lost dogs; it will give people a place to visit when they want to adopt a pet; it can house a veterinary clinic that makes vet care available to families with pets including vaccinations and spay/neuter; it will help control stray and feral animal populations that will inevitably endanger local wildlife and spread disease; and it can help educate the public about the responsibilities of pet ownership and the consequences that can result when pets are dumped in the countryside.

Companion animals and families are a valuable combination. A shelter is the right thing for the area, to help avoid problems and to ensure appropriate facilities and care for the pets that will be moving in with their families.

Comment 1

This is a copy of a report on the effects of the MPR on the Cle Elum pet population. Receipt of this letter is noted.

Officers
President
James R. Ellis, Chairman*
Washington State Convention & Trade Center
Vice-Presidents
Rich Hanscum, Executive Vice President*
Weyerhaeuser Company
Treasurer
Sarah M. R. Jewell, Executive Vice President*
Washington Mutual Bank
Secretary
C. Theodore Thurston*
Immunex Alps Trade Club
Executive Director
Nancy Ebert*
Director At Special Projects
Ken Konigsmark

Directors
Bill Ahrendt, Commissioner Department Chair
Central Washington University
Cheryl Bull, Washington State Association
Jennifer Belcher, Commissioner of Public Lands *
Steve Bell, Executive Director
Friends of the Issaquah Salmon Hatchery (FISH)
Tom Buchanan, Director
King County Department of Natural Resources
David Black, Snoqualmie Pass
Jeanne Dietsch, Director of Operations, retired
Tom Bogar, Director of Operations, retired
The Boeing Company
Ken Bounds, Superintendent, Seattle Parks & Rec.
Mark Boyer, Middle Fork Outdoor Recreation Facilities
Steve Boyle, Associate Director, Rainier *
Jeanne Burbidge *
Sound Area Commander, Boards of Directors
Bonnie Bunning, S. Puget Sound Region Manager
Washington State Department of Natural Resources
Pierce County, Parks Division

Advisory Council
Anthony Angell, Supervisor
WA Office of Environmental Education
Greg Aubrey, Mayor, City of Cle Elum
Priscilla Collins, Trustee, the Bullitt Foundation, Inc.
Mike Coughlin, Mayor, City of Bellevue
Jennifer Dorner, Community Leader
Jim Dobbins, Mayor, City of South Cle Elum
Dave Enselow, Cle Elum Ski Member, City of Roslyn
George Gell, Former President
Greater Seattle Chamber of Commerce
Judy Edwards, North Bend District Ranger
Mt. Baker-Snoqualmie National Forest
Roger H. Flynt, Chairman, CEO and President
Safeco Corporation
John W. Ellis, Chairman & CEO, Seattle Mariners
Darrell L. Ehman, Former Governor & U.S. Senator
Randy "Tony" Hartine, Mayor, City of Snoqualmie
R. Janet Isbell, President, Bellevue Community College
Ann Petersen, Mayor, City of Issaquah
Lou Fairchild, Attorney, Three Weights Investment
Lena Gutenkauf, Community Leader
Norman Hansen, Former Mayor, City of Snoqualmie
Austin Hicks, Former Mayor, City of Issaquah
Rich Hooley, President and CEO
Plum Creek Timber Company
Jeanne Hunt, Forest Land Use Manager
Weyerhaeuser Company
Benjamine Ivey, Mayor, City of Redmond
Carol Jarrett, King County Citizens for Open Space
Carroll Johnson, King County Sheriff (Ret.)
Jim Judd, Executive Secretary
King County Labor Council
Phyllis Lamphere, Civic Leader, Seattle
Gilbert Levkoven, Kenan Advantage Group, AEC
Margaret Marshall, Management Consultant
Seattle/Cascade/Puget Mountains Interagency Committee
Doug McWilliams, Former Supervisor
Mt. Baker-Snoqualmie National Forest
Doug McClelland, King District Manager
Department of Natural Resources
Steve Moore, President & CEO
Seattle-King County Convention and Visitors Bureau
Tom Nelson, North Bend City Council
Lloyd Olson, Cle Elum City Council
Penny Peabody, Past President
King County Economic Development Council
David Ramsay, Redmond City Manager
Bob Rose, Conservation Consultant
Jim Simpson, Mayor, City of North Bend
Lee Spencer, Superintendent, Plum Creek Timber
Lee Springgate
City of Bellevue Parks and Recreation Department
Jerry Stokes, League of Women Voters of Washington
Catherine Stephenson, Cle Elum United Bruins
Wenatchee National Forest
Arlene Wade, Greater Harbor 2000
Southeast Seattle Renewal Group
Bob Watt, President
Greater Seattle Chamber of Commerce
Bruce Wishkovsky, Executive Director
Lauren Wolkerstorfer, Mt. Baker Mountaineers
Colleen Willoughby, Civic Leader, Seattle

Directors
Ad Chairman *
Washington Wildlife and Recreation Coalition
Aubrey Davis, Cascade Environmental Systems *
Jim Drago, Seattle City Council
Kathleen Drew, Community Relations Manager
Sound Transit
Phil Dyer, Washington Department of Transportation
Charles H. (Tony) Elliot, Retired, FHWA *
Richland, Executive Vice President, CPOM/USB
Richard Emilio
Cle Elum/Roslyn Chamber of Commerce
Ed Fennell, Snohomish Conservation
Lorna Hamilton, Chairman and President
MLM Enterprises
Jerry Harris, Director of Major Projects *
Puget Sound Energy
Phil Hobbs, Kittitas County Commissioner
Roger Hornbrook, Acting Director
Bellevue Parks and Community Services
Thomas Hull, Past President
The Mountaineers

Jeff Jones, General Manager
US Reclamation, Kittitas Operations
Maryanne Jaggers Jones
Washington Conservation Voters
John Keegan
Trump Mill Town Historical Preservation Society
Ian Kelley, Director of Public Affairs, Weyerhaeuser
Leon Kos, City Administrator, City of Issaquah
Pete Lagerwey, Black Diamond Bank, Commissioner
Seattle Engineering
Craig Lange, Olympia
King County Parks and Cultural Resources
Greg Lee, Vera Partnership *
The Trust for Public Land
Ken Lloyd, CWA Public Affairs Retired
Gary Locke, Governor, State of Washington *
Donald MacDuff, Senior Project Manager, Intermap
County Marshall, Bellevue City Council
Dan McDonald, State Senator, 45th District
Brian McEachran, Senior Attorney *
Microsoft Corporation

Phil McCormick with Hansen, Associate Broker
Gleason Valley Realty
Johnson Mendell &
Cumberland John A Brandy, Weyerhaeuser Nelson
Dana Middleton, Consultant
Beaver Creek Ski Holdings, Inc.
Jeff Morrison, Secretary
Washington State Department of Transportation
Penelope Nedrow, Superintendent of Schools
Cle Elum Roslyn School District
Mary Norton, Snoqualmie Chief Executive
Charles Olmsteed, Mount Rainier National
John Osborne, Northwest Regional Aerospace
Washington State Department of Transportation
Ray Owens, Ironwood Resorts
John Phipps, Forest Supervisor
Mt. Baker-Snoqualmie National Forest
Glenn Pinnix, Director
Washington State Parks and Recreation Commission
Leonard Pitzman, S. Central Regional Administrator
Washington State Department of Transportation

Frank Pritchard, Seattle Civic Leader
Charles Raines, Sierra Club, Director
Cascade Chapter, Issaquah Project
Dave Reed, State Senator, 5th District
Paul Schell, Mayor, City of Seattle
Ann Sitz, CEO, Intermountain Development
Ron Sims, King County Executive *
Roger Stennett, Cle Elum Ranger District
Wenatchee National Forest
David Stimmel, Boeing
University of Washington College of Forest Resources
Norman Waterman, Board, Mark Gordon, Retired
Larry L. Wellington, Vice President, Key Bank NA *
William Wellborn, Olympic Regional Planning
National Park Service
Jack Wheatley, Treasurer, Kittitas County
Cindy Wilkinson, Senior Vice President
Continental Bank
Mike Yeager, Manager, Land Use Planning
Plum Creek Timber Company

* Member Executive Committee

MOUNTAINS TO SOUND GREENWAY

1011 WESTERN AVENUE
SUITE 606
SEATTLE, WA 98104

PHONE (206) 382-5565
VOLUNTEER LINE (206) 812-0722
FAX (206) 382-3414

WWW.MTSGREENWAY.ORG
EMAIL: MTSGREENWAY@TPL.ORG

May 7, 2001

Mayor Gary Berndt
City of Cle Elum
119 West 1st Street
Cle Elum, WA 98922

received
5/7/2001
City of Cle Elum

Dear Mayor Berndt:

As you know, the Mountains to Sound Greenway Trust is a private, non-profit corporation acting on behalf of public and private organizations and citizens working to protect scenic, recreation, and tourism values along the I-90 corridor from Seattle to Thorp. Planning and accomplishments by the Trust were key factors in gaining National Scenic Byway designation in 1998 for this portion of the I-90 corridor. This is the only interstate highway in the nation to receive this important national designation. In this capacity, the Greenway Trust wishes to comment on the Draft EIS for the proposed Trendwest Properties: Cle Elum Urban Growth Area.

The Greenway Trust understands the potential economic and infrastructure benefits to the City of Cle Elum from the UGA and is supportive of the UGA proposal. If done with careful design and environmental protections, the UGA can become a significant enhancement to the City while minimizing impacts to the Greenway and the National Scenic Byway.

The key Greenway goals for this development include:

1. A design/layout that protects the visual forested character of the National Scenic Byway corridor
2. Avoiding the intrusion of commercial or other intensive development in the Bullfrog interchange and immediately adjacent to I-90. (We're aware that an informational kiosk may be located in this vicinity and believe this can be of benefit to visitors).
3. Protecting the riparian corridor along the Cle Elum river so that water quality is sustained and an adequate wildlife migratory corridor is accommodated.

To accomplish these goals, we believe that the Final EIS should strengthen and include language addressing the following comments from the DEIS:

Para 1.5, page 1-5: ("Issues identified during scoping"). In earlier correspondence and in discussions with Trendwest the potential view impacts to the National Scenic Byway and Greenway corridor that abuts the entire southern length of this project had

1

2

been identified as an issue but was not included in the DEIS list of issues. We ask that this be documented as an issue when publishing the FEIS. 2 (cont.)

Table 1-1, page 1-20, under "Aesthetics". When describing "mitigation measures," the table states that "Natural open space buffers along I-90 and Bullfrog Road would screen or diffuse views to the interior of the UGA." However, no dimensions for these buffers are documented anywhere in the DEIS. We believe it is important to document in precise terms exactly what the dimensions of these buffers will be in the FEIS so that no future misunderstanding occurs. In order to protect the scenic character between Cle Elum and Roslyn, we suggest that a forest buffer be considered adjacent to Hwy 903 as well. A minimum buffer width adjacent to I-90 should be no less than 150' based on previous commitments from Trendwest representatives. 3

Para 3.10.4, p. 3.10-19 ("Mountains to Sound Greenway Plan"): We appreciate the inclusion of the Greenway Plan in consideration for the UGA. This para mentions Elk Heights as the eastern terminus of the Greenway corridor, but this has been officially extended east to Thorp. We ask that this be corrected in the FEIS. Also, we believe that this paragraph should document that Greenway efforts led to the 1998 designation of the portion of I-90 between Thorp and Seattle as a National Scenic Byway. Here, too, when describing setbacks from I-90, this paragraph includes no specific dimensions for such a buffer. As stated above, we believe the FEIS should document the buffer dimension in this paragraph as well. 4

Para 3.12, page 3.12-1: Under "Aesthetics, Light, and Glare" there are several key issues important to the Greenway that are not addressed:

- There is no mention in the "Aesthetics" section of the Mountains to Sound Greenway corridor nor that this segment of I-90 is a "National Scenic Byway." These facts should be included in describing the "affected environment" along with a short description of the Greenway corridor and a definition of the term "National Scenic Byway." 5

p. 3.12-6 ("Views of the UGA"): The only mention of I-90 states: "Travelers along I-90 have limited views of the UGA because of the high travel speeds and moderately dense vegetation present along this stretch of highway." We suggest that this statement be expanded to acknowledge existence of both the Greenway corridor and the National Scenic Byway. It should further describe the potentially dramatic view impacts that could occur from building a large commercial business park adjacent to I-90 on what is now natural forestland. Even with a retained buffer, the width of which should again be documented in this section, it's quite likely that office buildings would still be visible through the spaced trees, even at night if buildings are lighted. 6

Further, signage facing I-90 from these buildings could negatively impact the I-90 view. We suggest expanding the discussion of view impacts so that these issues are identified, considered, and documented. 7

Para 3.12.4, page 3.12-10: "Mitigation Measures" (for Aesthetics, light, and glare) This paragraph should document the specific dimensions and plans for the permanent buffer along I-90 and Bullfrog Road. We suggest consideration of a buffer along Hwy 903 as well. This paragraph also discusses "provisions that set architectural design and material guidelines for residential and other structures." In addition to "residential structures" we suggest that building style and materials for the business park buildings be clearly defined within the Development Agreement process to ensure a unified, cohesive, and consistent appearance in the business park. It should be a goal of Trendwest and the City of Cle Elum to avoid mixed styles, colors, and materials in the office park. We'd suggest consideration for documenting precise Codes, Covenants, and Restrictions for the Office Park that define the types and styles of buildings allowed, potentially the types of uses (i.e. no large water consumers for example), the types of finish materials allowed, etc. 8

We found no mention of signage design standards or limitations in the DEIS. We'd suggest that clearly defined sign codes be established up-front for the office park that will control what signage is allowed to be placed on buildings. Consideration should be given to size limits on signs, lighting of signs, definition of whether neon or other type signs are allowed, and whether they are allowed to face I-90. We'd urge that no signage be allowed to face I-90, particularly signage intended to advertise to highway travelers. 9

The Greenway Trust asks that consideration be given to switching the locations of the Washington State Horse Park and the Business Park Campus within the overall design of the UGA, thereby placing the Horse Park adjacent to I-90 instead of the Business Park. The Greenway Trust encourages this plan alteration, believing that the view impacts from the Horse Park would be less than those of a Business Park and that the Horse Park may be more compatible with the existing forest setting. 10

The Trust thanks you for the opportunity to comment on the DEIS.

James R. Ellis
President, Mountains to Sound Greenway Trust

cc: Mr. Brian Carrico

Comment 1

Comment noted. Undeveloped open space in the UGA would include a 150-foot undisturbed buffer along the I-90 right-of-way. Undeveloped open space in the Cle Elum River corridor has been expanded under Alternative 5 (Preferred Alternative) from approximately 150 acres to 246 acres. The open space corridor includes the northeast quadrant of the Bullfrog/I-90 interchange (to the extent of Trendwest ownership in that area) and potential development is limited to a small interpretive center.

Comment 2

Comment noted. This issue has been added to the scoping discussion in Chapter 1, Summary, of the Final EIS and has been addressed in Section 3.11 of the Final EIS.

Comment 3

Trendwest has committed to a 150-foot buffer along I-90, a 100-foot buffer along Bullfrog Road, and a 50-foot buffer along SR 903 as part of Alternative 5, the Master Site Plan Application. The buffer along I-90 would contain sufficient vegetation to accomplish an approximately 75% visual screen from users of I-90.

Comment 4

The discussion of the Mountains-to-Sound Greenway Plan in Section 3.10, Land Use, in the Draft EIS has been moved to Section 3.11, Aesthetics/Light and Glare, of the Final EIS. The description of the corridor has been revised to reflect Thorp as the eastern terminus. A definition of the National Scenic Byway designation has been added, and perimeter buffer widths along I-90, Bullfrog Road, and SR 903 have been specified.

Comment 5

Refer to the response to Comment 4, above.

Comment 6

Comment noted. An updated discussion of aesthetics, light, and glare pertinent to Alternative 5 is included in the Final EIS (see response to Comment 4, above). As part of the Alternative 5 site plan, the Business Park location has been moved from alongside I-90 to alongside SR 903 (see Figure 2-5 in the Final EIS). Business Park building design (e.g., styles, colors, and materials) will be identified in the development standards for the UGA.

Comment 7

Refer to the response to Comment 6, above.

Comment 8

Comment noted. Refer to the responses to Letter 11, Comment 3 and Comments 3 and 6, above.

Comment 9

Comment noted. Sign code standards are found in Chapter 15.20 of the Cle Elum Municipal Code. Those provisions address size, lighting, etc. No signage directed toward I-90 highway travelers is proposed. Alternative 5 relocates the Business Park area away from I-90 (see Figure 2-5).

Comment 10

The Business Park has been relocated from alongside I-90 to alongside SR 903. Alternative 5 does not include the Horse Park as a part of the project; however, it does include area designated as a Reserve tract adjacent to I-90 that could accommodate a Horse Park (see response to Letter 4, Comment 2). Washington State Horse Park Authority would develop a Horse Park as a separate project.

received
5/7/01

City Planner

Milly Radonovich
Box 461
Roslyn, Wash
98941

May 7, 2001

Subject VGA

1. (Water)

Do you believe that we know how much water is in the ground and that availability of water is endless?

The VGA MPR combined wants 8 million gals of water a day during irrigation season.

Roslyn's reservoir holds 1 million gals. If we had a fire that surrounded Roslyn, it would deplete our reservoir.

The Money (#) people believe we have an abundance of water and the well will never go dry. Do you believe that? 1

(2.) (Traffic) Is the bullfrog Rd going to be a six lane, 8 lane 2

2.

Do you like the congestion we have on Memorial Day, 4th of July and Labor day? That's comparable to 20,000 more people and units.

I have witnessed Peak Rt., Nelson Siding and Lake Cle Elum developed and populated like never before. Yet the local businesses do not gain. These people drive to the West side every day and spend ($) on the west side

More people and more development is not the answer. Preservation is the magnet not development. What have we worked to preserve? Not what we have preserved.

2 (cont.)

3

4

we need another urban growth like we need a cancer growth.

Thank You.

Melly A. Radonovich

lifetime resident of Roslyn.

Please Respond that You read and received my comments and input.

Thank You

4 (cont.)

Comment 1

Comment noted. Refer to Section 3.4, Water Supply, and Appendix B of the Final EIS for an updated and expanded analysis of potential water supply impacts.

Comment 2

Bullfrog Road would remain two lanes. Assuming buildout occurs as predicted, a traffic signal would be required in Project Year 5 at the intersection of Bullfrog Road and SR 903. Traffic volume growth would be monitored to determine the actual impact timing and the types of mitigation improvements.

Comment 3

Comment noted. Refer to Section 3.18 and Appendix D of the Final EIS for an analysis of potential fiscal impacts under Alternative 5.

Comment 4

Comment noted.

Edmund A Januszkiewicz
PO Box 370
Roslyn, WA 98941

received
5/7/01
by Cle Elum
City Hall-KS.

Dear Sir or Madam:

I have grave concerns as to the fiscal impacts that the UGA will have on community and governmental services. The UGA will further the burden upon community services that the MPR has stretched to dangerous levels. The UGA DEIS does not adequately address the costs of the government services that the UGA would require. Social services, public works, public safety, city debt service, and general government service requirements are not evaluated to determine whether or not the UGA will be an additional burden upon the revenue stream. There seems to be an assumption that the development will realize the revenue stream required to support these services. There is not, however, any analysis or study that supports this contention. 1

At a minimum, Cost of Community Services (COCS) studies need to be undertaken to evaluate and understand the impact that this large housing development will have on the communities tax base. These studies compare the contributions (revenues) from each land use (residential, commercial, industrial, agricultural, forest, open space) to the service demands (expenditures) of each land use. COSC studies are a very general type of fiscal impact analysis that quantifies the difference between annual income and the expense of public services. COCS studies are a snapshot in time of costs versus revenues for each type of land use. They provide a baseline of current information on which informed land use and policy decisions can be made. I am enclosing a fact sheet and a COCS studies implementation guide for reference. 2n

Thank you,

Edmund Januszkiewicz

Is Farmland Protection A Community Investment?

How to do a Cost of Community Services Study



American Farmland Trust

Acknowledgments

I am grateful for the assistance of other members of American Farmland Trust's staff for their comments, suggestions and review of this handbook, including: Valerie Berton, Carol Fesco, Gary Kozel, Donna McAdam and Bob Wagner.

I especially would like to thank Dr. J. Dixon Esseks of Northern Illinois University and AFT's Center for Agriculture in the Environment who took time out of his busy schedule to make many very helpful comments on the draft.

Special thanks to Jennifer Blumenthal, Harrison Glavan and Juli Kois for their assistance in pulling together text and materials in the first stages of this project and their assistance in the Massachusetts studies upon which this handbook is based.

Finally, I would like to express my deep appreciation to Jim Riggle, who helped smooth out the rough spots and give context to the cost of community services technique.

Respectfully submitted,
Julia Freedgood
Spring 1993

Introduction

American Farmland Trust is a private conservation organization that works to stop the loss of productive farmland and to promote farming practices that lead to a healthy environment. We act on our mission through policy development, demonstration land projects and public education to protect the best farmland for future generations and to encourage good stewardship of our vital farmland resources. However, AFT is neither a pro-growth nor an anti-growth organization.

Our regional office in Northampton, Mass. covers the Mid-Atlantic States and New England from Delaware to Maine. Although this is a highly urbanized region and much of our agriculture is on the urban-edge, there are also some extremely rural areas. Three of the most common claims we hear when we work at the local level are:

1. Residential development will lower property taxes by increasing the tax base;

2. Farmland gets an unfair tax break when it is assessed at its actual use for agriculture instead of its potential use for development; and

3. Open lands, including productive farms and forests, are interim uses awaiting conversion to their "highest and best use."

Although a rural acre with a new house will undoubtedly generate more total revenue than an acre of cows or corn, such simplistic arguments do not provide communities with a realistic bottom line. Especially where farming and forestry are still important industries, the claims do not consider the real property tax contribution of privately owned natural resources. While they may be lower revenue generators, farm and forest lands require minimal public infrastructure and services.

Of these claims, AFT is most concerned about those used to oppose laws and statutes that benefit farmland, most notably use-value or current-use assessment, agricultural districts and zoning, and purchase of conservation easement programs. What particularly concerns us is that despite these claims, no basis in fact exists for opposing farmland retention programs to solve fiscal problems. Use-value assessment programs were designed to encourage landowners to keep the working landscape in production. Typically, these programs assess farmland and forestland at the value of their current use instead of at the value of their potential use for development.

Introduction

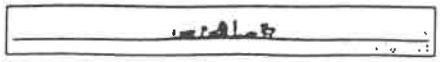
COCS studies suggest it is time to start appreciating farm and forest lands for their contribution to the local tax base. Their revenues may be modest, but so are their demands for services. Across America, evidence mounts that communities have paid a high price for unplanned growth -- from traffic congestion and increased infrastructure needs to budgetary shortfalls and rising property taxes. Yet, while adding to the tax base, farm and forest lands also provide wildlife habitat and protect our wetlands and floodplains. They provide tourist and recreational opportunities and contribute to the quality of life of local residents. Primary farm and forest industries are important economically, creating jobs and supplying lucrative secondary markets such as food processing and lumber milling. Common estimates place the multiplier effect of local agriculture at $3 to $5. (e.g., for every dollar received from farmers for selling agricultural goods and services, $3 - $5 are earned by local businesses and processors serving farmers and their customers.)

Over the years, AFT's COCS studies have received tremendous attention. Many Northeastern communities have asked AFT for help conducting their own COCS studies. Recently, we have received increasing numbers of requests from outside the region.

Because of this interest and our curiosity to see if the same pattern exists in other parts of the country, we have put together this handbook to help people conduct COCS studies themselves. Since the process is based on our work in Massachusetts where town government is very strong, it may have to be modified in other states. (Massachusetts is typical of New England where local budget and tax decisions are made by citizens at town meetings. County governments do not play large roles in town budgets, and there are no townships.). We also recommend you use this handbook in conjunction with the Massachusetts report, *Does Farmland Protection Pay?* where detailed tables and text serve as a case-study example of the process detailed here.

Feel free to call AFT for assistance using the information on the inside cover. We would like to know if you do a study and would be very interested in your results.

Thank you for your interest in this subject. We hope the handbook is user-friendly. Good luck!



Getting Started

Why Do a COCS?

Before you begin, think about what you want to find out and why. Consider your reasons carefully to make sure a COCS study will help accomplish your goals. Investigate other available techniques. Be sure that what you want is a snapshot of the current demand for services by land use, not a prediction of future demand. The following box suggests some questions to ask:

Why do a COCS?

+ Who and what is the study for?
+ Do critics pose a threat to ag districts, ag zoning, purchase of ag easement (PDR) programs or other kinds of farmland protection programs?
+ Is there local interest in natural resource conservation or farmland protection?
+ Is your state's use-assessment program under attack?
+ Do you need, and can you afford, a more sophisticated study?

Where Will You Conduct the Study?

AFT has found COCS studies most useful in places undergoing transition, especially those enduring development pressure. COCS may not be the best type of study for very rural or entirely urban areas. So think about what municipality to study. Consider how your local government is structured. Is town or county government stronger? Which public bodies are responsible for what types of services? Since every state is different, you may need to examine villages, towns, townships, parishes or counties to get the full picture. In a very small state with limited local government, you may even want to study the whole state! This is why you must be clear on your reasons for doing a COCS. Try to narrow the scope of your study to an area you can tackle thoroughly. Include all relevant revenues and expenditures, even if that means assembling various types of financial data.

For the purposes of this handbook, we have adapted AFT's Massachusetts studies for the model. Therefore, the local unit used for discussion purposes is town government.

Once you have decided where to focus your study, find out as much as you can about the community. The better you understand it, the easier your study will be. The following box outlines some possible questions to ask:

How Much Time -- and Money?

How much time does it take to do a COCS study? That really depends upon the complexity of your community, who does the research, what financial records exist and the type of personnel available to provide data. As a benchmark, AFT found the leg work in three Massachusetts studies required about 150 hours per town. Additional time was required for project coordination, report preparation and design and printing for all three studies.

A COCS budget varies according to the requirements of the study, but it should not be expensive. Depending on the resources you have at hand, costs can be greatly reduced. Most are associated with travel and personnel. AFT's three Massachusetts studies cost an average of $5,000 each, including limited printings of in-house reports. However, a potentially significant cost is publishing a report for wide distribution. Here, expenses are determined by the number of pages, design features, number of copies printed and method of distribution. Decide these things in advance and get printing estimates so you can budget accordingly.

If you use volunteers, costs will be minimal but the volunteers will have to be carefully supervised. Most universities have a set rate for graduate assistants, although you may find students who want to take on the study as part of their academic program. Professors and consultants charge more but add to the credibility of your findings. You will probably have to pay travel expenses -- you can use the federal reimbursement rate as a guide -- and some administrative costs.

Before you begin the study, evaluate available resources and your target audience. More than anything, answering budget questions specific to your locale will determine the eventual price tag.

which land uses provide what sources of income: property tax revenue, state and federal aid, funds from special districts and so on.

This step is very important because many local officials have never calculated the revenues from farmland and forestland. However, even more important is the next step: grouping and allocating expenditures. You must make sense out of budgets and reports and reorganize them by land use. Taken together, these steps help establish the town's current bottom line.

Be prepared to interview extensively to be sure you allocate expenses fairly. Make a special effort to stay objective -- the people you interview may be too close to the material to be impartial. Once you are confident you have allocated revenues and expenditures correctly, enter them into your spreadsheet. Then, you are ready for the final and easiest step -- calculating the ratios.

The following box outlines the five steps:

Five Basic Steps for a Cost of Community Services Study

1. Meet with local sponsors and define land use categories

* Residential * Commercial * Industrial * Farm, forest and open land

2. Collect data: Obtain relevant reports, contact officials, boards and departments

* Annual town budget * Property tax list * Land use breakdown
* Annual department reports * Expenditure ledger * Special grants

* Select board * Assessor * Treasurer * Planning board * City council
* Public works * Police chief * Fire chief * Human services * Water & sewer

3. Allocate revenues by land use

* Property tax * Local receipts * State aid * Miscellaneous
* Other: Special tax districts or self-sustaining departments

4. Allocate expenditures by land use

* Public works * Public safety * Education * Human services * Government

5. Analyze data and calculate ratios

Residential: Property used for dwellings, *including farm houses*, employee housing and rental units. Remember, houses are for people who need residential services, regardless of who owns them or their occupations.

Commercial: Property actively used for business purposes other than industrial, agricultural or forestry.

Industrial: Property actively used for wholesale production and utilities, usually goods-producing.

Farm, forest and open land: Property used or designated as open space, forest, farmland or recreational land. Often this category can be defined according to the state's use-assessment program.

With your sponsors' help, adapt these categories to the land use mix in your community. For example, if the area is still quite rural, you may not need to separate commercial from industrial. Think carefully about what to include in the farm, forest and open land category, which is generally buried in records of other land uses.

AFT recommends referring to your state's use-assessment program to help you define your open lands category. If necessary and relevant, add other open space categories from the tax codes. In use-assessment programs, working lands are taxed on the value of their actual use, rather than on their potential value for development. Applying this definition is easier than a more complicated delineation, and AFT has found the pattern of results remains the same.

To stay on track, go back to your original goals, keeping in mind personnel and time constraints as well as the level of development in your community. Remember, all you want to determine is how much each land use demands in services for every dollar it generates in revenues. The broader your categories, the easier it will be to present meaningful data. But be careful not to dilute information for expediency's sake. Above all, avoid muddled definitions!

2. *Collect data*

Now you are ready to work!

Start by choosing a typical year with closed books. This way, real numbers will be used, not financial estimates. Normally, the last completed fiscal period is best because it is freshest in people's memories and records are easiest to locate. However, if something unusual happened that might affect your findings, such as a major fire or unusual windfall, choose another year. Your sponsors can tell you what is -- or is not -- typical.

In collecting data, pay attention to how departments keep their records. Some use a fiscal

special districts (fire, water, sanitation and school) and miscellaneous revenues.

When you distribute revenues, think of how they apply to your land use categories. Property taxes may be the most straightforward. Building permit fees would be distributed according to the type of land use indicated by permit files or in a summary report. The same approach should work for other types of permits and licenses.

Special taxes and tax districts can be tricky, so weigh available information carefully before you decide how to handle them. For instance, if your community has a special fire district that only serves some neighborhoods and charges on a fee basis, you may want to treat it as a footnote and omit it from your regular analysis. Just be sure to mention this in your final report and explain the rationale for your decision. On the other hand, if fire districts represent all properties and are paid for out of regular tax revenues, include them as part of your regular analysis. Special districts illustrate why you must understand the community you are studying.

Three rules of thumb to follow when grouping revenues:

1. Gather as much information as possible, discuss any special cases with your sponsors and base your final decisions on the original goals of the study and the quality and quantity of available data.
2. Spell out your assumptions clearly.
3. Be sure that decisions you make on the revenue side match those you make on the expenditure side.

Transfer Land Values

Match local records with COCS land uses by transferring property values from the state tax classes to yours. This is a fairly simple, but time-consuming process. Subtract items that do not belong in existing categories, then add them to the appropriate categories for your study. For example, in Massachusetts, farm, forest and recreational lands enrolled in the use-assessment program are reported as commercial properties in the tax code. But they are considered farm, forest and open land in a COCS study. So AFT subtracted them from commercial and added them to farm, forest and open land.

Mixed-use parcels can be difficult to allocate. If you can determine the value of different land uses, break them out accordingly. Otherwise, attribute them to the category of primary use. Large towns often have computerized records that provide a high level of detail on lot size, number and type of buildings and so on. These can help you distribute revenues in mixed-use parcels in the same way they helped you in other categories. In small towns without computers, breakdowns may have to be determined by the assessors, if at all.

4. Group Expenditures and Allocate Them

Group Expenditures

Once you have gotten revenues in order, you can broadly group expenditures. Base your decisions on budget allocations and actual departmental expenses that should be readily available. AFT usually divides expenditures into five classes:

1. General government,
2. Public safety,
3. Education,
4. Health and human services, and
5. Public works.

However, if other categories are better suited to your community, use them. Just be consistent.

Allocate Expenditures

The heart of a COCS study is allocating expenditures based on land use demand. Since most town records are not kept by land use, this process requires significant effort. Try to stay intrigued and do not get frustrated if this step is difficult; it is a critical part of your study.

Even though expenditure reports are generally available from department heads, you may still have trouble allocating expenses. Start with ones you can apportion with little or no assistance. For example, education and most health and human services are residential. Remember, farm houses are considered residential. So are government expenses such as elections and voter registration. Even though society as a whole benefits from a healthy and educated voting public, citizens directly demand these services. COCS studies measure this demand, not the public good to be derived from it. While they provide practical data on land use requirements for services, these studies do not answer broad, philosophical questions about who in society should pay for what.

Allocating most services will rely on a fair amount of investigation. So put on your Sherlock Holmes hat and study the clues concealed in the basic financial data you have collected. Meanwhile, prepare specific questions to ask when you interview officials and key department heads for details.

Find out about expenses that may not be as straightforward as they seem. A forestry expense might be for pruning dead branches in a residential neighborhood or maintaining the woods in a recreational area. Pruning the neighborhood trees is a residential expense, whereas forest management serves open land. Does the animal officer handle working dogs or pets? Treat a guard-dog infraction at a factory as an industrial expense and a barking

allocations, or you may be forced to use your fall-back percentages. When you talk to the highway superintendent, try to tease out quantifiable data. The number of curb miles may provide some useful information, but beware! Simply counting the number of miles and estimating how many went through each land use sector will not give you an accurate picture of road use. Probe a little deeper.

Rural roads are often used by commuters and tourists, not just farmers. Farms need roads for tractors, milk trucks or hauling beans to the elevator. But a farmer driving to church or to shop is a residential expense.

Finally, try to avoid bias in your allocations and to base them on land use demand and sound financial data. If you hope that farm, forest and open lands will show a positive contribution, make sure you are conservative when you allocate revenues to them and liberal when you allocate their expenditures. This will help keep your study impartial and credible. When objective data is unavailable, use fall-back percentages.

5. Calculate ratios

Now you can analyze the data. Enter revenues and expenditures on a spread-sheet to come up with land use totals. Furnish as much detail as you want to use in your analysis. Then establish a ratio that shows how much was spent on services for every dollar raised in revenues.

For example, in one Massachusetts town, residential expenses were $4,025,367, and revenues were $3,458,764. Viewed as a ratio, for every dollar raised, it cost $1.16 to provide residential services. Farm and open land expenditures were $61,021 and revenues were $207,615 so the ratio between them was $1 to 29 cents.

When you review your findings, remember they are a snapshot of a single year and give a focused picture of demand on services in your community. They neither project growth nor describe all the financial implications of any land use. For example, in AFT's studies, commercial and industrial development were net contributors. But sometimes it appeared that this type of development attracted new residents to fill newly created jobs. Some officials complained that this further strained education and other public service budgets, which the community did not have sufficient resources to provide. COCS studies do not evaluate the extent to which secondary effects occur. These should be considered as part of the planning process.

After you have completed the calculations and determined the ratios, submit them as a draft to

Final Words

Whatever your findings, remember that one type of land use is not intrinsically better than another. Communities should not blindly pursue either a conservation or a growth management agenda. Planning decisions must be community-based and reflect local goals and opportunities. However, in the past, slighting the economic importance of farm and forestlands has meant these precious natural resources have consistently been sacrificed to their "highest and best" use, forever altering the local landscape and weakening the local potential of resource-based economic development. And while commercial/industrial growth offers a potential balance, it is not a miracle cure, either. What happens when local skills are not available to fill the jobs created by new businesses? Will new houses be needed for the people who move to town to take the new jobs? Will the cycle continue?

This is why it is so important for communities to see the full picture of their land uses. Disclosing the *net* contribution of farm, forest and open lands can help local leaders overcome the notion that natural resources *must* be converted to other uses to ensure economic stability. At the least, they should help dispel the myths that residential development lowers taxes, or that use-assessment programs give landowners an unfair tax break.

Even with due consideration of their multiple economic and environmental benefits, farm and forestlands will continue to be threatened by conversion to higher tax-generating uses. That is why local decision-makers must weigh all the advantages that farm and forestlands have to offer in the planning, zoning and public policy process. Supporting farmland protection and conservation can prove to be a sound community investment.

Sample Tables

Town Revenues

Source	Residential		Commercial		Industrial		Farm/Open		Total
TAX RECEIPTS									
Real property	$1,796,993	70.3%	$283,736	11.1%	$324,528	13.4	$132,921	5.2%	$2,556,178
Pers. property			20,369	43.0	27,001	57.0			47,370
TOTAL	1,796,993	69.0	304,105	11.7	369,529	14.2	132,921	5.1	2,603,548
STATE AID RECEIPTS									
Education	524,673	100							524,673
Public libraries	5,790	100							5,790
Highway fund	64,586	69.0	10,952	11.7	13,292	14.2	4,774	5.1	93,604
Lottery/Beano	129,296	69.0	21,924	11.7	26,609	14.2	9.557	5.1	187,386
Vets abatement	2,373	100							2,37
Elderly abatement,	12,976	100							12,976
Overestimates	2,567	69.0	435	11.7	528	14.2	190	5.1	3,720
TOTAL	742,261	89.4	33,311	4.0	40,429	4.9	14,521	1.7	830,52
LOCAL RECEIPTS									
Excise Tax	154,000	77.0	34,000	17.0	12,000	6.0			200,000
Other excise							5,500	100	5,500
Interest income	102,120	69.0	17,316	11.7	21,016	14.2	7,548	5.1	148,000
Payments-in-lieu	41,400	69.0	7,020	11.7	8,520	14.2	3,060	5.1	60,000
Penalties/Inter.	6,900	69.0	1,170	11.7	1,420	14.2	510	5.1	10,000
Trash Disposal	62,900	34.0	57,350	31.0	61,050	33.0	3,700	2.0	185,000
Other Dept.	27,600	69.0	4,680	11.7	5,680	14.2	2,040	5.1	40,000
Licenses/Permits	12,420	69.0	2,106	11.7	2,556	14.2	918	5.1	18,000
Fines/Forfeits	72,450	69.0	12,285	11.7	14,910	14.2	5,355	5.1	105,000
TOTAL	479,790	62.2	135,927	17.6	127,152	16.5	28,631	3.7	771,500
OTHER RECEIPTS									
Free Cash/Total	258,822	69.0	43,887	11.7	53,265	14.2	19,130	5.1	375,104

Town Expenditures									
Source	Residential		Commercial		Industrial		Farm/Open		Total
GENERAL GOVERNMENT									
Election/registr	4,100	100							4,100
Town Office	11,237	89.0	631	5.0	593	4.7	164	1.3	12,625
Town computers	62,300	89.0	3,500	5.0	3,290	4.7	910	1.3	70,000
Town reports	2,670	89.0	150	5.0	141	4.7	39	1.3	3,000
Telecommunication	890	89.0	50	5.0	47	4.7	13	1.3	1,000
Gen insurance	27,145	89.0	1,525	5.0	1,433	4.7	397	1.3	30,500
Empl insurance	96,964	89.0	5,448	5.0	5,120	4.7	1,417	1.3	108,949
Emergency reser	28,560	71.4	4,520	11.3	5,200	13.0	1,720	4.3	40,000
Stabilization	28,560	71.4	4,520	11.3	5,200	13.0	1,720	4.3	40,000
Debt service	7,140	71.4	1,130	11.3	1,300	13.0	430	4.3	10,000
TOTAL	431,065	77.8	49,819	9.0	47,982	8.7	24,889	4.5	553,755
PUBLIC SAFETY AND SERVICES									
Police Dept.	146,778	65.0	45,162	20.0	31,614	14.0	2,258	1.0	225,812
S. Deerfield Fire	121,569	59.0	41,210	20.0	32,968	16.0	10,302	5.0	206,049
Deerfield Area Fire	32,662	80.0	3,675	9.0	2,450	6.0	2,041	5.0	40,828
Board of Health	1,170	78.0	150	10.0	180	12.0			1,550
Dog Officer	2,000	100							2,000
Pest control	2,640	88.0	360	12.0					3,000
Dutch Elm disease	1,760	88.0	240	12.0					3,000
Tree Warden	17,953	88.0	2,448	12.0					20,401
Taking of prop	21,848	71.4	3,458	11.3	3,978	13.0	1,316	4.3	30,600
TOTAL	348,380	65.5	96,703	18.2	71,190	13.4	15,917	2.9	532,190
PUBLIC WORKS									
Utility inspect	8,820	73.5	1,488	12.4	1,692	14.1			12,000
Highway	253,624	71.4	40,139	11.3	46,178	13.0	15,274	4.3	355,215
Street lights	22,050	73.5	3,720	12.4	4,230	14.1			30,000
Pickup truck	12,138	71.4	1,921	11.3	2,210	13.0	731	4.3	17,000
Waste disposal	40,954	34.0	37,340	31.0	39,749	33.0	2,410	2.0	120,453

23

COST OF COMMUNITY SERVICES STUDIES



Fact Sheet

rev. January 2000

DESCRIPTION

Cost of Community Services studies are an inexpensive, easy-to-understand way to determine the net fiscal contribution of different land uses to local budgets. Municipal records are reorganized to assign the cost of local public services to privately owned farm, forest and open lands, as well as residential, commercial and industrial lands. The result is a set of ratios that compare the annual income to the annual expenditures for different land uses.

COCS studies are a snapshot in time of costs versus revenues for each type of land use. They do not predict future costs or revenues or the impact of future growth. They do provide a baseline of current information to help local officials and citizens make informed land use and policy decisions.

METHODOLOGY

COCS studies involve five basic steps:

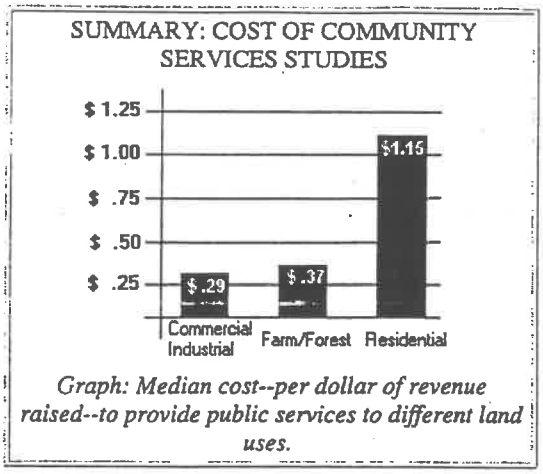
1. Define the scope of the project and identify land use categories to study (e.g., residential, commercial, industrial, farm and forest land).
2. Collect data on local revenues and expenditures.
3. Group revenues and allocate them to the land use categories identified in step 1.
4. Group expenditures and allocate them to the land use categories identified in step 1.
5. Analyze the data and calculate revenue-to-expenditure ratios for each land use category.

The process is straightforward, although ensuring reliable figures requires the assistance of local officials and service providers. The most complicated task is interpreting existing records to reflect COCS land use categories. Allocating revenues and expenses requires a significant amount of research, including extensive personal interviews.

HISTORY

Communities often evaluate the impact of growth on local budgets by conducting or commissioning fiscal impact analyses. Fiscal impact studies project public costs and revenues from different land development patterns. They generally show that residential development is a net fiscal loss for communities and recommend commercial and industrial development as a strategy to balance local budgets.

Rural towns and counties that are likely to benefit most from the information provided by fiscal impact analyses rarely have the expertise or resources to conduct a study, which tends to be expensive. Also, these studies rarely consider the fiscal contribution of farm, forest and recreational lands, which are very important to rural economies.



Graph: Median cost--per dollar of revenue raised--to provide public services to different land uses.

The findings of COCS studies are consistent with those of conventional fiscal impact analyses, which document the high cost of residential development and recommend commercial and industrial development to help balance local budgets. What is unique about COCS studies is that they show that agricultural land is similar to other commercial and industrial uses. In every community studied, farmland has generated a fiscal surplus to help offset the shortfall created by residential demand for public services. This is true even when the land is assessed at its current agricultural use.

Communities need reliable information to help them see the full picture of their land uses. COCS studies are an inexpensive way to evaluate the net contribution of farm and open lands. They can help local leaders discard the notion that natural resources must be converted to other uses to ensure fiscal stability. They also dispel the myths that residential development leads to lower taxes, that differential assessment programs give landowners an unfair tax break and that farmland is just waiting around for development.

One type of land use is not intrinsically better than another, and COCS studies do not judge the overall public good or long-term merits of any land use or taxing structure. Communities must balance goals such as maintaining affordable housing, creating jobs and conserving land and resources. With good planning, these goals can complement rather than compete with each other. COCS studies give communities another tool to make decisions about their futures.

SUMMARY OF COSTS OF COMMUNITY SERVICES STUDIES, REVENUE-TO-EXPENDITURE RATIOS IN DOLLARS

State/Town	Residential including farm houses	Combined Commercial & Industrial	Farm/Forest Open Land	Source
Connecticut				
Bolton	1 : 1.05	1 : 0.23	1 : 0.50	Geisler, 1998
Durham	1 : 1.07	1 : 0.27	1 : 0.23	Southern New England Forest

American Farmland Trust Publications: Cost of Community Services

AFT developed cost of community services studies in response to three common claims: that residential development lowers property taxes for existing residents by increasing the tax base; that farmland gets an unfair tax break when it is assessed at its agricultural value instead of its potential development value; and that open lands—including productive farm and forest lands—are interim uses awaiting development. Widespread interest in these studies has made AFT a leader in evaluating the financial contribution of farmland to local budgets and the fiscal relationship between farmland and other community land uses. Results to date indicate farmland is a net positive contributor to local coffers.

The Cost of Community Services in Frederick County, Maryland -- This study, produced by AFT for the Frederick County AgriFuture Roundtable, analyzes the cost of community services in Frederick County and three of its towns. 1997; 36 pages; $12.95 (PFREDCOCS)

The Cost of Community Services in Madison Village and Township, Lake County, Ohio -- In the first-of-its kind study in the Midwest, this report compares service costs in two Cleveland-area municipalities. 1993; 32 pages; $5. (POHCOCS)

Does Farmland Protection Pay? The Cost of Community Services in Three Massachusetts Towns -- Working under contract to the Massachusetts Department of Food and Agriculture, AFT studied the cost of community services in three Connecticut River Valley towns. 1992; 38 pages; $10. (PPROTPAY)

Dutchess County Cost of Community Services Study -- As development continues to pressure farms and farmland in Dutchess County, N.Y., this study evaluates the cost of community services in two Dutchess County towns. 1989; 11 pages; $5. (PDTHCOCS)

Farmland and the Tax Bill: The Cost of Community Services in Three Minnesota Cities -- AFT worked with the Land Stewardship Project to analyze the cost of services in three Twin Cities metro- area cities. 1994; 20 pages; $10. (PFARMTAX)

Is Farmland Protection a Community Investment? How to Do a Cost of Community Services Study -- To respond to the considerable interest in COCS studies, AFT developed this definitive, step-by-step handbook to help communities undertake such analyses. AFT recommends the handbook be used with a COCS case study. 1993; 26 pages; $10.
With *Does Farmland Protection Pay? The Cost of Community Services in Three Massachusetts Towns*; $15. (PHOWTO)

These publications may be ordered by calling 800-370-4879 or by faxing the order form to us at 413-586-9332
http://www.farmland.org/merch/publist.htm

New Hampshire				
Deerfield	1 : 1.15	1 : 0.22	1 : 0.35	Auger, 1994
Dover	1 : 1.15	1 : 0.63	1 : 0.94	Kingsley et al., 1993
Exeter	1 : 1.07	1 : 0.40	1 : 0.82	Niebling, 1997
Fremont	1 : 1.04	1 : 0.94	1 : 0.36	Auger, 1994
Stratham	1 : 1.15	1 : 0.19	1 : 0.40	Auger, 1994
New Jersey				
Freehold Township	1 : 1.51	1 : 0.17	1 : 0.33	American Farmland Trust, 1998
Holmdel Township	1 : 1.38	1 : 0.21	1 : 0.66	American Farmland Trust, 1998
Middletown Township	1 : 1.14	1 : 0.34	1 : 0.36	American Farmland Trust, 1998
Upper Freehold Township	1 : 1.18	1 : 0.20	1 : 0.35	American Farmland Trust, 1998
Wall Township	1 : 1.28	1 : 0.30	1 : 0.54	American Farmland Trust, 1998
New York				
Amenia	1 : 1.23	1 : 0.25	1 : 0.17	Bucknall, 1989
Beekman	1 : 1.12	1 : 0.18	1 : 0.48	American Farmland Trust, 1989
Dix	1 : 1.51	1 : 0.27	1 : 0.31	Schuyler County League of Women Voters, 1993
Farmington	1 : 1.22	1 : 0.27	1 : 0.72	Kinsman et al., 1991
Fishkill	1 : 1.23	1 : 0.31	1 : 0.74	Bucknall, 1989
Hector	1 : 1.30	1 : 0.15	1 : 0.28	Schuyler County League of Women Voters, 1993
Kinderhook	1 : 1.05	1 : 0.21	1 : 0.17	Concerned Citizens of Kinderhook, 1996
Montour	1 : 1.50	1 : 0.28	1 : 0.29	Schuyler County League of Women Voters, 1992
Northeast	1 : 1.36	1 : 0.29	1 : 0.21	American Farmland Trust, 1989
Reading	1 : 1.88	1 : 0.26	1 : 0.32	Schuyler County League of Women Voters, 1992
Red Hook	1 : 1.11	1 : 0.20	1 : 0.22	Bucknall, 1989
Ohio				
Madison Village	1 : 1.67	1 : 0.20	1 : 0.38	AFT and Lake County Ohio SWCD, 1993
Madison Township	1 : 1.40	1 : 0.25	1 : 0.30	AFT and Lake County Ohio SWCD, 1993
Pennsylvania				
Allegheny Township	1 : 1.06	1 : 0.14	1 : 0.13	Kelsey, 1997
Bedminster Township	1 : 1.12	1 : 0.05	1 : 0.04	Kelsey, 1997
Bethel Township	1 : 1.08	1 : 0.17	1 : 0.06	Kelsey, 1992
Bingham Township	1 : 1.56	1 : 0.16	1 : 0.15	Kelsey, 1994
Buckingham Township	1 : 1.04	1 : 0.15	1 : 0.08	Kelsey, 1996
Carroll Township	1 : 1.03	1 : 0.06	1 : 0.02	Kelsey, 1992

Comment 1

Comment noted. A comprehensive fiscal impact analysis of revenues, public service costs, net fiscal impacts, and cumulative fiscal impacts of the UGA and MountainStar MPR on all affected jurisdictions is found in Section 3.19 and Appendix H of the Draft EIS for Alternatives 2, 3, and 4, and Section 3.18 and Appendix D of the Final EIS for Alternative 5. The City also has prepared a Municipal Facilities and Services Expansion Plan independent of the EIS that addresses costs of government and social services. Mitigation measures are incorporated into the draft Conditions of Approval for the project.

Comment 2

The fiscal impact analyses found in Appendix H of the Draft EIS and Appendix D of the Final EIS use a thorough, comparable approach to the COCS study mentioned. Refer to Appendix H of the Draft EIS for a detailed description of the impact analysis methodology. Receipt of the COCS implementation guide is noted.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
15 West Yakima Avenue, Suite 200 • Yakima, Washington 98902-3452 • (509) 575-2490

Received
5/7/2001
City of Cle Elum

May 7, 2001

Gary Berndt
City of Cle Elum
119 West First Street
Cle Elum WA 98922

Dear Mr. Berndt:

Thank you for the opportunity to provide comments on the draft environmental impact statement (EIS) for the Trendwest Properties: Cle Elum Urban Growth Area (UGA) [#200101896].

The Washington State Department of Ecology, with the assistance of Pacific Groundwater Group, is currently preparing a supplemental EIS for Trendwest's water right change applications to serve the MountainStar Master Planned Resort (MPR). The water supply plan to serve the MountainStar MPR is very similar to the water supply plan to serve the Trendwest Properties Cle Elum UGA development. Due to the closely related nature of the water supply plans, Pacific Groundwater Group has conducted a review of the Cle Elum UGA draft EIS and provided an issue paper. Please include the enclosed issue paper and this letter as part of the official record for consideration of Trendwest Properties: Cle Elum UGA Master Plan. 1

In addition to the enclosed issue paper, we have the following comments:

Additional clarification is needed to describe development within the geomorphic floodplain. On page 1-15, under mitigation measures for alternatives 2, 3, and 4, the document states that, "construction in the floodplain would be limited to an interpretive center and supporting road." However, on the soil type map (figure 3.1-5), the area of Bullfrog Flats (proposed for single family residential development in Alternatives 2, 3, and 4) is shown as having Racker Gravelly Sandy Loam soil, which is described as geomorphic floodplain soils. A clear understanding is needed of the Cle Elum River floodway, 100-year floodplain, 500-year floodplain and the "geomorphic" floodplain with respect to the proposed interpretive center and single-family residential development. 2

Additional capacity at the City of Cle Elum Wastewater Treatment Plant due to interim improvements cannot be assumed. Any additional capacity at the treatment plant due to interim improvements will need to be evaluated for actual capacity after interim improvements are operational. 3

The temporary on-site sewage disposal systems combined with the potential groundwater impacts from the development proposal, the geology of the area, and the presence of sensitive receptors (Cle Elum River, Yakima River and Cle Elum Fish Hatchery wells) are justification for the need to perform additional contaminant loading calculations and mitigation as appropriate. 4

Section 3.17.4 Mitigation for Wastewater proposes a stand alone wastewater treatment option should the regional treatment plant not be constructed. It is important to note that WAC 173-220-150 National Pollutant Discharge Elimination System Permit Program (4) and WAC 173-216-110 State Waste Discharge Permit Program (8), require that permits for domestic wastewater facilities only be issued to public entities. These requirements would prevent Trendwest from developing a wholly owned and operated stand alone wastewater treatment plant facility. 5

If you have any questions about these comments please contact me at (509) 457-7125.

Sincerely,

Randall Doneen
Permit Assistance Center

RD:gh
010504
Enclosure: (1)

EIS #011896

cc: Rebecca Inman, HQ SEA
Debbie Smith, CRO
Christine Hall, CRO
Catherine Reed, CRO
Anna Hoselton, CRO
Joe Mentor, Mentor Law Group
Peter Schwartzman, Pacific Groudwater Group

Comment 1

Comment noted. Your letter, including comments from Pacific Groundwater Group, is included in the official record of comments on the Draft EIS.

Comment 2

Please note that the Draft EIS does not describe the Racker soil series as being synonymous with the geomorphic floodplain. On page 3.1-11, it states that the soils are "noted for their susceptibility to flooding because of their location in the floodplain." Figure 3.3-2 shows that a large part of the Racker series is outside both the 100-year floodplain and the geomorphic floodplain.

With regard to placement of an interpretive center, an exact location has not been determined, but would be in coordination with the Washington Department of Fish and Wildlife and Yakama Tribe under the terms of their agreement with Trendwest (Cooperative Agreement, December 2000). Because there is no agreement on design and location of the center, it is not included in this Final EIS for analysis in Alternative 5.

Comment 3

Comment noted.

Comment 4

Comment noted. Refer to Section 3.3, Water Quality, and Section 3.16, Utilities, for discussions of contaminant loadings to the Clè Elum and Yakima rivers.

Comment 5

Comment noted. The standalone wastewater treatment option is no longer proposed.

Pacific Groundwater Group
2377 Eastlake Ave. E.
Seattle, Washington 98102
206.329.0141 FAX 329.6968

JM0101.01

May 4, 2001

DEPT OF ECOLOGY
Received
MAY 0 7 2001
CENTRAL REGION OFFICE

Department of Ecology
Central Regional Office
15 W. Yakima Ave. Suite 200
Yakima, WA 98902

Attn: Randall Doneen

Re: Issues Identified During Review of the Draft EIS for Trendwest Properties Cle Elum Urban Growth Area

Dear Randall,

This letter report presents discussion of key issues related to State Environmental Policy Act (SEPA) evaluations presented in the Draft Environmental Impact Statement (DEIS) for the Cle Elum Urban Growth Area (UGA) owned by Trendwest. The issues presented below were identified and described by us (Ecology's consultant team hired under the cost reimbursement program) to assist Ecology in SEPA review for Trendwest's *Master Planned Resort* (MPR). MPR determinations require consideration of UGA impacts because cumulative impacts must be evaluated for the two developments *combined*.

The consultant team includes Pacific Groundwater Group (groundwater issues and project management), Montgomery Water Group (surface-water quantity and water rights issues), and Parametrix (fisheries and surface-water quality issues). The consultant team reviewed the UGA DEIS after prior review of the MPR DEIS, the MPR FEIS, and other relevant supporting documents.

This issues paper is organized into two parts. Part 1 describes key issues identified during our review of the DEIS. Issues are first grouped based on five major mechanisms for impact (transfer of tributary water rights, transfer of main-stem water rights, direct impacts of the UGA, indirect impacts from the UGA, cumulative impacts from the UGA and MPR) and then grouped by area of technical analysis. The technical areas include fisheries (F), surface-water quantity (S), surface-water quality (SQ), groundwater quantity (G), groundwater quality (GQ), and water rights/water use (W). Part 2 provides more specific comments, questions and corrections. The purpose of Part 2 is to provide supporting details for issues identified in Part 1, and to provide feedback to contribute to finalization off the EIS for the UGA (to be completed by issuing a Final EIS in several months time).

PART 1 – KEY ISSUES

1 Impacts From Transfer of Tributary Water Rights

F-1.1. The relationship between streamflow and amount of fish habitat is inadequately quantified (area of habitat gained or lost, length of stream made accessible) in Big, Swauk, and First Creeks, and the Teanaway River. Along with flow, connectivity (e.g. continuous flow between sequential stream reaches, and between the tributary and the Yakima River) can also strongly influence available habitat. 1

S-1.1. The analysis of the benefits of leaving tributary diversions instream relies on hydrologic and hydraulic modeling to derive conclusions regarding the number of days the streams are currently dry, the number of days that the streams will have water in them after transfer to the Trust Water Rights Program, and increases in streamflows resulting from discontinued diversions. The analyses are presented in Appendix D – Water Supply. The hydrologic modeling performed relies on statistical analyses and broad assumptions regarding the fate of surface and ground water left instream or not applied to the area pertinent to the water rights being transferred. The statistical analyses are based upon streamflows measured in other, nearby basins. The statistical uncertainty and potential error in the hydrologic modeling is great and not adequately addressed in the EIS. 2

S-1.2. The hydraulic modeling analyses appear to be based upon one point in the stream and no discussion is provided as to its location and representation of conditions throughout the affected reach of tributaries. The modeling appears to assume that the relationship between increased streamflow at the point of diversion and at the mouth of a stream follows the relationship observed on First Creek (p. 3.5-18). This assumption cannot be justified and has a potentially major effect on the estimated increases in streamflow at the mouths of Big Creek, the Teanaway River, and Swauk Creek. Streamflow increases at the mouths will depend on the transmitting capacity of the alluvial sediments along each stream, and will vary from stream to stream and reach to reach. It is our opinion a more detailed monitoring program on the tributaries is warranted to provide the type of detailed information that the EIS purports to present. That monitoring program is proposed for this summer and is designed to provide adequate information to assess the effects of leaving the Trendwest tributary water rights instream. 3

S-1.3. Short discussions of third-party impacts to tributary water users are provided in the DEIS. In one case (p. 2.5-20), the DEIS discusses potential impacts to Mill Ditch users but does not mention potential impacts to users with ditches on the other tributaries. Further on (p. 3.5-35) the DEIS states that Trendwest is working with users on other shared ditches to protect them from impairment. A more detailed discussion is needed to address the potential impacts to water users on the ditches that will have flow reduced. The monitoring program proposed for this summer should provide additional information regarding seepage losses in the tributary irrigation ditches and can be used as a basis for addressing potential impacts. 4

S-1.4. A short discussion of future, ongoing stream flow monitoring in tributaries is provided on page 3.5-35. The intended purpose of the monitoring is to ensure that the Cle Elum UGA does not use more water than is available from Trendwest's purchased tributary water rights. A more detailed discussion is needed to assess the capability of the 5

monitoring equipment and plan of action to measure flows and potentially reduce diversions from the mainstem. 5 (cont.)

S-1.5. A conclusion is made on page 3.5-19 regarding the reestablishment of natural flood flows on First Creek and the beneficial effect on channel geomorphology. It seems unlikely that all of the naturally occurring flood flow currently gets diverted into the First Creek Water Users Association irrigation ditch. No supporting documentation or analyses is provided to back up that claim. It is also worth noting that restoration of winter flows on First Creek is based on discontinuation of a full diversion that is actually not allowed during the non-irrigation season (except for stock watering). It is therefore questionable whether environmental benefit should be credited to this discontinuation of winter use. 6

G-1.1. The DEIS discusses potential impacts to groundwater levels in wells nearby to the irrigation applications retired by Trendwest. The discussion generally relies on the concept that "if there were no other recharge sources available, well yield could decrease as a result of retiring irrigated acreage" and cites other nearby (or regional) recharge sources as means for maintaining local groundwater levels (p.3.5-24). The idea that other (residual) recharge sources will offset the impacts of reduced irrigation recharge is not necessarily correct. Groundwater levels occurring in wells are affected by the *cumulative* influence (superposition) of contributing recharge sources. A well located close to a single recharge source will benefit from the groundwater mounding resulting from that source, regardless of the presence of other nearby sources. Therefore, mounding analyses and review of well construction information is needed to assess potential impacts to nearby wells. This observation even applies to alluvial aquifers that are connected to nearby streams. Such analyses should be presented in the DEIS for all tributary water rights, including the FCWUA. 7

G-1.2. Estimates of reduced groundwater recharge in the upper Reecer Creek sub-basin due to discontinuation of Trendwest's water-right applications from First Creek appear to be inaccurate. The DEIS states that recharge to the Reecer Creek basin is estimated on the order of 35 af/yr (p. 3.5-25). However, the volume allocated to Trendwest's FCWUA properties (1,165 af) compares to an irrigation-season consumptive use of 554 af/yr (presented in the MPR FEIS). This means that a good portion of the diversion (611 af/yr) is lost to ditch and field seepage. Given the seepage losses observed during the irrigation season on the upper portion of the FCWUA ditch (Appendix D, Table 3-5), the fact that a portion of the FCWUA ditch is located within the Reecer Creek basin, and likely irrigation efficiencies associated with the volume of field application, return-flow recharge of 35 af/yr appears to be an underestimation. Furthermore, it is not reasonable to compare quantities of local recharge (which could have a local effect on nearby wells) with quantities of regional recharge (which are spread over the entire basin). As discussed above, superposition analysis would be needed to estimate local effects on groundwater levels. 8

G-1.3. The surface-water model assumes that return flows from diversions and field applications return to the diversion reach of the stream on the same day as the diversion. This assumption affects the estimation of impacts associated with discontinuing Trendwest's water right diversions on the tributary streams. If a groundwater pathway causes a lag time between diversions and return flows to the streams, historic conditions 9

may have provided higher groundwater inflows to tributaries in the latter irrigation season (and beyond) relative to the future conditions associated with discontinued Trendwest diversions. Groundwater analysis is needed to estimate the timing of associated return flows to the tributary streams. 9 (cont.)

G-1.4. The groundwater study performed for Big Creek employs a flow model to estimate whether return flows from irrigation seepage would discharge to Big Creek or the Yakima River. While the modeling exercise is a reasonable approach to this estimation, the groundwater study does not first discuss/interpret the field data, nor does it fully report model assumptions and results. More information is needed to better understand how the model depicts the groundwater flow system and hydraulic continuity with surface-water features. In addition, uncertainties inherent in the model could affect the model outcome. Sensitivity analyses were not performed to evaluate these uncertainties. A detailed description of recommended additional information is presented in Part 2 of this report. Finally, the Big Creek study should reconcile differences in understanding of groundwater/surface-water interactions on upper Big Creek estimated with the model and formerly published by USBR. 10

G-1.5. Increased summer season flow in tributary streams and higher shallow groundwater levels may lead to increased riparian evapotranspiration, which could partially offset increased flows between the point of diversion and the main stem. Conversely, increased riparian vegetation could also add benefit by reducing temperatures and providing shade and organic input. Where reasonable statements can be made regarding changes in riparian evapotranspiration, this component should be included. 11

G-1.6. Most of the increased water available due to reduced Trendwest tributary diversions will likely be transmitted to the Yakima River, whether transmitted via surface streamflow, sub-surface flow in stream alluvium, or sub-surface flow in the regional aquifer. However, possible time lags associated with groundwater pathways should be taken into account to better understand the timing of flow arrivals to the Yakima River. Although the time lag for sub-surface alluvial flow appeared small in First Creek, it should be addressed for other tributaries. 12

2 Impacts From Transfer of Mainstem Water Rights

F-2.1. The amount of habitat loss in Reecer Creek is unknown, or the fish species that will be affected in Reecer Creek. 13

F-2.2. There is a need to confer with tribal and state fisheries managers to determine if they concur in the assessment that the flip-flop and water budget change will not have significant impacts on mainstem fish production. 14

S-2.1. One-third of the volume of Yakima River Water Rights held by Trendwest are proposed to be transferred for the UGA water supply. The EIS and its supporting documentation states that increased diversions during late summer/early fall periods will benefit TWSA as the Bureau of Reclamation desires to maintain streamflow as low as possible during that time period (page 3.5-23 and other pages). Since the Yakima River flow would be reduced, the USBR would not have to release as much water during wintertime to incubate salmon redds because of the lesser flow in the channel during late summer/early 15

fall period. That may be true in all but dry years when the USBR is releasing the minimum flow possible while maintaining an adequate instream flow. They may choose to release slightly more flow to compensate for the Cle Elum diversions and maintain a minimum instream flow. Documentation or consultation with the USBR should be provided on the issue of their operations and how the proposed water rights transfers will affect those operations. 15 (cont.)

S-2.2. The EIS states there are no winter instream flow requirements or criteria set by Title XII legislation (page 3.5-23 and elsewhere). While that is true, there are fish related operational target flows for wintertime the Bureau of Reclamation uses in operating the Yakima Project. A presentation and discussion of those wintertime operational flow targets and the potential effect of diversions from the Yakima River during that period should be presented. Documentation of discussions with the Bureau of Reclamation on how the Bureau would operate the Yakima Project during a dry year when streamflow is limited should be provided 16

S-2.3. A short discussion of third-party impacts to other mainstem irrigation diversions is provided on pages 3.5-29. It is our understanding that there are *more than* the six diversions referenced between Cle Elum and Ellensburg that could be impacted by reduced flow in that reach. Those other diversions should be identified and analyzed for their potential impacts. 17

S-2.4. On page 3.5-19, the EIS states that flow increases would occur in the Yakima River at the Parker gauge during the irrigation season. During a dry year any water left instream would likely be diverted by the Roza Irrigation District or others before reaching the Parker gauge. 18

S-2.5. The comparisons of consumptive use for irrigation (at current place of use for water rights) to the future consumptive use for the UGA area list wintertime consumptive use at current places of use to be 2.3 acre-feet per month for the UGA and 6.8 acre-feet per month for the UGA plus MPR area (page 3.5-17 and others). We could not find a discussion of how those quantities were derived. We assume they may reflect existing stock water rights. Provide calculations and discussion regarding the winter time consumptive use quantities. 19

3 Impacts Directly Resulting From the UGA

F-3.1. The impacts of overfishing, harassment, and poaching are probably adequately addressed, with the possible exception of inadequate detail in the DEIS regarding the terms of the Cooperative Agreement between WDFW, the Yakama Nation and Trendwest. 20

F-3.2. The specific terms of the Kittitas County or Cle Elum Critical Area Ordinances (CAO's) need to be reviewed for their adequacy in meeting the ESA 4(d) rules to protect mid-Columbia summer steelhead, spring chinook, and bull trout. 21

F-3.3. Side channels occur along the Cle Elum in the UGA reach that could be critical habitat for bull trout. There is insufficient detail on the existing habitat to evaluate the risk to bull trout spawners from harassment. 22

F-3.4. There is insufficient detail to assess the adequacy of the proposed mitigation for increased human use and population associated with the UGA. While the Cooperative Agreement specifies no structures of impervious surfaces within the active floodplain, details on trail and service road placement relative to existing riparian vegetation and forest are needed to assess the impacts of any proposed river corridor development (or lack thereof). While not providing quantification, it's worth noting that the UGA DEIS concludes that these kinds of impacts are unavoidable. 23

S-3.1. Water available from Trendwest's water rights does not exceed UGA consumptive use on a monthly basis (Table 4-4a in Appendix D). Deficits are projected for July, September, and November through March. Appendix D states "the UGA water plans rely on changes in points of diversion of the tributary and Yakima water rights. Consequently, they do not assume storage withdrawals from Reclamation reservoirs." (p. 4-22). Do monthly deficits require releases of storage, or are they considered offset by increased TWSA from the month(s) prior? 24

SQ-3.1. Both the MPR and UGA EISs discuss the potential upgrade of existing wastewater treatment facilities, and the potential for a cost allocation agreement between the City of Cle Elum and Trendwest for a regional wastewater treatment plant. The interim WWT facility upgrade is under construction, and is expected to "facilitate compliance" with NPDES permit requirements. The DEIS does not provide detail on the existing or projected loadings to the Yakima River from an enlarged, regional facility, or the biological effects in the diffusion zone, or downstream from the outfall of an upgraded existing facility. 25

SQ-3.2. If groundwater quality were impacted below the UGA, associated contaminants could make their way to the Cle Elum and Yakima Rivers. Pollutant impacts in the Cle Elum and Yakima Rivers are claimed to be "undetectable", and would be further reduced by instream mixing (p. 3.3-14). The reference cited to support this (CDM 2000) was not listed in the references section of the EIS. If further analysis is performed (see "GQ" comments below) and groundwater impacts are determined or estimated, then additional analysis may be required to estimate impacts on receiving surface water bodies and instream biota. 26

GQ-3.1. The DEIS suggests that contaminant loading from roadways and parking lots will have insignificant effects on groundwater quality in the Upper Aquifer (p. 3.4-16). This is assumed due to a combination of the efficiency of treatment facilities and attenuation in the unsaturated zone (75-125 feet thick). However, no quantification of contaminant loading and treatment is presented to support this assertion. Based on discussions with Ecology, the question of whether groundwater contamination may occur via the UGA's runoff infiltration approach should be addressed with a quantitative contaminant loading analysis. In addition, if groundwater contamination is a possibility, discussion should include possible impacts to the lower aquifer, especially in areas where the aquitard is missing between the two aquifers. 27

GQ-3.2. Contaminant loading discussions for impervious areas, golf course, equestrian village and business park all state that the thickness of the unsaturated zone (75-125 feet) is expected to attenuate contaminant loading from these facilities. While geologist's logs from on-site and nearby wells mention the presence of silt as a secondary soil 28

component (e.g. "gravel with silt"), the degree of attenuation offered will depend on the particular contaminant and the actual silt content. For instance, recharge through variably saturated gravel with silt could occur fairly quickly if the silt content is low and preferential pathways occur within the gravel. Reliance on attenuation in the unsaturated zone should not be considered a "conservative analysis" for glacial outwash materials. Because glacial outwash deposits typically contain minimal amounts of organic material, they may not provide much attenuation to petroleum products, pesticides or other hazardous chemicals potentially associated with the business park (depending on transport times). 28 (cont.)

GQ-3.3. Nitrate is a contaminant associated with the golf course, horse park and equestrian center. The degree to which the unsaturated zone will provide attenuation for nitrate is unknown, and will depend largely on whether anaerobic zones occur interlayered with aerobic zones. The most conservative analysis would not attribute large attenuation efficiencies to the vadose zone. Quantitative estimates of nitrate loading would provide a more realistic assessment of potential impacts to groundwater quality and receiving surface-water bodies. 29

W-3.1. The site water balance relies on wastewater return flows, which are over 80% (page 3.17-17). No references or case studies are cited for the assumptions of the percentage of water returning as wastewater. The issue of ownership of the wastewater flow is not discussed. According to current water law, the City can use or sell the wastewater without a water right permit. Since the site water balance relies on wastewater return flows to the Yakima River an adverse impact to other Yakima River water users would result if the wastewater is consumptively used. 30

W-3.2. The irrigation efficiencies provided in the UGA-DEIS (page 3.17-15) are likely low if efficient irrigation systems are required for homeowners and a conservation rate structure is applied. A more detailed discussion of the water conservation measures proposed should be included in the EIS. 31

W-3.3. If return flows via groundwater from irrigation on the UGA are delayed in reaching the river(s), the schedule and magnitude of water supply deficits could change from those presented in Table 4-4a. 32

W-3.4. Stormwater runoff modeling for the UGA suggests that recharge will increase due to addition of impervious surfaces and infiltration of associated runoff. The conclusion of a general increase in recharge appears accurate, however the modeling performed to estimate increased recharge has not been subjected to rigorous sensitivity analysis, uncertainty analysis, and may omit some relevant factors in its assumptions (see related text in Part 2 of this document). As long as the estimates of increased infiltration are not intended for use in the project water balance, no additional review of the stormwater modeling is needed to support "no adverse impact" with respect to recharge. However, if increased infiltration were sought for credit to the UGA water balance, additional review of the model would likely be required by Ecology. 33

4 Impacts Indirectly Resulting From the UGA

F-4.1. There is insufficient detail to assess the adequacy of the proposed mitigation for increased human use and population in areas external to the UGA and MPR. New development along streams in unincorporated areas of Kittitas County could impact fish and stream habitat due to clearing of riparian vegetation, and by harassment of fish by humans or pets. While the UGA DEIS does not provide quantitative estimates of impacts associated with such vegetation clearing and increased human use, the impact is noted as potentially significant (p. 3.7-24) and unavoidable. A detailed review of applicable county or city ordinances, and their track record of success, is needed to assess the probable impacts of either development on fish and fish habitat. 34

G-4.1. Increased housing demand in unincorporated areas is predicted for growth associated with the UGA, and is used to estimate associated water demand (p. 3.5-25). An additional 70 houses are estimated to consume 44 af/yr of groundwater from exempt wells. This compares to an estimated 635 houses associated with the MPR for a consumptive use of 401 af/yr (p. 3.5-34). While we haven't reviewed DEIS Section 3.11 ("Population and Housing"), we note a potential disparity between the numbers of residential units projected for the MPR and the UGA. The MPR will have roughly three times the dwelling units as the UGA, but is estimated to create approximately nine times the increased housing demand in unincorporated areas. This may be due to differences in the demographics of the two developments. If assumptions are documented in Section 3.11, some reference should be included in Section 3.5. If this difference is not documented and justified in the EIS, additional analysis and description would be required. 35

G-4.2. While Kittitas County estimates suggest that 85% of population growth will occur in the lower Kittitas County, this is unlikely the case for increased housing demand associated with either the MPR and the UGA because settlement will likely occur close to the developments. If indirect water consumption is to be included for determination of environmental benefit, then related consumptive use should be included in the project water balance and (conservatively) all of the estimated growth in unincorporated areas should be assumed to occur near the developments. The estimated consumptive use from unincorporated areas associated with the UGA is 44 af/yr, and may require revision (see G-4.1 above). 36

G-4.3. The DEIS states that future consumptive use on lands made fallow by the retirement of irrigated acres associated with Trendwest's tributary water rights are "outside the scope of this Draft EIS as they are not interdependent with UGA development" (p. 3.5-37). However, Ecology considers these additional consumptive uses to be indirect impacts of the UGA and MPR developments. As such, groundwater consumption associated with development on these properties should be incorporated into the UGA water balance when used for assessment of environmental impact to aquatic resources. 37

5 Cumulative Impacts Resulting From the UGA and MPR

Many of the comments provided for water rights transfers, indirect impacts and direct impacts associated with the UGA are equally applicable to the MPR. In these cases, the same 38

assessments would be required for cumulative impacts between the UGA and the MPR. While differences do exist between the degree of coverage presented in the MPR EIS and the UGA DEIS, issues identified in this paper that must be addressed both for the UGA alone and the UGA plus the MPR include:

38 (cont.)

- all of the tributary and mainstem water-right transfer issues (due to splitting of water rights);
- all indirect UGA impact issues; 39
- all surface-water quality issues (SQ-3.1 and SQ-3.2); and, 40
- issues F-3.2, F-3.4; W-3.3, W-3.4. 41

In addition, the following issues pertain to cumulative impact analysis:

G-5.1. The issues identified for UGA groundwater quality (GQ-3.1 thru GQ-3.3) need to be evaluated together with the groundwater quality issues identified for the MPR. Note that our prior "Issues Paper" for the MPR EIS (dated 2/16/01) suggested that more analysis be performed on groundwater quality beneath the MPR and associated loading on receiving surface-water bodies. Also note that some of the groundwater from the MPR flows beneath the UGA before discharging to surface-water bodies. Improved analysis/documentation of groundwater quality impacts from impervious surfaces and various land uses (including nutrient loading) would likely be required to fully address cumulative impacts. 42

W-5.1. A short discussion of the City of Cle Elum's existing water supply is provided on page 3.5-11 and elsewhere. Additional discussion should be provided regarding the City's water rights situation; their existing water use and the amount of water that the City believes can be conserved. What will the fate of the City's conserved water be? Will they have sufficient water to serve secondary growth resulting from the Trendwest UGA and MPR? 43

PART 2 - SPECIFIC COMMENTS, QUESTIONS AND CORRECTIONS

1 Water Supply Analysis

1. Discussion of flow increases on First Creek (pp. 3.5-18,19) is confusing in that Table 3.5-5 accounts for only the legally diverted water from the Creek (irrigation season) whereas the ensuing discussion states that discontinuation of year-round diversions will help restore the "natural frequency of flood forming flows". If year-round diversions are illegal (i.e. not included in the water right), credit should not be taken for discontinuing such diversions. 44
2. The Water Supply Appendix (Appendix D) defines a water right "transfer" as a change in the purpose of use, place of use, or point of diversion (p. 1-2). Because the purpose of use can be directly related to the timing of the withdrawal, timing should also be noted in this description. 45

3. The irrigation efficiencies described in Appendix D are 60% for residential units. However Table 2-1 appears to show efficiencies of 65% for residential irrigation and 75% for golf course irrigation. 46

4. The text description of Pautzke water rights states a Qa not to exceed 6,053 af/yr (p. 2-7 of Appendix D) whereas the attached Table 2-3 shows the Qa as 4,783 af/yr. Manual addition of the values presented in Table 2-4 confirms the 6,053 amount. Reported values of total Qa for the Teanaway water rights are 1,016 af/yr (Tables 2-3 and 2-6), whereas manually summed values add up to 1,205 af/yr. 47

5. The DEIS states that development under Alternative 1 (no action) would likely result in construction of 106 exempt wells for 106 individual residences (p. 3.5-12). The exempt wells allow 5000 gallons per day use, which may serve six homes if water use is restricted. On page 3.5-13, the EIS estimates the water demand for each residential lot under this alternative to be 2475 gallons per day (gpd). If Trendwest were to oversee the development of the site at existing zoned densities, a pending appeal before the State Supreme Court may ultimately negate construction of multiple exempt wells for a single development. The EIS states that the water supply for Alternative 1 could also be supplied by Class B water systems (page 3.5-12). For a demand of 2475 gpd, only two lots could be supplied by Class B system well. It is doubtful a Class B water system would be formed for only two residential lots. 48

2 Surface Water Characterization

1. Appendix D states that Big Creek is the only potentially affected sub-basin where there are no daily streamflow gauge data available (p. 3-7). This statement appears to ignore Reecer Creek and First Creek. 49

2. Appendix D describes available flow records for Swauk Creek (1909-1911) as collected by the USGS (p. 3-11). Communication with USBR suggest that they operated a gage just upstream of the mouth of Swauk Creek in the early 1990's. If available, that data should also be referenced. Similarly, Appendix D should also mention the new USBR gage on the lower Teanaway River in its description on page 3-16. 50

3. The EIS states that the added recharge from the UGA site amounts to approximately 1% of the flow in the Yakima River (page 1-11, 3.3-11). That calculation is not correct because low flows below the confluence of the Yakima and Cle Elum Rivers are typically much higher than the 100 cfs cited in the UGA-DEIS (p. 3.3-11). Year-round average flows at that point on the Yakima River are about 1,800 cfs, which can also be compared to the approximately 1 cfs estimated increase in site recharge. 51

4. There is a major inconsistency in the DEIS regarding the volume of water that would increase the TWSA (340 ac-ft, p. 3.5-23, versus 900 ac-ft, p. 3.7-22). 52

3 Surface-Water Flow Modeling

1. The surface-water model assumes that return flows are returned to tributary reaches on the same day as diversions. If this is not the case, irrigation diversions taken during the mid 53

season could actually return to supplement streamflows in the later season via a groundwater pathway. 53 (cont.)

2. The surface-water model appears to assume that each tributary will behave similar to First Creek in transmitting increased flows at Trendwest's prior points of diversion to the stream mouths. This is not a reasonable assumption. The amount of water present at the mouths will depend on the transmitting capacity of the alluvial aquifer in adjacent to the stream mouths. 54

3. The applicability of the surface water model is dependent on the correlation between streamflow measured in other basins to that occurring in the stream of interest. The correlation varies substantially from stream to stream. A discussion of the potential error in the streamflow estimated using the statisitical modeling approach is not contained in Appendix D. Confidence limits (+/- flow) should be placed on the results. A statement is made in the report that higher correlation occurs in the June through September time period than the remainder of the year. That is expected, as the flows are much smaller during that time period introducing a higher potential for correlation. However all the statistical analyses do not adequately answer the question of if, and how much streamflow would be present in each stream after transfer of water rights. That can be answered much better with a monitoring program as discussed earlier. 55

4. For the surface-water model, irrigation water rights and Trendwest consumptive uses were estimated on a monthly basis. Appendix D states that the diversion requirement and return flow for the Trendwest irrigation water rights were determined by first calculating the monthly net consumptive use, then applying an irrigation efficiency factor derived from the Washington Irrigation Guide (p. 4-2). However, efficiency factors should actually vary from diversion to diversion based on factors such as the length of the conveyance ditches. Text in the second paragraph of page 4-2 states that diversion requirements were estimated from net consumptive use, and should also reference efficiency factors. 56

4 Modeling of Infiltration Recharge for Stormwater Management

1. Does the HSPF model incorporate assumptions regarding changes in runoff due to soil compaction? Significant areas (e.g. 450 acres) will be cleared to develop the UGA. Heavy machinery used in clearing will cause compaction. HSPF modeling in the Puget Sound has shown that lawns (compacted) create more runoff than pasture. 57

2. Documentation of HSPF modeling in Appendix G is confusing regarding the occurrence of shallow till. While Table 2-2 in the appendix suggest that basin Y-5 is covered by shallow till (in agreement with soils descriptions in Appendix A), Figure 2-2 shows little till occurrence. A section regarding soil-cover-slope-complex summary (p. 2-11) does not include till-covered areas as comprising over 3 percent of the site, however the till in basin Y5 comprises 8 percent of the site area. In addition, the HSPF modeling predicts that runoff in most sub-basins will go to zero due to the infiltration facilities. However soils in Sub-Basin Y5 overly shallow till, which likely perches groundwater and may therefore create runoff. Does the model account for conditions that would create runoff over the shallow till? 58

3. The groundwater appendix of the DEIS, and text within the main document state that the model predicts runoff to go to zero under UGA development alternatives 2 through 4 (e.g. 59

see UGA Water Balance Impact Summary Table C-2). However, Table 2-7 of Appendix C shows that some runoff remains in basins 1, 12, Y1 and Y2. Some of this runoff appears due to fact that the model did not infiltrate runoff for "converted areas" existing under the current condition. While model predicted runoff is indeed significantly reduced for all basins, it is not reduced by 100 percent for the UGA area (as reported outside of Appendix G). The mechanism for the continued runoff should be documented more clearly, and text outside of Appendix G should be modified to reflect actual modeling predictions. 59 (cont.)

4. Table 2-4 in Appendix G presents model results for total basin area and total flow under the current condition. The ratios between these two values ranges from 1.04 to 1.85 feet, with most basins yielding between 1.04 and 1.25 feet. Higher values are noted for Basin Y5 (till cover) and Basin 1. Basin 1 has no steep slopes, no till, and the same forest vegetation as all other basins. It flow efficiency of this basin appears oddly high. If this observation reflects mechanisms not explained in Appendix G, explanation should be provided. 60

5 Groundwater Characterization and Impact Analysis

1. Assumptions used for single residence consumptive use of groundwater vary among different sections of the DEIS. For indirect development (i.e. housing demand in unincorporated areas) the DEIS assumes that an ERU uses 240 gpd plus irrigation for one-half acre, and that 20% of the diversion requirement is actually consumed (p. 3.5-26). Similar assumptions are used to estimate residential groundwater demand under the "no action" alternative (p. 3.5-13). However, a separate discussion of groundwater quantity impacts under the "no action alternative" assumes that each family unit uses 5,000 gpd and that 50% is returned to the upper aquifer as recharge (p. 3.4-11). 61
2. The groundwater characterization in Appendix C states that boring logs for the cross-sections are presented in Section A.3 of Appendix A – however they are not presented there. 62

6 Big Creek Groundwater Study

1. The Big Creek Groundwater Study employs a groundwater flow model to estimate where prior infiltration from field seepage on the Gentry property would flow within the uppermost aquifer. The modeling approach is a reasonable one, however the data available for calibration provide very little detail about actual field conditions in the immediate vicinity of Big Creek. Model results appear to show insignificant interaction between Big Creek and adjacent aquifer based on predicted groundwater levels. Do limited field data support such a lack of direct hydraulic continuity (e.g. Lund well groundwater elevation vs. nearest Big Creek water level surface)? Such a comparison should be included along with the (more theoretical) model results. 63
2. The study does not report how several surface-water features (KRD canal, Big Creek, Little Creek) were represented in the model. Were they represented as stream or river boundary cells? To what extent did they allow model interaction with the underlying aquifer? If leakage was model via a vadose zone connection, were the leakage values on the water balance reasonable and supported by existing gaging data? The way in which these features were modeled could affect model results, and should be documented. 64

3. The constant head boundary values along the upstream model boundary were extrapolated based on gradients observed among five groundwater elevation points within the model domain. To what extend does uncertainty associated with these extrapolated (assumed) values influence the potential for model-predicted hydraulic connections between the upper portions of Big Creek and the underlying aquifer? 65

4. Model calibration results appear fairly reasonable, and tend to overestimate heads in the upper reaches of the valley. If the model allows interaction between Big Creek and the underlying aquifer, overestimated heads would be conservative in that they exaggerate the opportunity for a direct hydraulic connection between surface-water and groundwater. Even with such exaggeration, the model appears to predict no significant hydraulic interaction between the aquifer and the stream (judging from groundwater elevation contours alone). 66

5. Contrary to the title of Section 1.5 of the study, there was no sensitivity analysis or validation performed. Parameters included in the model (constant head values, transmissivity and aquifer bottom elevation) are sufficiently unknown to include significant uncertainty. In addition, the degree to which model calibration targets vary from year to year and seasonally is unknown. Finally, the study report implies that recharge was defined using precipitation values; however, recharge should be some portion of precipitation (e.g. minus runoff and evapotranspiration). 67

6. The results of the model (predicted groundwater levels showing no apparent interaction between Big Creek and the underlying aquifer) need to be reconciled with USBR's description of groundwater-surface-water interactions in their water supply analysis report to BPA. The report states that "Big Creek flows are recharged by groundwater throughout the reach extending for 1 mile downstream of the upper diversion" (Appendix D, p. 3-40). 68

We hope that the comments presented above are useful to you in formulating outstanding issues that need to be addressed for SEPA evaluation and water rights issues. Please feel free to contact any of the consultant team members should you have any related questions.

Sincerely,
Pacific Groundwater Group

Peter Schwartzman by cw

Peter Schwartzman
Associate Hydrogeologist

Cc: Bob Sullivan (Parametrix)
Bob Pfeifer (Parametrix)
Bob Montgomery (Montgomery Water Group)
Dan Matlock (Pacific Groundwater Group)

Comment 1

Trendwest proposes to transfer its tributary water rights to instream flows, which would help move Big, First, Swauk, and Reecer creeks and the Teanaway River toward a more normative condition. The normative flow concept stresses the importance of natural flow paths and hydrology to sustain the conditions to which naturally spawning salmon have adapted over centuries of evolution (Poff et al, 1997). No significant adverse impacts on fish habitat are anticipated, and quantifying the relationship between streamflow and fish habitat was not considered necessary. However, in support of additional studies performed for the Final EIS, Ecology's consultant team conducted a reconnaissance of the fish habitat in affected tributary streams in the summer of 2001; an additional description of the tributaries is included in Section 3.6, Fisheries, of the Final EIS. Also, as part of the updated Water Supply Technical Report Supplement, Ecology's consultant team provided a hydrologic analysis of each of these tributary basins based on field investigations in 2001. These are included as Exhibit G to Appendix B of the Final EIS.

Comment 2

Uncertainty was addressed in the Draft EIS (see Figures B-3 and B-4 and Table B-2 of the Water Supply Technical Report). The model was updated and expanded for the Final EIS analysis, as described in Appendix B, the Water Supply Technical Report Supplement. Statistical evaluation of the regressions used to estimate streamflows and upper, middle, and lower simulation runs were used to predict a range of streamflow results for the study years 1991 through 1993 and 1995. These were used to characterize the "average" flow year condition. The evaluation provided in Section 3.4, Water Supply, and in Appendix B of the Final EIS used the middle and lower simulation runs to characterize the most likely range of Yakima River streamflows resulting from proposed transfer of Trendwest's tributary and Yakima River water rights under average conditions. Appendix B, Exhibit H of the Final EIS adds a description of variability in streamflow estimates, irrigation return flow time lag distributions, and uncertainty in other model inputs such as irrigation efficiencies.

Comment 3

Since the Draft EIS was published, Ecology's consultant team performed field investigations on all tributaries affected by Trendwest's transfer of irrigation diversions to instream flows, including seepage studies. The results of the 2001 fieldwork recommended in this comment have been incorporated into the analysis as summarized in Section 3.4, Water Supply, and detailed in Appendix B of the Final EIS. Instream flow changes predicted for the tributaries at the former points of diversion and hydraulic effects determined by Montgomery Water Group, one of the Ecology consultant team members, are described in Section 3.4, Water Supply.

Comment 4

The Final EIS incorporated additional analysis of impacts on third party diverters on the Yakima River mainstem, third party diverters in the affected tributaries, and groundwater users of aquifers potentially influenced by irrigation returns on lands appurtenant to Trendwest's water

rights. The Final EIS also incorporated information from studies conducted by Ecology's consultant team during 2001. Refer to Section 3.4, Water Supply, and Appendix B of the Final EIS for additional detail.

Comment 5

A monitoring program is described in Section 3.4, Water Supply, and Appendix B of the Final EIS as one mitigation element for the combined UGA and MPR projects. The monitoring program has been updated and expanded in detail since the Draft EIS was published. Trendwest would rely on compensatory transfers of tributary water rights to instream flows to ensure no net direct or indirect impacts on total water supply available (TWSA) and no increase in consumptive use of water under its mainstem water rights. While the model runs were used to characterize the anticipated magnitude of impacts, actual water availability from year to year cannot be forecasted by the model. An ongoing monitoring program would be established to assure Trendwest and other water users that the amount of water that would be used in connection with the MPR and UGA proposals is consistent with the water available under the several water rights that have been acquired by Trendwest, and the collective operations described in the water supply plan for the Trendwest resort are protective of other water users' rights on the Yakima River's tributaries and mainstem. Refer to Section 3.4, Water Supply, for a detailed description of: (1) the conceptual monitoring plan, including onsite metering, reporting, and response to monitoring results; (2) offsite streamflow monitoring for each tributary on which Trendwest has water rights and of the mainstem river flow in the reach between Cle Elum and Ellensburg; (3) provisions for monitoring when an acquired water right is one of two or more that are diverted at a common point, or share a ditch or canal; (4) periodic monitoring of the other water users on the tributary streams that are downstream of stream gauges; (5) monitoring already required to report water use to USBR under interim Court Orders in *Acquavella* consistent with RCW 90.03.360; and (6) how Cle Elum's and Trendwest's use of water under Trendwest's proposed water supply plan would be altered to reduce diversion or implement a pre-approved mitigation plan during periods when the diversion would conflict with USBR operations.

Comment 6

We agree with the comment. The analysis provided in Section 3.4, Water Supply, and Appendix B of the Final EIS no longer contains this statement. Trendwest's water rights transfers to instream flows would move First Creek toward a more normative condition during the irrigation season (see Comment 1, above).

Comment 7

Ecology's consultant team has evaluated the changes in shallow groundwater elevations arising from discontinued irrigation return flows, which is one result of Trendwest's transfer of water rights to instream flows. The results of that analysis are described in Section 3.4, Water Supply, and in Appendix B, Exhibit I. Impacts on groundwater levels are evaluated generally for the Big Creek, Teanaway River, First/Swauk Creek, and Reecer Creek basins. Wells completed in the upper portions of their aquifers in the areas predicted to be influenced by the former irrigation

returns would be vulnerable to impact. These impacts are presented as a significant unavoidable adverse impact in the Final EIS.

Comment 8

Refer to Comment 7, above. The maximum seasonal decline in groundwater resulting from the Trendwest water rights transfers in the Reecer Creek subbasin could not be determined. Drilling information from area well logs was too vague and other sources of hydrogeologic information were not available. The change in field/ditch seepage from the formerly irrigated properties associated with Trendwest water rights would be approximately 1 cfs during the irrigation season. This translates to an annual average recharge of 0.56 cfs. Seepage from the First Creek Water Users Association main ditch would also reduce by about 0.1 cfs. Some localized reduction in groundwater elevations could be reasonably expected to occur, but related effects could not be assessed from available information.

Comment 9

Since the Draft EIS was published, Ecology's consultant team performed field investigations on all tributaries affected by Trendwest's transfer of irrigation diversions to instream flows. Transfer to instream flows is proposed as mitigation for consumptive use increases that might otherwise occur under the transfer of its mainstem Yakima River water rights. Terminating the irrigation diversions in the tributaries would also terminate human-induced irrigation return time lags. Ecology's consultant team has estimated these time lags based on field investigations in 2001. Tributary time lags were incorporated into the water supply model for the Reduced Density MPR and Alternative 5. Results of the water supply analysis are described in Section 3.4, Water Supply, and detailed in Appendix B of the Final EIS.

Comment 10

The Big Creek Groundwater Study included in the Draft EIS shows the direction of irrigation return flow paths migrating through groundwater from the Gentry property. A conceptual and numerical model of the study area was developed to estimate the groundwater flow gradients between recharge sources and discharge sinks. The numerical model showed that the predominant factors in determining the groundwater gradient field in the study area were the recharge from the KRD Canal and the discharge to the Yakima River.

The model was updated to incorporate an analysis of the Big Creek basin performed in 2001 by Ecology's consultant team (see Exhibit I to Appendix B of the Final EIS). Stream-specific assumptions and inputs for the Big Creek water availability portion of the model are described in detail in Appendix B of the Final EIS.

Comment 11

The degree to which riparian conditions would be changed by added flow during the irrigation season was not analyzed. If, in the future, increased evapotranspiration causes a reduction in water availability, it would be mitigated through the monitoring program described in Section

3.4, Water Supply, which was designed to ensure that water used by Trendwest would not exceed water availability under its water rights.

Comment 12

Refer to the response to Comment 9, above.

Comment 13

Based on existing information, fish species potentially affected by the project include those listed in Table 3.7-1 of the Draft EIS. Since the Draft EIS was published, Ecology's consultant team has conducted surveys of the affected tributaries. Detailed description of the habitat characteristics and fish use is included in Section 3.6, Fisheries, of the Final EIS. Trendwest's water rights transfers from irrigation to instream flows would tend Reecer Creek toward a more normative condition (see Comment 1, above).

Comment 14

Between the Cle Elum River and Reecer Creek, flow reductions would result in both average and drought years, as described in Section 3.4, Water Supply. The flow changes are small relative to irrigation flow releases by USBR during most of this period. The small hydraulic changes that result are described in Section 3.4 and in Exhibit K to Appendix B of the Final EIS. Northwest Hydraulic Consultants analyzed impacts from the water supply plan on flows at selected diversions in the mainstem Yakima River between Cle Elum and Ellensburg (see Exhibit K of Appendix B). Fluctuations in water levels during the driest flows observed in each two-week period evaluated during the irrigation season ranged from an increase of 0.5 inch to a decrease of 0.25 inch. These small fluctuations would not reasonably have any measurable impact on fish or aquatic resource habitats.

Comment 15

Trendwest discussions with the USBR since the Draft EIS was published have established that USBR is not restricted by flows in the portion of the mainstem Yakima River that is affected by the MPR and UGA proposals. Rather, target flow requirements upstream of the projects determine the USBR's releases in the Yakima River basin. An updated discussion of potential impacts on TWSA is provided in Section 3.4, Water Supply.

Comment 16

Comment noted. An updated analysis of USBR flow management and obligations, including those to sustain fish, is described in Section 3.4, Water Supply, and in Appendix B of the Final EIS. Since 1981, the USBR's System Operations Advisory Committee (SOAC) has assisted USBR on fish-related issues associated with Yakima River Basin Water Enhancement Plan implementation. USBR determines flows for maintaining fish life in the Yakima Basin according to the annual prevailing conditions and in consultation with SOAC, irrigation district managers, and others (USBR 1999). Since 1995, targets for instream flows during the irrigation season have

been set annually by SOAC at Parker and Prosser, based on prevailing conditions, to meet flow targets at Parker and Prosser from April through October. Section 3.4 includes acknowledgement of the need to alter Cle Elum's and Trendwest's use of water under Trendwest's proposed water supply plan to reduce diversion or implement a pre-approved mitigation plan during periods when the diversion would conflict with USBR operations.

Comment 17

Comment noted. Eight diversions exist in the reach of the Yakima River between Cle Elum and Ellensburg. The eight diversions are described and analyzed in Section 3.4 and Appendix B, Exhibit K of the Final EIS.

Comment 18

Both the Draft EIS analysis and the supplemental analysis in Section 3.4, Water Supply, and Appendix B of the Final EIS account for legal diversions of water downstream of the Trendwest points of diversion, including priority dates of the water rights. The Roza Irrigation District water rights are not included in the model (see Exhibit C to Appendix B) because Trendwest's water rights are senior to the Roza Irrigation District's water rights. None of the other mainstem water rights were included in the model because the flow changes were insignificant relative to low flows in the river. A separate analysis was used to evaluate the potential for impairment to third party diversions on the affected reach of the Yakima River. Trendwest is proposing to transfer its tributary water rights to instream flows that could be conveyed to Ecology under RCW 90.38, or could be retained by Trendwest as private instream flows.

In general, Ecology would be responsible for management of tributary water rights transfers into the Yakima Trust Water Program until water available under the transferred rights reaches the mainstem of the Yakima River. At that point, USBR would manage water transferred to the Yakima Trust Water Program as part of TWSA. Tributary water rights that would not be transferred to the Yakima Trust Water Program would be managed by Trendwest as private instream flow rights to the confluence of each affected tributary stream with the mainstem Yakima River. The Washington Department of Ecology has a responsibility to protect trust water rights. The trust water rights would be protected from competing uses through monitoring, enforcement against the unauthorized use of water, and regulation of valid water rights according to priority. Ecology has the authority to issue regulatory orders against the use of water without a water right or in excess of a water right, and to regulate valid water rights according to priority, as long as a court order determines the existence, amount, and priority of the water claimed. Some but not all Trendwest water rights are currently described in an order from *Acquavella*. Big Creek and the Teanaway River each have a conditional final order, and the First and Swauk creeks order is pending.

Comment 19

The Water Supply Technical Report included in the Draft EIS identified that stockwater consumptive use was available outside of the irrigation season. It was assumed that 10% of the diversion volume specified in the Pautzke water right for stockwater was consumed uniformly

over its period of use. Ecology and the EIS consultants agreed to use 10% as the most probable value in the updated analysis for the Final EIS.

Comment 20

Section 3.6, Fisheries, of the Final EIS presents an expanded analysis of cumulative fishing pressure impacts from development of the Reduced Density MPR and Cle Elum UGA and additional discussion of mitigation measures. Discussions among Trendwest, WDFW, and Yakama Nation are ongoing for implementation of the Cooperative Agreement and possible amendment to address management of additional fishing by MPR and UGA residents on the mainstem and tributaries. The Cooperative Agreement is described in Appendix B of the Final EIS.

Comment 21

The Cle Elum Critical Areas Ordinance (CAO) has been reviewed for adequacy in meeting the Endangered Species Act 4(d) rules for protecting listed species. The Kittitas County CAO Title 17A, Section 17A.07.010 Riparian Habitats, should provide adequate protection of listed species present in Type 1 or Type 2 waters if it is appropriately implemented and adequately monitored and enforced. To ensure compliance with the Endangered Species Act 4(d) rules, the County could consider setting minimum buffers for Types 1, 2, and 3 waters to one "site potential tree height" from the ordinary high water level along rivers where trees naturally grow and 60 feet along rivers where trees don't grow.

For the City of Cle Elum CAO, a designation for Type 1 waters would need to be added and the sections with buffers would need to be updated in Chapter 18.01, Section 18.01.160, Designation of Riparian Corridors, and Section 18.01.170, Buffer Requirements for Riparian Corridors, as recommended above for Kittitas County.

Comment 22

Bull trout have not been documented in the reach of the Cle Elum River from the dam to the confluence with the Yakima River (including the reach through the UGA); however, it is possible that they migrate through this reach.

The comment expresses concern that bull trout spawners may be at risk from harassment in the UGA reach of the Cle Elum River. Spawning, incubation, and juvenile rearing are the bull trout life history stages that require the coldest water temperatures and the lowest fine sediment levels. Spawning typically occurs in the smaller tributaries and headwater streams that may be upstream of anadromous salmonids. The reach of the Cle Elum River through the UGA is not a headwater or tributary and would not meet the criteria (temperature) for bull trout spawning during the typical spawning season of August through October. Bull trout in the Cle Elum system would typically spawn in the small, high elevation streams that run into Cle Elum Lake. Because bull trout spawning is extremely unlikely to occur in the UGA reach of the Cle Elum, there is no risk of harassment of spawners.

Comment 23

A conservation easement covering the dedicated open space within the Cle Elum River corridor would be conveyed to the MountainStar Conservation Trust as part of the Cooperative Agreement among Trendwest, the WDFW, and the Yakama Nation. These three entities would manage the conservation easement. Currently, no details on trails or service road placement exist. Refer to Section 3.6, Fisheries, of the Final EIS for additional discussion of potential impacts from additional fishing on Upper County streams and rivers.

Comment 24

Results of simulations from the updated model indicate a deficit condition is anticipated under average climate conditions during two months, as described in Section 3.4, Water Supply, and Appendix B of the Final EIS. In July, a deficit of approximately 33.6 acre-feet to a surplus of approximately 13.4 acre-feet could result under long-term average conditions (as characterized by 1991 through 1993 and 1995 study years) for the cumulative MPR and UGA projects. In September, under the same conditions, a deficit ranging from 25.3 to 34.4 acre-feet was estimated. These deficits are recognized as significant adverse impacts requiring mitigation. These deficits would be mitigated as described in Section 3.4, Water Supply, of the Final EIS. No mitigation option requires storage releases by USBR, and no mitigation is dependent on increased TWSA from prior months. Impacts to TWSA have been reevaluated as described in Section 3.4, Water Supply.

Comment 25

The City of Cle Elum is the lead agency for construction of the regional treatment plant and is preparing a Facilities Plan and EIS. A discussion of potential loadings to the Yakima River from the regional wastewater treatment plant has been added to the cumulative impact discussion in Section 3.16, Utilities, of the Final EIS. Outfall studies that would be conducted as part of the Facilities Plan are also identified. Refer to Section 3.16 for an updated discussion on the status of the environmental review process for the treatment plant.

Comment 26

In response to comments on the Draft EIS, a quantitative analysis of potential water quality impacts has been conducted on the current proposed development (Alternative 5) and cumulatively with the MPR. No adverse impacts after proposed stormwater treatment and infiltration were determined to occur (see Section 3.3, Water Quality, and Appendix A of the Final EIS). Refer to the response to Letter 12, Comment 7 for additional detail.

Comment 27

Refer to the response to Letter 12, Comment 7. A quantified water quality analysis was prepared for the Final EIS and is included in Section 3.3, Water Quality, and Appendix A of the Final EIS. Water quality treatment prior to stormwater infiltration under Alternative 5 has been enhanced since the Draft EIS was prepared for Alternatives 2, 3, and 4.

Comment 28

The water quality analysis is updated in Section 3.3, Water Quality, and Appendix A to quantitatively assess Alternative 5. The revised analysis describes a higher level of stormwater treatment proposed for Alternative 5 than had been previously evaluated for Alternatives 2, 3, and 4 in the Draft EIS. The water quality analysis divides the UGA into four stormwater management zones for the determination of stormwater treatment based, in part, on the underlying geology. The underlying soils are moraine and outwash soils, which have a silty sand component that meets Ecology's criteria for crediting infiltration to native soils as water quality treatment in its 2001 Stormwater Management Manual (see Section 3.2.5 of Appendix A, the Water Quality Technical Report). The average transit time for the infiltrated stormwater to reach the underlying aquifer is between 120 and 200 days; solutes or particles in the water would travel much more slowly due to electrostatic attraction and particle deflection and/or trapping.

Comment 29

Alternative 5 (Preferred Alternative) does not include a golf course, equestrian village, or Horse Park. Nitrate-nitrogen from residential sources was conservatively described, under the unlikely assumption that 75% of households would both overfertilize and overwater (see Section 3.2.6 in Appendix A of the Final EIS). A 5% reduction in nitrate-nitrogen was attributed to denitrification in native soils, which is a low value. Because the rate of aquifer passage under the UGA and the exact amount of landscaping under Alternative 5 are not known, a loading analysis was not possible. However, under the very conservative assumptions used, the greatest residential nitrate concentration contribution to infiltrating stormwater was approximately a 1.0 mg/L increase immediately under the residential areas. This is well below the 10 mg/L nitrate-nitrogen standard for groundwater and drinking water. There is no nitrate-nitrogen standard for surface waters because it is virtually non-toxic (see Section 3.2.4 in Appendix A).

Comment 30

Additional information on the fraction of water demand returning as wastewater is provided in the subsection labeled *Wastewater Flow Projections*, Section 4, Appendix E. The City of Cle Elum does not currently propose water reuse as part of its wastewater planning effort, and impacts have not been analyzed in the Final EIS. If a proposal for reuse is considered in the future, water balance issues would be revisited at that time.

Comment 31

Refer to the added subsection *Water Use Standards* in Section 3 of Appendix E.

Comment 32

Return flows from the MPR and the UGA properties traveling as groundwater were evaluated for time delays in transit, and a schedule for their attenuated return to the Cle Elum and Yakima rivers was incorporated into the revised water balance model summarized in Section 3.4, Water

Supply, and described in detail in Appendix B, the Water Supply Technical Report Supplement. The specific return flow analysis is provided in Exhibit F to Appendix B of the Final EIS.

Comment 33

The estimate of increased recharge from stormwater was not used as a return flow component of the UGA's water balance, or cumulatively with the MPR for the same purpose. It is not a component in any of the analyses included in the Water Supply Technical Report Supplement (Appendix B). Recharge from irrigation returns and systems leakage and wastewater return flows from the UGA (and cumulatively from the MountainStar MPR) are included in the water balance and are discussed in detail in Section 3.4, Water Supply, and Appendix B of the Final EIS.

Comment 34

Refer to the response to Letter 5, Comment 6 for a discussion of increased human use and population that could affect riparian vegetation or cause harassment of fish. Refer to the response to Comment 21, above, regarding applicable city and county ordinances.

Comment 35

The employment-induced water demand analysis has been revised and is included as Appendix C in the Final EIS. This analysis includes an explanation of the induced growth estimation methods for the UGA and the MPR.

Comment 36

Comment noted. Since the Draft EIS was published, the potential impact of indirect and induced growth in the unincorporated areas of Kittitas County due to the Reduced Density MPR and the Cle Elum UGA has been analyzed.

In performing the analysis, the estimated increased population induced by the Reduced Density MPR and the Cle Elum UGA was allocated to the areas surrounding the resort, including the I-90 corridor from Snoqualmie Pass to Ellensburg. In addition, the analysis eliminated the public lands in the unincorporated areas near the resort as potential areas for future growth. The analysis also allocated the estimated population growth in these unincorporated areas to the individual subbasins designated by the Yakima River General Stream Adjudication (*Ecology v. Acquavella*), specifically, subbasins 1 through 9 and 12. The analysis estimates that the consumptive use from the indirect and induced growth in these unincorporated areas to be approximately 804 ac-ft/yr associated with the Trendwest MPR and residential UGA, and with the non-residential components (including the business park) of the UGA. Refer to Section 3.4, Water Supply, and Appendix B, Water Supply Technical Report Supplement, of this Final EIS for additional detail.

Comment 37

Refer to Letter 12, Comment 3 for a discussion of the indirect impacts from future consumptive use on lands made fallow by the transfer of Trendwest water rights. An analysis of those impacts and proposed mitigation is included in Section 3.4, Water Supply, and Appendix B of the Final EIS.

Comment 38

The requested analysis is provided in Appendix B, the Water Supply Technical Report Supplement, which cumulatively evaluates the MPR and UGA proposals.

Comment 39

The requested analysis is provided in Appendix B, the Water Supply Technical Report Supplement, and Appendix C, Employment-Induced Water Demand Analysis. The impacts are summarized in Section 3.4, Water Supply.

Comment 40

Section 3.16, Utilities, of the Final EIS provides a discussion of the environmental review process for the expanded Cle Elum wastewater treatment plant and identifies loadings and future water quality analyses that will be performed. Cumulative water quality impacts from the UGA and MPR projects are addressed in Section 3.3 of Appendix A, the Water Quality Technical Report.

Comment 41

Refer to the response to Comment 32 above, which describes how and where the delay in irrigation return flows from the UGA and MPR projects are addressed (raised as "issue W-3.3"). Refer to the response to Comment 33 above, which explains that increased stormwater recharge was not used in the project water balance (raised as "issue W-3.4"). Refer to the response to Comment 20 above, which describes cumulative assessment of fishing pressure impacts (raised as "issue F-3.1). Alternative 5 would retain a total of 246 acres as undeveloped natural open space within the Cle Elum River corridor, as described in the Final EIS (see Section 2.6, Alternative 5 Description). A conservation easement covering the dedicated open space within the Cle Elum River corridor would be conveyed to the MountainStar Conservation Trust as part of the Cooperative Agreement among Trendwest, WDFW, and the Yakama Nation. These three entities would manage the conservation easement cumulatively for the UGA and MPR (raised as "issue F-3.4").

Comment 42

Cumulative water quality impacts from the UGA and MPR projects are addressed in Section 3.3 of the Water Quality Supplemental Report, which is Appendix A of the Final EIS. Refer also to the responses to Comments 27, 28, and 29, above.

Except for a very small contribution from the extreme northeast corner of the MPR, no groundwater from the MPR passes under developed portions of the UGA under Alternative 5. The MPR and UGA's quantified water quality results indicated no cumulative adverse impact is reasonably expected.

In response to Ecology's request for an alternative analysis of the MPR groundwater quality as a check on the method used in the MPR Draft EIS, a specific analysis method was agreed on August 1, 2001 and implemented. No adverse impacts on surface water or groundwater quality are predicted as a result of the re-analysis. A subsequent request from Ecology for an even more conservative approach as a final confirmation of no adverse effect was also incorporated in the analysis (A.C. Kindig & Co. January 15, 2002. Groundwater and Surface Water Quality Reanalysis; letter to George Cockill, Trendwest Resorts, Inc.). Both alternative analyses, which Kittitas County has incorporated in an addendum to the MPR EIS, confirm the results and conclusions presented in the MPR Draft EIS.

Comment 43

As described in the Draft EIS and updated in Section 3.4, Water Supply, and Appendix B of the Final EIS, Cle Elum withdraws water from two surface water sources in the Upper Yakima River basin. The City is in the process of developing a new treatment plant and water system improvements, including new diversion works associated with both the Cle Elum and Yakima rivers, designed to serve the City of Cle Elum and Town of South Cle Elum. The new Cle Elum diversion works will function as a source of supply when Cle Elum River flows exceed a specified amount, to be determined annually by USBR and the System Operations Advisory Committee.

At present, the City relies on two sources for its municipal supply: (1) a water right owned by the City with a priority date of June 30, 1896 (confirmed by a Conditional Final Order in *State v. Acquavella*, and thereafter modified by Ecology in 2001) in the amount of up to 1,100 ac-ft per year and 3 cfs from the Cle Elum and Yakima rivers; and (2) a series of water supply agreements with the USBR, beginning in 1932, for a municipal supply derived from the Yakima River system of up to 2,170 ac-ft per year and 3 cfs (based on water rights of the United States). In conjunction with the processing of *Acquavella*, the City is now negotiating the latest in the series of USBR water supply agreements. In the context of *Acquavella* processing, the maximum to be withdrawn by the City pursuant to its 1896 priority right and the USBR agreement is 2,375 ac-ft per year. The yearly amounts of the City's water use have ranged between 3,100 ac-ft per year to 800 ac-ft per year. The latter amount is based on most recent withdrawal experience after the upgrading of the water supply facilities and has yet to be verified in light of long-term experience. Additional discussion of the City of Cle Elum's ability to serve secondary growth within the UGA is contained in Section 3.4 of this Final EIS.

Comment 44

Refer to the response to Comment 6, above.

Comment 45

As described in Appendix B of the Final EIS, Trendwest proposes to transfer its Yakima River water rights so that they may be exercised for beneficial uses within the MPR and UGA. Trendwest has filed water transfer applications with Ecology and the Kittitas County Water Conservancy Board (KCWCB). The applications filed with the KCWCB seek to transfer Trendwest's mainstem Yakima River irrigation and stock water rights from their current place of use near Ellensburg to year-around diversions at the City of Cle Elum's Yakima and Cle Elum River water supply diversion works. The three mainstem water rights have six water rights transfer applications pending, three of which would serve the MPR and three would serve the UGA. A portion of each of Trendwest's three mainstem water rights would provide for recreation, irrigation, and domestic beneficial uses within the MPR and a portion of each of its three mainstem water rights would provide for municipal supply within the City of Cle Elum. Trendwest has also filed applications with Ecology to transfer Trendwest's 11 tributary water rights to instream flows. These 11 rights have 22 water rights transfer applications pending, 11 to offset consumptive uses on the MPR and 11 to offset consumptive uses within the UGA. The tributary water rights could be conveyed to Ecology under RCW 90.38, or could be retained by Trendwest as private instream flows. Nearly all of the mainstem and tributary water rights proposed for transfer are seasonal irrigation rights, although a portion of some water rights are authorized for year-around stock watering. All of the proposed transfers would require changes in purpose and place of use; additionally, transfer of the mainstem rights would also require a change in the season of use and points of diversion

Comment 46

The irrigation efficiencies in Appendix E are 60% for residential and commercial, 70% for recreation turf, and 80% for golf course turf, as described in Section 3.16, Utilities, and Appendix E of the Final EIS.

Comment 47

Comment noted. Since the Draft EIS was published, the description of the Pautzke and Teanaway water rights and the annual quantities of water available under those water rights has been updated. The Qa for the Pautzke water rights is not to exceed 4,783 ac-ft/yr. and the Qa for the Teanaway water rights is not to exceed 1,016 ac-ft/yr. Refer to Section 3.4, Water Supply, for additional detail.

Comment 48

Comment noted. Although there is a pending appeal before the Washington Supreme Court concerning the use of multiple wells for a single development (*Ecology v. Campbell & Gwinn,* Washington Supreme Court No. 70279-9; Yakima County No. 99-2-02859-6), there has been no decision from the Supreme Court. Yakima County Superior Court, which is the basis for the matter pending before the Supreme Court, found that where there are withdrawals from multiple exempt wells within a subdivision, if each withdrawal is less than 5,000 gallons per day, they are considered multiple withdrawals and not a single withdrawal. Furthermore, the Superior Court

held that each 5,000-gallon per day withdrawal is exempt from the permit requirement of RCW 90.44.050. Therefore, the Yakima County Superior Court decision would allow the use of individual exempt wells for 106 residences, as mentioned in Alternative 1 (No Action Alternative).

Direct and indirect employment-induced households in unincorporated areas of the county would most likely rely on small public water systems or individual wells. Any use of surface water to meet this demand would necessarily have to rely on existing water rights (as opposed to new water rights) because the Yakima River system has been, by every practical measure, fully appropriated during the latter half of the irrigation season since the early 1900s. Additionally, all remaining water that might be available for appropriation under new water rights has been withdrawn from appropriation, pursuant to RCW 90.40.030, by various actions of the United States.

Small groundwater withdrawals for non-commercial irrigation and domestic purposes up to 5,000 gallons per day can be anticipated as a way of meeting the projected needs in unincorporated areas of the county. The effects on the Yakima River system would depend on the degree to which the groundwater aquifer is connected to the river, and would vary in accordance with the distance from the well to the river, the aquifer characteristics, and the rate and volume of water pumped to meet the demand. For these reasons, no new surface water permits for year-round residential use and only groundwater withdrawals that are exempt from permitting (see RCW 90.44.050) can be reasonably expected to meet this demand (see Section 3.4, Water Supply, and Appendix B of the Final EIS).

Comment 49

During the 2001 irrigation season, Ecology's consultants installed continuous depth sensors in the affected and previously ungauged tributaries. Data were downloaded from the sensors, and converted to discharge using consultant-derived rating curves. Appendix B of the Final EIS describes this monitoring effort.

Comment 50

The Washington Department of Fish and Wildlife operated the gauge near the mouth of Swauk Creek during the 1990s. These data, and data from Reclamation's Teanaway River gauge at Lambert Road (lower gauge), are referenced in Appendix B of the Final EIS.

Comment 51

Agreed. The low flow cited on page 3.3-11 in the Draft EIS for the Yakima River immediately below its confluence with the Cle Elum River is too low. The low flow figure offered of about 1,800 cubic feet per second in an average year would make the added 1 cubic foot per second stormwater recharge equate to about a 0.05% increase.

Comment 52

Refer to Section 3.4, Water Supply, and Appendix B of the Final EIS for a revised discussion of total water supply available (TWSA) impacts.

Comment 53

Refer to the response to Comment 9, above.

Comment 54

The rate of surface water infiltration through the creek bed and the transmitting capacity of the alluvial aquifer adjacent to the stream mouths affect the amount of water present at the mouth. Ecology's consultant team investigated these processes during the basin studies performed in 2001 (see Exhibit G to Appendix B of the Final EIS). The water balance model is modified to include seepage, alluvial subflow, and other hydrogeologic factors estimated from those studies. This is described in Section 3.4, Water Supply, and in Appendix B.

Comment 55

The uncertainty analysis has been expanded to include confidence limits for streamflows predicted by regression (see Appendix B). Tributary streamflows, irrigation, stockwater efficiencies, and lag time distributions of irrigation and alluvial aquifer return flows were all input using values agreed by Ecology to define upper and lower reasonable bounds for each parameter. The supplemental analysis added new data from streamflow and other field monitoring by Ecology's consultant team during 2001, a drought year. The analysis provides linear regression statistics, the 90% confidence limits for streamflow predictions, and standard error for predicted versus observed flows in Swauk, First, and Big creeks. Results for the average year conditions, characterized by the 1991 through 1993 and 1995 study years, were provided as a range between the middle and lower value simulations in Section 3.4, Water Supply, and in Appendix B. Late in the irrigation season in 2001, when streamflows were lowest, the observed streamflows tended to vary between the middle and lower value simulation results. Thus, the most reliable results of Trendwest's water rights transfers were also considered to vary in the range established by these simulations.

Comment 56

Appendix B describes the final water balance model for the Cle Elum UGA project and its construction in detail. The diversion requirement for water at each irrigation site is computed as the consumptive use divided by the irrigation efficiency. The range of irrigation efficiency values (0.32 to 0.45) was based on three sources of information. First, the Washington State Irrigation Guide provides on-farm irrigation efficiencies. The furrow irrigation efficiency of 60% was multiplied by a conveyance efficiency of 75% to obtain the upper end of the efficiency range. Second, the *Acquavella* adjudication provides the total volume of diversion allowed for the irrigation season (Qa) in each irrigation water right. The Qa was divided by the net consumptive use estimated by the Blanney-Criddle equation using mean monthly temperature and

precipitation input values for the period of 1989 to 1995. Third, Ecology provided its measurements of diversions into the 3M Ditch and the Ballard Ditch during 2001. Independently, for both ditches, the daily net consumptive use was estimated for the day of the measurements using the Blanney-Criddle equation with actual mean monthly temperature and precipitation measured during 2001. The irrigation efficiencies of the areas served by 3M and Ballard Ditches were estimated from net consumptive use divided by the measured diversion.

Irrigation consumptive use was defined as the volume of water consumed through plant evapotranspiration. The calculations, based on the Blanney-Criddle formula, used the same conceptual method as described in the Washington State Irrigation Guide to estimate crop net consumptive use. The Blanney-Criddle method incorporates, at minimum, precipitation, temperature, and crop types. The Washington State Irrigation Guide also includes averaged relative humidity and wind data; however, it does not include sufficient data to estimate relative humidity at the places of use of the Trendwest water rights. Therefore, the version of the Blanney-Criddle equation used in the Guide could not be incorporated into the model. The Blanney-Criddle equation incorporated into the model included temperature and precipitation inputs for which spatial and temporal distributions could be determined to estimate location-specific and time-specific net consumptive use.

Applicable proceedings in *Ecology v. Acquavella* were used to estimate the amount of land to be irrigated under each water right. For the Big Creek (Easton), Teanaway River, and Reecer Creek subbasins, these consist of Conditional Final Orders entered by the Court. The Court has not yet entered a Conditional Final Order for the Swauk Creek subbasin. Consequently, the Supplemental Report of Referee for Swauk Creek was used to describe the number of irrigated acres for each Swauk Creek water right.

Comment 57

The developed condition model reflects the compaction that would occur in construction of lawns. King County Surface Water Management Division parameters developed for golf and turf were used, both of which use lower infiltration capacity values than the value for pasture.

Comment 58

Figure 2-2 in Appendix E of the Final EIS has been corrected to show the AGI soils delineation. The soil-cover-slope complex summary has been corrected to conform to the data in Table 2-2 in Appendix E. The model generates runoff from the till soil unit as indicated by the interflow component for basins Y4-U and Y5-U in Table 2-4. The runoff is fully infiltrated as shown in Figure 2-6 in Appendix E, either inside or outside the basin generating the runoff.

Comment 59

Under the existing condition, Bullfrog Road contributes some direct runoff to the Cle Elum River. This is the runoff referred to in basins 1, 12, Y1, and Y2 in the Draft EIS Appendix G. That non-infiltrating runoff would not be changed as a result of the UGA or MPR projects. It

remains true that all newly developed runoff would be infiltrated, including under the UGA Alternative 5. This has been clarified in Section 2 of Appendix E to the Final EIS.

Comment 60

The boundaries of basin 1 are shown in Figure 2-1 in Appendix E of the Final EIS. Basin 1 consists of basin 1-1 and basin 1-2. The boundary between basins 1-1 and 1-2 are shown in Figure 2-5 of Appendix E. The soil types for the two basins are given in Table 2-2 of Appendix E. Basin 1-2 has 40 acres of outwash soil and 45 acres of bedrock soils. The bedrock soil causes the total flow per unit area to be higher than the outwash range of values.

Comment 61

The assumptions for diversion and consumptive use for in-migrant households are summarized in Table 9 in Appendix C of the Final EIS. Water demand for in-migrant households in unincorporated areas was estimated by applying the same method for "per household" demands as was used for the Cle Elum UGA Draft EIS. This assumes 240 gallons per household (2.4 persons per household assumed), less 80% return flows. Irrigation demands were calculated using the Washington State Irrigation Guide in Cle Elum for Upper County subbasins, and in Ellensburg for Lower County subbasins. These are compared to other assumptions made for incorporated areas, which used figures from each jurisdiction's latest Water System Plan. In most cases, these data were based on demand estimates dating to the early to mid-1990s.

Comment 62

Comment noted. Test pit logs are presented in Section A.3 of the Draft EIS. Drilling logs from the MPR EIS were not reproduced in the Cle Elum UGA EIS.

Comment 63

Ecology's consultant team collected additional streamflow data on Big Creek, which shows that seepage of additional streamflow (from reduced upstream diversion) would be insignificant. These data are included in the analysis provided in Section 3.4, Water Supply, and in Appendix B.

Comment 64

The water availability model for Big Creek described in Appendix B of the Final EIS calculates the amount of water available daily for the 1887 priority date Gentry water right, which was acquired to help offset consumptive use at the MPR and UGA site. The water availability model for Big Creek simulated the effects of transferring the Gentry water right by computing:

- The amount of water diverted daily from Big Creek by the senior users.
- The volume and timing of irrigation return flows before and after the water right transfer.
- The volume and timing of alluvial seepage return flow before and after the water right transfer.

Irrigation return flow from this property flowed vertically through the vadose zone to the water table, then laterally by groundwater to the Yakima River rather than back into Big Creek. The flow path to the Yakima River was approximately 1 mile, and delayed return flows in such a manner that some proportion of the return flow reached the Yakima River throughout the entire year. Ecology's consultant team estimated that about 80% of the total irrigation return flow reaches the Yakima River within 4 to 10 months after the start of the irrigation season (Pacific Groundwater Group 2002).

Ecology's consultant team modified and expanded a groundwater model to estimate the timing of return flow, adding an additional two-week delay to account for estimated time lags in the unsaturated zone (see Exhibit G to Appendix B). Ecology's consultant team and the project team agreed on reasonable ranges in values for the background recharge, seepage from Big Creek ditches, and hydraulic properties of the local soils. Hydraulic properties of soils are described by their hydraulic conductivity (K), which is the rate at which soil can transmit a liquid under the influence of gravity. A high K value means the soils can transmit water quickly (for example, gravel), and a low K value means the soils transmit water slowly (for example, silts). Ecology's consultant team developed fast and slow return flow schedules from this range of inputs by groundwater modeling.

Comment 65

The gradient of the creek is steeper than the groundwater gradient, and the groundwater level is below the surface water level near the KRD Canal. Therefore, the potential for groundwater to be hydraulically connected to Big Creek upstream of the KRD Canal is highly unlikely. Ecology's consultants confirmed this to be the case during their 2001 evaluations of the affected tributary basins, provided as Exhibit G to Appendix B. The model was set up to represent these conditions, and was revised to reflect the results of consultants' evaluations as warranted.

The uncertainty of the model boundary conditions is documented in Appendix B of the Final EIS. Calibration of the model also included testing the influence of the model boundary conditions on computed groundwater flow gradient and direction. Changing the model boundary conditions changed the flux through the model and affected the heads computed for the interior of the model. Calibration requires recharge and/or a change in the hydraulic conductivity of the aquifer to compensate for the effects of changing boundary conditions.

Ecology's consultant team conducted an extensive uncertainty evaluation by varying the hydraulic conductivity values in addition to recharge and boundary conditions. They also tested the sensitivity of computed lag times of irrigation return flow to hydraulic conductivity, recharge, and boundary conditions. These results, and their incorporation into the analysis, are summarized in Section 3.4, Water Supply, and in detail in Appendix B.

Comment 66

Refer to the response to Comment 65, above.

Comment 67

Refer to the response to Comment 55, above, with regard to the sensitivity analysis and uncertainty. Recharge from precipitation (i.e., stormwater) was not included in evaluation of the water rights transfers, except as climate-affected crop consumptive use estimates. A detailed description of the model's construction is provided in Appendix B of the Final EIS.

Comment 68

Ecology's consultant team conducted streamflow monitoring on Big Creek (upstream of the dam and downstream of Ensign Ranch Diversion) during 2001 to evaluate the seepage of streamflow through the creek bed and into the underlying alluvial aquifer. The consultants did not note seepage gains from the groundwater flow system into Big Creek during their review of the monitoring data and other available data. They used their 2001 data to develop a flow-seepage relationship for the reach between the two monitoring stations, which does not support the USBR's description of groundwater-surface water interactions in its water supply analysis report to the Bonneville Power Administration.

May-07-01 12:43P ROSLYN POST OFFICE 509 6493288 P.01

received
5/7/2001
City of Cle Elum

Erin Krake
Box 720
Roslyn, WA 98941

Gary Berndt, Mayor
City of Cle Elum
119 W. First Street
Cle Elum, WA 98922

May 6, 2001

Dear Mayor Berndt,

I am writing to comment on the Draft Environmental Impact Statement for the City of Cle Elum's Urban Growth Area development by Trendwest Resorts, Inc.

Due to the limited commenting period I can personally address only one issue. Please refer to RIDGE's comments for a complete list of the issues that need to be addressed in the final document. 1

In the DEIS chapter on housing and population, I noticed some glaring problems. The number of total units (for Alternative 2) is 898 permanent new units with 1,983 permanent new residents (table 3.11-11) and 530 seasonal units with 266,815 visitors each year (table 3.11-12). 2

The first problem is that of those units, none are expected to be "affordable," (3.11-24) even though many of the employees in the UGA and the MPR will be making minimum wage or slightly above. The second is the impact this lack of affordability will have on the housing market in Roslyn and Cle Elum. The final EIS should include binding and meaningful language that the company will mitigate its substantial impact on the area's housing availability and on providing affordable housing for, at the very least, its own employees.

What is more, this document is misleading in regards to population projections. It uses the plan's own figures for how many units the company WANTS to put in and the number of people it WANTS to house as projections for the county. Instead the document should adhere to the OFM's projections before the company bought the land or made a plan. In the least it should not try to say that the UGA MUST meet these projections to be in compliance with the Growth Management Act. This is a blatant falsity. (see entire chapter 3.11.2) 3

In reviewing the mitigation measures the company proposes, I did not find any real mitigation proposals. For example, there is no proposed employee housing "at this time" except for a "monitoring program" that uses "benchmarks" to identify what is attributable to Trendwest. There is no definition of what those benchmarks will be or who will be ultimately in charge of making the decision as to what caused it. Secondly, the plan proposes RV housing for its construction workers, but they haven't identified where or how big the park will be, at least in the part I read. Also, what about sewer and water for the RV park? How are they going to provide this before they have either of these facilities? Finally, it says the company "could" work with KCAC and the Housing Authority to "support" below market rate housing programs and "explore" subsidies for low income housing. In fact, the document admits there will "unavoidable adverse impacts" in that there will be an increase in population that hasn't been planned for or projected in any empirical way; there will be an increase in property values and 4

taxes; and there will be a lack of affordable housing. Where is the mitigation for these "unavoidable adverse impacts?" Aren't they required to mitigate these impacts? 4 (cont.)

I wish I had the time to read this document in its entirety. I hope the City protects itself and its citizens (and the rest of the county residents) by analyzing this draft thoroughly and making the final EIS better. It is only fair that this multi-million dollar corporation fully mitigate the negative impacts such a huge increase in our population and its subsequent needs will bring. 5

I don't disagree with developing businesses and housing in the UGA. I just don't think it must or should be on such a scale. I don't think it should take over all wildlife habitat, just because it's there. I don't think it should create a whole new town, just because they need more services and recreation for their MPR. And I don't think your existing city should have to create new, large-scale infrastructure that you don't even need, just because they will pay for it. You and I and all life in the upper county will be paying for it in the end. 6

Sincerely,

Erin Krake

Comment 1

Comment noted. The comment period for the Draft EIS was 45 days, beginning on March 23, 2001 and ending on May 7, 2001.

Comment 2

Affordable housing is addressed in the City's draft Conditions of Approval for the project. Mitigation measures include implementing an Affordable Housing Mitigation Program. A temporary RV park with a maximum of 100 spaces is proposed to house construction employees. Refer to Section 3.10, Population and Housing, of the Final EIS for a summary of the key elements of the Affordable Housing Mitigation Program.

Comment 3

Section 3.11 of the Draft EIS identifies the population *capacity* of Alternatives 2, 3, and 4 and compares this to the Office of Financial Management's 2020 population projection allocated to Cle Elum under the Kittitas County Countywide Planning Policies. Section 3.10 of the Final EIS provides an analysis for Alternative 5. OFM is expected to update its population projections in early 2002.

Comment 4

Refer to the response to Comment 2, above.

Comment 5

Comment noted.

Comment 6

Under the Growth Management Act, the City of Cle Elum would annex and serve the Urban Growth Area. Further, the deliberative process undertaken by the City of Cle Elum and Kittitas County of designating and planning for the UGA would have proceeded even without the MPR.

City of Roslyn
P. O. Box 451
Roslyn, Washington 98941
100 East Pennsylvania
509-649-3105

received
5/7/2001
City of Cle Elm

City of Cle Elum
119 West First Street
Cle Elum, WA 98922

May 7, 2001

As an Affected Agency and neighboring municipality, the City of Roslyn has reviewed the Draft Environmental Impact Statement for the Bullfrog Urban Growth Area dated March 23, 2001 and submits these comments for your consideration.

Water Supply for School District #404

The City of Roslyn has delivered potable water to the school campus on State Route 903 since 1968 when the high school was first constructed and has further expanded its delivery capacity to accomodate the growth and consolidation of school facilities. While no formal agreement between the City of Roslyn and the School District has been executed, we remain committed to serving the school's treated water supply needs because schools are a vital component in the quality of our community.

The expansion of the School District campus, as described in the DEIS, will enable our schools to construct facilities to accomodate the increase in student population directly and indirectly attributable to the proposed UGA and MPR developments. However, the water supply needs for an expanded school facility are not addressed.

Appendix D (Water Supply), Page 2-2: "The water demand estimates do not include the public facility demands, identified as the School District #404 school expansion area, cemetery expansion area, Community Recreation Center, and Business Park"

1

Roslyn's Comprehensive Water System Plan (1996) was based on growth projections that did not include population increases attributable to Trendwest's Master Plan Resort or Cle Elum's Urban Growth Area. The 1996 projections for water supply demand indicated that Roslyn will approach the limit of its capacity to divert water from Domerie Creek for a municipal water system in 2015.

The ability of Roslyn to accomodate growth in population, promote economic development, and plan for the future will be directly impacted by the water supply demand attributable to the expansion of the School District facilities. 1 (cont.)

The City of Roslyn proposes the following mitigations for the water supply impacts:

1) Expand the Environmental Impact Statement to include an analysis of the public facility demands for water supply, specifically the increased water supply needed to expand School District #404 onto an additional 25 acres 2

2) Include water rights transfers to the City of Roslyn as part of the conveyance of the School District expansion land 3

3) Facilitate a water delivery agreement with School District #404 and the City of Roslyn to formalize the terms and conditions of the water supply needed for growth. 4

Law Enforcement Level of Service

The Interlocal Agreement for Police Services, executed in July, 2000 defines the service area of the Cle Elum/Roslyn/South Cle Elum Police Department as the area inside the corporate city limits of the three municipalities. Annexation by Cle Elum of the Bullfrog Urban Growth Area will enlarge this service area by 1,100 acres and significantly impact the ability of our law enforcement agency to provide the established level of service to the City of Roslyn. We suggest that this be mitigated by frequent analysis and reports to the Police Oversight Committee so that staffing and equipment expansions can be implemented in a timely fashion. 5

Net Fiscal Impacts

Projections in the DEIS for the City of Roslyn to experience neutral or positive net fiscal impacts are based on increased retail sales tax revenues due to off site purchases by visitors and occupants from the UGA and MPR, and from an inflow of construction workers needed to fill the demand for building trades employment. Given the current profile of retail sales tax revenue generating businesses in the City of Roslyn the vast majority of the projected sales tax increases will be attributable to eating and drinking establishments. Significant public facility improvements and enhancements will be required to facilitate the projected sales tax revenue increases, including expanded public parking capacity, construction of public toilet facilities, and development of visitor information and interpretive sites. Costs for these visitor driven improvements are quantified in the City of Roslyn Capital Facilities Plan and should be included in the analysis of net fiscal impacts in the Final EIS. 6

Increased consumption of alcoholic beverages implicit in the increased sales tax projections for Roslyn will create increased law enforcement expenditures and potential incarceration cost impacts. Currently the City of Roslyn contracts with the Kittitas County Sheriff's Office for booking and jail services. Given the vast array of fiscal benefits that Kittitas County will accrue from the development of the MPR and UGA, designating the County as the responsible entity for jail and booking costs for the City of Roslyn would be a reasonable mitigation. 7

The City of Roslyn has already seen increased costs attributable to the population increases that will result from the development of the UGA and MPR. Updating the Comprehensive Plan has required contracting for the services of a City Planner, modifying the Comprehensive Wastewater and Sewerage Plan to accomodate new population projections has required engineering expenditures, and increased staff time has been devoted to responding to requests concerning zoning requirements and the availability of water and sewer for proposed new construction, both residential and commercial. Since Roslyn has no jurisdiction regarding MPR or UGA development there has been no straight forward procedure for a cost sharing agreement with the proponent to mitigate these staffing and revenue shortfalls. The Final EIS needs to address these indirect impacts to the City of Roslyn and propose appropriate mitigations. 8

Phased Environmental Review and Relationship of UGA and MPR Impacts

"Proposed mitigation measures are generally project specific, however, there is overlap to the extent that project impacts from the MPR and UGA may affect the same service provider, facility, or infrastucture. In these cases, mitigation measures for the MPR and UGA reflect a potential coordinated approach." (DEIS pg. 1-6) SEPA rules allow for phased review under certain criteria, but deems phased review inappropriate when "It would merely divide a larger system into exempted fragments or avoid discussion of cumulative impacts" ,WAC 197-11-060 (5)(d)(ii). 9

The only access to the City of Roslyn is Highway 903 and the cumulative effects of development of the MPR and UGA will create signifcant adverse impacts to ingress and egress capabilities. Population growth attributable to in-migrant construction and operational workers will impact Roslyn with increased affordable housing demands since both MPR and UGA development could commence concurrently. Enviromental review for water supply and wastewater infrastrucutre will likely focus on one system to serve both the MPR and the UGA and be based on cumulative impacts to the environment. Revising of Roslyn's Comprehensive Plan would be based on population projections derived from impacts attributable to both the MPR and UGA. 10

The Final EIS should coordinate all the cumulative information on impacts from both the MPR and UGA so that affected agencies are not handicapped in assessing what actions will be required to accurately plan for growth. Information used for assessing impacts and implementing mitigations should be brought up to date to reflect the most current statistics available. 11

Water supply and treatment plans should be brought up to date and presented in more detail. 12

Wastewater treatment facility plans expressed in the DEIS do not reflect the level of detail that should be available for reasonable environmental review of the alternatives. 13

Neighboring municipalities that will be required to modify and update their planning documents should be compensated by the proponent for the direct costs attributable to the proposed developments. 14

Population and Housing

Statistics provided in the DEIS concerning numbers of in-migrant workers needed for construction and operation of the UGA and MPR, and the anticipated levels of compensation that these workers can expect, lead to the conclusion that there will be a significant shortage of affordable housing available during the early phases of construction. This shortage will continue for several years after construction begins and create a major impact on the City of Roslyn. The price of housing will escalate with the increased demand and property taxes will increase due to the increased valuations. Present and historic home owners in Roslyn will see their property taxes go up and potentially create a financial hardship, especially for senior citizens on a fixed income. Many of the developable lots in Roslyn will require new water and sewer hook-ups, and the process required for reviewing and permitting new construction could overwhelm the existing staff capabilities.

The DEIS states that Trendwest has not proposed any employee housing, but will rely on the market to respond to affordable housing needs. Mitigation measures outlined are primarily based on a monitoring program that would commence with the issuance of construction permits and consist of various incentives to the market. However, a shortfall of available affordable housing will be created by the intrinsic time lags in this monitoring process. 15

Affordable housing construction should be included in the Development Agreement with Cle Elum so that projected demand for affordable housing will be met with a planned supply. The Final EIS should also include a more detailed break down of the expected rates of pay for specific types of construction, operational, and seasonal employees so that more accurate predictions can be made about the types of housing that will be required to meet the anticipated demand.

Any monitoring program will rely on establishing an accurate assessment of existing conditions so that impacts can be identified and mitigated. Roslyn is already responding to speculative inquiries about available housing and buildable lots. A base line study of affordable housing should be implemented before construction permits are issued.

The Cities of Roslyn and Cle Elum share a rich cultural heritage and pristine natural setting that have been the foundation of our municipal relationship. As we respond to population growth and the development proposed to accommodate that growth, a shared respect for the natural physical ammenities that create our environment will carry that relationship into the future. 16

Sincerely,

David Gerth, SEPA Official

Comment 1

The City of Cle Elum, the School District, and the City of Roslyn are continuing discussions regarding how to implement water service to the School District expansion area. Pursuant to the UGA Water Supply Agreement between Trendwest and the City of Cle Elum, the City of Cle Elum has agreed to provide water rights in an amount sufficient to meet school district growth needs (*Agreement Regarding Water Supply for the Bullfrog Flats UGA* dated June 19, 2001). The City of Roslyn serves the current school campus through an existing arrangement, which presumably would continue into the future. The City of Cle Elum is developing a water treatment plant and pipeline network that will be able to serve any new school expansion facilities located within the UGA. The City of Cle Elum water rights would cover this service, as provided for in the water supply agreement. Assuming this division of service, the City of Roslyn would continue to supply water to the existing school campus and the City of Cle Elum would serve any expansion on lands within the UGA (Michael Cecka, pers. comm., December 2001).

Comment 2

Water demand for irrigation requirements for the School District and cemetery expansion areas is identified in Section 3.17 of the Draft EIS and Section 3.16 of the Final EIS. Water demand for future School District expansion would depend on student populations and has not been estimated at this time. Refer to the response to Comment 1 above for a discussion of water provision for the School District. As part of the RIDGE Settlement Agreement, Trendwest has agreed to provide water for induced growth impacts on the City of Roslyn.

Comment 3

Refer to the response to Comments 1 and 2, above.

Comment 4

Refer to the response to Comment 1, above.

Comment 5

Comment noted. The interlocal agreement for police services establishes an oversight committee that includes all three jurisdictions and this governing structure would continue (*Interlocal Agreement for Law Enforcement Services* dated June 27, 2000). As population of the City of Cle Elum increases due to UGA development, the parties to the interlocal agreement could revise the oversight committee governing structure, as appropriate, to ensure an ongoing significant decision-making role for the City of Roslyn and South Cle Elum, even if the majority of the future population growth occurs within the City of Cle Elum.

The expected impact on police services is discussed in Section 3.16 of the Draft EIS and is discussed for Alternative 5 in Sections 3.15 and 3.18 and in Appendix D of the Final EIS. The analysis of Alternative 5 (Preferred Alternative) identifies projected personnel and equipment

expenditures and associated mitigation measures. The RIDGE Settlement Agreement includes payments directly to the City of Roslyn to address increased demand for public facilities.

Comment 6

The RIDGE Settlement Agreement includes payments directly to the City of Roslyn to address increased demand for public facilities. Refer to Appendix D of the Final EIS for additional detail.

Comment 7

Comment noted. Refer to the response to Comment 5 above regarding police service impacts and mitigation. Any decision regarding what jurisdiction is responsible for costs of booking and jail must be decided between the affected jurisdictions and is not a mitigation measure that the City of Cle Elum can decide for those independent jurisdictions.

Comment 8

Refer to the response to Comment 6, above.

Comment 9

Refer to the response to Letter 4, Comment 2.

Comment 10

Cumulative impacts are addressed for Alternatives 2, 3, and 4 under each element of the environment in the Draft EIS. Cumulative impacts are addressed for the Reduced Density MPR and Alternative 5 under each element of the environment in the Final EIS. Mitigation measures are identified to address potential cumulative impacts, as necessary.

Comment 11

The analyses in both the Draft EIS and Final EIS reflect the most current available statistics.

Comment 12

Section 3.16 of the Final EIS updates the status of the water and wastewater treatment plants currently in the design and planning phases. A discussion of potential loadings to the Yakima River and future water quality studies has been added to the cumulative impact discussion of Section 3.16. These are facilities proposed by the City of Cle Elum to implement the City's adopted water and wastewater comprehensive plans. A standalone water treatment plant is no longer proposed.

Comment 13

Refer to the response to Comment 12, above.

Comment 14

Neighboring jurisdiction's planning documents do not need to be modified as a direct result of MPR and UGA development, but may need modification because of future Office of Financial Management growth population projections for the County. As such, imposing mitigation for the costs of such planning updates on the project proponent is not appropriate. The City of Roslyn could adopt a full cost-recovery permit fee structure that would more directly address the potential impacts of any increased land use or building permit activity on existing city staff and resources. In addition, the RIDGE Settlement Agreement includes mitigation payments directly to the City of Roslyn to address fiscal impacts on the City from increased demand for public facilities and services.

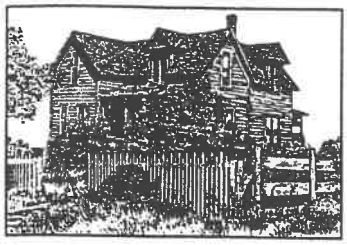
Comment 15

Refer to the response to Letter 26, Comment 2.

Comment 16

Comment noted.

received
5/3/01



Kittitas County
Department of Building & Fire Safety
411 N. Ruby, Suite 4, Ellensburg, WA 98926
Telephone (509) 962-7694 Fax (509) 962-7682

May 3, 2001

As the Fire Marshal of Kittitas County I have the following conditions that will apply to the Cle Elum UGA. Under an agreement between Kittitas County and City of Cle Elum Fire Marshal duties are provided. The comments are to be entered into the record as comments on the UGA Annexation.

If any questions arise please call.

Derald Gaidos
Fire Marshal
Kittitas County

The phasing of projects shall be in a way that fire protection can be maintained to protect the previous phase or phases. Water supplies for fire fighting and roads must be made available at the earliest point to allow the sites to be protected. As roads and paths become the established fire department/emergency access, maps should be kept up to date, with street names posted. Each development application shall specify how it relates to the overall phasing program. 1

Special efforts by the developer in the control of his work force will be a main concern to prevent the wild fire from ever starting. The Department of Natural Resources has Industrial Precautions, which limit and control all spark-emitting devices within forested areas of Washington State. Requiring the developer to follow the precautions should be a must requirement. If conditions are such that the work does not present a serious threat, City of Cle Elum Fire Chief can allow work with added conditions. 2

All open space lands shall be managed to buffer sensitive environments from intensive development or activities; to retain and restore native plant communities and to maintain 3

1

and enhance habitat; and, for developed areas, to provide an aesthetically pleasing landscape, provide habitat connections, and minimize risk of fire.

3 (cont.)

To document and achieve these landscape planning objectives, the developer will finalize and submit to the City for approval the existing conceptual Land Stewardship Plan and a Noxious Weed Plan for the entire UGA site prior to any construction and/or land clearing activities for the first phase or subphase of UGA development. An amendment to the Land Stewardship Plan and Noxious Weed Plan shall be submitted to the City for approval with a general site plan or site development plan for any phase or subphase of UGA development if the general site plan or site development plan is inconsistent with such Land Stewardship Plan and/or Noxious Weed Plan. Such amendments shall demonstrate how the goals and policies of the Land Stewardship Plan and Noxious Weed Plan will be implemented for the developed area in the phase or subphase of UGA development covered in the general site plan or site development plan.

4

The Land Stewardship Plan shall include and follow the Department of Natural Resources Backyard Stewardship Program, (Eastern Washington Type) as a model of fire prevention in the interface as a proven working program.

The amount of clearing on lots shall be consistent with City of Cle Elum Regulations or as otherwise stated. Single specimens of trees, ornamental shrubbery or similar plants used as plant covers, provided that they do not form a means of rapidly transmitting fire from the native growth to any structure will be exempt.

Uniform Building Code (UBC) guidelines shall be followed for siting and design of any facilities located in seismic hazard areas. Provisions for evaluating seismic issues as currently described in the draft International Building Code 2000 (IBC2000) shall be considered in design. If facilities are sited in areas prone to soil liquefaction, foundation supports shall be designed to extend deeper than the liquifiable soils. The Building and Fire Codes reference anywhere in "This Document" shall reflect to the most current code/codes adopted by the Washington State Building Council and City of Cle Elum. This will allow buildings to be built with the most current codes applicable rather than the code at approval of the Development Agreement.

5

Standards shall be as specified in the Development Agreement. The storage of all hazardous materials shall follow the same guidelines as prescribed by the latest codes and regulations from various agencies. The focus on the golf course chemicals shall be part of a total plan for use, containment and disposal of all hazardous materials during construction and operation of the MPR. All chemicals on site will require MSDS sheets at site and construction main office for use in emergency situations.

6

All golf course fungicides, herbicides, insecticides and fertilizers shall be stored in an enclosure with a closed sump to prevent chemical release. Mixing areas for golf course chemicals shall be enclosed with concrete curbs or other means for spill containment and a closed sump or collection point.

The applicant shall prepare a golf course spill prevention and accidental spill response plan consistent with Department of Ecology requirements. Following approval by Ecology, a copy of the plan shall be submitted to City of Cle Elum and Kittitas County.

6 (cont.)

Native plant species shall be used in landscape plantings in developed areas, and to revegetate cleared but open areas, including rights-of-way along UGA roads. A program to control the introduction or spread of noxious weeds or invasive species, using chemical and/or biological means, shall be developed by a professional forester in consultation with the Kittitas County Weed Coordinator, and shall be reviewed and approved as part of or in conjunction with the Land Stewardship Plan. The revegetation of open areas and disturbed areas shall be in conformance with the Land Stewardship Plan. Such Land Stewardship Plan shall include provisions relating to: (a) revegetating open and disturbed areas with use of low growing, perennial grass species close to native or cultivars of native species; and (b) using drought resistive species to minimize the risk of transmitting fire. These Conditions shall be addressed by the applicant through adoption of the Land Stewardship Plan and through general site plans or site development plans, and through restrictive covenants applicable to subdivisions and lots.

Remaining stands of un-thinned mature forest habitat within development areas shall, to the extent feasible, be retained and incorporated within open space areas. Any forest management activities within these areas shall comply with applicable local, state, and federal rules and regulations, and with the Land Stewardship Plan. The stands of doghair trees must be thinned and ladder rules removed as Kittitas County FIREWISE has dictated.

7

The applicant shall prepare and submit to City of Cle Elum for approval a Land Stewardship Plan which:
The Plan shall follow the guidelines of:

- The Department of Natural Resources, Backyard Stewardship Program (Eastern Washington Type)
- Recommendations for Fire Safety and Prevention of Forest and Rangeland in Kittitas County including Rural, Commercial and Private Developments as updated March 1999 by the Kittitas County Fire Co-op, a committee of the Kittitas County Fire Chief's Association.

These guidelines shall be used to protect the wildfire interface area, which is being developed. These are proven useful tools in fire protection.

Wood burning stoves shall be limited to common areas in the resort lodges, conference facilities and similar spaces. No stoves or wood burning devices shall be installed in any other units. The restriction of wood burning stoves shall be included to all privately owned units including the single-family residences. This would allow the fire prevention to be implemented from the highest standards and through out the UGA thus lowering the need for fire department response to wood stove related problems and also the problem of wood storage in a wildfire interface area.

8

Wood storage in the wildland interface area presents a problem of possible fire encroachment into the woodpiles and the radiant heat produced enhancing the fire front and making protecting the building impossible. In general, people have their wood storage very close to the building being heated. **8 (cont.)**

Development management practices shall include using well-maintained construction equipment and trucks to reduce emissions. Prolonged periods of vehicle idling and engine-powered equipment shall be avoided. Development Management Practices shall include the following fire safety items:

(a) All construction and maintenance vehicles on site shall have the industrial fire safety equipment, which includes a fire extinguisher, shovel, and spark arrestor/muffler and other specific per application.
(b) All smoking shall be controlled in prescribed smoking areas.
(c) Open flame/spark emitting shall follow the WA State DNR Industrial Precautions. **9**

Any exception of these will be examined on a per case basis by: (1) Fire Chief of the City of Cle Elum, (2) Department of Natural Resources and (3) Kittitas County Fire Marshal.

Burning of land clearing debris shall be consistent with the County Solid Waste Plan, Fire Protection regulations, and as conditioned by WAC 173-425-030 or otherwise permitted in accordance with the City-approved Land Stewardship Plan. **10**

Construction activities should/shall be limited to daytime hours. For the months of November through February construction activities shall be limited to 8:00 AM to 6:00 PM and for the months of March through October to 7:00 AM to 8:00 PM. During the summer months, these may be amended to reflect those hours prescribed by the WA State Department of Natural Resources Industrial Fire Precautions as to hours started and completion per precaution level. In "Hoot owl" level operations it is permissible to work 8 PM to 1 AM to lessen the fire danger. Working outside of the prescribed work hours should be an option with each case being looked at and reviewed by City of Cle Elum Fire Chief as an Administration Decision. **11**

All on-site roads shall be approved by City of Cle Elum, privately constructed to City of Cle Elum Standards for Emergency Vehicle Access following the KCFCA Fire Prevention Standards for development. **12**

Mapping and Addressing. The applicant shall provide to the City all mapping and addressing of the MPR development in a form consistent with the County's existing addressing system and in such GIS or other database format requested by the Public Works Department, consistent with how such information is maintained by the Department. Applicant shall provide City and zip code information for the entire UGA site before final approval of the first phase or subphase **13**

Any closures or restriction shall not prevent or hinder access necessary for emergency vehicles and shall be equipped with compatible OPTICOM or equivalent emergency vehicle access devices. **14**

At the point that the LOS requires adding a traffic signal or signals in the Upper Kittitas County, the applicant shall outfit the Fire/EMS vehicles that respond to the MPR and shall equip the traffic signal(s) with appropriate OPTICOM, or other similar equipment or system that is determined appropriate by the City for the safe movement of Fire/EMS equipment through congested intersections. 14 (cont.)

Proposed building materials, design and other architectural and landscape features of the UGA, including signage and lighting, shall be designed to help structures fit within the visual setting. The developer shall in consideration of building design and materials address the need for fire resistively in construction. Wildfires are spread via the radiant heat that is produced. The use of fire resistive materials lessens the chance of wildfire spread. The UGA is in a high fire danger area. 15

The applicant shall prepare, and submit to City for approval, proposed covenants, conditions and restrictions (CC&Rs) applicable to privately owned residential units/buildings within the UGA. The CC&Rs shall address, at a minimum, the following concerns: building material, color and design; limits on clearing open space portions of individual lots; accessory buildings; landscaping requirements and limitations; lighting; policies regarding domestic pets; storage and use of toxic or hazardous materials (e.g. pesticides, herbicides); and maintenance. The City shall ensure consistency of these elements of the CC&Rs with applicable policies in its Comprehensive Plan; other elements of the CC&Rs are not subject to review by the City. The applicant and City may address the above mentioned standards in the UGA Development Agreement. The applicant shall add to the covenants list the following items: 16

(a) All building including private SFR single family residence, MFR multi family residence and buildings required under the most current building code adopted, shall have approved fire sprinklers installed, tested and maintained as listed in National Fire Protection Association sections 13, 13D, 13R. 17

(b) All buildings shall have a defensible space requirement around each structure. Defensible spaces shall be determined by application of formulas found in "Recommendations for Fire Safety and Prevention", dated March 1999, copies of which are available in the office of the Kittitas County Fire Marshal. Defensible space around structures does not constitute a portion of the developed area of a lot or parcel, and shall not be counted against any applicable lot coverage restrictions. 18

(c) The Wildfire Hazard Severity Rating shall have the following additional adjustment factors"

- Fire sprinklers in structures – subtract three (3) points; and
- External underground sprinklers – subtract one (1) point.

(d) Overall wildfire rating for :

Point Totals	Defensible space distance from structures
Low = 0-15 points	10 feet
Moderate = 15-30 points	20 feet
High = 30-45 points	25 feet
Extreme = 45+ points	30 feet +

18 (cont.)

Required conditions for public services are based, in large part, on assumptions and analyses of costs and revenues to City of Cle Elum and other service providers. The applicant shall verify, monitor and report on costs and revenues accruing to Kittitas County, the Cities of Cle Elum, South Cle Elum, and Roslyn and any other service providers periodically throughout development of the UGA. Such reports shall be submitted at the end of Year 1, Year 3, Year 5, Year 7, Year 10, and thereafter in 5-year increments until full buildout. The Conditions herein shall be modified, as appropriate; to reflect changes in UGA construction plans or operations that result in significant modifications to expected revenues and costs.

19

Fire Protection

The fire-flow for buildings other than one and two-family dwellings is dictated by the Uniform Fire Code as type of building construction and square footage of the building. Appendix III-A, Table A-III-A-1 provides fire flow in relation to building construction type. Fire flows range from 1500 gallon per min. for 2 hours of duration to 8000 gallon per min. for 4 hours of duration. Exception: A reduction in required fire flow of up to 75% , as approved, is allowed when the building is provided with an approved automatic sprinkler system. The resulting fire flow shall not be less than 1,500 gallons per minute

20

The developer shall establish an in-house, multi-service Fire/EMS unit, appropriately trained and equipped to respond as an initial-attack fire force. The persons in this unit shall be affiliated to its parent organization. City of Cle Elum shall require membership to its fire department. Cle Elum Fire will require the affiliation to an EMS service within Kittitas County to allow pre-hospital care as directed by the Medical Program Director.

21

All principal UGA structures with assembly, business, mercantile, residential, storage, and mixed use occupancies, shall be equipped with automatic fire sprinkler systems designed and installed in accordance with applicable codes and standards. The Kittitas County Fire Marshal shall determine whether additional buildings, not described previously, shall also be required to be sprinklered.

A UL approved site shall monitor all fire suppression and fire alarm detection automatic alarms. This is required by nationally recognized Fire Sprinkler codes, NFPA 13. 13D & 13R

22

The applicant shall provide support, through funding and/or in-kind contributions, for monitoring and reporting of Fire District 6, Fire District 7, Cle Elum, South Cle Elum and Roslyn responses to UGA-related fire service/EMS calls as a result of mutual aid provisions. Reports shall be submitted to City of Cle Elum at the conclusion of Years 1, 3, 5, 7 and 10 and thereafter in 5-year increments until buildout. Developer shall agree to enter into a Cooperative Agreement with City of Cle Elum Fire Department, similar to that attached hereto.

The applicant shall initiate discussions with City of Cle Elum regarding a funding/compensation agreement for UGA fire protection. As appropriate, in the event of any shortfall, the applicant shall provide contributions to City of Cle Elum, to supplement expected tax revenues, the additional staff and equipment deployed by City of Cle Elum to serve the UGA. Developer shall agree to enter into a Cooperative Agreement with City of Cle Elum Fire Department, similar to that attached hereto. 23

The applicant may make available a site and/or a proportionate share of funding, for a new fire station operated by City of Cle Elum on or adjacent to the UGA site. Developer shall agree to enter into a Cooperative Agreement with City of Cle Elum, similar to that attached hereto.

Recycling of wood building products will be a major issue. The recycle will allow waste to be used in a positive manner, the waste streams not increased, and the contractors not burning the products. Waste shall be controlled in a fire safe manner. All CDL wood waste shall be disposed of as called for in the Kittitas County Solid Waste.

The chipping and grinding of all forest debris, not considered as merchantable timbers, shall be considered as an alternative to large forest silvicultural fires. This large amount of wood product can and should be used in the trail system and the re-vegetating of the disturbed open areas. All CDL wood waste shall be disposed of as called for in the Kittitas County Solid Waste Plan. There shall be no outdoor burning of forest debris or other material by any owner of an individual residential lot. 24

The DOE is expecting and has planned for the restriction of open burning in all forms in the city of Cle Elum in the year 2005. With this in mind, all land clearing debris shall be properly disposed of 25

Emergency Response/Aid Services

The applicant shall, pursuant to a mitigation agreement with Hospital District 2, agree to acquire, equip and contribute an ALS ambulance to the district to ensure timely EMS capability to the UGA. The mitigation agreement shall address the timing of the mitigation plan. Alternatives to such purchase which may be pursued in cooperation with the District may include equipping the Cle Elm BLS ambulance to satisfy ALS requirements and arranging transport privileges that would allow an MPR/UGA paramedic to continue to provide ALS services during transport; or establishing protocols for automatically recalling and placing in service a back-up ambulance crew using the Hospital District 2 ambulance.

In cooperation with Hospital Districts 1 and 2, the applicant shall monitor the frequency of UGA-related demands for un-reimbursed emergency medical and hospital services generated by the MPR. Reports shall be submitted to City Years 1, 3, 5, 7 and 10 and thereafter in 5-year increments until buildout.

26

In coordination with Kittitas County's Solid Waste Department and the Department of Ecology, the applicant shall develop and implement a solid waste management plan for the UGA. The plan shall address expected waste volumes, waste reduction, recycling and handling considerations for all types of wastes. The plan shall include a recycling program to reduce solid waste volumes needed for disposal. The plan shall be submitted in accordance with the 1997 Kittitas County Solid Waste Management Plan for consideration as a project specific amendment. The plan shall complete the approval process in accordance with the 1997 Kittitas County Solid Waste Management Plan and shall become an UGA condition of approval. Any changes to the Plan shall be incorporated as UGA conditions of approval.

The following Condition is necessary to mitigate impacts related to land clearing debris.

(a) The applicant shall not send land-clearing debris through the County owned transfer stations. Land Clearing Debris shall be given away free, chipped to be used in the equestrian facility, marketed as pulp, used on MPR trails or burned on site as conditioned by WAC 173-425-030 or as permitted by the County-approved Land Stewardship Plan.

The following Condition is necessary to mitigate impacts related to equestrian wastes.

(a) The applicant shall not send equestrian wastes through the County owned transfer stations. Used bedding and horse manure shall be disposed of in accordance with WAC 246-203 and Board of Health Ordinance #1999-01. All such materials shall be hauled off-site for disposal.

27

The applicant shall support and participate in a program to monitor MPR-related demands for law enforcement, fire protection, emergency medical and hospital services, the response pattern to those service demands by local government service providers, and the costs associated with the respective jurisdictions' responses. The jurisdictions to be included in this program would include Kittitas County agencies, Fire Districts 6 and 7,

28

Hospital Districts 1 and 2, and the municipalities of Cle Elum, South Cle Elum and Roslyn.

The following measures shall be implemented by the applicant if necessary to ensure that revenue lags to service providers, if any, are identified and mitigated:

(a) Provide funding to the City of Cle Elum Fire Department if necessary to supplement the increased tax revenues available to support the increased service costs.

(b) In coordination with Hospital District 1 and Hospital District 2, monitor UGA-related revenues and costs to the Districts. The applicant shall reimburse the Districts for any shortfalls between MPR-generated revenues (including fee reimbursements from patients) and costs.

28 (cont.)

Fire Mitigation:

"SAMPLE AGREEMENT"

Surplus Military Vehicle

City agrees to:

- Secure a chassis that can be used as a combination tender and fire suppression vehicle during the initial phase of road and first building construction for UGA.

Developer agrees to:

- Pay the cost to convert the _____vehicle to a usable unit. Conversion will include installation of a water tank, pump, side storage compartments, emergency radio and lights, miscellaneous equipment recommended by the Fire Chief and paint the vehicle. The Parties estimate that the cost of converting the surplus military vehicle may be approximately $20,000, which equipment will be obtained through selection of the low bid in competitive bidding process;

- The _____vehicle will be an all-terrain vehicle and should remain on the City of Cle Elum property until replaced by a newer tender; and

- The converted surplus military vehicle will be returned to the City when replaced by a permanent tender when it is necessary to replace it with a newer tender.

29

Training

City agrees to:

- Make arrangements for training classes to train members of the City and surrounding fire department in specialized rescue;
- Carry the mobile trench rescue equipment on the converted tender listed above; and
- Bid and purchase the equipment necessary for the trench rescue team and specialized rescue.

Developer agrees to:

- Reimburse the District for the cost of the trench rescue equipment in an amount estimated to be $_____;
- Pay the cost of the instructor and necessary materials used to put on the class;
- Have at least four of the UGA/Resort supervisory personnel attend the trench rescue class;
- Training programs shall be renewed on an annual basis during the period of open trench construction; and
- Have available on site, plywood, timbers and ropes designated only for use with the trench rescue team.

29 (cont.)

Public Safety Facility

City agrees to:

- To work with Developer in the design of a public safety facility on the property to accommodate fire personnel and equipment, medical personnel and equipment.

Developer agrees to:

- Construct such facility so that it is available concurrently with the opening of the first hotel.

Triple Combination Pumper

City agrees to:

- Provide specifications for a fully equipped triple combination pumper and tender, and to purchase the vehicle. The triple combination pumper shall be purchased such that it is available on site to coincide with the opening of the first hotel.

Developer agrees to:

- Reimburse the City for the cost triple combination pumper;

Initial Fire Fighters

City agrees to:

- The District agrees that the initial UGA personnel will also serve and be trained to serve as first response fire fighters.

Developer agrees to:

- Work with the City of Cle Elum Fire Department in the hiring process and pay the cost of the personnel. The personnel shall be hired and trained prior to the opening of the hotel.

Volunteer Fire Fighting Force

City agrees to:

- Recruit and maintain as large a volunteer fire fighting force as possible in the area of the UGA.

29 (cont.)

Developer agrees to:

- Pay the cost to train in fire suppression tactics those Resort employees who agree to serve as part of the volunteer fire fighting force; and

- Developers employees shall be under the supervision of the Chief of the City of Cle Elum Fire Chief for training and fire department activities.

The Parties understand and agree that conditions within the City as well as the UGA change from time to time. Consequently, flexibility must be maintained in this Agreement to allow for those changes. As a result, the Parties recognize that the following additional steps are necessary subsequent to the execution of this Agreement:

- Jointly develop a plan and schedule for additional fire fighting personnel and equipment. This plan shall be reviewed and updated on an annual basis, and filed with the City of Cle Elum.

- At full build-out the Parties anticipate that the equipment necessary for the UGA will include one (1) triple combination pumper, one (1) tender and

one (1) 4 x 4 one-ton or larger brush truck with skid mount tank and equipment. Providing mechanisms to ensure that this equipment is available at full build-out of the project shall be part of the plan listed above. All fire department apparatus must meet NFPA and Washington State Department of Labor and Industries Fire Fighter Safety Standards.

- Developer shall pay all costs for the firefighters and equipment on the UGA site not covered by revenues collected from within the UGA development so as not to result in any adverse financial impacts on parties outside the UGA who are served by the City.
- The City has the right to utilize these department members in any suppression activities within the City and for mutual aid responses as they see fit.
- The City shall negotiate the benefit these fire fighter personnel are to the entire City and pay a prorated share of the cost.
- The response area for apparatus and personnel assigned within the City to incidents outside the City shall be determined between the City Fire Chief and reviewed by the Director of the UGA. Any dispute to this designated response area as determined by the Fire Chief shall be resolved by the Kittitas County Fire Marshal.

29 (cont.)

Comment 1

Comment noted.

Comment 2

Comment noted. Section 3.16 of the Draft EIS includes compliance with the Washington Department of Natural Resources industrial precautions as a mitigation measure.

Comment 3

Comment noted. Implementation of a Land Stewardship Plan is discussed in Section 3.6, Plants and Animals, of the Draft EIS. The Cooperative Agreement among Trendwest, WDFW, and the Yakama Nation also includes a Land Stewardship Plan for the management of open space areas of the MPR property and the Cle Elum River corridor. Management of open space and buffer areas is incorporated in the City's draft Conditions of Approval for the project.

Comment 4

Refer to the response to Comment 3, above.

Comment 5

Comment noted. Section 3.1 of the Draft EIS states that development in the UGA would comply with Uniform Building Code guidelines.

Comment 6

Comment noted. Compliance with all applicable federal, state, and local regulations for storage and use of hazardous materials would be required. Alternative 5 no longer contains a golf course within the UGA. Refer to Section 2.5 of the Final EIS for a description of Alternative 5.

Comment 7

Refer to the response to Comment 3, above.

Comment 8

Wood-burning fireplaces and woodstoves would be prohibited in all residential units within the Cle Elum UGA. Construction-related and operational fire safety measures would be implemented (see Sections 3.16, Public Services, of the Draft EIS and 3.2, Air Quality, of the Final EIS).

Comment 9

Refer to the response to Comment 8, above.

Comment 10

Section 3.2, Air Quality, of the Final EIS has been updated to discuss "land clearing burning." Outdoor burning would comply with fire protection regulations and provisions specified in a Land Clearing Burning Permit from the Department of Ecology. Potential recycling and disposal of land-clearing debris would be coordinated with the Kittitas County Solid Waste Program and the City of Cle Elum.

Comment 11

Mitigation measures in the Draft EIS include limiting noisy construction activities to between 7 a.m. and 7 p.m. This time period is carried forward in the draft Conditions of Approval and reflects a limitation on evening and nighttime construction that is more stringent than the Washington State Department of Ecology's noise regulations, which limit noisy construction activities to between 7 a.m. and 10 p.m. only at residential receiving properties (see Table 3.9-2 of the Draft EIS). Construction activity would occur consistent with city code requirements.

Comment 12

Comment noted.

Comment 13

Comment noted.

Comment 14

Comment noted. The City of Cle Elum and Kittitas County Fire Marshall would review and approve all emergency services access, which would meet all applicable state and local requirements. Access, fire (water) flow, and building standards are discussed in Section 3.16 of the Draft EIS and are updated for Alternative 5 in Section 3.15 of the Final EIS. Any traffic signals would require appropriate OPTICOM or other similar equipment to facilitate safe and efficient movement of emergency vehicles.

Comment 15

Comment noted.

Comment 16

Comment noted. Alternative 5 and the Master Site Plan Application include a proposal to prepare development standards and codes, covenants, and restrictions (CC&Rs) addressing the topics noted. Any proposed development standards or CC&Rs would only be approved if determined consistent with city plans and regulations.

Comment 17

All construction including, but not limited to, single-family residences would comply with adopted Uniform Fire Code requirements.

Comment 18

Comment noted. The City of Cle Elum and the Kittitas County Fire Marshall would evaluate all construction for compliance with applicable fire protection safety standards, including the March 1999 *Recommendations for Fire Safety and Prevention*.

Comment 19

The projected impact on public safety service providers is discussed in Sections 3.16 and 3.19 of the Draft EIS and in Sections 3.15 and 3.18 (for Alternative 5) and Appendix D of the Final EIS. These sections identify expected personnel and equipment costs associated with UGA development and a fiscal impact shortfall monitoring and mitigation program to track actual revenues and expenditures of the City of Cle Elum and Hospital District No. 2. The monitoring program would also require a shortfall mitigation payment if expenditures exceed revenues. Because the proposed shortfall mitigation would provide for monthly accounting of revenues and expenditures, it would respond fully to actual development impacts. Additional agreements associated primarily with development of the MPR that would apply to potential cumulative impacts have been negotiated with Kittitas County, Fire District No. 7, and KITTCOM. Shortfall monitoring and mitigation are not required for indirect impacts on other cities, which are not expected to be negative.

Comment 20

Comment noted. All construction would be required to comply with the Uniform Fire Code.

Comment 21

The City of Cle Elum would encourage UGA residents to participate in the Cle Elum volunteer fire department, although the City cannot require any individual to participate. Section 3.18 of the Final EIS identifies proposed mitigation for impacts on fire protection and emergency medical services.

Comment 22

Comment noted. All construction must comply with the requirements of the Uniform Fire Code, including, but not limited to, requirements for sprinklers.

Comment 23

Sections 3.16 and 3.19 of the Draft EIS describe projected impacts on fire protection services and proposed mitigation. Since the Draft EIS was published, the City's fiscal consultant has

prepared a Municipal Facilities and Services Expansion Plan, which describes in more detail expected personnel and capital expenditures necessary to mitigate impacts from the proposed development. Refer to Sections 3.15 and 3.18 and Appendix D of the Final EIS for additional discussion of these requirements for Alternative 5. Costs of fire protection services would be included in the proposed shortfall monitoring and mitigation program. Because the Fire Department is a department of the City and because the proposed shortfall monitoring and mitigation would be established in an agreement with the City, a separate agreement with the Fire Department is not necessary.

Comment 24

Comment noted. Refer to the response to Letter 2.

Comment 25

Refer to the response to Comment 10, above.

Comment 26

Since the Draft EIS was published, Hospital District No. 2 and Trendwest have negotiated a mitigation agreement. The agreement tracks UGA-related calls for service and establishes a shortfall mitigation plan to pay for UGA-related costs that exceed Hospital District property tax revenues and patient fees. Refer to Section 3.18 of the Final EIS for additional discussion of impacts and mitigation for Hospital District No. 2.

Comment 27

Refer to the responses to Letter 2 and Comment 10, above. Under Alternative 5, a Horse Park is not proposed.

Comment 28

Section 3.15, Section 3.18, and Appendix D of the Final EIS describe mitigation measures for impacts on public service agencies, including the City of Cle Elum, from development under the Reduced Density MPR and Alternative 5.

Comment 29

Comment noted. Refer to the response to Comment 23 above regarding monitoring and mitigation of impacts on fire services.

REBOUND

• The Seattle/King County Building & Construction Trades Council •

5/2/01

received
5/4/2001
City of Cle Elum

The Hon. Gary Berndt,
Mayor,
City of Cle Elum
119 W. First St.
Cle Elum, WA 98922

Dear Mayor Berndt:

Comments herein are submitted on behalf of REBOUND, an organization representing the interests of skilled construction trade workers. REBOUND and its affiliates have many members who live in the area and would be affected by the proposed UGA expansion. We appreciate the extensive efforts the City has made to mitigate the proposed resort but continue to believe that more can and should be done. While many impacts have been studied, others have not been addressed.

PROPORTIONATE SHARE

First I would like to follow up on my previous comments regarding proportionate-share payment for transportation improvements and the city's ability to pay its share "after the fact" through some cost-recovery mechanism. The State Constitution requires that taxation be "uniform" and this is commonly interpreted as meaning over an entire jurisdiction. The City cannot pick and choose who is to be taxed within its jurisdiction. This presents a problem in funding the City's after-the-fact proportionate share. Short of raising taxes on the entire jurisdiction, the only way the City can do this is to create a LID in the effected area. This could be problematic if a majority of the property owners in the proposed LID are opposed to paying for transportation impacts that are seen as caused by and benefiting Trendwest and have already been paid for. Furthermore, if the City's share is substantial, the LID may have to be sized such that the individual charge is not burdensome. This could put the City in the position of taxing those who do not directly benefit from the transportation improvement. 1

Additionally, impact fees to pay for transportation improvements would have to cover the entire jurisdiction and going this route will inevitably lead to projects that do not benefit from the traffic improvements paying for them.

This issue should be looked at with more scrutiny in the final EIS and further mitigation sought from Trendwest to avoid unnecessary legal and political hassles surrounding taxing mechanisms.

2700 First Avenue, #103 Seattle, Washington 98121 1-800-244-9178, (206) 441-7364 or 441-0455

FISCAL IMPACTS

Careful scrutiny of Appendix H, dealing with Fiscal Impacts, leads to a series of troubling questions regarding insufficiently studied and insufficiently mitigated fiscal impacts on local jurisdictions.

Of the ten governmental jurisdictions covered in the DEIS: the State of Washington, KITTCOM, Kittitas County Hospital District #2, Cle Elum-Roslyn School District #404, the Cities of Cle Elum, Roslyn, Ellensburg and South Cle Elum and Kittitas County Fire District #7, one is predicted to experience a positive net fiscal impact in all years, five are predicted to experience negative fiscal impacts in the first few years followed by positive fiscal impacts in future years and four are not discussed due to limited fiscal impact. 2

The State of Washington is the one jurisdiction predicted to experience a positive fiscal impact in all years. The total over 30 years is estimated to vary from $50-74 million, depending on alternative. The important fact that is left out of this overview is that the costs attributed to WSDOT are likely underestimated and cover only road maintenance. Costs of additional safety and capacity improvements on SR 903 or I-90 are not included. Any kind of improvements to I-90, such as widening or improving the interchanges in the Cle Elum area, could easily erase any positive net fiscal impact to the state. 3

The Cities of Ellensburg, Roslyn and South Cle Elum and KCFPD #7 are not studied because impacts are thought to be minimal, due to distance in the case of Ellensburg and lack of a retail base in South Cle Elum and Roslyn. While legitimate arguments can be made to not study fiscal impacts on the Fire District, Ellensburg and South Cle Elum, failure to study fiscal impacts to the City of Roslyn misses potentially significant impacts.

Roslyn's proximity to the UGA and MPR and it's historical attractions will naturally make it a destination for resort residents and visitors. While some positive fiscal impacts can be expected from addition patronage of the businesses in town and the possibility of new businesses growing to serve resort residents and visitors, the potential negative fiscal impacts remain unexplored. Chief among these are the impacts on the city's water supply system, both its quantity and quality, and the physical infrastructure in town, including roads, sidewalks and lighting. Increased development and tourist activity will lead to increased demands for infrastructure developments while the ability to finance such needs may not exist. Potential impacts to Roslyn should be studied in further detail. 4

Short-term Revenue Shortages Predicted

Of the ten jurisdictions studied, five are predicted to face short-term revenue shortages. Included in this predicament are Kittitas County, the City of Cle Elum, Kittitas County Hospital District #2, Cle Elum-Roslyn School District #404 and KITTCOM. All are predicted to lose anywhere from $1,000 to $100,000 in the first year and decreasing amounts in the following years. 5

Kittitas County

Kittitas County is expected to see shortfalls:

Alternative 2:	$410,000 loss in the first five years
Alternative 3:	$407,000 loss in the first five years
Alternative 4:	$302,000 loss in the first five years

City of Cle Elum

Cle Elum is predicted to lose money the first few years of the UGA build out.

Alternative 2:	$86,000 loss in first two years
Alternative 3:	$92,000 loss in first six years
Alternative 4:	$92,000 loss in first two years

Kittitas County Hospital District #2

The hospital district is predicted to lose money in the early years of the UGA build out:

Alternative 2:	$424,000 loss in first 11 years
Alternative 3:	$406,000 loss in first 11 years
Alternative 4:	$206,000 loss in first 5 years

5 (cont.)

According to a recent Seattle Times Article (4/23/2001) the Hospital District is currently suffering financial difficulties. Some residents of the UGA and MPR will be retirees and thus more likely to utilize the District's services, driving up the impact on the District's financial situation.

KITTCOM

KITTCOM is predicted to lose money every year of the 30-year UGA build-out:

Alternative 2:	$1.107 million loss over 30 years
Alternative 3:	$1.264 million loss over 30 years
Alternative 4:	$1.715 million loss over 30 years

Additionally, Appendix H lists subscriber fees as one of the UGA-generated revenues that are to fund KITTCOM. These subscriber fees come out of jurisdictional budgets and unless or until the jurisdictions have the necessary revenue to pay the increased subscriber fee, KITTCOM will face further shortfalls.

Cle Elum-Roslyn School District #404

District #404 is predicted to lose money the first five years of the UGA build-out:

Alternative 2:	$272,000 loss in first five years
Alternative 3:	$287,000 loss in first five years
Alternative 4:	$210,000 loss in first four years

Additionally, the section on new school construction assumes that the state will pay 80% of the cost of new school construction. In reality, the state's share is closer to 40% on a statewide average so an 80% match seems particularly speculative.

Making up the Difference

Total Predicted Shortfalls for all jurisdictions under Alternative 2: $2.299 million
Total Predicted Shortfalls for all jurisdictions under Alternative 3: $2.456 million
Total Predicted Shortfalls for all jurisdictions under Alternative 4: $2.525 million

While the same entities (with the exception of KITTCOM) are projected to see surpluses in succeeding years, there is little discussion of how the jurisdictions are to cope with the early-year shortfalls. Will staff be laid off or services cut? Will taxes be raised on current residents to make up the difference? Will Trendwest pay the difference? **5 (cont.)**

Given that the jurisdictional entities must balance their budgets, they will have to either cut services or raise taxes to make up the difference, unless Trendwest can be made to make up the shortfalls in the early years of the UGA buildout.

Most mitigation measures referenced include frequent mention of monitoring, studies and cost-sharing arrangements. Trendwest should be required to transfer funds, in an amount sufficient to cover the total projected shortfall, to a fund set up to pay claims by effected jurisdictions.

Increased Expectations of Government Services

Harder to quantify but equally important is the likelihood of west-siders moving in and bringing with them increased expectations of government services. Since most UGA owners and dwellers will likely be from a higher-income bracket than many county residents, they will be able to afford increased taxes to pay for services they expect. For example, West-siders will expect a professional response during a fire, both in terms of response time and staffing. They will expect roads to be paved. They will complain about outdoor burning's effects on air quality and the smell from cows and horses. In sum, they will put increasing demands on local government to raise its services to urban standards and with it, urban costs. This has been the case in many of the formerly small, rural towns in the central Puget Sound region. **6**

Conclusion

REBOUND believes the fiscal impacts are understated in the DEIS and should be examined in greater detail. Additional mitigation should be sought from Trendwest, **7**

particularly "short-term shortfall" funds to make up for deficits in the early years of the UGA build out. 7 (cont.)

Respectfully Yours,

Brian Carpenter
Research Analyst

opeiu8/afl-cio

Comment 1

Comment noted. Refer to the response to Letter 7, Comment 16.

Comment 2

Refer to the response to Letter 7, Comment 16.

Comment 3

Refer to the response to Letter 14.

Comment 4

Comment noted. The RIDGE Settlement Agreement has addressed this issue. Refer to the response to Letter 27.

Comment 5

Refer to the response to Comment 1, above. The discussion of KITTCOM has been updated in the Final EIS. The Draft EIS discussed KITTCOM as a separate public service agency and projected deficits throughout the 30-year buildout period. In reality, costs to KITTCOM would be mitigated through the structure of its revenue acquisition. It is anticipated that the subscriber fees will be set to cover costs not covered through the telephone surcharge or grant monies. Subscriber fees (per-call basis) will be billed to affected public service providers (City of Cle Elum and Hospital District No. 2). Charges attributable to UGA development will be included in the shortfall monitoring and shortfall payment agreements between Trendwest and the City of Cle Elum, and Trendwest and Hospital District No. 2.

Comment 6

Comment noted.

Comment 7

Comment noted. Refer to Section 3.18 and Appendix D of the Final EIS. Refer to the response to Letter 7, Comment 16.

Dark Skies Northwest

C/0 Bruce Weertman
6749 18th Ave NW
Seattle, WA

received
5/14/2001
City of Cle Elum

May 1, 2001

City of Cle Elum, 119 West First Street, Cle Elum, WA 98922

Dear City of Cle Elum:

This letter concerns the UGA / Trendwest Properties Draft EIS and Light Pollution.

I represent the International Dark Sky Association (IDA). The IDA's mission is to "To preserve and protect the nighttime environment and our heritage of dark skies through quality outdoor lighting". IDA's goals are to be effective in stopping adverse environmental impacts on dark skies by building awareness of the problem of light pollution and of the solutions, and to educate everyone about the value and effectiveness of quality nighttime lighting.

Thirty years ago, the Milky Way was visible from many of Seattle's neighborhoods. Today, because of excessive light pollution, only the brightest stars are visible from Seattle. For amateur astronomers living in the Everett, Seattle, and Tacoma metropolitan region, the countryside around Cle Elum is one of the closest areas with skies that are dark enough for serious observing. Table Mountain, which is about 15 miles east of Cle Elum, is by far the most popular star-watching site in the state of Washington and perhaps for the entire NW United States (see http://www.tmspa.com). Every summer, Table Mountain is the site of one of the largest "Star Parties" in the country. This three-night event draws close to 1,500 amateur astronomers. Several members of the Seattle Astronomical Society own property in the Cle Elum area for astronomical observing. The University of Washington operates the Manastash Ridge Observatory roughly 15 miles south east of Cle Elum. My point is simple; many people value the darkness of the night sky in the Cle Elum area. 1

In general, the level of sky glow generated by light pollution is proportional to an urban area's population; when the population doubles, the number of lights double and the level of sky glow doubles. Effective outdoor lighting codes can, and do, reduce this proportionality. For example, Tucson Arizona has a population approaching 1 million yet because of its good lighting code it creates the sky glow of a "typical" population of 80,000. A good lighting code dictates, amongst other things, that outdoor lights must be fully shielded. The IDA publishes an *Outdoor Lighting Code Handbook* which discusses in detail how to write an effective Outdoor Lighting Code (a copy is included with this letter and it is available on the web at http://www.darksky.org/ida/library.html). Many communities have adapted their own lighting codes. In the NW United States, noteworthy examples are Deschutes County, Oregon and Ketchum, Idaho. Copies of these well-written lighting codes are included with this letter. A compilation of lighting codes in the NW is available at http://www.scn.org/darksky/code/. 2

The Outdoor Lighting Code Handbook defines four environmental zones:

Zone E1:

> Areas with intrinsically dark landscapes. Examples are national parks, areas of outstanding natural beauty, areas surrounding major astronomical observatories, or residential areas where inhabitants have expressed a strong desire that all light trespass be strictly limited.

Zone E2:

> Areas of low ambient brightness. These are suburban and rural residential areas.

Zone E3:

Areas of medium ambient brightness. These will generally be urban residential areas.

Zone E4:

Areas of high ambient brightness. Normally these are urban areas that have both residential and commercial use and experience high levels of nighttime activity.

I encourage you to define the UGA / Trendwest Properties as an E1 zone and to write your code with the handbook's recommendations for this zoning. This will guarantee the preservation of your areas dark skies. Amongst other things, you should consider a "lumen cap". A lumen cap sets a maximum for the number of lumens that maybe shined onto an acre of property. I also encourage you to limit the number of months that holiday lighting may be displayed. For example, only allow holiday lighting from Thanksgiving through 15 January. Although I may sound like the Grinch, I would like to point out that at a distance of 1 mile a single 100 watt incandescent bulb outshines the combined light of all of the stars in the night sky! I encourage you to ban sports lighting. In particular I would like to point out that it is essentially impossible to light a night time golf driving range in a way that doesn't great huge amounts of glare and sky glow. If you do allow sports lighting, the code should dictate that only fully shielded lighting system be used such as the one sold by Softlite (http://www.serv.net/soft/index.html). **2 (cont.)**

A good lighting code will (1) help preserve your natural setting, (2) save energy and money, (3) help preserve your property values and (4) save our view of the cosmos for generations to come.

Sincerely,

Bruce R Weert

Bruce Weertman
Chair, Dark Skies Northwest – NW Section of the IDA
On the web at http://www.scn.org/darksky
The IDA is on the web at http://www.darksky.org

COMMENT SHEET
City of Cle Elum - UGA / Trendwest Properties DEIS

See Attached Letter

Name	Street Address	City/Town	ZIP
Bruce Weertman	6749 185th Ave. NW	Seattle	98117

OUTDOOR LIGHTING

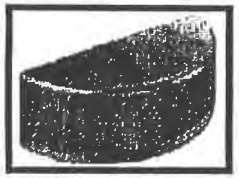
If outdoor lighting is not well-designed and properly installed, it can be costly, inefficient, glare, and harmful to the nighttime environment. Four effects of poor lighting are:

Glare

Light Trespass

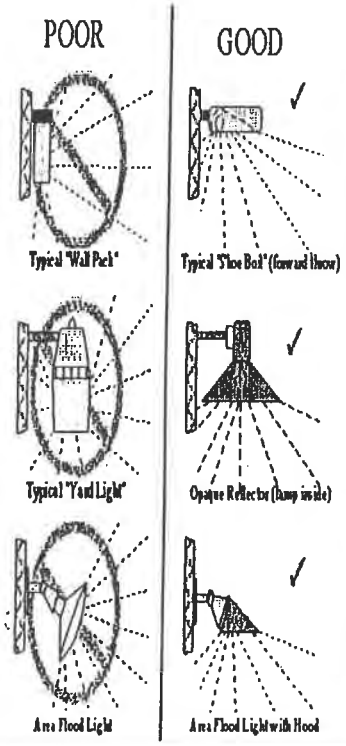
Energy Waste

Sky Glow



mcPhilben Lighting

EXAMPLES OF SOME COMMON LIGHTING FIXTURES



Deschutes County Community Development Dept.
117 NW Lafayette Avenue
Bend, OR 97701
(541) 388-6575
Website: http://newberry.deschutes.org/cddweb/cdd.htm

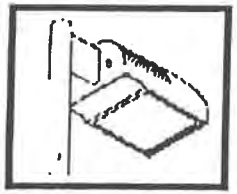


EFFICIENT OUTDOOR LIGHTING

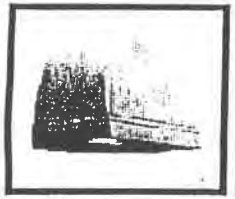
The efficient and effective use of electrical lighting outdoors can offer major energy and cost savings. This information sheet shows some of the different types of lighting that can be used to replace the old type outdoor lighting.



Hubbell Lighting NPU-BI-Skycap Low Cost



Kim Lighting SAR High cost



McPhilben Lighting High Cost



Abolite DWB-1 Low Cost

ALTERNATIVE LIGHTING RESOURCES

Good lighting means that we save energy and money, and we avoid hassles. A quality lighting job makes a "good neighbor." And we have a safer and more secure nighttime environment.

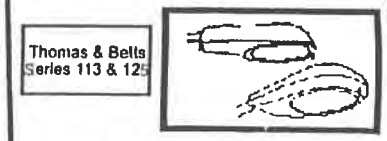
GOOD LIGHTING

It provides adequate light for the intended task, but never over-lights. It uses "fully-shielded" lighting fixtures, fixtures that control the light output in order to keep the light in the intended area. It has the lighting fixtures carefully installed to maximize their effectiveness on the targeted property and minimize their adverse impact beyond the property borders.

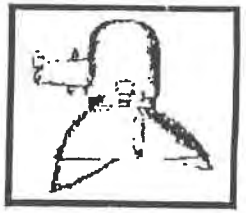


Westerfield-low cost-Series 50

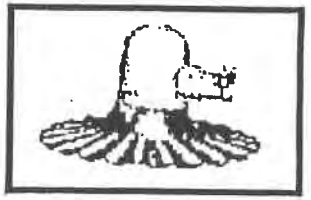
COMMON LIGHTING FIXTURES



Thomas & Betts Series 113 & 125



Pemco Lighting Model-Admiral Hat



Slonco RLM3000 & RMS 300



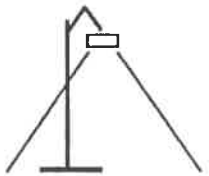
Deschutes County Community Development Dept.
117 NW Lafayette Avenue
Bend, OR 97701
(541) 388-6575
Website: http://newberry.deschutes.org/cddweb/cdd.htm

Letter 30

Standard Outdoor Lighting Creates Serious Problems for Everyone

because it:

1. Decreases security and safety.
2. Causes glare.
3. Decreases visibility.
4. Is expensive.
5. Wastes money.
6. Causes global pollution.
7. Obliterates beauty of the night sky.



You can help improve the quality of your night lights!



1. For more information CONTACT:

   * International Dark Sky Association.
     Phone: 520-293-3198
     http://www.darksky.org
     E-mail: IDA@darksky.org
   * Dark Skies Northwest
     http://www.scn.org/darksky
     darksky@scn.org

2. To ARRANGE for an informative talk for your church, community group, service club, city council, school board or just a group of neighbors and friends—contact:

   Bruce Weertman
   Dark Skies Northwest
   6749 18th Ave NW
   Seattle, WA 98117

   (206) 783-9514
   darksky@scn.org
   http://www.scn.org/darksky

Frequently asked questions

WHAT ABOUT CRIME?

Experienced professionals in law enforcement say:

"There is no statistically significant evidence that street lighting impacts the level of crime, although it reduces the fear of crime."
—*Law Enforcement Assistance Administration, Dept. of Justice.*

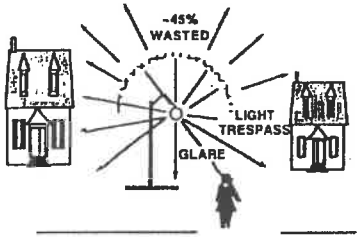
WHAT ABOUT VANDALISM?

The 4-J school district in Eugene, Oregon has eight schools enrolled in their "Dark Campus" program. "Vandalism has virtually disappeared in certain problem schools.

This is not a program to eliminate lighting! This is a program to eliminate bad lighting and encourage BETTER and BEST lighting.

Current lighting fixtures create widespread problems.

WHAT IS WRONG WITH THIS PICTURE?



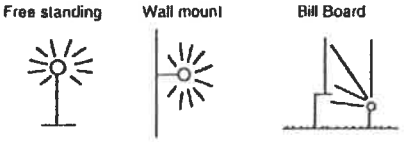
This picture shows a typical widely-used light. It is bright and unshielded which leads to the following problems:

a. Unshielded lights create glare. Glare decreases visibility.
b. Unshielded lights are expensive. 35-70% is wasted by going up in space.
c. Wasted energy contributes to unnecessary global pollution.
d. Unshielded lights cause light trespass into one's own home and violate privacy in others'.
e. Uplight causes sky glow and obliterates stars, meteors, and the northern lights. As a result, astronomical deep-space study is severely hampered and we can no longer see the beautiful night sky.

The SOLUTION is SIMPLE:

"Light the subject, hide the source."

The best lighting fixtures put light where it is needed.



POOR

Notice how these light fixtures throw light every where. "One person's security light can become another person's prison light."



GOOD

This fixture does not throw the light up.



BETTER

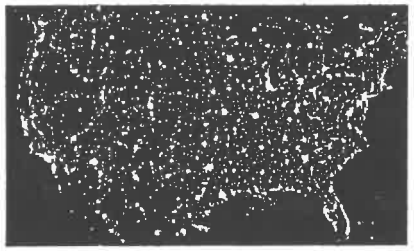
These fixtures direct the light exactly where it is needed! Here we get everything we want in outdoor light systems:

✔ Visibility: Shopping malls, streets, building entrances, driveways.
✔ Security: Improved personal security and minimized vandalism.

BEST

Use fixtures indicated above as "BETTER," –then turn the lights off when they are not needed.

Lighting the sky wastes money.



This composite photograph of the USA at night shows the problem that must be solved. We are lighting up the universe, and the USA alone is wasting, each year, more than $2,000,000,000.

WHO IS CHANGING?

- Schools across the US are implementing "Dark Campus."
- At least 150 cities and counties have passed good night light laws and ordinances.
- Lighting engineers are beginning to consider the total environment, not just filling spaces with light.
- City of Tucson is saving $2M per year with new street lights.
- San Diego reduced electric costs by 67% with updated fixtures!

Replaced existing light fixtures usually pay for themselves in 3-5 years! Use upgraded fixtures in new installations!

Ordinance Number 743

AN ORDINANCE OF THE CITY OF KETCHUM, IDAHO, TO BE KNOWN AS THE "DARK SKY ORDINANCE" ESTABLISHING REGULATIONS AND GUIDELINES FOR EXTERIOR LIGHTING; PROVIDING FOR GENERAL PROVISIONS, DEFINITIONS, CRITERIA, NOTIFICATION, THE CITY'S ROLE, AND VIOLATIONS, LEGAL ACTIONS AND PENALTIES; PROVIDING A SAVINGS AND SEVERABILITY CLAUSE; PROVIDING A REPEALER CLAUSE; AND, PROVIDING AN EFFECTIVE DATE.

WHEREAS, unnecessary and improperly designed light fixtures cause glare, light pollution and wasted resources; and,

WHEREAS, glare and light pollution can result in: hazardous circulation conditions for all modes of transportation; the diminishing ability to view the night sky; light trespass; and, unattractive townscape; and,

WHEREAS, the people who live in and near Ketchum value the natural environment, including the beauty and high quality of the night sky; and,

WHEREAS, the City of Ketchum is a destination resort community, economically dependent upon tourists and part-time residents; and is dependent upon its natural resources and environment to attract tourists and part-time residents; and,

WHEREAS, the City of Ketchum desires to protect the health, safety and welfare of the (residents, tourists, motorists and) general public, and to protect the night sky that adds to the quality of life and economic well being of the City; and,

WHEREAS, these regulations for exterior lighting will not sacrifice the safety of our citizens or visitors, or the security of property, but instead will result in safer, efficient and more cost-effective lighting.

NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND CITY COUNCIL OF THE CITY OF KETCHUM, IDAHO:

SECTION 1 - GENERAL PROVISIONS

1.1 Title - This Ordinance together with the amendments thereto, shall be known and may be cited as the Ketchum Dark Sky Ordinance.

1.2 Purposes - The general purpose of this Ordinance is to protect and promote the public health, safety and welfare, the quality of life, and the ability to view the night sky, by establishing regulations and a process of review for exterior lighting. This Ordinance establishes standards for exterior lighting in order to accomplish the following:

a. To protect against direct glare and excessive lighting;

b. To provide safe roadways for motorists, cyclists and pedestrians;

c. To protect and reclaim the ability to view the night sky, and thereby help preserve the quality of life and the tourist experience;

d. To prevent light trespass in all areas of the City;

e. To promote efficient and cost effective lighting;

f. To ensure that sufficient lighting can be provided where needed to promote safety and security;

g. To allow for flexibility in the style of lighting fixtures;

h. To provide lighting guidelines;

i. To provide assistance to property owners and occupants in bringing nonconforming lighting into conformance with this Ordinance; and,

j. To work with other jurisdictions within Blaine County to meet the purposes of this Ordinance.

1.3 Scope - All exterior lighting installed after the effective date of this Ordinance in any and all zoning districts in the City of Ketchum shall be in conformance with the requirements established by this Ordinance and any other applicable ordinances. All existing lighting installed prior to the effective date of this Ordinance in any and all zoning districts in the City of Ketchum shall be addressed as follows:

a. All existing lighting located on a subject property that is part of an application for a City of Ketchum Planning Department Design Review, Conditional Use, or Subdivision Permit, or Building Permit is required to be brought into conformance with this Ordinance. Conformity shall occur prior to issuance of Certificate of Occupancy, Final Inspection, or Final Plat Recordation, when applicable. For other permits, the applicant shall have a maximum of thirty (30) days from date of permit issuance to bring the lighting into conformance.

b. All existing exterior commercial lighting that is not in conformance with this Ordinance shall be brought into conformance with this Ordinance within twelve (12) months from the date of adoption of this Ordinance, by June 30, 2000.

c. All existing lighting that does not meet the requirement of Zoning Ordinance Number 208, Section XXIV, Subsection 24.5, which states that "any parking, yard, or building illumination in [any] zoning [district] shall be so directed as to protect adjacent properties from glare and direct lighting" is required to be brought into conformance with this Section of Zoning Ordinance Number 208.

d. All existing exterior residential lighting, not affected by (a) and (c) above, that does not comply with this Ordinance is required to be brought into conformance with this Ordinance within two years from the date of adoption of this Ordinance, by June 30, 2001.

e. In the event of a discrepancy in applicable ordinances, the most restrictive shall apply.

SECTION 2 - DEFINITIONS

Unless specifically defined below, words or phrases used in this Ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this Section its most reasonable application.

2.1 Area Light - Light that produces over 1800 lumens (See Addendum 1 for Light Output of Various Lamps). Area lights include, but are not limited to, street lights, parking lot lights and yard lights.

2.2 Average Footcandle - The level of light measured at an average point of illumination between the brightest and darkest areas. The measurement can be made at the ground surface or at four to five feet above the ground.

2.3 Ballast - A device used with a discharge lamp to obtain the necessary voltage, current, and/or wave form for starting and operating the lamp.

2.4 Building Official - The City of Ketchum Building Official.

2.5 Bulb - The source of electric light. To be distinguished from the whole assembly (See Luminaire).

2.6 Candela (cd) - Unit of luminous intensity.

2.7 Commission - The City of Ketchum Planning and Zoning Commission.

2.8 Eighty-five (85) Degree Full Cut-Off Type Fixtures - Fixtures that do not allow light to escape above an 85 degree angle measured from a vertical line from the center of the lamp extended to the ground. (See Figure 2).

2.9 Existing Lighting - Any and all lighting installed prior to the effective date of this Ordinance.

2.10 Exterior Lighting - Temporary or permanent lighting that is installed, located or used in such a manner to cause light rays to shine outside. Fixtures that are installed indoors that are intended to light something outside are considered exterior lighting for the intent of this Ordinance.

2.11 Fixture - The assembly that holds the lamp in a lighting system. It includes the elements designed to give light output control, such as a reflector (mirror) or refractor (lens), the ballast, housing, and the attachment parts.

2.12 Flood Light - Light that produces up to 1800 lumens (See Addendum 1 for Light Output of Various Lamps) and is designed to "flood" a well-defined area with light. Generally, flood lights produce from 1000 to 1800 lumens.

2.13 Flux (radiant flux) - Unit is erg/sec or watts.

2.14 Footcandle - Illuminance produced on a surface one foot from a uniform point source of one candela. Measured by a light meter.

2.15 Full Cut-Off Fixtures - Fixtures, as installed, that are designed or shielded in such a manner that all light rays emitted by the fixture, either directly from the lamps or indirectly from the fixture, are projected below a horizontal plane running through the lowest point on the fixture where light is emitted. (See Figure 1).

2.16 Glare - Intense light that results in discomfort and/or a reduction of visual performance and visibility.

2.17 Holiday Lighting - Festoon type lights, limited to small individual bulbs on a string, where the spacing of bulbs is not closer than three inches and where the output per bulb is no greater than 15

lumens.

2.18 IESNA - Illuminating Engineering Society of North America (IES or IESNA) - The professional society of lighting engineers, including those from manufacturing companies, and others professionally involved in lighting.

2.19 Illuminance - Density of luminous flux incident on a surface. Unit is footcandle or lux.

2.20 Lamp - The source of electric light: the bulb and its housing. To be distinguished from the whole assembly (See Luminaire).

2.21 Light - The form of radiant energy acting on the retina of the eye to make sight possible; brightness; illumination; a lamp, as defined above.

2.22 Light Pollution - Any adverse effect of manmade light including, but not limited to, light trespass, uplighting, the uncomfortable distraction to the eye, or any manmade light that diminishes the ability to view the night sky. Often used to denote urban sky glow.

2.23 Light Trespass - Light falling where it is not wanted or needed, generally caused by a light on a property that shines onto the property of others.

2.24 Lighting - Any or all parts of a luminaire that function to produce light.

2.25 Lumen - Unit of luminous flux; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela. One footcandle is one lumen per square foot. One lux is one lumen per square meter.

2.26 Luminaire - The complete lighting unit, including the lamp, the fixture, and other parts.

2.27 Luminance - At a point and in a given direction, the luminous intensity in the given direction produced by an element of the surface surrounding the point divided by the area of the projection of the element on a plane perpendicular to the given direction. Units: candelas per unit area. The luminance is the perceived brightness that we see, the visual effect of the illuminance, reflected, emitted or transmitted from a surface.

2.28 Non-Essential - Lighting that is not necessary for an intended purpose after the purpose has been served. Does not include any lighting used for safety and/or public circulation purposes. Example: For purposes of this Ordinance, lighting for a business sign is considered essential during business hours, however, is considered non-essential once the business is closed.

2.29 Partially Shielded - The bulb of the fixture is shielded by a translucent siding and the bulb is not visible at all. Light may be emitted at the horizontal level of the bulb. (See Figure 3).

2.30 Planning and Zoning Administrator - The City of Ketchum Planning and Zoning Administrator or a member of the City of Ketchum Planning Department Staff.

2.31 Recessed - When a light is built into a structure or portion of a structure such that the light is fully cut-off and no part of the light extends or protrudes beyond the underside of a structure or portion of a structure.

2.32 Shielded - When the light emitted from the fixture is projected below a horizontal plane running through the lowest point of the fixture where light is emitted. The bulb is not visible with a shielded

light fixture, and no light is emitted from the sides of the fixture. Also considered a full cut-off fixture. (See Figure 4).

2.33 Temporary Lighting - Means lighting that is intended to be used for a special event for seven (7) days or less.

2.34 Uplighting - Lighting that is directed in such a manner as to shine light rays above the horizontal plane.

SECTION 3 - CRITERIA

The Commission, the Building Official and/or the Planning and Zoning Administrator shall have the authority to require new lighting, and existing lighting pursuant to Section 1.3(a) hereinabove, to meet the recommendations and guidelines, in addition to the requirements of this Ordinance.

3.1 All applications for Design Review, Conditional Use, Subdivision and/or Building Permits shall include lighting plans showing location, type, height, and lumen output of all proposed and existing fixtures. The applicant shall provide enough information to verify that lighting conforms to the provisions of this Ordinance. The Planning and Zoning Administrator, Commission and/or Building Official shall have the authority to request additional information in order to achieve the purposes of this Ordinance.

3.2 All exterior lighting shall be full cut-off fixtures with the light source fully shielded, with the following exceptions:

a. Luminaires that have a maximum output of 260 lumens per fixture, regardless of number of bulbs, (equal to one 20 watt incandescent light), may be left unshielded provided the fixture has an opaque top to keep light from shining directly up. (See Figure 5).

b. Luminaires that have a maximum output of 1,000 lumens per fixture, regardless of number of bulbs, (equal to one 60 watt incandescent light) may be partially shielded, provided the bulb is not visible, and the fixture has an opaque top to keep light from shining directly up. (See Figure 3).

c. Flood lights with external shielding may be angled provided that no light escapes above a 25 degree angle measured from the vertical line from the center of the light extended to the ground, and only if the light does not cause glare or light to shine on adjacent property or public rights-of-way. (See Figure 6). Flood lights with directional shielding are encouraged. (See Figure 7). Photocells with timers that allow a floodlight to go on at dusk and off by 11:00 p.m. are encouraged.

d. Holiday lights as defined in Subsection 2.17 are exempt from the requirements of this Ordinance for the six and one half month period from November 1 to April 15, except that flashing holiday lights are prohibited on commercial properties. Flashing holiday lights on residential properties are discouraged. Holiday lights are encouraged to be turned off after bedtime and after close of businesses.

e. Sensor activated lighting may be unshielded provided it is located in such a manner as to prevent direct glare and lighting into properties of others or into a

public right-of-way, and provided the light is set to only go on when activated and to go off within five minutes after activation has ceased, and the light shall not be triggered by activity off the property.

f. Vehicular lights and all temporary emergency lighting needed by the Fire and Police Departments, or other emergency services shall be exempt from the requirements of this Ordinance.

3.3 Light Trespass - It is the intent of this Ordinance to eliminate and prevent light trespass through the proper installation of lighting fixtures. All existing and/or new exterior lighting shall not cause light trespass and shall be such as to protect adjacent properties from glare and excessive lighting.

3.4 IESNA Guidelines - The Commission may require that any new lighting or existing lighting that comes before them meet the standards for footcandle output as established by IESNA.

3.5 All non-essential exterior commercial and residential lighting is encouraged to be turned off after business hours and/or when not in use. Lights on a timer are encouraged. Sensor activated lights are encouraged to replace existing lighting that is desired for security purposes.

3.6 Area Lights - All area lights, including street lights and parking area lighting, shall be full cut-off fixtures and are encouraged to be eighty-five (85) degree full cut-off type fixtures. Street lights shall be in accordance with the Idaho Power Franchise Agreement and/or the Light Conformance Schedule adopted by resolution by the City Council. Street lights shall be high pressure sodium, low pressure sodium, or metal halide, unless otherwise determined by the Council that another type is more efficient. Street lights along residential streets shall be limited to a 70 watt high pressure sodium (hps) light. Street lights along nonresidential streets or at intersections shall be limited to 100 watts hps, except that lights at major intersections on state highways shall be limited to 200 watts hps. If the Council permits a light type other than high pressure sodium, then the equivalent output shall be the limit for the other light type (See Addendum 1). For example: a 100 watt high pressure sodium lamp has a roughly equivalent output as a 55 watt low pressure sodium lamp, or a 100 watt metal halide lamp.

Parking area lights are encouraged to be greater in number, lower in height and lower in light level, as opposed to fewer in number, higher in height and higher in light level. Parking lot lighting shall not exceed IESNA recommended footcandle levels.

All freestanding area lights within a residential zone, except street lights, shall be mounted at a height equal to or less than the value 3 + (D/3), where D is the distance in feet to the nearest property boundary.

3.7 Luminaire Mounting Height - Free standing luminaires shall be no higher than 25 feet above the stand/pole base, except that luminaires used for playing fields shall be exempt from the height restriction provided all other provisions of this Ordinance are met and the light is used only while the field is in use, and except that street lights used on major roads may exceed this standard if necessary as determined by the City Council, as advised by a lighting engineer. Building mounted luminaires shall be attached only to walls, and the top of the fixture shall not exceed the height of the parapet or roof, whichever is greater.

3.8 Uplighting - Uplighting is prohibited in all zoning districts, except in cases where the fixture is shielded by a roof overhang or similar structural shield from the sky and a Idaho licensed architect or engineer has stamped a prepared lighting plan that ensures that the light fixture(s) will not cause light to extend beyond the structural shield, and except as specifically permitted in this Ordinance.

3.9 Flag Poles - Upward flagpole lighting is permitted for governmental flags only, and provided that

the maximum lumen output is 1300 lumens. Flags are encouraged to be taken down at sunset to avoid the need for lighting.

3.10 Service Stations - The average footcandle lighting level for new and existing service stations is required to be no greater than 30 footcandles, as set by the IESNA for urban service stations.

3.11 Canopy Lights - All lighting shall be recessed sufficiently so as to ensure that no light source is visible from or causes glare on public rights-of-way or adjacent property.

3.12 Landscape Lighting - Lighting of vegetation is discouraged and shall be in conformance with this Ordinance. Uplighting is prohibited.

3.13 Towers - All radio, communication, and navigation towers that require lights shall have dual lighting capabilities. For daytime, the white strobe light may be used, and for nighttime, only red lights shall be used.

3.14 Temporary Lighting - Temporary lighting that conforms to the requirements of this Ordinance shall be allowed. Nonconforming temporary exterior lighting may be permitted by the Planning and Zoning Administrator only after considering 1) the public and/or private benefits which will result from the temporary lighting; 2) any annoyance or safety problems that may result from the use of the temporary lighting; and, 3) the duration of the temporary nonconforming lighting. The applicant shall submit a detailed description of the proposed temporary nonconforming lighting to the Planning and Zoning Administrator. The Administrator shall provide written notice of said request to owners of property immediately adjacent to the subject property. Said notice shall inform adjacent property owners they may comment on the request during a period of not less than ten (10) days after mailing of the notice and prior to final action on said request.

3.15 Neon Lights - Neon lights are only permitted pursuant to the Sign Ordinance, Section XXIV, Zoning Ordinance Number 208.

3.16 The attached figures and information sheets shall be incorporated into this Ordinance as guidelines for the public and the City for use in meeting the intent of this Ordinance. The figures and information sheets only serve as examples. The City does not endorse or discriminate against any manufacturer or company that may be shown, portrayed or mentioned by the examples. Additional information is provided at the Ketchum Planning Department

SECTION 4 - NOTIFICATION

4.1 The City of Ketchum Building and Planning Department permits shall include a statement asking whether the subject property of the proposed work includes any exterior lighting.

4.2 Within thirty (30) days of the enactment of this Ordinance, the Planning and Zoning Administrator shall send a copy of the Dark Sky Ordinance with a cover letter to all local electricians and local electric suppliers listed in the local 1999 telephone books, as well as to the Ketchum/Sun Valley Chamber of Commerce. Within ninety (90) days (coincide with next available mailing) the Planning and Zoning Administrator shall send notice to all property owners on the Ketchum Water/Sewer mailing list.

SECTION 5 - THE CITY'S ROLE

5.1 The City of Ketchum will commit to changing all lighting within the City rights-of-way and on City-owned property to meet the requirements of this Ordinance through the franchise agreement with the power company and/or through the Light Conformance Schedule adopted by resolution by the Council.

http://www.scn.org/darksky/code/id/ketcdrlo.html 5/1/01

5.2 The City of Ketchum will assist property owners and/or occupants to correct any nonconforming lighting through consulting with the owner/occupant and assisting in the provision of shields.

SECTION 6 - VIOLATIONS, LEGAL ACTIONS AND PENALTIES

6.1 Violations and Legal Actions - If, after investigation, the Planning and Zoning Administrator finds that any provision of this Ordinance is being violated, the Administrator shall give notice by hand delivery or by certified mail, return receipt requested, of such violation to the owner and/or to the occupant of such premises, demanding that the violation be abated within thirty (30) days of the date of hand delivery or of the date of mailing of the notice. The Planning Department Staff shall be available to assist in working with the violator to correct said violation. If the violation is not abated within the thirty (30) day period, the Administrator may institute actions and proceedings, either legal or equitable, to enjoin, restrain or abate any violations of this Ordinance and to collect the penalties for such violations.

6.2 Penalty - A violation of this Ordinance, or any provision thereof, shall be punishable by a civil penalty of one hundred dollars ($100) and each day of violation after the expiration of the thirty (30) day period provided in Subsection 6.1 above, shall constitute a separate offense for the purpose of calculating the civil penalty.

SECTION 7 - SAVINGS AND SEVERABILITY CLAUSE

It is hereby declared to be the legislative intent that the provisions and parts of this Ordinance shall be severable. If any paragraph, part, section, subsection, sentence, clause or phrase of this Ordinance is for any reason held to be invalid for any reason by a court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance.

SECTION 8 - REPEALER CLAUSE

All City of Ketchum ordinances or resolutions or parts thereof which are in conflict herewith are hereby repealed.

SECTION 9 - EFFECTIVE DATE

This Ordinance shall be in full force and effect from and after its passage, approval and publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF KETCHUM, IDAHO and approved by the Mayor this 21st day of June, 1999.

_____

Guy P. Coles

Mayor

Attest:

_____

Sandra E. Cady, City Clerk

Publish: Idaho Mountain Express

http://www.scn.org/darksky/code/id/ketcdrlo.html 5/1/01

June 30, 1999

Chapter 15.10. OUTDOOR LIGHTING CONTROL

15.10.010. Purpose and intent as relates to residential, commercial and public area lighting.
15.10.020. Purpose and intent as relates to street lighting.
15.10.030. Conformance with applicable codes.
15.10.040. Approved materials and methods of construction or installation/operation.
15.10.050. Definitions.
15.10.055. Definition-Outdoor light fixtures.
15.10.060. Definition-Community Development Department.
15.10.065. Definition-Exempt light fixtures.
15.10.070. Definition-Individual.
15.10.075. Definition-Installed.
15.10.080. Definition-Shielding.
15.10.085. Definition-Fully Shielded.
15.10.090. Definition-Partially shielded.
15.10.095. Definition-Directed shielding.
15.10.100. Definition-Unshielded.
15.10.105. Definition-High intensity discharge lamp sources.
15.10.110. Definition-Luminous tube lighting.
15.10.120. Requirements for installation of outdoor lighting.
15.10.130. Submission of plans and evidence of compliance with code-subdivision plats.
15.10.140. Shielding.
15.10.150. Prohibitions.
15.10.160. Externally lighted outdoor advertising signs, billboards.
15.10.170. Exemptions.
15.10.180. Violations and penalties.
15.10.190. Violations constitute public nuisance.
15.10.200. Code requirements tables for shielding

15.10.010. Purpose and intent as relates to residential, commercial and public area lighting.

The purpose of this section is to affirm the right of citizens in Deschutes County, Oregon to illuminate residential, commercial and public areas with lighting fixtures appropriate to the need while utilizing such illumination in a way that preserves rural and urban vistas and is confined to the property from which it is generated.
(Ord. 94-024 § 1, 1994)

15.10.020. Purpose and intent as relates to street lighting.

The purpose of this section is to affirm that citizens of Deschutes County, Oregon have a right to the safety of well-lighted streets and highways and that such illumination by nature cannot be confined to the property from which it is generated. Thus, certain high wattage and low wattage applications for the propose of highway safety as defined below are allowed under these provisions.
(Ord. 94-024 § 1, 1994)

15.10.030. Conformance with applicable codes.

All outdoor electrically powered illuminating devices shall be installed in conformance with the provisions of this code, the building code, the electrical code, and the sign code of the jurisdiction. No provision of this ordinance are intended to pre-empt applicable state codes.
(Ord. 94-024 § 1, 1994)

15.10.040. Approved materials and methods of construction or installation/ operation.

The provisions of this code are not intended to prevent the use of any design, material, or method of installation or operation not specifically prescribed by this code, provided any such alternate has been approved. The building official may approve any such proposed alternate that:

A. Provides an equivalent alternative design that does not exceed 1800 lumens nor project light off-site of the subject lot or parcel.

(Ord. 94-024 § 1, 1994)

15.10.050. Definitions.
Whenever appropriate in applying the provisions of this chapter, the following words and phrases are defined as set forth in 15.10.055-110.
(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.055. Definition-Outdoor light fixtures.
"Outdoor light fixtures" means outdoor artificial illuminating devices, outdoor fixtures, lamps and other similar devices, permanently installed or portable, used for flood lighting, general illumination or advertisement. Such devices shall include, but are not limited to, search, spot and flood lights for:

1. buildings and structures;
2. recreational areas;
3. parking lot lighting;
4. landscape lighting;
5. billboards and other signs (advertising or other);
6. street lighting;
7. product display area lighting;
8. building overhangs and open canopies;
9. holiday lighting.

(Ord. 94-024 § 1, 1994)

15.10.060. Definition-Community Development Department.
"Community Development Department" means the Community Development Department or designated representative(s) for the purposes of this ordinance.
(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.065. Definition-Exempt light fixtures.
"Exempt light fixtures" means outdoor artificial illuminating devices which are exempted by section 15.10.110.
(Ord. 94-024 § 1, 1994)

15.10.070. Definition-Individual.
"Individual" means any private individual, tenant, lessee. owner or any commercial entity including but not limited to companies, partnerships, joint ventures or corporations.
(Ord. 94-024 § 1, 1994)

15.10.075. Definition-Installed.
"Installed" means initial installation of outdoor lighting fixtures following the effective date of this ordinance. Projects with approved construction plans prior to effective date of this ordinance are excluded from compliance with the ordinance in the initial installation only.
(Ord. 94-024 § 1, 1994)

15.10.080. Definition-Shielding.
"Shielding" for the purpose of this ordinance is provided for a lighting fixture by design of such fixture or by an externally applied device such as a shroud or hood of metal, wood or painted glass that does not allow transmission of light.
(Ord. 94-024 § 1, 1994)

15.10.085. Definition-Fully Shielded.
"Fully shielded" means outdoor light fixtures shielded or constructed so that light rays emitted by the fixture are projected below the horizontal plane.
(Ord. 94-024 § 1, 1994)

15.10.090. Definition-Partially shielded.
"Partially shielded" means shielding so that the edge of the shield is at or below the centerline of the light source or lamp so as to limit light emission above the horizontal plane to 10 percent or less.
(Ord. 94-024 § 1, 1994)

15.10.095. Definition-Directed shielding.
"Directed shielding" means shielding by design or external application that directs light downward and limits direct line-of-sight of a fixture's lamp to the property upon which the fixture is installed.
(Ord. 94-024 § 1, 1994)

15.10.100. Definition-Unshielded.
"Unshielded" means light fixtures lacking any means to restrict the emitted light to below the horizontal plane.

15.10.105. Definition-High intensity discharge lamp sources.
"High intensity discharge lamp sources" means high pressure sodium, mercury vapor, metal

halide, low pressure sodium, and other similar lamps.
(Ord. 94-024 § 1, 1994)

15.10.110. Definition-Luminous tube lighting. "Luminous tube lighting" means gas-filled tubing which, when subjected to high voltage, becomes luminescent in a color characteristic of the particular gas used, e.g. neon, argon, etc.
(Ord. 94-024 § 1, 1994)

15.10.120. Requirements for installation of outdoor lighting.

A. Except as exempted by provisions of this ordinance, as of the date of adoption, the installation of outdoor lighting fixtures shall be subject to the provisions of this ordinance.

(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.130. Submission of plans and evidence of compliance with code-subdivision plats.

A. All proposed subdivisions and partitions within Deschutes County that include outdoor lighting fixtures or street lighting shall be subject to the provisions of this ordinance.

(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.140. Shielding.

A. All nonexempt outdoor lighting fixtures shall have shielding as required by the tables set forth in section 15.10.200.

(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.150. Prohibitions.

A. Laser Source Light. The use of laser source light or any similar high intensity light for outdoor advertising or entertainment, when projected above the horizontal is prohibited.

B. Searchlights. The operation of searchlights for advertising purposes is prohibited between eleven o'clock P.M. and sunrise the following morning.

C. Recreational Facilities. No outdoor recreational facility, public or private, shall be illuminated after eleven o'clock P.M. except to conclude a specific recreational or sporting event or any other similar activity conducted at or in the facility which was in progress under such illumination prior to eleven o'clock P.M., except that any outdoor recreational facility, public or private, which is illuminated with outdoor lighting fixtures conforming to this code may operate any time with such illumination.

(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.160. Externally lighted outdoor advertising signs, billboards.

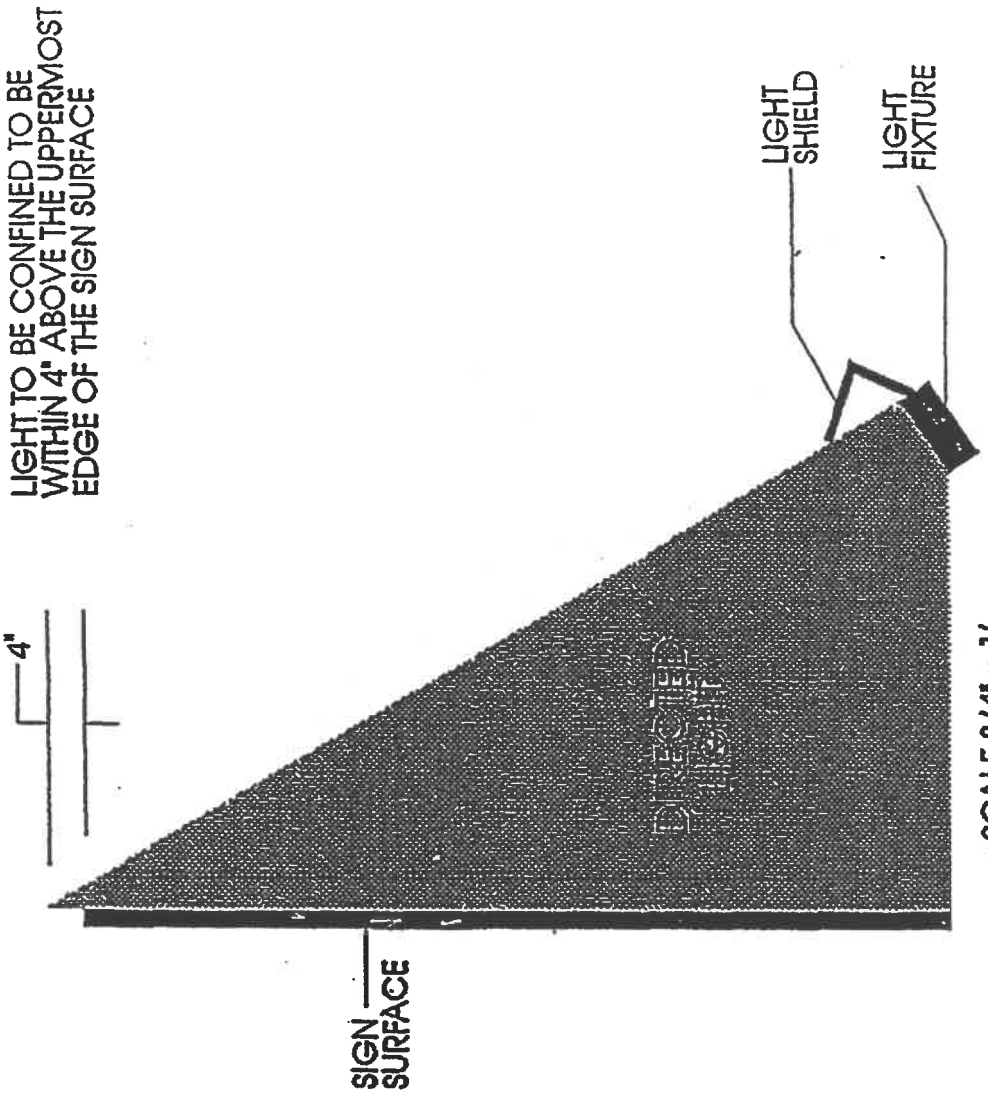
A. All externally lighted advertising signs and billboards will be illuminated by one of the following manners:
   1. Top mounted fixtures in which case such fixtures will conform to the shielding requirements as set forth in section 15.10.140.
   2. Bottom mounted fixtures in which case such fixtures shall be shielded either by application of external device or manufactured in such a way that upward and side directed light is confined to an area within 4 (four) inches of the outermost surface of the sign's top and sides. Shielding will be constructed in such a manner that no reflective surface of the lighting fixture will extend past the limit of the shielding in the vertical plane when viewed from directly above. (See typical drawings - Figure 1 and Figure 2 attached.)

(Ord. 95-063 § 1, 1995; Ord. 94-024 § 1, 1994)

15.10.170. Exemptions.

A. Nonconformance.
   1. All other outdoor light fixtures lawfully installed prior to and operable on the effective date of the requirements codified in this ordinance are exempt from all such requirements except those regulated in subsections A, B, and C of section 15.10.090 or as follows:
      a. All replacement of outdoor lighting fixtures, as of the date of adoption, shall be subject to the provisions of this ordinance.

FIGURE 1
Section 15.10.160



SCALE 3/4" = 1'

FIGURE ONE

TYPICAL EXTERNALLY ILLUMINATED OUTDOOR SIGN CONFIGURATION

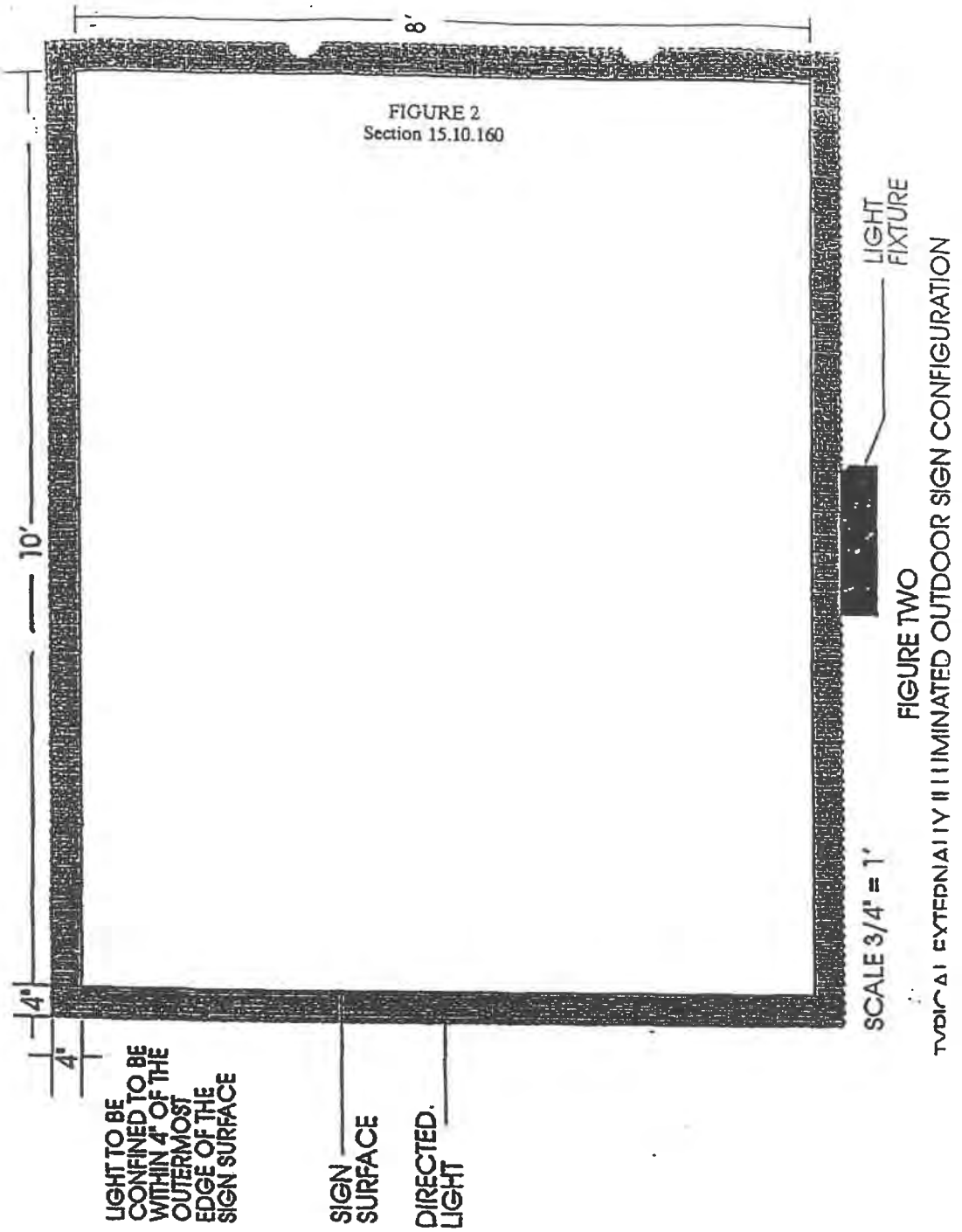


FIGURE 2
Section 15.10.160

FIGURE TWO
TYPICAL EXTERNALLY ILLUMINATED OUTDOOR SIGN CONFIGURATION

15.10.200. Code requirements tables for shielding

A. Outdoor lighting fixtures (except street lighting - see Table 2).

Table 1

	WATTAGE - SEE SECTION 1 BELOW								
Lamp Type	25	30	35	40	50	60	75	100	110 OR MORE
LOW PRESSURE SODIUM	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
HIGH PRESSURE SODIUM	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
METAL HALIDE	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
FLUORESCENT	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
QUARTZ	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
TUNGSTEN HALOGEN	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
MERCURY VAPOR	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD
INCANDESCENT	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD

1. For the purpose of this section wattage ratings for lamp types will be for either a single lamp source or multiple lamp sources when installed in a cluster.

2. Lamp types not listed in the table may be approved for use by the building official providing installation of these lamps conforms to the lumen limits established in this section.

3. Glass tubes filled with argon, neon or krypton do not require shielding.

Table 2 TYPICAL LUMEN VALUES FOR VARIOUS LAMP WATTAGE **

WATTAGE	LOW PRESSURE SODIUM	HIGH PRESSURE SODIUM	METAL HALIDE	FLUORESCENT	QUARTZ	MERCURY VAPOR	INCANDESCENT
9				500			
18	1,800						
35	4,725	2,250					
40		4,000		2,250			480
50							880
55	7,925						
60							870
70		5,800	5,500				
75						2,800	1,190
90	14,400						
100		9,500	8,000			4,300	1,750
110				6,600			
150		16,000					2,850
175			14,000			8,600	
200		22,000					4,010
250		27,500	20,500			12,100	
300							6,360
400		50,000	36,000			22,500	
500							10,850

** Taken from data supplied by Portland General Electric - Energy Resource Center

Table 3 **WATTAGE - SEE SECTION 1 BELOW**

B. STREET LIGHTING. All street lighting fixtures will be shielded in conformance with Table 3 included in this section.

WATTAGE	55	70	75	90	100	150	175	250	400 OR MORE
LOW PRESSURE SODIUM	PARTIAL SHIELDING	PARTIAL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING
HIGH PRESSURE SODIUM	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING
METAL HALIDE	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING
FLUORESCENT	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING
QUARTZ	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING
MERCURY VAPOR	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING
INCANDESCENT	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	PARTIAL SHIELDING	FULL SHIELDING	FULL SHIELDING	FULL SHIELDING

1. For the purpose of this section wattage ratings for lamp types will be for either a single lamp source or multiple lamp sources when installed in a cluster.
2. Lamp types not listed in the table may be approved for use by the building official providing installation of these lamps conforms to the intent of this code.

Comment 1

Comment noted.

Comment 2

Comment noted. All lighting for development within the MPR and UGA would meet the International Dark Sky Association's Zone E1 standards, as specified in the draft Conditions of Approval for the project. Roadway lighting would be consistent with the Illuminating Engineering Society and WSDOT lighting criteria.

Kittitas County Planning Department
411 N. Ruby, Suite 2 • Ellensburg, WA 98926
(509) 962-7506 • Fax (509) 962-7697

received
5/4/2001
City of Cle Elum

May 4, 2001

Brian Carrico, Planner
City of Cle Elum
119 West First ST
Cle Elum, WA 98922

FAX: (509) 674-4097

Dear Mr. Carrico:

Kittitas County has received the DEIS for the Trendwest Cle Elum UGA project. At this time the County has no comments but wishes to be considered a party of record for the project. 1

Thank you for the opportunity to comment on this project.

Sincerely,

KITTITAS COUNTY PLANNING DEPARTMENT

Catherine G. Dunn
Office Manager

TOTAL P.01

Comment 1

Comment noted.

Town of South Cle Elum
6th and Lincoln - P. O. Box 160
South Cle Elum, Washington 98943
509-674-4322

May 3, 2001

received
5/4/2001
City of Cle Elum

Mayor Gary Berndt
Bob Burke
Brian Carrico
119 West First Street
Cle Elum, WA 98922

Re: dEIS Comments

Gentlemen:

The following constitutes the Town of South Cle Elum's official comments on the draft EIS for the Cle Elum Bullfrog UGA. After reviewing the entire document, the Town Council is left with the firm conviction that the matter of housing impacts, both direct and cumulative, in conjunction with the development of the MountainStar, is inadequately addressed and analyzed in the dEIS, and instead, the topic is largely deferred to the future and diffused throughout the document. It is our strong conviction that there is both an area-wide insufficient supply of housing stock for UGA development workers, and also that the subsequent impact to the value of homes as a result of massive new construction of residences in the UGA will render prices and taxes for existing housing unaffordable for those already here. 1

In addition, the Town remains concerned that the impacts to traffic, roads and solid waste be addressed prior to the issuance of any development permits. We trust that mitigation agreements will be put in place which include input from the Town of South Cle Elum, so that our citizens suffer no unavoidable significant adverse impacts as a result of the subarea planning and zoning for development in the Bullfrog area. 2

Thank you for your consideration of the Town's comments. We look forward to working with you in developing appropriate mitigation as the need arises.

Sincerely,

James L. DeVere

JAMES L. DeVERE, Mayor
JLD:sn

Comment 1

Comment noted. Affordable housing is addressed in the City's draft Conditions of Approval for the project. Mitigation measures include implementing an Affordable Housing Mitigation Program, which includes, in part, maintaining a minimum of 150 rental units in the UGA for 20 years. A temporary RV park with a maximum of 100 spaces is proposed to house construction employees. Refer to Section 3.10, Population and Housing, of the Final EIS for a summary of the key elements of the Affordable Housing Mitigation Program.

Comment 2

Comment noted. In general, the Town of South Cle Elum is included in the impact analyses conducted for the Draft and Final EISs. With regard to transportation issues, the Town of South Cle Elum was included within the study area for the analysis of transportation impacts, and mitigation measures are identified for the intersection of First Street and South Cle Elum Way.

Cle Elum Fire Department

P.O. Box 147 Cle Elum, Wa. 98922

— Since 1903 —

May 2, 2001

received
5/4/2001
City of Cle Elum

The Cle Elum Fire Department requires the following mitigation for the Cle Elum Urban Growth Area (UGA).

Equipment

City agrees to:

- Develop specifications for the equipment for fire protection of the UGA.
- Provide specifications for a fully equipped triple combination pumper, brush truck and tender, and to purchase the vehicles. The triple combination pumper shall be purchased such that it is available at 2004 or before. All other equipment shall be purchased at the start of the project. 1

Developer agrees to:

- Fund as required in EIS (page 101)
  Triple Combination Pumper-fully equipped.
  Brush Truck-One Ton, 4X4 or better.
  Water Tender-3000 gallons minimum.
- Reimburse the city for the costs of fully equipped triple combination pumper, brush truck and tender.
- Pay for the equipment at the time dictated by Cle Elum Fire Department Fire Chief.

1

Training

City agrees to:

- Make arrangements for training classes to train members of the city and surrounding fire department in specialized rescue.
- Carry the specialized rescue equipment.
- Bid and purchase the specialized equipment.

Developer agrees to:

- Reimburse the city for the cost of specialized rescue equipment in an amount to be determined by the Fire Chief..
- Pay the cost of the instructor and necessary materials used to put on the class.
- Have at least four of the UGA resort supervisory personnel attend the specialized class.
- Training programs shall be renewed on an annual basis during the period of open trench construction.
- Have available on site, plywood, timbers and ropes designated only for use with the trench rescue team.

2

Public Safety Facility

City agrees to:

- To work with developer in the design of a public safety facility (one that accommodates the fire personnel and equipment, medical personnel and equipment.)

3

Developer agrees to:

- Work with the city on design of the Main Public Safety Building and fund as required in EIS. (page 101)

2

Initial Fire Fighters

City agrees to:

- The city agrees that 1 paid Fire Chief and 3 paid Firefighters will be trained as first response fire fighters. (to be phased in by the discretion of the Fire Chief.) The personnel shall be hired and trained prior to the opening of the hotel.

4

Developer agrees to:

- Work with the City of Cle Elum Fire Department paying the cost of the personnel including turnouts, personal protective equipment and radio equipment.

Volunteer Fire Fighting Force

City agrees to:

- Recruit and maintain a volunteer fire fighting force as large as possible in the area of the UGA.

Developer agrees to:

5

- Pay the cost to train in fire suppression tactics those resort employees who agree to serve as part of the volunteer fire fighting force.

- Developer's employees shall be under the supervision of the Chief of the City of Cle Elum Fire Chief for training and fire department activities.

The parties understand and agree that conditions within the city as well as the UGA change from time to time. Consequently, flexibility must be maintained in this agreement to allow for those changes. As a result, the parties recognize that the following additional steps are necessary subsequent to the execution of this agreement:

6

- Jointly develop a plan and schedule for additional fire fighting personnel and equipment. This plan shall be reviewed and updated on an annual basis, and filed with the City of Cle Elum.

- At full build-out the parties anticipate that the equipment necessary for the UGA will include one (1) triple combination pumper, one (1) tender and one (1) 4 x 4 one-ton or larger brush truck with skid mount tank and equipment. Providing mechanisms to ensure that this equipment is available at full build-out of the project shall be part of the plan listed above. All fire department apparatus must meet National Fire Protection Association and Washington State Department of Labor and Industries Fire Fighter Safety Standards. 6 (cont.)

- Developer shall pay all costs for the firefighters and equipment on the UGA site not covered by revenues collected from within the UGA development so as not to result in any adverse financial impacts on parties outside the UGA who are served by the city. 7

- The city has the right to utilize these department members in any suppression activities within the city and for mutual aid responses as they see fit. 8

- The city shall negotiate the benefit these fire fighter personnel are to the entire city and pay a prorated share of the cost. 9

- The response area for apparatus and personnel assigned within the city to incidents outside the city shall be determined between the City Fire Chief and reviewed by the Director of the UGA. Any dispute to this designated response area as determined by the Fire Chief shall be resolved by the Kittitas County Fire Marshal. 10

If any questions arise, please call.

Chuck Norton
Fire Chief
Cle Elum Fire Department

cc: Mayor Gary Berndt
Cle Elum City Council

Comment 1

Projected impacts and suggested mitigation measures for City of Cle Elum Fire Department services are discussed in Section 3.16 of the Draft EIS. Since the Draft EIS was published, the City has prepared a Municipal Facilities and Services Expansion Plan that evaluates more specifically potential impacts on the fire department. This information is incorporated into the analysis for Alternative 5 in the Final EIS. Refer to Sections 3.15, 3.18, and Appendix D of the Final EIS for a revised detailed discussion of projected impacts on fire department personnel and capital facilities. Mitigation measures also are revised in these sections and are included in the City's draft Conditions of Approval for the project.

Comment 2

Refer to the response to Comment 1, above.

Comment 3

Refer to the response to Comment 1, above.

Comment 4

Refer to the response to Comment 1, above.

Comment 5

Refer to the response to Comment 1, above.

Comment 6

Refer to the response to Comment 1, above.

Comment 7

Refer to the response to Comment 1, above.

Comment 8

Refer to the response to Comment 1, above.

Comment 9

Refer to the response to Comment 1, above.

Comment 10

Comment noted. The issue of when Cle Elum fire personnel and equipment would be available to respond to calls outside the city limits is outlined in the mutual aid agreement between the City and other firefighting jurisdictions.

Post Office Box 441
Roslyn, Washington 98941

Brian Carrico
CleElum City Hall
119 West First Street
CleElum, WA 98922

Dear Mr. Carrico,

We believe that both the CleElum UGA and MPR should be considered together in terms of **cumulative impacts**. Between both these proposed developments, the County and the City of CleElum are planning to do a lot more than pave paradise and put in a parking lot. In both of these combined scenarios, we are talking about almost 6,000units (apartments, condominiums, single-family residences, townhouses, hotel rooms, etc.), 3-4 hotels, a major horse park, several minor equestrian parks, 3-4 golf courses, a major business park, retail shops, an amphitheatre, a waste water treatment facility, trails, school and cemetery expansions, a community recreation center, recreational vehicle campgrounds, etc., etc. It doesn't take a degree in urban planning to forecast that there will be significant impacts to water, wetlands, noise, aesthetics, light, glare, traffic, air quality, plants and animals, etc. We are not reassured when the experts report salient facts like "even under the most extreme conditions, **traffic noise** rarely approaches the level that could cause hearing damage" or that "no locations close to the UGA have extensive long-duration views of the UGA" except for frequent users of Bullfrog Road and SR 903. Have any of the people who prepared this report lived in our area over time? Between the two of us, we have lived in Roslyn for over 45 years. We love the night sky and do NOT want the combined **sky glow** form both the UGA and MPR. The beauty of the night sky from our backyard is one of the reasons that we chose Roslyn for our home. We also love the visual landscape of the upper county. We are concerned that it is more important to the planners of the UGA to have buffers along I-90 than along SR 903. Why aren't **view sheds** from SR 903 not buffered in alternatives 2, 3, or 4. Even a buffer of 150 feet along this road would not adequately screen or diffuse views to the interior of the UGA. We think the planning priority should be to consider residents of upper county communities not travelers along I-90. 1 2 3

Secondary growth is a major issue, which is largely not addressed in this DEIS. Following the second public hearing in a conversation with Mayor Berndt, he mentioned his concerns with the sale of the ridge lands bordering CleElum. He stated that he preferred a planned development like the UGA to unplanned development, and he was concerned about the impacts of logging trucks on the roads through CleElum. This type of secondary growth needs to addressed and mitigated. Secondary growth will be encouraged through both these developments. Please address this in the EIS. 4

What about **snowmobile traffic** in the UGA? Will they be allowed in the self-proclaimed snowmobile capitol of the world? What about the noise, smell, and traffic flow impacts caused by snowmobiles? This should be mitigated! 5

Please also review the comments we both made at the second public hearing. We would also like to go on record as supporting the comments and supporting documents submitted by RIDGE. 6

Sincerely,

Peg Bryant and Cordy Cook

Comment 1

Comment noted. Both the Draft EIS and this Final EIS reflect a proactive effort to undertake detailed analyses of cumulative impacts related to the MPR and UGA for all elements of the environment. Analyses were conducted in close coordination with affected agencies, organizations, and local jurisdictions and addressed all issues identified during the scoping period for the EIS.

Comment 2

Comment noted. Refer to the response to Letter 10, Comment 1 for a discussion of lighting standards that would be implemented.

Comment 3

Alternative 5 includes a 50-foot buffer along SR 903. Setbacks from SR 903 and height limits for structures will be specified in the Conditions of Approval for the project. Building design guidelines for the Business Park (now located along SR 903) would be specified in the development standards for the UGA. Refer to Section 3.11, Aesthetics, of the Final EIS and responses to Letter 11, Comment 3, and Letter 22, Comments 3 and 6 for additional information.

Comment 4

Indirect impacts on land use are discussed in Section 3.10 of the Draft EIS and in Section 3.9 of the Final EIS. All growth within the County would occur consistent with adopted land use plans and zoning regulations.

Comment 5

Snowmobile traffic was not a mode of travel or use that was identified in the Draft EIS. Unlike the adjacent MPR, snowmobile use is not expected to be significant with the UGA property. All existing regulations regarding snowmobile use on city streets and rights-of-way would similarly apply to development within the UGA. The City could monitor snowmobile use on the proposed trail network within the UGA and if it was determined to be a problem. The City also could impose appropriate restrictions on snowmobile use on the trails.

Comment 6

Comment noted.

Brian Carrico, Planning Director
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Dear Mr. Carrico,

I am a Cle Elum resident. However, I work for a business in the Ellensburg area. We are interested in opening an office in the Upper County, however, we have had difficulty locating a suitable site in the downtown retail district. Inadequate parking is definitely contributing to this difficulty.

Many of our clients are Upper County residents and an office up here would be of great benefit for them as well as for us. We don't know what we will do as the need is now and we have had difficulty reaching a solution. However, if we can not find an adequate office we will set our sights on the business park in the Urban Growth Area.

Growth is inevitable given our proximity to the Seattle Metropolitan Area and I believe that the proposed plans and related mitigation outlined in the EIS offer a well planned solution to the pressures of this growth.

By what I have experienced, in our search for adequate facilities for our business, I must stress again that the need is now. 1

What I see in the UGA EIS is that the proposal will have a significant beneficial impact on the existing retail core of Cle Elum. I also know that many of our clients when they come to see us remain in the Ellensburg area to shop or dine. Why keep sending business out of town? Why not keep this revenue here?

I have observed that over the past four years, Trendwest has demonstrated a committed relationship with the City Cle Elum and I believe that the city's EIS document is comprehensive. I applaud the mutual efforts towards the goal of creating a first rate Urban Growth Area to be annexed into the city and I urge your approval of this document.

Sincerely,

Keith W. Hartley

Comment 1

Your support of the project is noted.

Cle Elum Urban Growth Area DEIS – RIDGE Narrative Comments

5/7/01

INTRODUCTION

1) The division between the UGA proposal and the MPR is untrue and artificially imposed by TW to avoid having to deal with impacts. There is language about cumulative impacts in the UGA DEIS, but all the problems with the MPR as approved by the County (scale, size, unmitigated impacts to the community) are not adequately identified in either project, and will compound problems with the UGA as proposed. 1

2) The "phased environmental review" of these projects that should be in this DEIS (starting with MPR, Horsepark, water supply, water delivery system (including intakes), sewer systems (including discharge), Cle Elum's proposed re-do of its zoning code, etc.) are not being considered at this time. 2

3) Shifting corporate structures (JeldWen, TW Resources, TW Investments, MountainStar Resources) it is unclear who is doing what and when and with whom. 3

4) There are many examples of unidentified water use. How many swimming pools? (The Community Center, the private recreation center, the lodge just in the UGA, for starters) 4

5) Population numbers have to balance throughout the County. Huge growth in Cle Elum could generate the same total growth for the County, but only if the rest of the County doesn't grow at a reasonable rate. State services provided are dependent upon these numbers, so if growth spike beyond projections, the County will not receive what it needs, when it needs it, for state funded programs.) TW says that the UGA's projected growth (never mind the MPR's or secondary growth) is just barely within OFM's projections. 5

6) Lands given to Community Center, Horse Park and School don't come with water rights 6

7) Sometimes irrigation is proposed, sometimes there won't be any. Which is it? 7

8) Private housing vs. integrated community housing (check out the golfcourse lots and "equestrian village) 8

9) How many equestrian centers? (The Horse Park, the "temporary equestrian area," and another equestrian center in its own "village") 9

10) Does one want to get on or off the freeway? When? MPR didn't address this issue (only looked at Bullfrog exchange, nothing in Cle Elum, even though backups were predicted). Take a look at how the Business Park traffic will need to go through CE to come or go east. 10

11) Mitigation is based on existing levels of service (LOS) of Cle Elum. This means if Cle Elum doesn't have adequate parks, street maintenance, traffic flow, etc., then the UGA will only "mitigate" to meet existing levels. It COULD raise LOS for City. TW consultants are using Cle Elum's standards for entire area (such as Bullfrog Road, which means it can get as congested as downtown Cle Elum before there is any situation that would call for mitigation.) 11

12) Consultants for UGA didn't do their homework and/or used "conceptual" information in dealing with cumulative impacts from MPR: 12

a) impact to school district: wrong costs /foot, wrong reimbursement, wrong estimates of students coming in.

b) traffic entrances and exists from MPR are based on "conceptual" locations

c) wildlife consultant was unaware of where water intake on Cle Elum River is proposed, he used information from engineering consultant re: footprints ("conceptual?") within site, and was unaware of construction other than a small kiosk in floodplain (see p 1-15, what is proposed is a "interpretive center and supporting road). 12 (cont.)

d) beware of the distinction between "operational" and construction. All mitigation is categorized under both, but if you look at "proposed" phasing (this is cited later in chapter 2), some parts will not be built out all at once. So when does "operational" begin? At full build-out? When things begin?

13) Storm water run-off from both MPR and UGA that contaminates surface water (water that is contiguous with the Cle Elum River) 13

14) Just like the MPR, way too much of the proposed mitigation is based on monitoring. By the time an impact has been documented, what needs to be done for mitigation is too late. (Consider the school district's examples of lag time as new students arrive.) 14

15) We want concurrency and the mitigation to go into effect before we get slammed with the problems.

WATER SUPPLY

1) The issues surrounding the UGA water supply are very similar to what we raised with the MPR. Trendwest has not obtained approval to move water up to the Cle Elum area. Whether they will be able to move water, how much, and the time frame, is highly speculative at this point. Ecology's consultants have raised questions about whether there is a true environmental benefit that comes from TW's tributary (e.g., Teanaway, Big Creek) water rights that it proposes to leave instream as mitigation for all this development. 15

2) TW offers, as mitigation for its water right impacts, to "not divert water from the Yakima River if flows are insufficient to meet Yakima River target flows." UGA DEIS at p. 3.5-35. If TW is not diverting, where will the water come from to serve the UGA and the MPR? 16

3) We continue to disagree with the cumulative effects analysis. The impact of the UGA, combined on the MPR, is likely to be much greater than predicted. TW keeps insisting that folks who work at the resort will live elsewhere in the County. This is unrealistic. So what water will be used to serve all these people? Exempt wells, Roslyn's water, and CE and So. CE water. This is going to put a huge burden on local communities. Because TW has been in litigation over this, they refuse to admit how great the impacts are actually going to be. The MPR analysis was inadequate and underestimated impacts. But they continue to defend that analysis and use the same assumptions because they are still in court. This means that important impacts are not being considered. 17

For example, TW proposes to move water from properties in other places. But many of those "sending" properties are being developed. The DEIS refuses to acknowledge that the impacts associated with moving that water is really connected to the UGA and the MPR. See DEIS at 3.5-37. This is shortsighted and incorrect. 18

WATER QUALITY

1) General Surface Water Quality: The DEIS asserts that there is little direct run-off from the UGA site to surface waters, DEIS at 3.3-3, and that even this small amount will be eliminated with development of the UGA. Given the significant increase in impervious surfaces, this assumption is not entirely credible. Based on this assumption, the DEIS also concludes that no water quality impacts to the five UGA wetlands and the Cle Elum River will result from the development. DEIS at 3.3-11; 3.3-13. 19

2) Discussion of ground water recharge to the rivers acknowledges that pollutants may concentrate in ground waters, and that the upper aquifer zone beneath the UGA is in direct hydraulic continuity with surface waters. DEIS at 3.4-6. But, according to the DEIS, "cumulative concentrations of pollutants predicted in groundwater are expected to be undetectable in river water after instream mixing." DEIS at 3.3-14. In other words, the UGA surface water pollution control strategy depends upon groundwater dilution and use of the Yakima and Cle Elum Rivers as additional dilution zones for contaminated groundwater discharge. 20

3) The DEIS identifies pollutant sources, but lacks information about actual concentrations of pollutants that can be expected to be generated by UGA activities.

4) Experience indicates that Trendwest is not likely to provide adequate protection for construction-generated sediment and erosion control. The TESC measures proposed for the MountainStar MPR site are very general in nature and are not being implemented. 12

The UGA DEIS acknowledges that there is "significant potential for erosion and generation of turbid surface water runoff" for Alternatives 2, 3, and 4 during construction. DEIS at 3.3-9. There is a real question whether sediment impacts resulting from construction would in fact be controlled by mitigation. DEIS at 3.3-14 to 15. 22

5) Pollutants will be generated by UGA development, (e.g., increase in impervious surfaces (from 0 to 279 acres, page 3.3-10 at Table 3.3-1 and App. C, Table C-2); landscaping chemicals, household chemicals, petroleum compounds and other automotive chemicals, etc.). Significant precipitation occurs in the area, and that precipitation routed through the stormwater control system will convey pollutants to ground water. "The quality of stormwater is an indicator of the potential impact on groundwater quality." DEIS at 2.4-15. Infiltration of recharge will increase significantly (from 1,630 to 2,380 af/yr for Alternative 2). 23

6) The DEIS acknowledges that pollutants generated by various activities proposed for the UGA will leach into groundwater. Indeed, the DEIS assumes that soils and surface materials will filter and remove pollutants before they contaminate ground water and surface waters. However, the conclusion that the unsaturated zone between ground surface and water table levels will "afford adequate attenuation of pollutants in infiltrating stormwater" is unsupported. See, e.g., DEIS at 3.4-17. Lacking information about the actual predicted concentrations of pollutants it is impossible to assess whether untreated stormwater filtration would be effective. Given the urban densities proposed for the UGA, one can assume this system would not be adequate. 24

7) Specific Pollutant Sources:

a) Golf course management plan: The golf course management plan does not employ appropriate measures to reduce and eliminate potential chemical contamination to ground waters. The DEIS fails to provide adequate quantification of the potential contamination. Moreover, given the pristine condition of the aquifers beneath the UGA, Cle Elum should require the most modern methods of golf course maintenance. 25

b) Horse park: From the description at p. 2-18 that the Washington State Horse Park will be a sizeable facility designed to accommodate a large number of horses. The DEIS acknowledges that even with proper BMPs, outdoor paddocks will be a source of water quality degradation. 3.3-13. There is no quantitative information to support the conclusion that mitigation measures would effectively reduce this impact. 26

c) Equestrian Village: The DEIS acknowledges that a residential horse grazing area could contaminate groundwater. DEIS at 3.4-17. This is an unacceptable impact that is not adequately quantified or discussed. 27

d) Master Drainage Plan: DEIS acknowledges that stormwater/drainage plan will influence operational impacts of UGA on groundwater quantity/quality. DEIS at 3.4-14. 28

8) The proposal to allow emergency overflows into the Cle Elum and Yakima Rivers for infrequent flood events is an unacceptable mitigation measure. DEIS at 3.3-17. The DEIS lacks discussion regarding the impact of such events on water quality. 29

9) Cumulative Effects: The DEIS limits its assessment of cumulative effects to the MPR and UGA developments. DEIS at 3.4-17. Are there other sources of groundwater contamination that should be considered in this analysis? Moreover, this DEIS accepts uncritically the assertion in the MPR EIS that there are no "adverse changes to water quality from the proposed MPR." DEIS at 3.4-18. The MPR development will generate similar pollutants and reduce pervious surface areas. No quantitative information is provided to assess, in total, the pollutant loading to local aquifers. 30

10) With all these people moving into the area, there will be water quality impacts related to impervious surfaces, people pouring bad things down their drains, increased use of pesticides and herbicides, etc.. It's inevitable. How does CE propose to maintain the relatively pristine environment in those circumstances? 31

11) Increased population will mean more people want to go the rivers. This will put pressure on fish species at the brink of extinction. How are you going to keep people from fishing, walking around in the rivers, etc.? 32

Conclusion: In reviewing the water quality section of the UGA DEIS it becomes apparent that the drainage plan is a linchpin. All precipitation in the area infiltrates to groundwater, taking the various construction, household, golf course, horse park and automobile chemicals with it. Soils and aquifer materials absorb and filter pollutants, flow-through ground waters dilute them, and by the time groundwater discharges to the Cle Elum and Yakima River, voila!, it's clean. Well, actually, it's not clean, but "contaminant concentrations" are quickly diluted by river flows. The DEIS actually says that. The drainage plan for the UGA will theoretically route waters and pollutants (concentrating them even more I suspect), prevent direct runoff into surface waters, etc. A summary of the Master Drainage Plan is presented at DEIS p. 3.3-16. There is an actual plan, however, which is not included in the appendices. 33

TRAFFIC (Also see attachment on traffic impacts – Brian Carpenter, REBOUND 4/25)

1) SR 903 is going to become a backed up, clogged mess with all the people visiting Cle Elum and Roslyn. On summer weekends, it will be jammed all the way from Roslyn to Cle Elum. 34

2) Downtown Cle Elum and Roslyn are going to be swamped with cars. Where are they going to park? 35

3) Making left turns off of SR 903 and Bullfrog Rd. will become more dangerous due to the increase in oncoming traffic. Many turns have no turn pockets or signals. 36

4) The EIS underestimates the number of car trips that will be generated by each dwelling. Friends and relatives will come to visit on the weekend and they will bring their cars too. 37

5) On big summer weekends, or when there's a big event at the Horse Park, the traffic will be horrible. Who is going to pay for the additional police service to direct traffic? Will emergency vehicles be able to respond in a timely manner on these clogged streets. (Up #903 to Roslyn/Ronald/Salmon la Sac or down Bullfrog Rd.) 38

6) Our schools are located on SR 903 and buses travel along 903. More traffic on this road will make it more dangerous for our kids. 39

7) All it takes is one fatal accident to cause an outcry for traffic improvements, but how do we fund them? 40

8) The proportionate share arrangement with Trendwest gives the County a license to tax growth in the future to pay for Trendwest's impacts. This isn't fair. Neither the City nor the County have any major source of road funding. What happens when SR 903 has to be widened to 4 lanes to accommodate the traffic 41

9) What about improvements to the intersections with I-90, exits 80 and 84. The state doesn't have any money to improve them. I-90 is already congested on weekends, the UGA development will only make this worse. 42

10) Pedestrians trying to cross SR 903 are going to face more dangers from speeding traffic. No mention of crosswalks in the DEIS. 43

9)Traffic analysis focused (almost entirely?) on summer; consultant wasn't aware of "any particular problems related to winter conditions" (Pass Closure? driving and parking conditions?) 44

10) How will the citizens of South Cle Elum get out of S Cle Elum when there is only one access road with no light? 45

HOUSING AND POPULATION

1) Affordable housing: There is no price info available on any Trendwest housing types and there are no plans for subsidized or low income housing within the UGA (yet many workers will be low income). TW still wants to "investigate" affordable housing options with other entities. Chapter 3.11-24 46

2) Population and housing projections: In 1995, the OFM (state Office of Financial Management) projected approx. 4733 more people in the county in 2015. At the request of the City of Cle Elum and because of the TW proposals, the County changed that figure to 14,470 by 2020 and moved the allocations from unincorporated Kittitas County to the Cle Elum UGA. 47

3) The DEIS states the UGA must meet the housing demands of those new 14,470 figures. However, it is these proposals creating the population projections. Therefore the DEIS should use the OFM figures for its no action alternative (alt. 1). 3.11-11 48

PUBLIC SERVICES

1) Page 3.16.17: Concern: While the DEIS concedes that "Concurrent development of the MPR and UGA could create significant additional demand for law enforcement, fire protection, and EMS response", the "concurrent development" is not analyzed. 49

2) Concern: Secondary growth is not considered relative to public services. Page 3.16.16: The DEIS admits that the school district is already at very near full capacity and that a new K-12 school would need to be built. Concern: Wouldn't this raise taxes for all residents of school district 404? The DEIS also states that the water source for the school expansion area is yet to be identified. This is a concern. Page 3.16.17: The DEIS proposes that monitoring be done for police, fire, and Kittcom and then bonds be issued and then services upgraded. Concern: This will result in significant lag time and severe squeeze of existing services while new personnel are recruited, trained, equipped. These needs should be proactively addressed. 50

UTILITIES

1) Page 3.17.22: The regional water and wastewater treatment plants are critical components of both the MPR and UGA. Neither of these development projects can proceed without these components. Concern: They should be included in the analysis and not only in a separate SEPA review process. What about the septic capacity for the school expansion – where are those plans? 51

2) Page 3.17.23: The DEIS concedes that a stand-alone water treatment plant may be necessary. They admit that both the UGA and MPR would be served by the plant. Concern: This shows that these two projects are really the same project artificially separated by Bullfrog Road. Concern: The stand-alone treatment plant should be included in this analysis and not only in a separate SEPA review process. 52

NOISE

1) Page 3.9.3: "...even under the most extreme conditions, traffic noise rarely approaches the level that could cause hearing damage". Concern: Even at moderate levels, traffic noise could cause frustration and stress due to time delays, disruption of the rural quality and character of Upper County life, etc. 53

2) Page 3.9.5: The Cle Elum Cemetery is included in a category that includes playgrounds, active sports areas, and parks. Concern: The cemetery is more like land "on which serenity and quiet are of extraordinary significance". The cemetery is already heavily impacted by noise from I-90 and cannot tolerate additional noise impacts. 54

3) Page 3.9.6: The UGA DEIS uses the hours between 12:00 pm and 4:30 pm "to characterize the weekday afternoon rush hour noise levels". Concern: An average score here includes large periods of sparse traffic i.e. the sampling was started too early and ended too early. A 3:00 pm to 6:00 pm timeframe would have been a better measure of 55

afternoon rush hour. These measurements were also done in the winter of 1998. What about more recent data? 55 (cont.)

4) Page 3.9.8: The no action alternative does not even consider a stand-alone MPR. Concern: If a stand-alone MPR is an option, this noise source must be addressed, and it is not. 56

5) Page 3.9.12: Predicted traffic noise levels contributed from the proposed MPR or secondary growth are difficult to assess due to unknown placement of the actual buildings, therefore the DEIS asserts no cumulative traffic noise impacts exist under any of the proposed alternatives. The DEIS also states that because "the exact location of proposed land uses within both the MPR and UGA and the specific distances between structures are unknown", ambient noise level predictions (i.e. operational activity noise levels and potential impacts from the proposed land uses—not including traffic) cannot be made. Concern: This issue was very poorly addressed in the DEIS. Wouldn't it be safe to say that noise would be increased with the addition of almost 6,000 living units, 3-4 golf courses, a proposed horse park, 2 "business" parks, an amphitheater, etc.? This needs to be studied and mitigated. 57

6) Additionally, in relation to noise, the DEIS has failed to even consider the impact of snowmobile noise from the UGA and the MPR. 58

7) Also not considered are the likely impacts of small plane traffic at the CE airport, the sound of mowers for golf course and lawn maintenance, and the impacts on the cemetery. 59

AESTHETICS, LIGHT, AND GLARE

1) Page 3.12-9: The DEIS states "no locations close to the UGA have extensive long-duration views of the UGA...Viewers most affected by changes in the visual landscape would be the frequent users of Bullfrog Road and SR 903." Concern: Current residents of Upper County would be significantly impacted. Bullfrog Road and SR 903 are much more relevant to Upper County residents and visitors than the view from the freeway, which is buffered in all of the alternatives. However, viewsheds from SR 903 are not buffered in alternatives 2, 3, or 4 to reduce the visual impacts of dense development. This needs to be mitigated! A buffer of 150 foot along Bullfrog Road would not adequately screen or diffuse views to the interior of the UGA. 60

2) Page 3,12-10: The DEIS asserts that "skyglow could change on properties within approximately 10 miles of the site...Development of the UGA would add to the skyglow effects of the proposed MPR...". Concern: The beauty of the night sky from our backyards not from Table Mountain or the Manastash Ridge is one of the reasons cited by many current residents of Upper County for living here. Astronomical observation can currently be done from our homes not from an observation station. This is a quality of life issue, and it is a definable significant adverse impact which is not adequately addressed. Mitigations must include state of the art shielding, elimination of landscape lighting, etc. 61

WETLANDS

1) The #4 and #5 Wetlands need more than 100 ft. buffers – located in residential areas migratory birds can be adversely affected by pets. 62

2) Demand buffers at a minimum of the Cle Elum Critical Areas Ordinance Standards.
3) Wetland #1, #2, #3 will fall inside open space plan. Human use could have adverse affects and should be mitigated by more upslope and natural open space dedicated to non-motorized use. 62 (cont.)

PLANTS, ANIMALS AND FISHERIES

1) Scale of development may require enforcing "No fishing" or "Catch and release" regulations – effecting existing users. 63
2) Stormwater run-off depends on "infiltration" no treatment- sediment and pollutants can affect habitat. 64
3) No WDF&W bull trout survey was ever conducted on the Cle Elum – it needs to be done. 65
4) How can surface water run-off from "section T" (housing development in Bullfrog Flats) – not be expected to disturb river health. 66
5) Mitigation to protect 38 sensitive species of plants that are potentially found on the property. 67
6) Management of priority habitats: eagle habitat, snags and downed wood; instream/riparian habitat, and wetlands not identified. 68
7) Management of wetlands and wetland dependent vegetation not identified. 69
8) Increased river buffering
9) Identification of important wildlife corridors and linking those with the MPR, the Roslyn ridge and the upper Cle Elum valley.
10) Reducing Elk-human conflict through conservation of Elk wintering grounds and management of set-aside lands. 70
11) Cluster homes and development on the east side of UGA to allow animal movement and connectivity.
12) Limit construction to after the bird-breeding season, in cooperation with the Migratory Bird Treaty Act.
13) Only allow native grasses and shrubs to be planted.
14) Eliminate snowmobile and motorized recreation on the property.
15) Keep trails out of the Cle Elum River and limit river access to protect wildlife. 71
16) Mitigation should include purchase of land on the south side of Easton Hill where Elk are repeatedly seen foraging.
17) Eliminate golf course which would eliminate lots of the human/wildlife conflicts. 72

PARKS

1) No hard numbers on how many people could potentially impact the surrounding recreations areas, specifically federal and state land. 73
2) DEIS states that each neighborhood must provide a "pocket park". But no specifics on how large or for what use. 74
3) The DEIS states often that there will be such a minimal increase in total people in the UGA that current recreational facilities will be able to absorb more use. How can they prove that? With recreational use increasing rapidly on federal land already, demands on resources are stretched beyond their limit. They need to show how use over the long-term 10-20-50 years down the road will affect the environment. 75

4) The UGA provides minor recreation facilities. It does not address the needs for large areas for snowmobiling, hiking, mountain biking, winter skiing. They also do not address how TW will tap into the already existing federal trail system. What type of agreement will they have, and is the Forest Service willing to do that? 75 (cont.)

5) How will they address the need for more RV parks for summertime construction employees. They state that the limit will be exceeded. 76

6) Items not addressed in the DEIS that RIDGE identified in the scoping process: 77

a) Loss of hunting opportunities, preservation of public access to trails.

b) Impacts to existing parks, impacts of snowmobiling and ORV use on and off the development.

c) local residents access to river corridor

d) increasing demand on Alpine Lakes Wilderness, need for integrated trails plan.

e) potential impacts from resort-induced growth stimulating adjacent land use changes.

7) The City of Cle Elum is developing open space Levels of Service (LOS) standards for regional open space. Their standard is 25 acres per 1,000 people – not including sensitiv areas – steep slopes, floodplains, and golf courses. Trendwest proposes to set aside open space based on a National Recreation and Parks Assoc. standard which includes only the steep slopes and wetland floodplains. More usable open space should be set aside for recreation that is usable by the public and not just golfers. 78

EARTH

1) Did not address possible effects on ground water and historical mining in the UGA or on the surrounding landscape. 79

2) Did not address stability of ground due to mining in the UGA or on the surrounding landscape. 80

3) Did not address how the fluvial system could potentially affect runoff from the development. How permeable are the soils? And where does runoff go? 81

AIR QUALITY

1) A plan is needed to deal with winter inversions from wood burning stoves, snowmobiling and excessive driving. 82

2) Mitigation to deal with increased Carbon Monoxide emissions from above uses. 83

3) Phasing of construction to deal with poor air quality.

4) Analyze cumulative impacts of construction at Resort and UGA on air quality and identify mitigation. 84

ECONOMICS AND FISCAL IMPACTS (Also see attachment from Brian Carpenter, REBOUND, May 2, 2001)

1) Studies for employment and labor are based on the Kittitas County Profile and the Mountainstar Employment Analysis. Graphs are based on combining the UGA and MPR employment. Employment trends for upper county are not addressed. 85

2) Operations: 80% of combined MPR and UGA employment will pay less the $30,000 annually. Retail, restaurant, lodging, and services – will pay non-living wage salaries. Are salary figures in 2001 dollars? 2010? 2020? 86

3) Property values: Accelerated property values would have tax ramifications. Appendix H. describes how taxes will be lower as the UGA reaches maturity or hold constant at worst. Where have tax bills in other Trendwest areas gone down? Where are the examples of other places? 87

4) Our Community has a very high level of Seniors on fixed incomes, they are reluctant to ask for reduced tax and fee rates even though they qualify (Cle Elum reduced water/sewer rate). How will increased property values affect their standard of living? 88

5) Economics of Cle Elum: A town that two months ago could not afford to cough up $4,000 for their share of a dogcatcher. Where will the money come from to repair 2nd Street, or any other road ? Storm drains, sewer lines, water lines, sidewalks, parks; what will be the priority for Cle Elum? The east end of Cle Elum has been waiting for years for necessary repairs. Who comes first, the ones that have been waiting for municipal services or new connection lines in an Urban Growth Area? 89

6) Economic impacts for businesses relying on tourism.- traffic needs to be able to flow through Cle Elum. 90

7) The significant amount of retired people on fixed incomes in this community need to be considered in this study. 91

LANDUSE

1) According to the DEIS 3.10-2 the proposed development would be twice the physical size of Cle Elum with about the same #of housing units and population. With the contiguous Resort – the area will house 5 times the population of Cle Elum. Why this size and this population? 92

2) The Cle Elum Comprehensive Plan says that the City does not want to outpace its ability to provide infrastructure with the new UGA. By entering into the proposed water and sewer construction – doesn't the City waive its autonomy to control infrastructure? 93

3) Draft Bullfrog Subarea Plan states that the city wants development in the UGA "to enhance the natural environment of the Cle Elum River Corridor". How does this density do that? 94

CULTURAL RESOURCES

1) Historic uses on the land have not been discussed or addressed. Ownership of historical finds have not been stated. Buffers of 50 feet from "cultural finds" are not large enough. 95

Comment 1

Refer to the response to Letter 4, Comment 2.

Comment 2

Refer to the response to Letter 4, Comment 2.

Comment 3

Comment noted.

Comment 4

Water demands for current proposed uses within the UGA are identified in Section 3.16 of the Final EIS.

Comment 5

The Office of Financial Management's 2020 population projection for Kittitas County is allocated to Cle Elum and other jurisdictions within the county, consistent with the Kittitas County Countywide Planning Policies. Updated OFM population projections are anticipated in early 2002.

Comment 6

The City would supply water to the Community Recreation Center. The Horse Park is not included under Alternative 5, and water rights would be the responsibility of the developer of that project. As part of the RIDGE Settlement Agreement, Trendwest would provide water for induced growth impacts on Roslyn.

Comment 7

Refer to Section 3.16 of the Final EIS for a summary of untreated water demands associated with Trendwest and non-Trendwest land uses.

Comment 8

Comment noted. The golf course, Horse Park, and equestrian village have been eliminated from Alternative 5.

Comment 9

Refer to the response to Comment 8, above.

Comment 10

The transportation model network that was developed for the Cle Elum UGA is shown in Appendix F of this Final EIS as Figure F-1. I-90 interchanges that serve the Cle Elum and Roslyn communities were included in the network, had traffic assignments made to each interchange, and were evaluated for level-of-service impacts. The Business Park traffic is one component of the UGA development that was modeled and included in the travel forecasts.

Comment 11

Level-of-service (LOS) goals are identified in the *Draft Bullfrog Subarea Plan* for park and recreational facilities within the City of Cle Elum. LOS standards for transportation are described in Section 3.15 of the Draft EIS and Section 3.14 of the Final EIS.

Comment 12

Comment noted. The analysis contained in the Draft EIS was conducted based on known and available information at the time. Typically, operational impacts are analyzed as following the initial five-year construction phase. Refer to the updated analyses included in the Final EIS for the Reduced Density MPR and Alternative 5.

Comment 13

Refer to Section 3.3, Water Quality, and Appendix A of the Final EIS for a detailed and quantified analysis of potential water quality impacts on the Cle Elum and Yakima rivers.

Comment 14

The definition of "mitigation" in the State Environmental Policy Act (SEPA) includes "monitoring the impact and taking appropriate corrective measures" (WAC 197-11-768). Monitoring is an effective technique to measure and quantify potential impacts that cannot be identified with reliability at this point in the planning and design process.

As a jurisdiction planning under state of Washington Growth Management Act (GMA), the City of Cle Elum cannot approve new development if it would cause the level-of-service of a road in its jurisdiction to decline below the standards in the transportation element of the City's Comprehensive Plan, unless transportation improvements to accommodate the development are made concurrent with the development. GMA defines "concurrent" as: (1) improvements or strategies that are in place at the time of development or (2) a financial commitment that is in place to complete improvements or strategies within six years (RCW 36.70A.070).

The need for various public facilities and services is discussed in Sections 3.15 (Transportation), 3.16 (Public Services), and 3.17 (Utilities) of the Draft EIS. Potential impacts on public facilities and services under Alternative 5 are discussed in Sections 3.14 (Transportation), 3.15 (Public Services), and 3.16 (Utilities) of the Final EIS. The proposed mitigation measures are identified for construction and operation concurrent with the expected impact. In addition, policies from

the *City of Cle Elum Comprehensive Plan* and the *Draft Bullfrog Subarea Plan* require mitigation concurrent with development. Proposed mitigation measures reflect an appropriate balance between identifying specific mitigation measures and using ongoing monitoring to confirm these measures.

Comment 15

In December 2000, Trendwest entered into a contract with the Department of Ecology for the purpose of conducting additional environmental review and processing of Trendwest's water rights transfer applications. Additional analysis of the impacts of Trendwest's water rights transfers on the Yakima River target flows has been conducted and mitigation measures for these impacts have been identified. Refer to the response to Letter 5, Comment 1 for additional information.

Comment 16

Proposed mitigation measures have been updated in the analysis contained in the Final EIS. Refer to the response to Letter 5, Comment 1.

Comment 17

Comment noted. Refer to the response to Letter 5, Comment 2.

Comment 18

Comment noted. Refer to the response to Letter 5, Comment 4.

Comment 19

Under Alternative 5, all stormwater except for floodflows in excess of the 100-year design storm would be infiltrated onsite, with no direct connection to surface waters. The only wetlands on the developed portion of the UGA site under Alternative 5 are in isolated depressions. Roof runoff could be used to augment water supply to these basins, should that need be identified during engineering design after conclusion of SEPA requirements.

Comment 20

Refer to the responses to Letter 12, Comment 7 and Letter 25a, Comments 27 and 28. Since the Draft EIS's evaluation of Alternatives 2, 3, and 4, a higher level of treatment is proposed for Alternative 5, which has been quantitatively evaluated in Section 3.3, Water Quality (see Appendix A, Water Quality Technical Report, for details).

Comment 21

Section 3.3 and Appendix A of the Final EIS contain a quantified analysis of potential water quality impacts.

Comment 22

A temporary erosion and sediment control plan would be developed as described in Sections 3.1 and 3.3 of the Draft EIS. An individual National Pollutant Discharge Elimination System (NPDES) permit and approved Stormwater Pollution Prevention Plan would be obtained through the Department of Ecology. Control measures would be specified in the permit documents.

Comment 23

Refer to the response to Comment 20, above.

Comment 24

Refer to the responses to Comments 20 and 21, above. The UGA site was divided into four stormwater management zones to determine stormwater treatment for Alternative 5 based, in part, on the underlying geology. The underlying soils are moraine and outwash soils, which have a silty sand component that meets Ecology's criteria for crediting infiltration to native soils as water quality treatment in its 2001 Stormwater Management Manual (see Section 3.2.5 of Appendix A, the Water Quality Technical Report). The higher level of treatment proposed since the Draft EIS and the additional treatment afforded by infiltration of the treated stormwater are predicted to adequately mitigate water quality impacts.

Comment 25

No golf course is proposed under Alternative 5 for the UGA. The Golf Course Management Plan for the MountainStar MPR golf courses contains detailed analysis of proposed pesticides and their use within the framework of integrated pest management (IPM). IPM is a modern and accepted strategy that minimizes the use of, and need for, pesticides. Environmental information on mobility, persistence, and toxicity for each pesticide and the restrictions and conditions for their use are described in the IPM.

Comment 26

No Horse Park is proposed under Alternative 5 for the UGA. For the alternatives described in the Draft EIS, as noted in Section 3.3, when open paddocks were not used during the wet season, among other measures also specified, background (unaffected) water quality was maintained. The Draft EIS includes all measures listed in this section that maintained water quality as mitigation measures.

Comment 27

No equestrian village is proposed under Alternative 5 for the UGA. Groundwater quality protection under Alternative 5 is analyzed in detail in Section 3.3 and Appendix A of the Final EIS.

Comment 28

Water quality management has been substantially revised under Alternative 5. The revised management system is summarized in Section 3.3 and described in detail in Appendix A of the Final EIS.

Comment 29

Allowance for flood flow passage is an appropriate engineering requirement for stormwater systems design to provide for public safety. Only floods in excess of the 100-year event would generate emergency overflows. The 2001 Washington Department of Ecology *Stormwater Management Manual* proposed for use by Trendwest requires safe conveyance but not treatment of water quality for these rare flood events.

Comment 30

The Final EIS updates the cumulative assessment of the MPR and UGA in the Draft EIS. Refer to Section 3.3 and Appendix A of the Final EIS.

Comment 31

Water quality impacts associated with impervious surfaces under Alternative 5 will be handled by stormwater treatment system and infiltration. Drains in residences would convey water to the wastewater treatment plant. Pouring toxins into storm drains is illegal. The use of pesticides and herbicides is evaluated for Alternative 5 in the Final EIS. See the updated analysis for Alternative 5 in Section 3.3 and Appendix A of the Final EIS.

Comment 32

The evaluation of increased human pressure on fishing resources has been expanded for Alternative 5 in Section 3.6 of the Final EIS. Washington Department of Fish and Wildlife would continue to manage regional fisheries resources. Trendwest has entered into a Cooperative Agreement with the Washington Department of Fish and Wildlife and the Yakama Nation to address agency and tribal concerns about environmental impacts from Trendwest's development proposals for the MPR and UGA. The parties have agreed to work toward the goal of no net loss of fish and wildlife habitat, as well as the protection of the environmental, scenic, historical, cultural, and recreational values associated with the Trendwest property. The Cooperative Agreement establishes a number of restrictions within the Cle Elum River corridor, as described in Appendix B of the Final EIS. As part of the RIDGE Settlement Agreement, Trendwest would also contribute financially to the purchase of conservation easements on adjacent forested lands.

Comment 33

Refer to the response to Comment 28, above.

Comment 34

Comment noted. SR 903 was evaluated for level-of-service impacts at principal intersections. Mitigation measures are identified in the County's conditions for approval for the MPR and the City's draft Conditions of Approval for the UGA. Refer to the response to Letter 7, Comments 10 through 12 for additional discussion of SR 903.

Comment 35

Refer to the response to Letter 7, Comment 5.

Comment 36

Refer to the response to Letter 7, Comments 10 through 12.

Comment 37

Refer to the response to Letter 7, Comment 3.

Comment 38

No Horse Park is proposed under Alternative 5 (Preferred Alternative). Under the terms of its agreement with Trendwest, the Washington State Horse Park Authority will be responsible for all environmental compliance related to that facility. Expected cumulative traffic impacts from peak summer weekends with the MPR and UGA development are discussed in Section 3.15 of the Draft EIS and in Section 3.14 of the Final EIS.

Comment 39

Comment noted. As traffic volumes increase on SR 903, the community would need to consider new safety-related improvements for school-age children. This is something that is common in all communities. Refer to the response to Letter 7, Comment 6 for a discussion of existing conditions.

Comment 40

Each agency typically has its own mechanism for funding improvements to correct safety problems. The accident history analysis contained in Section 3.15 of the Draft EIS found no unusual safety conditions that required corrections. The general guideline used by most agencies in the state of Washington is to identify high accident locations (HALs), which are defined as an unsignalized intersection with five or more accidents in a year or a signalized intersection with 10 or more accidents in a year. Any location with a fatality is also classified as a HAL. These locations are then prioritized based on a variety of factors including the number and severity of accidents, traffic volumes, etc. and investigated for solutions that would correct the identified safety problems. Fatality locations typically receive the highest priority for available funding.

Comment 41

Commenting on the County's proportionate share arrangement associated with the MPR is beyond the scope of this EIS. Based on the transportation analysis conducted for Alternative 5 cumulatively with the MPR, projected roadway volumes on SR 903 are not anticipated to exceed the design capacity of SR 903. Refer to the response to Letter 7, Comment 10 for additional information. Under the City's draft Conditions of Approval, Trendwest would pay its proportionate share for necessary traffic improvements.

Comment 42

Refer to the response to Letter 7, Comments 8 and 9.

Comment 43

Refer to the response to Letter 7, Comment 6 and to Comments 39 and 40, above.

Comment 44

The traffic analysis did address the summer time frame as the time with the largest amount of traffic volumes, and therefore, the greatest transportation impacts. Winter conditions and pass closures were not evaluated.

Comment 45

The intersection of First Street and South Cle Elum Way is identified in the EIS and in the City's Conditions of Approval as likely needing a traffic signal in Year 5 due to the general growth in the area's traffic volumes.

Comment 46

Refer to the response to Letter 26, Comment 2.

Comment 47

Refer to page 3.11-11 of the Draft EIS. The second paragraph states "The OFM high series forecasted that 4,733 more people would reside in the County by the year 2015 than the medium series forecasts." This statement expresses the difference between the 2015 high series forecast of 44,183 total county population and the 2015 medium series forecast of 39,450 total county population.

Beginning in the last paragraph on page 3.11-11, the discussion focuses on projections for 2020 and presents 48,670 as OFM's high series projected population for Kittitas County. Table 3.11-6 on the next page summarizes how the 20-year growth (or change) in population of 14,470 was allocated by Kittitas County in its 1999 amendment to the Countywide Planning Policies. The portion of that 20-year increase allocated to Cle Elum was 2,750.

Comment 48

Under the No Action Alternative, the City of Cle Elum would not annex the UGA and zoning would remain in Forest and Range 20 and Suburban.

Comment 49

Impacts on law enforcement and fire protection under Alternatives 2, 3, and 4 are analyzed in Sections 3.16, 3.19, and Appendix H of the Draft EIS. Under Alternative 5, these impacts are addressed in Section 3.15, Public Services, Section 3.18, Fiscal Conditions, and Appendix D of the Final EIS. Mitigation measures are identified and have been incorporated into the City of Cle Elum's draft Conditions of Approval.

Comment 50

Refer to the responses to Letter 1 regarding concerns about the School District.

Mitigation agreements have been negotiated in principle between Trendwest and primary service jurisdictions including the City of Cle Elum, Cle Elum-Roslyn School District #404, and Kittitas County Hospital District No. 2. Additional agreements associated primarily with development of the MPR that would apply to potential cumulative impacts have been negotiated with Kittitas County, Fire District No. 7, and KITTCOM. Provisions in the RIDGE Settlement Agreement provide mitigation to the City of Roslyn.

Mitigation agreements provide specific guidelines for identifying shortfalls by monitoring costs and revenue flows. The agreements outline Trendwest's funding responsibilities for expected or identified shortfalls, which may include personnel, operation, maintenance, and capital facilities costs as negotiated by the respective jurisdictions. Shortfall mitigation payments are used to address identified fiscal impacts as appropriate.

Refer to the response to Letter 27, Comment 1 for a discussion of water provision to the School District expansion area.

Comment 51

Refer to the responses to Letter 4, Comment 2 and Letter 37, Comment 6 for a discussion of the relationship between the City's wastewater treatment plant and the Trendwest project. Refer to the response to Letter 1, Comment 5 for the issue regarding septic capacity of the School District.

Refer to Section 3.16, Utilities, in the Final EIS for an updated discussion of the water treatment and wastewater treatment plant planning processes.

Comment 52

A standalone treatment plant is no longer proposed.

Comment 53

Comment noted. The noise regulations and guidelines evaluated in the EIS are based on protecting human health and welfare from the adverse impacts of noise. Future traffic noise levels are predicted to be within highway noise guidelines.

Comment 54

This Final EIS has been updated to address construction noise impacts on the cemetery and to identify mitigation measures. At the adjacent cemetery, some noise from construction activities would exceed existing noise levels at times, and could temporarily disrupt contemplative activities. To mitigate noise impacts on the cemetery, nearby construction activities could be coordinated to avoid scheduled memorial services.

Comment 55

As described in Section 3.9 of the Draft EIS, equivalent sound level (Leq) measurements were taken during 15-minute sampling periods, which is consistent with WSDOT noise measurement procedures. The Leq places more emphasis on the high noise levels than the lower accompanying background noise during a sampling period, and a logarithmic average of 15-minute Leq noise measurements would not be biased by large periods of sparse traffic (if present). More recent noise measurements would be similar to the 1998 measurements because an increase in background traffic of 2% a year would not substantially increase measured traffic noise levels. Traffic noise impacts have been predicted with FHWA-approved computer models for the afternoon rush hour.

Comment 56

Noise impacts of a standalone MPR are evaluated in the EIS for that development. Development of 19 to more than 106 single-family residences within the UGA under the No Action Alternative would not contribute substantially to cumulative traffic volumes along area roadways or to cumulative traffic noise.

Comment 57

The City of Cle Elum agrees that noise levels would increase under the alternatives. Additional vehicular traffic to and from the Cle Elum UGA would be the primary source of noise under the alternatives. Cumulative traffic noise levels can be accurately predicted based on projected cumulative traffic volumes, and they were predicted with FHWA-approved computer models for the Draft EIS (see Table 3.9-6 in the Draft EIS). The cumulative traffic noise levels are predicted to be within FHWA noise impact guidelines for highway noise.

Any onsite noise from residential and commercial land uses within the Cle Elum UGA are difficult to predict, but must meet the property-line noise standards established by the Washington State Department of Ecology (see Table 3.9-2 of the Draft EIS). If a regulated noise source within the UGA were to consistently exceed the Ecology property-line standards at neighboring properties, then reasonable mitigation measures to reduce onsite noise levels could be coordinated with the City of Cle Elum.

Comment 58

This Final EIS has been updated to address potential impacts of snowmobile noise. Snowmobile noise would be mitigated by limiting speeds and restricting snowmobile use within the UGA and MPR to designated trails. Snowmobiles would be allowed on city streets in Cle Elum, but their use and noise levels would be regulated by city ordinance.

Comment 59

Noise impacts on the cemetery are addressed in Tables 3.9-5 and 3.9-6 of the Draft EIS. This Final EIS has been updated to address construction noise impacts on the cemetery and to identify mitigation measures (see Comment 45 above). Alternative 5 would not include a golf course and associated lawn mowers. Noise impacts from increased air traffic were not considered potentially significant and were not evaluated.

Comment 60

Alternative 5 includes a 50-foot buffer along SR 903. Setbacks from SR 903 and height limits for structures will be specified in the Conditions of Approval for the project. Building design guidelines for the Business Park (now located along SR 903) would be specified in the development standards for the UGA. Refer to Section 3.11, Aesthetics, of the Final EIS and the response to Letter 11, Comment 3 and Letter 22, Comments 3 and 6 for additional information.

Comment 61

Comment noted. Refer to Section 3.11 of this Final EIS for additional discussion.

Comment 62

Under the Cle Elum Critical Areas Ordinance, Wetlands 4 and 5 likely would be designated as Category III with a buffer of 50 feet. The buffer width requirements of the Cle Elum Critical Areas Ordinance would be applied. As described in the Draft EIS, the hydrological isolation and small size of Wetlands 4 (0.1 acre) and 5 (0.3 acre) limit their potential habitat value to waterfowl.

Comment 63

Comment noted. Current WDFW regulations prohibit fishing for, or retaining, bull trout, steelhead, and salmon in the Cle Elum River. Anglers may fish for other game fish June 1

through October 31. It is WDFW's responsibility to monitor and adjust regulations to conserve and protect fish resources.

Comment 64

Refer to the response to Letter 36, Comment 20.

Comment 65

Comment noted.

Comment 66

Comment noted. Development proposed in Planning Area T under Alternatives 2, 3, and 4 has been removed under Alternative 5.

Comment 67

Sensitive plant species are discussed in Section 3.6 of the Draft EIS and Section 3.5 of the Final EIS. Of the 38 plant species listed in Table E-3 (Appendix E in the Draft EIS) as potentially occurring within the UGA, 26 are described as unlikely to occur because of a lack of appropriate habitat within the UGA. Nine of the 12 plant species that occupy habitat types within the UGA occur in wetlands and riparian corridors. Retaining wetlands and the geomorphic floodplain of the Cle Elum River within the UGA as undeveloped open space is discussed in Section 3.6 of the Draft EIS. The remaining three sensitive plant species are associated with forested upland habitat. Areas of native forested vegetation will be retained within the UGA as undeveloped open space.

Comment 68

Management of wetlands and priority habitats is discussed in Section 3.6 of the Draft EIS and would occur in accordance with the City of Cle Elum Critical Areas Ordinance.

Comment 69

Under Alternative 5, the area of undeveloped open space known as the Cle Elum River corridor has been expanded to include what was Planning Area T under Alternatives 2, 3, and 4 and the adjacent west ridge.

Comment 70

Section 3.6.4 of the Draft EIS identifies the Cle Elum River corridor as the most significant wildlife corridor within the UGA, and includes a discussion of elk wintering grounds and linkage with offsite habitat. The major identified riparian corridor that connects the UGA with offsite habitat in the MPR and surrounding lands would be retained as undeveloped open space. This

corridor would allow for continued movement to offsite properties where elk feeding still occurs and to other seasonal range areas.

Comment 71

Management of priority habitats and species is discussed in Sections 3.6.3 and 3.6.4 of the Draft EIS. "Fish and wildlife habitat conservation areas associated with Washington State priority species include nesting areas (including species that would be protected under the Migratory Bird Treaty Act), breeding areas, and migratory routes/destinations identified by WDFW within the UGA occur in areas that will be retained as undeveloped open space."

Mitigation identified in the RIDGE Settlement Agreement addresses concerns over purchase of adjacent land and management of the Cle Elum River corridor.

Comment 72

Under Alternative 5, the golf course has been eliminated.

Comment 73

Additional use of offsite recreational resources is acknowledged in both the Draft and Final EISs. Quantifying numbers of potential users to surrounding recreation areas would be speculative and likely inaccurate. An analysis of increased human pressure on fishing resources has been added to Section 3.6, Fisheries, of the Final EIS.

Comment 74

Comment noted. The *Draft Bullfrog Subarea Plan* contains a discussion of park requirements, including "pocket parks" or "mini-parks." Mini-parks are typically 0.25 to 0.5 acre in size and are improved with minimal passive recreational facilities and, typically, children's play equipment. These parks would be located in the residential parcels. The precise locations of these parks would be determined during the parcel platting stage. Section 3.15 of the Final EIS contains additional discussion of park mitigation requirements.

Comment 75

Nowhere in Section 3.14 of the Draft EIS is there any statement that recreation-related impacts would be minimal and capable of being mitigated by existing recreational facilities in the area. Refer to Table 3.14-2 and the accompanying discussion, which summarize the need for new recreational facilities in the UGA to comply with the City of Cle Elum's level-of-service goals, and how the project would mitigate those impacts.

Comment 76

Refer to the response to Letter 26, Comment 2 and to the updated Section 3.10, Population and Housing, in the Final EIS.

Comment 77

Under the terms of the RIDGE Settlement Agreement, all access to the Cle Elum River shall be offered on an equal basis to all Kittitas County residents, MPR and UGA residents, and guests. River access would be managed and/or restricted to: (1) protect salmon spawning areas, (2) restrict motor vehicle use inside the river corridor, and (3) protect fish, fish habitat, and shoreline areas.

The Alpine Lakes Wilderness Area has been added to Section 3.13 of the Final EIS.

Snowmobiles must be licensed, have appropriate mufflers, and operated in a safe manner, consistent with the City of Cle Elum's code requirements.

Comment 78

Comment noted. The Cle Elum UGA Master Site Plan Application, described as Alternative 5 in Section 2.5 of this Final EIS, includes approximately 418 acres of open space, only a small portion of which is located within steep slopes and wetland floodplains. In particular, Alternative 5 proposes to retain the entire lower bench along the Cle Elum River as open space, including substantial acreage outside of the 100-year floodplain. The golf course has been eliminated from Alternative 5, although it is a potential use discussed in the *Draft Bullfrog Subarea Plan*. In addition, Alternative 5 includes a proposed community park and recreational center on approximately 12 acres and a neighborhood clubhouse and lake on approximately 18 acres.

Comment 79

Refer to the response to Letter 25a, Comment 28 for effects on groundwater quality and the potential for influence to offsite surface waters. Refer to Section 3.3 and Appendix A of the Final EIS for additional detail. Coal mine hazard areas are discussed in Section 3.1 of the Draft EIS and potential impacts are low.

Comment 80

Refer to page 3.1-12 of the Draft EIS for a discussion of existing coal mine hazards in the UGA area. On page 3.1-21, the Draft EIS discusses why the potential for future coal mine subsidence in the UGA is low.

Comment 81

Refer to the responses to Letter 12, Comment 7 and Letter 25a, Comment 28.

Comment 82

Under Alternative 5, wood-burning fireplaces and woodstoves would be prohibited in all residential units within the Cle Elum UGA.

Carbon monoxide (CO) concentrations were modeled in the Draft EIS with EPA-approved computer programs during conditions of winter inversions. Because the future CO concentrations under all alternatives are expected to be well below the National Ambient Air Quality Standards, air quality mitigation measures would not be required for traffic emissions of CO. Any traffic mitigation measures to reduce traffic volumes or improve intersection level-of-service under Alternative 5 or the MPR correspondingly would reduce cumulative air pollution. Increased snowmobile use would occur during the winter and temporary, localized air quality impacts could occur during snowmobile operation depending on the number of snowmobiles in use in a specific area. These impacts would not result in significant impacts on overall air quality.

Comment 83

Mitigation measures to reduce construction air quality impacts are identified in the Draft EIS, and additional construction mitigation measures under Alternative 5 are identified in Section 3.2, Air Quality, in this Final EIS. Section 3.2 of this Final EIS has been updated to evaluate outdoor burning impacts and mitigation measures under Alternative 5 during the land-clearing phase of construction. Construction phasing is discussed in Chapter 2 of the EIS.

Comment 84

Cumulative construction-related air quality impacts are discussed in Section 3.2 of the Draft EIS and in Section 3.2 of the Final EIS. Cumulative construction impacts under Alternative 5 would be similar to Alternatives 2, 3, and 4, and are not anticipated to be significant because construction activities between the MPR and UGA are geographically separated and mitigation measures would be put in place to control particulate matter and CO emissions.

Comment 85

Authoritative agencies, particularly Washington Employment Security, do not regularly monitor Upper Kittitas County separately from Kittitas County as a whole. Where possible, economic trend descriptions throughout Kittitas County have been updated in Chapter 3.17, Economic Conditions, to reflect newly released economic data.

Comment 86

Salary figures are in 1999 dollars unless expressed otherwise. It is reasonable to assume that in the future, salaries would at least keep pace with inflation of around 2.5% annually.

Comment 87

Based on surveys of area destination resorts, these types of developments do not measurably inflate existing property values and property tax bills in the Pacific Northwest (Johnson Gardner 2001).

Comment 88

Negative financial impacts on local senior citizens are not expected because: (1) surveys of destination resorts have shown that existing property values and property tax bills in the Pacific Northwest are not measurably inflated, (2) Washington voters have approved property tax growth caps (including I-747), and (3) property tax and utility programs to help senior citizens exist in Kittitas County. Consistent with the terms outlined in the Pre-Annexation Agreement between the City of Cle Elum and Trendwest, existing citizens and ratepayers should not suffer negative financial impacts as a result of Trendwest development activities within the UGA.

Comment 89

Refer to the response for Letter 16, Comment 3.

Comment 90

Comment noted. UGA traffic would travel into Cle Elum. Improvements would be needed at several locations to maintain traffic operations. Mitigation for traffic impacts is outlined in the City's draft Conditions of Approval for the project.

Comment 91

Refer to the response to Letter 36, Comment 88.

Comment 92

Comment noted. Kittitas County added this area to the City of Cle Elum UGA in 1998. It is sized to accommodate the range of OFM population allocated to Cle Elum in the County's Comprehensive Plan. Because the projected buildout of the UGA would take 30 years and the growth population allocations are for 20 years, total City population capacity with the full UGA development and existing city limits is slightly higher than the OFM 20-year projection. Alternative 5 includes significant new open space designation along the Cle Elum River corridor. When this open space area is taken into account, the average residential densities in the UGA are consistent with the Growth Management Act requirements for urban areas, thereby making this an appropriate-sized UGA. Refer to additional discussion of this issue in Section 3.10 of the Draft EIS and Section 3.9 of the Final EIS.

Comment 93

Water supply and wastewater treatment capacity for the City of Cle Elum are discussed in Section 3.17 of the Draft EIS. Expanded City water service and City wastewater treatment services are addressed in two separate agreements between the City of Cle Elum and Trendwest: *Water Supply System Project Development Agreement* dated June 19, 2001 and *Interim Wastewater Treatment Facilities Project Development Agreement* dated July 26, 2000. In addition, the City of Cle Elum, Trendwest, City of Roslyn, Town of South Cle Elum, and other interested parties are pursuing a regional wastewater treatment facilities plan and funding

agreement that is required prior to providing wastewater treatment capacity beyond that provided in the interim wastewater treatment plant improvements described in Section 3.17 of the Draft EIS and Section 3.16 of the Final EIS.

Comment 94

Alternative 5 has been selected as the Preferred Alternative for development in the UGA. By concentrating residential uses in a relatively small residential land base and locating development away from the Cle Elum River corridor, Alternative 5 would provide opportunities for new housing, community recreation, and employment in the UGA, while promoting the preservation of the natural environment within the Cle Elum River corridor. This is consistent with the *Draft Bullfrog Subarea Plan*.

Comment 95

Refer to Section 3.12 for an evaluation of potential impacts on cultural resources under Alternative 5. Mitigation measures have been revised and updated since the Draft EIS was published and are specified in the City's draft Conditions of Approval for the project.

RIDGE Scoping comments/record for Cle Elum UGA 5/7/2001

Since the earliest days of discussion about Cle Elum's Urban Growth Area on Trendwest property, RIDGE has contended that environmental review of the UGA land and Master Planned Resort should be done simultaneously in one package. Due to the interrelationship of facilities in both projects, the resort and the UGA should have been analyzed in a single EIS rather than improperly segmented as they have been. The division between the UGA and the MPR was artificially imposed by Trendwest/Jeld-Wen to avoid mitigation of a multitude of impacts. As approved by the County, the MPR's unmitigated impacts due to comparative scale and monstrous size coupled with similar unmitigated impacts from the UGA will decimate the communities of Roslyn, Ronald, and Cle Elum. 1

RIDGE wishes to go on the record as saying that Trendwest's response to questions regarding their poor planning in both the MPR and UGA has repeatedly been that unresolved issues will be dealt with down the road reasoning these projects have a thirty-year build-out period. We find this response indicative of the inadequate quality of their planning and a strong indicator of Trendwest's carpetbagger mentality proving that they have no long-term commitment to the communities. We view this response as an insult to all Upper Kittitas County residents and communities; many residents have had family living in Roslyn and Cle Elum for over one hundred years and expect to have descendants living on in these communities for another few hundred years. Responsible planning must address all impacts, both short-term and long-term. Any other approach is totally unacceptable and can only be interpreted as the ultimate in short-sighted, inadequate planning. To assist you in scoping for the UGA we are submitting relevant documents for the record. Included are documents related to the City of Roslyn, to the MPR, to water, to wildlife, and to the UGA itself.

We request that these documents be added to the record: 2

A) Final Environmental Impact Statement on MountainStar MPR, Vols.1, 2, & 3
B) Final Development Agreement for MountainStar MPR with all related County Ordinances
C) Kittitas County Development Activities Application, MPR, March 7, 1997
D) Trendwest Agreements from Cle Elum Notebook, 5/2000
E) The "Green Book" Bullfrog Urban Growth Area, City of Cle Elum, 6/23/98
F) Cle Elum Comprehensive Plan
G) Kittitas County Comprehensive Plan
H) Kittitas County Countywide Planning Policies
I) Site Master Drainage Plan for MPR
J) Cle Elum's Critical Area Ordinance
K) Kittitas County's Critical Area Ordinance
L) Cle Elum's Road Standards
M) Kittitas County's Road Standards
N) EIS documents on Cle Elum's Zoning Code Changes re: UGA & MPR
O) Water Transfer Applications for Cle Elum UGA (these documents have been filed with

(208)

the DOE but are not yet available to the public due to the drought emergency)
P) Aerial map of Cle Elum River Corridor including surrounding communities of Ronald, Roslyn, Cle Elum and South Cle Elum, MPR site and UGA land

2 (cont.)

We submit copies of the following documents:

1) OFM Census Figures Based on Census 2000, March 30, 2001
2)Nomination of Roslyn to National Register of Historic Places
3)Comprehensive Plan for the City of Roslyn
4) Washington's Most Endangered Places 2000
5) City of Roslyn's scoping comments MPR, 4/3/1997

6) Letter from BOCC to Cle Elum, Roslyn, & South Cle Elum regarding Resolution 96-203's "special study area" , including copy of Resolution 96-203
7) Summary Proposed Water Delivery Agreement, Cle Elum/ TW
8) Memo of Understanding re: UGA, 4/13/1999
9) Letter TW's Mike Moyer to Mayor Berndt re: UGA, 3/10/98
10) Letter TW to Mayor Berndt re: cooperative wastewater treatment, 4/7/97
11) Letter American Engineering Corp. to Mayor Berndt re: cooperative water system, 4/8/97
12) Letter and response TW's Moyer to Councilmen Goldie and Glondo re: UGA, 4/9/97
13) Letter City of Cle Elum to URA Greiner Woodward Clyde re: interim sewer i improvement work, 9/30/99
14) Letter from URS Greiner Woodward Clyde re: amendment to agreement for wastewater improvement work, 9/24/99
15) Cle Elum Ordinance 1011, Interim Sewer Capacity Improvements Design Fund
16) Cle Elum Resolution 9/28/99-1, policy on Interim Sewer Capacity Improvements
17) Interim Wastewater Treatment Facilities Project Development Agreement Cle Elum, South Cle Elum/ TW, 7/26/2000
18) Addendum No. 1, Cle Elum/ Huibregtse, Louman Associates. 3/14/2000
19) Design, Engineering and Surveying Services Agreement for Cle Elum Water Treatment Project, Cle Elum/TW 5/30/99
20) Easement Cle Elum, South Cle Elum/TW 5/30/99
21) Cle Elum Resolution 3/14/00-1 re: Water rights/supply for TW's MPR
22) Cle Elum Resolution 11/23/99-1 re: Water rights/supply for TW's UGA

3

23) Article, Clubbing Southeast Asia. The Impacts of Golf Course Development, 11/93
24) Timeshare Tribune, Rebound newsletter, 7/2000
25) Article Puget Sound Business Journal, TW Resorts readies $47 million IPO, 5/30/97
26) Questions & Answers Concerning MountainStar Resort, 11/4/97

27) The Biological Case for Preserving Lands in the I-90 Corridor, Cascades Conservation Partnership, 7/10/00
28) Cooperative Agreement WDFW, YIN/ TW 12/4/2000

29) Letter Center for Environmental Law & Policy to Mayor of Ellensburg re: water rights 4/15/98
30) Letter TW to Mayor of Ellensburg re: water right purchase 4/15/98 with Proposal to Transfer
City of Ellensburg Water Rights to TW
31) Letter Perkins Coie LLP to Barwin (DOE) re: water rights change applications, 12/24/98

32) Letter Wash. DOH to Barwin (DOE) re: water rights change applications, 12/31/98
33) Memo of Agreement Kittitas County/ Bureau of Rec. 2/9/99
34) Letter DOE to Kittitas County re: scoping on MPR EIS, 3/24/99
35) Letter Bureau of Rec. to Kittitas County re: MPR water supply, 4/6/99 with attached comments and attached letters from DOE, Kittitas Reclamation District, & Roza Irrigation District
36) Letter DOE to Perkins Coie LLP re: Cle Elum & S. Cle Elum's water rights change applications, 4/22/99
37) Letter Perkins Coie LLP to DOE re: canceling two change authorizations, 5/14/99
38) Letter DOE to YIN re: Cle Elum's proposed change of pt. of diversion, 7/28/99
39) Letter Bureau of Reclamation to Rachel Paschal re: copies of documents related to water supply exchange request 10/27/99
40) Letter DOE to WDFW re: Cle Elum request for change of point of diversion, 7/28/99
41) Letter Rachel Paschal Osborn to DOE re: protest of water transfer applications, 10/27/2000

42) RIDGE Position Paper on MPR's, Doug Kilgore
43) RIDGE scoping comments TW MPR, 11/24/99 (also in Vol.3 of MPR EIS)

44) TW Application for Development Agreement, 12/23/96
45) Letter RIDGE to BOCC re: MPR project application 7/11/2000
46) Letter RIDGE to Kittitas County Planning Commission and BOCC re: TW Dev. Agreement with RIDGE's recommended conditions attached, 7/13/2000
47) Letter 1000 Friends of Washington to Kittitas County Planning Dept. re: MPR Dev. Agreement
48) Letter Rachel Paschal (for RIDGE) to Kittitas County Planning Dept. re: Development Application, 7/17/2000

49) RIDGE's/Rebound's Declaration with Opening Brief, Appeal of MPR FEIS, 5/25/2000 with attachments:
    1) Pre-annexation Agreement (listed as exhibit: submitted with item # 60 as Exhibit 17)
    2) Letter City of Cle Elum to DOE re: modification of Cle Elum NPDES Permit, 2/9/99
    3) Letter Gray & Osborne to DOE re: Roslyn's Comprehensive Sewer & Wastewater Facility Plan, 8/3/99
    4) City of Roslyn Comprehensive Water System Plan, 6/96
    5) City of Cle Elum, Town of S. Cle Elum Comprehensive Water Plan, 7/96
    6) Water Rights Application Tracking System, 5/18/2000
    7) Central Washington Park Foundation SEPA checklist, 4/24/2000
50) RIDGE's/ Rebound's Opening Brief, MPR FEIS appeal, 5/25/00
51) Transcript of RIDGE witnesses MPR FEIS appeal, 7/5/2000 (pp.54-89)
52) Transcript of Mayor Berndt, MPR FEIS appeal (pp. 161- 195)
53) Transcript of Joe Peck, MPR FEIS appeal, (pp. 1- 140)
54) Transcript of Joe Peck, MPR FEIS appeal, (pp. 54- 64)
55) Transcript of Bob Burke, MPR FEIS appeal (pp. 228- 251)
56) Prefiled Testimony of Mayor Berndt, MPR FEIS appeal, 6/13/2000 with attachments
57) Reply Brief, RIDGE/Rebound MPR FEIS appeal, 6/26/2000
58) City of Roslyn's Brief MPR FEIS appeal 4/26/2000

59) RIDGE's Petition for Review to Eastern Wash. Growth Management Hearing Board, 12/7/2000
60) RIDGE's Opening Brief before Eastern Wash. Growth Management Hearing Board, 3/26/01 with attachments:

3 (cont.)

1) Roslyn Comp. Plan (excerpts)
2) Draft EIS (excerpts)
3) FEIS (excerpts)
4) Transcript of EIS appeal hearing (excerpts)
5) Conceptual Master Plan
6) MPR application (excerpts)
7) MPR Conditions of Approval: Condition C-19
8) Staff Report - Third Draft (Aug.1, 2000) (excerpts)
9) Kittitas County Comp. Plan (excerpts)
10) Stipulation RE: Lack of Water Rights (July 5, 2000)
11) City of Cle Elum Resolution 11/23/99-1
12) City of Cle Elum Resolution 3/14/00
13) Pre-filed Testimony of Chris Lawson (excerpts)
14) Letter from DOE to Kittitas County, 7/11/00
15) Letter from DOE to Kittitas County, 3/18/99 with attached comments of Barwin
16) PUD Chapter of Kittitas County Zoning Code (Chapter 17.36.KCC)
17) Preannexation Agreement, revised 5/18/00
18) Letter from Mayor Berndt to DOE, 2/9/99
19) City of Roslyn Comp. Water System Plan 6/96
20 City of Cle Elum/ S. Cle Elum Comp. Water Plan, 7/96, draft

61) RIDGE's Reply Brief on the Merits, Superior Court, 3/12/01
62)RIDGE's Opening Brief on the Merits, Superior Court, 3/30/01
63)RIDGE's Supplemental Brief on Findings, Superior Court, 3/30/01

64) Forest Ecosystem Management Report, July 1993
65) Dept. of the Interior, 50 CFR Part 17, Fish and Wildlife Service
66) *Deer and Elk* excerpt of "Wildlife Habitat in Managed Forests"
67) Distribution of Mule Deer and Elk in Relation to Roads
68) *Big Game of North America* excerpt
69) *Domestic Dogs as Predators on Deer*
70) Graphs of Yakima River Flows at Richland, Horn Rapids Dam, Benton City, etc.
71) Wash. State EIS for Black Bear Management, Sept. 1996
72) State of Wash. Assessment of Elk Population Trends and Habitat Use, 1/1999
73) Living with Wildlife: Cougars
74) Living with Wildlife: Black Bears
75) Wash. State Management Plan for Black Bear
76) Wash. State Management Plan for Elk
77) Spring Chinook and Redd Counts in Yakima Subbasin
78) WDFW Weekly Report: re: Cougar and bear complaints in Roslyn

79) DEIS I-90 Land Exchange USFS/Plum Creek
80) FEIS I-90 Land Exchange, EIS Vol. 1, excerpt
81) FEIS Snoqualmie Pass Adaptive Management Area Plan
82) DOT Snoqualmie Pass Closures, 12/1999- 3/25/2000
83) FEIS Snoq. Pass Adaptive Management Area Plan, excerpt from Summary

84) Kittitas County Ordinance 2001-04, Amendment to Zoning Atlas for Deneen's Port Quendall Development

85) Yakima Herald Republic, *Judge Affirms Ruling to Halt Local Board Action on Water Rights*
86) Letter Larry Nickel, Kittitas County Water Quality/Quantity Coalition, re: TW EIS i inadequacy , 7/5/2000

3 (cont.)

87) Judgment on Statewide Water Issues
88) Letter with Questions, Larry Nickel to Kittitas County re: Hydraulic Continuity, Aquifer Recharge, 9/13/1999
89) EHB 1350, Committee on Envir., Energy and Water re: appeals of DOE decisions regarding changes or transfers of water rights , adopted, 4/21/01
90) Letter Bureau of Reclamation to DOE regarding Concerns for Trendwest Water Rights Applications and Resort Proposal, 10/30/2000
91) Letter Kittitas Reclamation District to DOE re: TW water rights transfers, 10/26/2000
92) Letter City of Roslyn to DOE re: protest of TW water rights transfers, 10/25/2000
93) Letter Oshie & Spurgin for YIN re: protest of TW water rights transfers 10/30/2000
94) Letter Kittitas County Water Quality/Quantity Coalition to DOE re: protest of TW water rights transfers, 10/24/2000
95) Letter Peg & Tom Whitaker to DOE re: protest of TW water rights transfers, 10/26/2000
96) E-Mail Joe & Shirley Gardner to DOE re: protest of TW water rights transfers, 10/27/2000
97) E-mail Henry Fraser to DOE re: protest of TW water rights transfers, 10/30/2000
98) Letter Shannon Cernick to DOE re: protest of TW water rights transfers, 10/30/2000
99) E-mail Jim & Julie Steves to DOE re: protest of TW water rights transfers, 10/27/2000
100) E-mail John D. Jordan to DOE re: protest of TW water rights transfers, 10/27/2000
101) Letter John D. Jordan to DOE re: protest of TW water rights transfers, 10/27/2000
102) Letter Chairein Coughtry to DOE re: protest of TW water rights transfers, 10/23/00
103) Letter Jim and Wanda Munroe to DOE re: protest of TW water rights transfers, 10/29/00
104) Letter Lea Beardsley to DOE re: protest of TW water rights transfers, 10/30/2000
105) Letter Christy Mirande to DOE re: protest of TW water rights transfers, 10/26/00
106) Letter Kristin Karns to DOE re: protest of TW water rights transfers, 10/26/00
107) Letter Scott Karns to DOE re: protest of TW water rights transfers 10/26/00
108) Letter Brian Woldseth to DOE re: protest of TW water rights transfers, 10/19/00
109) Letter Julie Miller to DOE re: protest of TW water rights transfers, 10/26/00
110) Letter Millie Radonovich to DOE re: protest of TW water rights transfers, 10/24/00
111) Letter Marie Fischer to DOE re: protest of TW water rights transfers, 10/13/00
112) Letter Marjorie Lumsden to DOE re: protest of TW water rights transfers, 10/12/00
113) Letter Olivia Litzenberg to DOE re: protest of TW water rights transfers
114) Letter James Begley to DOE re: protest of TW water rights transfers
115) Letter Heidi M. Ofredal to DOE re: protest of TW water rights transfers
116) Letter Larry Susich to DOE re: protest of TW water rights transfers
117) Letter Doug Johnson to DOE re: protest of TW water rights transfers
118) Letter Francis Paul Sikon to DOE re: protest of TW water rights transfers
119) Letter Sandra Tingaud to DOE re: protest of TW water rights transfers
120) Letter Halverson & Applegate for Harry H. Siepmann to DOE re: protest of TW water rights transfers, 10/30/00
121) Letter Halverson & Applegate for WH Bill Mundy to DOE re: protest of TW water rights transfers, 10/30/00
122) Letter Halverson & Applegate for Teanaway River Ranch Assoc. to DOE re: protest of TW water rights transfers, 10/30/00
123) Letter Halverson & Applegate for Teanaway Ranch Inc. c/o Linda Nordstrom to DOE re: protest of TW water rights transfers, 10/27/00
124) Letter Halverson & Applegate for Lavinal, Inc. to DOE re: protest of TW water r rights transfers, 10/27/00
125) Letter Halverson & Applegate for Ellensburg Water Company to DOE re: protest of TW water rights transfers, 10/27/00
126) Letter Halverson & Applegate for City of Ellensburg to DOE re: protest of TW water rights transfers, 10/30/00

3 (cont.)

127) Letter Halverson & Applegate for Cascade Irrigation District to DOE re: protest of TW water rights transfers, 10/30/00
128) Letter Halverson & Applegate for Mr & Mrs Fred Knoll, Mr and Mrs Steven Minalia, and Mr Tim Knoll to DOE re: protest of TW water rights transfers, 10/30/00
129) Letter Halverson & Applegate for Big Creek Water Users c/o David Lund to DOE re: protest of TW water rights transfers, 10/27/00

130) Letter Halverson & Applegate for West Side Irrigating Co. c/o Frank A. Gergerich to DOE re: protest of TW water rights transfers, 10/30/00
131) Letter Halverson & Applegate for Pat & Mary Burke to DOE re: protest of TW water rights transfers, 10/27/00
132) Letter Halverson & Applegate for Liberty Townsite to DOE re: protest of TW water rights transfers, 10/27/00

133) Supplemental Documentation in Support of TW Applications to DOE for Transfer of Water Rights, Mentor Law Group 9/2000
134) Application for Change of Water Right, No. 01724 Pautzke Bait Co. Inc. to Trendwest, 5/1/00
135) Application for Change of Water Right, Pautzke Bait Co. Inc. to TW, 5/1/00
136) Application for Change of Water Right, Pautzke Bait Co. Inc. to TW, 5/1/00
137) Application for Change of Water Right, First Creek Water Users to TW, 5/1/00
138) Application for Change of Water Right, First Creek Water Users to TW, 5/1/00
139) Application for Change of Water Right, Donald & Gloria Walker to TW, 5/1/00
140) Application for Change of Water Right, Walkers, 5/1/00
141) Map, First Creek Water Users Property
142) Map, Gentry Property
143) Map, Hartman Property
144) Map, Hartman Property
145) Map, Walker Property
146) Map, Walker Property @ 1
147) Map, Walker Property @ 2
148) Map, Walker Property @ 3
149) Map, Walker Property @ 4
150) Map, Walker Property @ 5

151) Agreement for Payment of Professional/ staff/consultant services, City of Cle Elum and Trendwest 12/22/99
152) Agreement for EIS Review and for EIS Consultant Services, Cle Elum and TW, with attachments, 11/2/99

153) GMA Publication *About Growth*, Winter 2000-2001

154) Letter DCTED to BOCC re: Proposed Ordinance for MTStar Resort Subarea, 7/17/2000
155) Letter Aramburu & Eustis for REBOUND re: MTStar Subarea & Dev. Agreement, 8/9/00
156) Letter Superintendent of Cle Elum School District to BOCC re: MPR & UGA, 7/5/2000
157) Letter Rachel Osborn for RIDGE re: MPR Development Agreement, 9/20/00

158) YIN Opening Brief FEIS Appeal on MPR
159) WDFW Opening Brief FEIS Appeal on MPR
160) WDFW List of Witnesses
161) City of Roslyn's Reply Brief, FEIS Appeal on MPR

3 (cont.)

162) National Audubon Society disclaims ties to golf sanctuaries, 6/7/98

163) Letter Fisher Consulting Services to RIDGE re: Biological Significance of Cle Elum River Property, 4/19/01
164) Map Deer Road-kill Distribution along I-90

165) Letter Cascade Conservation Partnership to Senators Gorton & Murray re: funding for federal land acquisition, 7/17/2000
166) Map of Cascade Conserv. Partnership Priorities

167) A Compilation of Info re: Noise
168) Guidelines for Urban Noise Ordinance
169) Noise Pollution Clearinghouse *Noise, Sovereignty, and Civility*
170) Noise Pollution Clearinghouse, *Fact Sheet, Noise effects on Wildlife*
171) Massachusetts Sec. 721.560 *Construction Noise Control*

172) Ordinance, City of Redmond re: exterior lighting standards
173) Chapter 15.10 Outdoor Lighting Control
174) Chapter 18.84 Deschutes County Oregon, Landscape Management

175) E-Mail Housing Trust Funds/Linkages 4/12/01
176) Letter Housing Trust Fund Project to Len Norwitz re: housing trust funds, 4/16/01
177) *Aspen's affordable housing program helps create community*
178) News from the Housing Trust Fund Project, Winter 00-01

179) DOE *Did you know?*
180) USDA Dust Palliative Selection and Application Guide
181) Response of Deer to Density and Distrib. of Housing in Montana
182) WAC 173-400-040 General Standards for maximum emissions
183) WAC 173-425 Outdoor Burning
184) Clean Air Washington
185) Wash. Clean Air Act, Chapter 70.94
186) Guide to Handling Fugitive Dust from Construction Projects

187) Nasdaq report re: TW: Risks associated with developing MTStar
188) TW letter to Kittitas County Residents, 1/7/97

189) Roslyn Houses Currently Not Receiving Water But Potential Customers
190) Roslyn Title 14, Subdivisions
191) Roslyn Chapter 10.30 Delayed Benefit Agreements Authorized
192) Roslyn Chapter 10 excerpt , re: water services
193) Roslyn Chapter 10 excerpt, re: sewer services

194) Letter Plum Creek to Roslyn Mayor Gerth re: "higher and better use lands", 12/4/00 with letter 12/9/00 from Gerth to Plum Creek attached, also map *Yakima Unit Higher and Better Use Lands*
195) Letter Gray & Osborne to Cle Elum re: Roslyn's Sewer & Wastewater Facility Plan, 10/26/00
196) Letter City of Roslyn to DOE re: Regional Sewage Treatment Plan, 10/30/00
197) Letter City of Roslyn to Cle Elum re: Regional Sewage Treatment Plan with G &O comments attached
198) Letter Cle Elum to Roslyn re: Roslyn's cost of planning for regional sewer, 12/28/00
199) Minutes Roslyn City Council 1/9/01 re: cost of UGA on Roslyn

3 (cont.)

200) Letter G &O to Mayor Gerth re: cost of reviewing Sewage Facility Plan, 2/1/01
201) Letter City of Roslyn to DOE re: sewage treatment plan 3/8/01 with attachments
202) Letter G&O to Mayor Gerth: re: Roslyn's sewage treatment plan, 4/18/01
203) City of Roslyn Expenditures re: NPDES Compliance
204) Map, K. County Public Works, Ronald & Roslyn 7/10/00
205) Map City of Roslyn Zoning
206) Roslyn Chapter 10.16, Cemetery Rates, Rules, & Regs
207) City of Roslyn Letter to TW re: Roslyn documents re: negotiations between TW & RIDGE, with attachments

208) Cle Elum UGA DEIS: RIDGE Narrative Comments, 5/7/01, including index of all items submitted on the Cle Elum UGA DEIS record
209) REBOUND Cle Elum UGA DEIS Traffic Comments, 4/25/01
210) REBOUND Cle Elum UGA DEIS Fiscal Comments 5/2/01
211) Notes, Len Norwitz & Thelma Simon re: money Cle Elum has received from Jeld-Wen/ Trendwest since May-June 1997

212) RIDGE's Reply Brief on EIS Issues, Superior Court
213) RIDGE's Reply Brief on the Merits, Superior Court (with attachments)
214) Letter, Edmund Januszkiewicz to Cle Elum re: concerns about stormwater management in UGA
215) Computer Disk containing Manual DOE *Stormwater Management Manual for Western Washington*, Vols. I - V, August 2000 including hard copies of manual organization, and tables of contents of volumes I - V

216) Letter DOE to Kittitas County Planning Dept. re: MPR project Application and Development Agreement, 7/11/00
217) Letter Bureau of Reclamation to DOE re: letter of concern re: TW water right applications and resort proposal 10/30/00
218) Letter DOH to Jon Barkee, TW, re: DOH comments on MPR water system plan, 2/14/01 with attached DOE letter, 12/11/00
219) Letter Pacific Groundwater Group to DOE re: Evaluation of Issues for Determinatic of Environmental Benefit from TW MPR Water Right Transfer Applications, 2/16/(
220) DOE letter to Pacific Groundwater Group re: TW water right applications Issue Pap dated Feb. 16, 2001, 3/12/01

221) Chart: Cle Elum Water Improvement Schedule
222) Easement between Cle Elum, S. Cle Elum and Jeld-Wen re: water utility system, 5/30/99
223) Tables Cle Elum's & S. Cle Elum's Water Storage Requirements, from Comprehensive Water Plan, 10/97, with attached map
224) Advertisement for Bids, City of Cle Elum 1996 Sewer System Improvements, 7/22/96
225) Chapter 8, Cost Analysis from City of Cle Elum 1991 Facility Plan Addendum, Feb. 1997

226) Letter Belew for RIDGE re: UGA DEIS 5/7/01 with attached abstract Smithsonian Magazine article, *What's green, has holes, and is larger than Delaware and Rhode Island Combined?* (4/97) and attached *Environmental Principles for Golf Courses in the US* and attached Preliminary Evaluation of Pesticides Used by the City of Seattle

3 (cont.)

227) Letter David Bricklin for RIDGE re: comments on Cle Elum's UGA DEIS, 5/7/01 with attached comments from Rachel Paschal on water quality/supply
228) Letter Pacific Groundwater Group to DOE re: TW MPR Environmental Review Outline, 4/26/01

229) Ad NKC Tribune for Alpine Land Company, 5/3/01

3 (cont.)

Comment 1

Comment noted. Refer to the response to Letter 4, Comment 2. The Final EIS acknowledges the RIDGE Settlement Agreement, which was negotiated after the Draft EIS was issued.

Comment 2

Comment noted. The Final EIS acknowledges the RIDGE Settlement Agreement, which was negotiated after the Draft EIS was issued.

Comment 3

The City of Cle Elum acknowledges receiving these documents.

MAY-07-2001 11:08AM FROM-BRICKLIN & GENDLER LLP 206-621-0512 T-118 P.002/006 F-778

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE, SUITE 1015
SEATTLE, WA 98101
(206) 621-8868
FAX (206) 621-0512

DAVID A. BRICKLIN
MICHAEL W. GENDLER
DAVID S. MANN

JENNIFER A. DOLD
CLAUDIA M. NEWMAN

May 7, 2001

Gary Berndt
Mayor
City of Cle Elum
119 West First Street
Cle Elum, WA 98922

Re: Cle Elum UGA: DEIS

Dear Mayor Berndt:

I write on behalf of RIDGE to provide comments to certain aspects of the above-referenced DEIS.

It appears that there is an inadequate description of the governmental action which triggers the legal requirement to prepare an EIS. The DEIS is drafted as if the proposed action were Trendwest s development plans. But Trendwest s development plans are not a governmental action and do not by themselves trigger a requirement to prepare an EIS. The governmental actions which trigger the need to prepare an EIS are the adoption of things such as comprehensive plan amendments, zoning regulations, and development agreements. 1

In my review of the DEIS, I have been unable to find any place where those governmental actions are described in any detail. Without an adequate description of the governmental actions being contemplated, it is impossible the City to prepare an adequate EIS and impossible for others to prepare comprehensive comments. 2

At a minimum, the governmental action presumably would be an amendment of the City s Comprehensive Plan (perhaps in the form of the adoption of a Subarea Plan). Consequently, there should be a description of a proposed Comprehensive Plan amendment and alternatives to that proposal. Then there should be an analysis of the consistency of that proposed Comprehensive Plan amendment (and the alternatives) with the comprehensive plans of adjacent jurisdictions, with the Countywide Planning Policies, and with other elements of the City s own Plan.. There appears to be no analysis of the consistency with the CPPs and only superficial analysis of consistency with the others. For instance, there appears to be no discussion of the extent to which housing supply from the 3

227

UGA together with housing supplies elsewhere in the City relate to the Plan s existing assessment of the City s housing needs. Indeed, in the absence of a proposed Comprehensive Plan amendment (and/or Subarea Plan), it would seem to be impossible to engage in meaningful inter-jurisdictional or internal consistency analyses at this time. 3 (cont.)

RIDGE continues to oppose the segmentation of analysis of development of the UGA from analysis of the development of the MPR properties. Rather than reiterate all of the bases for that objection in this letter, we are incorporating by reference our analysis of the segmentation issue that has been provided to the City in its capacity as a party to the pending Superior Court and Growth Management Hearings Board appeals pertaining to the MPR. (RIDGE is submitting those materials to you for this record under separate cover.) We supplement those referenced materials by noting that there are additional disclosures in this DEIS that corroborate our view that the MPR is dependent on development of the UGA. For instance, the housing analysis here confirms that there are inadequate housing supplies elsewhere in the Upper County to supply the needs created by development of the MPR. It is only by providing for substantial residential development within the UGA that the housing needs generated by the MPR can be satisfied. 4

The EIS fails to provide an adequate description of sewage treatment issues. First, it fails to provide a complete and adequate description of Cle Elum s current plans for a regional wastewater treatment plant. In the past, the term regional has been applied to two very different sewage treatment plant proposals. Initially, the term regional was applied to a relatively small treatment plant that did not include capacity for any of Trendwest s property. It is our understanding that later those plans were abandoned or put on hold and a decision was made to build a much larger facility. It is our understanding that two-thirds of the capacity of the larger facility now under consideration would be provided for development of Trendwest s lands. The description of the current proposed regional treatment plant is very unclear in the DEIS and needs to be expanded significantly. How does the current regional facility compare in size to the former regional facility? How much of the current regional facility s anticipated capacity would be based on needs anticipated from Trendwest s UGA property and, separately, how much would be derived from Trendwest s MPR property? 5

The EIS should make clear whether the sewage treatment plant that is now currently envisioned would be built if the MPR were not built. If not, how will sewage treatment be addressed differently if the MPR does not go forward? 6

Similarly, the EIS should make clear what type of sewage treatment plant would be constructed under the No Action alternative if the MPR goes forward and if it does not. The DEIS fails to distinguish clearly (if at all) between those two scenarios.

There is a brief discussion of a stand alone treatment plant at 3.17 -23. There it is acknowledged that the treatment plant would likely be located in the UGA. Where? How big would its footprint be? What type of odor control and visual screening would be employed? The impacts of a stand alone plant cannot be assessed without more detailed information like that. 7

Has Cle Elum assessed the technical, legal, and practical feasibility of a stand alone plant? What are the results of that analysis? Testimony provided during the MPR EIS hearings indicated that it was very unlikely that a stand alone facility could be developed. Again, rather than reiterate that analysis, we incorporate by refernce our previously prepared legal memoranda pertaining to that issue which RIDGE is submitting separately. In addition, we incorporate by reference the comments of the Department of Ecology (Bob Barwin) pertaining to that issue. We would like a response to the statements from Mr. Peck (the City of Roslyn) and Mr. Barwin that indicate that a stand alone facility is, for a variety of reasons, very unlikely. 8

There also ought to be discussion of how sewage treatment issues would be addressed if the MPR does not go forward but the UGA does. The City and Trendwest have asserted that the MPR and UGA are not linked in this regard. If that were the case, then this EIS ought to include an analysis of sewage treatment issues in the event that the UGA goes forward without the MPR. Please provide such an analysis. 9

Similar concerns apply to the DEIS discussion of domestic water treatment issues. For instance, there is an inadequate discussion of the existing plans for water treatment by the City of Cle Elum. There is an inadequate distinction made between the existing plans with and without the MPR. There is an inadequate description of the extent to which the water treatment facilities described under Alternatives 2-4 are dependent upon development of the MPR. Presumably, different facilities would be prepared if the MPR does not go forward but this is not discussed. 10

Throughout the document, population figures should be revised to reflect the recently released 2000 census data. This also will require revision of a variety of housing, economic, and other analyses that flow from current population figures. 11

Similarly, if the OFM 2001 population projections are available before the FEIS is published, those should be utilized in lieu of the older projections used in the DEIS. 12

The DEIS states that to mitigate the additional population projected to result from development of the UGA (under Alternatives 2-4) that the City will amend its Comprehensive Plan to reflect the County s use of the OFM high series population projections. See FEIS at 3.11-28. This appears to be a *non sequitur*. Please explain in 13

what sense this constitutes mitigation. Amending the Comprehensive Plan in this manner does not seem to reduce or eliminate the impacts and therefore does not appear to constitute mitigation. 13 (cont.)

The DEIS is far too ambiguous in stating that development of the UGA could result in higher than projected population for Roslyn and South Cle Elum (3.11-30) and that it could limit the City s ability to provide affordable housing consistent with Cle Elum s affordable housing goals (id.). The EIS should include a better assessment of the likelihood of these impacts resulting and also include an assessment of the magnitude of these impacts. Decision makers and the public are not served by a document which couches its so-called analysis in such ambiguous terms. 14

The air pollution analysis wholly omits any discussion of the project s impacts in terms of greenhouse gas emissions. Automobiles are one of the major sources of greenhouse gas emissions. There probably is no more serious environmental problem facing this country than figuring out how to reduce its greenhouse gas emissions. The EIS acknowledges that there is increasing amounts of commuting from the Upper County into the King County metropolitan area. The EIS needs to clearly state a prediction of the number of vehicle miles that will result from commuters (and others) if the UGA is developed and then translate that figure into a quantity of greenhouse gas emissions. An alternatives analysis needs to be prepared which considers the potential for providing housing far closer to the Seattle metropolitan area for persons who work in that area. Transit, trip reduction, car pool/vanpool, and other alternatives should be analyzed for reducing total vehicle miles and greenhouse gas emissions. 15

The EIS includes a mundane discussion of solid waste issues (e.g., is there room at the dump?). Development of a new community from scratch provides unusual and exciting opportunities for making recycling easier than throwing things away. The EIS should explore options for facilitating reuse and recycling of domestic and construction materials. In terms of a Comprehensive Plan policy, consideration should be given to including language that would direct the City in its implementing regulations and permits to do far more than the status quo in terms of encouraging reuse and recycling. If this EIS is used for a zoning ordinance, too, then these general policies could be fleshed out in that document and, if this document is also to be used for development agreements and other permits, then even more detail would be required. 16

The EIS is similarly deficient regarding use and conservation of energy. At the Comprehensive Plan, zoning, and permitting stage, consideration should be given to the means by which energy demand could be reduced, for instance, by siting requirements to maximize solar heating in 17

winter and minimize air conditioning demands in the summer; and to explore possibilities for solar powered and other green energy sources.

I would appreciate a meaningful response to these and other comments from RIDGE. Thank you for your time and consideration.

17 (cont.)

Very truly yours,

BRICKLIN & GENDLER, LLP

David A. Bricklin

DAB:psc

Enclosure

Comment 1

The City of Cle Elum's proposed action is described in the Fact Sheet and Section 1 of the Draft EIS and includes adoption of a subarea plan, zoning regulations, a SEPA planned action ordinance, and a development agreement. The discussion of the governmental actions has been expanded and updated in the Fact Sheet and Summary of the Final EIS.

Comment 2

The *Bullfrog Urban Growth Area Report,* which was issued by the City in June of 1998 and forms the basis of the proposed subarea plan, is described in Section 2 and Section 3.10 of the Draft EIS. Alternative land use plans both for the City's subarea plan and zoning actions as well as for Trendwest's project application are described in Section 2 of the Draft EIS. Consistency of the project with the *Bullfrog Subarea Plan* is discussed in Section 3.10 of the Draft EIS. Section 1 and Section 3.9 of the Final EIS include a discussion of these actions in the context of Alternative 5.

Comment 3

Refer to the response to Comment 2, above.

Comment 4

The State Environmental Policy Act (SEPA) allows for the separate review of projects that are fundamentally independent of one another. As discussed in detail in the pleadings submitted by Trendwest and the City of Cle Elum in *RIDGE v. Kittitas County, et al* (Yakima County Superior Court Docket No. 00-2-02761-2), the MPR proposal could proceed independent of development of the UGA and vice versa. While some employees of the MPR would likely live within the UGA, that fact alone does not inseparably link the MPR and UGA for purposes of SEPA review. Further, in the above-referenced Superior Court proceeding, the judge has ruled that separate SEPA review of the MPR and UGA was within the County's discretion (Memorandum Opinion Re: Appeal, May 29, 2001).

Comment 5

A discussion of projected flows, loadings to the Yakima River, and the planning process for construction of the wastewater treatment plant has been added to Section 3.16, Utilities, of the Final EIS. The City of Cle Elum is lead agency for that project. A discussion of the regional plant also is contained in Appendix E of the Final EIS.

Comment 6

The water and wastewater treatment plants currently in the design and planning phases are facilities proposed by the City of Cle Elum to implement the City's water and wastewater comprehensive plans. Some upgrade of these treatment plants, and accompanying environmental evaluations, would have been necessary to meet the City's projected demand even without the

Trendwest project in the UGA. The City of Cle Elum is lead agency on construction of both the water and wastewater treatment plants and is responsible for the environmental review and compliance requirements. The City of Cle Elum, City of Roslyn, Town of South Cle Elum, and Trendwest are continuing discussions regarding shared funding and construction of a Regional Wastewater Treatment Facility that would handle wastewater from each of those jurisdictions and the MPR and UGA. The City has decided to prepare an environmental impact statement for this facility, which would consider alternatives to the proposed action.

Comment 7

A standalone wastewater treatment plant is no longer proposed.

Comment 8

Refer to the response to Comment 7, above.

Comment 9

Refer to the response to Comment 6, above.

Comment 10

Refer to the response to Comment 6, above. In addition, the City of Cle Elum completed its SEPA review of the proposed water treatment facilities by issuing a Mitigated Determination of Non-significance on January 18, 2001. Comments were received from Bonneville Power Administration, Kittitas County Planning, and the Department of Ecology. No appeal of the Mitigated Determination of Non-significance was filed. In August 2001, the City of Cle Elum and U.S. Department of Agriculture issued a Draft National Environmental Policy Act (NEPA) Environmental Report on the water treatment plant and related facilities.

Comment 11

The analysis of Alternative 5 contained in the Final EIS reflects data from the 2000 Census that was available at the time of publication.

Comment 12

Comment noted. OFM projections were not available at the time of publication of this document.

Comment 13

The full array of plans, policies, and regulations that local agencies use to guide, condition, approve, or disapprove development proposals is considered to be legitimate mitigation of potential project impacts. Refer to Section 3.10 of the Final EIS for an updated discussion of proposed mitigation for population and housing impacts.

Comment 14

Refer to the response to Letter 26, Comment 2 for a discussion of affordable housing mitigation. Section 3.10 of the Final EIS has been updated to reflect proposed mitigation measures.

Comment 15

Section 3.2 of the Final EIS has been updated to reference the fact that additional traffic would emit "greenhouse" gases, primarily carbon dioxide. Potential increases in vehicle miles traveled from residents that may commute to King County cannot be predicted with any accuracy and thus, a quantified analysis of "greenhouse" gases would also be highly speculative and was therefore not completed. An alternative of providing housing closer to the Seattle metropolitan area would not meet the objectives of the proposal.

Comment 16

Comment noted. Since the Draft EIS was published, Kittitas County and Trendwest have developed a proposed Solid Waste Management Plan Amendment dated November 2001 that addresses solid waste management issues for both the MPR and the UGA, including discussion of recycling and waste reduction. The policies and strategies contained in that document, once adopted by Kittitas County, would apply to UGA development. Additional discussion of solid waste impacts and mitigation measures is contained in Section 3.16 and Appendix E of the Final EIS. Refer also to the responses to Letter 2.

Comment 17

Comment noted. Refer to Section 3.16, Utilities, and Appendix E of the Final EIS for a discussion of proposed measures to achieve energy efficiency.

Edmund A Januszkiewicz
PO Box 370
Roslyn, WA 98941

Dear Sirs,

I would like to voice some concerns about the stormwater management plan proposed for the Cle Elum UGA. The collection and treatment system is inadequate considering the area's unique geological structure and the high concentration level of contaminates which an urban environment manifests. The proposed system relies on infiltration of the stormwater runoff as the treatment technique. In the proposed configuration, the stormwater is to be channeled into collection areas and then allowed to infiltrate into the aquifers underlying the UGA. It is hoped that the act of infiltration will filter and absorb the pesticides, oils, heavy metals and other pollutants inherent in the runoff.

The highly permeable nature of the soils allows for the rapid dissipation of the stormwater runoff into the two aquifers. This reduces the resident time that the runoff will spend in the soil prior to reaching one of the aquifers. This rapid migration of the stormwater severely reduces the effectiveness of these filtration techniques. The glacial outwash that permeates this site is not a material that is conducive to this type of filtration method. 1

It is not wise to channel the stormwater runoff into one area. This will concentrate the contaminates. As they seep into the groundwater, the limited filtration aspects of the soils will be overloaded due to the high concentration of the contaminants. In effect non point source pollution will be turned into point source pollution. Every collection / infiltration site will have it's own contamination plume.

Due to the highly permeable soils, aquifers that are contiguous, the abundance of springs and seeps on the property, and the proximity of the Cle Elum and Yakima rivers other collection and treatment methods should be used. The Stormwater Management Manual for Western Washington should be used to guide the design and construction of the stormwater system. This manual includes BMP's that are to be promulgated by the Department of Ecology in June of 2001. Since the UGA is an urban area with urban densities the stormwater system needs to be designed to urban standards. This needs to include a contained piping system to direct and collect the stormwater. All of the runoff from roads, driveways, and parking lots need to be piped to oil / anti-freeze separators. All of the golf course irrigation and stormwater runoff needs to be piped to a treatment plant to prevent to accumulation and concentration of toxic pesticides. A physical treatment plant needs to be constructed on site to treat both the UGA's and the MPR's stormwater. 2

Thank you,

Edmund Januszkiewicz

P.S. I am including the table of contents for all 5 volumes of The Stormwater Management Manual for Western Washington along with an IBM formatted zip disc that contains the complete manual. 3

Comment 1

Refer to the responses to Letter 12, Comment 7 and Letter 25a, Comment 28.

Comment 2

Refer to the response to Letter 25a, Comment 28. The UGA project proposes to conform to requirements of the 2001 Ecology Stormwater Management Manual. For portions of the site, the proposal exceeds Ecology's manual requirements. The manual does not require, and the applicant does not propose, to treat all runoff with oil/antifreeze separators or to transfer all stormwater runoff to a treatment plant. Refer to Section 3.3, Water Quality, and Appendix A of the Final EIS for a description of the proposed facilities and the quantified analysis of stormwater quality for Alternative 5.

Comment 3

Comment noted.

Jul 06 01 12:58p City of Cle Elum p.24

From: Rachael Paschal <rdpaschal@earthlink.net>
Subject: Re: Water Comments Part 2
Cle Elum Urban Growth DEIS

1. Water Quality Comments

The Cumulative Effects analysis for the Surface Water quality section fails to identify pollutant loading and aquatic impacts to the Yakima and Cle Elum Rivers from the wastewater treatment plant (including the Cle Elum upgrade and the "stand alone" plant identified as an option in the MPR FEIS) as a cumulative impact. 1

Assumptions about groundwater infiltration do not appear to account for changes in runoff patterns due to soil compaction. What effect will new lawns and general development activities have on capacity of soils? 2

DEIS is incorrect to assume that Trendwest will construct a stand-alone wastewater treatment plant and that such a plant could mitigate for BOD and TSS loading. DEIS at 3.17-18; 3.17-23. It is virtually impossible for Trendwest to obtain an NPDES permit or permission to privately operate a treatment plant. The DEIS should recognize this in its analysis of water quality impacts related to wastewater treatment. 3

2. Water Supply Comments

The DEIS attempts to identify and propose mitigation for impacts relating to water transfers and water supply to the UGA. Because the Department of Ecology has determined that a Supplemental Environmental Impact Statement is needed before water transfer decisions can be made, it is duplicative and inappropriate for Cle Elum to attempt to identify, analyze, and propose mitigation for the impacts associated with the water right decisions. A major reason for this is that the DEIS makes a number of incorrect legal assumptions about water rights. This problem was also evident throughout the MPR EIS process, and in fact the UGA DEIS perpetuates legal errors of the MPR documents. For example, water balance for the UGA focuses on net consumptive use, but Trendwest must supply the UGA with the total diversion quantity needed. Another issue that the DEIS explictly refuses to address are impacts of removing water from the "sending" properties from which Trendwest proposes to transfer water to the UGA, MPR and local tributaries. There are also a number of cumulative impacts associated with the water right transfer proposals that are simply not treated in theUGA DEIS. The discussion of water rights and water supply impacts is per se inadequate. Rather than attempt to resolve this issue, the matter should be deferred to the Ecology SEIS process, which, as pointed out below, should be conducted prior to or simultaneously with this and the other EIS's necessary for the project. 4

Several water supply-related impacts will result from development of the UGA, but have been determined to be subject to other EIS processes. Preparation of the UGA EIS before environmental analysis is conducted for the water right transfers, wastewater treatment, water supply plan, and water rights mitigation activity (whatever that might be), including all of these impacts related to the MPR, is improper. This segmentation or piece-mealing of 5

environmental review is improper. Segmentation of MPR and UGA environmental review, especially with respect to water resource impacts is improper. In the alternative, the numerous EIS's required for this project and the MPR should be tiered in a manner that allows meaningful consideration of all of the impacts related to the UGA in this EIS. 5 (cont.)

Trendwest has represented in correspondence to the Department of Ecology that it may pursue groundwater rights and aquifer storage and retrieval as options for supply to the UGA and MPR. The DEIS contains no discussion of these alternatives. 6

Discussion throughout Section 3.5 of the DEIS refers to "consumptive use" as the measure of demand for the UGA. This is incorrect. Demand for water for the UGA must be calculated based on total diversion quantity. Trendwest will not receive credit for return flows in the water right transfer or water system planning process. If total demand is analyzed, the comparison between demand and supply will likely reveal a significant deficit in water available to the UGA (and MPR) under Trendwest's present proposal. 7

The DEIS reference to "consumptive use" impacts (at p. 3.5-14 and throughout) is confusing and improperly narrows the scope of impacts.

Trendwest may not rely upon wastewater as an offset against water demand for the UGA. Wastewater will be owned and subject to allocation (if any) by Cle Elum. 8

The ERU calculations are inconsistent. The DEIS acknowledges that it must utilize ERU demand as set forth in Cle Elum's Comprehensive Water Supply Plan as a basis for calculating UGA ERU, but fails to do so. Instead, demand calculations are based on a smaller number, 302 gpd/ERU, even though the DEIS acknowledges that "the City will initially issue certificates of water availability for the project based on the water use rate set forth in City's Comprehensive Water Plan (October 1997) which is currently 610 gallons per ERU." DEIS at 3.5-15; 3.17-14/15. Demand must be calculated at the legally required rate. As a result, the calculations of total water demand are grossly inaccurate. There is no discussion of future averaging of ERU demand city-wide. 9

Development of new residences, businesses and recreational facilities, literally from the ground up, represents an opportunity to require high efficiency water conservation infrastructure and practices. Cle Elum should impose on the UGA water efficiency requirements more stringent than that required by state law, and discuss this alternative in the DEIS. 10

The DEIS acknowledges that "Water demands do not include public facilities, including the school and cemetery expansion areas, Community Recreation Center, or Business Park." DEIS at 3.5-15. While demand is analyzed, DEIS at App. G, p. 3-4, the impacts of these uses, which will occur within the UGA, are not considered. Nor does the DEIS discuss the source of water to serve these uses. Moreover, the DEIS fails to discuss the cumulative impacts of these demands. 11

The two-thirds/one-third split of water rights between the MPR and UGA illustrates that the two projects are integrally related and that segmentation of this EIS from that of the MPR is improper. 12

The DEIS repeatedly refers to "available water supplies" in reference to Trendwest's proposal to transfer water rights to the UGA and MPR. Trendwest's proposed water right transfers are speculative and even assuming they are approved, the quantities of water that will be approved 13

by the Department of Ecology and available for transfer cannot be known until Ecology makes its decision. The DEIS is inadequate in its reliance upon unsupported assumptions about water availability. 13 (cont.)

The assertion that winter water is available to the UGA is unexplained. Presumably this ties to Trendwest's acquisition of year-round stockwater rights, but no analysis is provided to explain quantification. 14

The DEIS asserts that "each of the tributaries would experience increases in stream flow during the irrigation season." DEIS at 3.5-18. However, the water supply technical analysis (Appendix D) relies on heavily on generalized assumptions and statistical analysis as a basis for this conclusion. Assumptions regarding stream hydraulics, hydrogeology, groundwater recharge, groundwater discharge, evapotranspiration rates are generalized and lack data and statistical support. 15

Reference to "drought period of 1991 to 1995" is unexplained. DEIS at 3.5-18. What is the basis for defining this period and what is its significance? 16

Discussion of relative benefits to Bureau of Reclamation operations on late fall and winter stream flow in the Cle Elum and Yakima Rivers is confusing and unsupported. See DEIS at 3.5-20. It is particularly unclear whether assumptions about impacts would hold true in all types of water years. Equation of reduction in storage releases of 3.49 cfs in September to reductions of 3.03 cfs in the period November through March is an unexplained assumption. DEIS at 3.5-33. 17

The DEIS identifies "deficit" periods caused by UGA and MPR diversion demand, but fails to identify these deficits as a significant adverse impact. The Yakima basin, as acknowledged in the DEIS, is a fully appropriated basin. Increased water use on the UGA will mean that during years in which water supply is pro-rated, junior water users will receive less water as a result of UGA water demand. 18

The proposal to reduce diversions for water supply to the UGA during deficit conditions is not a viable option for public water supply and should be identified as a significant adverse impact. 19

The DEIS assertion that there are no instream flow criteria during winter does not accurately characterize regulatory approaches to stream flow requirements. DEIS at 3.5-23. Salmonids need flow at all life stages, including winter, and under Yakama Nation treaty rights and Bureau of Reclamation operations, necessary winter flows are protected. 20

The DEIS assumes that 85% of the indirect growth induced by the UGA and MPR would settle in the Lower County. DEIS at 3.5-25. This assumption is unsupported; it is likely that many more households that are dependent upon the UGA and MPR for employment will settle closer to those developments. 21

Water consumption calculated for unincorporated area housing is low compared to water usage in adjacent communities. It is inappropriate to utilize DOH guidelines if water usage can be predicted to be higher. Likewise, the assumption that consumption equals 20% of diversion is not appropriate if water efficiencies are low (as discussed at 3.5-15). Moreover, the impacts to communities that serve induced growth are based on total diversion, not consumption. 22

The conclusion that increased consumption related to the UGA is insignificant, either alone or in combination with the MPR, is incorrect. Cle Elum and So. Cle Elum have experienced recent moratoria on hook-ups and do not have water available to serve new growth. Induced and

accelerated growth in Roslyn is inconsistent with Roslyn's water supply and land use comprehensive plans. Increased exempt well usage in unincorporated areas will remove water that is otherwise available to TWSA. In sum, there is no water available to serve induced growth and the increased demand represents a significant adverse impact. 22 (cont.)

The DEIS is inconsistent in its statement that TWSA would increase by 340 acre-feet, DEIS at 3.5-23 and 900 acre-feet, DEIS at 3.5-33. 23

It is unlikely that flow would increase at Parker gage during years when junior districts are pro-rated. DEIS at 3.5-19. 24

The DEIS mentions "emergency irrigation water storage within the UGA golf course" but does not provide environmental analysis of this option. DEIS at 3.5-20; 3.17-11. 25

DEIS discussion of third parties impacted by transfer of water upstream from Ellensburg to Cle Elum does not account for all diverters and is incomplete. DEIS at 3.5-29. 26

The DEIS acknowledges the need for Trendwest to conduct additional activities to offset impacts to third parties affected by its water right transfer strategy and further acknowledges that retention of carriage water in irrigation ditches may be such an activity. DEIS at 3.5-35. Retention of water in ditches would significantly alter the asserted instream benefits associated with tributary water rights. The DEIS should describe the impacts of these approaches. 27

The DEIS that development on "sending lands" from which Trendwest is removing water rights is outside the scope of impacts required to be considered is incorrect. DEIS at 3.5-27. 28

The reliance on change of use of Cle Elum's existing water rights to serve the UGA as an interim water source seems highly unlikely, given that Cle Elum rights are at capacity. DEIS at 3.17-11. The DEIS should identify other, more plausible sources of interim water supply. 29

Comment 1

Refer to the response to Letter 37, Comment 6. In addition, a discussion of wastewater flows and loadings to the Yakima River and a description of water quality studies that would be conducted as part of the EIS on the wastewater treatment plant have been added to Section 3.16, Utilities, and Appendix E of the Final EIS. Evaluation of aquatic impacts on the Yakima River from the wastewater treatment plant would be part of the EIS for the wastewater treatment plant. A standalone wastewater treatment plant discharging to the Cle Elum River is no longer being considered.

Comment 2

Grading and compaction by development activities would increase rates of stormwater runoff. The stormwater management system is designed to have adequate capacity for the increased runoff volume, including infiltration of treated stormwater. The infiltration facilities are described in the Draft EIS, Section 3.3, Surface Water. The stormwater management system is described in the Final EIS, Section 3.3, Water Quality, and in Appendix A of the Final EIS.

Comment 3

A standalone wastewater treatment plant is no longer being considered.

Comment 4

In December 2000, Trendwest entered into an agreement with the Department of Ecology for the purpose of conducting additional environmental review and processing of the proposed water rights transfers for both the MPR and UGA. This additional analysis is incorporated into the Final EIS. Section 3.4, Water Supply, and Appendix B of the Final EIS contain an expanded analysis of the cumulative impacts of the water supply plan. The analysis in Section 3.4 and Appendix B includes the impacts from ending irrigation on lands appurtenant to Trendwest's acquired water rights. Refer to the response to Letter 5, Comment 1 for additional detail.

Comment 5

Refer to the response to Comment 4, above, and to Letter 4, Comment 2 and Letter 39, Comment 1.

Comment 6

Trendwest is not proposing aquifer storage and retrieval as options for water supply; thus these options are not evaluated in the Draft or Final EIS.

Comment 7

Water demands for the UGA alone, and for the UGA and MPR cumulatively, are calculated in terms of total water diversion requirements, consumptive use, and total return flows. Section 3.4 and Appendix B of the Final EIS include an updated and expanded analysis of the potential water

supply impacts. The difference between the terms "water demand," which is the total diversion requirement, and "consumptive use," which is the total diversion less return flows, has been clarified in Section 3.4, Water Supply, of the Final EIS.

Comment 8

Trendwest proposes to transfer its Yakima River water rights so that they may be exercised for beneficial uses within the MPR and UGA, as described in Section 3.4, Water Supply, of the Final EIS. Beneficial use of this water would include a return flow component from the wastewater treatment plant to the Yakima River. At the present time, no consumptive use of the wastewater treatment plant return flows is proposed. Any future proposal to use these flows (for example, reuse) would be subject to environmental review at that time.

Comment 9

The demand calculations for each type of equivalent residential unit (ERU) for the UGA are described in detail in Section 3.5, Water Supply; Section 3.17, Utilities; and Section 3 of Appendix G in the Draft EIS. The demand calculations are the same as those approved by the Washington State Department of Health (DOH) for the Trendwest MPR (MountainStar Master Planned Resort Water System Plan 2001). The City's past high figure of 610 gpd/ERU is a result of its supply system and the fact that it has issued water at a flat rate to all users irrespective of actual usage. The efficiency of the proposed UGA system and the fact that water would be metered and billed based on the metering are both very different from the situation that resulted in the City's 610-gpd/ERU demand rate. As described in Section 3.4, Water Supply, of the Final EIS, in accordance with the City of Cle Elum's adopted water policy for the UGA, the City would initially issue certificates of water availability for the project based on the water use rate set forth in the City's Comprehensive Water Plan (October 1997), which is currently 610 gallons per ERU. Cle Elum would monitor the use of both the City's current water customers and new UGA customers so that, when appropriate, adjustments may be made to the ERU average daily demand in the future. DOH design criteria require a minimum of three years of historical consumption data be used to establish ERU average demand. Consequently, the City's intent is to reexamine Trendwest's estimated demands once units are constructed and water meter records reflecting water use are available, and incorporate updated ERU water demands into future required updates of the City's Water Comprehensive Plan. These updated ERU demands may result in the City issuing additional water availability certificates for the UGA from the water initially required by the City for each ERU beyond Trendwest's estimated demands. Alternatively, if the calculated ERU value for development within the UGA underestimates water demand, Trendwest would need to provide additional water rights to the City before full buildout of the UGA could be achieved.

Comment 10

The UGA would restrict the amount of area that may be irrigated by lot owners. The Uniform Plumbing Code requirements, which provide for water saving devices and construction methods, would be followed for UGA residential construction, and metering would be employed. There

are no existing City of Cle Elum landscaping restrictions. Refer to Appendix E of the Final EIS for a discussion of proposed measures to achieve water use efficiency in the UGA.

Comment 11

Refer to the response to Letter 27, Comments 1 and 2 for a response to the school expansion area. Future provision of water to the school district would be negotiated between Trendwest, the City of Roslyn, and the City of Cle Elum, as described in Section 3.4, Water Supply, of the Final EIS. The water demands for the Business Park and Community Recreation Center, as well as untreated water demands to irrigate the Business Park, Community Recreation Center, and cemetery and school expansion areas, are shown in Table 3.4-5 and described in Section 3.4, Water Supply, of the Final EIS. The City of Cle Elum would supply water for the Business Park, the Community Recreation Center, the school expansion area, and the cemetery expansion area within the UGA from its Yakima River system's existing water rights or water supply bases.

Comment 12

As described in Section 3.4, Water Supply, of the Final EIS, Trendwest's three Yakima River water rights have six water rights transfer applications pending, three of which would serve the MPR and three of which would serve the UGA. The three mainstem water rights have six water rights transfer applications pending, three of which would serve the MPR and three would serve the UGA. A portion of each of Trendwest's three mainstem water rights would provide for recreation, irrigation, and domestic beneficial uses within the MPR and a portion of each of its three mainstem water rights would provide for municipal supply within the City of Cle Elum. Trendwest has also filed applications with Ecology to transfer Trendwest's 11 tributary water rights to instream flows. These 11 rights have 22 water rights transfer applications pending, 11 to offset consumptive uses on the MPR and 11 to offset consumptive uses within the UGA. SEPA allows separate review of the impacts from projects that are fundamentally independent of each other. Filing water rights applications as described above does not mean the two projects are sufficiently interdependent to require a single SEPA analysis. The water rights could be transferred for MPR use whether the UGA development occurred or not. Similarly, the water rights could be transferred for UGA use whether the MPR development occurred or not. Further, the question of proper segmentation of SEPA review for the MPR development and the UGA development has been addressed by court appeal of the Kittitas County MPR approval, *RIDGE v. Kittitas County, et al*, Yakima County Superior Court Docket No. 00-2-02761-2 (Memorandum Opinion Re: Appeal, May 29, 2001)

Comment 13

Comment noted. The Department of Ecology will ultimately determine the availability of water as part of processing the water rights. However, potential water supply impacts modeled in the Draft and Final EISs are based on a legal review of available water rights and not on "unsupported assumptions."

Comment 14

The Water Supply Technical Report included in the Draft EIS identified stockwater consumptive use as available outside of the irrigation season. It was assumed that 10% of the diversion volume specified in the Pautzke water right for stockwatering was consumed uniformly over its period of use. For the Final EIS, Ecology agreed to use 10% as the most probable value.

Comment 15

Since the Draft EIS was published, the Water Supply Technical Report has been supplemented to respond to Ecology's comments and to analyze potential impacts from the Reduced Density MPR and Alternative 5. The Water Supply Technical Report Supplement is Appendix B to the Final EIS, which includes an expanded analysis showing the statistical basis of the streamflow estimates, hydrogeology descriptions from studies performed by Ecology's consultant team in 2001 (including groundwater recharge and discharge), and the basis of the crop consumptive use estimates using Blanney-Criddle calculations.

The Water Supply Technical Report Supplement (Appendix B of the Final EIS) analysis of tributary stream hydraulics is not included in the same manner as for the Water Supply Technical Report in the Draft EIS. The change in tributary flow depth and velocity is removed from the discussion of impacts in the supplement. Stream hydraulics in the Water Supply Technical Report Supplement is considered in the seepage analysis conducted by Ecology's consultant team. The results of the seepage analysis are included in the Water Supply Technical Report Supplement water balance model. Refer to Section 3.4, Water Supply, and Appendix B, Water Supply Technical Report Supplement, of the Final EIS for additional detail.

Comment 16

As described in Section 3.4, Water Supply, and Appendix B of the Final EIS, the simulation period for the model includes water years 1991 through 1995 and 2001. The period of water years 1992 through 1994 was the worst continuous drought on record for the Yakima River basin. Water availability in 1994 was the worst of these three continuous drought years. For purposes of this analysis, a "drought year" was defined as a year in which the USBR prorates water supplies to its contract water users because there are insufficient supplies to meet demands. Model results from four of the six water years are averaged on a monthly basis to represent long-term, average conditions. Those four years include the relatively average years of 1991 and 1995, and the dry years of 1992 and 1993, so the model's representation of the long-term average is likely conservatively dry. The worst simulated drought years (1994 and 2001) were removed when computing the long-term, average conditions. Mean monthly changes in Yakima River streamflow are computed for water year 2001 to exemplify drought condition results. Water year 2001 was the worst single year drought since 1977, which was the worst single year drought on record in the Yakima River basin.

Comment 17

Refer to Letter 12, Comment 5 regarding winter streamflow management for fish incubation by USBR in the Yakima and Cle Elum rivers. The analysis in Section 3.4 and Appendix B of the Final EIS was updated to include time delays from irrigation and other groundwater-routed system loss return flows from the UGA and MPR to the Cle Elum and Yakima rivers. These return flows, in combination with the more rapid return flows from the wastewater treatment plant to the Yakima River, offset winter consumptive use. Winter reductions in Yakima River streamflow below Reecer Creek would result from terminating the time delays from irrigation return flows from properties appurtenant to Trendwest's tributary water rights, but not from any other cause, as explained in Section 3.4 of the Final EIS. The cumulative impacts of the UGA and MPR projects on total water supply available (TWSA), and its management by the USBR, has been updated in Section 3.4 of the Final EIS.

Comment 18

A deficit condition is anticipated under average climate conditions during two months, as described in Section 3.4, Water Supply, and Appendix B of the Final EIS. In July, a deficit of approximately 33.6 acre-feet to a surplus of approximately 13.4 acre-feet could result under long-term average conditions (as characterized by 1991 through 1993 and 1995 study years) for the cumulative MPR and UGA projects. In September, under the same conditions, a deficit ranging from approximately 25.3 to 34.4 acre-feet was estimated. These deficits are recognized as significant adverse impacts requiring mitigation. Mitigation for these impacts is described in Section 3.4, Water Supply, of the Final EIS. An array of options is shown to be feasible for mitigation, including groundwater infiltration of surplus water, onsite storage releases from artificial ponds to reduce diversions, and additional water right acquisition. During drought years, Trendwest could also reduce golf course irrigation on the MPR to control diversions. As a result of mitigation, monitoring of Trendwest's water use, and monitoring of water availability under Trendwest's water rights, no significant unavoidable adverse impacts would result. In addition, Trendwest has agreed to obtain water to mitigate for some indirect uses in excess of what typically could be required under SEPA, through the Cooperative Agreement with WDFW and Yakama Nation and through the RIDGE Settlement Agreement (see Section 3.4, Water Supply, and Appendix B of the Final EIS for details).

Comment 19

As identified in the response to Comment 18 above, Trendwest could use untreated water stored in onsite artificial ponds to feasibly meet irrigation demands that would otherwise result in deficits even during drought years. Reduced diversions to supply untreated water for golf course irrigation could also be achieved with temporary reductions in irrigation (i.e., reduced acres or reducing water only to ensure turf survival). Neither of these strategies to control diversion demand would impair public safety or water supply. Mitigation for identified impacts on water supply has been updated in the Final EIS in Sections 3.4 and Appendix B.

Comment 20

As described in Section 3.4 and Appendix B of the Final EIS and in Section 3.5 of the Draft EIS, the Yakima River Basin Water Enhancement Project Act requires USBR to meet flow targets at Parker and Prosser, but only from April through October. Since 1995, a reduction in Yakima River streamflow at Parker or Prosser from November through March would not have resulted in stream flows being less than Title XII target flows. However, pre-Title XII instream flow targets were specified year-round at locations farther upstream than Parker (Cle Elum, Easton, and Martin) and on the Cle Elum River. Other flow targets may exist, but these are not formally stipulated in state or federal laws. Since 1981, the System Operations Advisory Committee (SOAC) has assisted USBR on fish-related issues associated with the operations of the Yakima River Basin Water Enhancement Project. The USBR Field Office Manager determines flows for maintaining fish life in the Yakima River basin according to the annual prevailing conditions, and in consultation with SOAC, irrigation district managers, and others (USBR 1999). Furthermore, according to the partial summary judgment regarding the rights of the Yakama Nation entered by the Superior Court on July 17, 1990, the Yakima Field Office Manager is responsible for providing minimum instream flows to maintain all life stages of anadromous fish in the Yakima River basin. Fall and winter flow targets that are set annually or seasonally by SOAC and the Yakima Field Office Manager are not listed in Title XII instream flow criteria. Problems related to fall spawning and winter incubation have been successfully managed in the Yakima River.

Comment 21

In the Draft EIS, the current population split between the Upper (15%) and Lower (85%) County was applied to the distribution of induced households to facilitate an evaluation of potential offsite water demand. For the Final EIS, a more detailed and comprehensive analysis of potential distribution of employment-induced households was conducted (see Appendix C of the Final EIS). Distribution of induced households across Kittitas County is assumed to occur consistent with the allocations identified in the Countywide Planning Policies. Unincorporated Kittitas County is projected to absorb approximately 26% of the 20-year population growth in the County.

Comment 22

Water consumption in adjacent communities is higher than the water consumption calculation for unincorporated housing because the water systems in the adjacent communities are older and less efficient. Induced housing in the unincorporated areas would follow current Uniform Plumbing Code requirements, which provide for water-saving and construction methods that were not used in the adjacent communities.

The water consumption calculations are discussed in Appendix D, Water Supply, and Appendix G, Site Engineering Report, of the Draft EIS. The water consumption calculation of 240 gpd per household is based on 100 gpd per person set forth in the Department of Health standard unit demands multiplied by the projected 2.4 person per household ratio. Refer to the response to Comment 21 above and Appendix C of the Final EIS for an analysis of potential water demand

from indirect and induced growth. See Section 3.4, Water Supply, for an updated discussion of potential impacts to TWSA.

The City of Cle Elum and the Town of South Cle Elum have combined their water systems and are enhancing the efficiencies of the joint water systems to allow for additional hookups. Trendwest would provide water to the City of Cle Elum for its development within the UGA.

In addition, as part of the RIDGE Settlement Agreement, Trendwest has agreed to negotiate an agreement with the City of Roslyn to mitigate for increased water demands resulting from induced offsite development within Roslyn.

Comment 23

Comment noted. Refer to the revised TWSA analysis in Section 3.4 and in Appendix B of the Final EIS.

Comment 24

The Draft EIS analysis of the 1991 through 1995 study period includes several years when pro-rationing was in effect. The results showed that flows at Parker would increase only if the cumulative effect of Trendwest water right transfers upstream of Ellensburg results in a decrease in net consumptive use and all other diverters did not change their diversion rates. This Final EIS uses the study years 1991 through 1993 and 1995 to characterize average year conditions, and adds water year 2001 to characterize conditions during a drought when supplies are prorated. Under average year conditions, Yakima River flows downstream of Reecer Creek would be increased as a result of Trendwest's proposed water rights transfers except during two months (July and September). Under drought conditions similar to those that occurred in 2001, the deficits in these two months would be increased, but surpluses would remain for all other months. See Section 3.4, Water Supply, and Appendix B of the Final EIS for details.

Comment 25

No golf course is proposed for the UGA under Alternative 5. A lake is proposed for recreation under Alternative 5, but not as a potential storage supply during periods of deficit. For the other alternatives and for the MPR, golf course irrigation would be supplied from untreated water pumped through artificial ponds. Those artificial ponds provide storage, which could be used if the ponds are drawn down as described for one mitigation option in Section 3.4, Water Supply, and in Appendix B. No adverse environmental consequences would occur from routing irrigation water through artificial ponds or from using water stored within them for irrigation purposes to control diversions during periods of deficit.

Comment 26

Refer to Letter 25a, Comment 17 and Section 3.4 of the Final EIS. Also, refer to Exhibit K of Appendix B for an updated discussion of impacts on third parties in the reach of the Yakima River between Cle Elum and Ellensburg and mitigation of those impacts.

Comment 27

Since the Draft EIS was published, the Water Supply Technical Report has been supplemented. Additional analysis of third-party impacts on tributary surface water users and mitigation for those impacts is contained in Section 3.4 and Appendix B of this Final EIS. No carriage water retention or storage is proposed that could affect the flow simulation results of the model used to evaluate impacts.

Comment 28

Comment noted. Refer to Section 3.4, Water Supply, of the Final EIS for an analysis of impacts from terminating irrigation of lands appurtenant to Trendwest's tributary water rights after those water rights are transferred to instream flows. Impacts resulting from water demands for development of these lands are described in Section 3.4, Water Supply, and in Exhibit H of Appendix B of the Final EIS.

Comment 29

As described for Alternatives 2, 3, and 4 in the Draft EIS, construction water for development of the UGA under Alternative 5 would likely be acquired from private or public water sources and either trucked into the construction site or diverted from existing utility lines for untreated water (e.g., the MPR untreated water main, if constructed).

May 7,2001
POB 927
Roslyn, WA 98941

To: The City of Cle Elum
RE: Comments of the DEIS of the proposed Cle Elum UGA

The following comments are submitted on behalf of RIDGE.

Phased environmental review lacks specifics
We are concerned at the lack of specifics regarding "phased environmental review" and what projects are or are not part of what is within the scope of this EIS. For example, mention is made of the Horse Park, yet there is not enough information to respond to impacts including the amount of animal waste that will be generated, where the trails system will go offsite, traffic impacts from the Horse Park use, etc.. 1

The MPR, the water supply for the UGA and the MPR (and related impacts on other water consumption and quality), the water delivery system (including intakes), the sewer and stormwater systems, Cle Elum's proposed re-do of its zoning code, the school expansion, the proposed senior center, the electrical service system expansion, natural gas facilities, and the secondary development and real estate speculation that is occurring in the Cle Elum Lake and River corridor and elsewhere in upper Kittitas County all need to be fully incorporated into this EIS. 2

golf courses
The golf course within the UGA and the other golf courses proposed for the MPR will have huge and significant impacts. The amount and types of herbicides, fungicides, and pesticides need to be specified. No golf courses should be allowed unless they meet highest possible standards of IPM management.

In the most basic research concerning the impacts of golf courses, it is clear that the original design and operating standards of a golf course determine how great an environmental impact a course will have. We request that there be a higher "weed tolerance" ratio used (that is, that more weeds be allowed so that less chemicals will be needed to keep them out). We also recommend the turf height be kept as tall as possible, to reduce the stress on its vegetation. We are especially concerned about the use of fungicides, and their potential as carcinogens. We also oppose "preventative" use of pesticides, fungicides, and herbicides, as this dilutes their effectiveness and creates a heaver pattern of use. 3

We recommend review by Thomas R. Parent, President of Soil Organics Consulting Service (Lansing, Michigan) be incorporated into the approval of any golf course design. Mr. Parent is familiar with the principals of Eco-Turf culture. His company, 4

Soil Organics Consulting Service, has managed the fertility of the first organic golf course in history to be preliminarily certified. The course's name is Granite Ridge Lodge LLC and is located near Ashland, WI in the town of Highbridge and has been preliminarily certified by Farm Verified Organics. The National Eco-Turf Initiative could also provide guidelines for better golf course management. **4 (cont.)**

I have attached the guidelines for better planning and practices outlined by the Gold Course Superintendents of America. I have also attached the abstract of an article by Jay Stuller, originally published in the April 1997 issue of Smithsonian Magazine. This article cites several recently constructed golf courses which incorporated design features to minimize environmental impacts. We request they be used as a model for conditions required on all golf courses in the MPR and UGA. The following two articles provide further specifics: "How Green Are These Fairways?" by John Grossman, Audubon, September-October 1993; and "Golf Courses Are Denounced as Health Hazards" by Timothy Noah, The Wall Street Journal, May 2, 1994. Copy of "Preliminary Evaluation of Pesticides used by the City of Scottsdale" also attached. **5**

Trendwest's sales operations

Trendwest is marketing individual lots within the MPR before such development is platted. TW has carefully avoided actual sales of property, and yet continues a large campaign. I was called within the last three weeks and offered a free trip to Reno if I would tour the MPR lands with a sales representative. RIDGE believes this continued marketing part of a strategy to involve many individual parties who will feel their interests are violated if the MPR and UGA cannot be built out according to Trendwest's as yet unplatted (and in the case of the UGA, still in SEPA) projects. This is a concern and impact in relation to the UGA because of the MPR requires infrastructure and services that are part of the UGA. **6**

Working for a sustainable forested ecosystem and economy,

Ellie Belew.

Ellie Belew
for RIDGE

Preliminary Evaluation of Pesticides Used by the City of Seattle

Philip Dickey, Washington Toxics Coalition, Green Gardening Program

The Approach in Context

These notes describe the approach taken for a preliminary assessment of pesticides used by the City of Seattle. The purpose of this assessment is to prioritize candidates for phaseout in order to meet the City's desire to reduce pesticide use. The tiered lists generated as a product of this assessment can only be correctly interpreted with an understanding of the approach and methodology that was used.

It has become clear after working with the list of pesticides provided by the City that a single step assessment will be insufficient. The list was too large for a highly detailed analysis at the beginning. While some elements of exposure analysis will likely have to come into play at some point, it would be prohibitively expensive to do that for all of the products on the list. Therefore, a second assessment step, as described in the recommendations at the end of this report, is suggested for some products.

This initial screeing is not, nor should it be, a risk assessment. Risk assessments require an enormous amount of information and analysis in order to estimate exposure and quantify risk. Risk assessments are only able to estimate risk subject to considerable uncertainties arising from incomplete toxicology data and current limitations in their ability to model the effect of exposures to many chemicals at one time. Thus, even though a risk assessment may be able to deliver a quantifiable result, there immediately arise valid questions about the precision, accuracy, and relevance of that number.

This report describes an initial cataloguing and hazard characterization. It identifies potential hazards of the products and may also characterize the degree of hazard (e.g. low, medium, or high) or the certainty of the hazard (possible, probable, or known). This hazard assessment identifies, for example, if a product contains a possible carcinogen (cancer-causing ingredient). A risk assessment would include cancer potency, estimated exposure levels, and other factors in order to estimate risk, i.e. number of cancers per million exposures. Whereas a risk assessment seeks to determine the likelihood of a given set of outcomes in a particular population, a hazard assessment can help decide if a chemical is appropriate for use under a given set of criteria. It is possible to decide as a matter of principle not to use any products containing known or probable carcinogens without seeking to determine exactly how many cancers might occur as a result of continuing to use the products.

It must be emphasized that this initial screening considered for the most part only active ingredients in the products. Active ingredients in pesticide products are those that are directly responsible for the pesticidal action. Active ingredients in the products were obtained from product labels. Other ingredients (so-called "inert" ingredients) are not usually listed on labels and are frequently considered proprietary information despite the fact that they may be toxic or otherwise hazardous. Although some hazardous inert ingredients are listed on MSDSs, all inert ingredients could not be identified in most products. Although a court ruled in 1996[21] that the identity of inert ingredients in pesticide formulations must be available to the public, the information is not disclosed on product labels and a process for obtaining this information in a timely manner has not yet been established. Thus, while an assessment of inert ingredients would be desirable, it has not been possible at this time. For this reason, hazards of inert ingredients were not evaluated unless included in parameters that relate to the full product formulation, such as product toxicity category or signal word. Only the active ingredients could be screened against lists of carcinogens,

reproductive toxicants, and endocrine disruptors. In addition, only active ingredients were evaluated for persistence and mobility in soil.

Procedure

A list of pesticides used was provided by the City. This list consisted of several parts containing a total of well over 200 products. Some of the product names were incomplete or duplicative. Apparent duplicate products were removed and additional information was requested on products with incomplete names. Some of the products were not pesticides, but rather pesticide adjuvants or fertilizers. Those products will not be covered in this report. A few products were added for evaluation as potential alternatives for some uses.

Whenever possible, a product label and Material Safety Data Sheet (MSDS) were obtained for each product. For many products, labels and MSDSs were downloaded from manufacturers' Internet web sites. If labels were not available electronically, they were obtained from the US EPA's Pesticide Product Label System CD-ROM[1]. Additional MSDSs were downloaded from various Internet sites. In many cases, more than one product is registered with a particular name. The US EPA's Office of Pesticide Programs registration database[2] was used to match product names and registration numbers in order to pinpoint the correct products to evaluate. In a few cases where exact product matches were not found, the evaluation was performed on similar products for which more complete information was available. In the end, some product registration numbers could not be identified and some product labels could not be found within the time available. If necessary, additional effort could be made later to resolve these issues if the products in question are used in quantities that would justify the effort.

A final list of approximately 220 products was entered into an Excel spreadsheet for analysis. A second spreadsheet was used to record properties of ingredients.

Parameters and Sources of Information

A variety of product and/or ingredient attributes were collected so that the City would be able to use the information against different screening criteria in the future. The parameters used in this analysis are as follows:

Hazard Category (full product):
Each pesticide product registered by EPA is assigned a hazard category I, II, III, or IV by the Agency based on characteristics of the full product formulation, including acute toxicity, and skin and eye irritation. In evaluating the acute data, EPA assigns the hazard category based on the greatest hazard, i.e. ingestion, inhalation, skin absorption, eye irritation, etc. A relatively non-toxic product (via ingestion, inhalation, or skin absorption) could be placed in the highest hazard category merely on the basis of extreme eye irritation. Products in category I are most hazardous and bear the signal word DANGER on their labels. Those in category II are labeled WARNING. Both category III and IV products are labeled with CAUTION. Product category was determined from label signal words, and category III and IV products were not distinguished from each other.

Restricted Use Pesticides:
Some pesticides are restricted to use only by certified pesticide applicators and are not available to the general public because of high toxicity, particularly hazardous ingredients, or environmental hazards. Pesticides designed as restricted use are indicated as such in this analysis. Sources of information included product labels and EPA's list of restricted use pesticides.[3]

Dioxin-containing Ingredients:

The City requested that the product list be screened for those that would pose disposal difficulty due to the presence of dioxin contamination. The criterion used for identifying potential dioxin-containing waste was the EPA waste designation F027: "Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols...does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorphenol as the sole component." No products on the list met this criterion.

Persistent, Bioaccumulative Toxic Chemicals (PBTs): (active ingredients only)
At the request of the City, the list of products was compared to two lists of chemicals designated as persistent, bioaccumulative, and toxic. The first is an initial list of 12 chemicals proposed by EPA as a priority list.[18] No products contained active ingredients on this list. The second list is the list of 27 PBTs proposed by the Washington State Department of Ecology as candidates for elimination in the state.[19] Two chemicals on this list (endosulfan and trifluralin) were found in a total of four products.

"P" Chemical Products on state Dangerous Waste List: (active ingredients only)
The product list was screened against the state of Washington Dangerous Waste Regulations list of "P" discarded chemical products list.[17] Products with a listed chemical as the sole active ingredient are indicated in the product tables. Only four ingredients in products on the list met this criterion: dimethoate, disulfoton, endosulfan, and oxamyl.

Carcinogens (active ingredients only):
Various state, federal, and international organizations evaluate or list chemicals for carcinogenicity. Due to the expense and difficulty of such evaluations, not all agencies have reviewed the same chemicals and not all reach the same conclusions on a given chemical. For this reason, we have presented the ratings of several agencies whenever possible. Those agencies and their categories are as follows:

US EPA[4]
- Old system:
  - Group A - Human carcinogen
  - Group B - Probable human carcinogen
    - B1 - Indicates limited human evidence
    - B2 - Indicates sufficient evidence in animals, inadequate or no evidence in humans
  - Group C - Possible human carcinogen
  - Group D - Not classifiable
  - Group E - Evidence of noncarcinogenicity for humans
- New system (weight of evidence categories):
  - Known/Likely
  - Likely
  - Cannot be Determined
  - Not Likely

State of California[5]
- No categories; single list of chemicals entitled "known to the State of California to cause cancer."

National Toxicology Program (NTP)[6]

National Toxicology Program (NTP)[6]
- Known to be human carcinogens
- Reasonably anticipated to be human carcinogens

International Agency for Research on Cancer (IARC)[7]
- Group 1 - carcinogenic to humans
- Group 2A - probably carcinogenic to humans
- Group 2B - possibly carcinogenic to humans
- Group 3 - not classifiable as to its carcinogenicity
- Group 4 - probably not carcinogenic to humans

Carcinogenicity information was obtained by screening active ingredients against the above lists. Although MSDSs do indicate listing of ingredients by some of these agencies, the information may not be current or complete. In the tables that accompany these notes, a blank cell in the carcinogenicity columns indicates that the agency has no listing for the chemical. It does not mean that the agency has determined that the chemical is not carcinogenic. The case of conflicting results from different agencies could be a problem in principle, but for the chemicals considered here there were few such conflicts. There were cases where one agency found a chemical to be a possible carcinogen, while another found it to be not classifiable. In such a case, which is not really a conflict, the finding of possible carcinogenicity is the one that would trigger the tier rating as the criteria are written. In the one case of an actual conflict (piperonyl butoxide), the single product where that compound was the only suspected carcinogen was marked as conflicting evidence.

Reproductive/Developmental Toxicants (active ingredients only):
Active ingredients in the products were screened against the State of California lists of reproductive and developmental toxicants[5]. Blank cells indicate that the compound is not listed.

Neuro-acting Pesticides: (active ingredients only):
Chemicals that act primarily via the central nervous system are indicated in this column by type of chemical. The fact that a chemical has this mode of action does not mean that products containing it should be considered neurotoxic in the sense that any exposure would cause nerve damage or even nervous system effects. The usual dose and threshold concepts would apply. However, these groups of chemicals should be considered carefully in terms of worker exposure and exposure of the general public, particularly children, pregnant women, the elderly, the chemically sensitive, and other highly susceptible populations.

The main chemical classes identified as neuro-acting are organophosphates, carbamates, pyrethroids (synthetic pyrethrins), and pyrethrins. In addition there were several organochlorines, one chlorinated nicotinyl, and metaldehyde, which affects the nervous system but not as its principal mode of action. Although this information was collected, it was not used in the sample set of criteria provided for screening products into tiers. As it happens, most products with neuro-acting active ingredients were placed in Tier 1 because of at least one other sample criterion. This class of pesticides tends to have fairly broad ecotoxicity, being generally non-selective with respect to beneficial insects and often being quite toxic to birds and aquatic species as well. This lack of selectivity is perhaps the strongest reason to phase out or curtail the use of as many of these products as possible and to substitute more selective control methods where they are appropriate and available. It should be noted that the pyrethrins have the advantage (from a toxicology point of view) of very short residual life, a factor which helps to reduce both human and wildlife exposure.

Endocrine Disruptors: (active ingredients only)
Considerable attention has focused in recent years on the ability of certain chemicals to mimic or block the effects of hormones in humans and other wildlife. Because of the similarity of the

block the effects of hormones in humans and other wildlife. Because of the similarity of the endocrine system across many species, its critical role in development and reproduction, and its extreme sensitivity to very low levels of hormone-like compounds, there is the potential for endocrine disrupting substances in the environment to adversely affect wildlife and humans. Although the science is relatively new and in many cases highly controversial, considerable evidence of effects in wildlife and some evidence in humans has caused many scientists to warn of potential dangers from exposure to endocrine disrupting chemicals. Under the Food Quality Protection Act, the EPA is required to screen pesticide ingredients for endocrine system effects. Until that screening is done, a comprehensive list of endocrine disruptors will not be available. For purposes of this analysis, we used the list of endocrine disruptors compiled by the State of Illinois Environmental Protection Agency. Chemicals on this list are classified as known, probable, or suspected of causing endocrine system effects[8].

Ecotoxicity: (active ingredients only)
For purposes of this initial review, information on toxicity to non-target wildlife species was deduced primarily from required precautionary statements on product labels.[9] While these statements were not specifically designed for making comparisons between products, there are several reasons why this approach was taken:
1) As described below, the label warning language follows a hierarchy that is based on the toxicity of the active ingredient and field observations.
2) The product label is the primary document that describes the precautions required to use the product in a legal manner. It is the document that every product user should have in their possession and read before using the product.
3) The product label is the quickest source of information based on a uniform standard.
4) This screening does not consider chronic exposures. While it would be desirable to obtain additional ecotoxicity information in the form of appropriate LD50s, LC50s, and NOELs (no effect levels) or LOELs (lowest observed effect levels), not all Material Safety Data Sheets contain this information, and not all documents that offer some of this information present data for the same species. In addition, the information available may be for active ingredients only and not the full product formulation. Therefore, to pursue the approach of gathering and comparing detailed toxicity values was judged to be beyond the scope of what could be done within the time and budget limits of this evaluation. This level of investigation should occur in the level two toxicology assessment for a reduced number of products.

Toxicity to Birds:

According to EPA regulations,[9] the required label warnings for avian toxicity are derived in the following manner:
* Products labeled as "**toxic to birds**" contain an active ingredient with an avian acute oral LD50 of 100 mg/kg or less or a subacute dietary LC50 of 500 ppm or less.
* Products labeled as "**extremely toxic to birds**" have been shown by accident history or field studies that they may result in fatality to birds.

Additional data for active ingredients was taken from *the Farm Chemicals Handbook* [10] and EXTOXNET[11], an Internet web site maintained by cooperative extension in a number of states. Ingredients were classified according to the following scale:

Toxicity Category	Bird acute oral LD50 (mg/kg)
Practically non-toxic (PNT)	>2000.
Slightly toxic (ST)	501-2000
Moderately toxic (MT)	51-500
Highly toxic (HT)	10-50

5

Very highly toxic (VHT) <10

This additional information on active ingredient toxicity was not used in any ranking criteria, but was gathered to see if label warnings were consistent with toxicity of the ingredients.

Toxicity to Aquatic Organisms:
According to EPA regulations, the required label warnings for aquatic toxicity are derived in the following manner.
* Products labeled as "**toxic to fish**" contain an active ingredient with a fish acute LC50 of 1 ppm or less.
* Products labeled as "**extremely toxic to fish**" have been shown by accident history or field studies that they may result in fatality to fish.

Additional data for active ingredients was taken from *the Farm Chemicals Handbook* and EXTOXNET. Ingredients were classified according to the following scale:

Toxicity Category	Aquatic LC50 (ppm)
Practically non-toxic (PNT)	>100
Slightly toxic (ST)	10-100
Moderately toxic (MT)	1-10
Highly toxic (HT)	0.1-1
Very highly toxic (VHT)	<0.1

This additional information on active ingredient toxicity was not used in any ranking criteria, but was gathered to see if label warnings were consistent with toxicity of the ingredients.

Toxicity to Bees:
According to EPA regulations, the required label warnings for bee toxicity are derived in the following manner.

Honey Bee Toxicity Groups and Cautions

Additional data was evaluated for the active ingredients as a supplemental source. Data for active ingredients was taken from *the Farm Chemicals Handbook* and EXTOXNET. Ingredients were classified according to the following scale:

Toxicity category	Meaning
Practically non-toxic (PNT)	Relatively nontoxic. Can be used with few precautions with minimum injury to bees.
Moderately toxic (MT)	Kills bees if applied over them. Can be used with limited danger to bees if not applied over bees in the field or hives. Correct dosage, timing, and method of application are essential.
Highly toxic (HT)	Kills on contact during application and for one or more days after.

This additional information on active ingredient toxicity was not used in any ranking criteria, but was gathered to see if label warnings were consistent with toxicity of the ingredients.

Toxicity to other Wildlife or Domestic Animals:
According to EPA regulations, the required label warnings for wildlife toxicity are derived in the

following manner:
* Products labeled as "**toxic to wildlife**" contain an active ingredient with an mammalian acute oral LD50 of 100 mg/kg or less..
* Products labeled as "**extremely toxic to wildlife**" have been shown by accident history or field studies that they may result in fatality to wildlife.

In addition, certain products carry label warnings about hazards to domestic animals or secondary hazards to particular species. For example, rat poison may pose a secondary hazards to birds of prey. Such warnings were taken as an indication of the presence of hazards to wildlife as well.

Persistence (active ingredients only):
The environmental persistence of compounds varies widely depending on many factors. In addition to the inherent degradability of the compound itself, persistence is affected by where the compound is found (soil, water, air, leaf surface), temperature, moisture, amount of organic matter present, and so on. We chose as a standard measure of persistence the halflife in average soil, disregarding halflives in other media and in extreme soil types. This number, measured in days, is the amount of time required for the concentration of the chemical to decrease by one-half. For consistency, data were taken from the Oregon State University Extension Pesticide Properties Database,[12] the Agricultural Research Service/US Department of Agriculture Pesticide Properties Database,[13] or the Hazardous Substances Databank,[14] in that priority order.

Pesticides are classified as non-persistent, moderately persistent, or persistent based on their halflives.[12] Those classifications are as follows:

Non-persistent	<30 days
Moderately persistent	30-100 days
Persistent	>100 days

In the cases of ingredients which are minerals, biodegradation of the metals does not occur, although the valence state may change, new compounds may be formed, or materials may be washed from the soil or taken up by plants. For minerals, the notation NA indicates not applicable. Halflives were found for most, but not all, ingredients.

When thinking conceptually about degradation of pesticides, it is important to remember that after one halflife, half of the chemical remains. If the decay follows first order kinetics, another halflife would be required before the residue reaches 1/4 of the original. To decrease by one order of magnitude (a factor of 10), more than three halflives are required. So even a pesticide considered non-persistent could remain in average soil at levels of around 10% of the applied concentration for as much as three months.

A final important issue relating to persistence is the presence of breakdown metabolites that may pose hazards in themselves. When one looks at the halflife and other attributes of the parent compound, it is easy to disregard the fact that as this compound disappears, other compounds may be forming that may be more toxic, persistent, or more mobile than the parent compound. These compounds can be overlooked in studies that are not specifically looking for them. No attempt was made in this assessment to look systematically for hazardous breakdown products for each active ingredient. However, in the course of looking at the environmental fate (persistence and mobility) data, it became apparent that in at least several cases major metabolites possess one or more properties that should not be ignored in evaluating the parent compound. The compounds identified thus far are the following:

Parent Compound	Metabolite	Concern
acephate	methamidophos	Metabolite is about 40 times more toxic than parent as measured by oral rat LD5011
daminozide	unsymmetrical dimethyl hydrazine (UDMH)	Also a probable carcinogen4,5,6,7
dichlobenil	2,6-dichlorobenzamide	More persistent, more soluble, more mobile, detected in ground-water20
malathion	malaoxon	1000 times more potent cholinesterase inhibitor, more persistent, slightly more mobile14
mancozeb	ethylene thiourea (ETU)	Also a probable carcinogen4,5,6,7
metaldehyde	acetaldehyde	Probable carcinogen4,5,6,7

Water Pollution Hazard (active ingredients only):
The potential for ground-water or surface-water pollution by pesticides is dependent on many factors, including persistence of the ingredients, water solubility, soil binding, amount of rainfall or irrigation, soil properties, amount and frequency of applications, soil slope, vegetation present, proximity to ground- or surface-water, etc. The parameters considered below are those that relate strictly to the pesticide itself. In use, the water pollution risk can often be mitigated by product

8

choices based on site-specific factors. Generally the risk is reduced when soil quality is high, vegetation is dense, and water is distant. The parameters discussed below can be used to identify the products with the highest inherent risk characteristics.

Leaching Potential

The Ground-water Ubiquity Score (GUS) is an empirically derived index that relates pesticide persistence and soil binding to mobility. GUS can be used to rank pesticides for their potential to move toward groundwater. [12] The GUS index is defined mathematically as follows:

$$GUS = \log_{10}(\text{halflife}) \times [4 - \log_{10}(\text{Koc})]$$

where Koc is the soil sorption coefficient and halflife is the soil halflife in days. GUS values for typical pesticides range from a low of about -6 to a high of about 7. A pesticide movement rating ranging from "extremely low" to "very high" has been assigned to the numerical values by the researchers in the OSU Extension Pesticide Properties Database.[12] The values are as follows:

GUS value	Pesticide Movement Rating
<0.1	extremely low
0.1 - 1.0	very low
1.0 - 2.0	low
2.0 - 3.0	moderate
3.0 - 4.0	high
> 4.0	very high

The GUS index was found for most, but not all, active ingredients in the OSU Database. When it was not found, it was calculated from the halflife and soil binding coefficient, if those were available. In a few cases, even though the GUS index could not be found or calculated due to data gaps, qualitative information on soil binding or mobility was identified in either EXTOXNET or the Hazardous Substances Databank.

In addition to the GUS index, information on pesticide movement potential was noted from product label warnings about the leachability of the products and/or the detection of such or similar chemicals in ground-water. EPA requires two levels of warnings for products with characteristics determined to result in likely contamination of ground-water from use as labeled.[9] A lower level of warning is required if no actual detections have occurred or no field studies have been done. A higher level of warning is required if detections have occurred or field studies have shown that the chemical leaches. For purposes of this initial screening, the presence of either warning was considered an indication that the chemical has high mobility. This approach was most consistent with the use of the GUS index, which does not indicate actual detections in ground-water or below a certain soil depth. In rare cases where a label ground-water advisory occurs but the GUS index did not indicate high mobility (e.g. glufosinate ammonium), the label advisory was given priority.

Runoff Potential

The potential of a pesticide to run off from the application site with applied (rain or irrigation) water is strongly influenced by its solubility in water and its soil binding. There are two main mechanisms whereby a pesticide can run off: dissolved in water or bound to soil particles. The properties which govern these processes are quite different. A pesticide that binds to soil can run off when the soil particles themselves are washed or eroded away. Products with high risk for this type of runoff have high soil binding, generally considered a desirable property because it prevents movement of the chemicals through or away from the soil. It is my judgment that this type of runoff is best prevented by site-specific factors or by avoiding pesticides entirely rather than by

product selection, since the products that have low risk for movement with soil particles are generally those with high risk for groundwater pollution. If erosion is occurring at the site, no pesticide will stay put. For this reason, no parameter was included to evaluate pesticide runoff via adsorption to soil. Although a "runoff potential" is listed in worksheet 2 of the Excel workbook that accompanies these notes, that information was not used because it appears to take account only of this one type of runoff mechanism and was judged of little value in this assessment for the reasons discussed above.

The other type of runoff scenario does lend itself more reasonably to product comparisons. If a pesticide is highly soluble in water but has poor soil binding, it has potential to move with applied water. If that water is tending to move laterally over or through the top layers of soil, the pesticide will move with it. Products at risk for runoff in water would tend to have high solubility, low soil binding, and a long halflife. Most pesticides that have high solubility also have low soil binding[15], so for those products the low soil binding itself is an indication of the potential for both ground-water and surface-water hazard and the GUS index should be a reasonable index of hazard for both processes. The important exception to be considered is products with both high binding and high solubility or low binding and low solubility. The former group will have low GUS values, the latter high GUS values. Some products with low GUS values, considered low risk for ground-water, may pose a higher risk for surface water runoff if their solubility is high. On the other hand, some products with high GUS values, considered high risk for leaching, may be less prone to runoff because they do not dissolve in water. I have so far identified no standard benchmarks for making decisions in these cases, but if the City intends to continue using any pesticides near surface water or storm drains, a good GUS score should not automatically indicate low probability for runoff. Other factors must be considered, such as product solubility, application method (i.e. spray, wipe on, etc.), application rate and frequency, application timing, and site conditions that allow substantial water runoff or soil erosion from treated areas. Poor soil, high slope, and absence of vegetation are all risk factors for runoff.

Initial Ranking by Tiers

The City requested that all products on the list be classified into one of three tiers: products that should be highest priority for phasing out, those of moderate concern that might be used only under certain conditions, and those of lower concern that might be considered usable tools in an IPM framework. A set of sample criteria was written following the model provided in the form of a discussion draft. A proposed ranking follows in Tables 1-4, based on the test criteria below. A final determination will require finalization of the City's criteria for ranking pesticides. The factors influencing the tier assignments are shown in the tables so that products can easily be reassigned when changes are made to the criteria. As noted earlier, the pesticides must still undergo use and alternatives analysis.

Tier Definitions

Tier 1: Highest concern, highest priority for phaseout
Tier 2: Moderate concern, second priority
Tier 3: Lowest concern.
Tier 4: Insufficient information available to assign to above tiers

Tier 1: (Any of the following are true) (All ingredients should be identified so that they can be screened using these tests)

* Products in Hazard Category I: Signal word DANGER
* Restricted use pesticides (except aquatic herbicides#)
* Products that cannot be disposed of because of dioxin contamination
* Products with active ingredient on the state list of acutely dangerous wastes (P list)
* Products with known, likely, or probable carcinogens as active ingredients

10

* Products with reproductive toxicants as active ingredients (CA Prop 65 list)
* Products with known or probable endocrine disruptors as active ingredients
* Products labeled as highly toxic or extremely toxic to birds, aquatic species, bees, or wildlife. (exceptions for products used only indoors; exception to bee toxicity will be needed for products intended to control bees, wasps, or hornets, possible BMP needed)
* Products with active ingredients with soil halflives greater than 100 days (possible exception for products used only indoors)
* Products with active ingredients with mobility ratings high or very high or with specific label warnings about groundwater hazard. (possible exception for products used only indoors)

#Note: aquatic herbicides are not included in this criterion because all aquatic applications in the state are restricted because of the need for a permit rather than because of particular properties of the chemicals involved. Aquatic herbicides could be included here, and if so, should be added via a separate criterion.

Tier 2:
* All products not specifically assigned to tier 1 or tier 3.

Tier 3: (All of the following are true) (All ingredients should be identified so that they can be screened using these tests)
* Product contains no possible or probable carcinogens
* Product contains no reproductive toxicants (CA Prop 65 list)
* Product contains no ingredients listed by Illinois EPA as known, probable, or suspect endocrine disruptors
* Active ingredient has soil halflife of 30 days or less (exception for minerals)
* Active ingredient has extremely low or very low mobility in soils. (possible exception for indoor products)
* Product is not labeled as toxic to fish, birds, bees, wildlife, or domestic animals.

Tier 4: Not enough information.
Product registration or label not found
or
Key data not located for active ingredient (halflife, soil binding, ecotoxicity, etc.)

Discussion

All of the products analyzed were registered by EPA and were legal to use in accordance with the label at the time they were purchased. The City has determined that it wishes to reduce pesticide use, indicating that it desires to curtail or cease the use of certain products that it could legally use. In essence, the City wishes to set a higher standard than EPA registration as a basis for its pesticide use. There are many good reasons for doing so, not the least of which is bringing the City's own practices into accord with those that it recommends to its residents. Detection of a wide variety of pesticides in Puget Sound streams,[22,23] in some cases at levels exceeding chronic safety standards for aquatic life, has focused attention on the need to find and eliminate the sources of contamination. Preliminary research has begun to draw connections between pesticide levels in surface-water and pesticide sales.[23] The recent listing of salmon under the Endangered Species Act underscores the urgency of removing anthropogenic stresses on aquatic species. Recent research in the San Francisco Bay Area has shown that runoff of diazinon from only a few homes in a watershed is sufficient to raise diazinon levels in streams to levels that threaten some aquatic species.[24] The study further demonstrated that the contamination can occur even if the products are used scrupulously as directed on the label. These results lend support to the idea that some products need to be eliminated from use, not merely reduced.

11

Within the context of an integrated pest management program, choices of which control methods to use are based on many factors, including product hazards, label restrictions, effectiveness, site-specific factors, and available alternatives. The work reported here can be used to compare certain product attributes to screen products for desirability of use. It should be reiterated that actual risk from using products depends on many factors, some of which are not product dependent, such as weather, site conditions, application rates, and so on.

Nearly every chemical product (with a few exceptions) scores poorly in at least one parameter recorded in this analysis. For example, the Tier 1 lists (115 products) contained:
* 25 products with known, likely, or probable carcinogens (mostly fungicides)
* 20 products with known or probable endocrine disruptors
* 14 products with persistent ingredients (mostly herbicides and fungicides)
* 24 products with predicted high or very high soil mobility (mostly herbicides)
* 27 products labeled as highly toxic or extremely toxic to birds, fish, bees, or wildlife (mostly insecticides and molluscicides)

The decisions as to which products to use and which to discontinue requires applying a set of criteria over the hazard matrix to group the products into tiers. Only one set of criteria is offered here as an example. This particular set of criteria happens to screen many products into Tier I, those products of highest concern. Many of the products in Tier 1 were placed there because of only one of the criteria (not always the same one). Clearly, the choice of criteria is critical. I have indicated in the ranking criteria some cases where exceptions would seem to make sense. However, these products should be looked at carefully in the context of their uses to determine applicability of the criteria. Products for which elimination is not practical should undergo the second level of review to ensure that they are the best choice for the circumstances, that use will be as low as possible, and that all possible safety precautions will be applied.

Recommendations

1. The enclosed set of screening criteria is proposed as a starting point that identifies important issues of concern that can be used as a basis for prioritizing products for phaseout, restrictions, or further review. This screening should be considered as preliminary. A second stage of toxicity review and exposure evaluation is suggested for any products that fall into Tier 1 or 2 but which the City would like to consider continuing to use after the use and alternatives analysis. (Details of how this would work are presented at the end of this section). The City should make its own decision, with public input, as to which of the screening criteria should be considered pass/fail for all products.

2. The City should use the ranking charts from the preliminary screening with the following understanding:
   a) Blank cells can mean that tests have not been done or other information is unavailable.
   b) Some criteria may be found not to apply to products (including those in Tier 1) after uses are analyzed.
   c) Placement of a product in Tier 2 or even Tier 3 does not mean that the product is necessarily safe. In addition, concerns raised by the presence of unknown, so-called "inert" ingredients should be addressed (see point #3 below).

3. The City should require knowledge of all ingredients in any products they continue to use. These additional "inert" (non-active) ingredients should then be screened against the same lists as the active ingredients, as shown in the flow chart. Without this information, it is impossible to do a valid scientific review. A recent study of poor salmon returns in Canada[16] hypothesizes that the culprit may be an inert ingredient (nonylphenol) in pesticides applied over the watershed. If this

hypothesis is proven, the situation would illustrate very clearly the importance of non-active ingredients in environmental safety. It would be fruitless to select products for salmon protection without knowing the identity of toxic inert ingredients that have produced toxic effects in salmon. In other words, you can rule out a product without knowing all ingredients, but you cannot with certainty rule it in.

4. The sheer volume of products used by the City, many for the same apparent purpose, reveals the need to reduce duplication and try to standardize usage. One area where this seemed most striking was in the array of products used for controlling bees, wasps, and hornets, presumably in the vicinity of utility meters or other similar sites. If it is determined that chemical use needs to continue for this purpose, it would be desirable to settle on the least hazardous formulation and to standardize that product or similar products city-wide. Unfortunately, I have not yet been able to adequately compare these products because of the lack of complete data for several pyrethroids widely used as active ingredients. There is need for followup work in this area.

5. The City must establish criteria that define the "need" for a pesticide based on reasonable thresholds in the IPM framework. The City should consider input from the public in establishing these need criteria. If it is eventually determined from the use/alternatives analysis that certain products will be retained for limited uses, reductions might be obtained through best management practices that clearly limit and define the uses that will be allowed. However, if comparison of new BMPs to actual current uses shows little reduction potential, the City will not have achieved its goals.

6. As new products are introduced, the City will want to do ongoing evaluations to determine if these products are acceptable or not. A considerable fraction of the time required in doing this assessment was spent gathering product labels and other information. Regardless of whether such evaluations are done in-house or by a consultant, the City can save time and money by providing product labels and MSDSs to the person or persons doing the evaluation. Additional product information such as product brochures, toxicology reports, etc. should also be collected as products are considered.

7. While it would be tempting to use actual detections in surface-water or ground-water as a criterion for ranking products, I have not followed this approach because of the time required to acquire the data and because the presence of chemicals in water is a lagging indicator of both use and product properties. The City may well decide to use the results of recent surface-water testing to phase out widely found contaminants such as 2,4-D, MCPP, dicamba, and dichlobenil, or those found to exceed chronic aquatic standards, such as diazinon, carbaryl, chlorpyrifos, and malathion. However, it is critical to remember that some of the ingredients in other products are not detected either because they are not widely enough used or because the studies have not looked for them. If the science indicates that these chemicals are highly persistent and/or mobile, then continuing to use them (or especially increasing use of them) likely will result in their being found in water at a later time.

8. The time and budget allotted for this evaluation were far too small for a complete review of more than 200 products with approximately 100 active ingredients. New products continued to come in throughout the evaluation process. While I have made every effort to be accurate and have reviewed virtually every cell in the spreadsheets for errors, under the level of pressure imposed by this work the probably of mistakes in data entry or consistency inevitably goes up. In addition, I have been unable, within the time allowed, to locate adequate data on roughly 16 of the active ingredients. I suggest that the data gathered here, especially the tiered list of products, be considered preliminary and subject to revision and expansion as the process proceeds.

9. Finally, the City is to be commended for embarking on this important process. The City should remain committed to reducing pesticide use and persistent in reaching that goal. It would be tempting to take the easy way out and to maintain the *status quo* without trying hard to demonstrate leadership by challenging assumptions and finding wisdom and experience both inside and outside the local area. The Endangered Species Act listing should tell us that we cannot continue as we have been. But it's more than just salmon. We must also protect our residents, our workers, and our air, land, and water.

Proposal for Additional Toxicology and Exposure Evaluation
The diagram on the next page shows how the proposed two levels of screening would fit into the full evaluation process with its use and alternatives analyses.

1. The initial stage catalogues the products used and identifies a number of potential hazards such as acute toxicity or irritation potential, carcinogens, reproductive toxicants, endocrine disruptors, persistent chemicals, highly mobile chemicals, and chemicals that contain ingredients toxic to non-target organisms. The screening net at this stage must be quite wide-mouthed and fine meshed, so that all the important issues are picked up. For example, if a product is persistent (has a halflife over 100 days), that can have major implications for exposure potential and for mobility. The product needs to be flagged for
that possibility. Later it may be found that the concerns about persistence are not likely to result in high exposure (e.g. used only in areas inaccessible to the public or wildlife) or mobility (e.g. very high soil binding and minimal solubility in water). On the other hand, if biological or mechanical methods are available that can control the problem, the chemical may be eliminated as unnecessary. Alternatively, if another chemical is available that has a much shorter halflife and is less toxic, the choice can be made to use it instead of the original chemical. Whatever the outcome, the initial flagging of the persistence allowed this decision to be made in a reasoned manner.

2. The screening criteria are used to generate lists (Tier 1, Tier 2, Tier 3) based on concerns raised about product characteristics. That has been done at this point. (A Tier 4 list was also generated, containing products for which more information is needed before screening can take place.)

3. The Tier 1 list (highest concern) is then examined for product uses, perceived need for the product, the availability of alternatives, and cost of implementing the alternatives. At this point, many products may be found to be obsolete, unnecessary, duplicative, and inappropriate for some uses. Those products can be discarded (through appropriate hazardous waste disposal channels!) and eliminated from further consideration. In addition, an examination and reassessment of pest and weed tolerances should provide additional opportunities to eliminate some products. A similar look should then be given to Tier 2.

4. Products that groundskeepers feel they must continue using or for which there are no apparent viable alternatives will then need to be looked at further. At this point the City should revisit the preliminary criteria to decide which of these should eliminate products absolutely and without exception. I suggest that many, if not most, of them should be. A precautionary approach to worker safety, public safety, and environmental protection will send an important philosophical message and set a good example for the public. Criteria that are deemed not applicable for particular product uses, such as toxicity to birds for products used only indoors, can be dropped for those products. At the same time, the

Wild: label warnings of toxicity to wildlife
Note: raw data are found on spreadsheets #1 (products) and #2 (ingredients).

References

1. US EPA, Pesticide Product Label System, CD-ROM, updated to July, 1997.
2. US EPA/OPP Pesticide Products Database, http://www.cdpr.ca.gov/docs/epa/m2.htm
3. US EPA, Restricted Use Products Report, http://www.epa.gov/docs/RestProd/rupapr99.htm
4. US EPA, Pesticidal Chemicals Classified as Known, Probable or Possible Human Carcinogens, http://www.epa.gov/pesticides/carlist/table.htm#a
5. State of California list of carcinogens, http://www.oehha.org/prop65/41699ntc.htm
6. National Toxicology Program, Report On Carcinogens, 8th Edition, http://ntp-server.niehs.nih.gov/NewHomeRoc/CurrentLists.html
7. International Agency for Research on Cancer, IARC Monographs Programme on the Evaluation of Carcinogenic Risks to Humans, Complete List of Agents, Mixtures and Exposures Evaluated and their Classification, http://www.iarc.fr/
8. Illinois EPA Endocrine Disruptors Strategy, February 1997.
9. US EPA Office of Pesticide Programs' Label Review Manual, http://www.epa.gov/opppsps1/labeling/lrm/ and Code of Federal Regulations 40 Part 156.
10. Farm Chemicals Handbook, Meister Publishing Company, Willoughby, OH, 1998.
11. EXTOXNET, The Extension Toxicology Network, Pesticide Information Profiles, http://ace.ace.orst.edu/info/extoxnet/
12. Oregon State University Extension Pesticide Properties Database, http://ace.orst.edu/info/nptn/ppdmove.htm
13. Agricultural Research Service, US Department of Agriculture Pesticide Properties Database, http://www.arsusda.gov/rsml/ppdb2.html
14. Hazardous Substances Databank, Toxnet, National Library of Medicine, http://toxnet.nlm.nih.gov/servlets/simple-search
15. University of Idaho, Pesticides and their Movement in Soil and Water, Current Information Series No. 865, http://www.uidaho.edu/wq/wqpubs/cis865.html
16. Fairchild, WL, EO Swansburg, JT Arsenault, and SB Brown. "Does an association between pesticide use and subsequent declines in catch of Atlantic salmon (Salmo salar) represent a case of endocrine disruption?" Environmental Health Perspectives 107 (5): 349-358, 1999.
17. State of Washington Dangerous Waste Regulations, 173-303 WAC, January 12, 1998.
18. EPA PBT Strategy, http://222.epa.gov/pbt/aboutpbt.htm
19. Washington State Department of Ecology, Questions & Answers on the Ecology Initiative on Persistent, Bioaccumulative, and Toxic Chemicals (PBTs), http://www.state.wa.us/ecology/eils/bcc/bccfaq.html
20. Larson, AG. "Pesticide Residues in the East Chelis Superficial Aquifer." Pesticides in Ground Water Report no. 5, Washington State Department of Ecology, Environmental Investigations and Laboratory Services Program. Toxics, Compliance and Ground Water Investigations Section. Publication #94-26, February, 1994.
21. NCAP v. Browner, 941 F. Supp. 197 (D.D.C. 1996)
22. Bortleson, GC, and DA Davis. "Pesticides in selected small streams in the Puget Sound Basin, 1987-1995." U.S. Department of the Interior—U.S. Geological Survey, National Water Quality Assessment Program, Fact Sheet 067-97, June, 1997.
23. Voss, FD, SS Embrey, JC Ebbert, DA Davis, AM Frahm, and GH Perry. "Pesticides detected in urban streams during rainstorms and relations to retail sales of pesticides in King County, Washington." U.S. Department of the Interior—U.S. Geological Survey Fact Sheet 097-99, April, 1999.
24. "Diazinon sources in runoff from the San Francisco Bay Region." Technical Note 106, Watershed Protection Techniques 3 (1): 613-616, April, 1999.

Comment 1

Refer to the response to Letter 4, Comment 2.

Comment 2

Comment noted. Both the Draft EIS and this Final EIS reflect a proactive effort to undertake detailed analyses of cumulative impacts related to the MPR and UGA for all elements of the environment. Analyses were conducted in close coordination with affected agencies, organizations, and local jurisdictions and addressed all issues identified during the scoping period for the EIS.

Comment 3

A Golf Course Management Plan has been prepared for the MountainStar MPR golf courses. No golf course is proposed under Alternative 5 (Preferred Alternative). The golf course plan describes integrated pest management principles that would be used on the MountainStar MPR site, including weed tolerances, preferences for cultural methods (non-chemical) wherever possible to prevent or treat weed or disease infestations, and pesticides use, including any restrictions on their use.

Comment 4

Comment noted. Refer to the response to Letter 40, Comment 3.

Comment 5

Comment noted. Refer to the response to Letter 40, Comment 3. Receipt of the attachment is noted.

Comment 6

Comment noted.

4.2 Public Hearing Comments and Responses

CLE ELUM UGA DRAFT EIS PUBLIC HEARING

April 18, 2001

REPORTED BY:
KELLI S. STRICKLER

MAYOR BERNDT: Good evening, everyone. If we could, I would like to go ahead and start tonight. The public hearing for the Cle Elum UGA Draft Environmental Impact Statement is now open. This public hearing will proceed in an orderly fashion and I would like to ask your cooperation in the following procedure:

Everyone present will be given the opportunity to be heard. In addition to our taking notes, the City is recording with a cassette and a court reporter is present to transcribe tonight's testimony as well. Therefore, when you make your comments, please begin by stating your name and address. Speak slowly and clearly so that the tape recorder and the court reporter can accurately get that information.

I ask that only one person be allowed to speak at a time. I also ask that your comments be directed to me as lead agency, not to supporters or proponents of the pending matter. This issue before us tonight is the Draft EIS for the Cle Elum Urban Growth Area, which the City of Cle Elum anticipates annexing and subsequently will require both planning and zoning to be adopted. The City will be conducting additional public hearings as it contemplates subarea planning and zoning for this area.

Tonight's hearing is geared to taking testimony, comments, questions and concerns about the content of the Draft EIS addressing environmental impacts to the built and

natural environment that may flow from planning and zoning for growth in the Bullfrog UGA.

After we have received all the testimony, comments, concerns and questions about the Draft EIS, that information will be reviewed and considered, after which time a Final EIS will be published. It is our objective that the answers to the questions and concerns raised tonight will be addressed in the Final EIS. I cannot provide answers to your questions. My goal is to find out the questions that arise from the Draft EIS and revise it as necessary. Your cooperation is greatly appreciated.

Before we begin hearing from the audience, I would like to introduce the Cle Elum City Planner, Brian Carrico, who will present the staff report on the matter. When he is done, I will open the floor for comments from the audience.

In fairness to all here, each person will be given an opportunity to speak for an initial period not to exceed -- we originally had five minutes; however, I understand that we only have five folks signed up to speak and so we can increase that I would say to not more than ten minutes. If there are additional people, please come and sign up.

For ease of coordination tonight, I will be taking comments from those listed on the sign-up sheet first. If those who did not sign up, raise your hand, state your name and address so we can add your name to the sheet. Please

don't hesitate to raise that hand to ask to speak. Our job is the public's business and we want to hear from you.

Does anyone wish to sign up at this point?

Anybody that is not signed up -- I am sorry. If not, I am introduce Brian Carrico.

MR. CARRICO: Thank you, Mayor Berndt. For the record, my name is Brian Carrico and I am the City Planner for Cle Elum. I will make some brief comments tonight regarding background of the project, the reasons for the hearing and then what happens next in this process.

As indicated by the mayor, the hearing tonight is to take comments on a Draft Environmental Impact Statement. The DEIS has been completed analyzing the impacts of a development proposal by Trendwest Properties for approximately 1,100 acres in the area commonly referred to as the Bullfrog Urban Growth Area.

A preliminary development plan is based on a proposal that was submitted to the county in 1998. As part of the proposal, the City will also consider the adoption of a subarea plan and zoning for the area as well as consideration of a master planned development for much of the area submitted by Trendwest Properties, Inc. A development agreement is also proposed between the City and the property owner to control the development of the property.

The Environmental Impact Statement is being completed to

comply with the State Environmental Policy Act commonly known as SEPA. SEPA is a state law which was enacted back in 1971, and it requires that the impacts of activities of government on the built and natural environment are identified and assessed prior to the government taking action. It requires the submittal of a checklist on impacts and a decision on what impacts will occur as a result of the project.

The environmental review process for this item began on February 22, 1999 when Kittitas County issued a Determination of Significance and Scoping Notice for the project. Since then the City has taken over as lead agency status for the UGA. The EIS issued a determination of significance which caused the EIS to be written and a scoping notice for the project. Since that time the City has taken over as a lead agency for the entire process for the development within the Urban Growth Area.

The EIS that is the subject of tonight's hearing analyzes four different alternatives including the no action alternative, which is the current zoning within the county. The preliminary master plan, which is the original submittal by Trendwest that includes approximately 1,028 dwelling units, approximately 950,000 square feet of business park space, a golf course, a lodge and land designated for a city water treatment plant, for a future school explanation, for an expansion of a a city cemetery and a potential Washington

state horse park.

Alternative three expands the number of residential units by 380 and reduces the business park to 600,000 square foot. The other activities remain the same.

Alternative four reduces the number of residential units, reduces the business park to 300,000 square feet and reduces the cemetery expansion areas to approximately three acres.

The subject property is currently located within the jurisdiction of Kittitas County. However, the area is part of the City's Urban Growth Area as adopted by the county. The property owner has signed a pre-annexation agreement with the City that indicates development will not occur until annexed into the city.

Trendwest Properties as the owner has submitted a notice of intent to annex to the city, which has been accepted. An annexation petition is expected soon. The decisions made by the City will not take effect until annexation of the property, until we gain control of it.

The reason for tonight's hearing is to take comments on the DEIS documents. SEPA requires a thorough assessment of the environmental impacts of the project so that the decision makers, in this case the City of Cle Elum Planning Commission and the city council have a full understanding of the impacts of the proposal and so that the impacts can be appropriately mitigated.

Comments tonight should address the impact analysis contained in the EIS or not whether the project should or should not be ultimately approved. Tonight is not the time to engage in a back and forth debate or demand for specific answers to questions as part of the public hearing. The FEIS is the vehicle for answering those questions. Of course, their senior staff and EIS consultants are available before -- they were available before the hearing and possibly afterwards and also at the next hearing on the 25th to have individual conversations with and to ask specific questions.

The comment period for the EIS is provided to ensure that the City has properly addressed the impacts from the proposal. The City will take the comments and questions provided tonight along with the comments provided at the next hearing and any written comments and those will be addressed in the Final Environmental Impact Statement.

You may comment tonight orally or at the next meeting. You may also submit written comments and address them in a Final Environmental Impact Statement at any time up to May 7th depending on the comment periods that the anyone is interested to; however, you can submit them in any form you like written. There is no greater weight given to oral or written comments.

Comments will be accepted in writing until Monday, May 7th. They can be mailed, faxed or dropped off at City Hall.

The FEIS will be used by the decision makers during deliberations on the project. There will be additional hearings scheduled before the City Planning Commission and the City Council to address the project and whether it's consistent with city plans and policies. It is at those hearings where the merits of the project will be discussed.

If you do leave your name and address, a mailing address, or make any comments orally tonight, we will be providing future notices of additional hearings on this project. So if you haven't and you would like to receive those, please sign up in the back and get your name and address to the city and we will put you on the list. That's all I have to say tonight and I will turn it back to the mayor.

MAYOR BERNDT: Beginning public comments. I would like to start with JoAnn Rushton.

MS. RUSHTON: I am JoAnn Rushton. My address is 508 Madison Street, South Cle Elum. I am here representing the Community Center Complex Board. We are a group that is working towards the community center that is shown on the maps. And with the land and the financial support from Trendwest, we are hoping that with everything going through that we will be able to do to the compound center and pool.

The pool may be a problem with the water the way it is right now. We certainly hope to be able to do that to better serve the residents who are already here and the expanded

1

residential people that are coming in.

I haven't had a chance to look over the actual Environmental Impact Statement, the large one, but they seemed -- Trendwest seems to do a very good job and the City does a very good job in identifying all the impacts. That's it.

1 (cont.)

MAYOR BERNDT: Thank you. And Evelyn Nelson.

MS. NELSON: Good afternoon. Welcome to you. I am Evelyn Nelson, Superintendent of Schools. I am here representing the school district and my address is 2690 State Road 903. I have prepared a principal comment, but I would also like to share that tonight before the city. So if you bear with me I am actually reading from my own statements.

The Cle Elum-Roslyn School District would like to take this opportunity to express concerns regarding the published EIS for the Cle Elum UGA. Upon reviewing the document, we are left with a number of concerns. Those include: No. 1, Appendix H, Fiscal and Economic Impact Analysis, page 110 states, quote, The 25-acre land donation to the school by the applicant has been deemed adequate to accommodate such growth, end quote.

2

Four major limitations to this statement include: A: Not all acreage is useable as required in state law, Washington Administrative Code 180-26-020, for a school site. See diagram 2-5 main text.

B: The value of the parcel does not offset the local fiscal impact. The fiscal impacts of anticipated growth in the student enrollment and subsequent housing are referenced on pages 3.19-15 and Table 3.19-6. The information cites an 80 percent state match for construction costs. Those construction costs are also listed as $110 per square foot. These statistics do not match the school district's capital facilities plan data.

The findings resulting from the school district's research on school facilities construction reveal a current state match of 30.73 percent of those items which the state will match or 13.23 percent of the total cost for constructing a new school. The current cost of construction is $182.58 per square foot for an elementary school, $214.96 per square foot for a middle school and $246.70 cents per square foot for a high school. 3

C: The cost of interim housing for students is borne totally by the local community; state matching funds are not available for such costs. 4

Item D: The total fiscal impact of space needs is estimated on page 114, Appendix H, to be 1.5 million in excess of state matching funds. The school district's research indicates the space needs will cost $25,647,114, of which $3,088,670 is state match and $22,558,444 is local responsibility. Eighty percent of these costs are the result 5

of an anticipated student enrollment from the Cle Elum UGA and MountainStar Resort. **5 (cont.)**

School districts concerns not addressed in the EIS include: A: Anticipated growth in student population will far exceed the district's current septic capacity. **6**

B: Anticipated growth in student population and expansion of facilities will cause increase in water usage. Availability of water resources to meet these needs is a concern. Questions remain concerning the district's use of potable water as a source of irrigation. **7**

C: The current UGA boundary may create a fiscal impact to the school district if necessary services must be purchased from a neighboring municipality. **8**

D: Increased assessed valuation is seen in the EIS as a solution to local fiscal impacts. However, increased assessed valuations tend to follow the arrival of new students by a periods of 2.5 to three years. How should the district offset the impact of interim housing needs during this period? **9**

E: For a district to realize any increase in revenue from increased assessed valuation, it must first successfully validate and pass a levy or bond measure by a super-majority vote, 60 percent. Thus, increased assessed valuation does not guarantee increased revenue. **10**

The aforementioned limitations cause concern by the school officials on behalf of the district, its' children and **11**

the local community. Therefore, we strongly encourage city officials to support the district's position that a signed mitigation agreement must be in effect prior to the issuance of any permits or approvals. Thank you.

11 (cont.)

MAYOR BERNDT: Thank you. Did we get the written comments?

MS. NELSON: Yes.

MAYOR BERNDT: Brian Lenz.

MR. LENZ: Mayor, my name is Brian Lenz, residing at 1441 Emerson Road. Tonight I am representing Puget Sound Energy & Utility Company that is the utility facility on the UGA area. We also own I believe 13 acres within the complex. I think it's noted as power station on the maps here.

The comments that we have as an utility is that we are able and willing to provide service to any of the planned facilities or that are listed in the UGA's different proposals. And that is the point where we receive the majority of the power through to the county, in through that station. So we have adequate capacity to handle new construction and any development that's listed within the -- any of the proposals. We are also in the process of reviewing a natural gas requirements.

12

And as you may know, we have a partially completed project bringing natural gas to the upper county including this property. We are in the process of reviewing routes and

looking at significant crossing issues to be addressed this year in order to possibly complete the project in 2002.

One of the comments I have is that without the type of development that is proposed, bringing natural gas is not as feasible to the community. And as you may remember in the past years of working with different community businesses and businesses that looked at locating in the area, many times they pass this community by because natural gas is unavailable. So we are excited for an opportunity to bring that resource and that energy source to the community if we can look at getting these sorts of plans before.

One of the things that we look at as an utility is that whether there's land that's been bought by different individuals. They may have one acre, three acre, five-acre parcels. It's very difficult to provide infrastructure to provide those sorts of properties when there's not a master plan or a plan that really addresses it. **12 (cont.)**

In the three and a half four years that I have been working with the organization that is proposing this, it has been very positive and they looked at very many of the issues that come about in addressing growth through a planned way. I guess I am not really saying it well, but it certainly is a better way to go with a plan and environment for utilities versus the scattered sprawl that has occurred in other areas.

So as a company we are very supportive of the plans and

stand ready to provide service to those.

MAYOR BERNDT: Thank you, Brian.

Keith Hartley.

MR. HARTLEY: I would like just to submit my letter. My name is Keith Hartley. I am just going to submit an address of 416 West Second Street, Cle Elum.

MAYOR BERNDT: Thank you, Keith.

Ellie Belew.

MS. BELEW: I am going to pass.

MAYOR BERNDT: That is the last speaker that I have registered for tonight. If you want to, come on up.

MS. SIMON: I am Thelma Simon. I reside at 1245 Wallace Drive, I have a business at 701 East First Street. So it's hard to make comments when you're not able to read it. And as a person that does most of my reading in the evening, I don't know if anybody else reads in the middle of the day, but this has not been accessible. And since the issue has come up, the majority of our Cle Elum senior citizens haven't got a copy.

I would like to see that we get one down at the senior center and somehow I would like to be able to make comments, but I would like to be able to read it. So that's just what I would like to say.

MAYOR BERNDT: Thank you, Thelma.

Anyone else? If not, we will cease. Yes.

12 (cont.)

13

14

MR. DANTZLER: Jeff Dantzler; 1702 West Side Road. I would just like to, Mr. Mayor, express my support as a business owner in the area for an opportunity to have a planned area come to this area. Whether it's on the business side of it or it's the community side of it, this brings a lot of opportunity, a lot of jobs to the area.

A lot of concerns came up when we located our business here some eight years ago that we didn't foresee. A few of the problems that we would run across in expanding that business in this area primarily is because we had to go through all the hassles of expanding, moving buildings out of the way and buying parcel by parcel and bringing utilities even though there are utilities already on this piece of land. Just a lot of inefficiency.

15

If we had come to this particular area today, we would not be interested in considering Cle Elum today because of the size. It would not be feasible unless an area such as this is proposed here existed with the large tract of lands with the utilities coming right up to the lots. Trendwest has obviously spent several years putting this together, that's obvious. If we were to be at a point to come out here now and do this, I would just skip Cle Elum and move on by.

So finally we really need to plan this out. We should have businesses where these employees can shop, places where they can raise their families. We will be able to bring some

good jobs to this area.

One of the other things is the -- we have a problem with recruiting individuals that want to work for us because husband and wife both have a need for jobs, good quality jobs in the area. Many times we can only provide one of them employment. We cannot complete their needs, so there needs to be more professional jobs in the area.

And I do not believe that that business park atmosphere will create strip malls and create competition for downtown Cle Elum. It will bring business, office business, you know. When it's clean industry, hopefully it is clean manufacturing, that sort of thing. Think about it. Priceless retail orientation, that kind of thing, so I think that would be good for everyone.

15 (cont.)

MAYOR BERNDT: Thank you, Jeff.

Anyone else?

Okay. We will meet again next week same time, same place. We will gladly accept comments in writing through May 7. We do have the EIS for sale at City Hall, copies are available for review at the city library in cross line and Cle Elum. I thank you for coming tonight.

And one thing I would like to ask just for my own edification was it of value to have the public session beforehand? Were you able to get any information?

MS. SIMON: It needed to be longer.

MAYOR BERNDT: Okay. Thank you.

MS. SIMON: Maybe some of the documents that they are referring to when they are explaining how they arrive at some of this could be provided during the educational periods.

MAYOR BERNDT: Very good. Thank you. We appreciate that. Thank you all very much.

Comment 1

Comment noted. Parks and recreation mitigation, including the Community Recreation Center, is described in Section 3.13 of the Final EIS.

Comment 2

Refer to Letter 1, Comment 1 for the response to the comment letter submitted by the Cle Elum-Roslyn School District.

Comment 3

Refer to the response to Letter 1, Comment 2.

Comment 4

Refer to the response to Letter 1, Comment 3.

Comment 5

Refer to the response to Letter 1, Comment 4.

Comment 6

Refer to the response to Letter 1, Comment 5.

Comment 7

Refer to the response to Letter 1, Comment 6.

Comment 8

Refer to the response to Letter 1, Comment 7.

Comment 9

Refer to the response to Letter 1, Comment 8.

Comment 10

Refer to the response to Letter 1, Comment 9.

Comment 11

Refer to the response to Letter 1, Comment 10.

Comment 12

Comment noted. Utility service is described in Section 3.16 of the Final EIS.

Comment 13

Comment noted. Refer to the response to Letter 35.

Comment 14

Comment noted. A copy of the Draft EIS was provided to the Senior Center. Please refer to the response to Letter 9, which was submitted by the Upper Kittitas County Senior Center.

Comment 15

Comment noted.

CLE ELUM UGA DRAFT EIS PUBLIC HEARING

April 25, 2001

REPORTED BY:
KELLI S. STRICKLER

MAYOR BERNDT: Good evening, everyone. If we could, I would like to go ahead and start tonight. The public hearing for the Cle Elum UGA Draft Environmental Impact Statement is now open. This is the second session. This public hearing will proceed in an orderly fashion and I would like to ask your cooperation in the following procedure:

Everyone present will be given the opportunity to be heard. In addition to our taking notes, the City is recording what is said and a court reporter is present to transcribe tonight's testimony as well. Therefore, when you make your comments, please begin by stating your name and address. Speak slowly and clearly so that the tape recorder and the court reporter can accurately get that information.

I ask that only one person be allowed to speak at a time. I also ask that your comments be directed to me as lead agency, not to supporters or proponents of the pending matter. The issue before us tonight is the Draft EIS for the Cle Elum Urban Growth Area, which the City of Cle Elum anticipates annexing and subsequently will require both planning and zoning to be adopted. The City will be conducting additional public hearings as it contemplates subarea planning and zoning for this area.

Tonight's hearing is geared to taking testimony, comments, questions and concerns about the content of the Draft EIS addressing environmental impacts to the built and

natural environment that may flow from planning and zoning for growth in the Bullfrog UGA. In the last session there was an issue of a person believing they could not ask questions. We encourage that.

After we have received all the testimony, comments, concerns and questions about the Draft EIS, that information will be reviewed and considered, after which time a Final EIS will be published. It is our objective that the answers to the questions and concerns raised tonight will be addressed in the Final EIS. I cannot provide answers to your questions. My goal is to find out the questions that arise from the Draft EIS and revise it as necessary. Your cooperation is greatly appreciated.

Before beginning hearing from the audience, I am going to introduce the Cle Elum City Planner, Brian Carrico, who will present the staff report on the matter. When he is done, the floor will be open for comments from the audience. In fairness to all here, each person will be given the opportunity to speak for an initial period not to exceed five minutes. If more time is needed, we will make that available after everyone has had a chance to speak.

Sign-up sheets are in the entry for those of you who wish to speak. I will be taking comments from those listed on the sign-up sheet first. If there is anyone who wishes to speak who did not sign up, please raise your hand. As we get to

you, please state your name and address so we can add your name to the sheet. Please don't hesitate to raise a hand. Our job is the public's business and we want to hear from you tonight.

On my left -- I failed at the last hearing to introduce the City's attorney, Erin Anderson. That's her (indicating). At this point I will give you Brian Carrico.

MR. CARRICO: Thank you, Mayor Berndt. For those of you who were here last time you will have to hear this again. For the record, my name is Brian Carrico, and I am a City Planner for Cle Elum. I will cover some brief comments tonight on the background of the project, the purpose of tonight's hearing and what the next steps are.

As indicated by the mayor, the hearing tonight is to take comments on the Draft Environmental Impact Statement for the Bullfrog Urban Growth Area. This DEIS has been completed to analyze the impacts of a development proposal by Trendwest Properties for approximately 1106 acres in the area commonly referred to as the Bullfrog UGA.

The preliminary development plan analyzed by the DEIS is based on a proposal originally submitted to the county in 1998. As part of the proposal, the City will consider the adoption of a subarea plan, which there are copies of that draft in the back, and zoning, there is a copy of a draft zoning of the district for the property, as well as

consideration of the master planned development for much of the area submitted by Trendwest Properties. A development agreement is also proposed between the City and the land owner to control the development of the property.

The EIS is being completed to comply with the State Environmental Policy Act commonly known as SEPA. SEPA is a state law that was enacted by the legislature back in 1971, and it requires that the impacts of activities of government that effect the built and natural environment are identified and assessed prior to taking action on the item. It requires the submittal of a checklist that identifies the impacts and a decision from the government or the city on what impacts will occur as a result of the project.

The environmental review process for this issue began on February 22, 1999 when Kittitas County issued a Determination of Significance and Scoping Notice for the project. Since that time the City has taken over as the lead agency status for the UGA.

The EIS analyses four different alternatives one of which is a no-action alternative there are maps in the back that provide details on what those different alternatives are.

To summarize the alternatives, the preliminary master plan, which is alternative 2, is the original submittal by Trendwest. It includes approximately 1,028 dwelling units, approximately 950,000 square feet of a business park, a golf

course, a lodge and land designated for a city water treatment plant, an area for expansion of the school, an area for expansion of a city cemetery and land identified for a Washington state horse park.

Alternative 3 expands the number of residential units by 380 and reduces the business park to approximately 600,000 square feet.

Alternative 4 reduces the number of residential units, reduces the business park to 300,000 square feet and reduces the expansion area for the city cemetery to approximately three acres.

The subject property is currently located within the jurisdiction of Kittitas County. However, the area is part of the City's Urban Growth Area that was adopted by Kittitas County. The property owner has signed a pre-annexation agreement with the City that indicates development would not occur until annexed into the City of Cle Elum.

Trendwest Properties has submitted a notice of intent to annex to the city, which has been accepted by the city. An annexation petition from Trendwest is expected soon. Any decisions made by the City would not take effect until annexation of the property.

Regarding the reason for tonight's hearing, tonight's hearing is to take comments on the Draft Environmental Impact Statement documents. SEPA requires a thorough assessment of

the environmental impacts of the project so that decision makers -- in this case the City of Cle Elum Planning Commission will make recommendations to the city council, and then the Cle Elum City Council will make a final decision on the project -- so that those decision makers have a full understanding of the impacts of the proposal and so that the impacts can be appropriately mitigated.

Comments tonight should address the impact analysis contained in the EIS and not whether the project should or should not be ultimately approved. Tonight is not the time to engage in a back and forth debate on issues or demand for specific answers to questions as part of the hearing. The FEIS is the vehicle for answering those questions. As the mayor said, you are welcome to pose questions, but don't expect answer to those questions tonight.

Staff and DEIS consultants were available beforehand to answer questions and you may have some time afterwards if there are other questions for you to ask.

The comment period that the City has set for the DEIS is to ensure that the City has properly addressed the impacts from the proposal. The City will take comments and questions that are provided tonight and those received in writing and address them in the Final Environmental Impact Statement.

You may make comments tonight in person or you can submit them in writing up until the end of the comment period which

is May 7th. There is a comment sheet in the back tonight if you want to take one of those and may comments on that as you hear things tonight. However, you should submit the comments in whatever form you like as long as we can read them. There is no greater weight given to testimony provided tonight or those provided in writing. They can be mailed, faxed or dropped off at City Hall and we will get them into the process.

Once we get all those comments and draft the Final Environmental Impact Statement, that will be used by the decision makers during deliberations on the project. There will be additional hearings scheduled before both the City Planning Commission and the City Council to address the project whether it is consistent with city plans and policies. It is those hearings where the merits of the project will be discussed.

If you leave your name and address, a mailing address in the back on the sign-up board or you have already signed up with your mailing address, we can provide you with any future notices of public hearings or other things going on on this project.

That's all I have to say tonight and I will turn it back to the mayor.

MAYOR BERNDT: Thank you, Brian.

Now for public comment. First up Ellie Belew.

MS. BELEW: My name is Ellie Belew. I live at 145 Fifth Street in Roslyn. I will give you a written copy of my comments when I am finished.

What do we want? We want more schools, we want more schoolhouses and less jails, more books and less guns, more learning and less fights, more leisure and less work, more justice and less revenge. We want more opportunity to cultivate our better nature. So said Samuel Doppers decades ago.

What we want here, what we all want? We want jobs. We want Cle Elum as a vibrant community, not simply an easy drive through. And we want this for all the upper county municipalities and communities. We want clean air and water; we want some peace and quiet; we want community both human and natural; we want affordable services that meet our needs and has predictability in rates and what is delivered; we want the ability to know exactly all what this development is before it happens. 1

And what are we getting? We are getting a nonspecific, quote, unquote, phase environmental review, unquote, of a variety of aspects of development that are really part of one huge development. There are a lot of projects that should be in this DEIS. These include the MPR, the horse park, the water supply for the UGA and the MPR, related impacts on other consumptions, water consumption and quality, the water

delivery system including intakes, the sewer and storm water system, Cle Elum's proposed review of the zoning code, the range of secondary involvement and speculation that is occurring in the Cle Elum Lake and River corridor and elsewhere in the county. I could go on and on.

We are getting shifting corporate entities that have been involved in all of this development. Jeld-Wen, Trendwest Resources, Trendwest Investments, Trendwest Properties, Mountainstar Resources, World Mark and whatever comes next. We get unidentified water use. We get private residential development, long and short-term occupancy versus integrated community housing. Check out the golf course lots and equestrian village versus apartment house sightings. Compare the MPR development types to those in the UGA.

We get how many equestrian centers? So far I can count the horse park, a temporary equestrian area and another equestrian center in its' own village. How many of these convert to snowmobiles in the winter?

1 (cont.)

We get storm water runoff from both the MPR and the UGA that contaminates surface water, water that is contiguous with the Cle Elum River.

2

We get jammed traffic. Think about Bullfrog Road, putting in a freeway entrance and exit for both the MPR and UGA. Think about 903 through Ronald and Roslyn coming into this. Consider that part of Cle Elum between the UGA where

3

anyone who takes either I-90 is.

I could go on and on about what is not addressed in this DEIS nor in the MPR EIS. I could write pages on what is not addressed in the proposed possible mitigation of those impacts that are identified. RIDGE will be do this in writing. Tonight in the very few minutes I am allowed, I want to speak what will be lost and destroyed with the Trendwest development.

Respect for this place will be destroyed. Piecemeal quantification of impacts into what can be measured in a few weeks of monitoring does not begin to address this. The various corporate entities that include Trendwest and Mountainstar, to name a few, have no respect for the property they are currently holding title to.

What do I mean by this place? I mean the property Trendwest currently holds title to is a grand living place. It is more of the natural world than not. You can see the stars at night and the weather during the day. You can smell the river and trees, the wetlands, the mushrooms. You can hear the wind in such trees as are left and animals in the river. You can sometimes even hear the land as I have when spring melt loosens the rocks in some other place and there are rock falls or when the rain whispers on a rock. This place right now is bigger than what humans have done to it.

When Trendwest, quote unquote, goes out and the entire

3 (cont.)

4

development on all this property is, quote unquote, operational, this place will no longer be. There will be lots of buildings and roads, right of ways and golf course holes. There will be a comfortable way to tour virtually every foot of the physical location. It will not be a grand living place that is more equitable than not.

When Trendwest has had its' way with this place, much will be destroyed. Not lost because it will be sit here until it is gone. Then when I come from behind upon an older gentleman, we will not be following a game trail, we will not be on one of those benches above the Cle Elum River. I will not need to make extra noise so he is not unduly startled. He will not jump up and be surprised to see another human nor will he say, geez, I thought you were a big old elk. Mitigate that.

4 (cont.)

MAYOR BERNDT: Thanks, Ellie.

Brian Carpenter.

MR. CARPENTER: Brian Carpenter. B-R-I-A-N C-A-R-P-E-N-T-E-R. My address is 2049 South 36th, Suite 208, Tacoma, Washington 98409. I am going to limit my comments to transportation tonight. And I would like to start by pointing out the sort of transportation environment that the city and the county and the report are dealing with.

Washington state faces a severe lack of funding for transportation improvements. The same is felt in every city

5

and county across the state and it has become even worse since passage of 695. The county's total transportation budget is 14.7 million, the city's is about 302,000 with another 101,000 for arterial work. That's for one year. This is not likely to change any time soon given the state legislature is unwilling to bite the bullet and find any revenues for transportation, so that's the environment we deal with. **5 (cont.)**

Secondly I would like to start with the trip generation figures that were used in the transportation planning modeling LOS studies and impacts in mitigation. We believe that the trip mitigation -- or the trip generation statistics underestimate the actual number of trips that would be generated.

Modern families have multiple cars and multiple schedules. Many of the people will be using the resort as a weekend getaway. They will have multiple trips to and from the resort to accommodate their family members' schedules. Their family members and business associates will come and visit as well. So again we believe that the trip generation statistics are underestimated and underrepresented. **6**

What this ultimately means is simply more traffic, lower levels of service and an increased need for mitigation. And there are any number of specific situations where this could be pointed out as likely to be necessary. The obvious point is the intersection of Bullfrog Road and 903, which Trendwest **7**

has agreed to pay for the channelization or the realignment of the intersection with right-turn lanes and left-turn pockets.

They have left out the traffic signal which will be needed sooner rather than later. They have called for the traffic signal to fall under what they call the proportionate share arrangement. The proportionate share arrangement is what I would like to sort of explore next. It seems to be something that a lot of thought has been put into and it raises a lot of important questions.

The obvious one being as what if the city or county doesn't have its' proportionate share when the improvement is needed. And the mitigation agreement or the development agreement says that if the city and county doesn't have its' share, Trendwest is supposed to pay the whole cost and seek reimbursements from the city or the county.

Well, the problem is, then, getting reimbursed from the city or county. The city or county will face political pressure not to raise taxes to pay for the rich yuppies from Seattle to come over here. The city and county will also face the state requirement for constitutional uniformity of taxation, which means you can't just pick and choose who you are going to tax and who you are going to slap a penalty on to. You have to set aside an entire group and it has to meet the constitutional test of uniformity.

So you're going to end up with people who are saying I am

7 (cont.)

8

not benefitting from this, why am I paying for this and it's after the fact and it's already built. Additionally, the city's share is say 5 or 10 percent of the project and that amounts to 50 or $100,000. That still is a sizeable amount of money in such a small city with such a small budget. And it raises the question of does the city have to tax individuals in an amount that is onerous and would cause -- or would simply deter people from developing a property because they don't want to pay a couple thousand dollars extra for the city's share after the fact. **8 (cont.)**

These are questions that we think need to be looked at with more detail in the EIS and will hopefully be addressed in the Final EIS. Thank you.

MAYOR BERNDT: Thank you, Brian. Did you have the written one for us?

MR. CARPENTER: Yes.

MAYOR BERNDT: Thank you. There's a name that I cannot read. The address is 411 North Ruby.

MR. GAIDOS: I know who that is. My name is Derald Gaidos, D-E-R-A-L-D G-A-I-D-O-S. And I am Kittitas County's fire marshal. The reason I am here to testify tonight is because I also work for the City of Cle Elum as part of the building department's arrangements with the city, so I have been reviewing the information. **9**

I have got a few comments I would like to make tonight

and I'll submit most of it in writing. The proposed development is at this time under the jurisdiction of Kittitas County. The City of Cle Elum is extending the UGA to include this project sometime in the future. The intrastructure of this project in whatever manner it comes to exist is the upmost importance. **9 (cont.)**

Roads should be built to Kittitas County's standard or better, to Cle Elum's standard or better. The water system will have to meet or exceed the 1997 Uniform Fire Code fire flow requirements and fire hydrant placement. All buildings shall be sprinklered if required and voluntarily sprinklered to keep the water flow down and the impact on the fire department less. **10** **11**

Developers in the City of Cle Elum's Fire Department have some issues to work out to ensure the level of service needed for the development is what they need. After starting the development, the developer will have to be extremely careful of starting a fire in the proposed area. The proposed area is directly west of the City of Cle Elum and with our summer conditions the chances for catastrophic wildfires are real.

Special efforts by the developer to control his work force will be the main concern to prevent wildfires from ever starting. They will be underneath the Department of Natural Resources industrial precautions which will limit control of all spark emitting devices in the forested regions of **12**

Washington state. All equipment, vehicles and stationary motorized equipment shall fall underneath the inspection and in the control of DNR during the season. That includes all vehicles going on to the site including pickups. 12 (cont.)

Fire flow is one reason why I think we should really put a sprinkler in everything possible. Fire flow, not knowing exactly what the buildings are going to be, can run up to 8,000 gallons a minute for a duration of four hours. That's a lot of water. By fire sprinklering everything, we can reduce that down to a water system that only has to be at 1,500 gallons a minute for two hours. Fire sprinklers take the impact off the fire department. 13

Defensible space matrix is provided by Kittitas County Fire Prevention Co-op, and we have worked it out so it is -- we give points for slope, fire sprinklers so you have a space from your structure to the trees or the brush. 14

I urge that we take great caution in planning this development. In 20 years I want somebody to stand out front and say they did a good job when they built it. I don't want them to stand at the bottom of a few subdivisions that we have got in our county that right now we are in complete panic of what we are going to do. We need to look down the line 20 years what this thing is going to look like in whatever shape it is and we do the best we can. Thank you. 15

MAYOR BERNDT: Thank you. And you have written

comments?

MR. GAIDOS: I will drop it in.

MAYOR BERNDT: Peggy Pace.

MS. PACE: Peggy Pace. Do you want my physical address too? P.O. Box 651, Roslyn, Washington. Okay. I have pretty much the same experience about this Urban Growth Area as I did when I spoke about the master planned resort. I will go ahead and tell you what they are, but it seems like you have just moved the problem.

The traffic is the big concern. I work in Ellensburg. I am going to have to drive from Roslyn through this area and I don't think the road is going to be wide enough for all of the cars that are going to be here. I don't really think that Cle Elum's growth projections require that many residential units. If it is called the Cle Elum Urban Growth Area. That would mean to me that Cle Elum is planning to expand into this area, and I don't think that's what really is going to happen. I think it's going to be a bunch of people from somewhere else. So I am concerned also about all of those people and how they will fit into the school system. 16

And I am concerned about when they are building this project over how ever many years that takes, the workers will be here and where will their children go to school.

I am concerned about the water. So far there's no water. Trendwest does have water rights, but they are 17

somewhere else.

And I am concerned about the fire and police coverage. I don't want them to be stretched so thin that if we have a fire up in Roslyn that we won't be able to be adequately covered.

Diminished quality of life. Between the traffic and the noise and all the extra people, I just don't think it will be quite as peaceful as what I have enjoyed here.

And the wildlife corridors. It seems to me that there is not going to be places for the wildlife to go through. I was looking at a map and couldn't quite figure out where the wildlife was supposed to go through.

And the glare from that many units, houses, hotels or the horse park and golf course and everything else, I don't think I will be able to see the stars at my house in Roslyn as I have been able to see them every night when it's been clear for the past 25 years. Thank you.

MAYOR BERNDT: Thank you, Peggy.

David Gerth.

MR. GERTH: David Gerth, 205 Alaska, Roslyn, Washington. The mayor of Roslyn and I am representing the City of Roslyn with these comments.

The development proposal described in the Draft Environmental Impact Statement is a very large and significant change in the upper county community. The city of Roslyn will be directly indirectly impacted in a significant way by the

17 (cont.)

18

19

20

21

22

development proposal as described in the Draft Environmental Impact Statement. The City of Roslyn is drafting and refining written comments to be submitted by the May 7th deadline. It is proving a challenge given our level of staffing, but we will have a significant list of comments.

I do have two that are refined to the point of submission, and I would like to read these at this time. As an effected agency and neighboring municipality, the City of Roslyn has reviewed the Draft Environmental Impact Statement for the Bullfrog Urban Growth Area dated March 23, 2001 and submits these comments for your consideration.

22 (cont.)

The water supply for the School District No. 404. The City of Roslyn has delivered potable water to the school campus on State Route 903 since 1968 when the high school was first constructed and has further expanded its' delivery capacity to accommodate the growth and consolidation of school facilities.

While no formal agreement between the City of Roslyn and the school district has been executed, we remain committed to serving the school depleting our supply because schools are a vital component to the quality of our community.

23

The expansion of the school district campus as described in the Draft Environmental Impact Statement will enable our schools to construct facilities to accommodate the increase in student population directly and indirectly attributable to the

proposed Urban Growth Area and master planned resort development. However, the water supply needs for an expanded school facility are not addressed.

Appendix D, the water supply appendix, page 2-2 states: The water demand estimates do not include public facility demands identified as the School District 404 school expansion area, cemetery expansion area, community recreation center and a business park. **23 (cont.)**

Roslyn's comprehensive water system plan is based on growth projections that do not include population increases attributable to Trendwest master planned resort or Cle Elum's Urban Growth Area. The 1996 projections for water supply demand indicating that Roslyn would approach the limit of its' capacity to divert water for a municipal system in 2015. **24**

The ability of Roslyn to accommodate growth in population, to promote economic development and plans for the future will be directly impacted by water supply demand attributable to the expansion of school district facilities.

The City of Roslyn proposes the following mitigations for the water supply impacts: No. 1: Expand the Environmental Impact Statement to include an analysis of the public facility demands for water supply. Specifically the increased water supply needed to expand School District 404 to an additional 25 acres. **25**

No. 2: Include water rights transfers to the City of Roslyn as part of the conveyance of the school district **26**

expansion lands. No. 3: Facilitate a water delivery agreement with School District 404 and the City of Roslyn to formalize the terms and conditions of the water supply and needs.

26 (cont.)

The second comment has to do with law enforcement level of service. The interlocal agreement for police services executed in July 2000 defines a service area of the Cle Elum/Roslyn/South Cle Elum Police Department as the area inside the appropriate city limits of the three municipalities.

Annexation by Cle Elum of the Bullfrog Urban Growth Area will enlarge the service area by approximately 1,100 acres and significantly impact the ability of our law enforcement agency to provide the established level of service to the City of Roslyn. We suggest that this be mitigated by frequent analysis and reports to the police oversight committee so that staffing and equipment expansions can be implemented in a timely fashion.

27

There are more comments that are moving past the draft stage and will be in by May 7th. Thank you, Mayor.

MAYOR BERNDT: Thank you, David. Will those be included or do you want to leave those?

MR. GERTH: We will inclue them as a group, so these will be part of that.

MAYOR BERNDT: Thank you. Pat Christensen.

MS. CHRISTENSEN: Pat Christensen, C-H-R-I-S-T-E-N-S-E-N, 320 West Fourth Street, Cle Elum, 98922. All right. This will be brief. We have a letter coming from the senior center. And other than that I just wanted to make a comment that on behalf of the seniors here in Cle Elum and those especially that use the senior center that are in and out, we want you to be aware of our needs of the senior population in this. And I think that's all. We just want you to know that the seniors are here and please consider us. Thank you. **28**

MAYOR BERNDT: Thanks, Pat.

Thelma Simon.

MS. SIMON: Thelma Simon, 141 Wallace Drive, Cle Elum. I have some concerns. And, boy, that was some heavy reading, I will tell you. So some of the concerns I have right off the bat is air quality and water quality issues. You know, we seem to have a problem following state and federal regulations as it stands right now, so I am real concerned that these issues are really considered. **29**

In terms of air quality, what happened last summer, I don't know if we will have a repeat of that again, but I wouldn't like to see it closer to home, which would be Cle Elum. So I would like to know that something like that affects the air we breathe and other things that affect the water we drink because we take our water right out of the

river. So these are things that we really do safeguard as a community. 29 (cont.)

As reading the UGA EIS, I was concerned about how the graphs are made by combining the MPR employment in the graphs, so it's kind of a combination of MPR and the UGA -- Urban Growth Area. Anyway, one of the graphs I was reading talks about employment trends for the upper -- not upper county, but Kittitas County as a whole. And I was wondering if the upper county employment trends are addressed. The fact that people do drive over the pass every day to go to work do we have accurate records of that in the county. 30

And I was also concerned that when this MPR UGA is developed, it said that 80 percent of the combined employment will pay a modest salary. And, you know, what is a modest salary? They say less than $30,000 annually, so that's around $15 an hour or whatever. Is this today's price or is this 10 years down the road or is this 20 years down the road? 31

One of the concerns that I have is if this is a young family or a single parent with a couple children, is this going to be a category of where our children get reduced lunches or qualify for services through our county.

They also discuss property taxes in Appendix H and that the taxes will be lower when this is -- reaches maturity or held constant. Do we have any other area that something like this is in where the taxes have dropped? Do you have any kind 32

of an example that you can show people that will say that your taxes will go down and not up. 32 (cont.)

I am real concerned -- I am really concerned in terms of the economics of Cle Elum. It seems like the last few months we have been trying to dig up $4,000 to pay for a dog catcher. If we can't come up with $4,000, how are we going to repair the roads that are going to have that much more traffic on them. Second is a mess, we all know that right now. If we are planning on using Oak Street's exit or entrance to the freeway, Second is just going to become worse.

We have the east end of Cle Elum that we have water lines, sewer lines, sidewalks. All of these things have been on a list I suppose for quite a while for needing repairs. Where do the priorities lay? Do we have a town that has a list of repairs that needs to be done on one end or do we have annex an area where we have all new services. 33

I have a concern how we do this and still keep in touch with that -- what do we call that where this will not cost the citizens of Cle Elum anything. So if you have people living here that are not going to absorb any of these costs, where is this money coming from.

One of the things that I didn't notice was parks. In Cle Elum already we have three -- I thought we had three or four, but I can't figure that out, three parks. In the UGA I don't notice any parks, parks that children play in. And we do have 34

a community center, we do have a golf course, but it seems like if you have housing you would need municipal parks. And I am out of time. Thank you. **34 (cont.)**

MAYOR BERNDT: Thank you.

Larry Susich.

MR. SUSICH: Larry Susich, 504 -- P.O. Box 504, Roslyn, Washington. And my concern basically is with the Phase Environmental Review. And two points that I would like to make is when you go to look up the water treatment plant, it's lost in the UGA, it's not really reviewed. And I have a concern that currently Cle Elum's water intake is up by Winston Bridge above the MPR. And when the MPR comes in, there can be God knows how many golf courses, off site -- or non-source point pollution. All kinds of things are running into the Cle Elum River.

And then Cle Elum's two new intakes in impasse are going to be south of the MPR, from what I understand, by Bullfrog and down by the Yakima/Cle Elum conversion zone. So what you're doing is you're taking the pollutants from the MPR, running it into the river and then giving it to the people of Cle Elum to drink. Then I think that the environmental review of that needs to be a little better thought out. **35**

I kind of started to think why would the City of Cle Elum do this to its' citizens. And I couldn't think of any environmental reasons, so I looked at it economically. And it

would be a lot shorter route if the main stem went up just a couple miles instead of up to Winston Bridge.

And I would just like to point out that the NASDAQ reports Trendwest's financial reserves at about $650 million dollars, so I think it would be prudent for the City of Cle Elum to continue to get our water from a cleaner source. **35 (cont.)**

And also the horse park isn't reviewed, so you can't have a communally effect of the entire UGA. You can't wrap your arms around it and see what the whole effect of the whole thing is going to be. So I just think that the phase review is a big mistake. Thank you. **36**

MAYOR BERNDT: Thanks. Bruce Werdman.

MR. WERDMAN: Hi. My name is Bruce Werdman. I am from Seattle 6749 18th Avenue Northwest. And I am the Northwest Chairman of the International Dark Sky Association. The International Dark Sky Association's mission is to promote and preserve our dark skies. And one of the ways in which we do this is to encourage good lighting codes. And so we are very interested in what goes on here in terms of a lighting code. **37**

In 1970 in Seattle you could see the Milky Way 31 years ago, today it is a distant memory. So where do all the people from Seattle go if they want to see the Milky Way. Well, the answer is they come here. And in particular they come to Table Mountain, which is only like 15 miles away from here.

In the summer there's a star party there every year. It is one of the biggest star parties in the entire world actually. It gathers up close to 1,500 people. It goes on for about four days. And over the years we have been noticing the light pollution levels at Table Mountain have been gradually increasing. The biggest offender there is Wenatchee. But looking at the population that would be coming into this area, it looks as though this area here would actually come into contention with Wenatchee.

Light pollution generally goes proportionate to the population unless you have good lighting ordinances in place, which they do not have in Wenatchee. I can throw all sorts of figures and facts at you. I only have five minutes, so I quite often -- I have an hour-long speech I can give you, but you probably don't want to hear it. **37 (cont.)**

For example, a 100-watt light bulb at a distance of one mile, a bare 100-watt light bulb, outshines all the stars in the sky. We spends two billion dollars a year in the United States lighting up the bottoms of clouds. Eighty percent of the creatures in the natural world are nocturnal.

I could go on and on, but the point is that light pollution has an impact. So the solution is strong, well written lighting codes. And I particularly point you to Deschutes County in Oregon, which is where Bend is. They have a very good lighting code there. And from what I understand

Bend is a very nice place to be at nighttime.

Some other things to consider is, you know, I know there's a lot of golf that's going to go on in this area and I have yet to see a good nighttime golf driving range. As far as I can, they are all a bunch of light bombs just lighting up the countryside.

I would also encourage you to put a lumen per acre limitation into your lighting code. This will put a cap on the amount of light that will be put on each area of land.

A good -- In summary, a good lighting code will preserve your way of life, it will save energy, it will preserve your property values. And this is good for Trendwest as well. It's going to be make this place a more beautiful place. We are not like anti anybody. We are pro to making the world a nice place to be in. And, finally, it will save the stars for generations to come. Thank you.

37 (cont.)

MAYOR BERNDT: Thank you. Bruce, will you put that in writing, please.

MR. WERDMAN: I can.

MAYOR BERNDT: Larry Jammes.

MR. JAMMES: My name is Larry Jammes, J-A-M-M-E-S, and my address is 491 Mitchell Road, Ellensburg. I am from lower county. I am an RN, I work in the emergency room down there. And I have a number of concerns in no particular order.

38

First off is traffic. And I don't see any way you can double the population of this valley without putting a four-lane road out there. And that four-lane road shouldn't be paid for by the citizens of this county. And I also wonder how Trendwest is going to mitigate the inevitable inversion that's created by doubling the car traffic at least in this valley. We all see what it gets like in the winter when there is an inversion. Similarly in the summer, but especially in the winter with added snowmobile traffic. **38 (cont.)**

As regards public services, EMS in upper county is already inadequate. And the upper county taxpayers have shown an unwillingness to bite the bullet and pay for what true emergency service constitutes. All the people coming to live over here are going to have their primary care physicians on the west side, so they will be using the emergency rooms as their primary care physicians.

I don't see any way that that can be mitigated by just allowing it to play out, it has to be proactively mitigated. And just reading the papers recently, I don't any willingness by upper county to really address that issue. Family care physicians are not emergency physicians and on-call family practice physicians are totally inadequate to address that. **39**

Also how are the taxpayers going to react to the inevitable need for another school. Right now schools are at capacity. Are they going to want to pass a school levy to pay **40**

for Yuppies kids to get schooled over here.

And as regards housing, I didn't see any attempt to address the impact of the secondary growth and the low-income people who will need affordable housing. It's stated in there somehow that they are investigating alternatives, but there's absolutely nothing said about the cost of the housing in the UGA. They won't come up with an accurate description of how the housing is going to be priced for MPR, so it's kind of like dump it on the county and see how it plays out.

40 (cont.)

41

It seems like there's a whole lot of reference to monitoring, but there's nothing proactive as regards good solutions. They have done this before, they have been at it, they know what happens. And they know that if they just sit back and kind of get pulled along unwillingly that the taxpayers -- the existing tax base and the citizens already there will end up footing part of the bill for litigation for their moving in there. That's it.

42

MAYOR BERNDT: Thank you.

Courtney Cook.

MS. COOK: Courtney Cook, 117 North Fifth Street Alley, Roslyn speaking on behalf of myself and for RIDGE tonight. I would like to speak about public services and also about utilities. And while the Draft Environmental Impact Statement concedes that, quote, concurring development of the resort and UGA would create significant additional demand for

43

law enforcement and fire protection in response to both the concurrent development is not analyzed. 43 (cont.)

Secondary buildup of growth is not considered relative to public services. This is a huge failure of this document. The Draft EIS admits that the school district is already at or very near full capacity and that a new K through 12 could be built. Where is the money going to come for that. 44

The EIS also states that the water source for the school expansion is not yet identified. This is a real problem. You have got to get that figured out. 45

The Draft EIS proposes that the monitoring be done for fire police Kitcom and then bond the issue and then services upgraded. This results in a significant lag time and puts a severe squeeze on existing services while new personnel are recruited, trained and equipped. These needs need to be proactively anticipated. We know that we will have to upgrade the services, it's a mistake to wait a year or more until those needs can be realized. 46

Then the regional water and waste treatment plants are critical components to both the resort and the UGA without which neither of those projects can proceed. They should be included in this analysis and not a separate SEPA review. 47

The Draft Environmental Impact Statement concedes that a standalone water treatment plant may be necessary. They admit that both UGA and the resort will be served by the plant. This shows that these two projects are really the same project 48

artificially separated by the Urban Growth Area.

The standalone treatment plant should be included in this analysis and not as a separate SEPA review process. Honestly, separating these various EISs out when this is really one big project is a farce. Thank you very much. **48 (cont.)**

MAYOR BERNDT: Thanks. Peg Bryant.

MS. BRYANT: Hi. My name is Peg Bryant and I live at 116 Fifth Street Alley. At least that's the address this time. It's been changed three times. I have been a resident of Roslyn for almost 30 years and I have been thinking a lot, as you may know, about the MPR and UGA. And this just came to my mind as I was reflecting on the MPR the other that I think they should be considered together.

But in the area behind my house as you walk out my door, the area from Bullfrog Road to Ronald there's one farm, okay. And so I am not as familiar with this area here, but I know there's not that kind of single-family housing or multiple-family housing either in the large stretch of the proposed UGA. So I really think that we have to consider these two things together. **49**

And we are doing a lot more than paving paradise and putting in a parking lot. We are talking about almost 6,000 units, condos, townhouses, multiple single-family units, three to four golf courses and related facilities, a major horse park, several minor equestrian parks, a major business park.

Plus then you have got the retail shops and pro shops over in the UGA -- or I mean the MPR. You have the amphitheater. Then we have the waste water treatment facility, at least everybody is hopeful we have one. I know your deadline is August 7th, right, to get that in place.

We have got trails, we have got schools and cemetery expansion. We have got hotels. Count them, three, four, five, I don't know. We have got community recreation centers, recreational vehicles campgrounds, apartment housing in the UGA.

So think about it. I mean I can't conceptualize what this area will look like if all of this goes through. I don't think that any number of consultants can in terms of quality of life issues.

49 (cont.)

Some specific concerns. I didn't see snowmobiles addressed. And isn't Cle Elum the snowmobile -- the self-proclaimed snowmobile capital of the world is it. So I imagine that that is going to be an issue. I think this needs to be addressed in terms of noise, smell, impact and traffic flow, multiple rates of travel, use of the different golf course or snowmobile, the horse trails, whatever.

50

Night sky has already been addressed. We don't need lit golf courses, we don't need lit horse parks flooding the night sky. So we need more specifics for significant mitigation.

51

I notice that the apartment complex is beautifully sited

52

on SR903. I also notice that, though, there is a buffer along along Bullfrog proposed and along I-90, there is no buffer proposed that I could see along SR903. 52 (cont.)

Traffic impacts have already been discussed will be great in Roslyn and Cle Elum. I am really concerned about Roslyn. The UGA, which is the Cle Elum Urban Growth Area, has three major exits off of Bullfrog. One kind of off by Safeway going into the business park and then one off of. That's a big concern as to how that's going to be mitigated for people who go and come from Roslyn as well. 53

So what about those impacts on those surrounding communities on Lake Cle Elum and also on the Alpine Wilderness areas. I mean these people aren't going to be content just hanging around even though there's all this stuff. They are going to be going out and seeing the sites what's left of them. 54

The concerns about noise. In the UGA DEIS it stated even under the most extreme conditions traffic noise rarely approaches the level that could cause hearing damage. Well, that's good to know. Even at moderate levels, traffic noise could cause frustration and stress due to time-delays, disruption of the rural character and quality of upper county life. 55

The Cle Elum cemetery is included in a category that includes playgrounds, active sports areas and parks. It seems 56

to me that the cemetary that is more like land which is stated on which serenity and quiet are of extraordinary significance. So maybe that should be re-examined. The cemetery is already heavily impacted by noise from I-90 and cannot tolerate additional noise impacts. **56 (cont.)**

Also the predicted traffic noise level contributed from the proposed resort secondary growth that we know is going to happen because they are going to come here and the UGA and the MPR is going to look pretty crowded after a while so they are going to want to go somewhere else. And we haven't really looked at that in either the MPR or the UGA. **57**

The DEIS also states that because of the exact location of proposed land uses within both the resort and the UGA and the specific distances between structures are unknown, noise level predictions cannot be made. Well, okay. I think they should be able to be made and that those things may be able to get more concrete and less conceptual. **58**

Aesthetic light and glare. The DEIS states no locations close to the UGA have extensive long-duration use of the UGA. Areas most effected by changes in the visual landscape would be the frequent users of Bullfrog Road and SR903. Well that's what I am. I am a frequent user of that road and so are many people here. Time is up. **59**

MAYOR BERNDT: There are three or four more, so we will try to come back.

MS. BRYANT okay.

MAYOR BERNDT: Are we going to get written?

MS. BRYANT: Yes.

MAYOR BERNDT: Lynn Norwitz.

MR. NORWITZ: You can read along with me. My name is Lynn Norwitz. I live at 403 East Washington Street in Roslyn. I actually have two questions before I start. Can you tell me if there are planning commission members here from Cle Elum.

MAYOR BERNDT: One.

MR. NORWITZ: Out of how many?

MAYOR BERNDT: There are five I think.

MR. NORWITZ: And how many city council members are here in? 60

MAYOR BERNDT: One.

MR. NORWITZ: Great, thanks. That wasn't too tough a question. I am going read this. Trendwest -- it's about water. Hopefully I will send other comments in, but this is about water. Quantity. Trendwest has not obtained approval to move water up to the Cle Elum area as far as I can tell. Whether they will be able to move water, how much and the time frame is highly speculative at this point.

The Department of Ecology consultants have raised questions about whether there is a true environmental benefit 61 that comes from Trendwest tributaries, Tenaway Creek water

rights. That if proposed to leave in stream as mitigation for all of its development, Trendwest offers as mitigation for its' water right impacts to not divert from the Yakima River whose flows are insufficient to meet Yakima River target flows. That's in Section 3.5. If Trendwest is not diverting, where will the water come from to serve the UGA and the MPR. 62

We continue to disagree with the cumulative effects analysis that have gone on for all these projects. The impact of the UGA combined with the MPR is likely to be much greater than predicted. The ancillary buildup already with speculation around the resort will only intensify with full buildup of the Urban Growth Area. All you have to do is take a drive up 903 through Roslyn and Ronald to see what the future will bring as you go up to the lake. And the county lacks oversight of the development is not something we can deal with, but it is our problem. 63

So I think that Trendwest keeps insisting that folks who work at the resort will also live elsewhere in the county is unrealistic. The question I have is so what water will be used to serve all of these people whether it will be Roslyn's water, Cle Elum's water, South Cle Elum's water. This is going to be a huge burden on the local community. 64

Because Trendwest has been in litigation over this, they refuse to admit how great the impacts are actually going to be. The MPR analysis would have us adequately believe there 65

is minimum impacts. They continue to defend this analysis and use the same assumptions because they are still in court. And it seems that the court impacts are not being considered and I would ask you to pursue this as best you can. **65 (cont.)**

For example, Trendwest proposes to move water from properties and other places, but many of those sending properties are being developed. Example is the Tenaway lots that will be divided up and sold throughout the coming years. The EIS refuses to acknowledge that the impacts associated with moving that water is really connected to this Urban Growth Area and MPR. And that is short sighted and I believe they are incorrect. **66**

With all these people moving into the area, there will be water quality impacts related to certain services, people pouring bad things down the drains, runoff from roads and road surfaces, increased use of pesticides, etc. I mean it's inevitable. And I want to know how Cle Elum proposes to maintain the relatively pristine environment with these circumstances. **67**

I guess my last couple of points are these. Increased population means more people will want to go to the rivers. I am obviously concerned about fish as a fisherman. My last concern I will mention is that we need to be factoring in swings in precipitation. I am not an expert, but we are obviously in a time which is as significant as any we have had **68** **69**

in the last 25 years. I notice that Cle Elum has had water moratoriums for the last several years. I question where do you think this water is going to come from in lean water years. I would like to see further analysis of what this summer would bring if we are going live through it. **69 (cont.)**

Again I will just refer to the fact that it was spoken that other lands were purportedly given to entities on this site, the community center and the horse park and the school district, I see like to know where those waters are coming from. Thank you very much. **70**

MAYOR BERNDT: This is your submission in writing?

MR. NORWITZ: It is.

MAYOR BERNDT: It looks like Ron something, 204 East Arizona, Roslyn.

UNIDENTIFIED SPEAKER: I will decline to speak.

MAYOR BERNDT: Okay. Ellen Howe.

MS. HOWE: Good evening. I am Ellen Howe, I live at 1441 Watt Canyon Road Road in Thorp, 98946. I am here tonight as chair of the Phoenix Economic Development Group. As chair of the Kittitas County Economic and Associate Development Organization, the Phoenix Economic Development Group, I would like to address the fiscal impacts of the Cle Elum Urban Growth Area as detailed in the Draft Environmental Impact Statement. **71**

It's heartening that so many jobs would be created by the

UGA project. We were pleased to see that the local labor pool took on half of the construction jobs and 80 percent of the operation jobs on the UGA. Even those who are hired outside the area are going to be spending some of their dollars here, which is certain to give our economy a boost.

As an stressed timber impacted county, Phoenix recognizes the importance of the community retaining family wage jobs such as those that this project will create. The business park truly has unlimited potential for our area. While existing services and retail sectors will benefit from the construction of lodging, restaurants and recreational facilities, the business park will greatly enhance our expansion and recruitment efforts for light manufacturing and the high tech businesses to our community. **71 (cont.)**

In terms of the fiscal impacts, the state will benefit from the cautionary approach to the construction of the state-of-the-art water and waste water treatment plants. Finally, the mitigation agreement that Trendwest is willing to commit to will certainly ensure that local jurisdictions are fully funded if the impacts of the project are greater than expected. The Cle Elum Urban Growth Area development is a win-win for Cle Elum and Kittitas County and Trendwest. Let's move it forward. Thank you.

MAYOR BERNDT: Susan Willis. **72**

MS. WILLIS: My name is Susan Willis. My post

office is Box 315 in Roslyn. I don't think I am going to say anything new except I will also speak for the salmon. As a teacher, elementary teacher, we do a lot of work with salmon. We go out to the rivers and we watch them spawn. We look for that return in the fall.

And I know from teaching about salmon that salmon need cold clear gravel. And when I think about that development along that river stream, the golf courses, hotels, equestrian centers, the business park and all these homes, I can't imagine that that river is going to stay cold and clear and ready for those salmon. There are buses from all over eastern Washington that drive their children up to our river to watch those salmon spawn.

72 (cont.)

There have been a lot of comments tonight about air quality, the inversions we have in the winter, about the night sky. People have not talked yet about the elk habitat that I drive by every day on my way to school.

73

People talk about the expansion of the schools, who is going to pay for them, where is the water going to come from. We have a high quality of life here. We still have some wildness here, we still have some wildlife that benefits from that wildness. The reason people want to come here is because it's so wonderful and because it's so wild.

I don't see that the expansion of the MPR across Bullfrog Road or the MPR itself is going to preserve the wildness of

74

this place. People need the stars, the salmon needs the gravel, the elk needs its habitat. Don't forget that, that's who we are.

MAYOR BERNDT: Thank you, Susan. This is the last of the signed up speakers that I have. Would anyone wish to make comments that has not signed up? **74 (cont.)**

Not seeing that, Thelma, do you want to finish?

MS. SIMON: Yes, thank you. I will make it really quick. Thelma Simon again. One of the issues that I was trying to bring up, I didn't see transit as being part of this. If the growth projections are for more traffic, one of the issues that is a real concern of mine is also the fact that we have many senior citizens in the upper county that are still driving and they feel safe driving. I know that my mother on the other side of the mountains doesn't drive anymore because she feels she can't handle the traffic. **75**

That's not true here. We have seniors that show up today on lunch day and drive in our community. And if there's a lot more traffic, how will they get to the new senior center.

The other issue is that we are proposing a community center on Bullfrog Road I have a son that's 11 years old. I don't know how he would get to that community center. I do not consider it would be safe to ride a bike up the highway because I didn't see a sidewalk or anything on it. And I don't know that that would be a very safe way to go where **76**

there's nothing along the road there. 76 (cont.)

My other concern is that I am one of those people that come down West Side Road that goes through South Cle Elm every day to get to my place of business. So are a lot of other people that come through lower Peoh Point and upper Peoh Point and West Side Road. So possibly South Cle Elum will have a light and possibly a second entrance to south Cle Elum. 77

And the other issue that I forgot to admit or talk about was 950,000 square foot for a business park. We have had a really hard time trying to figure out how large that is. We have decided it is smaller than a supermall and double the size of North Bend Outlet Mall. And, you know, we are still trying to get a real take on how big that is. 78

So if those people are working, where are they going to park, where are they going to drive through. So that's it.

MAYOR BERNDT: Thanks, Thelma.

Peg Bryant?

MS. BRYANT: I am not going to take long. I was talking about the aesthetics and about the long duration views of the UGA, that there wouldn't be any of those. And yet the DEIS states that the viewers most effected by the changes of the individual landscape would be the frequent users of Bullfrog and SR903. And I think that that's the current residents of upper county. Bullfrog Road and SR903 are at least to me much more relevant than the I-90 corridor, the 79

view from that.

Also view sheds from SR903 are not an alternative to 2, 3 or 4. This I think really does need to be mitigated if you choose to go ahead with the proposal. A buffer of 150 foot, which I think it is, off along Bullfrog Road would not adequately screen views to the interior of the UGA. And you can tell that just by walking out in the wooded area that's been thinned, which I am sure that it will be, and looking through it. I mean 150 feet is the length of my block, that's not very long. **79 (cont.)**

The DEIS also asserts that the sky glow could change in the properties within approximately ten miles of the site. Well, that's where a lot of us live. It goes on to say that the development of the UGA would add to the sky glow effects. It is very important that these do get mitigated. **80**

Just a little on plants, animals and fisheries. The management of priority habitats for snags, downed wood zones. These are not really identified. It might be an idea to consider to increase the forced buffer around the river to include all of Bullfrog Flats. Which in doing that it would, a, reduce the elk/human conflict by preserving elk wintering grounds. It would also allow animal movement and habitat up and down the river and north and south. **81**

People have talked about storm water runoff.

Finally, this doesn't make me feel real comfortable. **82**

Thank you for your time. We will be submitting a large number of comments in writing.

MAYOR BERNDT: Okay. Okay. That's all the folks that I have for speaking. I guess at this point I will close the public hearing. Erin says ask one more time. Okay. With that said I will close this public hearing. We will be accepting comments and then there is a time to work through them. We don't have a specified time periods for when the Final EIS comes out. It depends on how much analysis and work that will need to be done to come up with the final one.

So I would like to thank you all. I really appreciate it. There were some good and some very thoughtful comments on this and at this point we are done. Thank you very much.

Comment 1

Refer to Letter 4, Comments 1 through 5 for the response to the comment letter submitted by Ellie Belew.

Comment 2

Refer to the response to Letter 4, Comment 6.

Comment 3

Refer to the response to Letter 4, Comment 7.

Comment 4

Refer to the response to Letter 4, Comment 8.

Comment 5

Refer to Letter 7, Comment 1 and Letter 29 for the response to the comment letters submitted by REBOUND.

Comment 6

Refer to the response to Letter 7, Comment 3.

Comment 7

Refer to the response to Letter 7, Comment 10.

Comment 8

Refer to the response to Letter 7, Comment 16.

Comment 9

Refer to Letter 28 for the response to the comment letter submitted by the Kittitas County Department of Building and Fire Safety.

Comment 10

Refer to the response to Letter 28, Comment 12.

Comment 11

Refer to the response to Letter 28, Comments 20 and 22.

Comment 12

Refer to the response to Letter 28, Comment 9.

Comment 13

Refer to the response to Letter 28, Comments 20 and 22.

Comment 14

Refer to the response to Letter 28, Comments 18.

Comment 15

Comment noted.

Comment 16

Transportation impacts of both the UGA and MPR are addressed in Section 3.15 of the Draft EIS for Alternatives 2, 3, and 4 and are addressed in Section 3.14 and Appendix F in the Final EIS for Alternative 5. The study area extends from northwest of Ronald to (and including) the I-90/SR 970 interchange. Peak-hour traffic volumes are projected to be well below the design capacity for SR 903.

The Cle Elum UGA meets criteria in the Growth Management Act because it is designed to accommodate projected population growth in Kittitas County and the City of Cle Elum. The Kittitas County Board of County Commissioners approved updated population projections for Kittitas County in 1999. Those population projections included a specific allocation (19%) of that future growth to Cle Elum. Section 3.11 of the Draft EIS identifies the population *capacity* of Alternatives 2, 3, and 4 and compares this to the Office of Financial Management's 2020 population projection allocated to Cle Elum under the Kittitas County Countywide Planning Policies. Section 3.10 of the Final EIS provides an analysis for Alternative 5. OFM is expected to update its population projections in early 2002.

Since the Draft EIS was published, Trendwest has negotiated a mitigation agreement to address potential impacts from increased enrollment. Please see the response to Letter 1 and Sections 3.15, Public Services, and Section 3.18, Fiscal Conditions, of the Final EIS for additional detail.

Comment 17

Comment noted. Trendwest proposes to change its Yakima River and tributary water rights under RCW 90.03.380. Trendwest has filed water change applications with the Washington Department of Ecology and the Kittitas County Water Conservancy Board. The applications seek to change Trendwest's mainstem Yakima River irrigation and stock water rights from their current place of use near Ellensburg to municipal purpose diverted year-around at the City of Cle

Elum's Yakima and Cle Elum River intakes. Trendwest has also filed applications with Ecology to change Trendwest's tributary water rights to instream flows. A detailed discussion of potential water supply impacts is included in Section 3.4, Water Supply.

Comment 18

Comment noted. Sections 3.16 and 3.19 of the Draft EIS describes projected impacts on fire protection services and proposed mitigation. Since the Draft EIS was published, the City's fiscal consultant has prepared a Municipal Facilities and Services Expansion Plan, which describes in more detail expected personnel and capital expenditures necessary to mitigate impacts from the proposed development. Please refer to Sections 3.15 and 3.18 and Appendix D of the Final EIS for additional discussion of these requirements for Alternative 5. No impacts on level-of-service are anticipated.

Comment 19

Comment noted.

Comment 20

Comment noted. Since the Draft EIS was published, the site plan has been redesigned to condense development within a smaller area and increase undeveloped open space along the Cle Elum River and for perimeter buffers. This riparian corridor connects the UGA with offsite habitat in the MPR and surrounding lands and would allow for the continued movement of wildlife to offsite properties. Refer to Section 3.5 of the Final EIS for an updated discussion of potential impacts on plants and animals under Alternative 5.

Comment 21

Comment noted. Alternative 5 (Preferred Alternative) does not include a Horse Park, hotel, or a golf course. All lighting for development within the MPR and UGA would meet the International Dark Sky Association's Zone E1 standards. These standards are recommended for use in "areas with intrinsically dark landscapes." Roadway lighting would be consistent with the Illuminating Engineering Society and WSDOT lighting criteria.

Comment 22

Refer to Letter 27 for the response to the comment letter submitted by the City of Roslyn.

Comment 23

Refer to the response to Letter 27, Comment 1.

Comment 24

Refer to the response to Letter 27, Comment 1.

Comment 25

Refer to the response to Letter 27, Comment 2.

Comment 26

Refer to the response to Letter 27, Comments 3 and 4.

Comment 27

Refer to the response to Letter 27, Comment 5.

Comment 28

Comment noted. Please refer to the response to Letter 9, which was submitted by the Upper Kittitas County Senior Center.

Comment 29

The water and wastewater treatment plants currently in the design and planning phases are facilities proposed by the City of Cle Elum to implement the City's water and wastewater comprehensive plans. Some upgrade of water and wastewater treatment plants would have been necessary to meet the Department of Health and Department of Ecology regulations as well as the City's projected demand even without the Trendwest project in the UGA.

Refer to the response to Comment 35 below and Section 3.3, Water Quality, in the Final EIS for an updated and expanded discussion of potential water quality impacts under Alternative 5.

The Cle Elum UGA is located in a region that is currently in attainment with the national ambient air quality standards (NAAQS), as designated by the Environmental Protection Agency and the State of Washington. Future carbon monoxide concentrations under all alternatives are expected to be well below the NAAQS (see Section 3.2 in the Draft and Final EISs).

Comment 30

Authoritative agencies, including the Washington Employment Security Department, do not regularly monitor Upper Kittitas County separately from Kittitas County as a whole. An economic trend description throughout Kittitas County has been updated in Section 3.17, Economic Conditions, of the Final EIS to reflect newly released economic data. Where possible, information for jurisdictions in Upper Kittitas County is provided (e.g., taxable retail sales and assessed property value).

Comment 31

Comment noted. Salaries for employees in the MPR and UGA identified in the Draft EIS reflect projected dollar per hour wages under the current economy – a salary of $30,000 annually is

higher than the existing Kittitas County average annual wage of approximately $21,600 (see Section 3.17 of the Final EIS). Because the golf course, Horse Park, lodge, and timeshare condominiums have been eliminated from Alternative 5, only minor employment is associated with Trendwest residential development under this alternative, reducing the cumulative impacts identified in the Draft EIS. Affordable housing is addressed in the City's draft Conditions of Approval for the project. See Section 3.10 of the Final EIS for additional detail.

Comment 32

Consistent with the terms outlined in the Pre-Annexation Agreement between the City of Cle Elum and Trendwest, existing citizens and ratepayers should not suffer negative financial impacts as a result of Trendwest development activities within the UGA. Property values are not expected to be significantly affected by combined MPR and UGA development (see Section 3.17, Economics, of the Final EIS).

Comment 33

Construction of infrastructure within the UGA would be the responsibility of Trendwest. Also, refer to the response to Comment 32 above regarding the terms of the Pre-Annexation Agreement.

Comment 34

City of Cle Elum goals for parks and recreational facilities at full buildout of the UGA are identified in the *Draft Bullfrog Subarea Plan*. Park and recreation resources proposed under Alternative 5 include 0.25- to 0.5-acre pocket parks in each planned residential area that would be dedicated to the City. Proposed trails include a combination of soft surface and hard surface trails or other pathways to provide uninterrupted bicycle and pedestrian routes through the UGA that link to road and/or trail systems outside the UGA. In addition, public use and access of the neighborhood lake would be allowed. Refer to Section 3.13, Parks and Recreation, of the Final EIS for an updated discussion of parks, open space, and recreational facilities proposed for the UGA.

Comment 35

Please refer to Letter 4, Comment 2 for a response to the issue of phased environmental review pertinent to the MPR and UGA projects.

The City of Cle Elum's existing and future primary water intake is on the Yakima River, not the Cle Elum River. It is anticipated that water for the MPR and UGA would be diverted from the Yakima River intake.

A quantified analysis of cumulative water quality impacts is included in Section 3.3 and Appendix A of the Final EIS. Impacts on the Cle Elum River are not anticipated due to: (1) treating stormwater based on current best management practices or better, (2) proposing source-control measures (most notably a golf course management plan for the MPR), and (3) proposing

to infiltrate nearly all stormwater. Development and use restrictions within the Cle Elum River corridor (to the extent owned by Trendwest) would also minimize potential water quality impacts.

Comment 36

The Horse Park was analyzed programmatically in the Draft EIS; however, the site design has since changed. Alternative 5 does not include a Horse Park. The Washington State Horse Park Authority would develop the Horse Park facility as a separate project. Trendwest has offered to donate land for a Horse Park contingent, in part, on the Washington State Horse Park Authority completing all required environmental review and having funds available for the project.

Comment 37

Comment noted. All lighting for development within the MPR and UGA would meet the International Dark Sky Association's Zone E1 standards, as specified in the draft Conditions of Approval for the project. Roadway lighting would be consistent with the Illuminating Engineering Society and WSDOT lighting criteria.

Comment 38

Transportation impacts of both the UGA and MPR are addressed in Section 3.15 of the Draft EIS for Alternatives 2, 3, and 4 and are addressed in Section 3.14 and Appendix F in the Final EIS for Alternative 5. The study area extends from northwest of Ronald to (and including) the I-90/SR 970 interchange. Road widening was not identified as necessary under any of the alternative scenarios.

Refer to Comment 29 above and Section 3.2 of the Final EIS for a discussion of air quality.

Comment 39

Mitigation criteria have been negotiated between Trendwest and Hospital District No. 2 to address potential service and capital facility impacts (see Section 3.18, Fiscal Conditions, of the Final EIS).

Comment 40

A mitigation agreement has been negotiated between Trendwest and the Cle Elum-Roslyn School District. Refer to the response to Letter 1 for additional detail on School District issues.

Comment 41

Mitigation measures stipulated in the City's draft Conditions of Approval address potential affordable housing impacts on the City. Measures include, in part, donation of acreage for affordable housing and maintenance of 150 rental units within the UGA for at least 20 years. Refer to Section 3.10 of the Final EIS for additional detail.

Comment 42

Comment noted. Refer to the response to Comment 32, above.

Comment 43

Refer to Letter 36, Comment 49 for the response to the comment letter submitted by RIDGE.

Comment 44

Refer to the response to Letter 36, Comment 50.

Comment 45

Refer to the response to Letter 36, Comment 50.

Comment 46

Refer to the response to Letter 36, Comment 50.

Comment 47

Refer to the response to Letter 36, Comment 51.

Comment 48

A standalone treatment plant is no longer proposed.

Comment 49

Comment noted. Please refer to the response to Letter 4, Comment 2 for a discussion of the issue of phased environmental review.

Since the Draft EIS was published and in response to public and agency comments, Trendwest has developed Alternative 5 and submitted the site plan to the City. Alternative 5 does not include a Horse Park, golf course, lodge, or permanent RV park. Also, as part of the RIDGE Settlement Agreement, the overall number of units on the MPR is reduced by approximately 18%.

Comment 50

Snowmobiles are addressed in Section 3.8 of the Final EIS. Refer to the response to Letter 34, Comment 5 for additional information.

Comment 51

Refer to the response to Comment 37, above.

Comment 52

The Alternative 5 site plan includes a 50-foot buffer along SR 903. Perimeter buffers would be enhanced with plantings to further screen views of UGA development.

Comment 53

Transportation impacts of both the UGA and MPR are addressed in Section 3.15 of the Draft EIS for Alternatives 2, 3, and 4 and are addressed in Section 3.14 and Appendix F in the Final EIS for Alternative 5. The study area extends from northwest of Ronald to (and including) the I-90/SR 970 interchange. Please refer to the responses to Letter 7, Comments 7, 8, and 9 for a discussion of potential impacts at interchanges with I-90.

Comment 54

Comment noted. The Draft and Final EIS acknowledge the increased use of offsite recreational resources from development of the MPR and UGA.

Comment 55

Comment noted.

Comment 56

Comment noted. Based on the noise modeling, noise levels at the cemetery, which are dominated by traffic noise from I-90 as you note, would not increase above Federal Highway Administration guidelines (see Section 3.9 in the Draft EIS and Section 3.8 in the Final EIS).

Comment 57

Noise impacts from cumulative traffic levels were modeled and are described in Section 3.9 in the Draft EIS (see Table 3.9-6).

Comment 58

Comment noted. Noise level predictions were modeled based on preliminary site plan design; however, potential receptors were modeled in worst-case locations (i.e., adjacent to roadways versus within the interior of the development). The statement you refer to in the Draft EIS relates to the ability to predict exact noise levels, which can only be done once the locations of individual structures have been finalized.

Comment 59

Comment noted. Perimeter buffers along I-90, Bullfrog Road, and SR 903 proposed under Alternative 5 would help to screen views of the development. Impacts on aesthetics, light, and glare under Alternative 5 are addressed in Section 3.11 of the Final EIS.

Comment 60

Refer to Letter 5, Comment 1 for the response to the comment letter submitted by Len Norwitz.

Comment 61

Refer to the response to Letter 5, Comment 1.

Comment 62

Refer to the response to Letter 5, Comment 1.

Comment 63

Refer to the response to Letter 5, Comment 2.

Comment 64

Refer to the response to Letter 5, Comment 2.

Comment 65

Refer to the response to Letter 5, Comment 3.

Comment 66

Refer to the response to Letter 5, Comment 4.

Comment 67

Refer to the response to Letter 5, Comment 5.

Comment 68

Refer to the response to Letter 5, Comment 6.

Comment 69

Refer to the response to Letter 5, Comment 7.

Comment 70

Refer to the response to Letter 5, Comment 8.

Comment 71

Comment noted.

Comment 72

Comment noted. No significant impacts on fisheries were identified from either the water supply plan or from potential water quality impacts. The Cle Elum River corridor would be protected as primarily undeveloped open space. Refer to the response to Comment 35 above and to Section 3.3, Water Quality, of the Final EIS for additional detail on proposed treatment for stormwater runoff.

Comment 73

Comment noted. Elk use and animal movement and habitat within the UGA are discussed in Section 3.6, Plants and Animals, of the Draft EIS, which includes a discussion of elk wintering grounds and links to offsite habitat. Mitigation measures for potential human/elk conflicts are identified. The Cle Elum River corridor is the most significant wildlife corridor within the UGA. The major riparian corridor that connects the UGA with offsite habitat in the MPR and surrounding lands would be retained as undeveloped open space. This corridor would allow for continued movement to offsite properties where elk feeding still occurs and to other seasonal range areas.

Comment 74

Comment noted. Please refer to the response to Letter 1 for a discussion of School District issues.

Comment 75

Comment noted. Public transportation does not currently operate in Kittitas County. The transportation analysis considered cumulative impacts from the MPR and UGA and identified mitigation measures to address those impacts. The analysis does not rely on public transportation, so it accurately reflects existing conditions and looks at the worst-case scenario for future impacts. Growth in traffic volumes would occur and traffic patterns would change over time. The City of Cle Elum is incorporating mitigation for future traffic impacts into the Conditions of Approval for the project.

Comment 76

SR 903 was evaluated for level-of-service impacts at principal intersections. Mitigation measures are identified in the County conditions for MPR approval and the City's draft Conditions of

Approval for the UGA. SR 903 is a state route and under the primary jurisdiction of the Washington State Department of Transportation (WSDOT); construction of a sidewalk or bike lane is not programmed by WSDOT at this time.

Comment 77

The Town of South Cle Elum was included within the study area for the analysis of transportation impacts, and the intersection of First Street and South Cle Elum Way is identified in the EIS and in the City's Conditions of Approval as likely needing a traffic signal in Year 5 due to general growth in the area's traffic volumes. Traffic impacts do not indicate the need for development of a secondary access from the City of Cle Elum.

Comment 78

Comment noted. The City of Cle Elum would specify parking requirements for the Business Park. Under Alternative 5, primary access to the Business Park would occur from SR 903 and Ranger Station Road.

Comment 79

Comment noted. As you note, the EIS identifies the frequent users of Bullfrog Road and SR 903 as most affected by changes in the visual landscape of the UGA. Perimeter buffers would be enhanced with plantings to further screen views of UGA development.

Visual contrast and harmony within the UGA between the built and natural environments would largely be a product of tree preservation, revegetation, the siting of structures, and design standards. Building mass, colors, and materials would determine the degree to which the structures visually blend with the natural settings and adjacent uses.

Comment 80

Refer to the response to Comment 37, above.

Comment 81

Management of priority habitats is addressed in Section 3.6 of the Draft EIS. In general, these areas are retained as undeveloped buffer areas in the site plan for Alternative 5. Undeveloped open space along the Cle Elum River has been increased from approximately 150 acres under Alternatives 2, 3, and 4 to approximately 246 acres under Alternative 5. Refer to the response to Comment 73 above for a discussion of elk use of the UGA.

Comment 82

Comment noted. Please refer to Section 3.3, Water Quality, of the Final EIS for a discussion of proposed treatment methods for stormwater runoff from UGA development.

5. References



5. REFERENCES

A.C. Kindig & Co. January 15, 2002. Groundwater and surface water quality reanalysis for stormwater infiltrated by the MountainStar Master Planned Resort.

Academy of Sciences and National Academy of Engineering. 1973. Water quality criteria, 1972, a report of the committee on water quality criteria. Washington, D.C., Environmental Studies Board, National Academy of Sciences, National Academy of Engineering. 594 p.

American Engineering Corporation. 1999. Cle Elum Urban Growth Area master drainage plan. Prepared for Trendwest Properties, Inc. July 1999.

Anderson, Eric. June and July 2001. District fish biologist, Washington Department of Wildlife, Yakima, Washington. Personal communications with Bob Pfeifer and Pete Lawson.

Associated Earth Science, Inc. (AESI). 2001. Technical memorandum: on-site groundwater return flow from irrigation for the MountainStar MPR and Cle Elum UGA. December 12, 2001.

Associated Earth Sciences, Inc. (AESI). 1999a. Technical report: geology, groundwater and soils. Prepared for Kittitas County and Huckell/Weinman Associates, Inc. June 29, 2001.

Associated Earth Sciences, Inc. (AESI). 1999b. Unpublished ongoing water quality data in support of the MountainStar MPR EIS. September 1999.

Balogh, J.C. and W.J. Walker. 1992. Golf course management and construction. Environmental Issues. Lewis Publishers, Chelsea, MI. 951 pp.

Boise National Forest. 1981. *The Gray Wolf: History, Present Status, and Management Recommendations.* Prepared by T. Kaminski and A. Boss. Boise National Forest, Supervisor's Office, Boise, Idaho.

Bonneville Power Administration (BPA). 1990. Preliminary design report for the Yakima/ Klickitat production project, March 1990. Submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-00245.

Bortleson, G.C. and D.A. Davis. 1997. Pesticides in selected small streams in the Puget Sound Basin, 1987-1995. U.S. Geological Survey Fact Sheet 067-97. 4 p.

Broadbent, F.E. and F. Clark. 1967. Denitrification, soil nitrogen. W.X. Bartholemew and F.E. Clark, eds. American Society of Agronomy, Inc., Madison, WI. 10:307-313.

Brown and Caldwell. 2001. Water supply modeling for Trendwest Properties: Cle Elum UGA EIS.

Brown and Caldwell. 2002. Water supply modeling for Trendwest Properties: Cle Elum UGA EIS.

Brown, K.W. et al. 1979. Movement of fecal coliforms and coliphages below septic lines. Journal of the Water Pollution Control Federation, Vol. 49:11:2285-2296.

Cascade Conservation Partnership 2000. *The Biological Case for Preserving Lands in the Interstate 90 Corridor.*

Cedarrock Consultants, Inc. 2002. *Trendwest MPR and City of Cle Elum UGA Fishing Pressure Analysis.* Prepared for Trendwest Resorts, Inc. Roslyn, Washington.

Churchill, Thomas E. and Dennis Griffin. 1998. *A Land Use History of the Proposed MountainStar Resort: The Results of a Cultural Resource Survey Along the Lower Cle Elum River – Kittitas County, Washington.* Prepared for Yakama Nation and Trendwest Resorts, Inc.

Cle Elum, City of. 1999. *Municipal Code, Chapter 10.20, Snowmobiles.* Cle Elum, Washington.

Cle Elum, City of. April 2001. *City of Cle Elum Comprehensive Plan, Draft Bullfrog Subarea Plan.*

Cle Elum, City of. August 2001. *Cle Elum UGA Trendwest Master Site Plan Application.*

Cle Elum, City of. December 2001. *Draft Development Agreement by and between the City of Cle Elum and Trendwest Properties, Inc. Relating to the Development of Real Property Located Within the Cle Elum Urban Growth Area, Commonly Known as the "Bullfrog UGA."*

Cle Elum, City of. March 2001. *Trendwest Properties: Cle Elum UGA Draft EIS.*

Cle Elum-Roslyn School District. March 26, 2001. *Capital Facilities Plan, 2001-2020.* Cle Elum, Wash.

Cummins, Jim. 2001. District fish biologist, Washington Department of Wildlife, Yakima, Washington. Personal communication with Bob Pfeifer, July 2001.

Earth Tech. 2001. Cle Elum Regional Sewage Facilities Plan, Preferred Alternatives Report.

Easterbrooks, John. November 28, 2001. Regional habitat manager, WDFW. Personal communication with Carl Hadley, Cedarock Consultants, Inc.

Ecology. See Washington Department of Ecology.

Economic Research Associates. 2000. Technical memorandums on employment-related housing for the MPR and UGA. Prepared for Trendwest.

H-01

Economic Research Associates. 2000. Technical memorandums on employment-related housing for the MPR and UGA. Prepared for Trendwest.

EPA. See U.S. Environmental Protection Agency.

Erickson, L. and D. Kuhlman.February 1987. What you need to know about groundwater concerns. Grounds Maintenance. Pages 74, 75, and 128.

Fast, D., J. Hubble, M. Kohn, B. Watson. 1991. Yakima River Spring Chinook Enhancement Study. Final Report. Bonneville Power Administration, Portland, OR. DE-A179-83BP39461.

Geomax. 2002. *Yakima / Cle Elum River Study Final Report.*

Gilliom, R. and C. Patmont. 1983. Lake phosphorus loading from septic systems by seasonally perched groundwater. Journal of the Water Pollution Control Federation 55(1):1297-1306.

Gold, A.J., W.M. Sullivan, R.E. Hanson, T.G. Morton. 1988. The effect of lawn care practices on groundwater. Lawn Servicing. July 1988. Pages 14-15.

Grimm, L. 2001. W&H Pacific. Personal communication with Andy Kindig (A.C. Kindig & Co.). November 21, 2001.

Hamer, T.E., E.B. Cummins, and W.P. Ritchie. 1991. "Relationships between forest characteristics and use of inland sites by marbled murrelets in northwestern Washington." Unpubl. Report, Wildl. Mange. Div. Nongame Program, Wash. Dept. of Wildl. Olympia, Washington. In: Ralph, C.J., S.K. Nelson, M.M. Shaughnessy, S.L.

Hantzsche, N.N., and E.J. Finnemore. 1992. Predicting groundwater nitrate-nitrogen impacts. Groundwater 30(4):490-499.

Hindmam, J. N., G. A. McMichael, J. P. Olson, S. A. Leider, and T. Clune. 1991. Yakima River species interaction study. Annual Report 1990. Washington Department of Wildlife, U. S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, BPA Report DOE/ BP-01483-1. February 1991.

Hobson Johnson & Associates. 1996. *General Overview of the Economic and Fiscal Impacts Associated with Destination Resorts.*

Hobson Johnson & Associates. 1998. *Visitor Analysis for MountainStar Resort, Kittitas County, Washington.* Prepared for Trendwest Resorts, Inc. Roslyn, Washington.

Hughes Associates, Inc. 1998. *Emergency Resource Evaluation Report.* Prepared for Trendwest Properties, Inc.

Huibregtse, Louman Associates, Inc. 1998. *City of Cle Elum and Town of South Cle Elum Project Report for Water System Improvements Including Water Treatment.*

Icicle Creek Engineers. June 1, 1999. MountainStar Master Planned Resort EIS Coal Mine Hazard Assessment, Kittitas County. Issaquah, Washington.

Ingles, Loyd G. 1965. *Mammals of the Pacific States.* Stanford University Press. Stanford California. 507 pp.

Institute of Transportation Engineers. 1997. *Trip generation manual.* Sixth edition, Washington, D.C.

Johnson, J. 2000. Concentration of 303(d) listed metals in the upper Yakima River station 30A090.

Johnson-Gardner. 2001. *Fiscal and Economic Impact Analysis for Proposed Development of the Cle Elum UGA in Kittitas County, Washington.* Included as Appendix H.

Johnson-Gardner. 2002. *Fiscal and Economic Impact Analysis of Proposed Development of Cle Elum Urban Growth Area Alternative 5 in Upper Kittitas County, Washington.*

Joy, J. 1997. A suspended sediment and DDT total maximum daily load evaluation report for the Yakima River. Pub. No. 97-321. January 1997.

Kerle, E.A., J.J. Jenkins, and P.A. Vogue. 1996. Understanding pesticide persistence and mobility for groundwater and surface water protection. Oregon State University Extension, EM 8561.

King County. 1995. Unpublished water quality data from the Uplands and Montreaux as part of Surface Water Management's best management practice evaluation program. Seattle, Washington.

Kittitas County Field and Stream Club. 1993. Recreational users' map of the Yakima River from East Nelson to Roza Dam. P.O. Box 522, Ellensburg, WA.

Kittitas County. 1997. *Kittitas County Solid Waste Management Plan.* Solid Waste Programs.

Kittitas County. 1997. *Kittitas County Comprehensive Plan, Volumes I and II.*

Kittitas County. 1999 *Kittitas County Countywide Planning Policies.*

Kittitas County. 2000. MountainStar Master Planned Resort Final Environmental Impact Statement. Prepared by Huckell/Weinman Associates, Inc.

Kittitas County 2001. Kittitas County Ordinance No. 2000-16, MountainStar Resort Development Agreement and associated Kittitas County approval documents. Adopted October 10, 2000.

Kittitas County. 2002. MountainStar Master Planned Resort Environmental Impact Statement Addendum. Prepared by Huckell/Weinman Associates, Inc.

Koehler, G.M. 1990. *Population and Habitat Characteristics of Lynx and Snowshoe Hares in North-Central Washington.* Canadian Journal of Zoology 68:845-851.

Koehler, G.M., and J.D. Brittell. 1990. *Managing Spruce Fir Habitat for Lynx and Snowshoe Hares.* Journal of Forestry 88(10):10-14.

Land Profile, Inc. 1998. Preliminary soil characterization and determination of irrigation feasibility. Report to W&H Pacific, Inc.

Mentor Law Group 2001. *The Settlement Agreement Regarding MountainStar Master Planned Resort Cle Elum Urban Growth Area and Supporting Infrastructure and Services.* Prepared for Trendwest Resorts, Inc. Roslyn Washington.

Mertes, James D., et. al. 1995. Park, Recreation, Open Space and Greenway Guidelines. A publication of the National Recreation and Park Association.

Mifflin, Wendy. May-August 1999. Director, Kittitas County Solid Waste Programs. Personal communication.

Mowat, G., K.G. Poole, M. O'Donoghue. 2000. *Ecology of Lynx in Northern Canada and Alaska.* Pages 265-306, chapter 9 in *Ecology and Conservation of Lynx in the United States.* USDA Forest Service, RMRS-GTR-30WWW and University of Colorado Press. 480 pp.

Municipality of Metropolitan Seattle (Metro). 1982. Toxicants in urban runoff. Metro Toxicant Program No. 2. Water Quality Division, Seattle, Washington.

Northwest Hydraulic Consultants, 2002. *Review of Yakima River Diversion Intakes – Cle Elum to Ellensburg Reach.* Analysis of potential hydraulic impacts of proposed relocation of Trendwest point of diversion. Final Report. Prepared for Trendwest Resorts, Inc. Roslyn, Washington Northwest Power Planning Council (NPPC). 2001. Yakima Subbasin Summary. Draft. August, 2001.

Northwest Power Planning Council (NPPC). August 2001. Yakima Subbasin Summary - Draft.

Pacific Groundwater Group for Ecology, 2002. *Big Creek Basin Hydrologic Analysis*, the *Teanaway River Basin Hydrologic Analysis*, and the *Swauk/First Creek Basin Hydrologic Analysis.*

Parametrix, 2002. *Existing fish habitat conditions in Yakima River tributary reaches affected by the MountainStar Resort development*. Prepared for Trendwest Resorts, Inc. Roslyn Washington.

Pearsons, T. N., G. A. McMichael, S. W. Martin, E. L. Bartrand, J. A. Long, S. A. Leider, G. R. Strom, A. R. Murdoch, E. McKenzie, and A. Fritts. 1996. Yakima River Species Interaction Studies Annual Report 1994. Washington Department of Fish and Wildlife, U. S. Department of Energy, Yakama Nation, Bonneville Power Administration, Division of Fish and Wildlife, BPA Report DOE/ BP-99852-3. September 1996.

Raedeke Associates, Inc. 1999. MountainStar Master Planned Resort EIS. Draft Technical Reports. Prepared by Huckell/Weinman Associates Inc., Kirkland, Washington.

Raedeke Associates, Inc. 2000. Wildlife Habitat Analysis, Draft EIS, Appendix E.

Reneau, R.B., Jr. and D.E. Pettry. 1976. Phosphorus distribution from septic tank effluent in coastal plain soils. Journal of Environmental Quality 5(1):34-39.

Roger, Steve. October 29, 2001 and 2002. WDFW Enforcement Officer, Cle Elum area. Personal communication with Mark Pedersen, Shapiro and Associates, Inc.

Ruediger, B.J., Claar, S. Mighton, B. Naney, T. Rinalsdi, F. Wahl, N. Warren, D. Wegner, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, S. Gniadek. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Bureau Land Management, National Park Service, and Fish and Wildlife Service. 120 pp.

Ruggiero, L.F., K.B. Aubry, S. W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 2000. E*cology and Conservation of Lynx in the United States.* USDA Forest Service, RMRS-GTR-30WWW and University of Colorado Press. 480 pp.

Sawhney, B.L. and J.L. Starr. 1977. Movement of phosphorous from a septic drainfield. Journal WPCF. November 1977. pp. 2238-2442.

Shapiro and Associates, Inc., Brown & Caldwell, Johnson-Gardner, LLC, and Mentor Law Group, PLLC. 2002. *Employment-induced water demand analysis MountainStar MPR and Cle Elum UGA*. Prepared for the City of Cle Elum's Trendwest Properties, January 7, 2002. Cle Elum UGA Final EIS (in progress).

Shelstad, Norm. 2000. Personal communication with Denise Evans. February 2000.

Stokes, D. and L. Stokes. 1996. Stokes Field Guide to Birds Western Region. Little, Brown and Company. Boston New York and London.

StreamNet. 2001. On-line database of fisheries, habitat, and water quality data. Spring chinook use of Reecer Creek.

TModel Corporation. 2001. *Transportation Model Report Summary, Cle Elum UGA, Final EIS.* Tmodel Corporation, Vashon Island, Washington. Included as Appendix F.

Transportation Research Board. 1994. *Highway capacity manual.* Special Report 209, National Research Council, Washington, D.C.

Transportation Solutions, Inc. 2001. MountainStar Master Planned Resort Draft Baseline Traffic Conditions. Prepared for Kittitas County and Trendwest, April 2001.

Transportation Solutions, Inc. February 2000. *Mountain Star Master Planned Resort, Preliminary Final Transportation Technical Report.* Prepared for Huckell Weinman Associates.

Trendwest Resorts, Inc., Washington Department of Fish and Wildlife, and the Yakama Indian Nation, 2000. *Cooperative Agreement Between the Washington Department of Fish and Wildlife, Yakama Nation, and Trendwest Resorts, Inc.* Produced by Trendwest Resorts, Inc. Roslyn Washington.

Trendwest Resorts, Inc.2001. *Land Stewardship Plan for the MountainStar Resort, Kittitas County, Washington.* December 19, 2001 draft. Prepared for Trendwest Resorts, Inc. Roslyn Washington.

U. S. Bureau of Reclamation. 1999. Yakima River Basin Water Enhancement Project: Final Programmatic Environmental Impact Statement. U.S. Department of the Interior.

U. S. Department of the Interior, Fish and Wildlife Service (USDI), and USDC, Bureau of Census. 1998. 1996 national survey of fishing, hunting, and wildlife associated recreation. U.S. Government Printing Office, Washington, DC.

U.S. Environmental Protection Agency (EPA). 1998. *Characterization of Building-Related Construction and Demolition Debris in the United States.*

U.S. Environmental Protection Agency (EPA). December 31, 1971. *Noise from construction equipment and operations, building equipment, and home appliances.* NTID 300.1.

U.S. Fish and Wildlife Service (USFWS). 1992. *Determination of Threatened Status for the Washington, Oregon, and California Population of the Marbled Murrelet.* Federal Register, Vol. 57 (191).

U.S. Fish and Wildlife Service. 1980. *Northern Rocky Mountain Wolf Recovery Plan.* Denver, Colorado. 66 pp.

U.S. Forest Service. 1997. *Snoqualmie Pass Adaptive Management Area Plan Final EIS.*

U.S. Forest Service, Cle Elum Ranger District. 1999. Personal communication with Denise Evans.

U.S. Forest Service. February 1995. Ecology and Conservation of the Marbled Murrelet. USDA Forest Service General Technical Report PSW-GTR-152.

W&H Pacific. June 2001. MountainStar Master Planned Resort Water System Plan. Approved by DOH, November 2001.

Walski, T. 1984. *Analysis of Water Distribution Systems.*

Washington Administrative Code, 2000. Chapter 173-425, Outdoor Burning. Washington State Department of Ecology, March 13, 2000.

Washington Department of Fish and Wildlife (WDFW). 1996. *Priority Habitat and Species List.* Habitat Program, Olympia, Washington.

Washington Department of Fish and Wildlife (WDFW). 1998. 1998 Washington State Salmonid Stock Inventory (SSI). Appendix: Bull Trout and Dolly Varden. Washington Department of Fish and Wildlife, Olympia, Washington. 437 p.

Washington Department of Fish and Wildlife, Yakama Nation, and Trendwest Resorts, Inc. 2000. Cooperative agreement between the Washington Department of Fish and Wildlife, Yakama Nation and Trendwest Resorts, Inc. December 4, 2000.

Washington Department of Fish and Wildlife. 2001. Fishing license data, unpublished. Information Services Department, Olympia, Washington.

Washington Department of Fisheries (WDF), Washington Department of Wildlife, Western Washington Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Washington Department of Fish and Wildlife. 212 pp. appendices.

Washington Department of Fisheries. 1975. *A catalog of Washington streams and salmon utilization.* Volume 1. Olympia, Wash.

Washington Employment Security Department. 2001. http://www.wa.gov/esd/lmea /labrmrkt /sed/kittsed.htm

Washington State Department of Ecology (Ecology). 1995. 1994 Washington State water quality assessment [305(b)] report companion document. Olympia, Washington.

Washington State Department of Ecology (Ecology). 1998. Department of Ecology final matrix for surface waters listed under section 303(d) included in 305B report of the Federal Clean Water Act (CWA). Olympia, Washington.

Washington State Department of Ecology (Ecology). 1999. Water Supply Bulletin 60 - Estimated Baseflow Characteristics of Selected Washington Rivers and Streams.

Washington State Department of Ecology (Ecology). 2000. Water quality standards for waters of the state of Washington (Chapter 173-201A WAC). Washington State Department of Ecology, Olympia, Washington.

Washington State Department of Ecology (Ecology). 2001a. Ambient water quality monitoring program for the Yakima River station 39A090.

Washington State Department of Ecology (Ecology). 2001b. Upper Yakima restoration plan: targeting sediments. April 2001.

Washington State Department of Ecology (Ecology). 2001c. Final stormwater management manual for western Washington, volume 5 runoff treatment BMPs. Publication No. 99-11 to 99-15. August 2001.

Washington State Department of Ecology. 2000. Final 1998 Section 303(d) List. Washington Department of Ecology water quality website http://www.ecy.wa.gov/programs/wq/303d/1998 by wrias.html

Washington State Department of Transportation (WSDOT) 2000. *The Final Report on the I-90 Snoqualmie Pass Wildlife Habitat Linkage Assessment.*

Weiskel, P. and B. Howes. 1992. Differential transport of sewage-derived nitrogen and phosphorus through a coastal watershed. Environmental Science and Technology 26(2):361-368.

Wenatchee National Forest. 1997. Yakima Watershed analysis. Cle Elum Ranger District. Cle Elum, WA.

Wilhelm, S., S. Schiff, and W. Robertson. 1994. Chemical fate and transport in a domestic septic system: unsaturated and saturated zone geochemistry. Environmental Toxicology and Chemistry 13(2):193-203.

Wilson, John. 2002. Earthtech. Personal communication.

Worley, Steve. 2002. Owner, Woorleybugger Fly Company, Ellensburg, WA. Personal communication with Carl Hadley, Cedarock Consultants, Inc. January 23, 2002.

Yakima River Basin Watershed Planning Unit and Tri-County Water Resources Agency. 2001. Watershed Assessment Yakima River Basin. January 2001. Prepared by Economic and Engineering Services, Inc.

Yousef, Y.A., M.P. Wanielista, T. Hvitved-Jacobsen, and H.H. Harper. 1984. Fate of heavy metals in stormwater runoff from highway bridges. The Science of the Total Environment 33:233-244.

6. Acronyms and Abbreviations



6. ACRONYMS AND ABBREVIATIONS

ac-ft	Acre-feet
ADD	Average Daily Demand
AESI	Associated Earth Sciences, Inc.
B&O	Business and occupation tax
BMPs	Best management practices
BOD	Biological oxygen demand
BP	Business park
CAO	Critical Areas Ordinance
CDL	Construction and demolition debris
cfs	Cubic feet per second
CO	Carbon monoxide
CO_2	Carbon dioxide
CTMP	Construction Transportation Management Plan
CWA	Clean Water Act
CWPP	Countywide Planning Policies
du/acre	Dwelling units per acre
dB	Decibels
dBA	A-weighted decibels
DO	Dissolved oxygen
DOH	Washington Department of Health
Ecology	Washington Department of Ecology
EIS	Environmental impact statement
EMS	Emergency medical service
EMT	Emergency medical technician
EPA	U.S. Environmental Protection Agency
ERU	Equivalent residential unit
EWC	Ellensburg Water Company
F&R	Forest and Range zone
FCWUA	First Creek Water Users Association
FHWA	Federal Highway Administration
FTE	Full-time equivalent
gpdpc	Gallons/day/capita
GMA	Growth Management Act
I/I	Infiltration/inflow
ITE	Institute of Transportation Engineers

KCC	Kittitas County Code
KCSW	Kittitas County Solid Waste Programs Office
KITTCOM	Kittitas County Communication Center
L_{eq}	Equivalent sound level
LOS	Level-of-service
LWD	Large woody debris
MDD	Maximum day demand
MDP	Master Drainage Plan
meq/gm	Milliequivalents per gram
MFSEP	Municipal Facilities and Services Expansion Plan
mg/L	Milligrams per liter
mgd	Million gallons per day
mL	Milliliter
MP	Milepost
MPR	Master planned resort
MUTCD	Manual on Traffic Control Devices
MWG	Montgomery Water Group
µg/L	Micrograms per liter
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRPA	National Recreation Park Association
NTU	Nephelometric turbidity units
OAHP	Washington State Office of Archaeology and Historic Preservation
OFM	Office of Financial Management
PGG	Pacific Groundwater Group
PM-10	Particulate matter less than 10 micrometers in size
Q_a	Maximum annual volume
Q_i	Instantaneous peak rate
RCW	Revised Code of Washington
REET	Real estate excise tax
RM	River mile
RV	Recreational vehicle

SEPA	State Environmental Policy Act
SOAC	System Operations Advisory Committee, U.S. Bureau of Reclamation
SPPP	Stormwater Pollution Prevention Plan
SWAC	Solid Waste Advisory Committee
SWMP	Solid Waste Management Plan, Kittitas County
TESC	Temporary erosion and sediment control
TMDL	Total maximum daily load
TP	Total phosphorous
Trendwest	Trendwest Properties, Inc.
TSI	Transportation Solutions, Inc
TSS	Total suspended solids
TWSA	Total water supply available
UFC	Uniform Fire Code
UGA	Urban Growth Area
UGN	Urban Growth Node
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UV	Ultraviolet
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WESD	Washington State Employment Security Department
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
YRBWEP	Yakima River Basin Water Enhancement Project

7. Distribution List



7. DISTRIBUTION LIST

Federal Agencies

Bonneville Power Administration
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation (Chris Lynch)
National Marine Fisheries Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service

Indian Tribes

Yakama Nation

State Agencies

Office of, Trade and Economic Development
Office of Community Development
Department of Ecology
Department of Fish and Wildlife
Department of Health
Department of Natural Resources
Department of Transportation
Office of Archaeology and Historic Preservation
Office of the Governor
State Parks and Recreation Commission
State Patrol

Local Government Agencies

Kittitas County Departments
- Planning Department
- Environmental Health
- Public Works
- Building & Fire Safety
- Solid Waste Programs
- Sheriff's Department
- County Commissioners Office
- Assessor's Office
- Water Conservancy Board

City of Cle Elum
- Extra for Public

Town of South Cle Elum
City of Roslyn
Kittitas County Fire District No. 6
Kittitas County Fire District No. 7
Kittitas County Hospital District No. 1
Kittitas County Hospital District No. 2
Cle Elum Roslyn School District #404
KITTCOM
Ellensburg Water Company
Washington State Horse Park Authority

Libraries/Senior Center

Carpenter Memorial Library, Cle Elum
Central Washington University Library, Ellensburg
Ellensburg Public Library
Roslyn Library
Upper Kittitas County Senior Center

Newspapers

Ellensburg Daily Record
Northern Kittitas County Tribune
Yakima Herald - Republic

Organizations/Other Agencies

Mountains to Sound Greenway
Plum Creek Timber Co. LP
Puget Sound Energy
REBOUND
Citizens for Sound Community Development
RIDGE
Phoenix Group
University of Washington, Dept of Astronomy
Dark Skies Northwest (Bruce Werdman)
Upper Kittitas County Community Center, JoAnn Rushton
Cle Elum Chamber of Commerce

Cle Elum Consultants

McConnell/Burke
Christopher Brown
Jeff Louman
Erin L. Anderson
Michael J. Mulcahy

John Wilson, Earthtech
Charlie Roe
Buck & Gordon
Vicki Morris
Art Campbell, Hererra

Trendwest and Consultants

Trendwest
Consultants
- Shapiro and Associates, Inc.
- Rick Peterson
- Jim Dawson
- Larry Grimm
- Joe Mentor
- Richard Weinman
- Tom Martin
- Andy Kindig
- Steve Lathrop
- Bill Reid
- Peggy Wyatt, Hackworth Architects

Organizations/Individuals who Commented

Pacific Groundwater Group (DOE Consultants)
Ellie Belew
Fred Hein, Kirkland
Shannon Cernick, Ronald
Larry Susich
Molly Palmer, Roslyn
Lisa Messmer, Roslyn
Edmund Janszkiewicz, Roslyn
Peg Bryant & Cordy (Courtney) Cook
Bricklin & Gendler, LLP
Rachael Paschal
Thelma Simon
Larry Jammes, Ellensburg.
Erin Krake
Len Norwitz
Susan Willis

Notice of Availability

Ken Boles
Harold Enrico
Bob Fink
Robert Swedberg
Larry Fudaz/Erma Turner
Russell and Virginia Brodin
Peter A. Larned
Kimberly Larned
Keith Kistler
John Morrow
Larry Nickel
Kittitas County Water District
Roza Irrigation District
Westside Irrigation District
Kittitas Reclamation District
Inland Telephone
Qwest Communications
Atelier, ps
Brian Lenz, Ellensburg (Puget Power)
Sierra Club Cascade Chapter
Erin Nelson, Upper Kittitas County Senior Center
Upper Kittitas County Youth Baseball Association
Keith Hartley, Cle Elum / Ellensburg
Peggy Pace (public testimony) PO 651, Roslyn
Pat Christensen, 320 W. 4th St, CE 98922

Trendwest Properties: Cle Elum UGA Final EIS

Appendix - Volume 1



March 18, 2002

City of Cle Elum

TABLE OF CONTENTS

Volume 1:

Appendix A - Water Quality Technical Report

Appendix B - Water Supply Technical Report Supplement

Appendix C - Employment-Induced Water Demand Analysis

Volume 2:

Appendix D - Fiscal Impact Analysis

Appendix E - Site Engineering Technical Report

Appendix F - Transportation

Appendix G - Agency Correspondence

Appendix A

Water Quality Technical Report



A.C. Kindig & Co.
ENVIRONMENTAL CONSULTING

Trendwest Properties: Cle Elum UGA FEIS Water Quality Technical Report

PREPARED FOR

Trendwest Resorts, Inc.
109 South First Street
P.O. Box 887
Roslyn, WA 98941-0887

Project No. 114
March 3, 2002

12501 Bellevue-Redmond Road, Suite 210, Bellevue, Washington 98005-2509
Tel 425 638-0358 Fax 425 455-8365

A.C. Kindig & Co.
ENVIRONMENTAL CONSULTING

Trendwest Properties: Cle Elum UGA FEIS Water Quality Technical Report

PREPARED FOR

Trendwest Resorts, Inc.
109 South First Street
P.O. Box 887
Roslyn, WA 98941-0887

PREPARED BY

A.C. Kindig & Co.
12501 Bellevue-Redmond Road, Suite 210
Bellevue, Washington 98005

Project No. 114
March 3, 2002

TABLE OF CONTENTS

Page

1.0 INTRODUCTION ..... **Error! Bookmark not defined.**
1.1 Supplemental Evaluation 1-1
1.2 UGA Alternative 5 and MPR Reduced Density Summaries 1-1
2.0 AFFECTED ENVIRONMENT 2-5
2.1 Hydrologic Setting 2-5
2.2 Surface Water Quality 2-5
2.2.1 Cle Elum River (WA-39-1434) 2-5
2.2.2 Yakima River 2-5
2.3 Groundwater Quality 2-7
2.4 Water Quality-Related Regulations 2-7
2.4.1 State Water Quality Standards 2-7
2.4.2 Washington State Groundwater Standards (Ecology 1990, Chapter 173-200 WAC) 2-9
2.4.3 Washington State Drinking Water Standards (WDOH 1992, Chapter 246-290-300 WAC) 2-9
2.4.4 Section 303(d) Threatened and Impaired Water Bodies 2-9
2.4.5 Washington State Water Quality Assessment 305(b) Report 2-11
2.4.6 Stormwater Management Manual for the Puget Sound Basin (Final Draft 2001 Ecology and the Puget Sound Water Quality Authority [Chapter 173-275-360 WAC]) 2-11
2.4.7 Stormwater Runoff National Pollutant Discharge Elimination System (NPDES) Permit 2-12
3.0 IMPACTS EVALUATION 3-1
3.1 Construction Impact Evaluation 3-1
3.1.1 No Action Alternative 3-1
3.1.2 Alternative 5 Construction Impacts 3-1
3.1.3 Alternative 5 Construction Mitigation 3-4
3.1.4 Cumulative Construction Impacts with the MPR and the Peare-O'Rourke Property 3-4
3.1.5 Unavoidable Adverse Impacts 3-5
3.2 Developed Water Quality Impact Evaluation 3-6
3.2.1 No Action Alternative 3-6
3.2.2 Alternative 5: Stormwater Contaminants 3-6
Metals 3-6
Oil and Grease, and Total Petroleum Hydrocarbons (TPH) 3-7
Suspended Solids 3-7
Nutrients 3-7
Fecal Coliforms, Biochemical Oxygen Demand (BOD), and Temperature 3-8
3.2.3 Stormwater Management for Alternative 5 3-8
Stormwater Facilities Changes 3-8
Stormwater Management Zones 3-8

TABLE OF CONTENTS (CONTINUED)

Page

Stormwater Facilities Proposed 3-10
Non-Point Source Controls Proposed 3-11
Enhanced Treatment Facilities 3-11
Stormwater Facility Maintenance 3-15
3.2.4 Alternative 5 Stormwater Quality Analysis Methods 3-16
3.2.5 Alternative 5 Stormwater Evaluation Criteria 3-19
3.2.6 Stormwater Quality Results and Discussion for Preferred Alternative 5 3-24
Groundwater Impacts 3-24
Analyses Results Not Crediting Additional Treatment from Infiltration 3-25
Infiltration Credited with Additional Treatment 3-26
Analysis Results from Proportionately Mixed Treated Stormwater Compared to the Existing Groundwater Quality 3-27
Surface Water Impacts 3-28
3.2.7 Alternative 5 Non-Point Water Quality: Landscaping 3-29
3.2.8 Alternative 5 Artificial Water Bodies 3-33
3.2.9 Alternative 5 Mitigation 3-34
3.3 Cumulative Impacts with the MPR 3-34
3.3.1 On-Site Operational Impacts 3-34
3.3.2 Suburban 1 Zoned Portion of the UGA 3-36
3.3.3 Off-Site Impacts 3-37
Water Supply 3-37
Employment-Induced Septic Systems 3-37
3.3.4 Groundwater Quality 3-38
3.3.5 Wastewater Treatment Plant Loadings to the Yakima River 3-38
4.0 REFERENCES 4-39

LIST OF FIGURES

Figure 1-1. Vicinity Map 1-2
Figure 1-2. Cle Elum UGA Site Map 1-3
Figure 1-3. Alternative 5 Land Use Plan 1-4
Figure 2-1. Surface and Groundwater Quality Monitoring Locations 2-8
Figure 3-1. Slope Map 3-2
Figure 3-2. Management Zones, Aquifer Susceptibility 3-3
Figure 3-3. Developed Conditions Basin Boundaries 3-17

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF TABLES

Table 2-1. Class AA and Class A Water Quality Standards 2-6
Table 2-2. Water Quality Standards for Groundwater in the State of Washington 2-10
Table 3-1. Changes to the Draft EIS Stormwater Treatment Proposal for the Cle Elum UGA 3-9
Table 3-2. Wet Pond Contaminant Removal Efficiencies (%) Reported in the Literature 3-12
Table 3-3. Standard Sand Filter Removal Efficiencies (%) Reported in the Literature 3-13
Table 3-4. Comparison of Calculated Wet Pond Plus Sand Filter Combined Efficiencies 3-14
Table 3-5. Stormwater Wetland Removal Efficiencies (%) Reported in the Literature 3-15
Table 3-6. Catchments Breakdown within the Four Water Quality Management Zones 3-16
Table 3-7. Untreated Water Quality References for Each Land Use Category 3-16
Table 3-8. Total Impervious Acreage per Management Zone, Alternative 5 3-18
Table 3-9. Alternative 5 Untreated Stormwater Runoff Quality (Excludes Infiltrated Roof Runoff) 3-19
Table 3-10. Yakima River Background, Surface Water Quality Standards, and Guidelines for Sublethal Fish Effect Avoidance 3-20
Table 3-11. Alternative 5 Forecast Stormwater Quality 3-25
Table 3-12. Alternative 5 Proportionately Mixed Treated Stormwater Compared to Existing Groundwater Quality 3-27
Table 3-13. Yakima River Water Quality Resulting from the UGA Analysis 3-29

EXHIBITS

Exhibit 1 Off-Site Rural Employment-Induced Septic System Analysis
Exhibit 2 Model Results for 5-acre and 20-acre Parcels

1.0 INTRODUCTION

1.1 Supplemental Evaluation

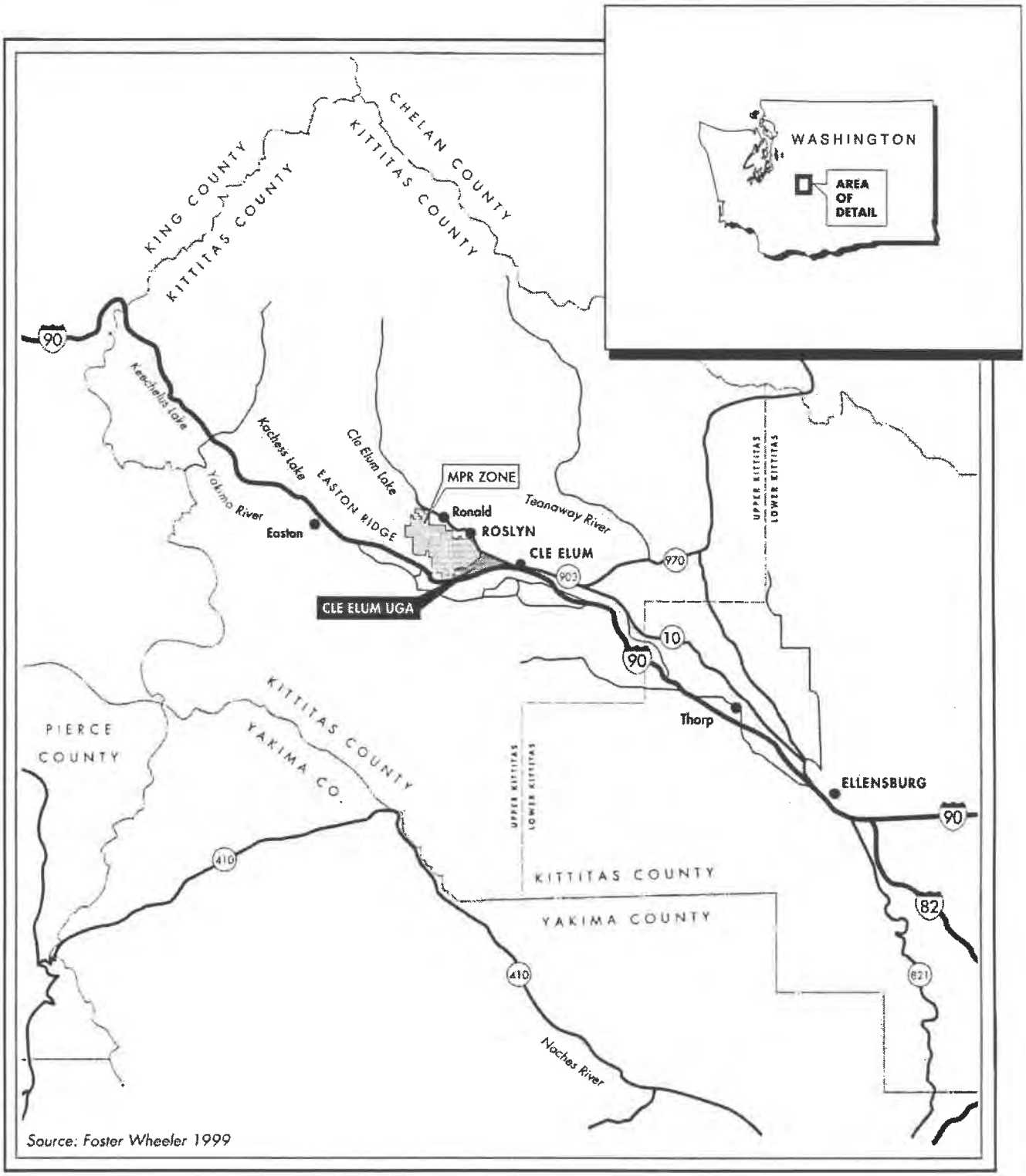
Trendwest proposes to develop 1,106 acres of property within the Cle Elum Urban Growth Area (UGA) located in Kittitas County, Washington (Figure 1-1). The property is bordered by State Route (SR) 903 to the east, Bullfrog Road to the north and west, and Interstate 90 to the south (Figure 1-2). The approved MountainStar Master Planned Resort (MPR) lies adjacent to and northwest of the UGA. The proposal for the UGA consists of a master plan community containing single-family and multi-family residential, commercial, and recreational land uses. Four alternatives were previously evaluated in the Draft Environmental Impact Statement (DEIS) prepared for the Cle Elum UGA (City of Cle Elum 2001). A fifth development alternative has been added since the publication of the UGA Draft EIS. A.C. Kindig & Co. was requested to prepare a supplemental water quality report for the analysis in the Final EIS. The supplemental report adds to the water quality analysis and quantitatively assesses Alternatives 5 (Preferred Alternative). This report contains an additional evaluation of construction impacts, as well as an analysis of post-developed stormwater runoff, treatment, infiltration, and groundwater quality impacts.

1.2 UGA Alternative 5 and MPR Reduced Density Summaries

The Conceptual Site Plan for Alternative 5 represents another site plan variation for development of the Cle Elum UGA that incorporates many of the land uses evaluated under Alternatives 2, 3, and 4 in the Cle Elum UGA Draft EIS. Alternative 5 has been designed to result in a level of environmental impact that falls within the range of environmental impacts evaluated in the Cle Elum UGA Draft EIS. Alternative 5 contains residential land uses (293 acres), a Business Park campus (80 acres), recreation/public facilities (134 acres), open space (418 acres), and a Reserve (175 acres) (Figure 1-3).

Cumulative impacts for Alternative 5 are being evaluated in combination with a Reduced-Density MPR and the September 2000 MPR Conceptual Master Plan submitted to Kittitas County. The reduction in density reflects terms of the settlement agreement between Trendwest and the RIDGE, a Washington non-profit corporation. The density for the MPR has decreased from 4,650 units to 3,785 units.

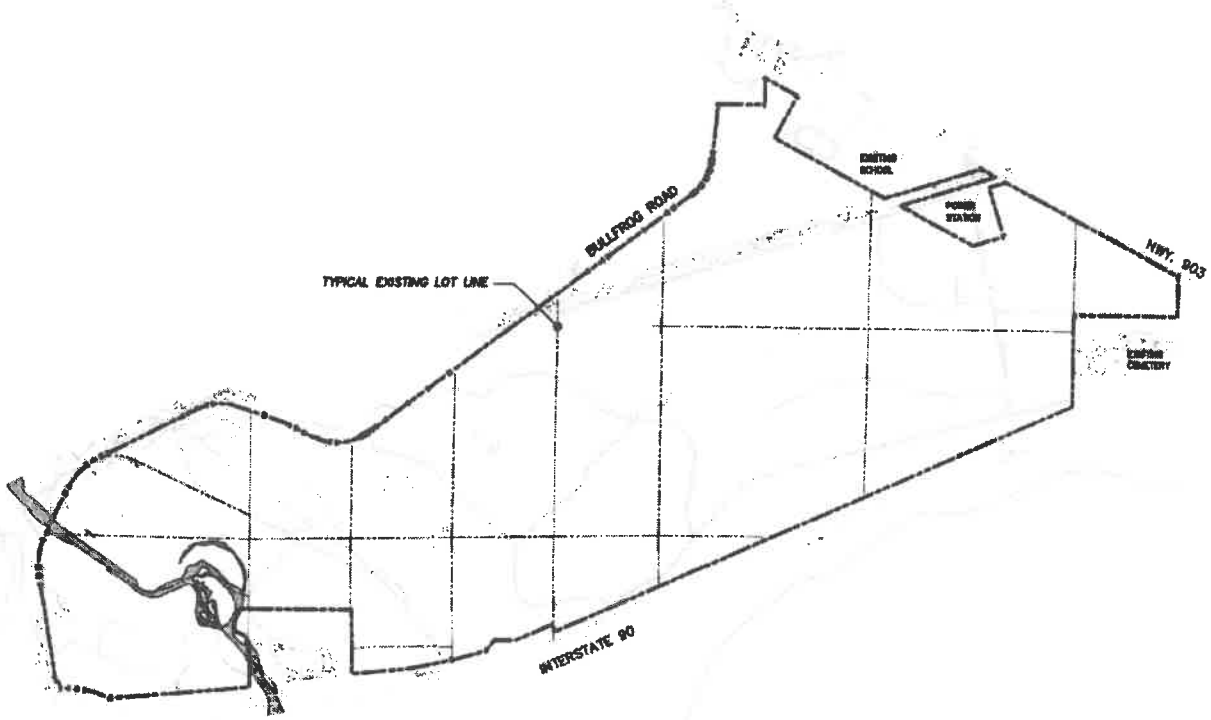
The primary difference between the September 2000 MPR Master Plan and the conceptual plan included in the MPR FEIS is the timing of golf course construction. In the September 2000 Plan, two golf courses are proposed for Phase I development and a potential golf course is proposed for Phase 3 development. In the MPR FEIS, one golf course was proposed in Phase 1 development with open space shown as a potential golf course.



REFERENCE: SHAPIRO AND ASSOCIATES.

A.C. Kindig & Co.	**Water Quality Technical Report Cle Elum UGA FEIS**	***Figure 1-1*** **Vicinity Map**

andy kindig projects\114 mountainstar\vicinity.cdr page1

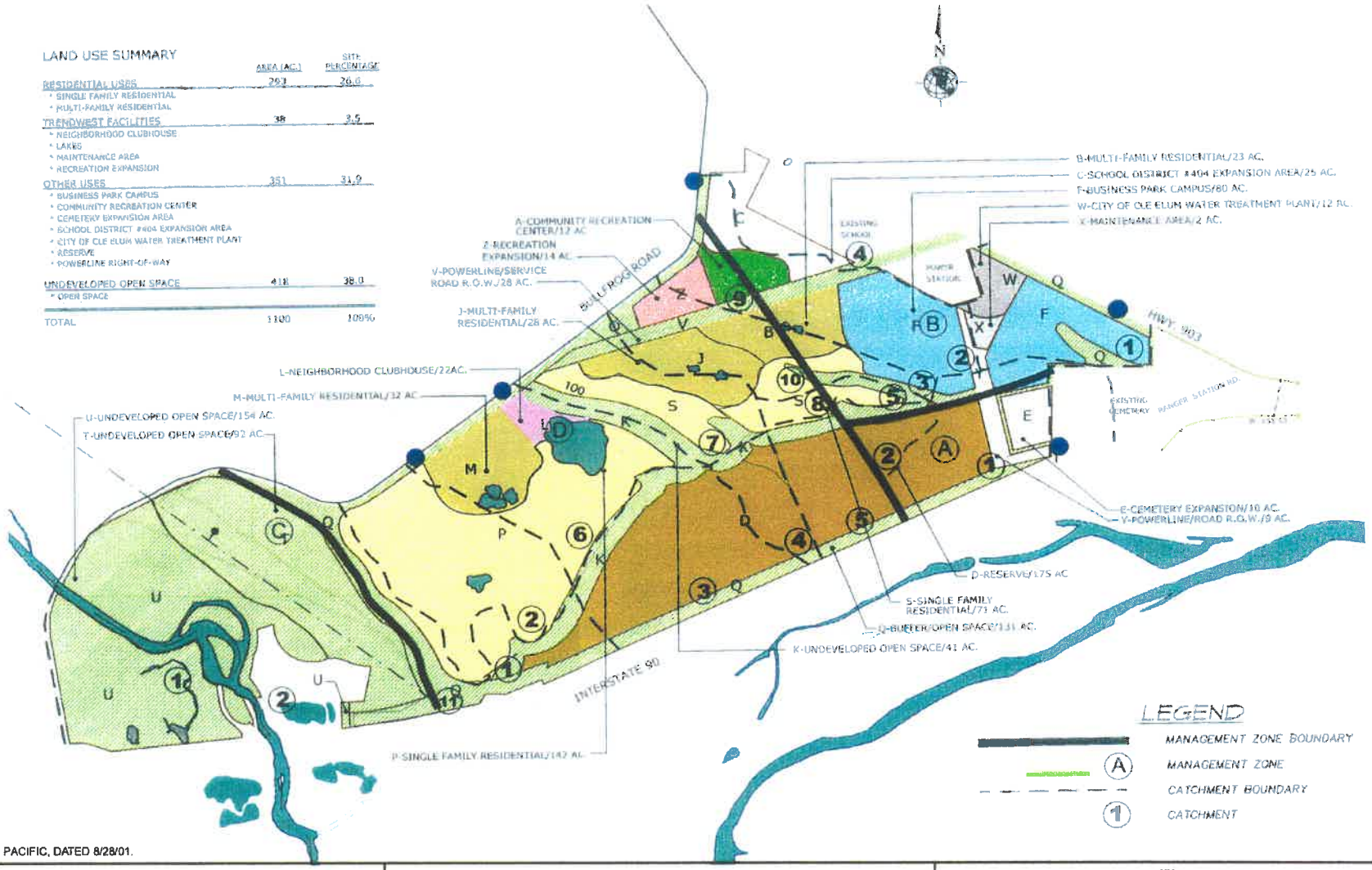


Source: KBA 2000

0 2000'
Approximate Scale in Feet

REFERENCE: SHAPIRO AND ASSOCIATES.

A.C. Kindig & Co.	**Water Quality Technical Report** **Cle Elum UGA FEIS**	**Figure 1-2** **Cle Elum UGA Site Map**



REFERENCE: W&H PACIFIC, DATED 8/28/01.

A.C. Kindig & Co.	***Water Quality Technical Report*** ***Cle Elum UGA FEIS***	***Figure 1-3*** ***Alternative 5 Land Use Plan***

2.0 AFFECTED ENVIRONMENT

2.1 Hydrologic Setting

The Cle Elum UGA Draft EIS previously described the regional hydrologic setting (Section 3.3.1). The proposed Cle Elum UGA site lies within the upper Yakima River drainage basin, which is designated as Water Resource Inventory Area (WRIA) 39 (Washington State Department of Fisheries [WDF] 1975). The UGA site is adjacent to the lower portion of the Cle Elum River between Bullfrog Road and Interstate 90. The Cle Elum River runs along the western boundary of the site and joins the Yakima River at River Mile (RM) 185.6. The Yakima River and Interstate 90 run along the southern boundary of the site. Approximately 750 acres of the UGA site is topographically located within the Yakima River basin, and approximately 350 acres is topographically within the Cle Elum River basin. Due to the nature of surface soils on the site, natural drainage from the site occurs through infiltration and subsurface groundwater flow. The Cle Elum River flows are controlled at the Cle Elum Dam operated by the United States Bureau of Reclamation (USBR). The dam is upstream of the project at RM 8.2. Water impounded by the dam forms Cle Elum Lake, which the USBR uses primarily for storing fall, winter and spring flows to supply late-spring through early fall irrigation demands in the Yakima Valley. A secondary function of the dam is flood control.

2.2 Surface Water Quality

The Cle Elum River from the mouth to Cle Elum Dam (RM 8.2) is identified as water body segment WA-39-1050, and designated Class AA (extraordinary) for water quality (Table 2-1) (Chapter 173-201A WAC).

The Yakima River is designated as Class A (excellent) water quality from its mouth to the confluence with the Cle Elum River, and is designated Class AA (extraordinary) for the reach from the Cle Elum River confluence (RM 185.6) up to its headwaters (Table 2-1) (Washington State Department of Ecology [Ecology] 2000, Chapter 173-201A-130 WAC). A special condition is applied in this reach (RM 185.6 to the headwaters of the Cle Elum River) in that the temperature shall not exceed 21.0°C due to human activities.

2.2.1 Cle Elum River (WA-39-1434)

Water quality data for the Cle Elum River collected by the United States Geological Survey (USGS), Ecology, and Associated Earth Sciences, Inc. (AESI), were summarized in the Draft EIS.

2.2.2 Yakima River

Water quality data from 1997 and 1998 were described in the Draft EIS. Ecology's ambient water quality monitoring program collected water quality data from 1989 through September 2000 (Ecology 2001a). To characterize the existing Yakima River water quality for this report,

the Draft EIS data set was updated to include all of Ecology's data collected from October 1994 through 2000. Water quality samples were collected monthly by Ecology from October 1994 through September 2000 at RM 191 located upstream of the UGA site (72 samples).

Table 2-1
Class AA and Class A Water Quality Standards

Class AA (extraordinary) water quality standards for the Cle Elum River from the mouth to the headwaters (Chapter 173-201A-130[17] WAC).

Fecal coliforms	Organism levels shall both not exceed a geometric mean value of **50** colonies/100 mL and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 mL.
Dissolved oxygen	Shall exceed **9.5** mg/L. Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.
Temperature	Shall not exceed **16.0**°C due to human activities. When natural conditions exceed 18.0°C, no temperature increases will be allowed that will raise receiving water temperatures by greater than 0.3°C.
pH	Shall be within the range of **6.5 to 8.5** with a human-caused variation within a range of less than 0.5 units.
Turbidity	Shall not exceed **5** nephelometric turbidity units (NTU) over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Toxic substances	Shall not be introduced above natural background levels in waters of the state that have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity of the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department. (Toxic substances include dissolved metals and ammonia-nitrogen.)

Source: Ecology 2000

Class A (excellent) water quality for the Yakima River from the mouth to the confluence with the Cle Elum River (RM 185.6) (Chapter 173-201A-130[141] WAC).

Fecal coliforms	Organism levels shall both not exceed a geometric mean value of **100** colonies/100 mL and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 200 colonies/100 mL.
Dissolved oxygen	Shall exceed **8.0** mg/L. Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.
Temperature	Shall not exceed **18.0**°C due to human activities. When natural conditions exceed 18.0°C, no temperature increases will be allowed that will raise receiving water temperatures by greater than 0.3°C.
pH	Shall be within the range of **6.5 to 8.5** with a human-caused variation within a range of less than 0.5 units.
Turbidity	Shall not exceed **5** nephelometric turbidity units (NTU) over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Toxic substances	Shall not be introduced above natural background levels in waters of the state that have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity of the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department. (Toxic substances include dissolved metals and ammonia-nitrogen.)

Source: Ecology 2000

Yakima River temperatures at RM 191 averaged 6.8°C and ranged from 0.20°C to 19.8°C. Two samples exceeded the Class AA standard of 16°C. Dissolved oxygen (DO) ranged from 8.0 mg/L to 13.0 mg/L and averaged 11.1 mg/L. A total of 12 samples within the 1994 to 2000 time frame did not meet the 9.5 mg/L DO minimum criterion. The lower DO values occurred in the summer months of July through September. The pH in the Yakima River ranged from 6.4 to 8.3. One sample was below the minimum 6.5 pH criterion (June 1996). Fecal coliform concentrations averaged 11.1 colonies/100 mL and ranged from 1 to 160 colonies/100 mL. The Class AA standard of 50 colonies/100 mL as a geometric mean was met.

Nutrient concentrations in the Yakima River at RM 191 were low. Total phosphorous (TP), nitrate+nitrite-nitrogen, and ammonia-nitrogen averaged 0.07 mg/L, 0.04 mg/L, and 0.10 mg/L, respectively. Total suspended solids (TSS) were variable, ranging from less than 1.0 mg/L to 62 mg/L. The average TSS was 5.6 mg/L. Turbidity averaged 3.4 NTU and ranged from 0.60 NTU to 30 NTU. The Yakima River upstream of Yakima to its headwaters is being targeted for study and cleanup by Ecology due to high levels of suspended sediment, turbidity, and pesticides (Ecology 2001b). The Yakima River below the project at RM 80.4 (segment WA-37-1010) has a Total Maximum Daily Load (TMDL) for turbidity and the pesticide DDT (See the 303 (d) discussion below).

Dissolved metals were analyzed in the Yakima River at RM 191 by Ecology to verify previously measured violations of state water quality standards from historic USGS survey data (Johnson 2000). All dissolved metals complied with chronic standards when measured six times between March 1999 and January 2000 (Johnson 2000). Dissolved lead was less than the detection level of 0.02 µg/L. Dissolved copper averaged 0.19 µg/L and dissolved zinc averaged 0.75 µg/L. The average hardness at this station was 27 mg/L $CaCO_3$.

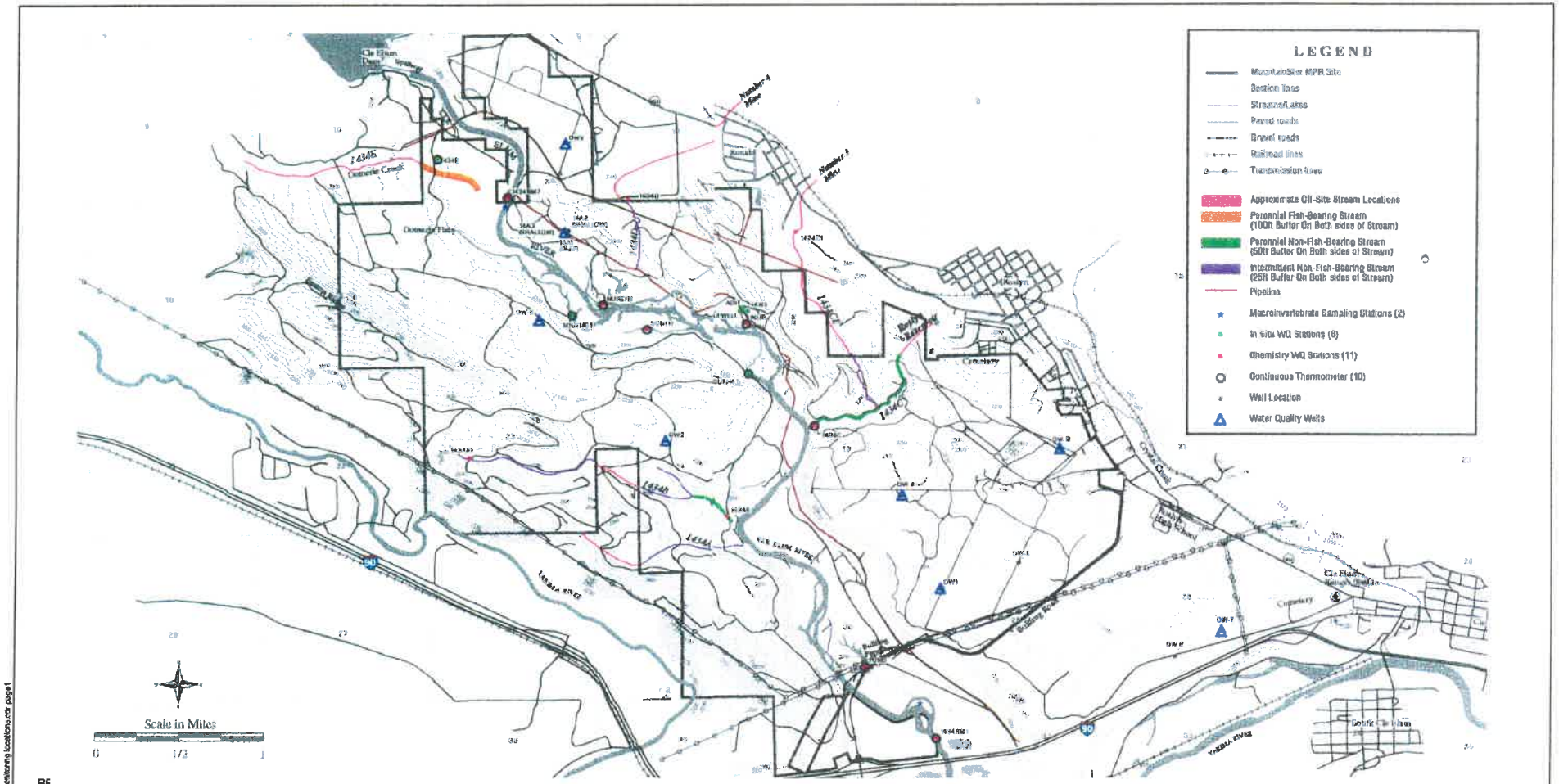
2.3 Groundwater Quality

Groundwater quality was described in the Draft EIS, and was based on results from four wells drilled (OW-7, OW-1, OW-4, and OW-9) for the MPR (Figure 2-1). Wells OW-9, OW-7 and OW-4 were sampled eight times between October 1998 and September 1999 (AESI 1999c). Well OW-1 was dry during five of the eight sampling events, therefore the water quality record is for three occasions (October and November 1998 and April 1999) (AESI 1999c).

2.4 Water Quality-Related Regulations

2.4.1 State Water Quality Standards

Surface waters in the State of Washington are regulated for quality by Chapter 173-201A WAC, administered through Ecology. These regulations classify surface waters into water quality categories, each with a defined range or maximum value for a variety of water quality constituents. The state water quality standards are intended to protect all beneficial uses of surface waters, including the protection of aquatic biota. As established above in Section 2.2,



Andy Kindig & Co.	***Water Quality Technical Report*** ***Cle Elum UGA FEIS***	***Figure 2-1*** ***Surface and Ground Water Quality Monitoring Station Locations***

surface waters near the site have a Class AA (extraordinary) and Class A (excellent) classification (Table 2-1).

2.4.2 Washington State Groundwater Standards (Ecology 1990, Chapter 173-200 WAC)

The goal of the Washington State groundwater quality standards is to protect groundwater quality and existing and future beneficial uses through an antidegradation policy (Chapter 173-200-030 WAC) and definition of maximum contaminant level (MCL) criteria (Table 2-2) (Chapter 173-200-040 WAC) (Ecology 1990). Existing water quality is to be protected and all contaminants proposed for entry to groundwater shall be provided with all known, available and reasonable methods of prevention, control and treatment prior to entry.

2.4.3 Washington State Drinking Water Standards (WDOH 1992, Chapter 246-290-300 WAC)

The purpose of drinking water regulations is to ensure health quality standards are maintained for public drinking water supplies. Drinking water standards established by the Washington Department of Health (WDOH) comply with the Federal Safe Drinking Water Act of 1974 and subsequent 1986 amendments (WDOH 1992, Chapter 246-290-300 WAC). The standards outline monitoring protocols and maximum contaminant levels (MCLs) for bacteriological, inorganic chemical and physical parameters, turbidity, trihalomethanes, pesticides, and volatile organic chemicals. The MCLs are divided into primary and secondary categories. Primary standards are based on chronic, non-acute, or acute human health effects. Secondary standards are based on factors other than human health effects. Groundwater standards and drinking water standards are similar, but not identical.

2.4.4 Section 303(d) Threatened and Impaired Water Bodies

Section 303(d) of the 1972 Federal Clean Water Act (CWA) requires states to identify and list threatened and impaired water bodies (Ecology 1998). The CWA requires the list to be updated and submitted for review and approval to the U.S. Environmental Protection Agency (EPA) every 2 years. The purpose of the listing is to identify segments where, with technology-based pollution control measures, the identified segments are not expected to meet the applicable standard(s) for the listed water quality parameter(s). The EPA allowed states to skip the year 2000 303(d) list due to the ongoing development of new federal rules affecting the listing process and the TMDL program. The next 2002 303(d) list is due in April of 2002. Under the amended CWA, the list is now required every 4 years instead of every 2 years.

The 1998 water quality limited list for Washington was approved by the EPA on January 28, 2000, and is the current active listing. The 1998 303(d) list includes the Cle Elum River as limited for temperature (Ecology 1998). The temperature listing was based on 26 excursions beyond the criterion from the mouth of the river up to Cle Elum Lake (segment WA-39-1050).

Table 2-2
Water Quality Standards for Groundwater in the State of Washington[1]

Contaminant	Maximum Contaminant Level (MCL) Criterion
Primary Contaminants	
Barium	1.0 mg/L
Cadmium	0.01 mg/L
Chromium	0.05 mg/L
Lead	0.05 mg/L
Mercury	0.002 mg/L
Selenium	0.01 mg/L
Silver	0.05 mg/L
Fluoride	4 mg/L
Nitrate-Nitrogen	10 mg/L
Total Coliform Bacteria	1/100 mL
Secondary Contaminants	
Copper	1.0 mg/L
Iron	0.30 mg/L
Manganese	0.05 mg/L
Zinc	5.0 mg/L
Chloride	250 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
pH	6.5-8.5 standard units
Color	15 color units
Radionuclides	
Gross Alpha Particle Activity	15 pico curie/L
Gross Beta Activity	50 pico curie/L

Source: Ecology 1990; Reference: Chapter 173-200-040 WAC.

[1] Partial listing of primary and secondary contaminants and radionuclide standard criteria. All heavy metal standard criteria are for total metals.

The 1998 303(d) list includes the Yakima River from RM 147 upstream to the Cle Elum River confluence at RM 185.6 for DDT, mercury, copper, cadmium, and the herbicide 4.4'-DDE (segment No. WA-39-1030). The Yakima River upstream of the site (segment WA-39-1060) is listed as limited for DO and temperature. The 1998 303(d) lists additional parameters for the Yakima River downstream of RM 147.

A TMDL for TSS and DDT was approved by the EPA for the Yakima River, segment WA-37-1010, on November 25, 1998. This water body segment extends from its mouth at the Columbia

River to RM 80.4, which is approximately 100 RM downstream from the UGA site. Ecology conducted a TMDL evaluation of the lower Yakima River basin in 1994 and 1995, in cooperation with the EPA and the Yakama Indian Nation. The TMDL evaluation focused on TSS and associated DDT loads from irrigated fields. Consequently, it is limited to the lower Yakima River basin during irrigation season. Turbidity targets for the mainstem Yakima and tributary sites are being instituted over an implementation schedule spanning 15 years (Joy 1997).

2.4.5 Washington State Water Quality Assessment 305(b) Report

Section 305(b) of the 1972 CWA requires all states to prepare biennial reports assessing the water quality of defined water bodies within the state. The 1998 report has been adopted, but the 1998 report is generic in scope with no specific water body information. Therefore, the 1994 list is used to characterize specific water bodies. The 1994 report prepared by Ecology addresses supported and impaired uses, sources, and causes of documented impairments of the Yakima River upstream and downstream of the project site (Ecology 1995). Yakima River supported uses upstream and downstream of the project include rearing, harvesting, and other fish spawning; salmonid spawning; and salmonid and other fish migration. Yakima River supported uses upstream of the project include primary and secondary contact recreation. Salmonid spawning is cited as impaired upstream and downstream of the project (Ecology 1995).

The Yakima River approximately 39 RM downstream of the site (water body segment No. WA-39-1030) is listed as impaired for rearing, harvesting, salmonid and other fish spawning, and migration. The source of this impairment is attributed to unspecified agriculture, irrigated crop production, unspecified hydro- or habitat-modification, and removal of riparian vegetation. Specific causes of the impairment are pesticides, priority organics, ammonia, pH, DO / organic enrichment, thermal modifications, and flow and habitat alterations (Ecology 1995).

2.4.6 Stormwater Management Manual for the Western Washington (Final Draft 2001 Ecology and the Puget Sound Water Quality Authority [Chapter 173-275-360 WAC])

Kittitas County has adopted the 1992 Ecology *Stormwater Management Manual for the Western Washington*, which lists the required stormwater management for drainage within the County (Ecology 1992). Trendwest will exceed that minimum requirement by complying with the standards detailed in the Final Draft 2001 Ecology Manual (Ridge Agreement, Section 1.9) (Ecology 2001c). The 2001c Ecology Manual specifies temporary erosion and sediment control (TESC) measures, storm drainage management (quantity and quality), and stormwater facility maintenance. The Ecology 2001c Manual has three water quality "Menus" describing treatment requirements for a variety of situations: the Basic, Enhanced, and Phosphorus Menus, each of which has options intended to provide equivalent removal of the pollution target(s) in Volume V. In addition, there is an Oil Control Menu for those projects deemed to require oil control.

2.4.7 Stormwater Runoff National Pollutant Discharge Elimination System (NPDES) Permit

For all new construction activity exceeding 5 acres in size, a Notice of Intent (NOI) must be filed for a National Pollutant Discharge Elimination System (NPDES) General Permit with Ecology for clearing, grading, and silt control. New legislation to be implemented by the EPA will require construction activities that disturb more than 1 acre to get a permit. Ecology expects to be issuing permits under the new rules by March 2003 (Austin, personal communication 2000). A public notice must be published at least once a week for 2 consecutive weeks in a newspaper that has general circulation in the county in which the site is located. The NOI must be received by Ecology prior to the publication of the public notices. Ecology will notify the applicant on coverage within 10 days of receiving a completed application; however, Ecology will not issue a permit until after the 30-day public comment period, which starts on the date of the last public notice publication.

Ecology may determine that an individual NPDES permit is required for the UGA site. An individual permit is written for a single facility and includes a description of the individual facility, its processes and discharge requirements in a fact sheet. This evaluation of the facility and legal requirements leads to a permit that specifies discharge treatment, monitoring, and reporting requirements tailored to an individual facility. Individual permits take a slightly longer time frame to issue than general permits because they assess the precise link between the discharge characteristics and permit requirements of the facility.

3.0 IMPACTS EVALUATION

3.1 Construction Impact Evaluation

Areas presenting risks of erosion and landslides exist within the UGA along the Cle Elum River, the West Ridge, Central Ridge, and East Ravine (Figures 1-2, 3-1, and 3-2). The area along the Cle Elum River contains low slopes ranging from 0 to 5 percent, but is determined to be at moderate to high risk for erosion because of the soils present and their location within the river floodplain (City of Cle Elum 2001). The Central Ridge contains soils with moderate erosion potential and slopes between 15 and 40 percent. The East Ravine is characterized by slopes between 15 and 40 percent and is considered to have a moderate to high risk erosion potential. The West Ridge contains slopes greater than 40 percent and is considered to have a high risk for both erosion and landslides.

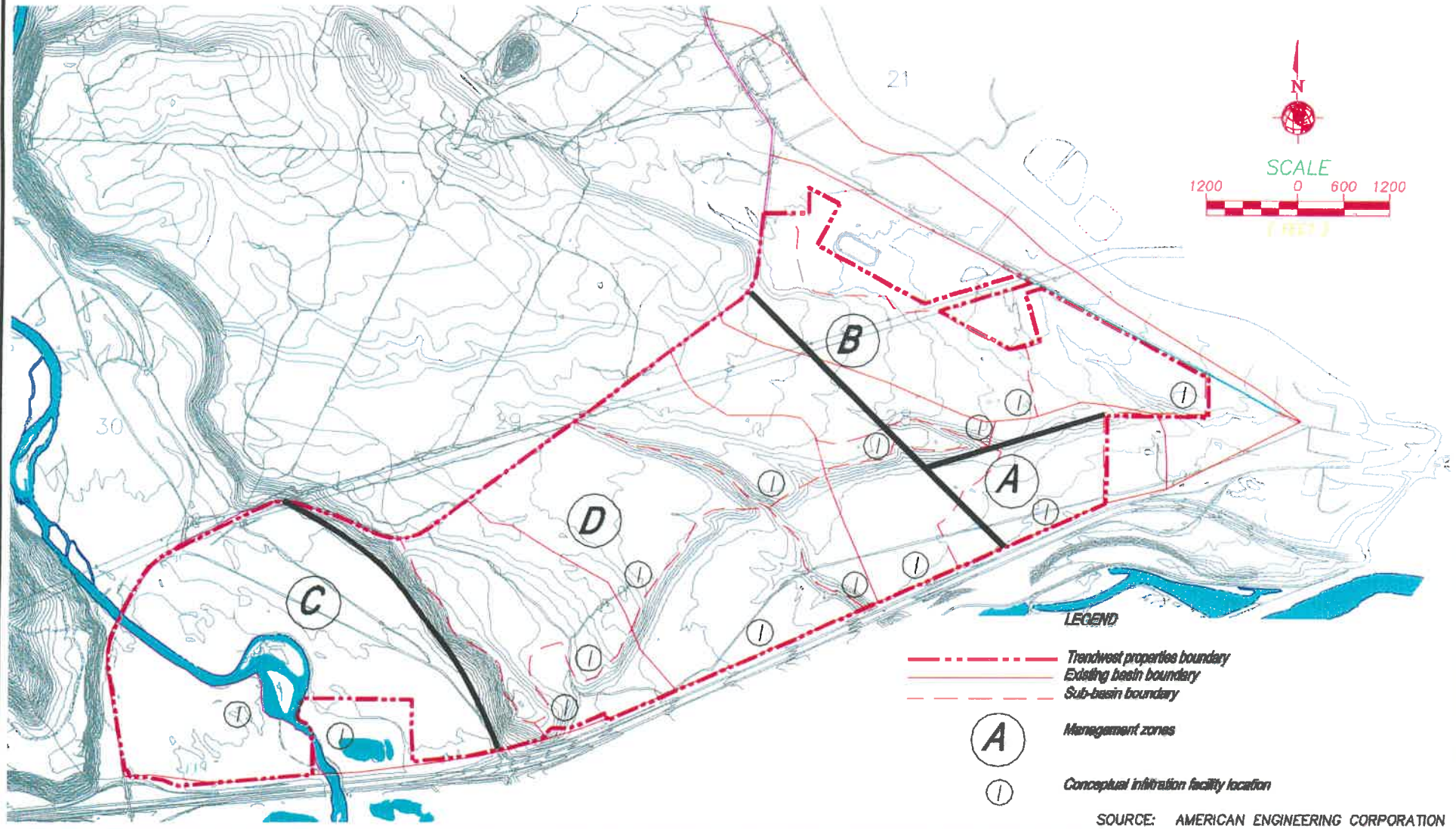
3.1.1 No Action Alternative

Since publication of the Draft EIS, approximately 23.0 acres within the Cle Elum UGA have been rezoned from Forest and Range 20 (20 acre lots) to Suburban 1 (one acre lots). The property is located north of Interstate 90 and east of Bullfrog Road, adjacent to the western boundary of Trendwest-owned property within the UGA. Kittitas County issued a SEPA Determination of Non-Significance (DNS) on the non-project action on October 10, 2001, with conditional language stating that any future development proposal would be subject to environmental review under SEPA at the time development was proposed. As such, potential impacts to water quality are addressed qualitatively in this EIS. Refer to Chapter 1, Summary of the Final EIS for additional description of the No Action Alternative.

Under the No Action Alternative, the rezone of 23 acres to 1 acre lots would increase the potential for water quality impacts to receiving waters during construction. These impacts are addressed in the context of cumulative impacts, in Section 3.1.4 of this report.

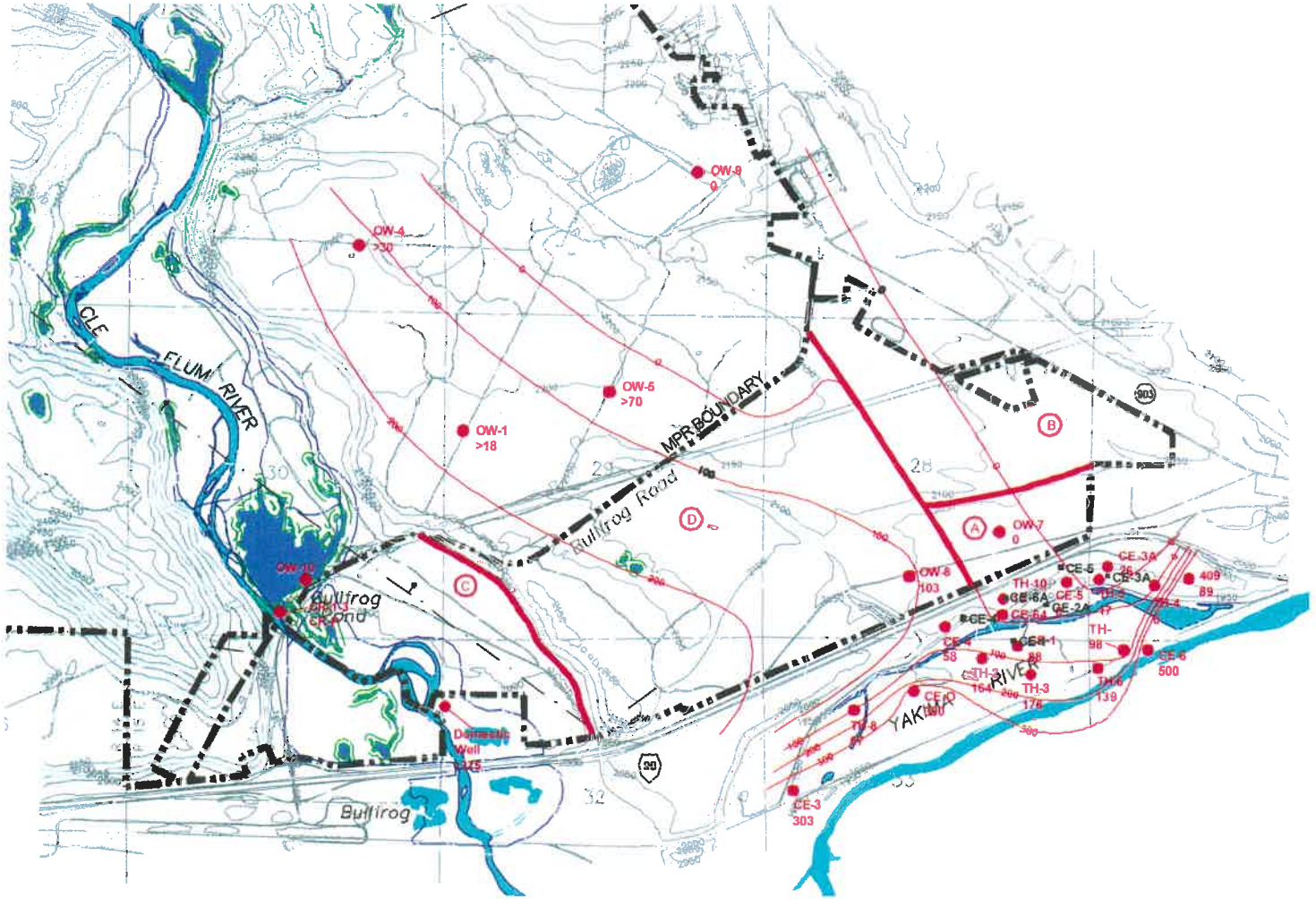
3.1.2 Alternative 5 Construction Impacts

The preferred Alternative 5 lowers construction risk by avoiding development near the Cle Elum River in the highest risk portion of the UGA. This area, labeled Management Zone C, is described in the section entitled "*Stormwater Management Zones*" below. This would reasonably be expected to prevent sediment introduction to the river as a result of clearing and grading. Alternative 5 also has a lower cut and fill quantity than Alternative 2 previously described in the Draft EIS (City of Cle Elum 2001). Infrastructure and building construction would expose erodible soils and could increase the rate of surface water runoff from storms as a result of exposure and compaction. Although nearly all of the site infiltrates without generating surface runoff under normal conditions at present, localized erosion from surface water flows could occur if TESC measures were not implemented, or if they were implemented but failed. Uncontrolled sediment release to on-site wetlands could decrease water quality as well as fill localized portions of the wetlands if water is channelized and contains silts and sands. Risk of



A.C. Kindig & Co.	Water Quality Technical Report Cle Elum UGA FEIS	Figure 3-1 Slope Map

H-01



LEGEND

CE-1 ■ Cle Elum Hatchery production well

(A) Aquifer Susceptibility Zone

The following table lists the susceptibility (low, moderate, high) for transport of contaminants to the shallow and deep aquifer.

Aquifer Susceptibility Zones

Zone	Shallow Aquifer	Deep Aquifer
A	High	High
B	Moderate to High	Moderate to High
C	High	Low
D	Low to Moderate	Low

N

0 900 1800
FEET

REFERENCE: W&H PACIFIC.

A.C. Kindig & Co.	Water Quality Technical Report Cle Elum UGA FEIS	Figure 3-2 Management Zones, Aquifer Susceptibility

these impacts would be increased during construction in the wet season when it was warm enough to rain (October through March) because of the increased difficulty in preventing erosion when saturated or frozen soils are exposed during warmer stormy weather; however, rare summer storms could also have the same result. Minor turbidity and minor sediment-related impacts to wetlands are generally not severe and long-lasting, since wetlands are naturally deposition environments. However, short-term water quality impairment and resulting habitat degradation could occur if inputs were sustained. Short-term water quality impacts to wetlands could include increases in turbidity, suspended and settleable solids, and phosphorus loading from eroded soils.

The use of heavy equipment during construction requires fueling and often limited storage of petroleum hydrocarbon products, which creates a risk of accidental spills of petroleum hydrocarbons. Unintended release of fuels, oil, or hydraulic fluid could contaminate soils and, if unintended or uncontrolled, migrate to groundwater or into surface water resources. Such water quality impacts, although locally severe, can typically be prevented with adequate construction site control measures and spill response planning required by the NPDES permit for construction discharge.

3.1.3 Alternative 5 Construction Mitigation

To avoid construction impacts, a Stormwater Pollution Prevention Plan would be prepared that employs applicable portions of Volume II of Ecology's (2001c) *Stormwater Management Manual for the Western Washington*. The manual includes Best Management Practices (BMPs) for control of sediments and construction waste during construction. Measures include required and recommended BMPs for control of sediment and for controlling pollutants other than sediment from construction sites. The proposed TESC measures were described in the UGA Draft EIS (City of Cle Elum 2001).

3.1.4 Cumulative Construction Impacts with the MPR and the Peare-O'Rourke Property

MPR and UGA cumulative impacts during construction were previously analyzed in the MPR DEIS and in the Draft EIS. Cumulative impacts on water quality as a result of construction within the UGA in conjunction with the MPR are not anticipated because nearly all water would be infiltrated, with very little potential for surface discharge reaching the Cle Elum River. The UGA would have little construction in the vicinity of the Cle Elum River under Alternative 2 previously described in the Draft EIS, or no construction in the vicinity of the river under Alternative 5. Most of the UGA property extends well to the northeast of the Cle Elum River, with little to no potential for construction impact to the river corridor. Cumulative impacts during construction would take two forms. With regard to individual wetlands or side-channels, there would be little to no potential for cumulative impacts because of the distance between the MPR and the UGA. Overland runoff would not extend from one site to the other. The Cle Elum corridor has been preserved as undeveloped open area for the MPR, which greatly reduced the risk of sediment delivery to the Cle Elum River (AESI 1999a). If any sediment was introduced to the Cle Elum River at the MPR site it would not reasonably be expected to have any impact on

the quality of water downstream at the UGA site. With regard to the Cle Elum River and the Yakima River downstream, the amount of released sediments that could reasonably be expected would be unlikely to have a combined effect measurably different from either action alone, due to: (1) the high hydraulic energy flushing small particles through the river system and (2) high-flow rates in the Cle Elum River system during most of the active construction season rendering introduced fines to immeasurable levels over background (AESI 1999a). The risk of accidental spills during construction might increase on a per-incident basis. However, individual spills, once contained in accordance with TESC requirements, would have no potential to combine to create greater impact, even if they were to occur at the same time. Therefore, no adverse cumulative impacts are reasonably expected from the MPR and UGA properties during construction if TESC plans are written and implemented as required under the separate NPDES permits for these two projects.

The property zoned Suburban is located in the Cle Elum River corridor area of the UGA that is geologically and proximally determined to be at highest risk among all the areas within the MPR and UGA study areas (see Section 3.2.3). The risk for construction-related impacts on this property is higher because it is located where the Cle Elum River is in direct continuity with an underlying shallow alluvial aquifer. In general, if construction on the Suburban zoned property occurred concurrently with that of the proposed development under Alternative 5 and the MPR, potential cumulative construction-related water quality impacts to the Cle Elum River would increase above those described for the MPR and Alternative 5 of the UGA alone.

Clearing, grading, and construction of residential and supporting infrastructure (access roadway and utilities) could potentially deliver fine sediments, accidental spills of petroleum products, or construction waste such as concrete leachate to the river via the underlying alluvial aquifer. Short term impacts would likely be localized, but could include increased turbidity or direct localized toxicity to aquatic organisms from accidental spills or releases of fuels, hydraulic fluids, or concrete wash water or leachate. The proposed rezone would be responsible for acquiring the necessary NPDES permit(s) for construction, if such were required. Through February of 2003, construction of property under single ownership and less than 5 acres in size would not require an NPDES permit from Ecology. After March of 2003, that size exemption is expected to be reduced to less than 1 acre. If required, the NPDES permits would include provisions for stormwater pollution prevention plans. If NPDES permits are not required due to the size exemption, which could occur if individual lots were sold to builders prior to construction, then building and grading permits would be required from Kittitas County. Erosion control and spill prevention measures for construction for the Suburban 1 zoned property, the UGA, and the MPR, could and would be implemented independently; no regional construction measures or runoff control measures are anticipated practical or necessary for all three areas combined.

3.1.5 Unavoidable Adverse Impacts

Isolated and localized releases of turbid water could occur to on-site wetlands or to the Cle Elum River under Alternative 5 if the TESC measures failed or were inadequately maintained.

Impacts to water quality or wetlands, if any, would be expected to be short-term with no broad or cumulative effects. Isolated spills of petroleum products could occur from construction equipment. These spills would be toxic if released to surface water and could contaminate shallow groundwater on a localized basis if uncontrolled. Accidental spill plans could adequately provide for containment and cleanup within constructed areas of the preferred Alternative 5, which are outside of the alluvial floodplain. Thus, no large-scale or long-term impacts are reasonably expected to occur away from the floodplain. No construction would occur within the floodplain.

3.2 Developed Water Quality Impact Evaluation

3.2.1 No Action Alternative

Direct operation impacts under the No Action Alternative were discussed in Section 3.3 of the Draft EIS. As described above under Construction Impacts, 23 acres of the UGA have been rezoned from Forest and Range 20 to Suburban 1, since publication of the Draft EIS. Potential operational impacts from development of this property, in combination with impacts from development of the Trendwest MPR and UGA properties, is provided in Section 3.3.4 of this report.

3.2.2 Alternative 5: Stormwater Contaminants

Metals

Roadways are a source of inorganic and organic materials that run off during storms. Roadways can contribute an array of pollutants to surface and groundwater resources (Maestri et al. 1988). Roadway runoff contains heavy metals, rubber, polycyclic aromatic hydrocarbons (PAHs), petroleum products, and solid materials. Stormwater washes these contaminants from roadways and deposits them downslope. The concentrations of these pollutants are highly variable by site, and are affected by numerous factors such as traffic characteristics, climate, maintenance, and adjacent land use (Maestri et al. 1988).

Lead was historically present in roadway runoff at higher concentrations than any other priority pollutant (Municipality of Metropolitan Seattle ([Metro] 1982), although it has declined considerably in the environment since its removal as a gasoline fuel additive. More recent data for developed runoff has shown a dramatic decline in metals and other automotive pollutants due to automotive emission controls and catalytic converters (CH2M Hill 1992). Lead in stormwater runoff originating from streets is associated with solid material; dissolved lead in storm runoff comprised less than 10 percent of the total lead found in runoff (Metro 1982).

The primary source of roadway copper is wear from vehicle parts, such as brakes, alternators, and radiators. Low concentrations of the cupric ion of copper are extremely toxic to phytoplankton (Metro 1982).

Tire rubber is the source of cadmium on roadways. Cadmium is less affected by sorption than other trace metals (Metro 1982). Salmonids are extremely sensitive to waterborne cadmium ions (Metro 1982).

Zinc is an abundant trace mineral that occurs naturally in water bodies. Studies of lakes adjacent to roadways show increases in zinc concentrations in lake sediments (Gjessing et al. 1984). Zinc is not considered a carcinogenic metal and federal agencies have no specified health limits for zinc. However, Washington State water quality standards for zinc do exist.

Street dust collects fuel combustion byproducts. Tire and mechanical wear are also concentrated in street dust and urban soils. Metro (1982) found all priority pollutant metals except selenium in street dust samples. Also, Metro (1982) determined that the six metals found in highest concentration in street dust also appeared in highest concentration in stormwater runoff from the same areas.

Oil and Grease, and Total Petroleum Hydrocarbons (TPH)

Oil and grease and total petroleum hydrocarbons (TPH) result from spills, leaks, antifreeze, hydraulic fluids, and asphalt leachate (Washington State Department of Transportation [WSDOT] 1997). Oil and grease have poor solubility in water and are hydrophobic, which means they readily separate from the aqueous phase and adhere to solid surfaces. Appreciable amounts of oil and grease can remain dispersed in water in emulsified form. The hydrophobic nature of these compounds is the basis for BMPs to remove them from stormwater. Supplying a large surface contact area (such as grasses in biofiltration or emergent vegetation in shallow ponds) allows the oil and grease and TPH to adhere to emergent surfaces, where they are degraded by microbial digestion, sunlight (photochemical degradation), and volatilization. TPH is a subset of oil and grease derived solely from petroleum products. TPH is more volatile than oil and grease; therefore it has at least equivalent and usually greater removal rates than oil and grease in stormwater facilities.

Suspended Solids

Sediment is comprised of inorganic and organic material and can be transported by, suspended in, or deposited by stormwater. Suspended sediment is generally considered to be one of the most substantial non-point source contaminants (Waters 1995, Crawford and Mansue 1996). Many contaminants including some metal ions, organic chemicals, and phosphorus bind to and are transported by fine sediments (Waters 1995, Simmons 1993).

Nutrients

Nitrogen and phosphorus occur in stormwater runoff from roadways, from fertilizers used in residential lawns and landscaping, and from sediment erosion. Phosphorus also originates from detergents used to wash cars or home exteriors. Phosphorus readily binds to sediments.

Consequently, if particulate settling is provided, much of the phosphorus can be settled out of the water bound to finer sediments.

Fecal Coliforms, Biochemical Oxygen Demand (BOD), and Temperature

Increased fecal coliforms are a generalized result of development related to residential and land use density. The construction of impervious surfaces collects organics from pet and wildlife waste that are then available to be washed off during storms. Fecal bacteria densities have been shown to be related to housing density, percent impervious surface, and domestic animal density (Young and Thackston 1999). Generally, stormwater runoff from residential and urban development carries a low biochemical oxygen demand (BOD) concentration, unlike runoff from agricultural areas with significant livestock use. Urban runoff can influence stream temperatures during summer storms because of the warmer impervious surfaces, reduced tree cover, and use of ponds to remove contaminants and/or detain flows. However, most storm runoff events and the vast majority of runoff volume occur during the cooler weather seasons, and stormwater on the UGA would be infiltrated, eliminating concern for temperature impacts.

3.2.3 Stormwater Management for Alternative 5

Stormwater Facilities Changes

Stormwater facilities for the UGA were previously described in Section 3.3 of the Draft EIS and in the MDP (AEC 1999). Since the Draft EIS was published, the proposal for water quality treatment of stormwater runoff has been modified, in most cases increasing treatment prior to infiltration. For this purpose, and publication of the Draft EIS, the UGA site was subdivided into stormwater management zones based on underlying geology and groundwater flow paths. Treatment is now proposed in accordance with the water quality risk in each zone (flow route, infiltration soil type, groundwater receptors, and receptor proximity). The project has also incorporated provisions of the 2001 Department of Ecology Stormwater Management Manual (Ecology 2001c) produced since Draft EIS publication, which has altered treatment requirements. The facilities proposed at the time of the Draft EIS are summarized below, along with the basis for the change in treatments proposed in the Final EIS (Table 3-1).

Stormwater Management Zones

The proposed UGA site is divided into four water quality management zones named A, B, C, and D, largely as a result of underlying geology and the groundwater flow patterns (AESI 2001) (Figure 3-2). The Cle Elum River lies to the west of the UGA, and is in direct continuity with a shallow aquifer in alluvial soils immediately adjacent to the river. The portion of the site overlying these alluvial deposits is Management Zone C. Underneath the shallow alluvial aquifer, the Cle Elum River, and the main central portion of the UGA site, there is an aquitard approximately 200 feet or more in depth that is formed of silt and clay lacustrine deposits. This aquitard protects the underlying deep aquifer from land surface influences. The main central portion of the UGA site is Management Zone D, which has outwash soils at the surface. Till

soils occur over the outwash on the highest elevations of Management Zone D to the north, nearest Bullfrog Road. The outwash supports a shallow aquifer, which again is separated from the deep aquifer by the same very deep lacustrine aquitard as occurs under Management Zone C.

Table 3-1
Changes to the Draft EIS Stormwater Treatment Proposal for the Cle Elum UGA

DEIS and MDP Treatment Category	Land Uses Served	Treatment Proposed in DEIS	Basis for Treatment Changes Incorporated in this FEIS Supplemental Report
Level I	Roof, Golf	Natural Infiltration *(No golf is proposed under Alternative 5)*	1. "Basic Treatment Menu" options from the 2001 Department of Ecology Stormwater Management Manual (for all land uses) in the lower risk Management Zones (Zones C and D as described below). These facility options are intended for projects that discharge to the ground. (Note: no development is proposed in Zone C under Alternative 5.) 2. "Enhanced Treatment Menu" options from the 2001 Department of Ecology Stormwater Management Manual (for all land uses) in the higher risk Management Zones (Zones A and B as described below). These facility options are intended for projects that discharge to waters tributary to fish-bearing streams. Although Management Zones A and B would discharge to the ground and the groundwater path is proximate to the drawdown Yakama Hatchery wells. Thus, these areas are proposed for a higher level of treatment where development is proposed.
Level II	Residential Driveways	Filter Strip Treatment and Natural Infiltration	
Level III	Roadways	Filter Strip Treatment and Natural Infiltration	
Level IV	Parking Lots, High Density	Bioswale Treatment and Natural Infiltration	

Further east, under Management Zones A and B, the surface soils are the same as for Management Zone D. However, Zones A and B are distinguished from D because the thick lacustrine aquitard is absent. Thus, the deep aquifer is more vulnerable to surface activity. Zone A is more proximate to the Yakima River, and thus the Yakama Hatchery intake wells, than Zone B, which is why they were separately distinguished.

In summary:

- Management Zone A is characterized as having a high risk for transport of contaminants to the underlying deep aquifer and thus to the Yakama Hatchery wells, due to proximity and the lack of an intervening aquitard;

- Management Zone B is characterized as having a high to moderate risk for transport of contaminants to the underlying deep aquifer; the geology is the same as Management Zone A, but B is more distant from the Yakama Hatchery wells;

- Management Zone D is characterized as having a low to moderate risk to the shallow aquifer due to soils and a very low risk to the deeper aquifer due to an intervening aquitard; and

- Management Zone C is characterized as having a high risk to the shallow alluvial aquifer and the Cle Elum River in direct continuity, but a very low risk to the deeper aquifer.

There is approximately 1.4 acres of an existing gravel roadway in Management Zone C, but no development is proposed by Trendwest in Management Zone C under Alternative 5. Zone C is not discussed further in this section, because the preferred Alternative 5 would have no direct influence on groundwater quality from this zone.

Stormwater Facilities Proposed

Treatment of Management Zone D runoff would meet the Ecology Manual requirements for a site proposing to infiltrate stormwater more than _ mile from a fish-bearing stream, a tributary to a fish-bearing stream, or a lake (Ecology 2001c). This basic level of treatment would be provided prior to infiltration in Zone D, which can be satisfied by biofiltration swales, filter strips, basic wet ponds, wet vaults, stormwater wetlands, combined detention and wet ponds, or sand filters. Stormwater wetlands are recommended, and for the purpose of this analysis are assumed to be the treatment facility type employed. Roof runoff is not considered to be pollution generating by the Ecology manual and could be infiltrated directly.

Zones A and B have less natural filtration afforded by the underlying sediments. Runoff from Zones A and B under the preferred Alternative 5 would have enhanced treatment to further reduce dissolved metals and other contaminants prior to infiltration. This proposed level of treatment would exceed the Ecology Manual requirements for water quality treatment (Ecology 2001c). The "Enhanced Treatment Menu" (Volume V) in the Ecology Manual incorporates two-facility treatment "trains" for enhanced dissolved metals removal. The "Enhanced Treatment Menu" provides a variety of facilities to satisfy this objective. The treatment facility could be any of the following:

- A biofiltration swale followed by a sand filter or media filter;
- A filter strip followed by a sand filter (or in reversed order);
- A basic wet pond followed by a sand filter or media filter;
- A wet vault followed by a sand filter or media filter;
- A basic combined detention and wet pond followed by a sand filter or a media filter; or a
- A presettling or detention basin, sand filter, and media filter in that sequence.

A treatment train consisting of a wet pond followed by a basic sand filter is recommended and for the purpose of this analysis was evaluated for all runoff from Management Zones A and B.

Non-Point Source Controls Proposed

The following non-point source are proposed under Alternative 5:

- Residential Landscaping: Residential owners would be provided with educational literature on means to reduce or eliminate landscape chemical use and encourage use of adapted landscaping plants.

- Non-Residential Landscaping: Common landscaping emphasizing native or adapted vegetation would be used in public areas to the extent feasible, and encouraged in private areas (for example business parks, multi-family landscaping).

- Residential and Commercial Structures: External unsealed copper ornamentation and the use of exposed galvanized metals would be prohibited (except where the latter may be required by City codes for construction of utilities).

Enhanced Treatment Facilities

Wet ponds followed by sand filters were analyzed for the enhanced treatment proposed for all runoff infiltrated in Management Zones A and B. Each portion of this dual facility is described separately below, followed by expectations for its combined function.

Wet Ponds

Wet ponds (or combined wet detention ponds) maintain a dead storage volume of water that removes dissolved phosphorus and nitrogen by settling of fine particles, nutrient uptake by algae and fringing vegetation, denitrification, microbial degradation of organics, and sequestering of phosphorus and metals in the sediments (Nussbaum 1990). The dead storage volume also dilutes the first portion of stormwater inflow with the higher quality residual water since the previous storm. Quiescent, or between-storm settling of particulates and attached contaminants, is very effective if the time between storms is a period of days. However, most runoff volume is treated under dynamic conditions during storms while pond inflow and outflow is occurring. Overall performance in removing particulates and the dissolved constituents that they attract and bind is a function of hydraulic residence time and dissipation of hydraulic energy, which relates to the amount of time slowly settling small particles will have to settle below the dead water storage at the pond's bottom. Time between storms is the largest factor in residence time, given the fixed wet pond sizing criteria in the Ecology Manual. The size, shape, and dead water depth in wet ponds are designed to dissipate hydraulic energy of water passing through the pond to promote settling of particulates, as well as prevent re-suspension of settled material. Efficiency for fine particle removal measured as the percentage of outflow over inflow concentrations is extremely variable from start to finish of a given storm and from storm to storm depending upon the runoff

hydrographs, and upon the inflow concentrations of stormwater constituents. Thus, stormwater facility functions are presented in the literature as averaged percent removal efficiencies for individual contaminants (Table 3-2).

Table 3-2
Wet Pond Contaminant Removal Efficiencies (%) Reported in the Literature

Reference	TSS	TP	NH3-N	NO3-N	Pb	Zn	Cu	FC	Oil and Grease
U.S. EPA 1993	80	65			75	60			
City of Austin 1990	46	37		36	40-60	40-60	40-60	20-40	
Martin 1989a	66	50	55		42	50			
King County 1995	50-90	50	72	67	25-80	30			
Urbonas 1994	90	40			10-95	0-70			
Schueler et al. 1991	50-90	50			40-60	40-60	40-60		
Brown and Schueler 1997	77	47		24	73	51	57	65	83
Shapiro 1998 (wet vault) [1]	50	20	14	-11	41	48	39		
Wanielista 1988					37	50	49		
Yousef and Wanielista 1985						47-97	47-97		
Average	68	48	64	42	52	50	52	47	83
Wet Pond Standard Values Used in this Analysis	80	45	65	40	50	50	50	45	75

[1] Wet vault performance for Lakemont facilities in Bellevue, Washington; water passing through the vault only. A wet vault is a subterranean chamber sized to contain a typical wet pond's volume, but lacks sunlight. Therefore, vaults lack biological uptake performance capability, which reduces nutrient removal performance, especially nitrogen. For that reason, nutrient removal rates for the wet vault were removed from averaging.

Sand Filters

Water quality enhancement in sand filters accrues from filtration, which removes particulates and associated contaminants; adherence (known as sorption) of contaminants to sand particles within the filter; and mineralization, the binding and immobilization of phosphorus to aluminum or iron in sand (Table 3-3). Turf-capped sand filters reduce clogging because the grass roots facilitate water flow in the sand matrix while the turf traps fines. This occurs even where the grass is dormant. Turf covers on sand filters also simplify and improve by improving the accuracy of the visual inspections. Lab tests evaluated the clogging potential of sand filters by applying a one time exposure of 2,000 to 3,500 NTU (AESI unpublished data [1998]). Turbidities this high are essentially silt slurry in excess of any possible developed runoff condition. All of the sand filters tested were clogged to 10 percent of their initial hydraulic conductivity by this treatment. Turf-covered sand filters recovered to 50 percent within a month, whereas the no-turf control remained at about 10 to 25 percent of its original hydraulic conductivity.

Table 3-3
Standard Sand Filter Removal Efficiencies (%) Reported in the Literature

Reference	TSS	TP	NH3-N	Pb	Zn	Cu	Coliform Bacteria
City of Austin (1990)	87	60	76	80	80	59	36
King County (1998)	80	<50					
Shapiro (1998) [1]	93	68	47	61	91	53	
Urbonas (1999) [2]	80-94	50-75			80-90	20-40	
AESI (unpublished 1998) [3]	75	35			77		
AESI (1999b) [4]	80	65	45	60	80	50	35
Values Used in this Analysis	85	65	45	60	80	50	35

[1] Data for water passing through the sand filter after wet vault treatment, data from 1996-1997.
[2] Most common data range for field measured performance ranges.
[3] Data from Trossachs plot Tract R sand filter with grass turf cover, January 1998. Outlet TP concentrations were very low, ranging from 0.008 mg/L to 0.030 mg/L.
[4] Data from Trossachs plat Tract R sand filter with grass turf cover, performance monitoring from January 15 through February 25, 1999. Mean TP inflow was 0.064 mg/L and mean (AESI 1998).

Combined Wet Pond and Sand Filter Performance

To evaluate the combined facilities, performance calculated from independent studies on sand filters and wet ponds was compared to field measures from a combined wet vault and sand filter in Lakemont, Washington. This system is a regional facility that serves a mixed use suburban development in the Puget Sound lowlands, and has 3 years of flow-proportionate field data.

For the calculated efficiency, contaminant removal efficiency of the second facility (the sand filter) was reduced by 25 percent to forecast the combined efficiency of the two-facility system. These values are shown in the first column in Table 3-4. This reduction is meant to account for the drop in removal efficiency that typically occurs in the second facility, because inflow concentrations are lower as a result of treatment in the first facility. For the wet pond plus sand filter combination proposed in Management Zones A and B, the combined efficiency calculations for wet ponds and sand filter performance in tandem were compared to 3 years of measured data from the Lakemont, Washington wet vault plus sand filter system (Shapiro 1998). The calculation method for combined facilities was reasonably accurate for most parameters, but underestimated heavy metals removal by approximately the 25 percent reduction factor applied to the sand filter efficiency (Table 3-4). Without that factor included, the calculated value was very close to the performance measured for the combined Lakemont facility. Nitrate-nitrogen and ammonia-nitrogen removals for the wet vault are lower in the Lakemont data because wet vaults do not allow for sunlight, and therefore afford little opportunity for biological uptake as compared to a wet pond (note: phosphorus is removed via sorption to and settling of particles even in a wet vault). The Lakemont data were not used to estimate nitrogen removal, but were weighted heavily for the remaining parameters since they provided field flow-proportionate data collected over 3 years. The efficiency values in this analysis are shown in Table 3-4.

Table 3-4
Comparison of Calculated Wet Pond Plus Sand Filter Combined Efficiencies

Parameter	Calculated Efficiency (%) [1]	Lakemont (wet vault) Combined Efficiency (%) [2]	Efficiency used in this Analysis for Combined Facilities (%)
Total copper	60	71	70
Total zinc	78	95	95
Total lead	67	77	75
Ammonia-nitrogen	67	54	67
Nitrate-nitrogen	52	6	52
Total phosphorus	69	75	75
Turbidity [3]	85	Not measured	85
Total suspended solids	92	96	95
Fecal coliforms	45	Not measured	45
Oil and grease [4]	75	Not measured	75

[1] Standard wet pond plus sand filter series, the latter discounted 25 percent. Facility efficiencies for wet pond and sand filter from Tables 3-1 and 3-2.
[2] Data for combined wet vault and sand filter at Lakemont, for the treated volume only (Shapiro 1998).
[3] Turbidity estimated at slightly less than TSS removal.
[4] Includes oil/water separator function in addition to wet pond and sand filter.

Stormwater Wetlands (Management Zone D)

Water purification in wetlands occurs through activity in their four principal components: vegetation; water column; substrates; and microbial populations (Hammer 1996). Stormwater wetlands have potential to function better than wet ponds, because pollutant removal is enhanced by a much greater level of microbial uptake and degradation as a result of the association between microbial growth and aquatic vegetation; by pollutant removal through binding to humic and organic acids; and by the sediment-water interface that these systems promote. The large areas providing contaminant-binding sites on sediments and plant structures, and the oxygenated/low oxygenated interface typically present at shallow depths in wetland soils, contribute to the biochemical transformation and immobilization of heavy metals, removal of nitrogen, and the decomposition of organic compounds (James 1995, Reuter et al. 1992, Hammer 1996). The wetland plants themselves also play a role in pollutant removal, although that function is highly variable between species. Roots and rhizomes of aquatic plants have been shown to accumulate metals to a greater degree than in the leafy structures, and plants such as rushes show a particularly good ability to take up organic contaminants, such as oils (Kulzer 1990). Most importantly, decomposing biomass provides a readily available source of organic carbon with a large surface area that sustains microbial populations. Microbial bacteria degrade organics and consume nutrients. Stormwater wetland performance expectations for the proposed system are summarized in Table 3-5.

The stormwater wetlands would be constructed per requirements of BMP T10.30 in the 2001 Ecology Manual (Ecology 2001c).

Table 3-5
Stormwater Wetland Removal Efficiencies (%) Reported in the Literature

Reference	TSS	TP	NH3-N	NO3-N	Pb	Zn	Cu	FC	Oil and Grease
Reed et al. 1981 Hickok et al. 1980 Lynard et al. 1980 Chan et al. 1982 ABAG et al. 1986 [1]	64	99			31-96	31-96	31-96		
Martin 1989b [2]	66	19	54-60	13-30	54*	75*			
Martin 1989b (pond and wetland)	88	41	0-61	30-43	70*	65*			
Field et al., 1993 [3]	54-84	25-40		-27-20	-16-50	47-55			
Schueler 1994 [4]	78	51		67	63	54	39	77	90
Reinelt and Horner, 1995 [5]	13.6	8				31		49	
Reinelt and Horner 1995	57	82				23		29	
Scholes et al. 1999 [6]	24				62	55			
Average Removal Efficiency	53	48	45	30	54	52	40	52	90

* Dissolved metals

[1] Literature review of stormwater treatment in artificial wetlands (Stockdale 1991).

[2] Detention pond and wetland system in Orlando, Florida. The system receives runoff from a 41.6-acre basin. The surface area of the permanent pool in the detention pond is 8,600 ft^2 and the wetlands cover an area of about 32,000 ft^2 and range in depth from 0 to 5 feet.

[3] A vegetative buffer strip with a length between 21 and 45 meters. The grass type is Kentucky 31 covering an area of 3,770 m^2 as part of a level spreader and buffer strip system.

[4] Median pollutant removal efficiencies for wetlands (Center for Watershed Protection 1999).

[5] Two freshwater wetlands Bellevue 3I (B3I) and Patterson Creek 12 (PC12) located in Bellevue, Washington. Wetland B3I is 2 ha in size and a drainage area of 187 ha. The storage volume is 400 to 5,000 m^3 and a residence time of 3.3 hours. Wetland PC12 is 1.5 ha in size and has a drainage area of 87 ha. The storage volume is 600 to 7,000 m^3 and has an average residence time of 20 hours.

[6] Brentwood wetland is a constructed wetland with a surface area of 360 m^2 and was sampled over 2 years. The average residence time for water in the wetland is 50 minutes.

Stormwater Facility Maintenance

To be effective, water quality facilities must be maintained. The 2001 Ecology Manual (Ecology 2001c) lists maintenance requirements for each BMP facility type in Volume V. Wet pond maintenance is described on page 10-12 (BMP T10.10). Pond maintenance measures include inspection and control of erosion on side slopes, removal of debris, maintenance of the spillway, and cleanout of sediments in the forebay.

Sand filter maintenance criteria is on page 8-22 in Volume V of the 2001 Ecology Manual (Ecology 2001c), and these measures would be employed on the Cle Elum UGA. Turf-covered sand filters maintain approximately 25 percent of their initial hydraulic conductivity even under adversely silty conditions, the 25 percent capacity equals 4 inches per hour, or four times the approximate rate at which sand filter design standards assume maintenance is required. Maintenance intervals for sand filters can be extended for many years with turf caps, and the maintenance can be conducted as needed. Inspection at any time of the year will show where the grass will not grow because of clogging. If the inspection warrants, the affected grass area would be replaced, instead of the wholesale sand bed replacement that would be required with a

sand filter lacking a turf cover. Thus, capping sand filters with turf is highly recommended for maintenance purposes.

Stormwater wetland maintenance requirements are the same as for conventional wet ponds in the 2001 Ecology Manual (Ecology 2001c).

3.2.4 Alternative 5 Stormwater Quality Analysis Methods

Stormwater quality was forecast for each of the management zones (A, B and D) that would contain development under preferred Alternative 5. The catchments making up each water quality management zone are described in Table 3-6 (Figure 3-3).

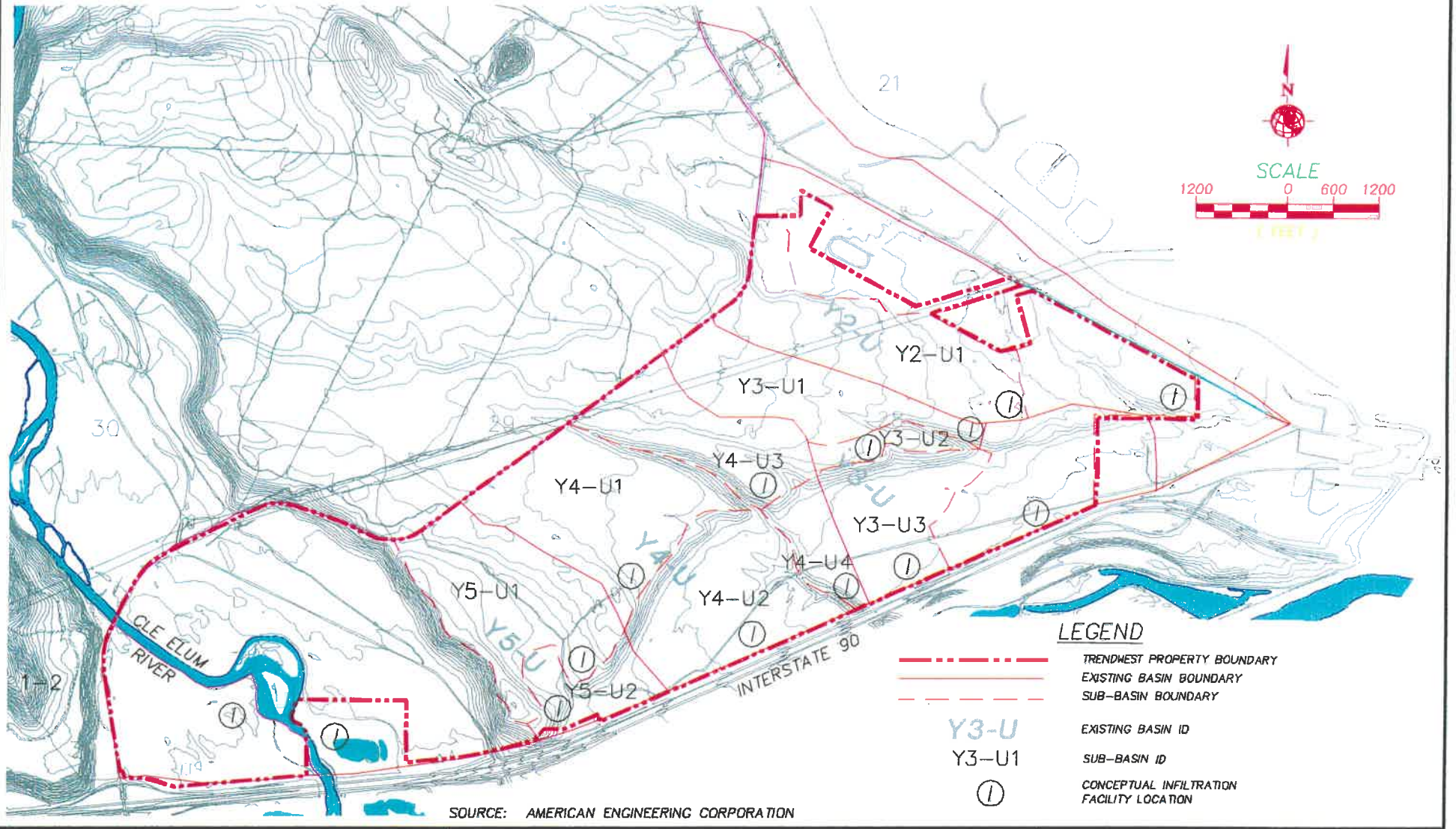
Table 3-6
Catchments Breakdown within the Four Water Quality Management Zones

Water Quality Management Zone	Catchments
A	Y3-U3
B	Y2-U1, Y2-U2, Y3-U1, and Y3-U2
D	Y4-U1, Y4-U2, Y4-U3, Y4-U4, Y5-U1, and Y5-U2

Untreated stormwater quality was forecast by dividing the site into land use categories, and using literature-based data for each category (Table 3-7).

Table 3-7
Untreated Water Quality References for Each Land Use Category

Land Use Category	References
Single-Family Residential *Alternative 5 proposes densities ranging from 2 to 7 DU/acre*	Single-family untreated runoff quality was forecast using residential runoff literature data from housing densities in the approximate range of 4 to 7 DU/acre, including associated roadways and plat infrastructure: AESI 1999b, King County 1995 and 1997, Shapiro and Associates 1998
Multi-Family Residential *Alternative 5 proposes densities ranging from 8 to 15 DU/acre*	Multi-family untreated runoff quality was forecast using runoff literature data for densities ranging from 10 to 14 DU/ac: City of Austin 1990, AESI 1999b, and City of Bellevue 1995
Commercial	Commercial land use untreated runoff quality was forecast using commercial and office park runoff literature data: Booth et al. 1997, City of Bellevue 1995, King County 1993, and Copp et al. 1997



A.C. Kindig & Co.	***Water Quality Technical Report*** ***Cle Elum UGA FEIS***	Figure 3-3
		Developed Condition Basin Boundaries

The Cle Elum UGA single-family residential land use under Alternative 5 would range between approximately 2 to 7 dwelling units (DU)/acre of the developed footprint, including the supporting roadways and infrastructure. Residential untreated runoff quality was forecast using residential runoff data from housing densities in the approximate range from 4 to 7 DU/acre, including their associated roadway and parking areas. The higher density multi-family or condominium land use would range from 8 to 15 DU/acre. Therefore, the untreated 10 to 14 DU/acre land use category was conservatively applied to all condominium runoff entering the storm drainage system. Because the traffic volumes expected for the project would be comparable to roadways supporting 2 to 7 DU/acre single-family housing or 8 to 15 DU/acre multi-family housing, this same runoff category was applied to project roadways. Parking lots for parks, commercial impervious, and other (minor miscellaneous) impervious areas were all conservatively assumed to have use similar to parking for commercial or retail use.

Runoff from each land use category was proportionately mixed in each management zone on the basis of impervious surface (Table 3-8). Runoff from the approximately 1.1 acres of arterial roadway accessing the UGA from Ranger Station Road and passing through Management Zone A was assigned the same untreated water quality as the composition of land uses in Management Zone B, which this roadway would serve. Untreated water quality was improved by transit through either a stormwater wetland (Zone D) or wet pond and sand filter facility (enhanced treatment, in Zone B). The untreated water quality estimated for Alternative 5 is presented in Table 3-9. Using removal efficiencies shown in Tables 3-2, 3-4, and 3-5, the resulting discharge quality was then compared to background groundwater concentrations, water quality standards, and fisheries sublethal limits. Non-point influences on water quality that are not collected by the storm drainage system, were analyzed separately (Section 3.2.6).

Table 3-8
Total Impervious Acreage per Management Zone, Alternative 5

Land Use by Management Zone	Impervious Acreage Without Roofs	Roofs	Undeveloped [1] Land
A	**1.10**	**0.00**	**63.9**
Access Roadway	1.10		
B	**66.7**	**31.7**	**63.7**
Single-Family Residential	5.80		
Single-Family Residential Roofs		3.80	
Multi-Family Residential	2.60		
Multi-Family Residential Roofs		4.90	
Commercial	56.8		
Commercial Roofs		23.0	
Open Space Parks	1.50		
C	**1.40**	**0.00**	**244.6**
Existing Gravel Road	1.40	0	

[1] School expansion, cemetery expansion, buffer areas, and other undeveloped open space.

Table 3-8
Continued

Land Use by Management Zone	Impervious Acreage Without Roofs	Roofs	Undeveloped [1] Land
D	**75.2**	**59.9**	**285.7**
Single-Family Residential	61.1		
Single-Family Residential Roofs		38.9	
Multi-Family Residential	9.30		
Multi-Family Residential Roofs		20.1	
Commercial	4.80		
Commercial Roofs		0.90	

[1] School expansion, cemetery expansion, buffer areas, and other undeveloped open space.

Table 3-9
Alternative 5 Untreated Stormwater Runoff Quality (Excludes Infiltrated Roof Runoff)

Parameter	Untreated Runoff Concentrations from Management Zones A and B	Untreated Runoff Concentrations from Management Zone D
Copper (µg/L)		
Total	10	8.0
Dissolved	4.0	3.2
Lead (µg/L)		
Total	9.0	4.0
Dissolved	4.8	2.1
Zinc (µg/L)		
Total	127	39
Dissolved	51	15
Nitrate+Nitrite-Nitrogen (mg/L)	0.45	0.40
Ammonia-Nitrogen		
Total (µg/L)	130	140
Unionized (µg/L)	0.30	0.30
Total Phosphorus (mg/L)	0.09	0.14
TSS (mg/L)	16	11
Fecal Coliforms (colonies/100 mL)	695	643
Oil and Grease (mg/L)	2.9	2.1

3.2.5 Alternative 5 Stormwater Evaluation Criteria

Three criteria were used to evaluate discharge from the stormwater treatment facilities. These were (1) the sublethal criteria for salmonids derived from the literature, (2) state water quality standards, and (3) the background groundwater and surface water conditions.

Sublethal effects include water chemistry-induced changes in physiology and/or behavior that affect the competitive vitality or reproductive potential of a fish population without direct lethal

effect. State water quality standards include a factor of safety to avoid lethal effects, but are not necessarily tied to sublethal effects data. The treated discharge in this updated analysis is compared to state standards, background conditions, and sublethal effects information (Section 3.2.4).

Fish sensitivity to water quality changes was assessed by evaluating literature data for behavioral and physiological fish responses to sublethal concentrations of typical storm runoff contaminants. The following information summarizes the literature review on water quality and fish health. For each parameter, the more restrictive of either the literature review or the state water quality standards was used as the "desirable limit" (Table 3-10).

Table 3-10
Yakima River Background, Surface Water Quality Standards, and Guidelines for Sublethal Fish Effect Avoidance

Parameter	Existing Concentration in the Yakima River [1]	Acute and Chronic State Water Quality Standards Class A	Literature-Based Fish Sublethal Limits
Temperature (°C)	6.8	Less than 18	--
Dissolved Copper (µg/L)	0.19	3.02/2.37	2.4 [2]
Dissolved Lead (µg/L)	0.01	8.38/0.33	11 to 16 [3]
Dissolved Zinc (µg/L)	0.75	24.2/22.1	12 [3]
Ammonia-Nitrogen, Total (µg/L) Unionized (µg/L)	 10 0.05	 24,000 [6] 66 [6]	 7,300 [6] 20 [5]
Nitrate+Nitrite-Nitrogen (mg/L)	0.04	None	Less than 250 [7]
Total Phosphorus (mg/L)	0.07	None	No direct adverse effects
pH	7.2	6.5-8.5	6.0-9.0 [4,5]
Dissolved Oxygen (mg/L)	11	Greater than 8.0 mg/L	--
Oxygen Saturation (percent)	96	Less than 110	75% saturation at 5°C (41°F); 90% saturation at 25°C (77°F) [5]
Hardness (mg/L as $CaCo_3$)	27	None	At least 20 [4]
Turbidity (NTU)	3.4	Less than 5 over background	--
Total Suspended Solids (mg/L)	5.6	None	Less than 80 [4]
Fecal Coliforms (CFU/100 mL)	11	100 [8]	--

Note: Water quality forecasts and baseline conditions were reported in total metals and converted to dissolved metals to compare to state standards. To obtain dissolved concentrations, approximately 40 percent of total copper and total zinc and 53 percent of total lead were assumed to be in dissolved form (King County 1995).

[1] Yakima River water quality data collected at Ecology's ambient monitoring station located at RM 191. Samples were collected monthly from October 1994 through September 2001. Yakima River hardness is 27 mg/L $CaCO_3$.
[2] Marr et al. 1995a.
[3] Birge et al. 1993; Wedemeyer 1977.
[4] Wedemeyer 1977.
[5] Piper et al. 1982.
[6] Unionized ammonia criterion for 15°C and pH of 7.0 and based on the EPA Gold Book (EPA 440/5-86-001).
[7] From Westin (1974).
[8] The standard is for a geometric mean of multiple samples, with not more than 10 percent exceeding 200 CFU/mL (CFU=colony forming units).

Metabolic rates of fish increase rapidly as temperatures rise. Many biological processes such as spawning and egg hatching are geared to annual temperature changes in the natural environment. Each fish species has a temperature range that it can tolerate, and within that range it has optimal temperatures for growth and reproduction (Piper et al. 1982). Temperatures of 18°C, or 10°C for spawning and egg development, are the upper continuous limits conducive to fish health in hatcheries (Wedemeyer 1977), but temperature requirements vary by species and life stage (EPA Region 10 2001). Temperatures that are too high or too low impart stresses that can dramatically affect production and render fish more susceptible to disease. Most chemical substances dissolve more readily as temperature increases and gases such as oxygen and carbon dioxide become less soluble as temperature rises (Piper et al. 1982). In most cases in the Pacific Northwest, stormwater discharge is not coincident with warmer weather conditions.

The literature indicates that sublethal concentrations of total copper (below those shown to induce mortality in bioassays) can induce physiologic and immune alterations, reduce growth, interfere with reproduction, and lead to behavioral changes in salmonids. Rainbow trout (*Oncorhynchus mykiss*) acclimation to chronic low levels of copper (20 µg/L) has been demonstrated, which is theorized to involve some specific cell types for local metal detoxification in addition to organs such as the liver, which provide whole-body detoxification (Julliard et al. 1993, 1995). A total copper concentration of 20 µg/L is just above that considered to be a non-effect value on fish olfactory systems (Julliard et al. 1995) and fish exposed to 20 µg/L cupric ion for as long as 40 weeks continued to distinguish olfactory clues (Saucier and Astic 1995). Under long-term exposure to low doses of cupric ion, a new steady state of olfactory cell growth and death was hypothesized to account for the olfactory recovery (Julliard et al. 1995).

Acclimation of rainbow trout to copper has also been reported with regard to its effect on gills and lipid metabolism.

Rainbow trout have been shown to be more tolerant than brown trout (*Salvelinus trutta*) to heavy metal concentration increases (Marr et al. 1995b). However, when metal concentrations are increased in conjunction with decreases in hardness and pH (down to 5), rainbow trout showed less acclimation potential than brown trout (Marr et al. 1995a). The Marr et al. (1995a) study was designed to examine the metal response of native populations adapted to high ambient metals in the Clark Fork River, Montana to populations adapted to low background metals. Pre-exposure resulted in increased physiological resiliency to metals; however, that acclimation came at the cost of reduced growth, which could reduce overall fitness (Marr et al. 1995a). Growth inhibition of rainbow trout has been shown at total copper concentrations as low as 4.6 µg/L (Marr et al. 1995a).

Increased susceptibility of rainbow trout to infectious diseases was examined by sublethal exposure to copper (25 µg/L), ammonia (0.5 mg/L), and nitrite (0.24 mg/L) for 24 hours, following exposure to the pathogen *Saprolegnia parasitica* (Carballo et al. 1995). Susceptibility to infection by this pathogen was observed to increase with exposure to ammonia (71 percent), copper (57 percent), and nitrite (50 percent). The reasons hypothesized for increased

susceptibility varied by toxicant. Ammonia was hypothesized to be related to interference with mucus production and, therefore, natural mucus removal of the pathogen. Copper was hypothesized to interfere with cellular immune response to the pathogen. Stress response was hypothesized as the cause of increased susceptibility to nitrite (Carballo et al. 1995). An upper limit of 5.0 µg/L total copper was recommended by Wedemeyer (1977) as the upper limit for continuous exposure in hatcheries to avoid suppressing gill ATPase production and to avoid compromising smoltification in anadromous salmonids.

An upper limit of 30 µg/L total lead was recommended by Wedemeyer (1977) for continuous exposure in soft water for hatcheries, where stress and crowding can make fish susceptible to disease and impaired physiological processes. The same limit was recommended by Wedemeyer (1977) for continuous total zinc exposure. This limit closely matches the 10 to 50 µg/L total zinc concentration (median 30 µg/L) shown to trigger rainbow trout behavioral avoidance (Birge et al. 1993).

Ammonia and nitrite can be toxic to fish (Russo and Thurston 1991). Nitrite does not occur naturally or in stormwater runoff at concentrations that are toxic. Nitrate can be high in hatcheries when ammonia is also high due to fish crowding (Russo and Thurston 1991). Nitrate-nitrogen is rarely reported in the hatchery literature, reflecting the fact that conventional flows through fish hatcheries do not have nitrate- or nitrite-nitrogen problems.

Nitrate is relatively non-toxic to fish, although concentrations in excess of 2 mg/L nitrate-nitrogen may have potential to affect salmonid egg development, based on one study by Kincheloe et al. (1979). However, the Kincheloe et al. (1979) study was severely compromised by poor control survival due to a fungal disease that complicated interpretation of these results. Generally, nitrate is more likely to be involved in eutrophication problems before being involved in toxic problems for fish. A maximum allowable concentration of 370 mg/L nitrate-nitrogen was recommended for hatcheries based on bioassay studies for chinook salmon (*Oncorhynchus tshawytscha*) (250 mg/L nitrate-nitrogen for trout) by Westin (1974).

Ammonia toxicity rises with pH and temperature due to the increasing fraction of unionized ammonia that occurs with increasing pH and increasing temperature. Ammonia toxicity is also reported to increase when DO concentrations fall (Russo and Thurston 1991). A 5-year life-cycle test on rainbow trout was performed over three generations at five ammonia exposure concentrations in the range of 0.01 to 0.07 mg/L unionized ammonia. Lesions were common in fish at 0.02 mg/L ammonia and higher concentrations; however, no other major effects were observed, including egg viability, numbers of eggs spawned and produced, growth of progeny, or mortality of parents or progeny of any of the tested generations (Thurston et al. 1984).

Other sublethal tests lasting from 1 week to 3 months were summarized by Russo and Thurston (1991) for both salmonid and non-salmonid species. These tests showed reduced food uptake and assimilation associated with growth inhibition at unionized ammonia concentrations as low as 0.002 to 0.15 mg/L. Pathological and disease-resistance effects under a wide range of water test conditions were reported between unionized ammonia concentrations of 0.04 to 0.4 mg/L.

However, some studies testing ammonia derived from domestic wastewater have attributed toxicity to ammonia that is actually caused by chlorine added to water supplies, based on re-testing. When chlorine was excluded, ammonia concentrations up to 0.4 mg/L for 90 days failed to cause pathologic damage cited as a characteristic in previous studies (Daoust and Ferguson 1984). Wedemeyer (1977) recommended 0.02 mg/L unionized ammonia be used as the limit for continuous exposure, which is lower than the toxicity-based state standards under Chapter 173-201A-040 WAC (Ecology 2000).

There have been numerous studies to determine the effects of turbidity on fish. High turbidity can change fish behavior, growth, physiology, and egg development, or indirectly affect fish by decreasing food supply and cover. Species responses to increased turbidity differ. Some fish stop feeding and seek cover, whereas others migrate into tributaries or up or downstream to clearer water (Chapman and Bjornn 1969, Hartman 1965, Olson et al. 1973, and Ruggles 1966). Physiological reactions to turbidity can include excessive mucus secretion, excretory interference, and respiration interference that can lead to suffocation (Ellis 1944, Trautman 1933). One year and older fish can survive high-suspended sediment for considerable periods (Sorenson et al. 1977). However, suspended sediment ranging from 100 to 6,000 mg/L were found to be limiting to rearing fish, and concentrations greater than 20,000 mg/L are considered acute lethal concentrations for salmonids (Cordone and Kelly 1961, Sorenson et al. 1977). Sigler et al. (1984) exposed coho (*Oncorhynchus kisutch*) and steelhead salmons (*O. mykiss*) to varying turbidity over 14 days. After being exposed to turbidity greater than 165 NTU, no study fish remained in the channel; 35 percent remained at 143 NTU, and 100 percent remained at turbidity ranging from 57 to 77 NTU.

The suggested criterion for salmonid fisheries for pH is between 6 and 9 (Piper at al. 1982, Wedemeyer 1977). Many fish species can live in waters having a pH greater than 9, even for extended periods, but at the cost of reduced growth and reproduction. Fish species have less tolerance of pH extremes at higher temperatures, and as discussed previously, ammonia toxicity becomes an important consideration at high pH (Piper et al. 1982). Trout species could experience mortality at pH greater than 9 (Piper et al. 1982).

The DO content of natural waters varies with temperature, salinity, turbulence, the photosynthetic activity of algae and plants, and atmospheric pressure. Determination of DO concentrations is a fundamental part of water quality analyses since oxygen is involved in, or influences, nearly all chemical and biological processes within water bodies. The lowest safe level of DO for trout is approximately 5 mg/L (Piper et al. 1982). Reduced food consumption by fingerling coho salmon occurs at oxygen concentrations near 4 to 5 mg/L (Piper et al. 1982). Fish death most often occurs if DO drops below 3 mg/L (Piper et al. 1982). Oxygen should be at or near 100 percent saturation and a continual concentration of 80 percent saturation or more provides a desirable oxygen supply (Piper et al. 1982). Oxygen is suggested to be at least 75 percent of saturation at 5°C or 90 percent at 25°C (Wedemeyer 1977). Saturation over 100 percent poses a threat to fish, and any levels over 110 percent are suggested by the literature as lethal (Piper et al. 1982). Gas supersaturation can occur when air is introduced into water under high pressure, which is subsequently lowered, or when water is heated. Water that is plunged

over waterfalls or dams, water drawn from deep wells, or water heated from snowmelt is potentially supersaturated (Piper et al. 1982).

At very low alkalinities, water loses its ability to buffer against changes in acidity, and pH may fluctuate quickly and widely to the detriment of fish; therefore, at least 20 mg/L as $CaCO_3$ is the suggested upper limit set for continuous exposure to salmonids (Wedemeyer 1977).

Turbidity and TSS can indirectly affect fish through their food supply, which is frequently a limiting factor (Leonard 1948). Trout feed on aquatic invertebrates year-round and exhibit an annual cycle of growth that closely corresponds to invertebrate numbers (Brown 1946, Maciolek and Needham 1952). The existing Washington State standard of 5 NTU above background provides a relatively high level of protection based on a review of studies on habitat alterations due to reductions in light penetration and direct effects of sediment and turbidity on aquatic life (Lloyd 1987). The literature-based criteria for TSS is 80 mg/L or less (Wedemeyer 1977), or 100 mg/L or less (Cordone and Kelly 1961, Sorenson et al. 1977).

The fecal coliform water quality standard of 100 colonies/100 mL is a geometric mean that makes allowances for occasional higher peak values. Thus, the presence of peaks in fecal coliforms, as expected, would not necessarily be inconsistent with state water quality standards. Increased concentrations of fecal coliforms are a generalized result of residential development. Improperly disposed pet waste and waste from wildlife deposited on impervious surfaces leads to high numbers of fecal coliforms. However, fecal coliform bacteria do not represent a threat to fish habitat value or habitat impairment unless they are correlated with nutrient or toxic (unionized ammonia) loadings as well. The literature does not indicate this association occurs from residential runoff.

3.2.6 Stormwater Quality Results and Discussion for Preferred Alternative 5

Groundwater Impacts

The predicted runoff quality from the UGA was calculated for the proposed project. The calculation combined the predicted untreated stormwater quality with the forecast contaminant removal efficiencies for the enhanced treatment facility and stormwater wetland. The facilities would discharge to an infiltration facility. Both pollutant filtration and capture occur in native soils via infiltration, which results in additional pollutant removal and treatment. The forecast water quality results described in Table 3-11 below assess both the stormwater discharge quality prior to entering the infiltration pond (this column in Table 3-11 does not account for the additional natural removal of contaminant that would occur in the outwash soils of the vadose zone), and for the predicted stormwater quality after crediting infiltration with additional treatment (this column in Table 3-11 credits infiltration with the contaminant removal that would occur naturally in on-site outwash soils). The additional pollutant removal via infiltration in Table 3-11 is conservative, based on the fact that the minimum treatment efficiency (percent removal) is based on filtration via outwash soils, and excludes the filtration that would naturally occur through the lacustrine aquitard, which is present in Management Zone D.

Table 3-11
Alternative 5 Forecast Stormwater Quality

Parameter	Treated Stormwater Discharged to Infiltration (no treatment credit for infiltration)		Treated Stormwater After Infiltration, Prior to Aquifer Mixing (infiltration credited with treatment)			Existing Groundwater Quality [1]	Groundwater Quality Standards
	Management Zones A and B	Management Zone D	Minimum Treatment by Infiltration (%)	Management Zones A and B	Management Zone D		
Copper (µg/L)							
Total	3.0	3.7	50	1.5	1.9	3.0	1000
Dissolved	1.2	1.5		0.60	0.80	1.3	NA
Lead (µg/L)							
Total	2.3	1.8	60	0.92	0.72	1.8	50
Dissolved	1.2	0.97		0.48	0.39	0.95	NA
Zinc (µg/L)							
Total	6.4	19	80	1.3	3.8	76	5000
Dissolved	2.6	7.2		0.52	1.4	30	NA
Nitrate+Nitrite-Nitrogen (mg/L)	0.22	0.27	5.0	0.21	0.26	0.20	10
Ammonia-Nitrogen							
Total (µg/L)	43	77	45	19	42	4.0	NA
Unionized (µg/L)	0.10	0.20		0.10	0.10	0.0	NA
Total Phosphorus (mg/L)	0.02	0.07	65	0.01	0.02	0.02	NA
TSS (mg/L)	0.80	5.2	50	0.40	2.6	3.0	NA
Fecal Coliforms (colonies/ 100 mL)	382	308	100	<1	<1	13	1
Oil and Grease (mg/L)	0.73	0.53	0.0	0.73	0.53	NA	NA

Note: Water quality forecasts and baseline conditions were reported in total metals and converted to dissolved metals. To obtain dissolved concentrations, approximately 40 percent of total copper and total zinc and 53 percent of total lead were assumed to be in dissolved form (King County 1995).

[1] Groundwater quality results for wells OW-1, OW-4, OW-7, and OW-9, December 1998 through September 1999 (AESI 1999c).

Analyses Results Not Crediting Additional Treatment from Infiltration

Stormwater quality after treatment is forecast to have higher concentrations of most stormwater constituents than the existing background groundwater quality, when considered prior to infiltration but after treatment at the surface. TSS, total and dissolved zinc, and total and dissolved lead are the exceptions, and would have concentrations at or below existing groundwater quality. However, prior to any added treatment from infiltration to the native soils, all treated discharge to the infiltration areas would conform to groundwater quality standards.

Infiltration Credited with Additional Treatment

After crediting additional treatment in native on-site soils via infiltration, all parameters would remain within groundwater quality standards. Nitrate-nitrogen and ammonia-nitrogen concentrations in the recharging stormwater are forecast to be higher than the background groundwater concentration (only 5 percent denitrification and no conversion of ammonia to nitrate-nitrogen was assumed as a very conservative assumption; in actuality, almost all ammonia would convert to nitrate-nitrogen).

All treated stormwater in Management Zones A, B, and D would infiltrate through moraine and outwash soils, which have a silty sand component. This component of the on-site soils would more than add the functional equivalence of sand filtration to all the stormwater catchments. An 18-inch depth of sand is one criterion Ecology references to credit infiltration to native soils with water quality treatment (Ecology 2001c), which is more than exceeded by soils under the UGA. Lesser treatment depths also are credited under the Ecology Manual if sufficient vertical removal and pollutant removal capacity is available in the soil. Ecology considers pollutant removal capacity to occur where there is at least 5 milliequivalents (meq)/100 grams (gm) dry weight soil cation exchange capacity. As reported in the Draft EIS, samples of MPR on-site soils had greater than 15 meq/100 gm dry soil cation exchange capability (Land Profile, Inc. 1998). This amount of cation exchange is well above the minimum of 5 meq/100 grams dry soil recommended by Ecology (2001c) for crediting infiltration as a water quality treatment device. Thus, in addition to the treatments for stormwater quality previously described before discharge to infiltration, storm runoff would receive at least the functional equivalence of sand filtration treatment after discharge. Consequently, the infiltration removal values for metals shown in Table 3-11 were set equal to the expected performance for sand filters (see Table 3-3). Fecal coliform removal from infiltration was given a 100 percent removal in Table 3-11, because of the times of unsaturated transit expected from infiltration. TSS was afforded less removal by infiltration than by sand filter treatment because the treatments before infiltration are expected to remove nearly all of the TSS load.

Fecal coliform bacteria values in Table 3-11 are predicted to average over 300 colonies/100 mL before infiltration. A minimum of 3.9 feet of soil has been shown to provide sufficient filtration to prevent fecal coliform contamination (Brown et al. 1979). Fecal coliforms would not reach the groundwater at a concentration greater than the maximum standard of 1 colony/100 mL because they have limited survival and mobility in soils, and because the average vertical transit times of infiltrated stormwater to the aquifer in the three management zones would vary from about 120 to 200 days (AESI 2001). Particles such as fecal coliforms move much more slowly than water through the vadose zone due to physical interference with movement or by electrical charge attraction to the soil particles; most would be trapped altogether by filtration.

Infiltration is also advantageous in phosphorous removal, because phosphorus binds to iron and aluminum in soils in a mineralized form, which effectively removes soluble phosphorus from groundwater. Phosphorus bound to particulates would be removed through filtration.

Analysis Results from Proportionately Mixed Treated Stormwater Compared to the Existing Groundwater Quality

Groundwater impacts were also evaluated by proportionately mixing the treated stormwater from Management Zones A, B, and D and comparing the results to existing groundwater quality prior to any mixing or dilution in the underlying aquifer (Table 3-12). The management zones were proportionately mixed on the basis of impervious acreage. The percent impervious acreage for each management zone was multiplied by each constituent concentration and the results summed across all management zones to achieve the combined (mixed) concentration of each constituent (Table 3-12). The combined constituent concentrations were compared to Washington State groundwater quality standards and background groundwater quality.

Table 3-12
Alternative 5 Proportionately Mixed Treated Stormwater Compared to Existing Groundwater Quality

Parameter	UGA Treated Stormwater After Infiltration, Prior to Aquifer Mixing (Table 3-11) (infiltration credited with treatment)		Proportionately Mixed Groundwater Quality Resulting from the UGA	Existing Groundwater Quality [1]	Groundwater Quality Standards
	Management Zones A and B	Management Zone D			
Copper (µg/L)					
Total	1.5	1.9	1.8	3.0	1000
Dissolved	0.60	0.80	0.70	1.2	NA
Lead (µg/L)					
Total	0.92	0.72	0.82	1.8	50
Dissolved	0.48	0.39	0.43	0.95	NA
Zinc (µg/L)					
Total	1.3	3.8	2.6	76	5000
Dissolved	0.52	1.4	0.98	30	NA
Nitrate+Nitrite-Nitrogen (mg/L)	0.21	0.26	0.24	0.20	10
Ammonia-Nitrogen					
Total (µg/L)	19	42	31	4.0	NA
Unionized (µg/L)	0.10	0.10	0.10	0.0	NA
Total Phosphorus (mg/L)	0.01	0.02	0.02	0.02	NA
TSS (mg/L)	0.40	2.6	1.5	3.0	NA
Fecal Coliforms (colonies/ 100 mL)	<1	<1	<1	13	1
Oil and Grease (mg/L)	0.73	0.53	0.63	NA	NA

Note: Water quality forecasts and baseline conditions were reported in total metals and converted to dissolved metals. To obtain dissolved concentrations, approximately 40 percent of total copper and total zinc and 53 percent of total lead were assumed to be in dissolved form (King County 1995).

[1] Groundwater quality results for wells OW-1, OW-4, OW-7, and OW-9, December 1998 through September 1999 (AESI 1999c).

The analysis forecast that TSS, TP, fecal coliforms, and all of the total and dissolved metals from infiltrated treated stormwater would not influence existing groundwater concentrations because they would be relatively indistinguishable from background groundwater quality in the descending recharge. The remaining constituents, total and dissolved copper, nitrate-nitrogen, and ammonia-nitrogen concentrations would likely have slightly higher concentrations in the descending recharge than exists in the present groundwater. The forecast for proportionately mixed UGA treated stormwater concentrations after infiltration in Table 3-12 (but prior to any aquifer mixing) is very conservative because they were based on filtration through outwash soils, but exclude the additional filtration that would naturally occur through the lacustrine aquitard, which is present under Management Zone D. The analyses are also conservative in that no conversion of ammonia to nitrate was assumed.

Surface Water Impacts

Groundwater from Management Zones B and D ultimately recharges to the Yakima River. The average annual flow in the Yakima River is 1,279,131 acre-feet. This volume is based on flow records collected by USGS at Station 12479500 near Cle Elum, Washington. The average annual developed condition discharge volume from Alternative 5 was not available for analysis; however, Alternative 2 was evaluated in the Draft EIS and would contribute an approximate stormwater volume of 1,763 acre-feet/year. Therefore, Alternative 2 would contribute approximately 0.14 percent of the Yakima River's volume on an average annual basis after development. Although the developed condition discharge volume is not available for Alternative 5, the preferred Alternative 5 would have a lesser degree of development and impervious surface than Alternative 2. It is reasonable to expect that Alternative 5 would contribute less than 0.14 percent of the volume to the Yakima River on an average annual basis.

Surface water impacts from groundwater recharge to surface waters were evaluated conservatively by comparing the proportionately mixed and treated stormwater resulting from the UGA (Management Zones B and D) directly to the existing average Yakima River water quality (Table 3-13). Under natural conditions, the treated stormwater from the UGA would mix with the groundwater and travel approximately 121 to 204 days prior to entering the Yakima River, however data on the rate of groundwater flow under various portions of the UGA site are not available. Therefore, by comparing recharge quality to the river quality and standards directly with no dilution is the most conservative and feasible approach. Analyzed under this conservative approach, all of the water quality constituents in the UGA stormwater recharging the aquifer would meet the state surface water quality standards, except dissolved lead. The predicted dissolved lead concentration of 0.43 µg/L would be slightly elevated above the chronic surface water quality standard of 0.33 µg/L, but unlikely to be distinguishable from the existing background groundwater quality of 0.95 µg/L. All stormwater constituents are interpreted from the analysis to approach background groundwater quality conditions. Dissolved copper, lead and zinc, as well as nitrate+nitrite-nitrogen concentrations in the treated stormwater recharging the aquifer, would be higher than the background concentrations in the Yakima River. However, given that (1) transit and mixing through the underlying aquifer, (2) the UGA development under Alternative 5 would contribute a minimal volume to the Yakima River (less than 0.14 percent of

average annual flow), and (3) the overall good quality of the treated stormwater after infiltration, there is no reasonable expectation of adverse change to the water chemistry of the Yakima River.

Table 3-13
Yakima River Water Quality Resulting from the UGA Analysis

Parameter	Proportionately Mixed Stormwater Quality Resulting from the UGA Prior to Aquifer Mixing (Table 3-12)	Average Yakima River Water Quality [1]	Acute and Chronic State Water Quality Standards Class A	Literature Based Sublethal Limits (Table 3-10)
Copper (µg/L) Dissolved	0.71	0.19	3.02/2.37	2.4
Lead (µg/L) Dissolved	0.43	0.01	8.38/0.33	11 to 16
Zinc (µg/L) Dissolved	0.98	0.75	24.2/22.1	12
Ammonia-N (mg/L) Total Unionized	31 0.0	10 0.0	24,000 [2] 66	7,300 20
Nitrate+Nitrite-N (mg/L)	0.24	0.04	None	Less than 250
Total Phosphorus (mg/L)	0.02	0.07	None	--
TSS (mg/L)	1.5	5.6	None	Less than 80
Fecal Coliforms (CFU/100 mL)	<1	11	100 [3]	--

[1] Average Yakima River water quality sampled at RM 191 by Ecology from October 1994 through September 2001.
[2] Unionized ammonia criterion for 15°C and pH of 7.0 and based on the EPA Gold Book (EPA 440/5-86-001).
[3] The standard is for a geometric mean of multiple samples with no more than 10 percent exceeding 100 CFU/100 mL.

3.2.7 Alternative 5 Non-Point Water Quality: Landscaping

The Draft EIS evaluated impacts of pesticides and fertilizers under Alternatives 2, 3, and 4 in Section 3.4.3. This section supplements that discussion for Alternative 5. Non-point influences to groundwater quality would include nutrients and possibly heavy metals from fertilizers applied to landscaping; pesticides and herbicides, which could be applied to landscaping; and fecal coliforms from pet waste.

Commercial pesticides and herbicides can be transported in stormwater runoff. The mobility and persistence of pesticides varies greatly. Organic pesticides used in residential gardens are not reported as a significant problem in surface runoff treatment facilities, but do not occur unpredictability in measurable quantities. Where measured, their appearance tends to be sporadic and has not been associated with toxic effect to surface waters. Metro (1982) reported tentative identification of seven pesticides in five of twenty-one samples collected during its survey of residential and urban areas in the early 1980s. Of the seven pesticides found, all had concentrations in untreated runoff above chronic standards at least once; however, no violations

of standards in receiving waters were noted and the report concluded *"due to dilution, flushing, adsorption, and sediment deposition, no acute toxicity problems were discovered in the sites studied"* (Metro 1982). More recently, USGS and Ecology conducted a survey of pesticides in 13 small streams in the Puget Sound Basin, using data collected between 1987 and 1995 (Bortleson and Davis 1997). None of the pesticides detected exceeded existing state or federal freshwater aquatic life criteria. Although no violations of state toxicity standards were found, four pesticides (diazinon, mevinphos, malathion [all insecticides], and diuron [an herbicide]) were found at levels exceeding maximum concentrations recommended by the National Academy of Sciences and National Academy of Engineering for the protection of aquatic life (National Academy of Sciences and National Academy of Engineering 1973). As a result, these products have come under increasing scrutiny. Although there was no definite conclusion of impact in the Bortleson and Davis (1997) study, it did highlight the importance of homeowner education as a source control measure for pesticides.

In a recent study concluded in 1998, USGS, Ecology, and King County tested 10 streams in King County for pesticides. Diazinon was the only pesticide shown to be a problem, but this product was found at levels considered toxic to aquatic life in 9 of the 10 streams. Diazinon was frequently used by homeowners to control European cranefly (*Tipula paludosa*) larvae in lawns. On May 19, 2000, EPA's Office of Pesticide Programs published a Federal Register notice announcing a preliminary human health risk assessment for diazinon and is classified as "restricted use" by the EPA. On December 5, 2000 EPA announced the elimination of all indoor uses of diazinon, and the phase-out of lawn and garden uses. For all indoor household use, retail sales will stop by December 2002. For all lawn, garden, and turf uses, manufacturing diazinon would cease in June 2003, and all sales and distribution would stop in August 2003.

Other pesticides have also come under scrutiny and are being restricted. In June 2000, the EPA released a revised risk assessment and announced an agreement with registrants to eliminate or phase out the pesticide dursban (also known as chlorpyrifos). Chlorpyrifos is commonly found in many home and garden bug sprays and is used in some treatments of termites, as well as on some agricultural crops. The provisions of the agreement and associated EPA actions become effective for the following uses on the following dates: December 31, 2000 dursban uses became prohibited for food and crop uses; December 31, 2001 retails stop the sale of dursban; and dursban would be eliminated from use as a new-home and building construction termiticide by December 31, 2005.

All the UGA stormwater would be infiltrated to soils. The relative mobility of 82 pesticides in soils was assessed, and a minority (17 percent) rated as having moderate or greater mobility (Erickson 1987, Kerle et al. 1996). Of the four pesticides listed above diazinon and diuron have a moderate mobility rating in soils, and mevinphos and malathion have a low mobility rating in soil (Kerle et al. 1996). Even if a pesticide is highly mobile, factors such as application rate, rainfall patterns, soil type, organic matter content, and the adsorption and decomposition characteristics of the soil type determine whether a pesticide is likely to reach the groundwater (Erickson 1987). Pesticide movement within the soil and in the groundwater is usually low because pesticides are often adsorbed and broken down by soil organic matter and microbial

biodegradation, therefore transport through the unsaturated zone is reduced (Erickson 1987, Gold 1988).

A.C. Kindig and Company has monitored the water quality at the Snoqualmie Ridge Golf Course over two years for all pesticides proposed for use in their Golf Course Management Plan. Golf course pesticides were monitored at four locations (1 groundwater well, 2 aquifer discharge stations, and a surface water station). No pesticides have been detected at either of the stations. Fertilizers are sources of nutrients, particularly nitrogen and phosphorus. Traces of heavy metals may also be included in some fertilizer blends available to homeowners. A review of the literature on nitrate-nitrogen leaching through turf to reach groundwater shows that, while variable, nitrogen losses rarely exceed 5 percent of the applied nitrogen fertilizer, which generally translates to about 1.6 mg/L nitrate-nitrogen concentration immediately below the turf rooted zone in well-fertilized lawns, and prior to any nitrogen losses by denitrification (Balogh and Walker 1992). Ammonia products in fertilizers are rapidly converted to nitrate-nitrogen within the soil. Nitrate-nitrogen is very mobile in groundwater because it is negatively charged, and is thus not attracted to the negatively charged soils. Some nitrate-nitrogen would be eliminated by denitrification, by which process nitrate-nitrogen is converted to gaseous nitrogen and/or volatile nitrous oxide by anaerobic bacteria during transit through the soil. Losses from denitrification typically range between 10 and 25 percent (Broadbent and Clark 1967) and are independent of the nitrate concentration over a broad range.

Homeowner practices, however, can be unpredictable, and over-fertilization, particularly when associated with overwatering, are the key triggers to nitrate-nitrogen leaching. Consequently, nitrogen loadings from homeowner fertilizer use could be much greater than for professionally managed turf, not only because homeowners can over-apply fertilizer in excess of turf or plant ability to take up nutrients, but they can also compound the problem by overwatering and thus leaching of the over-applied amount. Fertilizer application from residences and other landscaping would be dispersed in space and time over the developed lots, and will generally occur during the drier growing and irrigation season, when leaching from precipitation is less likely. Assuming (1) that the highest average turf-zone concentration for fertilized landscaping would be 1.6 mg/L (Balogh and Walker 1992), (2) 75 percent of landscaping is well fertilized in the longer-term, (3) the remainder of the areas are not fertilized but receive some rainfall with 0.4 mg/L nitrate-nitrogen (from the National Atmospheric Deposition Program station at LaGrande, Washington, in Pierce County; winter and spring 1998 maximum), and (4) 10 percent denitrification occurs, then landscaped areas could locally raise infiltrating groundwater by approximately 1.0 mg/L in nitrate-nitrogen concentration. This concentration is much greater than the concentration from infiltrated stormwater collected by the storm drainage and treatment system (Table 3-11), but nonetheless is well under the 10 mg/L groundwater quality standard (Table 3-11) and literature-based sublethal limits for fisheries (Table 3-10), even prior to any further mixing with other sources of recharge or the underlying aquifer. There are no surface water quality standards for nitrate-nitrogen (Chapter 173-201A-030 WAC), because it is virtually non-toxic. Consequently, there is no reasonable expectation of adverse impact from nitrogen fertilizers to groundwater or the Cle Elum or Yakima Rivers.

There are no drinking water maximum contaminant levels (Chapter 246-290 WAC) for phosphorus, or groundwater maximum standards for phosphorus (Chapter 173-200 WAC). There are no maximum water quality standards for phosphorus in surface waters (Chapter 173-201A WAC). Phosphorus binds readily to iron and aluminum and calcium to form mineralized compounds in soils, and thus is not readily transported subsurface through soils. A number of investigations on the movement of phosphorous applied to soil in effluent from wastewater treatment plants have shown that phosphorous binds to sorption sites in the soil. Even under high phosphorous loading to infiltration basins, for example wastewater treatment plant discharges, the soluble phosphorous front advances only very slowly as sorption sites are occupied. The distribution of phosphorus from effluent at various depths below a six-year-old septic drainfield trench has been measured (Sawhney and Starr 1977). Phosphorus in effluent 15 centimeters (about 6 inches) immediately below the drain trench rapidly reached a concentration equivalent to the septic effluent in the trench, as phosphorus-sorption sites in this horizon were occupied and saturated. Phosphorus concentrations at a 30 centimeter depth (about one foot) throughout the 13 months of monitoring showed a very large fraction was removed between 15 and 30 centimeters, even though the septic system had been in operation for six years. At a 60 centimeter depth below the infiltration trench (about two feet), phosphorus was reduced from an average 13.2 mg/L in the effluent to 0.5 mg/L, which is an approximate 96 percent reduction. Intermittant drainfield flow allowing for alternate drying and wetting of drainfield soils increased sorption capacity for phosphorus (Sawhney and Starr 1977).

Wilhelm et al. (1994) studied an operating 13-year-old single-family septic system to evaluate the geochemical processes occurring below the drainfield, including processes affecting phosphorus transport in the effluent. This drainfield included evaluations in both unsaturated and saturated zones within the underlying shallow aquifer. While phosphorus was removed in both zones, Wilhelm et al. (1994) found that phosphorus was reduced to near-background concentrations quickly in the saturated zone within the shallow aquifer, which was attributed to sorption onto calcium carbonate and precipitation with calcium ions. In 5-day laboratory experiments, Wilhelm et al. (1994) measured a soil sorption capacity of 5 mg/L of soluble phosphorus per 100 grams of soil. However, longer-term experiments and field studies show soils typically sorb with twice this capacity, pointing to the importance of regeneration, likely by re-coating of soils with calcium providing additional binding sites Weiskel and Howes (1992). Wilhelm et al. (1994) found that relative to the initial septic-tank effluent, the groundwater plume that traveled from the domestic septic system was locally and quickly depleted of phosphorus, even after 13 years of operation.

The conclusion that phosphorus is locally reduced to background levels because of its rapid adsorption and precipitation to iron, aluminum, and calcium is supported by Reneau and Pettry (1976), Gilliom and Patmont (1983), and Weiskel and Howes 1992. Given that very high loading sources of phosphorus do not contribute phosphorus above background to the receiving groundwater basin, there is no reasonable expectation that phosphorus from landscaping activity would have any influence on groundwater quality.

Metals in trace amounts could be contained in some fertilizers, however they are also largely immobilized in soils. Metals diffusion in ponds used to treat interstate freeway runoff was measured at less than 0.1 cm^2 per year, and over 95 percent o the total metals were contained in the pond sediments (Yousef et al. 1984). That situation had metals concentrations orders of magnitude higher than could occur with landscaping fertilizers. Therefore, any metals in fertilizers are not expected to migrate with groundwater and result in a measurable change to groundwater quality.

3.2.8 Alternative 5 Artificial Water Bodies

The conceptual site plan for Alternative 5 includes a number of artificial water bodies (small lakes or ponds) to provide landscape and recreational amenities for the community. None of the lakes would discharge to or be connected with a natural surface water. A total surface area of 15 acres is proposed for 8 to 10 ponds or lakes. The largest lake would be approximately 10 acres in size, and located as a part of the neighborhood clubhouse complex. The remaining lakes and ponds would average around three-quarters of an acre in size.

For the large lake, uses would include swimming, non-motorized boating and canoeing, fishing, and waterfowl viewing. A pedestrian trail system would border the lake's perimeter to allow for recessional walking and nature viewing. The lake would be 10 to 15 feet in depth and lined to prevent leakage into the groundwater system. To protect the water quality of the lake, stormwater would not discharge to the lake. Grading adjacent to the lake would be designed to direct shoreline runoff away from the lake.

The water in the large lake would be exchanged at least twice per year with untreated water for irrigation supply to the golf courses on the MPR to assist in maintaining water quality and minimizing undesirable aquatic vegetation growth. The exchange water would lower the temperature in the lake water and would be beneficial for a put and take fishery in the lake. Aeration of the lake at one or more locations could be provided if warranted to maintain circulation, depending upon final design.

For the smaller lakes, perimeter trail walking and nature viewing would be the principal intended use Some of the smaller lakes could have wetland components to attract waterfowl and other bird life. These lakes would also be lined. Water exchange in these smaller lakes is desirable, and could be accomplished by the method described above for the larger lake. Alternatively, treated water to be used for the UGA common area irrigation could be routed through the smaller lakes and then pumped to the points of irrigation.

All the lakes would have controls to maintain water surfaces at their functional design levels. Water needed to make up for evaporative losses from the lakes was included in the water demands calculations for Alternative 5 (Grimm, personal communication 2001).

A lake management and maintenance program is proposed for all artificial lakes, none of which would discharge to a natural water body. The applicable community or property owner

association would operate the program for individual lakes. The program(s) would be modeled after existing volunteer lake management and monitoring programs, such as presented in the *EPA's Volunteer Lake Monitoring: A Methods Manual.* For the large lake, coliform bacteria monitoring would be required to assure safe water quality conditions for swimming (Grimm, personal communication 2001).

3.2.9 Alternative 5 Mitigation

- Infiltration is feasible and proposed after stormwater treatment for all areas. Rooftop runoff would be infiltrated without needing water quality treatment.

- Stormwater infiltrated in Management Zones A and B would be treated with a wet pond and a sand filter to give enhanced treatment per the 2001 Ecology Manual, exceeding the treatment required in the manual.

- Stormwater infiltrated in Management Zone D would be treated with a stormwater wetland meeting the basic treatment requirements in the 2001 Ecology Manual.

- Avoidance of external copper (unsealed) and galvanized metal in structures in Management Zones A and B would be a significant source control measure for zinc and copper.

- Native vegetation could be encouraged for common landscaping for commercial and multi-family landscaping. This would minimize the need for landscape chemicals. If chemicals must be used, slow-release fertilizers low in phosphorus, and herbicide or pesticide usage on a minimal "as-needed" basis, selected on the basis of minimal transport and persistence potential, is recommended.

- Educational materials for water quality and habitat/resource protection could be provided to new homeowners to minimize the use of pesticides and lawn and landscape fertilizers.

- Installing covered parking, parking garages, or carports in multi-family and office areas could reduce vehicular contaminants in storm runoff from commercial development.

- To lower the potential for peak fecal coliform concentrations, dumpster areas could be roofed.

3.3 Cumulative Impacts with the MPR

3.3.1 On-Site Operational Impacts

With regard to long-term operational impacts, the MPR DEIS (Appendix C) provided a detailed analysis of impacts from a higher-density MPR plan than is currently proposed. Consequently,

the MPR DEIS evaluation conservatively overestimates impacts of the current proposal. The MPR DEIS (Appendix C) provided quantified results for stormwater-generated fecal coliforms, heavy metals, turbidity and TSS, nutrients, oil and grease, landscaping chemical use, golf course pesticides and fertilizer use, and equestrian center impacts to surface and groundwater quality. Cumulative impacts within the UGA were also briefly evaluated prior to publication, though not for the preferred UGA Alternative 5.

Briefly, the MPR DEIS concluded the following for the then-Proposed MPR and Alternative 1:

1. Even with TESC measures in place, some amount of sediment and petroleum hydrocarbon products from construction equipment could reach shallow groundwater in continuity with the Cle Elum River as a result of construction within the geomorphic floodplain of the Cle Elum River. This impact would not occur under the Reduced-Density MPR, because no residential or commercial development is proposed within the geomorphic floodplain.

2. Some large though rare storms and some rain-on-snow events could activate stormwater bypasses which could convey water with some contaminants directly to the Cle Elum River, rather than to on-site infiltration. The magnitude of these events would be greater than the volume of the 100-year storm runoff, however, and that would reduce contaminant concentrations in bypassed flows to very low levels.

3. Infiltration of treated stormwater and other non-point landscaping infiltration was determined to be sufficient to meet criteria for the protection of surface and groundwater beneficial uses.

4. Golf courses on the MPR site would be a source of fertilizers and pesticides that did not previously exist. A golf course management plan was prepared to avoid transport potential and impact, but some amount of pesticides could be leached into groundwater and some could be conveyed in surface flows when bypasses would be activated during large storms. It is not anticipated that under normal use these compounds would be detectable in surface or groundwater any distance from the golf courses. However, accidental spills could occur with localized effects if they were sufficiently large.

5. An equestrian center would increase equine manure loadings at the center and on the equestrian trails. Some localized release of manure and urine to the Cle Elum River could result, but it is not expected these loadings would adversely affect the river due to high irrigation releases by the USBR during nearly all of the warmer and drier seasons when horse riding would typically be enjoyed at the resort.

Since the MPR DEIS, 2 years of data have been collected from runoff from The TPC at Snoqualmie Ridge Golf Course, in Snoqualmie Washington (AESI 1999a). A golf course management plan very similar to that proposed for MountainStar is being used at Snoqualmie Ridge, with allowances for the difference in climate between the east and west sides of the

Cascade Mountains. All pesticides used on the golf course have been tested in streams and in golf course drainage facilities, and there have been no analytical results above detection limits for any pesticide.

MPR operational impacts described in the Draft EIS and summarized above were all negligible with regard to water quality, and this conclusion was reached through evaluation of a proposal with greater impact potential than the current Reduced-Density MPR proposal. Similarly, operational impacts described in this analysis for the Preferred UGA Alternative 5 are negligible. For both, the reasons for negligible change to background conditions resulted from (1) treating stormwater to current BMPs or better, (2) proposing source control measures (most notably a golf course management plan on the MPR), and (3) proposing to infiltrate nearly all stormwater (excluding surface discharge to Stream C for a small portion of the MPR). With the single exception of Stream C on the MPR, there would be no surface discharge from either the MPR or the UGA outside of emergency overflows in excess of the 100-year storm runoff event. Consequently, treated and infiltrated water from both sides would reach and mix with underlying groundwater, then recharge the Cle Elum and Yakima Rivers on a time-attenuated basis (AESI 2001). While the MPR and the UGA projects would represent independent loading sources to the underlying aquifer, on a per-acre basis the quality of the infiltrated water reaching the aquifer was shown for both projects to be well within groundwater beneficial use standards. In addition, the quality of the infiltrated stormwater was also shown to be well within surface water beneficial use standards and fish sublethal evaluation criteria on a concentration basis for each project independently, even under a very conservative assumption in that it directly reached the Yakima or Cle Elum Rivers without any prior groundwater mixing. When actual diffusion, mixing with groundwater, time-attenuated recharge, and mixing with Yakima River or Cle Elum River waters is accounted for, no adverse change to water quality is reasonably forecast.

3.3.2 Suburban 1 Zoned Portion of the UGA

The risk for cumulative operational water quality impacts from potential residential development on the property zoned Suburban 1 in conjunction with development under Alternative 5 and the MPR alone would increase above that described for the MPR and Alternative 5 of the UGA alone. This property is located where the Cle Elum River is in direct continuity with an underlying shallow alluvial aquifer. For this reason, this zone was labeled as the highest risk area of the UGA for development (see Section 3.2.3). Stormwater contaminants would contribute stormwater runoff and possibly treated effluent from on-site septic systems to the underlying shallow alluvial aquifer in direct continuity with the Cle Elum River.

Residential development would add nutrients from fertilizers and increase the risk of pesticide introduction to storm runoff from landscaping chemicals. Along with nutrients, a rural residential land use designation could result in increases in contaminants such as fecal coliforms and BOD, if livestock are held on the property. Very low automobile use would be expected in association with any future project at this density, and effective impervious surfaces generating runoff would also be very low on an area basis. Low level automobile traffic would likely mean that heavy metals and combustible products in stormwater would be inconsequential, certainly

on a regional scale. Stormwater treatment for the lots would need to comply with the 1992 Ecology Manual adopted by Kittitas County.

The MPR, Trendwest's UGA Alternative 5, and the property zoned Suburban 1 would all drain stormwater via subsurface routes to the Cle Elum or Yakima Rivers. The MPR and UGA proposals offer treatment to 2001 Ecology Manual standards, and infiltrate through soils suitable for further water quality treatment. It is less likely that development on the Suburban 1 zoned property, if it occurred, would treat to that standard, because the minimum Kittitas County and Cle Elum have yet to adopt the more stringent 2001 Ecology Manual. In addition, infiltration to the alluvial soils is not likely to afford additional treatment after infiltration because they are coarser materials and likely lack the cation exchange capacity that exists elsewhere on the UGA site, which Ecology has determined provides additional water quality treatment after infiltration. As such, potential risks to the Cle Elum or Yakima Rivers from cumulative development would increase. Specific surface and groundwater impacts resulting from future development in this area would be subject to environmental review prior to permits and approvals.

If residential development on the Suburban 1 zoned property were served by on-site septic systems, they would be required to comply with the Kittitas County Department of Health regulations for septic drainfield density and septic installation. If future environmental or Department of Health review resulted in a need for mitigation beyond standard septic installation, various enhanced septic systems or connection to the UGA sewer system would be feasible. The latter would require approval and construction of the UGA Trendwest proposal for connection to the sewer. Potential cumulative impacts to area drainage basins from septic systems associated with cumulative indirect growth are discussed in Section 3.3.2. Additional septic systems on the scale of the Suburban 1 zoned property were not found to have adverse consequences.

3.3.3 Off-Site Impacts

Water Supply

The proposed transfer of consumptive portions of tributary water rights to the MPR and UGA, leaving previous irrigation diversions instream, could only be beneficial to off-site tributary waters, though the amount of benefit to aquatic habitat and biota is not quantified.

Employment-Induced Septic Systems

The combined Reduced-Density MPR and UGA Alternative 5 would result in off-site rural employment-induced housing. To the extent that housing occurred in rural Kittitas County, it would employ septic systems. The potential for adverse impact to surface or groundwater from these added septic systems was evaluated (Exhibit 1) (A.C. Kindig & Co. 2002a).

Septic induced nitrate-nitrogen loadings to groundwater were analyzed by review of the literature, and by quantified analysis using the method of Hantzsche and Finnemore (1992) for 5-acre and 20-acre rural lots. With conventional septic treatment, and under the simplifying and

conservative assumption that the septic effluent plus precipitation recharge comprised the total groundwater volume under each lot, a nitrate-nitrogen concentration of 1.28 mg/L and 0.62 mg/L were predicted for 5-acre and 20-acre parcels with single households, respectively (See Appendix A). This result, which assumes no mixing with any underlying aquifer, is well within the 10 mg/L nitrate-nitrogen groundwater and drinking water standards. As expected at these densities, no adverse impacts to beneficial uses of groundwater would be expected. No adverse impacts from septic-origin phosphorus were reasonably expected, given the binding potential of phosphorus to native soils (Exhibit 1).

The evaluation nitrate-nitrogen on a regional subbasin (e.g., tributary basin) scale is provided for the combined Reduced Density MPR and Alternative 5 in Appendix A, reflecting the Master Site Plan for the UGA. Households from MPR and UGA-induced employment were distributed throughout subbasins in Kittitas County as described in the *Employment Induced Water Demand Analysis* (Shapiro and Associates, et. al. 2002). The results show that the maximum change in any of the subbasins would be 35 µg/L nitrate-nitrogen. This change would not have any adverse implications to beneficial uses of surface or groundwater in any basin.

3.3.4 Groundwater Quality

The MPR DEIS evaluated the cumulative impacts to the groundwater quality from stormwater infiltration by the MPR and UGA. A re-analysis of the most intensively built MPR subbasin was performed using alternative methods of analysis requested by Ecology. Two additional analyses, each increasingly conservative in terms of tending to over-estimate impacts, were requested by Ecology to verify the conclusions drawn in the MPR Draft EIS. Results of the two additional analyses confirmed no adverse impacts from the MPR (A.C. Kindig & Co. 2002b). These analyses are contained in the MPR FEIS Addendum (Kittitas County 2002).

3.3.5 Wastewater Treatment Plant Loadings to the Yakima River

Sewage treatment for the MPR and UGA could be accommodated by expansion of the Cle Elum wastewater treatment plant, which discharges to the Yakima River. The City of Cle Elum is planning to construct a regional wastewater treatment plant at the location of the existing plant at the east end of the City. Identification of potential effluent flows and pollutant loads to the Yakima River from Trendwest residential development and the regional wastewater treatment plant is provided in Section 3.16, Utilities, of the Final EIS.

4.0 REFERENCES

A.C. Kindig & Co. 2002a. Off-site rural employment-induced septic system analysis. January 11, 2002.

A.C. Kindig & Co. 2002b. Groundwater and surface water quality reanalysis for stormwater infiltrated by the MountainStar Master Planned Resort. January 15, 2002.

American Engineering Corporation. 1999. Cle Elum Urban Growth Area master drainage plan. Prepared for Trendwest Properties, Inc. July 1999.

Associated Earth Sciences, Inc. (AESI). 1998. Sand filter/grass cap bench test results. Unpublished data. Kirkland, Washington.

Associated Earth Sciences, Inc. (AESI). 1999a. Technical report: geology, groundwater and soils. Prepared for Kittitas County and Huckell/Weinman Associates, Inc., 1999.

Associated Earth Sciences, Inc. (AESI). 1999b. Post-development monitoring report, stormwater quality from catchment BL-2 (wet detention pond and grass-capped sand filter). Brighton's Landing, The Trossachs, and Belvedere Park. King County DDES File No. L98SH120. Report prepared for Pacific Properties, June 1999.

Associated Earth Sciences, Inc. (AESI). 1999c. Unpublished ongoing water quality data in support of the MountainStar MPR EIS. September 1999.

Associated Earth Science, Inc. (AESI). 2001. Technical memorandum: On-site groundwater return flow from irrigation for the MountainStar MPR and Cle Elum UGA. December 12, 2001.

Association of Bay Area Governments (ABAG). 1986. Urban stormwater treatment at Coyote Hills Marsh. ABAG, Oakland, California. December 1986.

Austin, City of. 1990. Removal efficiencies of stormwater control structures. Environmental Resource Management Division, City of Austin, Texas.

Austin, L. 2000. Washington State Department of Ecology. Personal communication, telephone conversation with Dana Zlateff (Associated Earth Sciences, Inc.). June 8, 2000.

Balogh, J.C. and W.J. Walker, 1992. Golf course management and construction. Environmental Issues. Lewis Publishers, Chelsea, MI. 951 pp.

H-01

Bellevue, City of. 1995. Characterization and source control of urban stormwater quality. Vol. 1. Tech Reports. March 1995. Bellevue, Washington.

Birge, W.J., R.D. Hoyt, J.A. Black, M.D. Kercher, and W.A. Robison. 1993. Effects of chemical stresses on behavior of larval and juvenile fishes and amphibians. American Fisheries Society Symposium 14:55-65.

Booth, D., K. Cumings, and R. Horner. 1997. Stormwater pollutant removal by two wet ponds in Bellevue, Washington. Civil and Engineering Department, University of Washington, Seattle, Washington.

Bortleson, G.C. and D.A. Davis. 1997. Pesticides in selected small streams in the Puget Sound Basin, 1987-1995. U.S. Geological Survey Fact Sheet 067-97. 4 p.

Broadbent, F.E. and F. Clark. 1967. Denitrification, soil nitrogen. W.X. Bartholemew and F.E. Clark, eds. American Society of Agronomy, Inc., Madison, WI. 10:307-313.

Brown, K.W. et al. 1979. Movement of fecal coliforms and coliphages below septic lines. Journal of the Water Pollution Control Federation, Vol. 49:11:2285-2296.

Brown, M.E. 1946. The growth of brown trout (*Salmo trutta* Linn.), II. The growth of two-year old trout at a constant temperature of 11.4 degrees C. Journal of Experimental Biology 22:130-144.

Brown, W. and T. Schueler. 1997. Comparative pollutant removal capability of urban BMPs: a reanalysis. Watershed Protection Techniques, Vol. 2, No. 4. June 1997. Median pollutant removal based on 30 samples.

Carballo, M., M.J. Munoz, M. Cuellar, and J.V. Tarazona. 1995. Effects of waterborne copper, cyanide, ammonia, and nitrite on stress parameters and changes in susceptibility to saprolegniosis in rainbow trout (*Oncorhynchus mykiss*). Applied and Environmental Microbiology G1(6):2108-2112.

Center for Watershed Protection. 1999. Microbes and urban watersheds: concentrations, sources, and pathways. Watershed Protection Techniques 3(1):554-565.

CH2M Hill. 1992. Suitability of the Mill Pond at Lakeland Hill at the location of Put and Take Trout Fishery in conjunction with its modification to serve as a detention facility. Bellevue, Washington.

Chan, E., G. Silvermand, and T. Bursztunsky. 1982. San Francisco Bay area regional wetlands plan for urban treatment. ABAG, Oakland, California.

Chapman, D.W. and T.C. Bjornn. 1969. Distribution of salmonids in streams with special reference to food and feeding. Pages 153-176 *in* T.G. Northcote, editor. Symposium on salmon and trout in streams. H.R. MacMillan Lectures in Fisheries, Vancouver, B.C.

Cle Elum, City of. 2001. Trendwest Properties: Cle Elum UGA Draft EIS. March 2001.

Copp, R., D. Vickstrom, T. Field. 1997. Performance of an infiltration basin for a commercial office park. Fifth Biennial Stormwater Research Conference. November 5 to 7, 1997.

Cordone, A.J. and D.W. Kelly. 1961. The influence of inorganic sediment on the aquatic life of streams. California Fish and Game 47(2):189-228.

Crawford, C.G. and L.J. Mansue. 1996. Suspended sediment characteristics of Indiana streams, 1952-84. U.S. Geological Survey Water Supply Paper 2404. 55 p.

Daoust, P.Y. and H.W. Ferguson. 1984. The pathology of chronic ammonia toxicity in rainbow trout, *Salmo gairdneri* Richardson. Journal of Fish Diseases 7:199-205.

Ellis, M.M. 1944. Water purity standards for fresh-water fishers. U.S. Fish and Wildlife Service, Special Scientific Report 2. 18 pp.

Erickson, L. and D. Kuhlman. 1987. What you need to know about groundwater concerns. Grounds Maintenance. February 1987. Pages 74, 75, and 128.

Field, R., M. O'Shea, and K. Chin. 1993. Integrated stormwater management. Lewis Publishers. 93-103.

Gilliom, R. and C. Patmont. 1983. Lake phosphorus loading from septic systems by seasonally perched groundwater. Journal of the Water Pollution Control Federation. 55(1):1297-1306.

Gjessing, E., E. Lygren, L. Berglind, T. Gulbrandsen, and R. Skaane. 1984. Effect of highway runoff on lake water quality. The Science of the Total Environment 33:245-257.

Gold, A.J., W.M. Sullivan, R.E. Hanson, T.G. Morton. 1988. The effect of lawn care practices on groundwater. Lawn Servicing. July 1988. Pages 14-15.

Grimm, L. 2001. W&H Pacific, Inc. Personal communication with Andy Kindig (A.C. Kindig & Co.). November 21, 2001.

Hammer, D.A. 1996. Creating freshwater wetlands. Lewis Publishers. 406 pp.

Hartman, G.F. 1965. The role of behavior in the ecology and interaction of underyearling coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*S. gairdneri)*. Journal of the Fisheries Research Board of Canada 22:1035-1081.

Hickok, E.A. 1980. Wetlands for the control of urban stormwater. Proceedings, National Conference on Urban Erosion and Sediment Control: Institutions and Technology. USEPA 905/9-80-002.

James, R.I. 1995. The role of constructed wetland treatment systems (CWTS) in ecological restoration. Land and Water (May/June). 16-18 p.

Johnson, J. 2000. Concentration of 303(d) listed metals in the upper Yakima River station 30A090.

Joy, J. 1997. A suspended sediment and DDT total maximum daily load evaluation report for the Yakima River. Pub. No. 97-321. January 1997.

Julliard, A.K., D. Saucier, and L. Astic. 1993. Effects of chronic low-level copper exposure on ultrastructure of the olfactory system in rainbow trout (*Oncorhynchus mykiss*). Histology and Histopathology 8:665-672.

Julliard, A.K., D. Saucier, and L. Astic. 1995. Time-course of apoptosis in the olfactory epithelium of rainbow trout exposed to a low copper level. Tissue and Cell 28(3):367-377.

Kerle, E.A., J.J. Jenkins, and P.A. Vogue. 1996. Understanding pesticide persistence and mobility for groundwater and surface water protection. Oregon State University Extension. EM 8561.

Kincheloe, J.W., G.A. Wedemeyer, and D.L. Koch. 1979. Tolerance of developing salmonid eggs and fry to nitrate exposure. Bulletin of Environmental Contamination and Toxicology 23:575-578.

King County. 1993. Pine Lake sand-filter mini-study, East Lake Sammamish Basin shopping center.

King County. 1995. Unpublished water quality data from the Uplands and Montreaux as part of Surface Water Management's best management practice evaluation program. Seattle, Washington.

King County. 1997. Water quality data from the Mill Pond Park as part of the Surface Water Management best management practice evaluation program. Seattle, Washington.

King County. 1998. King County surface water design manual. King County Department of Natural Resources, Water and Land Resources Division.

Kulzer, L. 1990. Water pollution control aspects of aquatic plants: implications for stormwater quality management. Office of Water Quality, Municipality of Metropolitan Seattle.

Land Profile, Inc. 1998. Preliminary soil characterization and determination of irrigation feasibility. Report to W&H Pacific, Inc.

Leonard, J.W. 1948. Importance of fish food insects in trout management. Michigan Conservation 17(1):8-9.

Lloyd, D.S. 1987. Turbidity as a water quality standard for salmonid habitats in Alaska. North American Journal of Fisheries Management 7:34-45.

Lynard, W.G., E.J. Finnemore, J. Loop, and R.M. Finn. 1980. Urban stormwater and technology: case histories. EPA Report. EPA-600/8-80-035.

Maciolek, J.A. and P.R. Needham. 1952. Ecological effects of winter conditions on trout and trout foods in Convict Creek California. Transactions of the American Fisheries Society 81:202-217.

Maestri, B., M.E. Dorman, and J. Hartigan. 1988. Managing pollution from highway stormwater runoff. Transportation Research Record 1166. p. 15-21.

Marr, J.C.A., H.L. Bergman, J. Lipton, and C. Hostrand. 1995a. Differences in relative sensitivity of naïve and metals-acclimated brown and rainbow trout exposed to metals representative of the Clark Fork River, Montana. Canadian Journal of Fisheries and Aquatic Science 52:2016-2030.

Marr, J.C.A., H.L. Bergman, M. Parker, J. Lipton, D. Cacela, W. Erickson, and G.R. Phillips. 1995b. Relative sensitivity of brown and rainbow trout to pulsed exposures of an acutely lethal mixture of metals typical of the Clark Fork River, Montana. Canadian Journal of Fisheries and Aquatic Science 52:2005-2015.

Martin, E.H. 1989a. Effectiveness of an urban runoff detention pond-wetlands system. ASCE Journal of Environmental Engineering 115(2):409-27.

Martin, E.H. 1989b. Effectiveness of an urban runoff detention pond-wetland system. Journal of Env. Eng. 114(4):810-827.

Municipality of Metropolitan Seattle (Metro). 1982. Toxicants in urban runoff. Metro Toxicant Program No. 2. Water Quality Division, Seattle, Washington.

National Academy of Sciences and National Academy of Engineering. 1973. Water quality criteria, 1972, a report of the committee on water quality criteria. Washington, D.C., Environmental Studies Board, National Academy of Sciences, National Academy of Engineering. 594 p.

Nussbaum, J. 1990. Urban stormwater runoff and groundwater quality. Report #90-2304. U.S. Environmental Protection Agency, Washington, D.C.

Olson, W.H., D.L. Chase, and J.N. Hanson. 1973. Preliminary studies using synthetic polymers to reduce turbidity in hatchery water supply. The Progressive Fish Culturist 35(2):66-73.

Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, and J.R. Leonard. 1982. Fish Hatchery Management. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 1982.

Reed, S.C., R. Bastian, W. Jewell. 1981. Engineers assess aquaculture systems for wastewater treatment. Civil Engineering, ACSE. July 1981.

Reinelt, L. and R. Horner. 1995. Pollutant removal from stormwater runoff by palustrine wetlands based on comprehensive budgets. Ecological Engineering, Vol. 4. 77-97.

Reneau, R.B., Jr. and D.E. Pettry. 1976. Phosphorus distribution from septic tank effluent in coastal plain soils. Journal of Environmental Quality 5(1):34-39.

Reuter, J.E., T. Djohan, and C.R. Goldman. 1992. The use of wetlands for nutrient removal from surface runoff in cold climate region of California, results from a newly constructed wetland at Lake Tahoe. Journal of Environmental Management 63:35-53.

Ruggles, C.P. 1966. Depth and velocity as a factor in storm rearing and production of juvenile coho salmon. Canadian Fish Culture 38:35-53.

Russo, R.C. and R.V. Thurston. 1991. Pages 58-89 *in* D.E. Brune, J.R. Tomasso, Jr. (Eds.). Aquaculture and water quality. World Aquiculture Society, Baton Rouge.

Saucier, D. and L. Astic. 1995. Morpho-functional alterations in the olfactory system of rainbow trout (*Oncorhynchus mykiss*). Environmental Biology of Fishes 30:345-351.

Sawhney, B.L. and J.L. Starr. 1977. Movement of phosphorous from a septic drainfield. Journal WPCF. November 1977. pp. 2238-2442.

Scholes, L.N.L., R.B.E. Shutes, D.M. Revitt, D. Purchase, and M. Forshaw. 1999. The removal of pollutants by constructed wetlands during wet weather. Water Science and Technology, Vol. 40, No. 3. 333-340.

Schueler, T. 1994. Review of pollutant removal performance of stormwater ponds and wetlands. Technical Note 6. Watershed Protection Techniques 1(1):17-18.

Schueler, T.R., P.A. Kumble, and M.A. Heraty. 1991. A current assessment of urban best management practices, techniques for reducing non-point source pollution in the coastal zone, review draft. Department of Environmental Programs, Metropolitan Washington Council of Governments, Washington, D.C.

Shapiro & Associates, Inc. 1998. Lakemont stormwater treatment facility monitoring program 1997 annual report.

Shapiro and Associates, Inc., Brown & Caldwell, Johnson-Gardner, LLC, and Mentor Law Group, PLLC. 2002. Employment-induced water demand analysis MountainStar MPR and Cle Elum UGA. Prepared for the City of Cle Elum's Trendwest Properties. January 7, 2002: Cle Elum UGA Final EIS (in progress).

Sigler, J.W., T.C. Bjornn, and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelhead and coho salmon. Transactions of the American Fisheries Society 113:142-150.

Simmons, C.E. 1993. Sediment characteristics of North Caroline streams, 1970-79. U.S. Geological Survey Water Supply Paper 2364. 84 p.

Sorenson, D.L., M.M. McCarthy, E.J. Middlebrooks, and D.B. Procella. 1977. Suspended and dissolved solids effects on freshwater biota: a review. U.S. Environmental Protection Agency Report 600/3-77-042. Environmental Research Lab, Corvallis, Oregon.

Stockdale, E. 1991. Freshwater wetlands and streams, urban stormwater, and nonpoint pollution control: a literature review and annotated bibliography. Resource Planning Section, King County Department of Parks and Planning and Resources, Seattle, Washington. Funded by the Washington Department of Ecology.

Thurston, R.V., R.C. Russo, J.R. Luedike, C.E. Smith, E.L. Meyn, C. Chakoumakos, K.C. Wang, and C.J.D. Brown. 1984. Chronic toxicity of ammonia to rainbow trout. Transactions of the American Fisheries Society 115:56-73.

Trautman, M.B. 1933. The general effects of pollution in Ohio fish life. Transactions of the American Fisheries Society 63:69-72.

Urbonas, B. 1994. Assessment of stormwater BMPs and their technology. Water Science and Technology 29(1):347-353.

Urbonas, B. 1999. Assessment of stormwater BMPs and their technology. Water Science Technology 29(1):347-353.

U.S. Environmental Protection Agency (EPA). 1993. Guidance specifying management measures for sources of nonpoint pollution in coastal waters. Report No. 840-B-92-0002. U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA) Region 10 Water Temperature Criteria Technical Workgroup. 2001. Technical synthesis: scientific issues relating to temperature criteria for salmon, trout, and charr native to the Pacific Northwest. Final Draft. February 28, 2001.

Wanielista, M.P. 1988. Alternatives for the treatment of groundwater contaminants: a detention pond with ground water inflow. Florida Department of Transportation, Tallahassee, Florida.

Washington State Department of Ecology (Ecology). 1990. Chapter 173-200 WAC. Water quality standards for ground waters of the state of Washington. Washington Department of Ecology. Lacey, Washington.

Washington State Department of Ecology (Ecology). 1992. Stormwater management manual for the Western Washington. February 1992.

Washington State Department of Ecology (Ecology). 1995. 1994 Washington State water quality assessment [305(b)] report companion document. Olympia, Washington.

Washington State Department of Ecology (Ecology). 1998. Department of Ecology final matrix for surface waters listed under section 303(d) included in 305B report of the Federal Clean Water Act (CWA). Olympia, Washington.

Washington State Department of Ecology (Ecology). 2000. Water quality standards for waters of the state of Washington (Chapter 173-201A WAC). Washington State Department of Ecology, Olympia, Washington.

Washington State Department of Ecology (Ecology). 2001a. Ambient water quality monitoring program for the Yakima River station 39A090.

Washington State Department of Ecology (Ecology). 2001b. Upper Yakima restoration plan: targeting sediments. April 2001.

Washington State Department of Ecology (Ecology). 2001c. Final stormwater management manual for western Washington, volume 5 runoff treatment BMPs. Publication No. 99-11 to 99-15. August 2001.

Washington State Department of Fisheries (WDF). 1975. A catalog of Washington streams and salmon utilization, Volume I, Puget Sound region. Olympia, Washington.

Washington Department of Health (WDOH). 1992. Drinking water regulations. (Chapter 246-290-300 WAC).

Washington State Department of Transportation (WSDOT). 1997. Stormwater management plan, Vol. 5.3. 40 CFR 122.26 (d)2.iv. March 25, 1997.

Waters, T.F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society, Monograph No. 7. Bethesda, MD. 251 p.

Wedemeyer, G.A. 1977. Environmental requirements for fish health. Proceedings of the International Symposium on Diseases of Cultured Salmonids. Travolek, Inc. Seattle, Washington.

Weiskel, P. and B. Howes. 1992. Differential transport of sewage-derived nitrogen and phosphorus through a coastal watershed. Environmental Science and Technology 26(2):361-368.

Westin, D.T. 1974. Nitrate and nitrite toxicity to salmonid fishes. The Progressive Fish Culturist 36(2):86-89.

Wilhelm, S., S. Schiff, and W. Robertson. 1994. Chemical fate and transport in a domestic septic system: unsaturated and saturated zone geochemistry. Environmental Toxicology and Chemistry 13(2):193-203.

Young K.D. and E.C. Thackston. 1999. Housing density and bacterial loading in urban streams. Journal of Environmental Engineering 125(12):1177-1180.

Yousef, Y.A., M.P. Wanielista, T. Hvitved-Jacobsen, and H.H. Harper. 1984. Fate of heavy metals in stormwater runoff from highway bridges. The Science of the Total Environment 33:233-244.

Yousef, Y.A. and M.P. Wanielista. 1985. Best management practices-effectiveness of retention/detention ponds for control of contaminants in highway runoff. FL/DOT/BMR-86-307. Florida Department of Transportation, Tallahassee, Florida.

EXHIBIT 1

Off-Site Rural Employment-Induced Septic System Analysis

EXHIBIT 1
OFF-SITE RURAL EMPLOYMENT-INDUCED SEPTIC SYSTEM ANALYSIS

1.0 Reason for Analysis

The Washington Department of Ecology (Ecology) raised off-site rural area groundwater quality impacts from added septic systems from employment-induced population growth arising from the Reduced Density MountainStar Master Planned Resort (MPR) and the Cle Elum Urban Growth Area (UGA). The issue was raised in a February 16, 2001 letter from Pacific Groundwater Group (PGG) to Ecology (*Re: Initial Evaluation of Issues for Determination of Environmental Benefit from Trend West MPR Water Right Transfer Applications*). Ecology requested Trendwest evaluate whether nitrate and phosphorus concentrations in groundwater would rise as a result of increases in rural Kittitas Co. populations and household septic tanks. The evaluation was requested on individual lot (e.g. 5-acre and 20-acre minimum rural parcel) and regional subbasin (e.g. tributary basin) scales. This analysis is provided for the combined Reduced Density MPR and Alternative 5, reflecting the Master Site Plan for the UGA. The number of employment-induced households in unincorporated Kittitas County, their distribution to tributary subbasins, and mean annual baseflow volumes for each subbasin, are reported in the *Employment-Induced Water Demand Analysis (Shapiro and Associates, et. al. 2002)*. This analysis is Appendix A of the Water Supply Technical Report Supplement in the Trendwest Properties: Cle Elum UGA Final EIS (City of Cle Elum 2001).

2.0 Phosphorus from Employment Induced Septic Drainfields

Phosphorus is often not regulated. There are no regulatory limits specific to phosphorus under the water quality standards. Phosphorus does not have a drinking water maximum contaminant level (Chapter 246-290 WAC), a groundwater maximum standard (Chapter 173-200 WAC), or a maximum surface water quality standard (Chapter 173-201A WAC). For some lakes and fewer rivers, phosphorus controls nuisance algal growth, and limits are placed on it through basin plans or Total Maximum Daily Load [TMDL] plans to prevent or correct human-induced eutrophication (excessive nutrients and algal growth). However, there are no reported eutrophication problems with the surface waters evaluated in this report. Phosphorus is not an issue for groundwater because it phosphorus binds readily to iron and aluminum and calcium to form mineralized compounds in soils, and thus does not readily migrate through soils.

H-01

Assuming that septic systems are legally built to minimum requirements of the Washington Department of Health, literature references were evaluated to evaluate the mobility of phosphorus away from a septic drainfield, and thus the risk to surface waters through added septic systems distributed on 5- to 20-acre or larger lots in rural Kittitas County.

A number of investigations on the movement of fertilizer phosphorous and of phosphorous applied to soil in effluent from waste water treatment plants have shown that phosphorous binds to sorption sites in the soil. Even under high phosphorous loading to infiltration basins, for example wastewater treatment plant discharges, the soluble phosphorous front advances only very slowly as sorption sites are occupied. Phosphorus in effluent at various depths below a six-year old septic drainfield trench was measured to see how phosphorus was distributed in the unsaturated soils immediately under the drainfield (Sawhney and Starr 1977). Soluble inorganic phosphorus in effluent 15 centimeters (about 6 inches) immediately below the drain trench rapidly reached a concentration equivalent to the septic effluent in the trench, as phosphorus-sorption sites in this horizon were occupied and saturated. Soluble inorganic phosphorus concentrations at a 30 centimeter depth (about one foot) throughout the 13 months of monitoring showed a very large fraction of the phosphorus was removed between 15 and 30 centimeters, even though the septic system had been in operation for six years. At a 60 centimeter depth below the infiltration trench (about two feet), soluble inorganic phosphorus was reduced from an average 13.2 mg/L in the effluent to 0.5 mg/L, which is an approximate 96 percent reduction. Sawhney and Starr (1977) also examined sorption regeneration, and showed that where septic systems flow to drainfields on an intermittent basis, allowing alternate drying and wetting of the drainfield soils, sorption capacity of the unsaturated soils was increased.

Wilhelm et al. (1994) studied an operating 13-year old single family septic system to evaluate the geochemical processes occurring below the drainfield, including processes affecting soluble phosphorus transport in the effluent. This drainfield included evaluations in both unsaturated and saturated zones within the underlying shallow aquifer. While soluble phosphorus was removed in both zones, Wilhelm et al. (1994) found that phosphate decreased to near-background concentrations quickly in the saturated zone within the shallow aquifer, which was attributed to sorption onto $CaCO_3$ and precipitation with Ca^{++}. In five-day laboratory experiments, Wilhelm et al. (1994) measured a soil sorption capacity of 5 mg/L of soluble phosphorus per 100 grams of soil. However, longer-term experiments and field studies show soils typically sorb with twice this capacity, pointing to the importance of regeneration, likely by re-coating of soils with calcium providing additional binding sites (Weiskel and Howes, 1992). Wilhelm et al. (1994) found that relative to the initial septic-tank effluent, the groundwater

H-01

plume that traveled from the domestic septic system was locally and quickly depleted of soluble phosphorus, even after 13 years of operation.

The conclusion that phosphorus is locally reduced to background levels is supported by results even where septic systems are placed in medium to coarse sands (Weiskel and Howes 1992). Soluble phosphorus was removed to background levels within 2.4 meters (less than 8 feet) of the drainfield discharge. The rapid immobilization of phosphorus was attributed to inorganic adsorption and precipitation to iron, aluminum, and calcium. Similar results are reported by Reneau and Pettry (1976) and Gilliom and Patmont (1983) for movement of septic-generated phosphorus through saturated soils.

Where water tables are at least a few feet below the drainfield, or where groundwater is shallow and soils are even medium-coarse saturated sands or finer-grained, septic system contributions of phosphorus to groundwater will be minimal. However, if septic systems were to be placed over shallow groundwater with very coarse soils, phosphorus concentrations could be much higher.

The Kittitas County Department of Health (DOH) has the responsibility to regulate septic drainfield density, and regulate septic installation only where soil and depth to groundwater conditions are suitable for adequate removal of all septic constituents. DOH generally prohibits septic drainfield placement in coarser grained soils, except where densities and rainfall are very low and beneficial uses of groundwater resources are not at risk. The DOH requires a depth of greater than 3 feet for vertical separation of any septic drainfield to the seasonally high groundwater table, for conventional gravity systems in fine and medium-grained soils (1B-6 soil types, WAC 246-272-02001) (DOH 2001).

The conclusion is that legally placed septic systems resulting from employment-induced growth from the Cle Elum UGA and MountainStar MPR would not result in export of phosphorus above background to groundwater, or via groundwater to surface waters. There is no reasonably expected adverse impact for any of the tributary subbasins affected by employment-induced population growth.

3.0 Nitrate-nitrogen from Employment Induced Septic Drainfields

Unlike phosphorus, nitrate-nitrogen readily travels sub-surface, and has a 10 mg/L maximum contaminant level health-based drinking water standard (Chapter 246-290 WAC) and a 10 mg/L maximum groundwater quality standard (Chapter 173-200 WAC). There is no maximum standard for nitrate-nitrogen in surface waters (Chapter 173-201A WAC), because nitrate-nitrogen is virtually

H-01

non-toxic to aquatic organisms. Nitrate loadings from induced septic system construction in rural Kittitas County was evaluated at the 5-acre and 20-acre lot size, and cumulatively in each affected subbasin identified in the *Employment-Induced Water Demand Analysis* (Shapiro and Associates, et. al. 2002)

3.1 Rural Lot Nitrate-Nitrogen Analysis Methods

Septic induced nitrate-nitrogen loadings to ground water was analyzed by review of the literature, and by quantified analysis using the method of Hantzsche and Finnemore (1992) for 5-acre and 20-acre rural lots. This model calculates nitrate-nitrogen loadings and concentrations prior to dilution or mixing in the underlying aquifer. The model mixes percolating recharge waters at steady state over the period of time simulated; in this case annually. Mass balance is inherent in the Hantzsche and Finnemore model, which includes inputs from waste water and recharge from rainfall, and losses from denitrification in the soil column. This approach includes a simplifying assumption that there is uniform mixing of waste water and percolating rainfall over the area being evaluated, which is not an unreasonable assumption at the 5-acre, 20-acre, or subbasin-wide spatial scales in this analysis. The model conservatively assumes full conversion of nitrogen to nitrate. This is usually a reasonable assumption, and at worst would tend to slightly over-estimate the nitrate-nitrogen concentrations where conversion is not 100 percent. The model ignores finer-scale dispersion and lateral flow, and mixing with ground water below the drainfields or from upgradient areas.

Three reference sources were used to estimate daily wastewater flows, the EPA Design Manual for On-site Wastewater Treatment and Disposal (U.S. EPA 1980), Metcalf and Eddy (1991), and measured flow data from the Holmes Harbor Wastewater Reclamation Facility in Freeland, Washington (T. Cleverdon, pers. comm. February 17, 1999). The Holmes Harbor system was selected because the collection system uses a septic tank effluent pump (STEP) and low pressure sewer system that is not susceptible to infiltration and inflow, and because it generated average data from a number of homes.

Average daily flow from a typical residential dwelling is cited by the U.S. EPA (1980) as approximately 45 gal/capita/day (gpcd), with peaks usually no greater than 60 gpcd and seldom exceeding 75 gpcd. Metcalf and Eddy (1991) estimated that typical wastewater flow rates from medium income and luxury homes is 60 gpcd. Flow data from the Holmes Harbor facility for 6 months in late 1998 averaged 15,000 gallons/day. There were approximately 100 residences discharging to the Holmes Harbor system, giving an average flow rate per contributing residence of 150 gpd. Population data from the Washington State Office of Financial Management indicates average dwelling occupancy is 2.5

H-01

persons/residence. Applying this occupancy rate to Holmes Harbor yields an average flow rate of 60 gpcd. To add a safety factor to the forecast flow rates, the average number of persons per residence was increased to three. The Kittitas County Health Department estimates a 240 gpd peak flow rate based on 2 bedroom occupancy (Nelson 2001). The average flow rate per residential dwelling of 180 gpd per residence was assumed for the model, which calculates an average annual case.

Nitrate loading is a function of wastewater flow and nitrate concentration of the wastewater. Metcalf and Eddy (1991) estimated average total nitrogen for medium strength wastewater (typical residence) as 40 mg/L. The EPA (1978) publication Management of Small Waste Flows reports two studies in which total nitrogen (TN) concentration in septic tank influent (inflow to the tank) ranged from 36 to 94 mg/L. Approximately 24 to 28 percent TN was removed through settling of solids in the septic tank. As a result, the TN concentration in the effluent ranged from 26 to 76 mg/L , and the mean value of effluent (outflow from the tank) samples was 45 mg/L. These data are very similar to those of Metcalf and Eddy (1991). Averaged, they yield a TN concentration of 53.5 mg/L TN in influent to the septic tank, and 42.5 mg/L in septic tank effluent. This effluent is then dispersed to the soil in the drainfield.

Long (1995) reported nitrogen removal performance for four soil types based on a literature review (course sands to clays). The more porous the media, the less nitrate removal expected. Long (1995) anticipated medium grain sands have an approximate 40 percent denitrification rate. If the 40 percent denitrification rate is used, the effluent concentration of nitrogen (as nitrate) after 3 to 4 feet of travel through the soil column would be approximately 26 mg/L, given a 42.5 mg/L TN effluent from the septic tank. This estimate compares very favorably with data presented in the U.S. EPA Design Manual (1980). Performance measurements of systems in medium sand treating typical household wastewater showed that TN in the effluent ranged from 18 to 33 mg/L. (U.S. EPA Design Manual, 1980). Nonetheless, as an additional conservative measure, denitrification was estimated (county-wide) to average 10 percent and not the 40 percent rate assumed by Long. Hanztsche and Finnemore (1992) suggested a 10 to 25 percent denitrification range was reasonably assumed, based on fertilization studies that should be applicable to septic effluent evaluations.

In summary, the anticipated TN removal for conventional on-site systems occurs through sedimentation of solids (24 to 28 percent reduction), and through a variety of processes (biological removal, immobilization, mineralization) once the effluent reaches the soil drainfield (10 percent reduction). Almost complete conversion of nitrogen compounds to nitrate-nitrogen would be expected as wastewater is treated in the soil. Nitrogen loading per residence, assuming 180

H-01

gal/day and 42.5 mg/L nitrogen (as nitrate-nitrogen) effluent, would be about 9.5 kg per year per residence.

The septic loading volumes were based on an average occupancy of 3 people at 60 gal/day each, a TN septic tank effluent concentration of 42.5 mg/L, and a 10 percent denitrification rate. Recharge to the rural lots evaluated would be variable for the employment-induced distribution through rural Kittitas County. For the purposes of this evaluation, recharge was based on the MPR East-C-Creek Subbasin recharge in the MPR DEIS, which was 20.25 inches per year. Rainfall nitrate-nitrogen concentration was set as 0.40 mg/L, which was taken from the National Atmospheric Deposition Program station at LaGrande, Washington, in Pierce County (winter and spring 1998 maximum).

3.2 Rural Lot Nitrate-Nitrogen Analysis Results

With conventional septic treatment, and under the simplifying and conservative assumption that the septic effluent plus precipitation recharge comprised the total groundwater volume under each lot, a nitrate-nitrogen concentration of 1.28 mg/L and 0.62 mg/L were predicted for 5-acre and 20-acre parcels with single households, respectively (Appendix A). This result, which assumes no mixing with any underlying aquifer, is well within the 10 mg/L nitrate-nitrogen ground water and drinking water standards. As expected at these densities, no adverse impacts to beneficial uses of groundwater would be expected.

3.3 Subbasin-wide Nitrate-Nitrogen Analysis Results

Households from MPR and UGA-induced employment were distributed throughout subbasins in Kittitas County as described in the *Employment Induced Water Demand Analysis* (Shapiro and Associates, et. al. 2002). Average annual baseflow volumes for each subbasin were also provided in that document. Using the nitrate loadings per household established above, the change in nitrate-nitrogen concentration that could accrue subbasin wide was also calculated, assuming the entire induced growth septic nitrate-nitrogen load in each subbasin became a part of the average annual baseflow (Table E-1).

The results show that the maximum change in any of the subbasins would be 35 µg/L nitrate-nitrogen. This change would not have any adverse implications to beneficial uses of surface or groundwater in any basin.

H-01

Table E-1
Maximum Subbasin Changes in Nitrate-Nitrogen Concentrations
from Employment-Induced New Septic Systems
in Rural Kittitas County
(Reduced-Density MPR and UGA Alternative 5)

Subbasin Number	Number of In-Migrant Households (MPR Reduced Density and UGA Alternative 5)[1]	Total Annual Waste Load (kg/yr)	Mean Annual Base Flow (ac-ft/yr)[2]	Change in Nitrate-Nitrogen Concentration Over Background (µg/L)
Subbasin No. 1 (Cle Elum)	13.3	126.4	115,076	0.89
Subbasin No. 2 (Easton)	43.3	411.4	143,986	2.32
Subbasin No. 3 (Teanaway)	36	342	66,687	4.16
Subbasin No. 4 (Swauk)	12.1	114.9	23,624	3.94
Subbasin No. 5 (Elk heights)	20.9	198.6	13,116	12.3
Subbasin No. 6 (Taneum)	10	95.0	29,542	2.61
Subbasin No. 7 (Reecer)	40.3	382.9	13,248	23.4
Subbasin No. 8 (Thorp)	21.5	204.3	7,099	23.6
Subbasin No. 9 (Wilson-Naneum)	100.3	952.9	22,144	34.9
Subbasin No. 12 (Shushuskin)	6.4	60.8	2,033	24.2

1) Table 6, Employment-Induced Water Demand Analysis MountainStar MPR and Cle Elum UGA, January 7, 2002 (Shapiro and Associates et. al. 2002).
2) Table 10, Employment-Induced Water Demand Analysis MountainStar MPR and Cle Elum UGA, January 7, 2002 (Shapiro and Associates et. al .2002).

H-01

References

Gilliom, R. and C. Patmont. 1983. Lake phosphorus loading from septic systems by seasonally perched groundwater. Journal of the Water Pollution Control Federation. 55(1):1297-1306.

Kittitas County Department of Health (DOH). 2001. Fax from Mark Nelson of the State Board of Health WAC 4672, September 21, 2001.

Reneau, R.B. Jr. and D.E. Pettry. 1976. Phosphorus distribution from septic tank effluent in coastal plain soils. Journal of Environmental Quality 5(1):34-39.

Shapiro and Associates, Inc., Brown & Caldwell, Johnson-Gardner, LLC, and Mentor Law Group, PLLC. 2002. Employment-Induced Water Demand Analysis MountainStar MPR and Cle Elum UGA; prepared for the City of Cle Elum's Trendwest Properties, January 7, 2002: Cle Elum UGA Final EIS (in progress).

Weiskel, P. and B. Howes. 1992. Differential transport of sewage-derived nitrogen and phosphorus through a coastal watershed. Environmental Science and Technology 26(2):361-368

Wilhelm, S., S. Schiff, and W. Robertson. 1994. Chemical fate and transport in a domestic septic system: unsaturated and saturated zone geochemistry. Environmental Toxicology and Chemistry, 13(2):193-203.

H-01

EXHIBIT 2

Hantzche and Finnemore (1992) Model Results for 5-acre and 20-acre Parcels

Mt. Star Estimated nitrate nitrogen concentration at entry to the shallow aquifer from residential septic use.

Date: December 5, 2001

Hantzsche and Finnemore (1992)

Conventional Septic

5 acre parcel **Equation Inputs:**

a	180	(gpd/du)	Waste Loading Rate.
b	1	(du)	Contributing Residential Units.
c	5	(acres)	Acres effluent will be discharged over.
d	42.5	(mg/l)	Septic tank effluent tot. nitrogen concentration.
e	20.25	(in/year)	Recharge Rate for fraction of year considered as steady state
f	0.4	(mg/l)	Nitrate concentration of the rainfall.
g	0.1	(%)	Percent denitrification
h	1	(year)	Fraction of year considered as steady state
I	180	(gpd)	Waste Load
j	24.06	(ft3/day)	Waste Load
k	8783.42	(ft3/year fraction)	Waste Loading Rate
l	0.04	(ft/yr)	Waste Load Distribution
m	0.48	(in/year)	Waste Load Distribution

Final Concentration NO3 1.28 (mg/l)

= ((m*d*(1-g))+(e*f))/(m+e)

H-01

Mt. Star

Estimated nitrate nitrogen concentration at entry to the shallow aquifer from residential septic use.

Date: December 5, 2001

Hantzsche and Finnemore (1992)

Conventional Septic

20 acre parcel

Equation Inputs:

a	180	(gpd/du)	Waste Loading Rate.
b	1	(du)	Contributing Residential Units.
c	20	(acres)	Acres effluent will be discharged over.
d	42.5	(mg/l)	Septic tank effluent tot. nitrogen concentration.
e	20.25	(in/year)	Recharge Rate for fraction of year considered as steady state
f	0.4	(mg/l)	Nitrate concentration of the rainfall.
g	0.1	(%)	Percent denitrification
h	1	(year)	Fraction of year considered as steady state
I	180	(gpd)	Waste Load
j	24.06	(ft3/day)	Waste Load
k	8783.42	(ft3/year fraction)	Waste Loading Rate
l	0.01	(ft/yr)	Waste Load Distribution
m	0.12	(in/year)	Waste Load Distribution

Final Concentration NO3 0.62 (mg/l)

= ((m*d*(1-g))+(e*f))/(m+e)

H-01

Appendix B

Water Supply Technical Report Supplement



www.C-LineProducts.com
Style #70568 1-888-860-9120

Water Supply Technical Report Supplement
MountainStar MPR and Cle Elum UGA

Trendwest Properties: Cle Elum UGA Final EIS

Prepared by:

Shapiro and Associates, Inc.
Brown & Caldwell
A.C. Kindig & Co.
Mentor Law Group, PLLC
Northwest Hydraulic Consultants, Inc.

March 18, 2002

TABLE OF CONTENTS

Page

1. INTRODUCTION 1
- 1.1 PROJECT ENVIRONMENTAL REVIEW 1
- 1.2 PURPOSE FOR TECHNICAL REPORT SUPPLEMENT 2
- 1.3 STATUS OF WATER SUPPLY PERMITTING 2

2. PROPOSED ACTION AND ALTERNATIVES 3
- 2.1 DESCRIPTION OF DEVELOPMENT PROPOSALS 3
- 2.2 WATER SUPPLY AND FACILITIES FRAMEWORK 6
- 2.3 DESCRIPTION OF AVAILABLE WATER SUPPLIES 9
- 2.4 ENVIRONMENTAL STEWARDSHIP AGREEMENTS 10

3. AFFECTED ENVIRONMENT 15
- 3.1 INTRODUCTION 15
- 3.2 TRIBUTARY SUBBASINS 16
- 3.3 YAKIMA RIVER MAINSTEM 20
- 3.4 2001 MONITORING ACTIVITIES 28

4. ENVIRONMENTAL IMPACTS 31
- 4.1 IMPACTS ON STREAMFLOWS 31
- 4.2 IMPACTS ON THIRD-PARTY WATER USES 51
- 4.3 IMPACTS ON WINTER STREAMFLOWS 59
- 4.4 TWSA AND RESERVOIR STORAGE IMPACTS 59

5. INDIRECT IMPACTS 61
- 5.1 DEVELOPMENT ON FALLOWED LANDS 62

6. CUMULATIVE IMPACTS 68

7. MITIGATION MEASURES 69
- 7.1 GROUNDWATER INFILTRATION 69
- 7.2 ON-SITE STORAGE RELEASES 69
- 7.3 WATER RIGHT ACQUISITION 70
- 7.4 DROUGHT MANAGEMENT 70
- 7.5 THIRD-PARTY WATER SYSTEM IMPROVEMENTS 70
- 7.6 MONITORING 71

8. UNAVOIDABLE IMPACTS 74
- 8.1 SHALLOW GROUNDWATER WITHDRAWALS 74
- 8.2 MAINSTEM FLOW LEVELS 74
- 8.3 IRRIGATION RETURN FLOWS 75

TABLE OF CONTENTS (continued)

Page

List of Tables

Table 2-1: Cle Elum UGA Development Activities Summary 3
Table 2-2: Cle Elum UGA Annual Water Requirements 4
Table 2-3: MountainStar Resort Development Activities Summary 5
Table 2-4: MountainStar Resort Annual Water Requirements 5
Table 2-5: Trendwest's Average Annual Consumptive Use and Supply Balance for Direct Uses, in Ac-Ft 7
Table 2-6: Trendwest Surface Water Rights 9
Table 2-7: MountainStar Unit Reductions 15
Table 3-1: YRBWEP Target Parker and Prosser Flows 22
Table 4-1: Tributary Water Rights Acquired by Trendwest 40
Table 4-2: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under Long-Term Average Year Conditions (Study Years 1991-1993, 1995)[1] 49
Table 4-3: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001) 50
Table 4-4: Baseline and Proposed Flow Conditions 53
Table 5-1: Consumptive Use (CU) from Future Use of Fallowed Lands 62
Table 5-2: Water Demands from Pautzke Property Development 63
Table 5-3: Consumptive Use, In-migrant Households Associated with Trendwest Employment—Unincorporated Areas 65
Table 5-4: Subbasin Groundwater Consumptive Use and Base Flow Comparison, MPR Reduced Density and UGA Alternative 5 65
Table 5-5: Consumptive Use, In-migrant Households Associated with Trendwest Employment—Incorporated Areas 67
Table 6-1: Trendwest's Average Annual Consumptive Use and Supply Balance for Direct and Indirect Uses, in Ac-Ft 69
Table 8-1: Water Surface Elevation Changes at Third Party Diversion Sites (in feet) 74

List of Figures

Figure 2.1: Subbasin No. 2 (Easton) 11
Figure 2.2: Subbasin No. 3 (Teanaway River) 12
Figure 2.3: Subbasin No. 4 (Swauk Creek) 13
Figure 3.1: Vicinity Map of Kittitas County 17
Figure 3.2: Mainstem Yakima River Diversions 24
Figure 3.3: Location of 2001 Gauge Stations 30
Figure 4.1: Log-Log Regression of Teanaway River at Forks and Big Creek (Upstream of Darling-Lund Diversion) 34
Figure 4.2: Predicted Versus Observed Big Creek Stream flow During 2001 Monitoring Period 34
Figure 4.3: Log-Log Regression of Teanaway River at Forks and First Creek Upstream of the Diversion 35
Figure 4.4: Predicted Versus Observed First Creek Streamflow During 2001 Monitoring Period 35
Figure 4.5: Log-Log Regression of Teanaway River at Forks and Swauk Creek (Upstream of First Creek) 36

Page

Figure 4.6: Predicted Versus Observed Swauk Creek Streamflow (Upstream of First Creek) During 2001 Summer Low Flow Season 36
Figure 4.7: Irrigation Return Flow Schedule to Yakima River from Big Creek Diversion (Hydraulic Conductivity of 750 ft/day) 43
Figure 4.8: Irrigation Return Flow Schedule to Yakima River from Big Creek Diversion (Hydraulic Conductivity of 75 ft/day) 43
Figure 4.9: Empirical Relationship Between Streambed Seepage and Big Creek Flow at the Diversion Dam 44
Figure 4.10: Alluvial Return Flow Schedule to Yakima River from Big Creek Seepage 44

Exhibits

Exhibit A: Combined Model Results
Exhibit B: Uncertainty Analysis
Exhibit C: Water Rights Incorporated in Water Balance Model
Exhibit D: Representative Spreadsheets from Water Balance Model (Brown & Caldwell)
Exhibit E: Water Demand Estimates (W&H Pacific 2001)
Exhibit F: On-Site Ground Water Return Flows from Irrigation; MountainStar MPR and Cle Elum UGA (Associated Earth Sciences, Inc. 2001)
Exhibit G: Tributary Basin Hydrologic Reports
1. Big Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002)
2. Teanaway River Basin Hydrologic Analysis (Pacific Groundwater Group 2002)
3. Swauk/First Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002)
4. Reecer Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002)

Exhibit H: Water Demand from Fallowed Lands (Shapiro, et. al. 2002)
Exhibit I: Assessment of Impacts to Groundwater Levels and Wells from Discontinued Irrigation Seepage Recharge (Pacific Groundwater Group 2002)
Exhibit J: Review of Effects of Water Rights Transfers on Tributary and Ditch Hydraulics (Montgomery Water Group 2002)
Exhibit K: Review of Yakima River Diversion Intakes (Northwest Hydraulic Consultants, Inc. 2002)

1. INTRODUCTION

Trendwest Resorts, Inc. (Trendwest) owns approximately 7,400 acres of land between the cities of Cle Elum and Roslyn in unincorporated Kittitas County, Washington. Trendwest proposes to develop approximately 1,100 acres of the Trendwest property located in the City of Cle Elum's Urban Growth Area (UGA) as a master planned community, consistent with the goals and requirements for UGAs under the Washington State Growth Management Act (RCW 36.70A). Trendwest has received approval from Kittitas County to develop the remainder of the property, located outside the City of Cle Elum's UGA, as the MountainStar Master Planned Resort (MPR). Trendwest has developed a water supply strategy for the proposed development that relies on transfers of existing water rights. The Cle Elum UGA water supply strategy is similar in many respects to Trendwest's strategy to provide water for the MountainStar Master Planned Resort. The proposed MPR was the subject of a separate EIS published by Kittitas County in June 2000. The cumulative impacts of both projects are described in this report and in the UGA EIS for which this report was prepared. The water supply strategy for each project is described below.

Trendwest is proposing to develop property it owns within the City of Cle Elum's UGA, separate from the MPR. Trendwest's UGA proposal involves the development of a variety of single-family and multi-family residential units; a business campus; and community and recreation facilities. The UGA Draft Environmental Impact Statement (EIS) considered three development alternatives (referred to in the document as Alternatives 2, 3 and 4) and a no action alternative, referred to in the document as "Alternative 1." All three development alternatives included an 18-hole golf course and related facilities. Alternatives 2 and 4 also included development of the Washington State Horse Park, a multiple-use, national class equestrian facility. Trendwest agreed to set aside property under all three development alternatives for a Community Recreation Center, the City of Cle Elum's water treatment plant, and for future expansions of the School District No. 404 campus and Laurel Hill Memorial Park Cemetery.

Following publication of the Draft EIS in March 2001, Trendwest redesigned its proposal in response to public comment and submitted a Master Site Plan Application to the City of Cle Elum in August 2001 for a fourth development alternative (Alternative 5). Alternative 5 has been designed to result in a level of environmental impact that falls within the range of impacts evaluated in the Draft EIS; as such, no new significant impacts are anticipated and the analysis of Alternative 5 is evaluated in the Final EIS. The primary differences between Alternative 2 and Alternative 5 are that Alternative 5 does not include seasonal/visitor accommodations, a golf course, or the Washington State Horse Park. Alternative 5 features permanent residential housing, and expands the area of natural open space that would be dedicated as the Cle Elum River corridor.

1.1 PROJECT ENVIRONMENTAL REVIEW

The City of Cle Elum has assumed lead agency status for purposes of compliance with the State Environmental Policy Act (SEPA). Cle Elum is preparing an EIS on the Trendwest development proposal and for adoption of a Subarea Plan and zoning regulations for the UGA, as required under the SEPA and the City of Cle Elum's SEPA ordinance. The City published a Draft EIS in March 2001. The City invited public comment through May 7, 2001.

In December 2000 Trendwest entered a Cost Reimbursement Contract under RCW 90.03.265 with the Washington Department of Ecology (Ecology) for the purpose of conducting additional environmental review and processing of the Trendwest's water right transfer applications. In accordance with implementing regulations, Ecology retained the consultant team of Pacific Groundwater Group (PGG), Montgomery Water Group (MWG) and Parametrix as technical consultants under this Contract (collectively referred to as the Ecology Consultant Team, or ECT). Over the course of the last year, Trendwest and the City of Cle Elum have worked with Ecology and ECT to conduct additional environmental review of the Trendwest water transfer proposals. Initially, Ecology intended to produce and adopt a Supplemental EIS to the Kittitas County Final EIS for the MPR to evaluate the Trendwest water transfers. In November 2001, however, Ecology agreed instead to provide ECT's work product to the City to be incorporated into the City's Final EIS.

Trendwest is requesting that Kittitas County prepare an Addendum to the MPR Final EIS to disclose additional information on specific water-related aspects of the MPR proposal. Finally, Trendwest is requesting that Ecology and the Kittitas County Water Conservancy Board (KCWCB) use the City of Cle Elum's EIS and the Addendum to the Final EIS for purpose of SEPA compliance for water rights transfer applications Trendwest has filed in connection with both the UGA and MPR projects.

1.2 PURPOSE FOR TECHNICAL REPORT SUPPLEMENT

The purpose of this supplement is to respond to comments received on the UGA Draft EIS and to provide additional environmental review for Trendwest's proposed water rights transfers. This analysis reflects additional 2001 streamflow monitoring and detailed analysis of hydraulic and hydrogeologic conditions in the subbasins where Trendwest's tributary water rights are located.

1.3 STATUS OF WATER SUPPLY PERMITTING

At Ecology's direction, and as required under RCW 90.03.280, Trendwest published public notice of all of its water rights transfer applications in newspapers in Kittitas and Yakima counties. The public notices for the MPR were originally published in the Ellensburg Daily Record, the Northern Kittitas County Tribune and the Yakima Herald. The notices invited public comment on the applications through October 30, 2000

On October 8, 2001, Trendwest filed six separate water right transfer applications with the KCWCB, three to supply water for residential development within the UGA and three to supply water to the MPR. Public notices for the mainstem water rights were published by the KCWCB in the Ellensburg Daily Record and the Northern Kittitas County Tribune on November 8 and 15, 2001, and republished on December 20 and 27, 2001, inviting public comment through January 28, 2002. At Ecology's direction, Trendwest published public notices for 22 water right transfer applications for its tributary water rights, proposing to change the purpose of use of its tributary water rights from irrigation and stockwater to instream flows. The pubic notices invited public comment through December 17, 2001. Eleven of the tributary water right applications were made to offset consumptive uses within the UGA and eleven applications were made to offset

consumptive uses within the MPR. The KCWCB will conduct a general investigation of the mainstem water rights transfer applications, creating a record for Ecology's review and approval. Ecology will conduct a general investigation of the tributary transfer applications. Both agencies will consider public comments prior to making any decisions on the applications.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF DEVELOPMENT PROPOSALS

2.1.1 Urban Growth Area

This Water Supply Technical Report Supplement considers the impacts of Alternative 5 (reflecting the Master Site Plan Application). A summary of the dwelling units (d.u.) and other development activities is shown in Table 2-1.

Table 2-1: Cle Elum UGA Development Activities Summary

Land Use	Alternative 5[1]
Residential Uses	
Single Family Residential	810 d.u.
Multifamily Residential	524 d.u.
Subtotal, Residential Uses	1,334 d.u.
Commercial Uses	
Business Park	950,000 square feet
Irrigation Uses	
Miscellaneous irrigation	30.0 acres
Subtotal, Irrigation Uses	30.0 acres

1 Miscellaneous irrigation uses in Alternative 5 include public areas and residential irrigation.
Source: Trendwest 2001.

Water demands for the UGA are calculated in terms of total diversion requirements, total return flows, and net water requirements. The total annual diversion requirement for Alternative 5 is 500.1 acre-feet (ac-ft). Of this total diversion, approximately 370.9 ac-ft represents a return flow to the Cle Elum and Yakima Rivers, either as infiltration from irrigation practices, system losses, or as wastewater. The peak instantaneous demand is approximately 1.6 cubic feet per second (cfs) and occurs in July. Annual water demands for UGA Alternative 5 are summarized in Table 2-2.

2.1.2 MountainStar Master Planned Resort

Trendwest is proposing to develop the MountainStar MPR on 6,225 acres west of the Cle Elum UGA property, consistent with the Conceptual Master Plan submitted to Kittitas County in September 2000. The MPR will include a wide variety of visitor accommodations and resort amenities, located in a Resort Center and in satellite facilities located throughout the property. Trendwest's plans for the MountainStar Resort include development of two championship golf

courses. Both will be located in the area east of the Cle Elum River. Both golf courses probably will include practice facilities, including putting greens and driving ranges.

Table 2-2: Cle Elum UGA Annual Water Requirements

Element	Alternative 5
Diversion Demands (ac-ft)	
Treated non-irrigation	358.7
Treated irrigation	70.6
Untreated irrigation	25.3
Misc. uses and losses	45.5
Total Diversion	500.1 ac-ft
Return Flows (ac-ft)	
Wastewater flows	301.1
Treated irrigation	24.7
Untreated irrigation	1.0
Irrigation, misc. uses and losses	44.1
Total Return Flows	370.9 ac-ft
Net Water Requirement (ac-ft)	129.2 ac-ft
Peak Instantaneous Demands (cfs) (July)	
Treated	1.4
Untreated	0.1
Total normal peak	1.6
Untreated emergency storage makeup	0.0
Total Normal + Makeup	1.6 cfs

Source: W&H Pacific 2001.

The MountainStar Resort will be opened for development in three primary phases, with each phase likely developed in sub-phases over a projected 30-year buildout period. The first year of buildout will correspond with development proposed for Phase 1, which includes the golf courses and Resort Center. The primary features of the Resort Center will be a 300-room overnight lodge, numerous shops and restaurants, a health spa, and a conference center. Construction in Phases 2 and 3 will be scheduled in response to market conditions. Each subsequent phase after Phase 1 may be started even though full buildout has not yet been completed in prior phases. Later resort phases will include overnight lodging, an equestrian center and other amenities.

MountainStar Resort will feature a variety of visitor accommodations, including timeshare and individually owned condominiums, clustered chalet home sites, and larger vacation lots. The Development Agreement and MPR Permit approved by the County for the MPR authorize Trendwest to develop 4,650 accommodation units. However, consistent with the terms of the recent settlement agreement with RIDGE (see discussion in Section 2.4), Trendwest has agreed to reduce the number of units constructed to 3,785. The dwelling units in the Reduced Density MPR are shown in Table 2-3.

Water demands for the MPR are calculated in terms of total diversion requirements, total return flows, and net water requirements (consumptive use). The Reduced Density MPR results in a

total diversion requirement of approximately 2,472 ac-ft. Return flows to the Yakima River, either as infiltration from irrigation practices, system losses, or as wastewater from the planned Regional Wastewater Treatment Plant, are approximately 1,490 ac-ft. Consumptive use is approximately 982 ac-ft each year. The peak instantaneous diversion demand for the project is approximately 9.5 cfs. Annual water demands for the MountainStar Resort with reduced densities as agreed to by Trendwest, are shown in Table 2-4.

Table 2-3: MountainStar Resort Development Activities Summary

Land Use	Reduced Density
Domestic Uses	
Single-family resort residential	2,695 d.u.
Resort condominiums	790 d.u.
Subtotal/Domestic Uses	3,485 d.u.
Commercial Uses	
Hotel/Lodge Rooms	300 rooms
Retail & Commercial Building Area	100,000 square feet
Irrigation Uses	
Golf course	273 ac.
Miscellaneous irrigation[1]	74 ac.
Subtotal/Irrigation Uses	347 ac.

1 Miscellaneous irrigation uses include landscaping in residential and commercial areas.
Source: Trendwest 2001.

Table 2-4: MountainStar Resort Annual Water Requirements

Water Demand Element	Reduced Density
Diversion Demands (ac-ft)	
Treated non-irrigation	1,335.8
Treated irrigation	162.0
Untreated irrigation	749.4
Misc. uses and losses	224.7
Total Diversion	2,471.9 ac-ft
Return Flows (ac-ft)	
Wastewater flows	1,098.2
Treated irrigation	55.2
Untreated irrigation	118.8
Misc. uses and losses	218.0
Total Return Flows	1,490.1 ac-ft
Net Water Requirement (consumptive use) (ac-ft)	981.7 ac-ft
Peak Instantaneous Demands (cfs)	
Treated	4.4
Untreated	4.2
Total normal peak	8.6
Untreated emergency storage makeup	0.8
Total Normal + Makeup	9.5 cfs

Source: W&H Pacific 2001.

2.2 WATER SUPPLY AND FACILITIES FRAMEWORK

Trendwest proposes to transfer its Yakima River water rights so that they may be exercised for beneficial uses within the MPR and UGA. Trendwest has filed water transfer applications with Ecology andthe KCWCB. The applications filed with the KCWCB seek to transfer Trendwest's three mainstem Yakima River irrigation and stock water rights from their current place of use near Ellensburg to diversions year-around at the City of Cle Elum's Yakima and Cle Elum River water supply diversion works. The three mainstem water rights have six water rights transfer applications pending, three of which would serve the MPR and three would serve the UGA. A portion of each of Trendwest's three mainstem water rights would provide for recreation, irrigation, and domestic beneficial uses within the MPR and a portion of each of its three mainstem water rights would provide for municipal supply purposes within the City of Cle Elum. Trendwest has also filed applications with Ecology to transfer Trendwest's 11 tributary water rights to instream flows. These 11 rights have 22 water rights transfer applications pending, 11 of which would serve to offset consumptive uses on the MPR and 11 which would serve to offset consumptive uses within the UGA. The tributary water rights could be conveyed to Ecology under RCW 90.38, or could be retained by Trendwest as private instream flows. Nearly all of the mainstem and tributary water rights proposed for transfer are seasonal irrigation rights, although a portion of some water rights are authorized for use for year-around stock watering. All of the proposed transfers would require changes in purpose and place of use; additionally, transfer of the mainstem rights would also require a change in the season of use and points of diversion

At full buildout, the consumptive uses associated with Trendwest's tributary water rights and Trendwest's Yakima River water rights combined exceed the cumulative consumptive use from these two projects by approximately 541 to 684 ac-ft. A water balance comparing water supplies and consumptive uses for the two projects is shown in Table 2-5.

The City of Cle Elum is developing a regional water supply system to serve the needs for the City and its UGA and the Town of South Cle Elum, as well as provide water to the MPR. The City of Cle Elum is in the process of establishing new surface water supply diversion works at one location each on the Cle Elum River and the Yakima River. The new Yakima River intake will be the primary source of supply, with the new Cle Elum River intake also functioning as a source of supply. The Yakima and Cle Elum Rivers in the area of Cle Elum's existing diversion works were evaluated, and both require modifications to work satisfactorily under present standards (Geomax 2002 *Yakima/Cle Elum River Study Final Report*). The changes to the new diversion works include: (1) moving the Yakima River diversion works directly downstream of the existing intake, and utilizing the new pipelines located in the Yakima River bed that were installed during emergency stabilization work involving the South Cle Elum bridge over the Yakima River; and, (2) moving the Cle Elum River diversion works approximately 4.9 miles downstream to the vicinity of the Bullfrog Pond area. Both diversion works will include appropriate fish screens. The new Cle Elum River diversion works will function as a source of supply for Trendwest's water uses when Cle Elum River flows exceed a specified amount, to be determined annually by the USBR and the System Operations Advisory Committee (SOAC). Water transmission lines will connect the two intakes to a new water treatment facility located on property provided by Trendwest in the UGA. The City will own and operate the diversion works and the new water treatment facility.

At present, the City relies on two sources for its municipal supply: (1) a water right owned by the City with a priority date of June 30, 1896 (confirmed by a Conditional Final Order in State v. Acquavella, and thereafter modified by Ecology in 2001) in the amount of up to 1,100 ac-ft per year and 3 cfs from the Cle Elum and Yakima Rivers; and (2) a series of water supply agreements with the USBR, beginning in 1932, for a municipal supply derived from the Yakima River system of up to 2,170 ac-ft per year and 3 cfs (based on water rights of the United States). In conjunction with the processing its claims in the Acquavella water rights adjudication, the City is now negotiating the latest in the series of USBR water supply agreements. In the context of the Acquavella proceeding, the maximum to be withdrawn by the City pursuant to its 1896 priority right and the USBR agreement is 2,375 ac-ft per year. The yearly amounts of the City's water use have ranged between 3,100 ac-ft per year to 800 ac-ft per year. The latter amount is based on most recent withdrawal experience after the upgrading of the water supply facilities and has yet to be verified in light of longer-term experience.

Table 2-5: Trendwest's Average Annual Consumptive Use and Supply Balance for Direct Uses, in Ac-Ft

Net Consumptive Use[1]		Available Water Supply[2]		
Direct Consumptive Use		Water Rights	Most Probable Lower Range[3]	Most Probable Upper Range[3]
		Tributary Water Rights		
Reduced Density MPR	981.7	Big Creek	124.7	126.5
UGA Alt. 5 (Residential)	129.2	Teanaway River	349.9	351.8
Direct Subtotal	1,110.9	Swauk Creek	366.8	486.6
		Tributaries Subtotal	841.4	965.0
		Mainstem Water Rights		
		Yakima River	811.1	830.2
		Mainstem Subtotal	811.1	830.2
		Total Supply	1,652.5	1,795.2
Average Net Water Supply Likely Range			541.3	684.3

1 Net consumptive use is the difference between total diversions and total return flows per year. Refer to Section 3.16, Utilities, and to Appendix E of the Final EIS for a detailed discussion of the derivation of water demand. Total diversion requirements are summarized in Appendix B, Exhibit E.
The return flows are described in Section 3.16 and summarized in Exhibit E., However monthly return flows shown in Exhibit E that would travel subsurface back to the Cle Elum and Yakima Rivers were time delayed and "smoothed" (attenuated) through time. The methods for calculating the groundwater-routed return flows are described in Exhibit F.

2 Water supply under Trendwest water rights shown reflects water availability under long term average year conditions calculated as part of the water balance model described in Section 4.1.

3 Long-term, average year, water supply availability would most likely occur within the range shown in these two columns, calculated from data in Tables B.1 and B.3 in Exhibit B.

Source: Brown & Caldwell 2002; W&H Pacific 2001.

2.2.1 Urban Growth Area

The City of Cle Elum would supply water for the Business Park, the Community Recreation Center, and the the school and cemetary expansion areaswithin the UGA from its Yakima River system existing water rights or water supply bases. These UGA uses are hereafter referred to as "non-residential" UGA uses. These are distinguished from all other UGA uses, which are hereafter referred to as "residential." Water users within the UGA residential development would become customers of the City's water utility and receive water service from the City of Cle Elum. Property within the UGA would be included within the City's water supply service area. Under the terms of the City's recently adopted Water Supply Policy, Trendwest and the City have executed a water supply agreement under which Trendwest will convey water rights to the City associated with Trendwest's residential development activities in the UGA. Upon Ecology's final approval of the transfer applications, Trendwest would convey approximately one third of its mainstem water rights to the City of Cle Elum for municipal use within the UGA. The Trendwest water rights would be added to the City's existing municipal water supplies and would provide a year-round water supply for new customers within the UGA in an amount equal to the quantity of the Trendwest water rights that were conveyed to Cle Elum for municipal use applied to the residential portion of the UGA, pursuant to the aforementioned agreement.

In accordance with the City of Cle Elum's adopted water policy for the UGA, the City would initially issue certificates of water availability for the project based on the water use rate set forth in the City's Comprehensive Water Plan (October 1997), which is currently 610 gallons per ERU. Cle Elum would monitor the use of both the City's current water customers and new UGA customers so that, when appropriate, adjustments may be made to the ERU average daily demand in the future. The Washington State Department of Health (DOH) design criteria require a minimum of three years of historical consumption data be used to establish ERU average demand. Consequently, the intent of the City would be to re-examine Trendwest's estimated demands once units are constructed and water meter records reflecting water use are available. Following the three-year data collection period, updated ERU water demands would be incorporated into future required updates of the City's Water Comprehensive Plan. These updated ERU demands may result in the City issuing additional water availability certificates for the UGA from the water initially required by the City for each ERU beyond Trendwest's estimated demands. Alternatively, if the calculated ERU value for development within the UGA underestimates water demand, additional water rights would need to be provided to the City by Trendwest before full buildout of the UGA could be achieved.

2.2.2 MountainStar Master Planned Resort

The MPR will have its own water supply utility. MountainStar Resort Resources, Inc. (MountainStar Resources) is a private, for-profit corporation organized by Trendwest to provide utility services for the MPR. MountainStar Resources has received approval from the Washington Department of Health (WDOH) for a water system comprehensive plan to operate as a privately-owned public water system.[1] The City of Cle Elum will provide water treatment services for MountainStar Resources, Inc.; however, water users in the MPR would be customers

1 The Washington Utilities and Transportation Commission (WUTC) will regulate MountainStar Resort Resources' water rates.

of MountainStar Resources, Inc., not the City of Cle Elum. Water demand calculations for the MPR and UGA are shown in Exhibit E of this report.

2.3 DESCRIPTION OF AVAILABLE WATER SUPPLIES

Trendwest currently owns three surface water rights on the Yakima River and 11 surface water rights on three tributaries between Easton and Ellensburg. Trendwest's surface water rights entitle the company to divert up to 40.7 cfs of water, not to exceed 8,075 ac-ft of water each year. These water rights were used historically for irrigation and stock water. Since being acquired by Trendwest, these water rights have either remained in use for irrigation or have been temporarily approved for instream flow purposes by the Yakima County Superior Court. The water rights currently are appurtenant to approximately 888 acres of land, the net irrigation requirements of which total about 2,065 ac-ft each year. Trendwest's surface water rights are summarized in Table 2-6.

Table 2-6: Trendwest Surface Water Rights

Source	Annual Water Quantity[1,2] (ac-ft)	Instantaneous Quantity (cfs)
Yakima River	4,783 ac-ft	23.4 cfs
Big Creek	390 ac-ft	1.5 cfs
Teanaway River	1,016 ac-ft	3.8 cfs
Swauk Creek	1,886 ac-ft	12.0 cfs
Total	8,075 ac-ft	40.7 cfs

1 Annual water quantity represents the total volume of diversion specified under the water rights.
2 Figures are rounded to the nearest acre-foot.
Source: Trendwest 2001.

2.3.1 Mainstem Yakima River Water Rights

Trendwest owns water rights that are appurtenant to three parcels of land formerly owned by Pautzke Bait Company, Inc. located in Ellensburg, about 20 miles downstream from the City of Cle Elum. The former Pautzke Bait Company water rights currently are appurtenant to three separate parcels that together comprise approximately 291 acres of land and entitle Trendwest to divert up to about 23.4 cfs, not to exceed about 4,783 ac-ft each year from the Yakima River and up to 4.0 cfs, not to exceed 1,270 ac-ft each year from Reecer Creek. Since the place of use under the Reecer Creek water right is identical to one of the Yakima River water rights, Trendwest considers this water right a supplemental water right. The Reecer Creek water right is not included in the water balance analysis.

2.3.2 Tributary Water Rights

Big Creek Water Rights

Trendwest purchased water rights appurtenant to approximately 81.5 acres of land in the Big Creek watershed, between Easton and Cle Elum. Trendwest's Big Creek water rights total approximately 1.53 cfs, not to exceed 390.1 ac-ft of water each year. The Big Creek water rights

formerly were used for irrigation purposes. Figure 2.1 shows the location of Big Creek within the Easton subbasin.

Teanaway River Water Rights

Trendwest owns water rights appurtenant to approximately 188 acres of land formerly irrigated from the Masterson-Walker Diversion on the Teanaway River. Trendwest's Teanaway River water rights entitle Trendwest to divert approximately 3.76 cfs, not to exceed 1,014.12 ac-ft for irrigation and 2 ac-ft for stockwater each year. The Teanaway River water rights formerly were used for irrigation and stock watering purposes. Figure 2.2 shows the Teanaway River subbasin.

Swauk Creek Water Rights

Trendwest owns water rights appurtenant to approximately 95 acres of land formerly owned by Kenneth J. Hartman, et al. Trendwest purchased water rights appurtenant to 75 acres of the former Hartman property prior to completion of the Draft EIS. Trendwest purchased water rights appurtenant to the remaining 20 acres in June 2001. The Hartman water rights entitle Trendwest to divert approximately 4.23 cfs, not to exceed 712.5 ac-ft each year directly from Swauk Creek.

Trendwest owns water rights from two separate parcels of land in the Reecer Creek Basin that receive water from a diversion on First Creek, a tributary to Swauk Creek. Trendwest owns water rights appurtenant to approximately 150 acres of land owned by J.P. Roan and formerly delivered by the First Creek Water Users Association (FCWUA) diversion from First Creek. The former Roan water rights entitle Trendwest to divert approximately 5 cfs, not to exceed 756.7 ac-ft each year. Trendwest also owns water rights for approximately 83 acres of land owned by E. James Nelson, et al., again delivered by FCWUA from First Creek. The former Nelson water rights entitle Trendwest to divert approximately 2.8 cfs, not to exceed 420.4 ac-ft each year. Together, Trendwest's FCWUA water rights comprise rights for 7.8 cfs, not to exceed 1,173.2 ac-ft each year. Figure 2.3 shows Subbasin No. 4 (Swauk Creek).

2.4 ENVIRONMENTAL STEWARDSHIP AGREEMENTS

2.4.1 WDFW/Yakama Nation Cooperative Agreement

Trendwest has entered into a Cooperative Agreement with the Washington Department of Fish and Wildlife (WDFW) and the Yakama Nation to address agency and tribal concerns about environmental impacts from Trendwest's development proposals for the MountainStar Resort and the Cle Elum UGA. The parties have agreed to work toward the goal of no net loss of fish and wildlife habitat, as well as the protection of the environmental, scenic, historical, cultural, and recreational values associated with the Trendwest property through the creation of a non-profit organization known as the MountainStar Conservation Trust. The Cooperative Agreement provides a mechanism to protect open space areas on Trendwest property, to acquire off-site conservation easements and water rights for instream flow purposes, and to provide other measures to protect against environmental impacts off the Trendwest property.

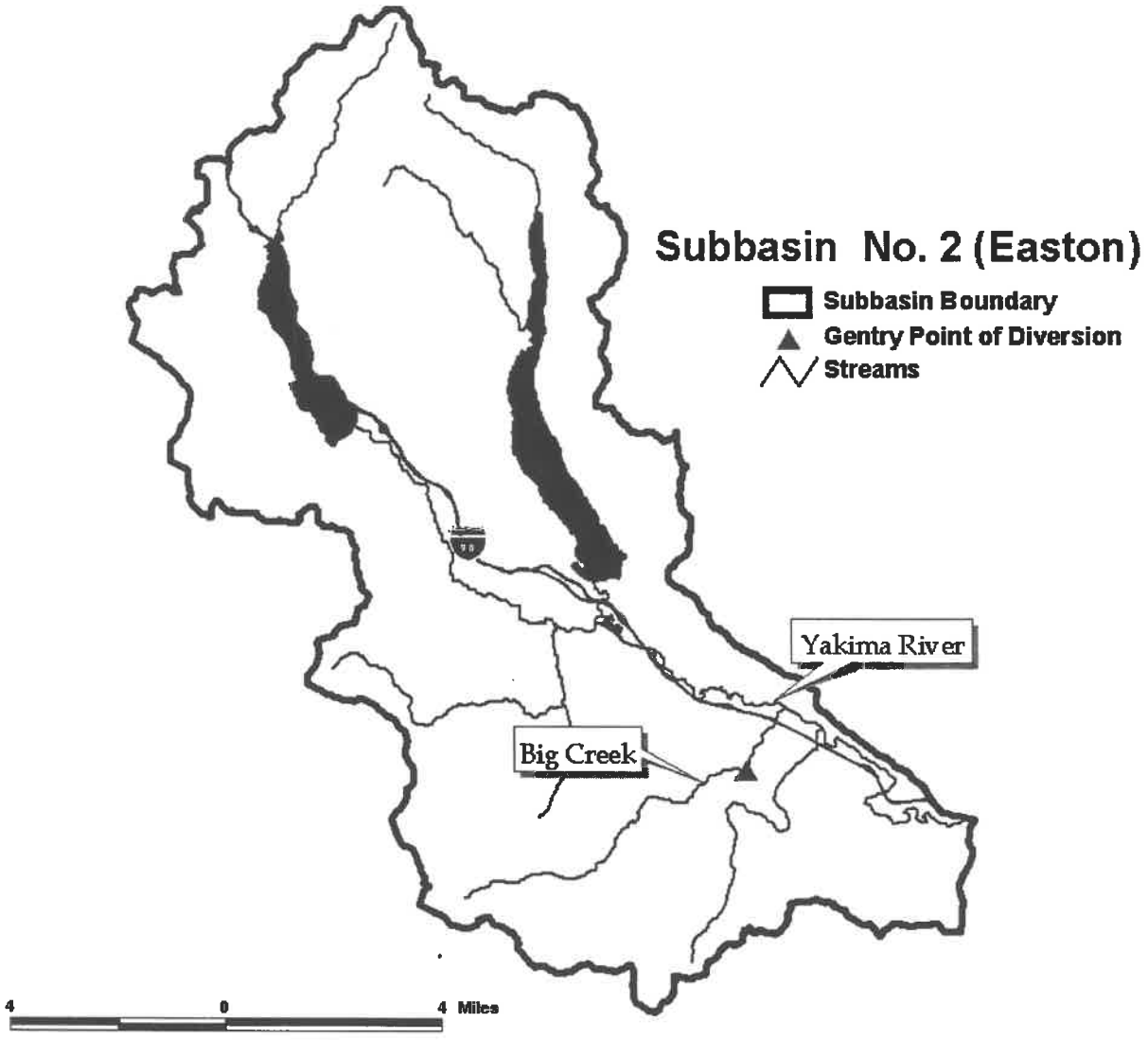


Figure 2.1. Subbasin No. 2 (Easton).

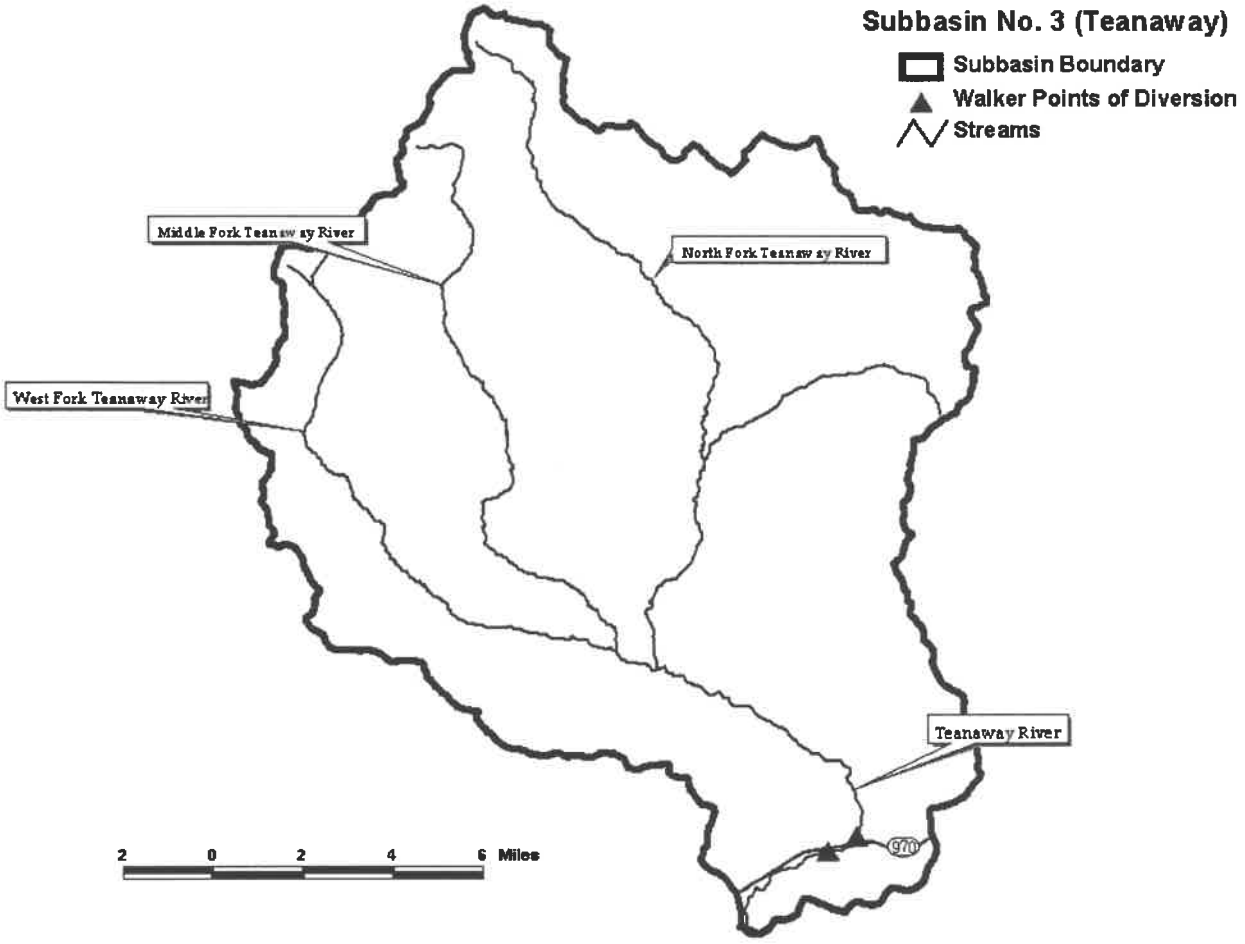


Figure 2.2. Subbasin No. 3 (Teanaway River).

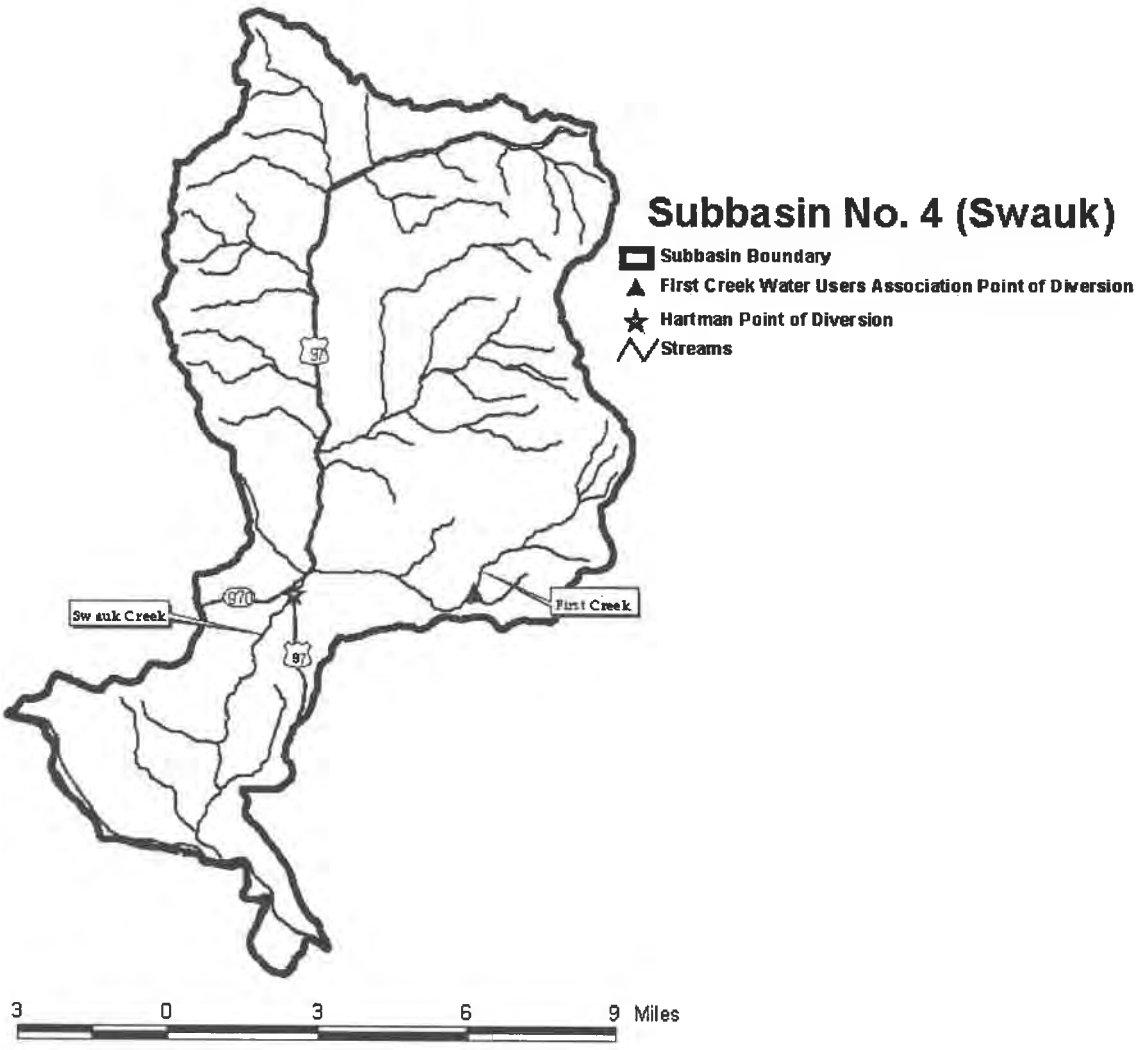


Figure 2.3. Subbasin No. 4 (Swauk Creek).

Implementation of the Cooperative Agreement is contingent on approval by Kittitas County of all permits and approvals necessary to develop the MountainStar Resort. The provisions of the Cooperative Agreement also are contingent on final approval by Ecology of transfer applications for each of the Trendwest Yakima River and tributary water rights, authorizing use of the water in connection with the Trendwest property.

Conservation Easements

Under the Cooperative Agreement, Trendwest has agreed to donate a conservation easement over most of the Cle Elum River geomorphic floodplain, thus securing permanent protection of the floodplain and its aquatic resources, to the extent owned by Trendwest, from the Cle Elum Dam to Interstate 90. A total of 1,071 acres of the Cle Elum River floodplain are within the MPR and 144 acres are within the Cle Elum UGA. Conveyance of the MPR portion of the easement is contingent upon MPR approval. Conveyance of the UGA portion is contingent upon approval of the UGA project.

The Cooperative Agreement establishes a number of restrictions within the Cle Elum River Corridor. First, residential units are prohibited in the corridor. Motorized vehicle use, for recreation or other purposes unrelated to governmental or property management functions, is not allowed. Trendwest is prohibited from riprapping the river banks, except to the extent necessary for bridge and utility river crossings. Trendwest has agreed not to construct impermeable trails or ground surfaces unless agreed to by the Trust. Trendwest has agreed not to extract gravel or conduct other mining. Finally, Trendwest has agreed not to undertake any forest management activity, firewood harvest, or other tree removal, except for purposes of fire protection, public health, or safety, or other purpose approved by the Conservation Trust Board consisting of one member each appointed by Trendwest, WDFW, and the Yakama Nation (for example, habitat restoration or enhancement).

The Cooperative Agreement includes provisions to manage a minimum of 1,171 acres on the west side of the MountainStar Resort property as open space. As permanent west side open space areas are identified during resort development, Trendwest will convey Conservation Easements to the MountainStar Conservation Trust.

In addition to protecting and managing the two on-site conservation easements, the Cooperative Agreement establishes a goal of acquiring ownership or conservation easements to at least 1,500 acres of land outside the Trendwest property. The MountainStar Conservation Trust is empowered to monitor and enforce the Conservation Easements and take other actions as necessary to protect open space areas the Trust has acquired. If satisfactory progress is not made toward off-site acquisition targets, Trendwest will increase its funding obligations to the MountainStar Conservation Trust in order to ensure that sufficient off-site properties are acquired to support the goal of no net-loss of wildlife habitat. The Agreement contains additional restrictions aimed at protecting other Yakima River floodplain areas from development and from gravel product production.

Acquisition of Water Rights for Instream Flows

Under the Agreement, Trendwest also will provide funding for the MountainStar Conservation Trust to acquire water rights from the upper Yakima River and its tributaries, to increase instream flows and to reduce consumptive uses of water within the upper basin. The purpose for this funding is to protect aquatic resources and downstream water users from impacts resulting from activities that are indirectly related to Trendwest's development activities. The water rights to be purchased under the Agreement are in addition to the water rights Trendwest has purchased to serve the projected water demand for the MPR and UGA development projects.

2.4.2 RIDGE Settlement Agreement

In September 2001, Trendwest entered into a settlement agreement with RIDGE, a non-profit conservation organization. In return for RIDGE's commitment to withdraw outstanding appeals and refrain from legal challenges to future MPR and UGA approvals, Trendwest agreed to a number of project modifications. First, Trendwest agreed to reduce the number of MPR units, as shown in Table 2.7, below. Second, Trendwest agreed to add an additional 550 acres of open space to the UGA and MPR projects. The new open space in the UGA and MPR will be protected by conservation easement. Third, Trendwest agreed to provide a comprehensive package of economic and environmental benefits for the local community. These include, in part, a commitment to transfer water rights to the City of Roslyn to provide water for indirect growth within Roslyn's municipal service area, and to provide water for expansion of the Cle Elum-Roslyn School District #404. The MPR approved units, and the unit reductions agreed to by Trendwest for a Reduced Density MPR, are shown in Table 2-7.

Table 2-7: MountainStar Unit Reductions

Type of Unit	County Approved	Settlement Terms	Unit Reduction	Percent Reduction
Single Family Units	3250	2695	555	17%
Condominiums	850	790	60	7%
Hotel Units	550	300	250	45%
Totals	4650	3785	865	18.6%

Source: Trendwest 2001.

3. AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The Water Supply Technical Report prepared to accompany the Cle Elum Draft EIS contains a description of the affected environment for the proposed transfers. This supplement adds a description of existing conditions and water uses in the affected tributaries and the mainstem reach between Cle Elum and Ellensburg. This supplement also describes stream measuring activities undertaken by Trendwest and Ecology's consultants[2] during the summer 2001

2 Montgomery Water Group, Inc. 2002. *Streamflow Monitoring Report, Yakima River Tributaries.*

irrigation season. The Water Supply Technical Report in the Draft EIS contains the following information about the affected environment:

- Characterization of basin hydrology—meteorological parameters, such as air temperature, precipitation, and snowfall; streamflows of the mainstem Yakima River and tributaries; and groundwater levels.
- Water resource development—water resources plans implemented and infrastructure constructed in the study area.
- Water use—the purpose and place of use of water rights, the administrative system of water allocation, and historical consumption.
- Stream channels—physical characteristics of the tributary streams affected by the proposed water supply exchange contract.

3.2 TRIBUTARY SUBBASINS

Existing conditions in tributaries to the upper Yakima River are described in *Yakima / Klickitat Production, Project Preliminary Design Report, Appendix B* (Bureau of Reclamation, U.S. Department of the Interior 1990). Existing conditions in each tributary are summarized below. A list of diversions from the affected tributaries is provided in Table B.3.a. in Appendix D in the Draft EIS. Figure 3.1 shows a vicinity map of Kittitas County.

3.2.1 Big Creek

Big Creek is approximately 12 miles long and enters the Yakima River from the south near Easton. Big Creek has been heavily channelized in its lower reaches and in the lower-most quarter mile suffers from channel instability and bedload deposition. It has two diversions. A small (2 to 3 cfs) bermed diversion exists about 0.7 miles from the mouth, which has a flat screen across the ditch. The Lund/Darling diversion dam, located about 2.1 miles above the mouth, has an impassable 5-foot head and two unscreened diversion ditches. Upstream of the Lund/Darling diversion dam, Big Creek flows through exposed bedrock. Just upstream of the dam, the stream flows through schist bedrock and alpine glacial drift deposits. At an elevation of about 2,240 feet, from just above the dam, Big Creek encounters the Yakima River alluvium. Flow continues downstream over the alluvium at a gradual slope towards the stream's confluence with the Yakima River at elevation 2,060 feet. Well driller's logs indicate there is clean sand and gravel below ground in the vicinity of Big Creek, which ECT named the Big Creek Alluvium[3]. Further from the creek, well logs indicate a higher incidence of silt and clay near the surface, underlain by sands and gravels that are part of the Yakima River alluvium. Depths to groundwater in the alluvial aquifer under the Big Creek basin below the Lund/Darling diversion dam are approximately 10 to 30 feet below the land surface. Data from three deep wells ranging from about 120 to 200 feet below the land surface have more shallow or artesian static water levels, indicating there is regional upward flow from a deeper confined aquifer into the shallow unconfined alluvial aquifer. Water level data collected by ECT show that Big Creek loses flow to the alluvial aquifer over much of its course below the Lund/Darling diversion dam down to the Yakima River. Seepage into the alluvial aquifer from Big Creek and from irrigated areas

3 Big Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002).

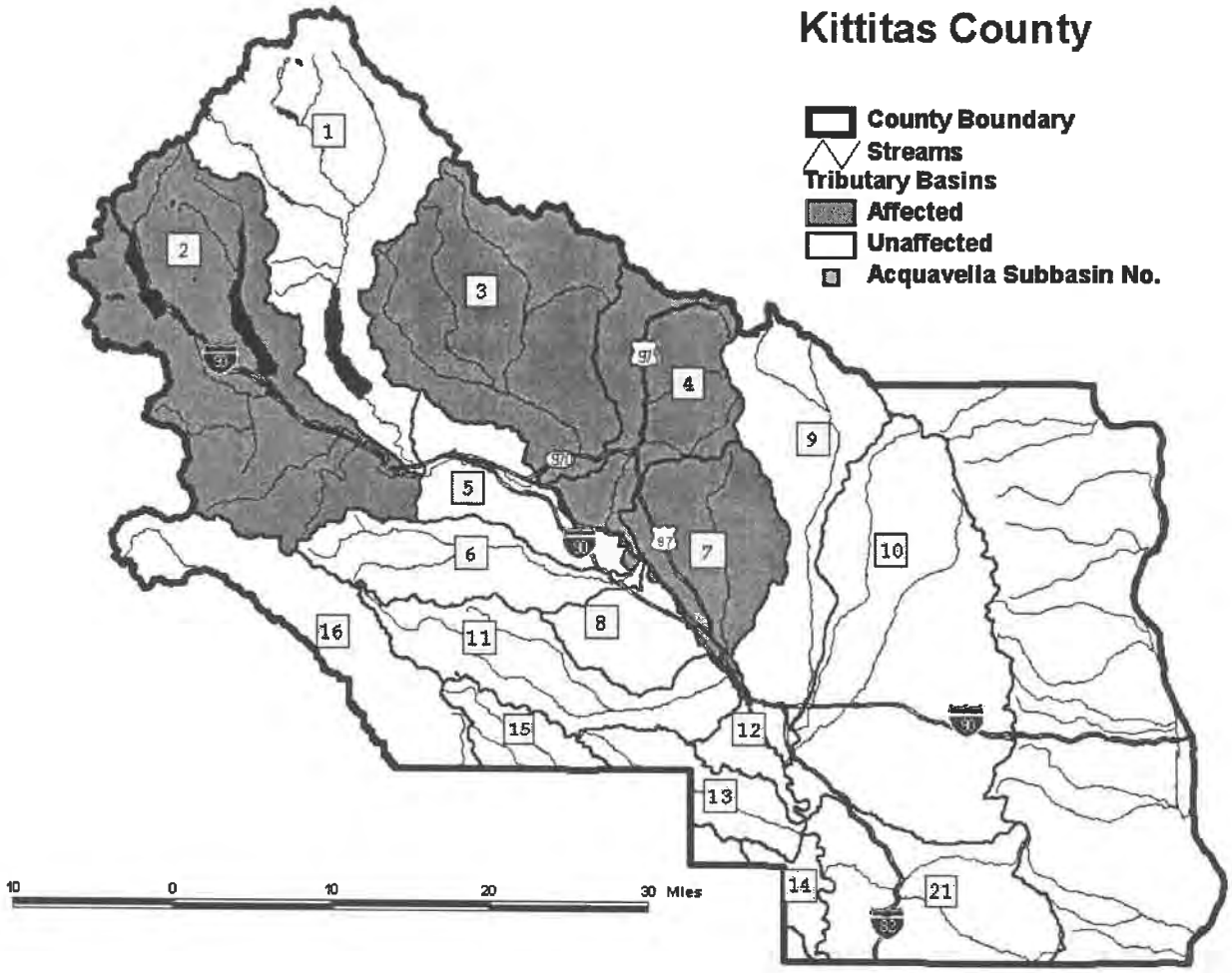


Figure 3.1. Vicinity Map of Kittitas County.

adjacent to the creek ultimately discharges to the Yakima River, and does not return to Big Creek downstream.

Big Creek has substantial summer flows above the Lund/Darling dam, but below this point, the creek carries very low flows allowed to pass through the upper diversion. Most of the creek's flow is removed at the lower diversion and the stream is nearly dry during the summer irrigation season from this point to the mouth. Big Creek produced steelhead historically and appears to still have potential for producing steelhead, coho, and to a lesser degree, spring chinook. Spring chinook juveniles rear in the lower reaches. The major factors limiting production on Big Creek, however, are the impassable Lund/Darling dam and unscreened diversion located at RM 2.1, and the lack of instream flows from this point to the mouth (USBR 1990).

3.2.2 Teanaway River

The Teanaway River is the second largest tributary to the Yakima River. The Teanaway River is approximately 61 miles long and has a drainage area of about 200 square miles. Based on its broad, flat floodplain and minimal channel incision, the Teanaway River is actively migrating across its floodplain. The lower river downstream of Red Bridge Road is underlain by soils ranging in composition from cobbles and gravel to fine-grained clay. In general, coarser materials are present nearer the surface, likely as a result of historic Teanaway River channel migration. These variably textured soils comprise the river's alluvial deposition within the floodplain. Near Red Bridge, driller's well logs indicate the alluvium is variable in depth above bedrock, ranging from zero to over 70 feet in thickness. Well logs along the Teanaway River near SR 970 in Section 26 indicate the alluvium may be several hundred feet thick[4]. Most of the wells located on the floodplain are completed into bedrock below the alluvial sediments; depths of 100 to 400 feet in these wells is common. Some of these wells have static water levels above the surface (artesian flow), while others have static water levels 200 feet or more below the surface. The floodplain alluvial aquifer under the Teanaway River at its mouth is part of an ongoing groundwater study conducted by the University of Montana and sponsored by the USBR. Data from the study show that groundwater conditions vary throughout the year without a discernable, direct correlation to streamflow. Just upstream of Highway 10, the University of Montana study team has installed a series of shallow wells in the alluvium, and has found historic stream migration pathways (paleochannels) with higher permeability than the surrounding finer-grained alluvium. Groundwater flow rates are likely higher through these paleochannels than through the surrounding alluvium.

The lower ten miles of the valley consists mainly of hay fields and is heavily irrigated where the Teanaway River flows through a broad valley. As natural runoff declines during summer and fall, the flows through this reach drop dramatically, and by September and October the lower river may be dry or nearly dry. The major riparian problems in this lower reach are seasonal lack of overhanging vegetation and lack of woody debris. The instream habitat also suffers from the disturbances caused by construction of berms associated with irrigation intakes.

4 Teanaway River Basin Hydrologic Analysis (Pacific Groundwater Group 2002).

Ecology has proposed a Teanaway Temperature Total Maximum Daily Load (TMDL) to the U.S. Environmental Protection Agency for approval[5]. This TMDL proposes to improve temperatures in the Teanaway River by establishing shade to the site potential levels, largely through landowner cooperation, incentives, and voluntary effort. Site potential shade is lowered in many parts of the Teanaway basin by bedrock in the riparian zone. A maximum temperature of 28.5°C was measured in the mainstem Teanaway River during Ecology's TMDL monitoring in the summer of 1998 (July 1 to October 6), during which the mainstem Teanaway temperatures exceeded the 18°C standard 85 percent of the time. Local landowners planted over 5,000 trees along 2.7 miles of the Teanaway River in early 2001. The USBR and the National Resources Conservation Service have implemented water conservation measures for irrigation and will transfer the consumptive use portion of those savings to the State Trust Water Rights Program once the Yakima River Adjudication is completed. In addition, the Bonneville Power Administration funded moving some diversions downstream, leaving 13 cfs of irrigation flow in the Teanaway River for an additional 3 miles. The Yakima River Basin Water Enhancement Project is funding the USBR to work with landowners interested in selling conservation easements, land, or water rights, to provide additional riparian shade and instream flow.

3.2.3 Swauk Creek

Swauk Creek is approximately 24 miles long and enters the Yakima River from the north between Cle Elum and Thorp. The drainage area is fairly large (100 square miles), but precipitation is minimal and natural summer stream flows are very low. Upper Swauk Creek flows through a narrow alluvial valley underlain by sandstone and conglomerates until approximately 1.5 miles above its confluence with First Creek[6]. Below this point and down to First Creek, the stream's alluvium is underlain by basalts. Below the First Creek confluence, Swauk Creek is no longer confined by bedrock, and opens onto a wide alluvial floodplain named Hidden Valley. At the lower end of Hidden Valley, the creek is again confined within a narrow bedrock canyon about 4 miles in length, opening just above the stream's confluence with the Yakima River. At this location the stream flows over fractured bedrock and onto Yakima River alluvial deposits.

Upper Hidden Valley contains coarse alluvial sediments at the First Creek confluence, likely a result of a local alluvial fan immediately downstream of the emergence of Swauk Creek from the bedrock constricting valley above First Creek. The lower portion of Hidden Valley is comprised of various alluvial materials, underlain by glacial deposits and sandstone and basaltic bedrock. The alluvial aquifer beneath Swauk Creek in Hidden Valley is likely in hydraulic continuity with Swauk Creek in the lower portions of the valley, where the valley is constricted causing groundwater elevations to rise relative to the land surface, and flow into the stream.

First Creek water entering Swauk Creek in the upper Hidden Valley recharges the alluvial deposits as it approaches the Creek, but that water likely recharges Swauk Creek further downstream in Hidden Valley. In the final mile upstream of its confluence, the First Creek valley widens and the creek flows over alluvial sediments deposited by both First Creek and Swauk

5 Draft Teanaway Temperature Total Maximum Daily Load Submittal Report, Publication No. 01-10-019 (Washington State Department of Ecology 2001).

6 First and Swauk Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002).

Creek. Further upstream, First Creek predominantly flows through a narrow, bedrock-confined valley. This narrow valley limits the amount of water that can be lost from First Creek to alluvial subflow, all the way down to the basalt upstream of the alluvium in the lower mile of the creek.

Above First Creek, Swauk Creek has been generally characterized as follows by USBR (1990). Swauk Creek's lower bedrock canyon is arid and the gradient is relatively steep. The streambed in this location consists of large rock and boulders. This reach is characterized by USBR as having very low or intermittent summer flow as far upstream as RM 5.0. The stream enters a forested zone at RM 8.0 and above this point flows are marginally adequate during the summer. The riparian corridor is generally good above RM 3.0 and the streambed appears stable throughout (USBR 1990).

There are five irrigation diversions on Swauk Creek below the First Creek confluence, and one irrigation diversion on First Creek. Trendwest purchased water rights from the First Creek diversion and from one of the Swauk Creek diversions.

3.3 YAKIMA RIVER MAINSTEM

Trendwest's water transfer proposals call for diverting water from the Yakima River at a location upstream of the historic point of diversion of the acquired water rights. The proposed transfers potentially affect the Yakima River reach between Cle Elum (the proposed new diversion location) and Ellensburg (the historic diversion location). Existing conditions in the mainstem upper Yakima River are described in *Review of Yakima River Diversion Intakes—Cle Elum to Ellensburg Reach* (Northwest Hydraulic Consultants, Inc. 2002), *Yakima River Basin Water Enhancement Project, Washington, Final Environmental Impact Statement* (Bureau of Reclamation, U.S. Department of the Interior 1999), *Draft Report on Biologically-Based Flows for the Upper Yakima River Basin* (Systems Operations Advisory Committee 1998), and in *Effects of Hydraulic and Geologic Factors on Streamflow of the Yakima River Basin, Washington: Geological Survey Water Supply Paper 1595* (U.S. Geological Survey, U.S. Department of the Interior 1963).

3.3.1 Setting

The Yakima River crosses four large structural basins, which are separated from one another by one or more large anticlinal or monoclinal ridges. The river transects these ridges through deep narrow canyons, the largest and longest of which is the Yakima Canyon between Ellensburg and Yakima. Named in downstream order, these basins are the Roslyn, Kittitas, Upper Yakima and Lower Yakima basins.

The Roslyn basin is typical of the geology of the western edge of the Columbia Plateau. Located high on the eastern slopes of the Cascade Mountains, the Roslyn basin includes a drainage area of about 800 square miles. Some of the highest mountains in the Yakima River basin border this basin. A broad dissected synclinal valley, whose axis extends for 20 miles in an east-southeast direction, forms the central part of the Roslyn basin. At the eastern end, about six miles east of the City of Cle Elum, it is ended abruptly by the cross-valley monoclinal structure that forms Lookout Mountain. Drainage into the Roslyn Valley is in part regulated by the outflow of Lake

Keechelus, Lake Kachess and Lake Cle Elum. The Teanaway River, Swauk Creek, Big Creek and Cabin Creek are important tributary streams that drain small mountainous areas in this basin. The Yakima River leaves the Roslyn basin through a narrow canyon eroded through the basalt a few miles south of Lookout Mountain.

The Kittitas basin consists for the most part of the Kittitas Valley, a long broad synclinal valley lying just southeast of the Roslyn basin. The valley has a southeast trend and a length of about 30 miles. Manastash Ridge, a long anticlinal ridge, forms the southern boundary of the valley, and the Wenatchee Mountains, a low east-trending range that attains a maximum altitude of about 6,000 feet, form the northern boundary. The Yakima River enters the Kittitas basin at the northwestern end of the Kittitas Valley and flows along the southwestern edge of the valley to Yakima Canyon, a few miles south of Ellensburg. Numerous tributary streams enter the Yakima River before it leaves the Kittitas basin. Manastash Creek and Taneum Creek drain an upland area west of the Kittitas Valley. Reecer Creek and numerous smaller tributary streams drain the south slope of the Wenatchee Mountains north of the valley.

The Yakima River extends for approximately 175 miles from its headwaters in the Cascade Mountain range to its confluence with the Columbia River near Richland. The upper Yakima River reach potentially affected by Trendwest's proposed transfers extends for approximately 28 miles from Cle Elum to the Mill Ditch Diversion in Ellensburg. There are six irrigation diversions in the potentially affected mainstem reach.

3.3.2 Yakima Project Operations

The Yakima River's streamflow is regulated by the operation of Keechelus, Kachess, and Cle Elum dams. USBR has operated these dams since the early 20th century. Target flows have been established by USBR for several points on the Yakima River in the past. The USBR describes its flow management strategy for the upper Yakima River as follows:

> Releases from the storage reservoirs of the Yakima River system are made for three purposes: (1) irrigation demand, (2) flood control, and (3) instream flows. Throughout the irrigation season, late March through October, release of water from the six Yakima Project reservoirs is made to meet diversion demands. In the fall, winter, and spring months, releases are made in conjunction with system flood control guidelines, and as the reservoirs are filled, the spring freshet is significantly modified.
>
> Each year, as unregulated runoff recedes and irrigation demand increases, a point is reached where irrigation demand exceeds unregulated flow (usually late June or early July), and the system is put on storage control. During storage control, the flow passing Sunnyside Diversion Dam is controlled to a target level to minimize spill. Generally, the return flows and unregulated flow are sufficient downstream from this point to meet diversion demands. During the period of storage control before September, emphasis is placed on meeting lower basin demands from Cle Elum Lake, and most of the demands above the Cle Elum River are met from Keechelus Lake.

After September 10 and into early October, most of the demand of the lower basin is met by releases from Rimrock Lake below Tieton Dam, and most of the upper basin demand is met from Kachess Lake. The objective of these releases, beyond continued diversion delivery, is to restrict the flow to target levels during September at Martin, Easton, and Roslyn. The reason for this "flip-flop" of releases is to keep spring chinook spawning as low as possible in the channel at this time. If the spring chinook deposit their eggs low in the river channel, incubation flows can be kept low as well the following winter, which minimizes the impact on irrigation water supplies. "Reduced" spawning flows with "flip-flop" are generally at or above the historic flow levels.

After mid-October, natural runoff is usually sufficient to meet any diversion demands without storage release. During mid-October through March, a portion of reservoir inflow is allowed to pass through to avoid dewatering salmon redds (nests of fish eggs)."[7]

Since 1995, targets for instream flows during the irrigation season have been set annually by SOAC at Parker and Prosser based on prevailing conditions. The goal of target flows is to maintain the wetted perimeter of the Yakima River at a minimum during the so-called "flip-flop" period. Irrigation season target flows at Parker and Prosser are shown in Table 3-1.

Table 3-1: YRBWEP Target Parker and Prosser Flows

Total Water Supply Available (million acre-ft)				Parker and Prosser Flows (cfs)
Apr-Sept	May-Sept	Jun-Sept	Jul-Sept	
3.2	2.9	2.4	1.9	600
2.9	2.65	2.2	1.7	500
2.65	2.4	2.0	1.5	400
Less than above TWSA				300

3.3.3 Fall and Winter Yakima River Streamflow

The YRBWEP Act requires USBR to meet flow targets at Parker and Prosser, but only from April through October. Since 1995, a reduction in Yakima River streamflow at Parker or Prosser from November through March would not have resulted in stream flows being less than Title XII target flows. However, pre-Title XII instream flow targets were specified year-round, at locations farther upstream than Parker (Cle Elum, Easton, and Martin), and on the Cle Elum River. Other flow targets may exist, but these are not formally stipulated in state or federal laws. Since 1981, SOAC has assisted USBR on fish-related issues associated with the operations of the YRBWEP. Flows for maintaining fish life in the Yakima Basin are determined by the USBR Field Office Manager, according to the annual prevailing conditions, and in consultation with SOAC, irrigation district managers, and others (USBR, 1999). Furthermore, according to the partial summary judgment regarding the rights of the Yakama Nation entered by the Superior

7 *Yakima River Basin Water Enhancement Project, Washington: Final Programmatic Environmental Impact Statement* 53 (Bureau of Reclamation, U.S. Department of the Interior 1999).

Court on July 17, 1990, the Yakima Field Office Manager is responsible for providing minimum instream flows to maintain all life stages of anadromous fish in the Yakima River Basin.

Fall and winter flow targets that are set annually or seasonally by SOAC and the Yakima Field Office Manager are not listed in Title XII instream flow criteria. Some low flows that cause biological problems are common and well known. For instance, after irrigation season ends, when releases are cut back to refill reservoirs, flows in most mainstem reaches become sub-optimal or critically low for fish. Problems related to fall spawning and winter incubation have been successfully managed in the Yakima River.

3.3.4 Yakima River Mainstem Diversions

All major irrigation entities in the Yakima Basin receive water under the terms of a 1945 federal court consent decree. The decree states the quantities of water to which all major water users are entitled (maximum monthly and annual diversions limits) and defines a method of prioritization to be used during water-short years. Water entitlements for proratable water users are based on the total water supply available (TWSA). TWSA represents the combined quantity of unregulated flow, return flow, and stored water available for the period April through September upstream from the Parker gauge at Sunnyside Diversion Dam on the Yakima River. USBR prepares forecasts of the TWSA beginning each March and continuing through the irrigation season. These forecasts are the basis for determining the adequacy of the TWSA to meet irrigation water entitlements stipulated in the 1945 consent decree. (USBR 1999). Figure 3.2 shows the location of the eight diversions in the affected reach between the City of Cle Elum's diversion works and Ellensburg. In addition, the City of Roslyn diverts water from Domerie Creek, a tributary to the Cle Elum River downstream of Cle Elum Dam. Roslyn's water right has a 1908 priority date.

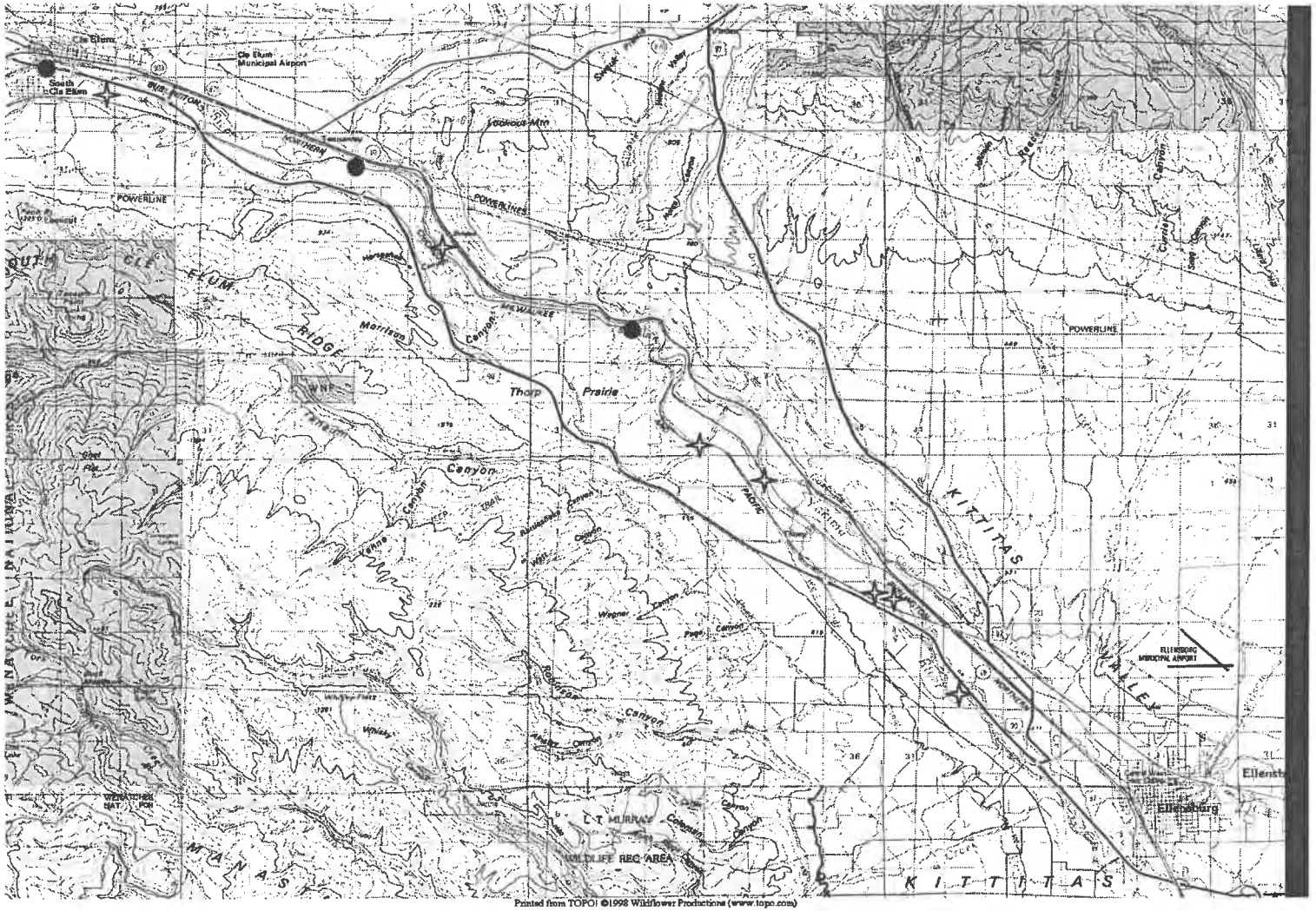
City of Cle Elum Diversions

The City of Cle Elum diverts water from the Yakima River for its municipal water system at an intake structure on the south bank of the river just east of the South Cle Elum Bridge, at Yakima River Mile 183. The City also maintains an intake structure on the Cle Elum River at about Cle Elum River Mile 7. The City is in the process of developing new water intake structures, as described above in Section 2.2.

Younger Ditch Diversion

The Younger Ditch Diversion is located on the left (north) bank of the Yakima River, just over one mile downstream of South Cle Elum at about River Mile 182. The diversion consists of a side channel diversion from the Yakima River, which directs flow into a 15-foot wide channel leading approximately 200 feet to an intake structure. The intake includes a rolling drum fish screen, several gated diversion openings, and a return flow bypass to the Yakima River. Diverted flows pass over a measurement weir and enter the Younger Ditch irrigation canal downstream of the intake structure.

Figure 3.2. Mainstem Yakima River Diversions



The Younger Ditch diversion channel sits on the left bank of the Yakima River on the outside of a large meander bend. Because of the meander bend the river is deepest and flows are swift along the left bank near the diversion channel. The higher flow along the left bank carries more entrained sediments. During the irrigation season, flow is relatively uniform across the river upstream of the diversion. Yakima River flows tend to form an eddy at the diversion channel as the river expands at the channel opening. The eddy results in the deposition and accumulation of fine-grained sediments in the diversion channel.

Wallace Pump Diversion

The Wallace Ranch (Bristol Flats) diversion is located on the left (northeast) bank of the Yakima River approximately 7.5 miles downstream from the City of Cle Elum at about River Mile 174. The diversion consists of a backwater channel off the Yakima River, which allows flow into a pump intake. The diversion channel is approximately 20 feet wide and 80 feet long.

The Wallace Ranch (Bristol Flats) diversion channel sits on the left bank of the Yakima River on a relatively straight reach of the river. The diversion is located approximately 100 feet downstream of a small constriction and riffle in the river. The river width at the inlet to the diversion channel is approximately 210 feet. The flow depth in the main channel near the diversion site is relatively shallow at low flows. There is considerable sedimentation in the backwater channel leading from the Yakima River to the pump intake. Diversions at this site could be precluded altogether if Yakima River water levels drop below the level of the sediment deposits.

West Side Irrigating Company Diversion

The Westside Irrigation Company diversion is located on the right (south) bank of the Yakima River upstream of the Burlington Northern Railroad Bridge and the Thorp Highway Bridge, north of Thorp, Washington at about River Mile 166. The Westside diversion consists of a gated intake structure on the right bank of the Yakima River which directs flow into a 20 foot wide trapezoidal channel leading approximately 1,500 feet to a second hydraulic structure. The second facility includes a rolling drum fish screen with a return flow bypass to the Yakima River and several gated openings leading to irrigation canals.

The Westside diversion intake structure is located on the right bank of the Yakima River on the outside of a large meander bend. The Yakima River is approximately 160 feet wide near the location of the diversion. As a result of the meander bend, channel is deeper along the right bank than at other points across this section. Thus, the siting of this diversion structure is appropriate from a hydraulic standpoint. Although the diversion structure is located appropriately, flow depths in this wide reach of the river are typically too low for the Westside Irrigation Company to make its full diversion during the low flow season. Westside annually places ecology blocks part way across the Yakima River downstream from the diversion site to raise the backwater into the intake structure.

Thorp Mill Ditch Diversion

The Thorp Diversion is located on the right (south) bank of the Yakima River approximately 2.8 miles downstream of the Thorp Highway Bridge north of the town of Thorp, Washington at about River Mile 163. The diversion consists of an ungated side channel diversion from the Yakima River, which directs flow into a 3 to 5 foot wide diversion channel. The diversion structure consists of 4 side-by-side box culverts that pass under the Burlington Northern railroad track.

The Thorp diversion channel sits on the right bank of the Yakima River in a relatively straight reach of the river, which is constrained from lateral movement by the Burlington Northern Railroad fill. Flows in this section of the river often are shallow and swift moving. Until recently, much of the diversion structure was blocked with fine-grained sediments.

Ellensburg Water Company Diversion

The Ellensburg Water Company (EWC) diversion structure consists of a diversion dam extending completely across the Yakima River. This structure has the capacity to divert EWC's full water entitlement (which ranges from 63 cfs to 125 cfs), regardless of Yakima River streamflow conditions. The structure also includes large head gates and fish screens. It is located immediately west of Highway 10, just below Yakima River Mile 162.

Packwood Canal Company Diversion

The Packwood Diversion is located on the right (west) bank of the Yakima River approximately 2000 feet downstream of the Burlington Northern Railroad Bridge near Thorp, Washington, at about River Mile 161. The diversion consists of an ungated side channel diversion from the Yakima River that directs flow into the Ellensburg canal. The Packwood Diversion structure protrudes out from the right bank of the Yakima River on the outside of a large meander bend. As a result of this meander, flow depths are likely to be deeper along the right channel bank than at other points across this section.

The Packwood Diversion structure protrudes out from the right bank of the Yakima River on the outside of a large meander bend. As a result of this meander, flow depths are likely to be deeper along the right channel bank than at other points across this section.

There is extensive erosion and deposition occurring near the diversion and significant human induced modifications have occurred over the last 40 years. The river has eroded the right bank upstream of the diversion, and bank protection measures (armoring and barbs) have been installed to constrain additional channel migration. Without the bank protection measures it is likely that the meander would continue to move downstream and could create problems for the Packwood diversion. Wood debris can accumulate in the Packwood diversion structure and impair operation of the diversion.

Cascade Irrigation Company Diversion

The Cascade Irrigation Company diversion is located on the left (north) bank of the Yakima River approximately 4,000 feet downstream of the Burlington Northern Railroad Bridge near Thorp, Washington, just above River Mile 160. The Cascade diversion consists of an intake structure on the left bank of a side channel of the Yakima River. The intake structure comprises 4 independently operable gates that direct flow into a large irrigation canal. Approximately 100 feet along the irrigation canal is another hydraulic structure and a measurement flume. A pump station is also located at this point.

The Cascade Irrigation diversion intake sits on the left bank of a side channel of the Yakima River downstream of a complex flow split. Upstream of the diversion flow is divided among the following four routes: 1) the Packwood diversion, 2) the Gladmar channel, 3) the main stem Yakima River, and 4) the Cascade side channel. The hydraulic complexities upstream of the Cascade irrigation diversion are a result of ongoing natural geomorphic processes and human river modifications. Hydraulic conditions continually change as a result of extensive sediment movement and deposition by the river. The Cascade side channel has been transformed from the primary flow path to a small side channel that likely requires extensive sediment removal to keep flowing. Human modifications to this stretch of the river over the last 40 years include levee building, bank armoring, barb construction, channel dredging, and opening the Gladmar channel. Each of these modifications has an effect on sediment deposition, and by extension, flows in the Cascade side channel.

Some of these modifications, for instance the armoring of the left bank upstream of the Packwood diversion and the opening of the Gladmar channel, have likely had a significant effect on sediment deposition that affects operation of the Cascade Irrigation diversion. It appears that the head of the Cascade irrigation side channel is being filled with sediment as a result of deposition associated with the upstream point bar. Furthermore, the Yakima River may be shifting towards the south at the location of the Gladmar channel opening. If the revetment blocking the Gladmar channel opening is not maintained, it is possible that the Gladmar channel might become the main flow path for the Yakima River. If this were to occur, it is possible that the side channel leading to the Cascade Irrigation diversion could be cut off from the flow entirely.

The Cascade Irrigation Company annually installs temporary structures in the Yakima River in order to maintain flows to the diversion structure. (Tony Jantzer, Cascade Irrigation, Pers. Comm.). Ecology block dams are installed in the mainstem at the head of the island that divides the river, and in the Cascade side channel downstream of the diversion intake. These structures are necessary if full irrigation diversions are to be made during periods of low flow.

Mill Ditch System

The Mill Ditch diversion is located on the left (north) bank of the Yakima River near Ellensburg, Washington, at about River Mile 158. The diversion consists of a lateral diversion off a side channel of the Yakima River. Flow diverted from the Yakima River side channel is directed into a 15-foot wide ditch leading approximately 100 feet to a twin culvert crossing under I-90.

Approximately 500 feet downstream of the I-90 crossing the diversion ditch joins with flow from a small groundwater fed lake and discharges from Dry Creek. From there, flow passes approximately 1,750 feet before reaching the Mill Ditch diversion intake structure. A rock weir across the channel maintains water levels at the diversion structure with return flows bypassing to the Yakima River via another channel under I-90. The intake includes several gated diversion openings. Downstream of the intake structure diverted flows pass over a measurement weir and then enter the Mill Ditch irrigation system.

The Mill Ditch diversion channel sits on the left bank of a side channel of the Yakima River. Discharges to the diversion channel are controlled by the level of water in the side channel and the level of a gravel bar on the left bank of the side channel. Discharges (and by extension water levels) in the side channel are controlled by a flow split in the Yakima River. The Washington Department of Transportation periodically removes gravel from the side channel entrance to increase flows being directed towards the diversion channel. This can include maintenance dredging only at the main stem of the Yakima River, maintenance dredging only in the side channel, or both.

3.4 2001 MONITORING ACTIVITIES

This section describes 2001 USBR monitoring data and field monitoring by ECT during the 2001 water year that contributed to the analyses in this report.

Hydrologic data were obtained by BC from two existing gauges at Forks and at Lambert Road to estimate natural streamflows along the Teanaway River. Both gauges are operated by USBR. USBR temperature and precipitation data from the Forks gauge were also obtained by BC. Information on active water rights usage[8] and irrigation ditch/pump flow was also gathered from Ecology. Data were gathered from May to September, 2001.

Water year 2001 was the worst single year drought since 1977, which was the worst single year drought on record in the Yakima River Basin.

ECT member MWG, in cooperation with Trendwest, collected streamflow data during the 2001 irrigation season from Yakima River tributaries and irrigation ditches where Trendwest proposes the transfer of existing water rights to instream flows. The data were used to support surface water and groundwater hydrology analyses completed for the processing of Trendwest's water rights application through Ecology. The 2001 monitoring program administered by Ecology consisted of either continuous or non-continuous water level recording, depending upon the station. Where non-continuous, the monitoring occurred either weekly or bi-weekly. Monitoring stations were established on Big Creek, Swauk Creek, First Creek, Reecer Creek, and Mill Ditch. Seepage surveys and weekly monitoring of irrigation diversions were also performed on the Mill, FCWUA, and Lund irrigation ditches. Suitable site locations for the stations were selected in May and June 2001 in the stream reaches identified for monitoring by ECT.

---

8 Personal Communication with Stan Isley, Sept. 13, 2001 and Sept. 20, 2001; Stan Isley Field Notes Fax, Aug. 30, 2001.

A total of the eleven continuous water level recording stations and six non-continuous stations (irrigation diversions and temporary staff-gauge installations) were installed and monitored at key points along the tributaries and ditches from May to October 2001. Continuous monitoring stations were placed at the following locations: (1) Big Creek upstream of the Darling/Lund diversion; (2) Big Creek downstream of the Darling/Lund diversion; (3) Big Creek downstream of the West Nelson Siding Road Bridge; (4) Big Creek on the Ensign Ranch property; (5) Swauk Creek upstream of the confluence with First Creek; (6) Swauk Creek downstream of the Burke and Burke-Hartman diversions; (7) Swauk Creek upstream of the confluence of Swauk Creek and the Yakima River; (8) First Creek downstream of the FCWUA diversion; (9) First Creek upstream of the confluence with Swauk Creek; (10) Mill Ditch headworks; and (11) Reecer Creek between Pott Road and Dolarway Road. Figure 3.3 shows the location of the continuous monitoring stations. The date of installation of the stations varied from May to July as property owner permissions were obtained. In addition to the continuous monitoring stations, various locations were monitored weekly including the Darling, Lund, and Ensign Ranch diversions on Big Creek, the FCWUA diversion flume and the Roan/Olsen weirs on First Creek, and on Mill Ditch just upstream of the confluence with Reecer Creek.

A series of flow measurements were collected at each of the continuous monitoring sites for development of stage-discharge rating curves. Flow measurements were collected whenever a significant change in stage was noted so that a range of low to intermediate flows was available for construction of the rating curves. The continuous stations consisted of a data logger and water level sensor powered by a rechargeable battery that recorded water level data every 15 minutes. Manual readings of the staff gauges were collected weekly so that the continuous data could be correlated to the actual gauge height readings. The rating curves were applied to the 15-minute water level data to create continuous flow hydrographs for the monitoring period at each of the eleven stream gauging stations. The continuous 15-minute data were averaged for each day to develop average daily hydrographs for the monitoring stations that were used in the hydrologic and hydraulic analyses.

The stations were monitored after the April to May spring freshet had passed, so in most cases high flows were not available to include in the rating curves. Many of the stations could not be installed until midway through the irrigation season so only partial low flow hydrographs are available at these stations. In general, flows in the creeks declined steadily to their lowest base flows in August and September, until heavy rain in mid-October resulted in rising hydrographs at all of the monitoring stations.

In addition to the weekly to bi-weekly monitoring program on the tributaries and irrigation diversions, Trendwest and the ECT conducted seepage surveys on the Lund and FCWUA irrigation ditches in July, August, and September 2001. For each seepage survey, measurements of the flow and cross-sectional geometry were collected at a number of key points along the ditch. The data were used to estimate the losses and/or gains in selected reaches of the ditches and the depths at key turnouts.

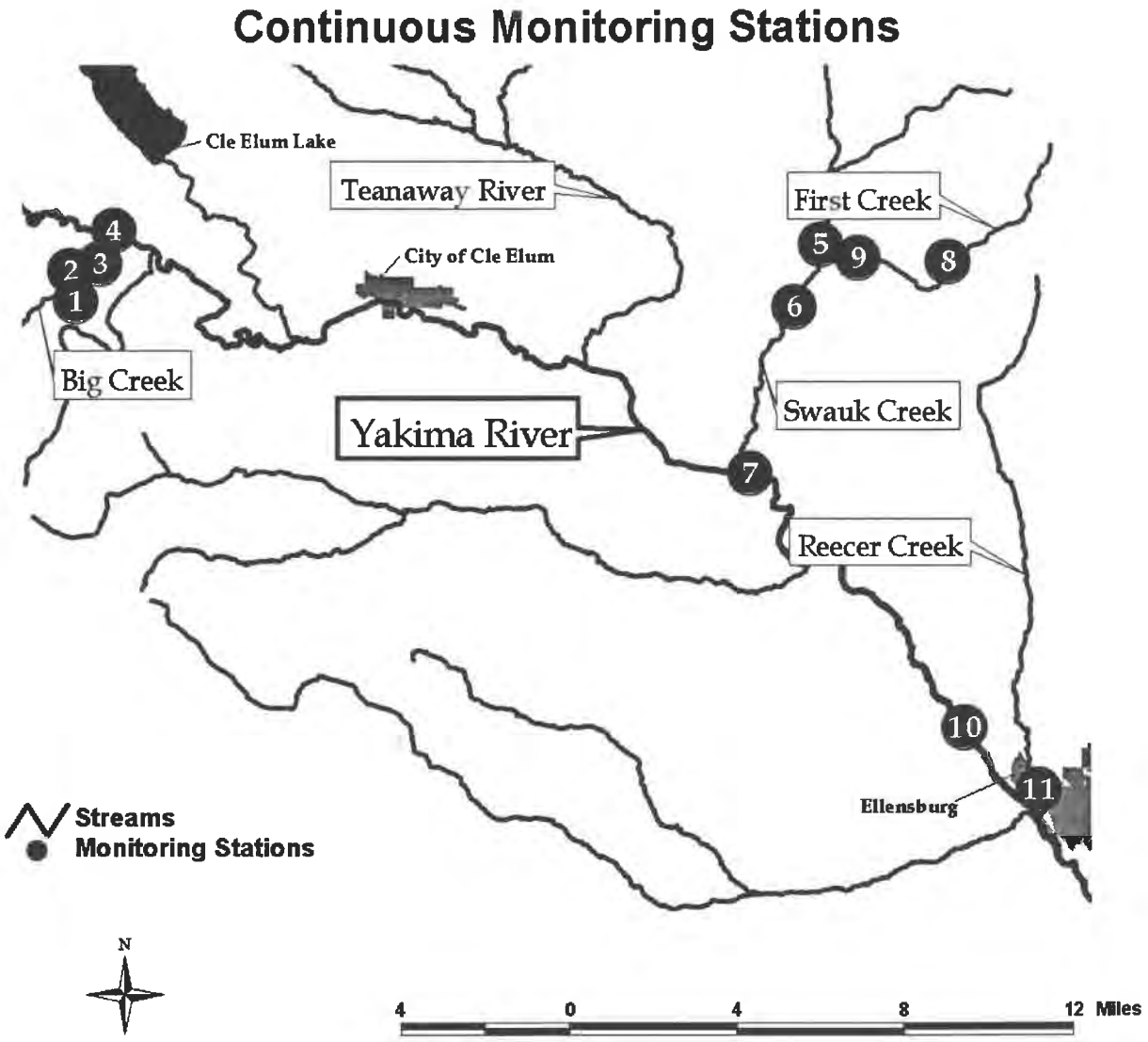


Figure 3.3. Location of 2001 Gauge Stations.

4. ENVIRONMENTAL IMPACTS

This section summarizes the potential water supply impacts resulting from implementation of all of Trendwest's proposed water rights transfers. Since publication of the Draft EIS, the water balance model was updated to reflect changes in the MPR and UGA proposals, recent monitoring data, additional information on onsite (MPR and UGA) irrigation return flow, and tributary irrigation and alluvial return flow information developed by Ecology. The water supply model changes are summarized below in Section 4.1.1. Potential direct impacts to tributary streamflows, tributary third party diverters, Yakima River streamflow and mainstem third party diverters are discussed below. This analysis supports the intent of Trendwest to supply water for both the MPR and UGA projects.

4.1 IMPACTS ON STREAMFLOWS

This section describes the balance of water between supply and demand and the effect on streamflow, summarized on a monthly basis, for both the UGA and Trendwest's proposed MountainStar MPR. A description of the water balance model for the upper Yakima River Basin (model), and how it was revised using new data collected cooperatively by ECT and the UGA consultant team, is contained in Section 4.1.1. Section 4.1.2 discusses model results, which show changes in Yakima River stream flows resulting from the transfer of Trendwest's mainstem Yakima River water rights, and from retiring consumptive uses of water resulting from irrigation use of Trendwest's tributary water rights. The proposed transfers would affect the lower Cle Elum River from about Bullfrog Road down to its confluence with the Yakima River, and a reach of the Yakima River between its confluence with Big Creek, near Easton (the vicinity of the uppermost proposed instream flow transfer) and Ellensburg (the most downstream historic diversion location).

The water balance model computes mean daily changes in Upper Yakima River basin streamflows due to the proposed transfers of, and changes in, Trendwest irrigation and stockwater water rights. On a daily basis, the model determines changes in Yakima River streamflow by accumulating changes in inflows and outflows, from upstream to downstream. These include changes from the transfer of Trendwest's mainstem Yakima River water rights, and from transferring Trendwest's tributary irrigation water rights to instream flows. The model results are evaluated as monthly average changes. The model was used to analyze and separate the effects of: (1) changes resulting from the shift of consumptive uses and return flows to the UGA and MPR sites (described below); and (2) changes resulting from converting former irrigation return flows to instream flows at the former points of diversion (these results are described in Exhibit A). These effects were evaluated under both "average" and "drought year" conditions, as explained in Section 4.1.1 below. The two conditions are relevant for purposes of evaluating potential mitigation and monitoring proposals, which is discussed in Section 7. For purposes of this analysis, a "drought year" is a year in which the USBR prorates water supplies to its contract water users because there are insufficient supplies to meet demands.

Related analyses are included as exhibits. Exhibit A includes a description of changes in streamflows that result from Trendwest's proposed transfer of tributary water rights into the Yakima Trust Water Program. Specifically, the model results contained in Exhibit A include the

effects of cessation of irrigation return flow, which is a non-consumptive use component. The timing of former return flows was included in the impact assessment for mainstem diversions in the reach of the Yakima River affected by Trendwest's water rights transfers, since these model runs most accurately characterize the net flow changes expected to occur. Exhibit B discusses the sensitivity of the results to a reasonable range of model input parameter values. The sources of uncertainty are identified and the variability of results due to these uncertainties is presented.

4.1.1 Water Balance Model Construction

The model includes separate water availability modules for each of the Yakima River tributaries where Trendwest acquired water rights.[9] The results from ECT analyses of tributary irrigation and alluvial return flow were integrated into the tributary modules of the model. The tributary modules were all linked to the mainstem module of the upper Yakima River, which includes flow changes to the lower portion of the Cle Elum River from UGA and MPR return flows. The model calculates the overall water balance resulting from transfer of the Trendwest water rights.

Water availability for the consumptive portion of Trendwest's water rights is calculated on a daily basis and reported on a monthly basis by the model. Ultimately, water availability is compared with water consumptive use by the MPR and UGA. The model was run using observed and synthetic tributary streamflows generated for study years selected to exhibit a natural range of hydrologic conditions. For each of the water rights acquired by Trendwest, the water availability modules track natural streamflow at the former point of diversion, the diversion and return flows associated with former irrigation use and existing senior users on the same water course, and assesses the extent to which sufficient water is available for withdrawal under the water right each day during the irrigation season. The water availability modules assume any water that would have been withdrawn under a Trendwest water right is left instream to mitigate for withdrawals from the Yakima River to supply water demands at the Trendwest property.

Separate water availability modules were necessary for each tributary to account for differences in the timing and receiving water for return flows, and the range of gains and losses of flow through the streambeds to the underlying alluvial aquifers. However, each of the water availability modules contains a number of common elements. This section of the report contains a description of the basic elements and assumptions common to each of the tributary water availability modules, followed by a description of the particular method used for each tributary stream.

The model originally was constructed for the MPR EIS and updated for the UGA Draft EIS. Subsequent Ecology review of the model resulted in a recommendation to include irrigation return time lags, and to incorporate additional data collected by Ecology during 2001. Regression analyses were conducted to improve the accuracy of the UGA Draft EIS estimates for Big, First

9 The tributaries with Trendwest water rights are Big Creek, Teanaway River, First Creek and Swauk Creek. First Creek is a tributary of Swauk Creek. First Creek flow is diverted to irrigate crops in the Reecer Creek Sub-Basin, via the First Creek Water Users Association Ditch (formerly known as the Wold-Munson Ditch). First Creek irrigation return flows follow groundwater pathways under the Reecer Creek Sub-Basin and discharge into the Yakima River near Ellensburg.

and Swauk Creek streamflows. The Draft EIS streamflow predictions were based on a limited set of historical USGS measurements, and monthly monitoring from the period of 1999 through 2000. Data from ECT in 2001 provided continuous streamflow from late spring through summer, and thus enabled regressions with a much larger set of measurements. In August 2001, ECT and the UGA team met to discuss the water balance model and decide how to best apply the new 2001 data in combination with the 1999 to 2000 data that were available. The ECT and UGA teams decided that updating the regression analysis to include the relationship between data from the USBR Teanaway River at Forks gauge and the 2001 continuous gauge data would be the best way to improve the accuracy of the model's streamflow estimates. The UGA team also agreed to calculate the confidence bounds around the regression prediction to indicate uncertainty of the streamflow estimates. Adding the large number of 2001 data pairs to the prior 1999 to 2000 data in the regression greatly tightened the confidence bounds around the model prediction for each stream. The regressions and confidence bounds are shown and discussed in Exhibit B.

The regression equations in the revised model used: (1) data collected by the UGA team during the 1999 and 2000 irrigation seasons; and (2) the ECT data from 2001. These data were paired with concurrent flow data from the Teanaway River to estimate flows at the continuous gauge locations. The data pairs, regressions, and R-squared values are shown in Figures 4.1, 4.3, and 4.5. The regressions link natural streamflow in the tributaries to streamflow measured at the Forks gauge on the Teanaway River. Figures 4.2, 4.4 and 4.6 show the regression-estimated streamflow and the 90 percent confidence limits with the actual measured flows for the period of continuous monitoring during 2001. These figures show that the actual streamflows are greater or less than the regression-estimated streamflow by varying amounts. The regressions minimized the difference between the concurrent observed and predicted flow for the total data set for each predicted streamflow location. Each regression includes the basic assumption that the differences between concurrent observed and predicted flows occur randomly in a log-normal distribution. A logarithmic transformation was used to avoid predicting negative flows during the low-flow season. Much of the time, the regression analysis over-predicted flows during the mid- to late-summer low flow season, and under-predicted flows during the spring and early-summer season.

It is evident that as streamflows reduced through the 2001 irrigation season, the fit of the predicted streamflows to the actual observed data tightens along with the 90 percent confidence bounds. Outside of a single storm in August 2001, the regression-predicted flows were within the 90 percent confidence bounds during the lower-flow period of concern. The late August 2001 storm shows as a peak in the predicted tributary hydrographs because of the Teanaway River's response to the storm. However, during the lowest flow season in 2001, observed stream flows generally ranged between the middle and lower bound model simulations (see Exhibit B). The middle and lower bound simulations were therefore used to characterize a reasonable range of expected conditions for the average study years.

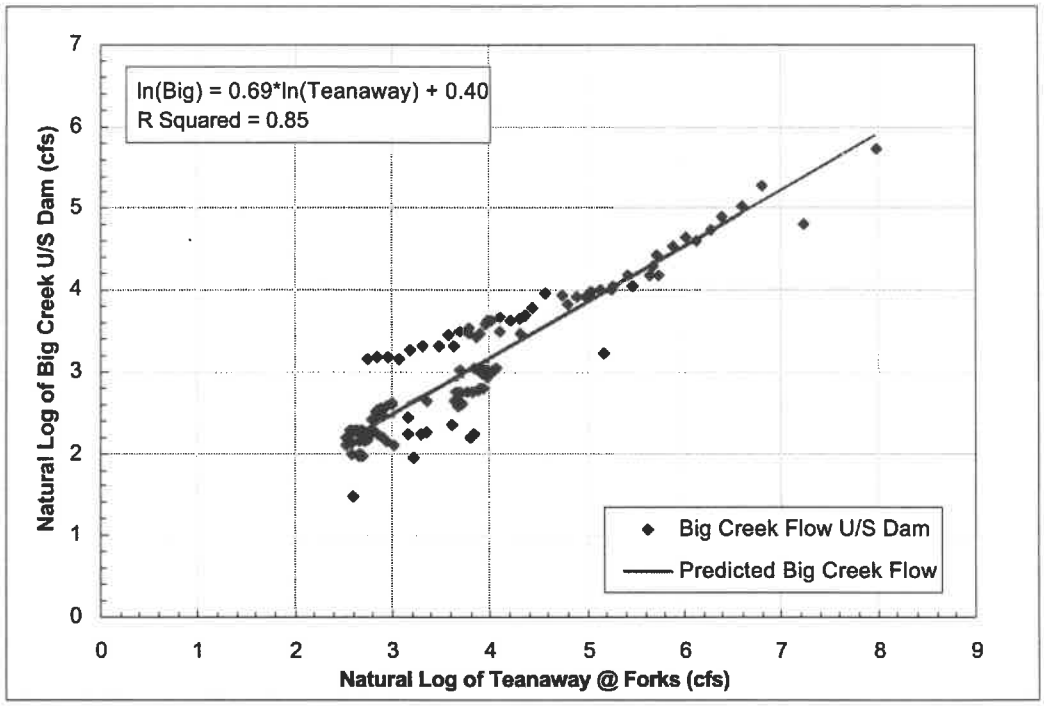


Figure 4.1. Log-Log Regression of Teanaway River at Forks and Big Creek (Upstream of Darling- Lund Diversion)

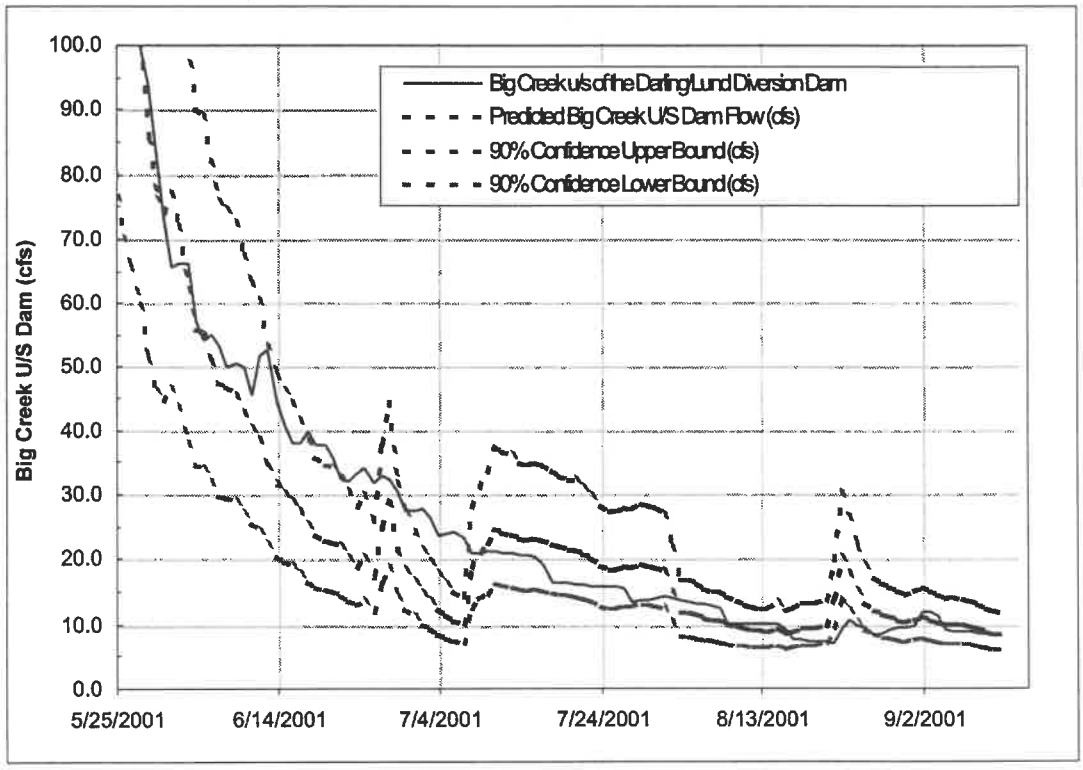


Figure 4.2. Predicted Versus Observed Big Creek Stream flow During 2001 Monitoring Period

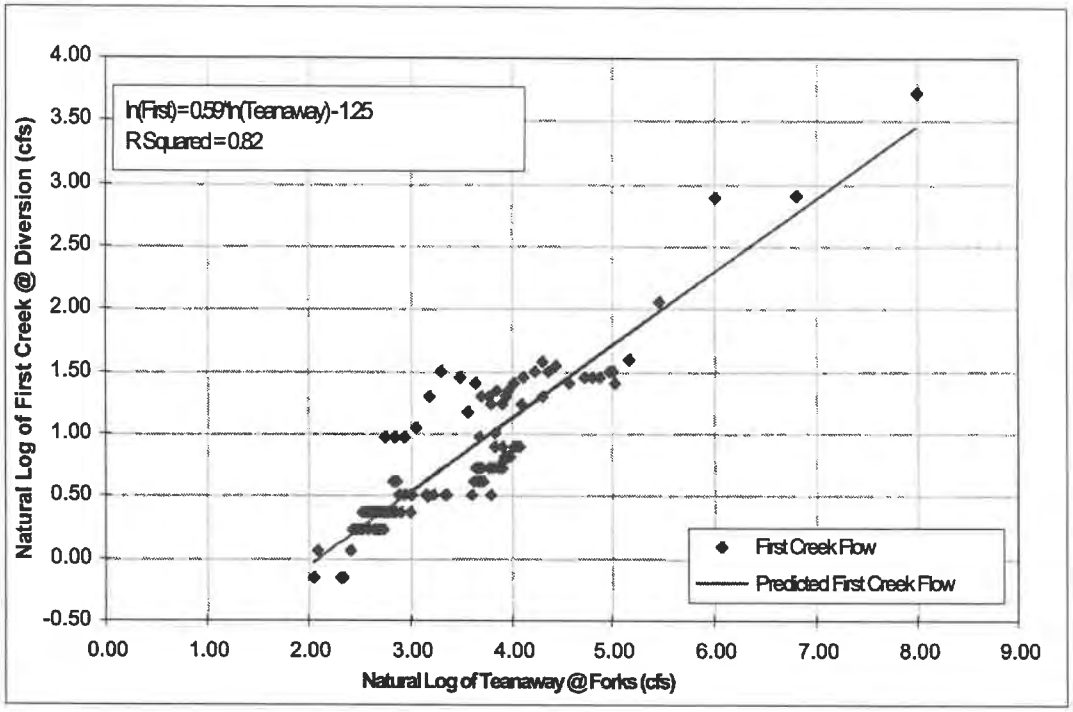


Figure 4.3. Log-Log Regression of Teanaway River at Forks And First Creek Upstream of the Diversion

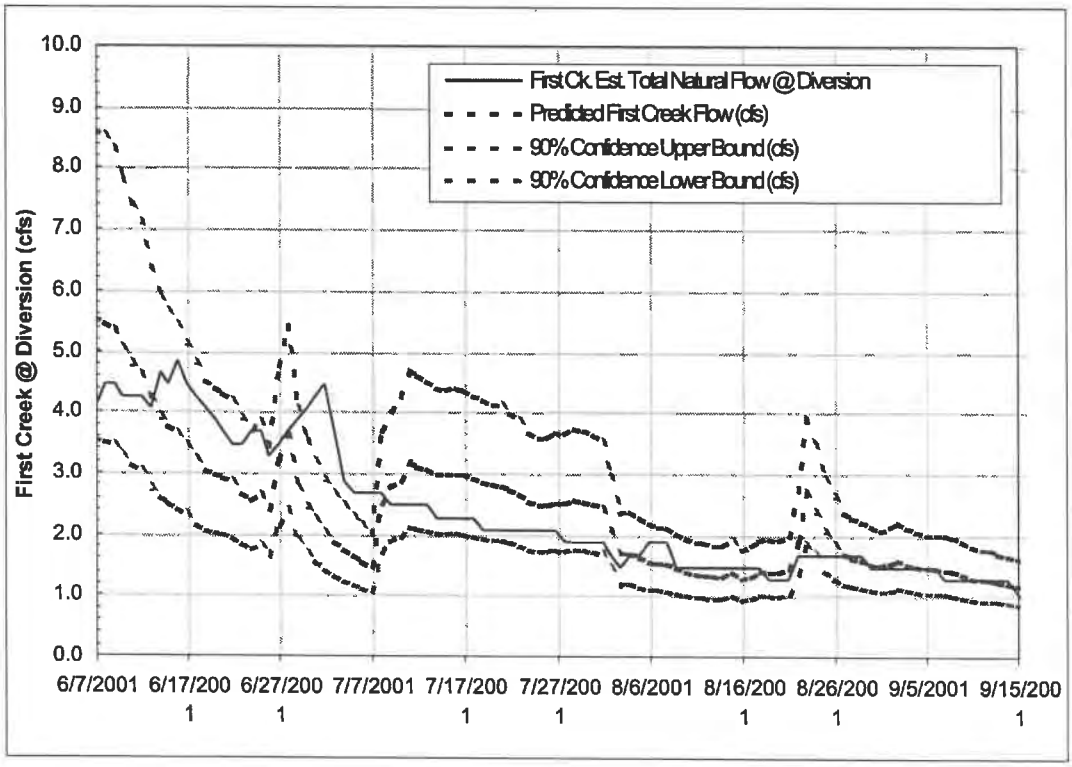


Figure 4.4. Predicted Versus Observed First Creek Streamflow During 2001 Monitoring Period

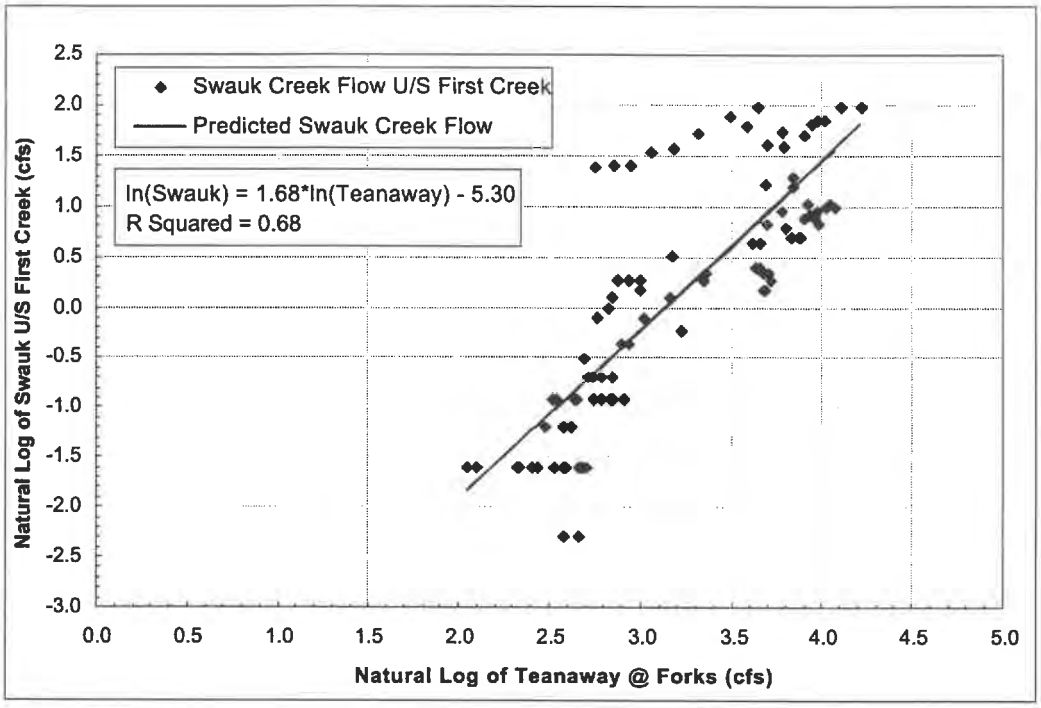


Figure 4.5. Log-Log Regression of Teanaway River at Forks and Swauk Creek (Upstream of First Creek)

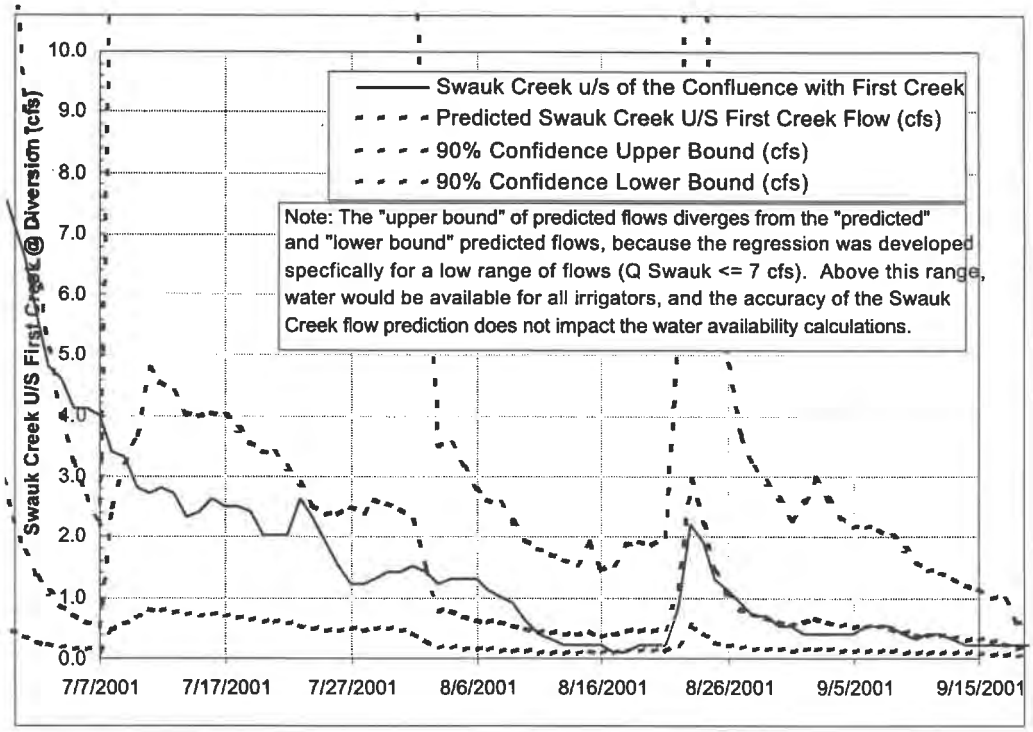


Figure 4.6. Predicted Versus Observed Swauk Creek Streamflow (Upstream of First Creek) During 2001 Summer Low Flow Season

Work by ECT in 2001 included not only continuous and non-continuous streamflow gauging on the tributaries and diversions, but also seepage studies, modeling of irrigation return flows, evaluation of alluvial subsurface flows, and review of the consumptive inputs and MPR and UGA return flow inputs to the models. Brown and Caldwell incorporated the new data and recalibrated the streamflow estimates of the water availability using the regressions described above. Consistent with the previous MPR and UGA EIS model analyses, water years 1991 through 1995 were simulated. Water year 2001 was added for this analysis to represent a drought year condition.

The water supply technical report prepared for the UGA Draft EIS used water years 1990 through 1995 as a study period. The study period for the revised model for the UGA Final EIS also includes water years 1991 through 1995 and 2001. The period of water years 1992 through 1994 was the worst continuous drought on record for the Yakima River basin. Water availability in 1994 was the worst of these three continuous drought years. Model results from four of the six water years are averaged on a monthly basis to represent long-term, average conditions. Those four years include the relatively average years of 1991 and 1995, and the dry years of 1992 and 1993, so the representation of the long term average by the model is likely conservatively dry. The worst simulated drought years (1994 and 2001) were removed when computing the long-term, average conditions. Mean monthly changes in Yakima River streamflow are computed for water year 2001 to exemplify drought condition results. Water year 2001 was the worst single year drought since 1977. 1977 was the worst single year drought on record in the Yakima River basin. The characterizations of "average" and "drought" conditions are defined by the years chosen to represent them in the study period. It should be noted that even between "drought" years, the dry conditions can manifest in different ways at different times of the year. In 2001, for example, October precipitation was greater than the October average.

Natural Streamflow

The USBR operates and maintains several streamflow monitoring stations in the Upper Yakima River basin. Prior to summer 2001, there were few flow data available for the tributary streams. USBR has continuous monitoring gauge gauges on the Teanaway River at the Forks and above Lambert Road, but Big Creek, First Creek, and Swauk Creek were not continuously monitored until Ecology's work in summer 2001.

Determining the natural streamflow for the study period was a key first element to the water availability modeling that involved intensive flow monitoring, statistical analyses and extensive collaboration with ECT. As described above, during the summer of 2001 Trendwest, in cooperation with ECT, installed continuous flow monitoring gauge gauges on Big Creek, First Creek, and Swauk Creek.[10] ECT recorded streamflow at each monitoring gauge, and Brown and Caldwell used the natural streamflow at the Teanaway River at Forks gauge as a reference to establish a set of regression equations linking streamflow in the Teanaway River and the other tributaries. The regression equations predict flow in the tributary streams based on the natural streamflow at Teanaway at Forks.

10 The ECT gauges recorded water level. Spot streamflow measurements collected by ECT were used to develop a relationship between flow depth and flow rate (i.e. a rating curve) that allowed for the conversion of water level to streamflow rate.

The log-log regressions for Big Creek and First Creek had R-square values above 0.80, and thus data from the entire monitoring period were used to define the relationship between the Teanaway and these two tributaries' flows. On the other hand, data for the entire Swauk Creek monitoring period resulted in a poor regression fit. Therefore, only the low flow range (less than 7.0 cfs occurring after July 1st) of the Swauk Creek monitoring data were used to obtain the best possible estimates of Swauk Creek flow from Teanaway data for the critical low flow period of interest.

Measurement or estimation of natural streamflows is made more complicated when diversions occur upstream of gauge locations. This occurred for the USBR Teanaway gauge at Forks and at the gauge ECT installed on First Creek below the FCWUA diversion. Estimations of natural flow at the Teanaway Forks gauge required correction for upstream diversions and return flows. Diversions were estimated using the Blaney-Criddle method to calculate crop consumption. Return flow quantities were estimated from crop consumption and irrigation efficiencies. Return flow routing and delays in timing were assessed by ECT (see Appendix B, which also provided estimates of reasonable confidence bounds for the sensitivity analysis shown in Appendix B. Total natural flow on First Creek was calculated directly by summing gauge data from the First Creek gauge below the diversion and measurements taken at the First Creek Water Users ditch just below the diversion.

Consumptive Use Calculations

Irrigation consumptive use was defined as the volume of water consumed through plant evapotranspiration. The calculations, based on the Blanney-Criddle formula, used the same conceptual method as described in the Washington State Irrigation Guide to estimate crop net consumptive use. The Blanney-Criddle method incorporates, at minimum, precipitation, temperature and crop types (in this case, pasture grass was used to represent the crop mix for the areas historically irrigated by Trendwest's water rights). The Washington State Irrigation Guide also included averaged relative humidity and wind data, however the Guide does not include sufficient data to estimate relative humidity at the places of use of the Trendwest water rights. Therefore, the version of the Blanney-Criddle equation used in the Guide could not be incorporated into the model. The Blanney-Criddle equation incorporated into the model included temperature and precipitation inputs for which spatial and temporal distributions could be determined to estimate location-specific and time-specific net consumptive use. The irrigation consumptive use in this report describes the total consumptive use for each predominate crop type, less effective rainfall.

Applicable proceedings in Ecology v. Acquavella were used to estimate the amount of land to be irrigated under each water right. For the Big Creek (Easton), Teanaway River and Reecer Creek subbasins, these consist of Conditional Final Orders entered by the Court. The Court has not yet entered a Conditional Final Order for the Swauk Creek subbasin. Consequently, the Supplemental Report of Referee for Swauk Creek was used to describe the number of irrigated acres for each Swauk Creek water right.

Water Availability Determination

The diversion and return flow calculations for the water rights Trendwest seeks to transfer determine when and how much water would have been available for the Trendwest acquired water rights. While each of the tributaries has its own combination of controlling factors, such as the relative location of junior and senior water users, the basic determination of water availability is the same for all tributaries. The model used the following steps to compute water availability and net consumptive use:

- Natural mean daily streamflow is estimated upstream of the point of diversion for Trendwest water rights.
- Mean monthly net consumptive use is calculated for Trendwest water rights and all senior water rights in the same tributary using the Blanney-Criddle equation. The equation inputs include actual mean monthly temperature and precipitation for the study period.
- Irrigation efficiency for surface diversions is established as a range of values (0.32 to 0.45) based on three sources of information, including rulings in the Acquavella adjudication, as described below.
- The irrigation diversion requirement is calculated by multiplying the net consumptive use by irrigated area and dividing by irrigation efficiency.
- Senior water right diversions are subtracted from the natural flows to determine water availability for Trendwest diversions and for all other water rights with the same priority.
- Time lagged irrigation return flows from upstream diversions are added back into the water availability.
- The Trendwest net consumptive use is determined based on the water available for diversion. If insufficient flow is available to meet the diversion requirement, then the crop consumption is calculated from available flow divided by the irrigation efficiency. Otherwise, the net consumptive use is calculated using Blanney-Criddle.

The prioritization of water rights is very important because, in some tributaries, there would not have been sufficient water for all irrigators throughout the summer season. In the water availability model, the location of a diversion is less important than its priority date, although location is important in situations where return flows are a significant percentage of total flow. For example, the model assumes junior rights holders must not divert if the water flowing past the diversion is less than sufficient to serve all downstream senior rights holders. Table 4-1 lists the tributary and mainstem water rights acquired by Trendwest. Exhibit C contains the list of all water rights included in the model for which priorities were assigned and consumptive uses calculated.

The diversion requirement for water at each irrigation site is computed as the consumptive use divided by the irrigation efficiency. The range of irrigation efficiency values (0.32 to 0.45) was based on three sources of information. First, the Washington State Irrigation Guide provides on-farm irrigation efficiencies. The furrow irrigation efficiency of 60 percent was multiplied by a conveyance efficiency of 75 percent to obtain the upper end of the efficiency range. Second, the Acquavella adjudication provides the total volume of diversion allowed for the irrigation season (Qa) in each irrigation water right. The Qa was divided by the net consumptive use estimated by the Blanney-Criddle equation using mean monthly temperature and precipitation input values for

the period of 1989 to 1995. Third, Ecology provided their measurements of diversions into the 3M Ditch and the Ballard Ditch during 2001. These two ditches are near each other, and divert water from the Teanaway River between the Forks and Lambert gauges. Independently, for both ditches, the daily net consumptive use was estimated for the day of the measurements using the Blanney-Criddle equation with actual mean monthly temperature and precipitation measured during 2001. The irrigation efficiencies of the areas served by 3M and Ballard Ditches were estimated from net consumptive use divided by the measured diversion. Irrigation efficiency does not change the maximum potential consumptive use by crops, but does affect the amount of water necessary to supply the diversion requirement. The diversion requirement is the crop consumption, plus the non-consumptive irrigation return flow from the irrigated acres, plus return flow derived from seepage from diversion ditches.

The amount of water not consumed by evapotranspiration (crop consumptive use) was assumed to infiltrate to the groundwater table and flow to a surface water body. The subsurface flow path and irrigation return flow timing was a complex issue investigated by Brown and Caldwell and ECT, using streamflow measurements, field test pits, geological inference, and computer groundwater model simulations. The methods used to route irrigation return flow were specific to each tributary water availability model. See the following section for a detailed description of the method used for each stream.

Table 4-1: Tributary Water Rights Acquired by Trendwest

Tributary Water Rights	Acres	Qa (ac-ft)	Qi (cfs)	CU (ac-ft)	CU (cfs)
Big Creek (Gentry 1887)	81.51	390.1	1.53	127.22	0.50
Big Creek Subtotal[1]	81.51	390.1	1.53	127.22	0.50
Teanaway (Walker 1883)	63.00	341.20	1.26	121.75	0.45
Teanaway (Walker 1883)	70.00	379.00	1.40	135.28	0.50
Teanaway (Walker 1883)	4.00	21.60	0.08	7.73	0.03
Teanaway (Walker 1890)	34.00	183.60	0.68	65.71	0.24
Teanaway (Walker 1898)	12.80	69.12	0.26	24.74	0.09
Teanaway (Walker 1898)	4.00	21.60	0.08	7.73	0.03
Teanaway Subtotal[2]	187.80	1,016.12	3.76	362.92	1.34
First Creek (1877)	69.9	359.80	2.8	166.65	1.30
First Creek (1881)	163.1	813.40	5.00	388.86	2.39
First Creek Subtotal[3]	233.00	1,173.20	7.8	555.51	3.70
Swauk Creek (Hartman 1889)	75.00	562.50	3.34	179.31	1.06
Swauk Creek (Hartman 1878)	20.00	150.00	0.89	47.82	0.28
Swauk Subtotal[c]	95.00	712.50	4.23	227.13	1.35

1 Conditional Final Order Re Subbasin No. 2 (Easton) (Feb. 13, 1997).
2 Conditional Final Order Re Subbasin No. 3 (Teanaway River) (Feb. 8, 2001).
3 Supplemental Report of Referee Re Subbasin No. 4 (Swauk Creek) (July 6, 1998).

MPR and UGA Return Flows

MPR and UGA return flows primarily are a combination of wastewater discharges, leakage, and irrigation return flows. Net consumptive use requirements are the difference between total diversion requirements and return flows. Aside from the stockwater component of Trendwest's mainstem water rights (which are authorized for continuous year-around use), all other water rights owned by Trendwest currently are authorized for seasonal use during the irrigation season (which varies by water right). The model was used to determine the extent to which UGA and MPR consumptive use outside the irrigation season was counterbalanced by (1) the consumptive use component of the year-around stockwater rights, (2) the non-delayed return flows (i.e., wastewater discharge) from the UGA and MPR sites, and (3) the time-delayed and attenuated return flows from irrigation and leakage on the MPR and UGA, which would enter the Cle Elum and Yakima Rivers year around. During the irrigation season, the model calculated the extent to which UGA and MPR consumptive use was counterbalanced by the three components described above, plus a fourth component consisting of transferring Trendwest's tributary water rights to instream flows. Monthly water requirements fluctuate on a seasonal basis with the highest consumptive use occurring between June and September (within the irrigation season).

Trendwest's proposed diversions would result in a reduction in Cle Elum River flow below the Cle Elum River diversion (when active) and in Yakima River streamflow at Cle Elum. However, as discussed previously the Cle Elum River diversion would operate on an intermittent basis, while the Yakima River diversion would always be active. The model therefore assumed all water diverted to supply the UGA and MPR was diverted from the City's Yakima River diversion works. Irrigation on the MPR and UGA properties would add return flows to the Cle Elum and Yakima Rivers. Other return flows would occur, most significantly from the wastewater treatment plant and from water supply systems leakage. The onsite return flows (MPR and UGA) infiltrating as groundwater would be delayed and "spread" through time (attenuated) before reaching the Cle Elum or Yakima Rivers. These delays and attenuating effects were estimated and are described in detail in Exhibit F. Wastewater treatment plant return flows were considered to be immediate for the purposes of analysis on a monthly average basis. Thus no time delays for wastewater return flows were put into the model. The difference between diversions and return flow (delayed and non-delayed) at any given time would be the net change in mainstem streamflow due to onsite water consumption by the MPR and residential UGA.

Stream-Specific Assumptions

Big Creek Water Availability Model

The water availability model for Big Creek calculates the amount of water available daily for the 1887 priority date Gentry water right, which was acquired to help offset consumptive use at the MPR and UGA site. The Gentry water right shares its priority date and diversion location with the Lund and Darling rights. These rights are the most senior on Big Creek. For the study period, there was sufficient water for all of the senior rights holders on Big Creek. The water availability model for Big Creek simulated the effects of transferring the Gentry water right by computing:

- The amount of water diverted daily from Big Creek by the senior users.
- The volume and timing of irrigation return flows before and after the water right transfer.
- The volume and timing of alluvial seepage return flow before and after the water right transfer.

Irrigation return flow routing and timing, and streambed seepage were important issues for determining the effects of water rights transfer on Big Creek. When Trendwest's share of the Gentry water right was operating, the water was conveyed via the Lund Ditch to the Gentry property. The Gentry property is located near the topographic divide between the Big Creek and Little Creek watersheds. Irrigation return flow from this property flowed vertically through the vadose zone to the water table, then laterally via groundwater to the Yakima River rather than back into Big Creek. The flow path to the Yakima River was approximately one mile, and delayed return flows in such a manner that some proportion of the return flow reached the Yakima River throughout the entire year. ECT estimated that about 80 percent of the total irrigation return flow reaches the Yakima River within 4 to 10 months after the start of irrigation season (PGG 2002).

ECT modified and expanded a groundwater model developed previously by Brown and Caldwell to estimate the timing of return flow (Figures 4.7 and 4.8). The predicted groundwater outflows shown in Figures 4.7 and 4.8 would be further delayed by two weeks due to estimated time lags in the unsaturated zone (Appendix G). ECT and the project team agreed on reasonable ranges in values for the background recharge, seepage from Big Creek ditches, and hydraulic properties of the local soils. Hydraulic properties of soils are described by their hydraulic conductivity (K), which is the rate at which soil can transmit a liquid under the influence of gravity. A high K value means the soils can transmit water quickly (for example, gravel), and a low K value means the soils transmit water slowly (for example, silts). ECT developed fast and slow return flow schedules from this range of inputs by groundwater modeling.[11] ECT and the project team agreed to use the average of the two schedules as the most probable schedule. The water availability model distributed the total annual irrigation return flow volume according to the schedule developed by ECT, using an average of the two schedules for the water balance model (see Section 4.1.2). The high and low return flow schedules were used to establish a reasonable range of expected outcomes from the simulation model (see Exhibit B).

Ecology streamflow monitoring during 2001 indicated that Big Creek loses surface water to its alluvial aquifer via streambed seepage. ECT quantified these losses by using field flow measurements to develop a relationship between flow and seepage (Figure 4.9). The water availability model routes the seepage volume for the "before" and "after" conditions to the Yakima River according to the schedule developed by ECT and shown in Figure 4.10.

11 Big Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002).

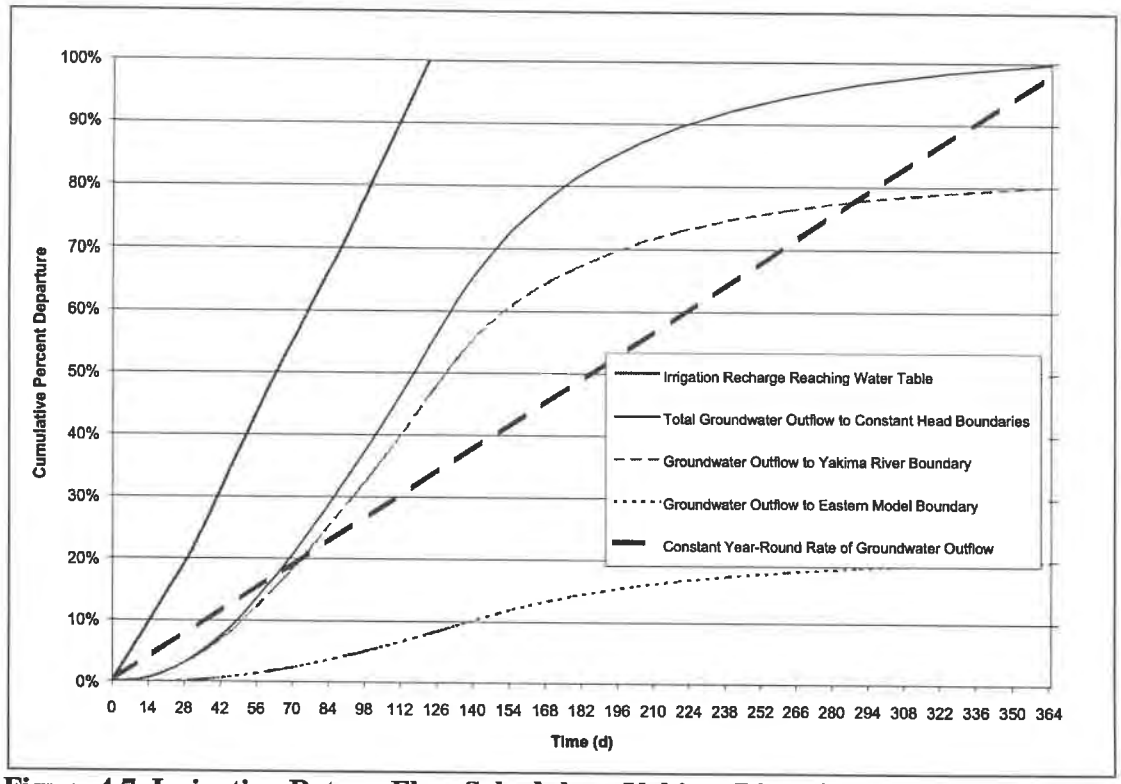


Figure 4.7. Irrigation Return Flow Schedule to Yakima River from Big Creek Diversion (Hydraulic Conductivity, K = 750 ft/day)

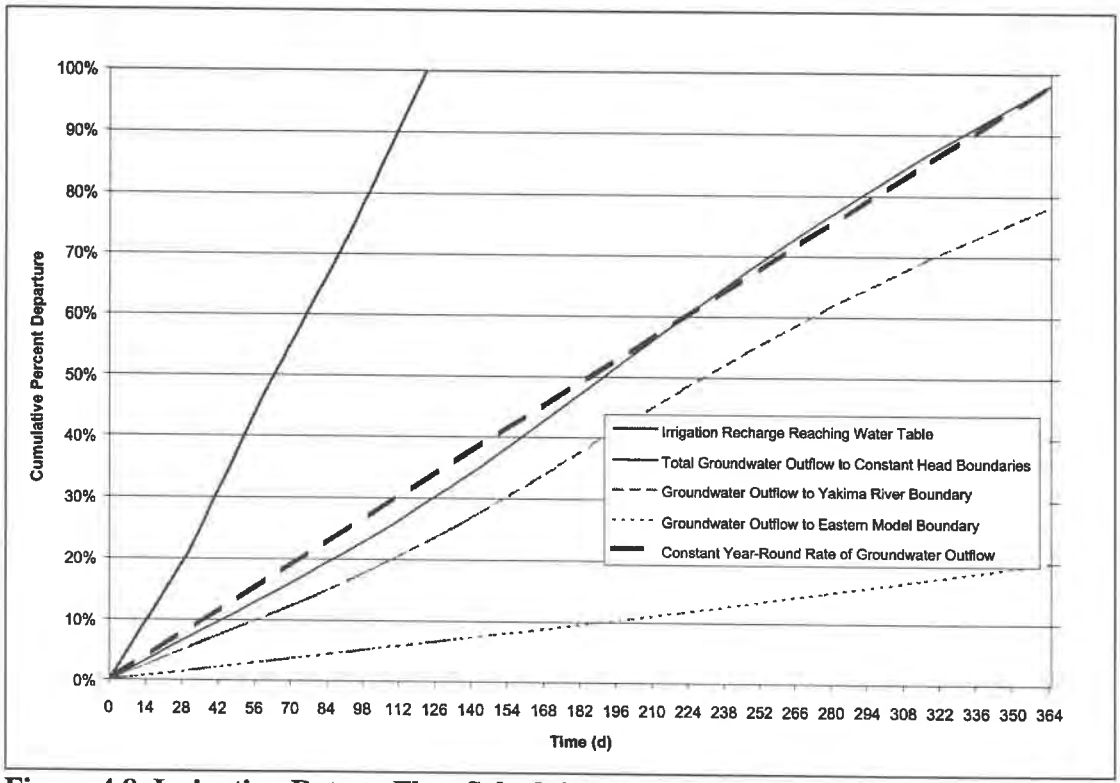


Figure 4.8. Irrigation Return Flow Schedule to Yakima River from Big Creek Diversion (Hydraulic Conductivity, K = 75 ft/day)

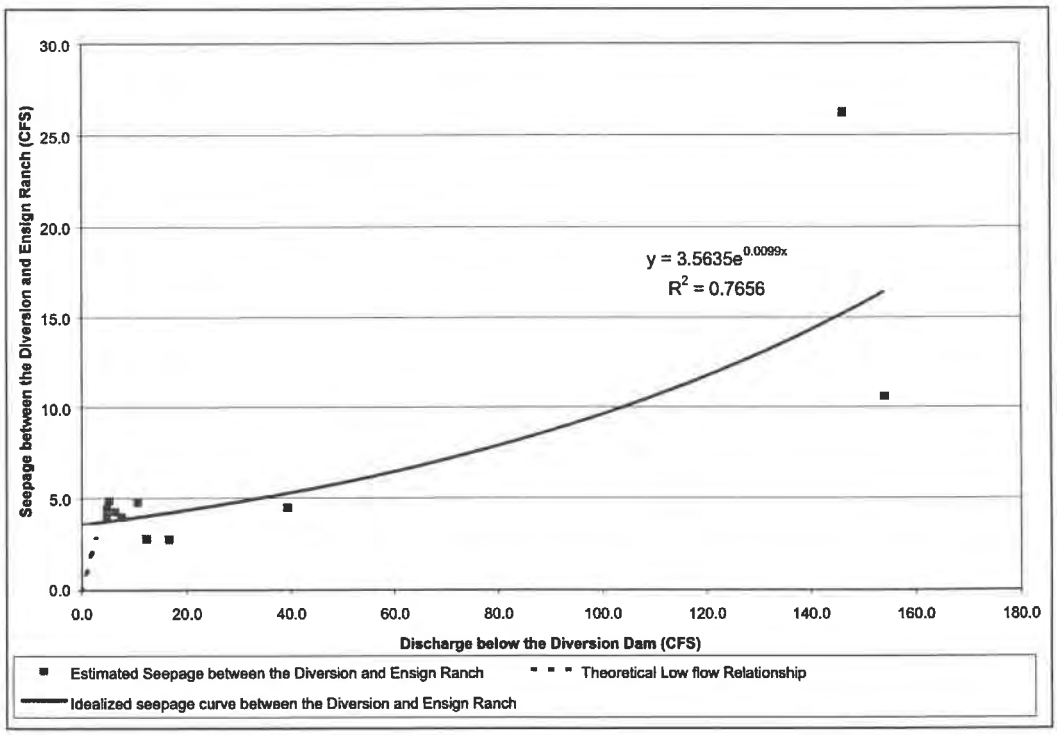


Figure 4.9. Empirical Relationship Between Streambed Seepage and Big Creek Flow at the Diversion Dam

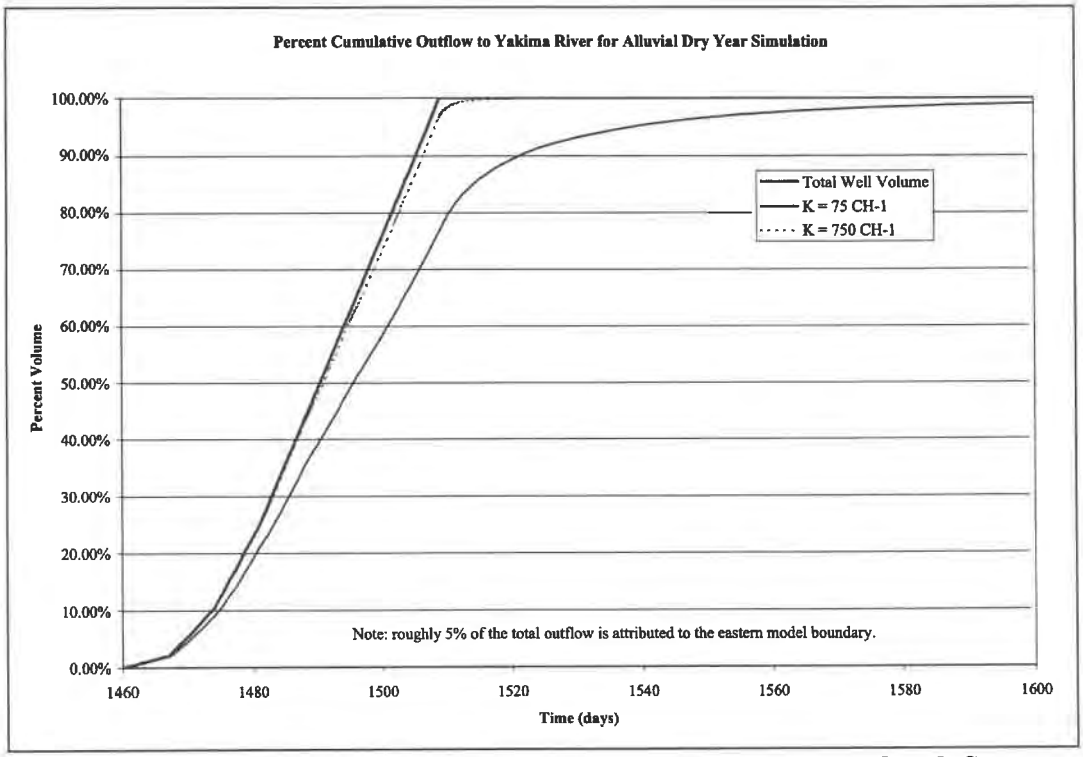


Figure 4.10. Alluvial Return Flow Schedule to Yakima River from Big Creek Seepage

There are four major irrigators on Swauk Creek: Hartman (acquired by Trendwest), Burke, Coe, and Tang. The Burke and Hartman properties, which are located just downstream of the confluence of First Creek and Swauk Creek, include rights that are senior to the Tang and Coe water rights, and the Hartman property also includes rights that are junior to the Tang and Coe water rights. Sufficient water must remain instream for the Tang and Coe properties before the junior Hartman right can be available to the Trust to help offset the consumptive use on the MPR and UGA site.

The Swauk Creek water availability model allocated water under Swauk Creek water rights, based on the priority date of each water right using the assumption that the water lost to streambed seepage between the former Hartman property and the downstream irrigators is insignificant. Although it was determined likely that a hydraulic connection exists between the creek and its floodplain, so that some subsurface irrigation return flows re-enter Swauk Creek near fields irrigated by diverters below the former Hartman property, the model was conservative in that it assumed upstream return flows were not available for use by other Swauk Creek irrigators. This had the effect of limiting water availability to supply Trendwest's junior Hartman water rights during some portions of the irrigation season to a greater extent than likely occurs. ECT field investigations and modeling supports the assumption of hydraulic connectivity, although some areas lacking continuity were noted during field investigations. ECT also estimated that seepage losses are insignificant at flows typical of the irrigation season. The cessation of the diversion at the Hartman property has resulted in an increase in surface water flow in Swauk Creek. Through a process of field investigation, geological inference, and groundwater modeling, ECT found that the Hartman property return flow enters the alluvial aquifer and discharges back to Swauk Creek both locally and throughout adjacent portions of Hidden Valley upstream of Swauk Canyon. ECT developed a return flow schedule for Swauk Creek that was incorporated into the Swauk Creek water availability model.[14]

Reecer Creek Return Flow Model

ECT field investigations found that there is water loss through seepage in the FCWUA ditches. Ditch seepage losses and irrigation return flows do not discharge to Reecer Creek. Based on hydrogeologic interpretation, ECT estimated that they return to the Yakima River uniformly throughout the year via a subsurface route.

ECT measured the changes in flow at different locations along the FCWUA ditch and provided a irrigation return flow schedule for use in the model.[15] The ditch losses are dependent on the amount of flow diverted and range from approximately 0.3 to 0.5 cfs. ECT estimated the on-field irrigation losses to be 50 percent of the water applied to the field, with return flow distributed evenly throughout the year.

The Reecer Creek return flow model computed the amount of water required for irrigation for the FCWUA properties, both before and after Trendwest acquired a portion of the FCWUA rights. Based on irrigation demand, the corresponding ditch seepage and total maximum

14 First and Swauk Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002).

15 Reecer Creek Basin Hydrologic Analysis (Pacific Groundwater Group 2002).

diversion were computed. The required diversion was compared with the water available in First Creek to determine how much water was (1) diverted, (2) lost to ditch seepage, and (3) applied to the FCWUA fields. The amount of the Trendwest's FCWUA diversion was fed back to the First Creek water availability model to estimate the change in flow in the First Creek/Swauk Creek system.

Mainstem Yakima River Water Rights

Trendwest acquired water rights from the Pautzke Bait Company to serve as the primary water supply for its MPR and UGA development proposals. The Pautzke water rights were delivered through Mill Ditch, which is a diversion canal for which water is diverted from the mainstem Yakima River upstream of Ellensburg. The Pautzke Bait Company property is located adjacent to the Yakima River, just downstream of the mouth of Reecer Creek. The Pautzke water rights are authorized for use both for irrigation and for stockwater. The season of use for the Pautzke irrigation rights is from April 1 to October 15. The stockwater right is available outside the irrigation season. The stockwater right helps offset consumptive use that occurs on the Trendwest property outside the irrigation season.

The Pautzke water rights are large, but have relatively low efficiency, so the consumptive use available ranges from 10 to 20 percent of the total diversion.

Ecology and the project team agreed to use a 10 percent consumptive fraction for stock water rights.

4.1.2 Water Balance Model Results

Since Trendwest purchased tributary and mainstem water rights, irrigation diversions to, return flows from, and crop evapotranspiration (consumption) within the formerly appurtenant properties ceased. Tributary and mainstem streamflows have already changed due to the water right purchases, which left water formerly diverted to irrigation as instream flow. Transfer of the tributary and mainstem water rights to the Trust (cessation of irrigation diversions) would direct Big Creek, First Creek, Swauk Creek, the Teanaway River and, to a lesser extent, the Yakima River, towards a more normative hydrologic condition. The normative flow concept stresses the importance of natural flow paths and hydrology to sustain the conditions to which naturally spawning salmon have adapted over centuries of evolution. (See Poff et al, 1997). For the purpose of assessing mitigation need for impacts to mainstem Yakima River flow, the model was also run under average and drought year conditions with only the consumptive portion of the tributary water rights transfers. Changes in flows due to changes in timing of irrigation return flows from the formerly appurtenant properties also result from transferring irrigation water rights to instream flows. Nevertheless, they were excluded from this series of model runs shown in this section. This distinction was made to account for the changes in mainstem flow that would result in impacts requiring mitigation (shown in this section), compared to termination of a human-caused irrigation delay, which also causes flow changes. Ceasing human-caused irrigation return flow delays is not identified as an impact under this SEPA evaluation (see Exhibit A).

The water balance model was run for a reduced density MPR consistent with the Ridge Settlement Agreement signed by Trendwest plus UGA Alternative 5 (combined lower density cumulative alternatives). In order to isolate the effects of consumptive use from time-lagged tributary irrigation return flows, the non-consumptive tributary irrigation return component was taken out of the equation. This is equivalent to assuming that subsurface irrigation return flows were left instream at the points of diversion. Diversions were limited by water availability; therefore, consumptive use could be less than the potential consumptive use (based on Blanney-Criddle estimates), especially for more junior water rights.

The long-term, average year impacts and drought year impacts due only to the consumptive use component of the proposed water right changes are shown in Tables 4-2 and 4.3, respectively.[16] The tables show the impact of the cumulative effects of the UGA Alternative 5 and MPR reduced density water use. The downstream cumulative effects of the proposed on-site water use and discontinued off-site irrigation is shown in the right-most column of each table. Mill Ditch is the lowest point in the Yakima River at which the water right transfers to instream flows under the Trust mitigate for consumptive uses on the MPR and UGA site. A negative value in this table column indicates a net reduction in mean monthly Yakima River streamflow. A positive value indicates an increase. Representative spreadsheets from the water balance model are appended in Exhibit D.

Table 4-2: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under Long-Term Average Year Conditions (Study Years 1991-1993, 1995)[1]

	D/S[2] Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.1
Feb	0.0	0.7	0.0	0.0	0.0	0.1
Mar	0.0	0.6	0.0	0.0	0.0	0.1
Apr	0.0	0.6	-0.3	-0.3	0.9	2.3
May	0.4	1.0	-0.3	0.9	3.1	5.1
Jun	0.5	1.1	-3.2	-1.8	0.3	2.5
Jul	0.6	1.2	-5.2	-3.6	-2.3	0.2
Aug	0.6	1.2	-3.8	-2.5	-2.0	0.4
Sep	0.0	0.6	-3.1	-2.7	-2.3	-0.4
Oct	0.0	0.7	-0.3	-0.3	0.1	0.7
Nov	0.0	0.7	0.0	0.0	0.0	0.1
Dec	0.0	0.7	0.0	0.0	0.0	0.1

1 The upper and lower bound simulation results are shown in Tables B.2 and B.3 in Exhibit B. The flow changes shown are from the middle simulation run (Table B.1 in Exhibit B).

2 D/S = "Downstream of … ."

16 Exhibit A contains water balance model predictions of the changes in Yakima River streamflow, that include the effects of irrigation return flow lag time and cessation of agricultural irrigation, in addition to the impacts of transferring the consumptive portion of Trendwest acquired water rights shown in Tables 4.1 and 4.2.

Table 4-3: Mean Monthly Changes in Yakima River Flow from the "Consumptive Use Model" (Excludes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001)

	D/S[1] Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.1
Feb	0.0	0.7	0.0	0.0	0.0	0.1
Mar	0.0	0.6	0.0	0.0	0.0	0.1
Apr	0.0	0.6	-0.3	-0.3	0.9	2.2
May	0.4	1.0	-0.3	1.0	3.2	5.0
Jun	0.5	1.1	-3.2	-1.9	0.0	2.1
Jul	0.6	1.2	-5.1	-3.6	-2.6	-0.2
Aug	0.6	1.2	-3.7	-2.5	-2.0	0.3
Sep	0.0	0.6	-3.1	-2.7	-2.4	-0.4
Oct	0.0	0.7	-0.3	-0.3	0.1	0.7
Nov	0.0	0.7	0.0	0.0	0.0	0.1
Dec	0.0	0.7	0.0	0.0	0.0	0.1

1 D/S = "Downstream of … ."

4.1.3 Conclusions

There would be no reductions in Yakima River flow outside of the irrigation season below Ellensburg (D/S Mill Ditch) due to transfer of Trendwest's water rights. The changes outside of the irrigation season would be about +0.1 cfs, which are relatively small. During lower flow periods of 2001, a drought year, the observed streamflows were often lower than the model-predicted flows in Big Creek, First Creek, and Swauk Creek, though above the lower 90% confidence bounds (see Figures 4.2, 4.4, and 4.6). Thus, accurate characterization of streamflow during the driest portion of the irrigation season is expected to occur between the middle and lower bound simulations that were run with the model (see the complete results in Tables B.1 and B.3 in Exhibit B). The middle and lower-bound simulations for the average flow condition give a relatively narrow range of results for the most probable flow changes. For example, below Mill Ditch the most probable range of change in the spring is a +5.0 to +5.1 cfs in May. The most probable ranges of change during the dry season below Mill Ditch are -0.5 to +0.2 cfs (July), +0.1 to +0.4 cfs (August), and -0.6 to -0.4 cfs (September). All other months showed flow increases for the lowest bound simulations.

During a severe drought such as occurred in water year 2001, a decrease in Yakima River streamflow would occur in July and September below Ellensburg. The September decrease shows as the same as the long-term average. This shows that under both very dry and more average conditions, little water is available at the end of the dry season to fulfill many of the acquired water rights, and thus there is little change between average and drought conditions at this time of the year. The difference between long-term and severe drought cumulative MPR and UGA change in July is a reduction of 0.4 cfs—from a 0.2 cfs increase to a -0.2 cfs decrease below Ellensburg. The maximum springtime mainstem flow increase during a drought year such as 2001 would be 5.0 cfs, which is also about the same as the long-term, average conditions (5.1 cfs) for May.

The model was also run to include the effect of terminating the former irrigation return flow time lags from the tributary water rights (named the "combined" model simulations). Those results are shown in Exhibit A.

4.2 IMPACTS ON THIRD-PARTY WATER USES

Changes in the consumptive use of water under Trendwest's mainstem and tributary water rights were examined for potential to affect three categories of third party water users. First, third parties diverting from the mainstem Yakima River between Cle Elum's intake and Reecer Creek were examined for impact arising from reductions in mainstem flow between those two points. Mainstem diverters were evaluated under the assumption that mitigation for TWSA flow reductions from the shift in consumptive use under Trendwest's proposed transfers could take place between Mill Ditch and Reecer Creek, below the potentially affected parties. Second, ECT investigated impacts to third party water users diverting from tributaries downstream of Trendwest's water rights transferred to the Trust. Third, ECT examined effects that third parties using groundwater from shallow wells might experience near lands fallowed by the irrigation transfer to the Trust. These third parties could experience lower groundwater elevations caused by cessation of irrigation return flow recharge from the fallowed lands.

The impacts are shown as a change in flow levels, but it is important to evaluate the significance of the changes in flow levels. Significance is related to the physical accuracy of measuring river flows, diversions and return flows. (USBR 1999, at page 115). Flow measurement accuracy depends upon flow level and measures devices employed. Typical gaging station error ranges from 5 to 20 percent to even higher during very high flows. Therefore, model results that rely on measured flows reflect the accuracy of flow measurements, and should be considered to be no more accurate than the accuracy of measured flows. To assess the significance of hydrologic impacts, USBR has used an overall measurement error of 10 percent to define a "non-measurable impact." USBR selected an impact of less than 10 percent of measured streamflows because impacts shown in a hydrologic model that are less than this amount are not measurable due to gaging error.

4.2.1 Mainstem Water Users

Trendwest representatives contacted all Mainstem water users and their diversion systems were evaluated to determine their susceptibility to interference from Trendwest's proposed water rights transfers. Given the small difference in mainstem TWSA flows between the Cle Elum diversion and Reecer Creek downstream, the main concern expressed was that diversion systems employed by these diverters were already marginal in most cases to collect their water rights from the river. The concern was not that mainstem flow rates would be insufficient to meet their needs. Any change in flow or head pressure past their headgates could adversely affect the diverter's ability to withdraw water.

To evaluate the effect of Trendwest's combined UGA and MPR projects on these third parties, the water balance model was run to include both the results of the Trendwest's mainstem water rights transfers to the UGA and MPR, and the results of leaving tributary irrigation return flows instream. Inclusion of the latter has the result of showing the result of terminating the slower

irrigation return pathway on the tributaries by leaving that water instream at the former point of diversion, hastening its delivery to the mainstem. That change in timing of the former irrigation returns to the Yakima River, in conjunction with the transfer of the consumptive portion of the water rights to the City of Cle Elum's diversion upstream, provides average year and drought year simulations for the total change to mainstem flows these third parties might experience. Those combined consumptive transfer plus irrigation return flow timing change results[17] were used to analyze the hydraulic impact potential between Cle Elum and Ellensburg (Exhibit K).

The combined water balance model results for an average year show that monthly average mainstem flow reductions of up to 4.6 cfs could occur in July and in September downstream of the Cle Elum River intake and the Teanaway, respectively. The flow reductions during the mid- to early irrigation season are less than for the consumptive transfer evaluation only (a monthly high reduction of 5.2 cfs) because the former irrigation returns reach the Yakima River more quickly. Late in the season, and for the remainder of the year, the irrigation returns would no longer slowly reach the Yakima River via groundwater flow paths, and thus mainstem flows are reduced even outside of the irrigation season (Exhibit A, Table A.3).

Hydraulic impacts to diversions in the mainstem Yakima River reach between Cle Elum and Ellensburg were evaluated (from upstream to downstream) for Younger Ditch, Wallace Ranch (Bristol Flats), Westside Irrigation Diversion, Thorp Diversion, Packwood Diversion, Cascade Irrigation Diversion, and Mill Ditch (Northwest Hydraulic Consultants, Inc. 2002). Impacts on Yakima River water levels at each of these diversion sites were estimated using the Manningsolver computer program for the Packwood, Wallace Ranch (Bristol Flats), Thorp, and Younger Ditch sites. This program computes "normal depth" based on the channel cross-section, water surface slope, Mannings roughness value ('n'), and flow. The normal flow depth near each diversion intake was estimated for the date of the evaluation using surveyed cross-section and water surface slope data. The Mannings 'n' for each site was calibrated based on the surveyed water level and the observed flow (approximately 1300 cfs at the Younger ditch site, 600 cfs at the Wallace Ranch (Bristol Flats) site and 2000 cfs at the other sites. The stream channel geometry, slope, and Mannings 'n' were then used to estimate flow depths for the altered low flow conditions at each diversion. Results of a sensitivity analysis for higher roughness values that would likely occur with lower flows caused a slightly higher Mannings 'n' (increased by 0.01) to be used for the evaluation of impacts for all of the diversion sites except Wallace Ranch (Bristol Flats). The 600 cfs calibration flow at that site was in the middle to low range of the flows used in the analysis, so it was not determined necessary to adjust that roughness value.

The approach described above was not suitable for the Westside Irrigation Company (Westside), because it places ecology blocks in the river downstream of its diversion during low flows to create constriction and backwater into the diversion. A simple hydraulic backwater model (HEC-RAS) was used to estimate the impact at this site, based on three cross-sections field surveyed downstream of the diversion site where the ecology blocks are placed, at the diversion intake structure, and approximately 100 feet upstream of the diversion structure. The HEC-RAS model was also used to evaluate the effect additional ecology blocks could have to offset the estimated impact of the Trendwest water rights transfers.

---

17 See Exhibit A, Combined Model Results, for a complete discussion of the combined model simulations. Combined model results are shown in Exhibit A, Table A.3.

Field reconnaissance at the Cascade Irrigation diversion (Cascade) indicated that this site is likely to experience significant difficulties regardless of the Trendwest transfers. Thus, review of this site was limited to discussion of current conditions and examination of alternatives to improve the long-term reliability of this diversion.

Hydraulics in Mill Ditch are complicated because water collected by the ditch originates from several sources in addition to the Yakima River. These sources include irrigation return flows. Flow from the Yakima River first enters a side channel with some of the side channel flow splitting off into a smaller channel leading under I-90 and ultimately to the diversion intake. The Mill Ditch site is the original point of diversion for the water rights that were acquired by Trendwest, thus Yakima River flows (and water levels) downstream of this point should not be affected by the proposed transfers. In fact, the tributary water rights and return flows incorporated in the Trendwest proposal would result in higher flows at this location than under baseline conditions (Brown & Caldwell 2002). Therefore, the discussion of potential impacts at the Mill Ditch diversion that follows is limited.

The Ellensburg Water Company / Olson Ditch diversion is also within the study reach. However, because of the dam across the Yakima River and the design of this diversion structure, the potential for impacts from a small flow reduction at this location are negligible.

The flow data used in comparing the baseline condition with the impacts of the proposed transfer are presented in Table 4-4.

Table 4-4: Baseline and Proposed Flow Conditions

Dates	Baseline	Proposed Condition			
	All sites based on Yakima River at Cle Elum Gauge (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)
May 1 - May 15	504	504	507	513	515
May 16 - May 31	580	580	583	588	590
June 1 - June 15	935	932	933	938	940
June 16 - June 30	1434	1431	1433	1438	1441
July 1 - July 15	1920	1916	1918	1922	1925
July 15 - July 31	2852	2847	2849	2850	2853
Aug 1 - Aug 15	2655	2652	2652	2652	2655
Aug 16 - Aug 31	1322	1317	1318	1318	1321
Sept 1 - Sept 15	380	376	377	377	379
Sept 16 - Sept 30	407	404	402	403	405
Oct 1 - Oct 15	363	362	361	361	362
Oct 16 - Oct 31	210	209	209	209	209

Source: Northwest Hydraulic Consultants, 2002.

The hydraulic computations for each diversion site used the estimated flows from the nearest upstream flow location. The diversion sites that were analyzed in detail, and the corresponding Yakima River flow used are given below.

- Younger Ditch Diversion Site – Yakima River at Cle Elum flow
- Wallace Ranch (Bristol Flats) Diversion Site – Yakima River at Teanaway flow
- Westside Irrigation Diversion Site – Yakima River at Swauk flow
- Thorp Diversion Site – Yakima River at Swauk flow
- Packwood Diversion Site – Yakima River at Swauk flow

The proposed low flow conditions (with the Trendwest water rights transfers) were determined as the estimated flows for current conditions less the estimated maximum diversion for the MPR and UGA. The maximum diversion data, estimated for each month to meet the demands of the MPR and UGA at buildout (100% developed), were provided by W&H Pacific. Conclusions drawn from the analysis were the following (see Northwest Hydraulic Consultants, 2002 for details):

Younger Ditch Diversion

Over the range of low flows used in the analysis, water levels at the inlet of the diversion channel would be reduced by approximately 0.00 to 0.01 feet as a result of the Trendwest water rights transfers. The greatest difference would occur in September when the diversion as a percentage of the flow is the highest.

Wallace Ranch (Bristol Flats) Diversion

Over the range of low flows analyzed, the water levels at the inlet of the diversion channel under the proposed conditions (Trendwest diversion relocation) are 0.01 feet greater early in the irrigation season to 0.01 feet less late in the season than under existing conditions. The largest difference (0.01 feet) is seen in the month of September when the diversion as a percentage of total flow is the highest.

Westside Diversion

The Trendwest diversion relocation would result in water level differences ranging from an increase of 0.02 feet to a reduction of 0.01 feet at the diversion site if ecology blocks are not in place (i.e. for the current river condition). With the ecology blocks in place the simulated differences in water levels at the diversion site range from +0.03 to –0.01 feet. The largest difference in water levels is predicted in the month of September when the diversion as a percentage of flow is the highest.

Thorp Diversion

Over the range of low flows used in this analysis, the water levels at the inlet of the diversion channel under the proposed conditions (Trendwest diversion relocation) would be +0.02 let early in the irrigation season to –0.01 feet than under existing conditions. The largest difference (0.01 feet) would be seen in the month of September when the diversion as a percentage of total flow is the highest. Based on this analysis the Trendwest diversion relocation may result in a small

increase or decrease in water levels at the inlet to the Thorp diversion channel but the largest computed reductions were less than or equal to 0.01 feet.

Packwood Diversion

Over the range of low flows used in this analysis, the water levels at the inlet of the diversion channel under the proposed conditions (Trendwest diversion relocation) would increase 0.04 feet early in the irrigation season and decrease by 0.02 feet later in the season. The largest difference (0.02 feet) would be seen in the month of September when the diversion as a percentage of total flow is the highest. Based on this analysis the Trendwest diversion relocation may result in less than a 0.02 foot drop in water levels at the inlet of the Packwood diversion channel over the irrigation season.

Cascade Irrigation Company Diversion

Considering the ongoing geomorphic processes at this site, the history of human induced modifications to this reach of the river, and Cascade Irrigation's current program of in-channel structure placement, the impact of Trendwest's proposed diversion cannot be reasonably estimated at this time. However, any potential impacts would be minimal compared to changes that are occurring due to natural river processes.

Mill Ditch Diversion

The hydraulics and hydrology of the Mill Ditch diversion are complicated by a number of factors including the flow splits off the Yakima River, the hydrology of the groundwater lake, and the flow in Dry Creek.

Diversions Downstream of Mill Ditch

Because flows downstream of the Mill Ditch diversion would theoretically be the same in both the current and proposed conditions it seems unlikely that the Trendwest proposal would result in any significant impacts.

4.2.2 Tributary Surface Water Users

Impacts to Tributary Flows

Hydraulic effects on the tributaries affected by the Trendwest transfers were evaluated for Ecology by Montgomery Water Group, Inc. (MWG), an ECT member consultant (Exhibit J).

Big Creek

MWG determined the hydraulic effects of the Trendwest Big Creek tributary transfer using data collected in Big Creek and at the Darling and Lund diversion ditches during 2001. See Section 3.4. Changes in stage or depth are highest at the end of the season when average flows in Big Creek are significantly lower. In Big Creek below the Darling/Lund diversion dam, the change in

stage resulting from the transfer of Trendwest's Big Creek water right to instream flow was graduated, rising from 0.00 ft in early May to 0.05 ft in the last half of August. These changes in stage persisted downstream to the West Nelson Siding Road. The change in stage in Big Creek at the Ensign Ranch was less, rising only by 0.04 ft in the last half of August.

Teanaway River

MWG determined the hydraulic effects of the Trendwest Teanaway River tributary transfers by using USBR data collected during 2001. The change in stage associated with increases in flow of 0.78 to 3.39 cfs ranges from approximately less than 0.01 to 0.16 ft from May to September 15. Immediately after the end of the season (September 16 through October 15), a decrease in flow and a corresponding decrease in stage of 0.01 to 0.02 ft are expected because of loss of return flows associated with irrigation on the Walker properties. These results are based upon the USBR Lambert Road rating curve and flow data. ECT's data suggest that the Lambert Road rating curve may incur some error at flows above 9 cfs. Any errors associated with those data would similarly affect the accuracy of these estimations.

Swauk Creek

MWG determined the hydraulic effects of the Trendwest Swauk Creek and First Creek tributary transfers on Swauk Creek using data collected in Swauk Creek during 2001. The increase in streamflow as a result of the Trendwest water rights transfers on Swauk and First Creeks are greater than the historical average flows in the creek from several biweekly periods during the season, especially in late summer. The estimated change in stage and depth at the Swauk Creek Martin gauge associated with changes in flow of 0.8 to 6.6 cfs ranges from 0.05 ft to 0.20 ft.

First Creek

Water used by the FCWUA is imported into the Reecer Creek subbasin from the Swauk Creek subbasin. Reecer Creek water users are not entitled under state law to rely on the continuation of return flows from water rights imported from another basin. Nevertheless, MWG determined the hydraulic effects of the Trendwest First Creek tributary transfers on First Creek using data collected during 2001. The estimated increase in stage and depth ranges from 0.17 to 0.39 ft at the upper First Creek station and 0.14 to 0.28 ft at the lower First Creek station. The highest flow measurement at the upper First Creek station was 2.8 cfs on July 3, 2001 and was taken when all the flow above the FCWUA diversion was diverted into First Creek. The highest flow measurement at the lower First Creek station was 2.0 cfs on June 11, 2001. Trendwest's water rights transfers to First Creek instream flows from mid-June to mid-October would increase creek flows, and therefore would result in a stage increase.

Reecer Creek

MWG determined the hydraulic effects of the Trendwest First Creek tributary transfers on Reecer Creek upstream of Dolarway Road using data collected in Reecer Creek during 2001. MWG estimated the reduction in stage on Reecer Creek associated with a reduction in flow of 25.4 to 28.2 cfs is approximately 0.6 ft at the Reecer Creek station. This estimate is based on the

check structure configuration present from July 11, 2001 to September 26, 2001. Diverters on Reecer Creek change the check structures throughout the irrigation season and from year to year based on daily irrigation needs. Changes in the check structures since MWG's September 26th measurements may have changed the rating curve and thus the reported relationship between flow and stage at the Reecer Creek Upstream of Dolarway Road site.

4.2.3 Third Party Tributary Diversions

MWG evaluated the effects of changes in the affected irrigation ditches due to the proposed transfer of Trendwest water rights where the ditches would remain in use, reported in *Review of Effects of Water Rights Transfers on Tributary ad Ditch Hydraulics* (Montgomery Water Group, Inc. 2002). MWG's findings were based on field observations, flow measurements, cross-sectional geometry surveys, and continuous monitoring data in the associated tributaries. Seepage analyses were conducted on three of the ditches where Trendwest holds water rights: Lund/Gentry ditch; FCWUA ditch; and Mill Ditch. No flow measurements or monitoring occurred on the Burke-Hartman ditch during 2001 because the ditch was not in use.

Big Creek: Lund/Gentry Ditch

MWG monitored irrigation diversions in the Lund/Gentry ditch weekly over the 2001 irrigation season. A seepage survey was conducted on July 12, 2001. Measurements were taken at laterals used by the remaining irrigators on the ditch. From these activities, MWG estimated that depths in the upper and lower Lund ditches would be 0.2 to 0.3 ft lower after the Trendwest transfer than the typical depths observed prior to the transfer. Lund ditch users have a number of laterals that serve the irrigated properties on the lower end of the ditch as well as a number of storage ponds and irrigation pumps. Changes in flow and depth in the Lund/Gentry ditch during the 2001 season when Trendwest's water rights were not diverted did not appear to affect the remaining water users' ability to divert water from the main ditch and associated laterals.

Swauk Creek: Burke-Hartman Ditch

Drought transfers on the Burke-Hartman ditch during the 2001 irrigation season prevented flow measurements at key points along the ditch. Consequently, no data were available to evaluate changes in hydraulic conditions within the Burke-Hartman ditch. Given that Trendwest's water right is a majority of the water allowed to be diverted to the ditch, some impact is reasonably assumed, but could not be quantified during the study period.

First Creek: FCWUA Ditch

MWG monitored weekly irrigation diversions on the FCWUA ditch over the irrigation season. Weekly measurements were taken at the FCWUA flume just downstream of the irrigation diversion and at the Roan/Olsen weir split near the end of the ditch in the Reecer Creek basin. In addition, several seepage surveys were conducted on the ditch during the irrigation season to evaluate seasonal changes in the hydraulic conditions along the ditch. Depths in the FCWUA ditch at Green Canyon and upstream of the Roan/Olsen weir are estimated to change by 0.1 to 0.5 ft and 0.2 to 0.5 ft, respectively. Changes in depth did not appear to affect the ability of other

water users to take water from the FCWUA ditch during the 2001 irrigation season when the Trendwest water rights were not diverted.

Yakima River/ Reecer Creek: Mill Ditch

MWG's analysis of how hydraulic conditions in Mill Ditch would change as a result of the proposed Trendwest water rights transfer were complicated by the relocation of a quarter mile section of Mill Ditch upstream of Hwy 97 in June 2001. This relocation changed both the channel hydraulics and the seepage characteristics in the ditch. These changes, as well as leasing of other water rights during the 2001 irrigation season, preclude the ability to separate the effects of the water rights transfer from the effects of the ditch relocation. In addition, there are a number of check structures on Mill Ditch and on Reecer Creek below the Mill Ditch confluence that facilitate water users' ability to alter water depths and improve delivery to their laterals. Field observations of Mill ditch during 2001 indicate that manipulation of the check structures allow adequate delivery to the remaining water users, even without the Pautzke water right.

4.2.4 Tributary Groundwater Users

Impacts to groundwater levels and wells resulting from the Trendwest transfers were evaluated by ECT (Exhibit I). PGG evaluated changes in groundwater from well logs on file with Ecology, ditch field seepage loss evaluations and geologic characterizations from its *Basin Hydrologic Analyses* for Big Creek, Teanaway River, First-Swauk Creeks, and Mill-Reecer Creek. The evaluation of impacts is limited to general observations about wells but does not estimate impacts to any particular well.

Big Creek

PGG estimated the maximum seasonal decline in groundwater resulting from retiring Trendwest water rights in the Big Creek subbasin would be 1. 5 to 2.0 ft. This maximum decline is centered in the northern half of Section 28, Township 20, Range 14 EWM. The area of groundwater change is roughly circular with a diameter of approximately 1.5 miles. No to very minor impacts to vicinity wells would result from this level of change. Groundwater level declines of this order are small relative to water columns reported in most wells. Nonetheless, declines on this order may cause minor yield reductions in some wells at some times of the year.

Teanaway River

PGG estimated the maximum seasonal decline in groundwater resulting from retiring Trendwest water rights in the Teanaway River subbasin would be 1.6 ft. This maximum decline is predicted to occur in Section 26, Township 20 North, Range 16 EWM. Because most wells are completed below (or deep within) the alluvial aquifer, only minor impacts to vicinity wells would likely result from this level of change. Declines of this order may cause minor yield reductions in some wells, particularly shallow wells completed in the alluvial aquifer, at some times of the year.

Swauk Creek

PGG estimated the maximum seasonal decline in groundwater resulting from retiring Trendwest water rights in the Swauk Creek subbasin would range from 3.0 ft to as much as 7.0 ft, depending on the value assumed for hydraulic conductivity in the Swauk basin. The area of change is confined to the Hidden Valley area and is approximately 1.25 miles in length. Groundwater level declines of this order are small relative to the reported completion depths of most nearby wells. Nonetheless, declines on this order may cause minor yield reductions in some wells, particularly shallow wells completed in the alluvial aquifer, at some times of the year.

Reecer Creek

PGG was unable to determine the maximum seasonal decline in groundwater resulting from retiring the Trendwest First Creek water rights in the Reecer Creek subbasin. Drilling information from area well logs was too vague and sufficient hydrogeologic information was not available. The change in field ditch seepage from the formerly irrigated properties associated with Trendwest water rights was estimated at 1 cfs during the irrigation season. This translates to an annual average recharge of 0.56 cfs. In addition, seasonal recharge from the FCWUA main ditch was estimated to be 0.1 cfs.

4.3 IMPACTS ON WINTER STREAMFLOWS

Average monthly mainstem Yakima River flows are either unchanged or slightly increased between Big Creek and Reecer Creek as a result of the consumptive use water rights transfers from November through March, in both average and the 2001 representative drought years (Tables 4-2 and 4-3). Below the Mill Ditch, Yakima River flows are increased every month during the winter under the long-term average year, and every month during the 2001 representative drought year for both the middle and lower bound simulations (see Table B.1 and B.3 in Exhibit B). Thus, there are no reductions in mainstem Yakima River winter streamflows that would result from the proposed transfer as determined by the consumptive use simulations.

Winter flows would be reduced as a result of transferring waters diverted to irrigation returns to instream flows, because the time-delay for water from those irrigation returns to reach the Yakima River would no longer occur. Some of those returns were delayed to return year-around, including during the winter. These reductions in winter flows are shown and discussed for the "combined model" simulations in Exhibit A (Tables A.1 and A.2 for the average and drought year characterizations, respectively). The most probable range of flow changes under the average year characterizations for the combined model simulations is shown in Tables B.4 and B.6 in Exhibit B (the middle and lower bound simulations for this series of model runs).

4.4 TWSA AND RESERVOIR STORAGE IMPACTS

TWSA represents the total water supply available for irrigation and other uses. The USBR includes three components in its TWSA calculations:

- Reservoir Storage on April 1

- Natural Streamflow between April 1 and September 30
- Irrigation return flow between April 1 and September 30.[18]

Two components of TWSA are natural streamflow and irrigation return flow between April 1 and September 30. These components of Trendwest's potential TWSA impacts are determined by estimating changes in flow from April 1 through September 30. To evaluate Trendwest's potential TWSA impact, Brown and Caldwell compared the combined effects of Trendwest's proposed water transfers, together with flow timing changes that would result from transferring Trendwest's tributary water rights to instream flows. The analysis was performed over the study period 1991 through 1995 and 2001, the years for which Trendwest had a simulated record incorporating the entire storage control period. Changes in Yakima River mainstem volumes and flows below Reecer Creek were totaled from monthly averages calculated from the model's simulated daily output. The "combined" water balance model describes mean monthly changes in Yakima River flow during both average year (characterized by 1991, 1992, 1993, and 1995) and drought year (characterized by 2001) conditions, including the influence of ending the time delays for the former irrigation return flows on the tributaries. For the average year, the "combined" model was also used to establish the most likely and reasonable range of flows to be expected (see Tables B.4 and B.6 in Exhibit B). In an average year, there would be a surplus of approximately 962 to 979 ac-ft during the period from April 1 through September 30, and in a drought year there would be a surplus of approximately 356 ac-ft.

The third component of TWSA is reservoir storage on April 1. Reservoir storage consists of carry over from the previous year together with accumulated runoff. The amount of water in storage also varies because of winter reservoir releases for flood control and to maintain fish egg incubation flows. Reservoir storage is utilized during periods of time when reservoir outflows are greater than reservoir inflows. This period is referred to as the storage control period. Changes in stream flows after October 1 caused by Trendwest's proposed transfers could affect the amount of water in storage at the beginning of the next irrigation season. That is because stream flow deficits from October 1 until the end of that year's storage control period[19] could reduce reservoir storage that is available for TWSA on April 1 of the following year if there is insufficient reservoir refill during the intervening period. Stream flow deficits following the end of storage control until April 1 could only affect reservoir storage if USBR determined it was necessary to release water from storage to compensate for streamflow reductions caused by the instream flow transfers. However, USBR would not operate to release flow as a result of any changes caused by Trendwest's water rights transfers from the beginning of flip-flop until the beginning of the next year's irrigation season. At that time of year, releases from the reservoirs are made to maintain flow targets to incubate salmon eggs. Flows in the Cle Elum River and in the Yakima River below Cle Elum are more than sufficient to meet those targets every year.[20]

---

[18] See Yakima River Basin Conservation Advisory Group, Draft Basin Conservation Plan for the Yakima River Basin Water Conservation Program, Appendix III-B, page 1 (1997).

[19] For the purposes of this analysis, the storage control period is assumed to end when reservoir inflow again exceeds outflow, which occurs on or about October 20 or each year.

[20] Late season flows in the Yakima River below Cle Elum are a function of reservoir releases to maintain incubation flows in the Easton Reach (C. Lynch, Chief Hydrologist, Yakima Project, USBR, July 18, 2001)

When all three TWSA components are taken into consideration, the proposed water transfers would have a positive impact on TWSA. Under long-term average conditions, there would be an annual surplus of approximately 557 to 689 ac-ft. In a drought year (as represented by 2001), there would be an annual surplus of approximately 121 ac-ft.

Storage control begins later in a wet year than in a dry year. In a dry year, the transfers could result in a net increase in water supplies available during the storage control period. In a wet year, storage control begins later in the irrigation season, and the early-season surpluses that would result from Trendwest's water rights transfers would not add directly to reservoir storage. Nevertheless, early season increases in natural flows below USBR project reservoirs can delay storage control, and thus benefit TWSA indirectly.[21] In addition, the wetter the year, the more likely it is that flood control releases would occur before the beginning of the next irrigation season. If the following year is a dry year, storage control would begin earlier in the season, and the early irrigation season surpluses from Trendwest's water rights transfers would provide a benefit to the system.

On a year-to-year basis and seasonally within any given year, changes in reservoir storage and TWSA due to Trendwest's proposed transfers would vary because of climatic variation and associated changes in USBR's operations. Even though analysis of conditions over Trendwest's study years of 1991 through 1995 and 2001 indicate no adverse impact is reasonably expected to TWSA, all future circumstances cannot be identified at this time. For that reason, to ensure that TWSA would be protected in any given year in the future, there would be a need for water management, involving coordination with the USBR, City of Cle Elum, and other water users, and an ongoing commitment from both Ecology and the USBR. Water management would ensure that, on an operating basis, Trendwest's consumptive uses and hydraulic impacts to TWSA and other water users are neutral or positive (see Monitoring in Section 7.6, Mitigation Measures).

5. INDIRECT IMPACTS

Trendwest has agreed to obtain water to mitigate for some indirect uses in excess of what typically could be required under SEPA, through various agreements as follows:

- The Cooperative Agreement between Trendwest, the Washington Department of Fish and Wildlife (WDFW), and the Yakama Nation (described below) obliges Trendwest to provide funding to acquire additional water rights to augment instream flows, in part to compensate for indirect water usage on lands fallowed by transfer of Trendwest's mainstem water rights, and also in part to compensate for water used by direct housing growth in unincorporated areas (households of construction workers and employees directly related to the MPR and residential UGA);
- The RIDGE Settlement Agreement obliges Trendwest to provide water rights to augment instream flows, in part to compensate for indirect water usage on lands fallowed by transfer of Trendwest's tributary water rights, and also in part to compensate for water used by indirect housing growth in unincorporated areas; to provide water to Roslyn for induced

[21] Yakima Field Office, U.S. Bureau of Reclamation, *Draft Yakima Field Office Project Operations Outlook: 2001 Irrigation Season* 8 (May 2, 2001).

housing within Roslyn's municipal service area; and to provide water for expansion of the Cle Elum-Roslyn School District #404.

5.1 DEVELOPMENT ON FALLOWED LANDS

Trendwest purchased water rights appurtenant to approximately 888.3 acres of land in upper Kittitas County. Most of the property from which Trendwest purchased water rights has been or is being converted from agricultural use and subdivided to residential use. These properties are referred to as "fallowed lands." *Water Demand for Fallowed Lands* attached as Exhibit H, describes the anticipated future condition for these properties in detail.

Development of land from which Trendwest purchased water rights is functionally independent from Trendwest's development proposals; however, development of the properties from which Trendwest has transferred water rights might possibly result in new groundwater withdrawals within the basin in the form of small wells exempt from permitting (see Section 5.1.2). Use of these small groundwater withdrawals would result in an increase in the consumptive use of water in the basin.

Table 5-1 shows consumptive use from residential development of formerly irrigated properties in unincorporated areas. Increased consumptive use was calculated based on the average per household domestic water use less domestic return flows plus irrigation of one-half acre of lawn or garden, as allowed for groundwater withdrawals exempt from permitting under RCW 90.44.050. The average per household domestic water use assumes a domestic diversion of 240 gallons per household (100 gallons per person per day x 2.4 persons per household), less 80 percent return flows. Net consumptive use was calculated using the same factor calculated for the Trendwest water rights water model, applied to a half-acre of irrigation (see Appendix D, Water Supply Technical Report, Draft EIS).

Table 5-1: Consumptive Use (CU) from Future Use of Fallowed Lands

Subbasin	Lots[2]		Net CU in/yr	Domestic Div/ERU gpd	Domestic Return %	Domestic CU Total gpd	Domestic CU Total ac-ft/yr	Irrigation CU/unit ac-ft/yr	Irrigation CU Total ac-ft/yr	Total CU ac-ft/yr
	<20 ac	>20 ac								
Big Creek (Gentry)	4	0	18.7	240	80	192	0.2	0.8	3.1	3.4
Teanaway R (Walker)	15	1	23.2	240	80	816	0.9	1.0	16.4	17.34
Swauk Creek (Martin)	6	2	28.7	240	80	480	0.5	1.2	12.0	12.5
First Creek (Nelson)	4	4	28.6	240	80	576	0.6	1.2	14.3	15.0
First Creek (Roan)[2]	0	0	28.6	240	80	0	0.0	1.2	0.0	0.0
Total[3]	29	14								48.1

1 Consumptive use for parcels 20 acres or larger was doubled, in keeping with the Kittitas County land use code, which allows two residential units on parcels of that size.

2 The current owner of this property anticipates maintaining its use as range land for the foreseeable future.

3 Excludes consumptive use on the City of Ellensburg's fallowed lands, in Table 5-2.

Source: Brown & Caldwell 2001; Mentor Law Group 2001.

The City of Ellensburg now owns the 291 acres previously irrigated by the Pautzke water. This land is within the city limits and is not presently being used. Although the City has not formalized any plans for its use and has contemplated its sale, it has been proposed that approximately 96 acres be used for the development of a public baseball and recreation complex, 81 acres of which would be irrigated. Additionally, the City has prepared a *Comprehensive Flood Management Hazard Plan,* February 1999. The City proposes that approximately 60 acres in the northerly two-thirds of this property be retained by the city as flood way and that the dike presently east of Reecer Creek be relocated to the westerly edge of the built-up portion of West Ellensburg. It is anticipated that the balance of the land will obtain water from the City's municipal water system.

Table 5-2 shows consumptive use from the ball field complex proposed by the City of Ellensburg on the former Pautzke Bait Co., Inc. property.

Table 5-2: Water Demands from Pautzke Property Development

	Irrigated Area Acres	CU Total in/yr	CU total acft/yr
City of Ellensburg Ball Field Complex	81.0	32	216.0

Source: Brown & Caldwell, 2001; Mentor Law Group, 2001.

The impact on Trendwest's water balance from these consumptive uses is further discussed in Section 6. (Cumulative Impacts).

5.1.2 Employment-Induced Housing

Construction and operation of the Residential UGA and MPR would generate direct impacts from local and non-local (outside Kittitas County) employment demand. The increased economic activity associated with these proposals would produce a ripple effect through the Kittitas County economy in the form of indirect impacts and induced impacts. Among these impacts are water related impacts from employment related housing in-migration. Depending on their locations, the new households would increase consumptive use from groundwater withdrawals or from municipal systems.

The households locating in unincorporated areas of the county would most likely rely on small public water systems or individual wells. Any use of surface water to meet this demand would necessarily have to rely on existing water rights (as opposed to new water rights) because the Yakima River system has been, by every practical measure, fully appropriated during the latter half of the irrigation season since the early 1900s. Additionally, all remaining water that might be available for appropriation under new water rights has been withdrawn from appropriation, pursuant to RCW 90.40.030, by various actions of the United States.

Small ground water withdrawals for non-commercial irrigation and domestic purposes up to 5,000 gallons per day can be anticipated as a way of meeting the projected needs in unincorporated areas of the county. The effects on the Yakima River system would depend on

the degree to which the ground water aquifer is connected to the river, and would vary in accordance with the distance from the well to the river, the aquifer characteristics, and the rate and volume of water pumped to meet the demand. For these reasons, no new surface water permits for year-round residential use and only ground water withdrawals that are exempt from permitting (see RCW 90.44.050) can be reasonably expected to meet this demand.

The Employment-Induced Water Demands Analysis, Appendix C to the Final EIS, distributes the estimated in-migrant households according to the Kittitas County Council of Government projections between incorporated and unincorporated County. Within unincorporated areas, the in-migrant households were further distributed by subbasins. Total water consumption is influenced by the distribution of households between incorporated and unincorporated areas and, to a lesser degree, by distributions in unincorporated areas by subbasin. Consumptive use varies throughout the County based on factors including different domestic water consumption rates among utility districts and climate variations that affect irrigation demands for crops and lawns. Based on the distribution of households, consumptive use was estimated based either on the development of exempt wells (when located within unincorporated areas) or on per unit water demands from the relevant Department of Health approved water system plans (incorporated areas). These consumptive uses were then placed in context of the average annual baseflows (unincorporated areas) or of the water system existing water rights (incorporated areas) to determine the magnitude of the impact.

In-Migrant Household Consumptive Use - Unincorporated Areas

Table 5-3 shows consumptive use for unincorporated in-migrant areas. New households in the unincorporated county are expected to receive water from groundwater withdrawals. Increased consumptive use was calculated based on the average per household domestic water use less domestic return flows plus irrigation of one-half acre of lawn or garden, as allowed for exempt water withdrawals under RCW 90.44.050. The average per household domestic water use assumes a domestic diversion of 240 gallons per household (100 gallons per person per day x 2.4 persons per household), less 80 percent return flows. Irrigation consumptive use was calculated using the Washington Irrigation Guide in Cle Elum for subbasins in the upper county (18.11 inches per acre per year) and in Ellensburg for subbasins in the lower county (31.46 inches per acre per year).

Consumptive use associated with in-migrant households in unincorporated areas are compared with the estimated mean annual subbasin base flows in Table 5-4. Mean annual subbasin baseflow was estimated at 13% of the mean annual precipitation in the subbasin times the total area of the subbasin. The 13% estimate is consistent with information contained in Ecology's Water Supply Bulletin 60 - Estimated Baseflow Characteristics of Selected Washington Rivers and Streams (Ecology 1999). The percentage of base flow that would be consumed by in-migrant households in unincorporated areas ranges from 0.02% to 2.07% for the MPR Reduced Density and UGA Alternative 5 development scenario. These low percentages indicate that consumptive use associated with in-migrant households in unincorporated Kittitas County would result in a minor impact on water availability in the upper Yakima River Basin.

Table 5-3: Consumptive Use, In-migrant Households Associated with Trendwest Employment—Unincorporated Areas

Households	Percent		Total Consumptive Use in Ac-Ft/yr
302.9	26%	Subbasins	
13.3	1.1	Subbasin No. 1 (Cle Elum)	10.7
43.3	3.7	Subbasin No. 2 (Easton)	35.0
36.0	3.1	Subbasin No. 3 (Teanaway)	29.1
12.1	1.0	Subbasin No. 4 (Swauk)	9.79
20.9	1.8	Subbasin No. 5 (Elk Heights)	16.9
10.0	0.9	Subbasin No. 6 (Taneum)	13.6
40.3	3.5	Subbasin No. 7 (Reecer)	55.0
21.5	1.8	Subbasin No. 8 (Thorp)	29.3
100.3	8.6	Subbasin No. 9 (Wilson-Naneum)	137
6.4	0.5	Subbasin No. 12 (Shushuskin)	8.68
		Total Subbasins	345
174.8	15%	Growth Nodes	
41.2	3.5	Subbasin No. 1 (Cle Elum) (Ronald) [1]	
90.9	7.8	Subbasin No. 2 (Easton) (Snoqualmie Pass & Easton)	73.5
42.5	3.6	Subbasin No. 8 (Thorp) (Thorp)	57.9
		Total Growth Nodes	131
		Total Unincorporated Areas	476

1 Consumptive use from the Ronald Urban Growth Node are calculated as incorporated consumptive use because Ronald receives water from Kittitas County Water District #2, which wholesales water from the City of Roslyn.

Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

Table 5-4: Subbasin Groundwater Consumptive Use and Base Flow Comparison, MPR Reduced Density and UGA Alternative 5

Subbasin Number	Total Consumptive Use from In-Migrant Households ac-ft/yr[1]	Mean Annual Base Flow ac-ft/yr	Total Consumptive Use as a Percentage of Base Flow
Subbasin No. 1 (Cle Elum) [2]	18.2	115,076	0.02%
Subbasin No. 2 (Easton) [2]	183	143,986	0.13%
Subbasin No. 3 (Teanaway)	49.1	66,687	0.07%
Subbasin No. 4 (Swauk)	16.5	23,624	0.07%
Subbasin No. 5 (Elk Heights)	28.5	13,116	0.22%
Subbasin No. 6 (Taneum)	23.0	29,542	0.08%
Subbasin No. 7 (Reecer)	92.7	13,248	0.70%
Subbasin No. 8 (Thorp) [2]	147	7,099	2.07%
Subbasin No. 9 (Wilson-Naneum)	231	22,144	1.04%
Subbasin No. 12 (Shushuskin)	14.6	2,033	0.72%
Total	804	436,555	0.18% Avg. Annual[3]

Source: Brown & Caldwell 2001.

1 Consumptive use calculated for in-migrant households includes those associated with the Business Park.

2 Consumptive use calculations for Subbasin Nos. 2 and 8 reflect water use from both unincorporated and urban growth node households. UGN households for Subbasin 1 (Ronald) are reflected in incorporated water consumptive use because Ronald receives apart of its water from the City of Roslyn.

3 Average annual percentage was calculated by summing the total consumptive use for all of the subbasins and dividing this by the mean annual basin flow for all the subbasins.

The potential impact on tributary streamflow is discussed in more detail in the Employment-Induced Water Demand Analysis, MountainStar MPR and Cle Elum UGA, attached as Appendix C of the Final EIS. The analysis compares annual subbasin consumptive use to mean annual base flow. The analysis shows that groundwater consumptive use represents a small percentage of mean annual base flows in individual subbasins and an average annual percentage of approximately 0.18 percent (MPR and UGA Alternative 5, including the Business Park) for the basins combined (see Appendix C). This percentage is small and supports a reasonable conclusion of no significant adverse impact.

The potential impact on tributary streamflow is dependent on many factors such as the amount of base flow that discharges to an individual tributary stream, whether or not hydraulic continuity exists between the groundwater and the tributary, and the specific number, location, depth, and screened interval of future groundwater withdrawals within a basin. Where hydraulic continuity exists, the magnitude of this impact would depend on the percentage of groundwater base flow that would be pumped and consumed. Due to the complexity and uncertainty related to any analysis that would attempt to quantify all these variables, average annual values of consumptive groundwater use and tributary baseflow were used to provide a basis for assessing the potential magnitude of impact to tributary streamflows for all the basins. This analysis concludes there is no significant or measurable impact on tributary streams. It is unlikely that the conclusion of no adverse impact would be affected by speculating about the placement of future exempt wells and their hydraulic continuity to the streams draining each basin. However, some portion of the total groundwater base flow within each subbasin would discharge into tributaries where hydraulic continuity exists, and some portion of the wells associated with indirect/induced households within unincorporated Kittitas County could withdraw groundwater that is in hydraulic continuity with tributaries. Potential impacts on tributary streamflow would likely be lower during the high flow season and would be greater during the later summer months, when streamflows are more dependant on baseflow and instantaneous rates of baseflow are lower than the average annual baseflow. Summer low flows measured in the Teanaway River from 1999 to 2001 at the Forks gauge ranged from 8 to 16 cfs, which is about 9% to 17% of the annual average baseflow of 92 cfs. Summer baseflow can be substantially lower than average annual baseflow. Consequently, the relative impact of reduced groundwater availability can be greater during the summer flow-flow season.

On the Teanaway River, where the lower Teanaway is known to be in hydraulic continuity with groundwater, a worst-case secenario was assumed for the purposes of evaluating potential magnitude of impact during the summer low flow season. All of the in-migrant wells were assumed to be shallow and located next to the lower reach of the river, even though the available land supply would not support this intensity of development. In that case, the consumptive use as a percentage of base flow during the summer low-flow season would be approximately 0.57%. This more specific "worst case" seasonal analysis shows a higher consumptive use impact during the low flow season due to the assumed well placement and due to seasonally high consumptive water use for irrigation of lawns and gardens.

In-Migrant Households Consumptive Use --Incorporated Areas

Table 5-5 shows consumptive use estimates from Trendwest related households in incorporated areas. Consumptive use for in-migrant households in incorporated areas was determined based on estimates of "per household" water use from each jurisdiction's latest water system comprehensive plan. In many cases, data for these water systems are based on estimates from the early to mid-1990s.[22] Where data were available for per capita, per day consumption, a factor of 2.4 was applied to reach a per-household number.

Table 5-5: Consumptive Use, In-migrant Households Associated with Trendwest Employment—Incorporated Areas

Households	Percent		Total Consumptive Use (ac-ft/yr)
687	59%	Incorporated Areas[1]	
231.1	19.8	Cle Elum / UGA	26.3
18.3	1.6	South Cle Elum / UGA	3.0
415.8	36.6	Ellensburg / UGA	56.3
12.1	1.0	Roslyn / UGA	1.7
41.2		Ronald UGN[2]	2.4
		Total Incorporated Areas	89.7

1 The households allocated to the Kittitas UGA by the KCCOG were reallocated across the other UGAs because Kittitas was not a likely location for the in-migrant households.

2 Consumptive use from the Ronald Urban Growth Node are calculated as incorporated consumptive use because Ronald receives water from Kittitas County Water District #2, which wholesales water from the City of Roslyn.

Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

For every jurisdiction except the City of Roslyn, the demands associated with potential in-migrant households is expected to be met by water available under that jurisdiction's water rights and within its projected future water demand. For every jurisdiction except the City of Roslyn, the demand associated with potential in-migrant households, if added to that jurisdiction's projected future water demands, would also fall within the amount of water available under its current water rights. The City of Roslyn was projecting a water supply deficit in meeting its projected future water demand, even without the Trendwest projects. As part of a settlement agreement entered with RIDGE, Trendwest has agreed to mitigate for increased water demands on Roslyn resulting from induced offsite development within Roslyn. (See discussion of RIDGE agreement in Section 2.4 above).

---

22 The City of Roslyn's average annual per day water use is estimated at 266 gallons per capita per day based on 1994-1995 data. Source: City of Roslyn Comprehensive Water System Plan (Gray & Osborne, Inc. June 1996), p.2-6. City of Cle Elum: Consumption per Service 508 gallons per day based on 1995 data. Source: City of Cle Elum Town of South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc., Oct. 1997), p. 32. Town of South Cle Elum: Consumption per Service 733 gallons per day based on 1981-1984 data. Source: City of Cle Elum Town of South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc. Oct. 1997), p. 32. Ellensburg: Average day demand 246 gallons per capita per day based on 1998 data. Source: Draft City of Ellensburg Water System Plan Update (HDR, Inc. 1999), p. 2-9.

6. CUMULATIVE IMPACTS

Cumulative impacts are estimated based on evaluation of the annual water demands and monthly diversion entitlements of other water users, and the effect of Trendwest's development proposals on USBR's ability to meet its water delivery requirements.

Consumptive use water balance results show that mitigation would be required to offset a reduction in mainstem Yakima River flow that would otherwise occur during September (a reduction of 0.4 cfs; Table 4-2). All other months show a net increase in mainstem flow below Reecer Creek, and thus no impact on mainstem flows. During 2001, representative of a severe single drought year, additional mitigation would be required to offset reductions of 0.8 cfs and 0.6 cfs in mainstem Yakima River flow below Reecer Creek during July and September, respectively (Table 4-3). All other months show no change or a net increase in mainstem flow below Reecer Creek during a drought comparable to 2001.

Mainstem Yakima River flows between the City of Cle Elum's diversion downstream to Reecer Creek are reduced at various points between April and September, under both average year and drought year conditions (Tables 4-2 and 4-3, respectively). In an average year, the greatest monthly reduction in mainstem flow would be 5.2 cfs between the City of Cle Elum diversion and the Teanaway River. Under 2001 drought year conditions, the greatest monthly reduction in mainstem flow due to the proposed transfers would be 5.4 cfs at the Teanaway River. Flow reductions tapering to 0.3 cfs would continue into October between Cle Elum's diversion and Swauk Creek (Table 4-3).

Return flows from upper basin water diversions are available for use further downstream, but water consumed anywhere in the Yakima system is lost to other downstream water users. For this reason, this report balances water consumption associated with currently authorized uses of Trendwest's water rights against water consumption on the Trendwest property, together with water consumption on fallowed lands and from induced development. The consumptive uses associated with Trendwest's water rights would exceed the annual consumptive quantity of water needed for development of the MPR and UGA projects (Table 2-6). Consumptive uses associated with induced offsite houseing and development on fallowed lands, however, are approximately equal to the consumptive uses associated with Trendwest's development proposals. The net water supply (i.e., annual quantity of water available for consumption under Trendwest's water supplies, less the amount consumed by the development proposals and induced and indirect development) would create a deficit of approximately 146 to 288 ac-ft. Table 6-1 shows a water balance for the proposals.

Table 6-1: Trendwest's Average Annual Consumptive Use and Supply Balance for Direct and Indirect Uses, in Ac-Ft

Net Consumptive Use		Available Water Supply[1]		
Direct Consumptive Use		Water Rights	Most Probable Lower Range[2]	Most Probable Upper Range[2]
		Tributary Water Rights		
Reduced Density MPR	981.7	Big Creek	124.7	126.5
UGA Alt. 5 (Residential)	129.2	Teanaway River	349.9	351.8
Direct Subtotal	1,110.9	Swauk Creek	366.8	486.6
Indirect Consumptive Use		Tributaries Subtotal	841.4	965.0
Fallowed Lands	264.1	Mainstem Water Rights		
Induced Housing	565.7	Yakima River	811.1	830.2
Indirect Subtotal	829.8	Mainstem Subtotal	811.1	830.2
Total Consumptive Use	1,940.7	Total Supply	1,652.5	1,795.2
Average Net Water Supply Likely Range			[-288.2]	[-145.5]

1 Model-predicted water supply for Trendwest's water rights incorporating water availability under the long-term average year conditions (Appendix B).

2 Long-term, average year, water supply availability would most likely occur within the range shown in these two columns, calculated from data in Tables B.1 and B.3 in Exhibit B.

Source: Brown & Caldwell 2002; W&H Pacific 2001; Mentor Law Group 2001.

7. MITIGATION MEASURES

Trendwest has identified three potential mitigation strategies to address adverse environmental impacts that result from decreases in Yakima River streamflow resulting from its water transfer proposals. Each strategy addresses impacts under conditions that are similar to those described as long-term average conditions.

7.1 GROUNDWATER INFILTRATION

A deficit occurs in September under average conditions, but substantial surpluses occur in April through June. Trendwest could divert water during the three months in which surpluses occur, and use stormwater infiltration facilities to infiltrate surplus diversions into groundwater. Subsurface returns of infiltrated water during the late spring and early summer would increase project streamflow contributions throughout the remainder of the year and, depending on the amount of water used for groundwater infiltration and the proximity of infiltration facilities to the Cle Elum River, could eliminate September streamflow deficits.[23]

7.2 ON-SITE STORAGE RELEASES

Trendwest is designing seven golf course water features on the MPR. Trendwest would circulate golf course irrigation water through these water features in order to provide storage and maintain water quality. However, it is feasible to use approximately 165 ac-ft of storage in the golf course

23 *On-Site Infiltration Option: Mitigation for Water Supply Deficit* (Associated Earth Sciences, Inc. 2001).

lakes to satisfy the approximate mean monthly September deficit of 24 ac-ft. Trendwest could use storage from these water features during the later part of the season, and replace that storage with surplus water available in April through July. Trendwest has sufficient water supply to refill these water features before each irrigation season.

7.3 WATER RIGHT ACQUISITION

Trendwest could acquire additional water rights and transfer them to instream flows to offset late irrigation season irrigation deficits. Additionally, under the environmental stewardship agreements described in Section 2.4 above, Trendwest has agreed to mitigate for increases in the consumptive use of water in the upper Yakima basin caused by Trendwest development activities, including increased water consumption from induced off-site housing.

7.4 DROUGHT MANAGEMENT

Under drought conditions, in addition to the above options, Trendwest could employ demand management by reducing irrigation on the MPR golf courses.

7.5 THIRD-PARTY WATER SYSTEM IMPROVEMENTS

7.5.1 Mainstem Water Users

Trendwest has been working with each of the mainstem diversions on the bypassed reach to identify needs for mitigation, if any. This includes working with various diverters over the last season to maintain diversion works. Trendwest has reached an agreement in principle with most of those diversions as to appropriate mitigation measures and fully anticipates agreements with all users in the near future.

7.5.2 Tributary Water Users

RCW 90.030.380 protects third-party water users from impairment of their water rights resulting from water right transfers. Trendwest's water rights formerly were used by water right owners who shared irrigation ditches with other water users. Trendwest has entered agreements with several Kittitas County irrigators who shared irrigation diversions with Trendwest's predecessors-in-interest to ensure their diversion rights are not affected.

Big Creek

Trendwest is working with the remaining water users on the Gentry/Lund ditch to address concerns of the remaining landowners on the Gentry/Lund ditch. Trendwest and the remaining diverters have identified issues to be addressed and are engaged in negotiations and anticipate a mitigation agreement to be in the near future. In addition to ongoing negotiations with the remaining water users, Trendwest in its agreement with RIDGE (see Section 2.4.2 above) has agreed to invest in upstream passage improvements and performance-based enhancements on Big Creek.

Swauk Creek

Trendwest is working with the remaining water user on the Burke-Hartman diversion to provide system improvements to prevent impairment of that party's water right caused by conveyance water reductions, as required under RCW 90.03.380.

First Creek

Following the purchase of the First Creek water rights, Trendwest worked with the remaining water users during the 2001 irrigation season to rebuild portions of the remaining canal, and to construct on-farm system improvements to reduce conveyance losses.

Mill Ditch

At this time, there does not appear to be an impact on Mill Ditch from the transfer of the Pautzke water right; however, Trendwest has agreed that if impacts are later discovered from the transfer of the Pautzke water right, Trendwest would negotiate the appropriate mitigation. If impacts are later identified due to the loss of the Pautzke right from the ditch, there remains the option of transferring Trendwest's Supplemental Reecer Creek water right to Mill Ditch as additional carriage water.

7.6 MONITORING

Trendwest would rely on compensatory transfers of tributary water rights to instream flows to ensure no net impacts on TWSA and no increase in consumptive use of water under its mainstem water rights. While the model runs performed were used to characterize the anticipated magnitude of impacts, actual water availability from year to year cannot be forecast by the model. As the 2001 monitoring program shows, water is not always physically available to satisfy Trendwest's tributary water rights, even though these rights generally are senior to the rights of most other tributary water users. Furthermore, Trendwest's tributary water rights may be subject to interception by intervening diverters, including those whose rights are junior in priority to those Trendwest has acquired.

An ongoing monitoring program would be established to ensure Trendwest and other water users that (1) the amount of water that would be used in connection with the MPR and UGA proposals is consistent with the water available under the several water rights that have been acquired by Trendwest and (2) the collective operations described in the water supply plan for the Trendwest resort are protective of other water users' rights on the Yakima River's tributaries and mainstem. This tributary monitoring program would include installation of equipment and data reporting consistent with existing state requirements to ascertain availability of water from Trendwest's proposed tributary water rights transfers. The program would also include installation of approved measuring devices and reporting of data by Cle Elum and Trendwest in connection with the Cle Elum water diversion and water use on the MPR and UGA properties. The data would be used, when necessary, to adjust the quantity of Trendwest's diversions to prevent any increase in the amount of water diverted under Trendwest's water rights over the amount actually available for diversion under its water rights, with allowance for other Trendwest obligations

under the RIDGE Settlement Agreement and the Cooperative Agreement with WDFW and the Yakama Nation.

7.6.1 Monitoring Water Use by Trendwest

As described earlier in this report, Trendwest would receive water from a diversion on the mainstem Yakima River owned and operated by the City of Cle Elum. Under certain streamflow conditions, Trendwest also may receive water from Cle Elum's proposed Cle Elum River diversion works. Cle Elum's diversions would include in-line flow meters capable of recording both the instantaneous flow rate (in cubic feet per second or millions of gallons per day) and the total annual volume diverted (in acre-feet or millions of gallons per year). Cle Elum would report its diversions for Trendwest to the appropriate agencies. Currently, Cle Elum must report its water diversion data to USBR and Ecology weekly during the irrigation season (March 1 to October 30), and monthly during the off-irrigation season (November 1 to February 28). *See* Exhibit A. These requirements would remain in effect, and would provide the basis for adjustments in water deliveries to Trendwest to account for water availability under the proposed tributary transfers. In response to monitoring information gathered, Cle Elum could adjust the amount of water delivered to Trendwest as necessary to adjust for water availability data according to information collected from tributary gauges described below.

7.6.2 Monitoring Streamflows

Monitoring of the hydrologic conditions would be required for each tributary on which Trendwest has water rights. The mainstem river flow in the reach between Cle Elum and Ellensburg also would be monitored. The monitoring program would consist of several stations designed to acquire water surface stage (elevation) data to be correlated to flow (in cubic feet per second) and to cumulative diversions (measured in acre-feet).

The following sites are proposed for the installation of permanent gauges to monitor tributary streamflows. Actual gauge locations would depend on physical suitability and landowner permission.

- Big Creek: Downstream of the Lund-Darling Diversion Dam and upstream of the Big Creek-Kittitas Reclamation District (KRD) Canal siphon.
- Teanaway River: The existing USBR gauge on the lower Teanaway stream gauge; a new rating curve would be developed to correlate flows and stream levels.
- Swauk Creek: Below the Coe (Tang) Diversion, but above the fractured basalt formation upstream of the Swauk Creek mouth. Unless or until water meter data is available from upstream diversions, a temporary gauge would be installed below the Burke Diversion, in the vicinity of the temporary gauge installed by Trendwest during the 2001 irrigation season.
- First Creek: On lower First Creek at a location near the Boise Cascade bridge.

7.6.3 Monitoring & Reporting Diversions

When an acquired water right is one of two or more that are diverted at a common point, or share a ditch or canal, provision for monitoring the other water user diversions would be developed

specifically to address the situation. Also, periodic monitoring of the other water users on the tributary streams that are downstream of stream gauges would be necessary to ensure that the tributary water rights are not diverted by junior appropriators. These data may be obtained by Ecology in the field in addition to any other measuring and reporting requirements that may exist.

Diverters on Big Creek, Teanaway River, and the Yakima mainstem are already required to report water use to USBR under interim Court Orders in Acquavella.[24] Under the monitoring and reporting orders, all parties who divert more than one cubic foot per second are required to keep diversion records and to provide those records to USBR on a weekly basis. USBR then is required to provide the records to Ecology. These reporting requirements are consistent with RCW 90.03.360, which requires all persons with surface water diversions over one cfs to install a measuring device. Ecology may require water users to report data describing the volume of water diverted.[25]

7.6.4 Frequency of Monitoring

Operational measurement of Cle Elum's diversions of water would be needed on a daily basis. Measurement of hydrologic conditions on the tributaries also would be recorded on at least a daily basis. Monitoring of other tributary water users would depend on compliance with applicable monitoring and reporting orders. Mainstem hydrologic conditions in the Cle Elum to Ellensburg reach of the Yakima River should be obtained at least weekly, consistent with information required to support USBR's TWSA calculations. The hydrologic monitoring by Trendwest and Cle Elum would be incorporated into USBR's monitoring network, either directly or through Ecology, and the two agencies would make the data available to one another and the public upon request.

7.6.5 Trendwest Monitoring and Reporting Institutional Requirements

The water rights transferred to the Yakima Trust Water Rights Program as a part of the Trendwest water supply plan will be managed by Ecology in accordance with Chapter 90.38 RCW. Coordination with the USBR, Cle Elum, and other water users would require an ongoing commitment from both Ecology and the USBR. As compared to historic institutional needs, the water supply plan requires additional coordination between the tributary water users, Cle Elum, Trendwest, Ecology and the USBR in order to ensure on an operating basis that consumptive uses and hydraulic impacts to TWSA and other water users are neutral or positive. Data from Trendwest's monitoring stations, the USBR's existing Teanaway River stations, and periodic field observations by Ecology staff would be used to gain that assurance. In general, Ecology would be responsible for management of tributary water rights transfers into the Yakima Trust Water Program until water available under the transferred rights reaches the mainstem of the

---

24 Order Pendente Lite Re: Metering, Measuring and Reporting Requirements (Oct. 13, 1994); Order Pendente Lite Re: Metering, Measuring and Reporting Requirements, Teanaway River and Big Creek, Kittitas County (Aug. 27, 1998).

25 It should be noted that the Acquavella court has on other occasions requiring monitoring and reporting as a condition to entry of a subbasin Conditional Final Order. See e.g., Conditional Final Order for Subbasin No. 15 (Wenas Creek) (Nov. 12, 1998).

Yakima River. At that point, water transferred to the Yakima Trust Water Program would be managed by the USBR as part of TWSA. Tributary water rights that would not be transferred to the Yakima Trust Water Program would be managed by Trendwest as private instream flow rights to the confluence of each affected tributary stream with the mainstem Yakima River. Thereafter, water available under the transferred water rights would become part of TWSA and managed by the USBR. Cle Elum's and Trendwest's use of water under Trendwest's proposed water supply plan would be altered to reduce diversion or implement a pre-approved mitigation plan during periods when the diversion would conflict with USBR operations.

8. UNAVOIDABLE IMPACTS

8.1 SHALLOW GROUNDWATER WITHDRAWALS

Groundwater elevations under and near properties appurtenant to the Trendwest water rights are raised by irrigation returns during, and for a period following, the irrigation season. Transferring irrigation water rights to instream flows will reduce the groundwater table under and near properties appurtenant to the Trendwest water rights. Lowering of groundwater tables in areas formerly influenced by those returns is an unavoidable change. Shallow wells extending into the upper portion of the groundwater aquifer would be susceptible to interference from the lowered groundwater tables if they are located where groundwater was raised by the irrigation returns.

8.2 MAINSTEM FLOW LEVELS

Small reductions in mainstem flows would occur during the irrigation season at various points between the Cle Elum diversion and Reecer Creek downstream, as a result of the combined transfer of consumptive rights by Trendwest and from termination of time lags resulting from former irrigation returns on the tributaries, which would be left instream under transfer to the Trust. While mainstem flows would remain sufficient to supply all irrigation needs between Cle Elum diversion and Reecer Creek, diversion systems employed by these diverters are in many cases marginal in their ability to collect their water rights from the river. Thus, any change in flow or head pressure past their headgates could adversely affect their ability to withdraw water. The changes in river elevation are shown in Table 8-1.

Table 8-1: Water Surface Elevation Changes at Third Party Diversion Sites (in feet)

Diversion Sites (feet assumed datum)	July 1– July 15	July 16– July 31	Aug 1– Aug 15	Aug 16– Aug 31	Sep 1– Sep 15	Sep 16– Sep 31	Oct 1– Oct 15	Oct 16– Oct 31
Younger Ditch	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01
Wallace Ranch	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.00	0.00
Westside Diversion[1]	0.00	-0.01	0.00	0.00	-0.01	-0.01	-0.01	0.00
Thorp Diversion	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.00	-0.01
Packwood Diversion	+0.01	0.00	-0.01	-0.01	-0.02	-0.02	-0.02	-0.01
Cascade Irrigation	Natural and man-caused geomorphic processes, and Cascade Irrigations in-channel structure placement do not reasonably allow estimation of impact, however any impacts would be minimal relative to natural river process impacts.							
Mill Ditch Diversion	Flows downstream of the Mill Ditch diversion would likely be the same before and after Trendwest's water rights transfers.							

1 Westside Diversion with ecology blocks in place. Source: Northwest Hydraulics, Inc 2002.

8.3 IRRIGATION RETURN FLOWS

Irrigation on upper Yakima River tributaries has altered historic streamflow conditions in two ways. First, water is lost through evapotranspiration, thereby reducing streamflows throughout the irrigation season. Second, irrigation water that is not consumed (i.e., return flow) is delayed in its return to the tributary stream by the time of subflow travel from the point of irrigation to the tributary channel (including the river hyporheic zone). Water diverted but not consumed, which represents irrigation return flows, is delayed in its eventual arrival into the mainstem Yakima River by travel through subsurface pathways. The result is that streamflows are lower in summer months but higher later in the year. In a normative (i.e., pre irrigation) condition, water that contributes to mainstem flows arrives in the mainstem earlier in the irrigation season than water that is routed via subsurface irrigation return pathways. One consequence of Trendwest's proposed tributary transfers to the Trust Water Program is that the associated human-caused delays in streamflow contributions from irrigation return flows would be reduced or eliminated altogether (see Exhibit A).

Exhibits A, B, and C

EXHIBIT A:

A.1 Tributary Transfers

Ecology has requested a presentation of changes in streamflow conditions that would result from eliminating irrigation return flow delays. In response to Ecology's request, this subchapter shows the effect of transferring Trendwest's tributary water rights, with consideration of changes in streamflow resulting from changes in return flow timing in the affected tributaries. The analysis includes the effects of the transfers on both the consumptive and non-consumptive use components of Trendwest's tributary water rights, after transfer to Ecology's Trust Water Program. The non-consumptive use component changes streamflow because the time to reach the tributary or mainstem Yakima as irrigation return flow is changed when these flows are left instream. Tables A.1 and A.2 show changes in tributary return flow timing, and the resulting impacts of the tributary transfers on mainstem flows, for the long-term average and drought year conditions, respectively.

Table A.1: Effects of Tributary Instream Flow Transfers Long-Term Average Year Conditions

Mean Monthly Changes in Yakima River Flow

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.8
Feb	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.8
Mar	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.8
Apr	-0.1	-0.1	-0.1	-0.1	2.6	2.6	2.0
May	0.9	0.9	0.9	4.1	8.9	8.9	8.3
Jun	1.2	1.2	1.2	2.6	6.7	6.7	6.1
Jul	1.2	1.2	1.2	3.0	5.3	5.3	4.7
Aug	0.9	0.9	0.9	1.9	2.5	2.5	1.9
Sep	-0.5	-0.5	-0.5	-1.5	-1.0	-1.0	-1.6
Oct	-0.4	-0.4	-0.4	-1.1	-0.6	-0.6	-1.2
Nov	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4	-1.0
Dec	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.9

Table A.2: Effects of Tributary Instream Flow Transfers Drought Year Conditions

Mean Monthly Changes in Yakima River Flow

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.8
Feb	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.8
Mar	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.8
Apr	-0.1	-0.1	-0.1	-0.1	2.6	2.6	2.0
May	1.1	1.1	1.1	4.5	9.5	9.5	9.0
Jun	1.4	1.4	1.4	2.4	5.6	5.6	5.0
Jul	1.5	1.5	1.5	3.9	5.3	5.3	4.7
Aug	0.7	0.7	0.7	1.4	2.0	2.0	1.4
Sep	-0.5	-0.5	-0.5	-1.5	-1.2	-1.2	-1.8
Oct	-0.4	-0.4	-0.4	-1.0	0.0	0.0	-0.6
Nov	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4	-1.0
Dec	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.9

The main difference between the changes shown for the combined water balance (discussed below) and the consumptive use water balance (discussed in Section 4.1) is due to attenuated non-consumptive irrigation return flows, which are left instream under the transfers. These model runs show the effects of changing discontinued return flows to instream flows on the Yakima River. These effects include elimination of the out-of-basin diversion of purchased water rights from First Creek (Swauk basin) into Reecer Creek basin for irrigation. In the Big and Reecer Creek subbasins, groundwater is not in hydraulic continuity with the creek. Return flows are highly attenuated and are returned to the Yakima River throughout the year. Thus, terminating the time-delay inherent in the return flows lowers Yakima River flow during the non-irrigation season, but increases mainstem flow in the irrigation season. In the Swauk Creek and Teanaway River subbasins, groundwater is hydraulically connected to surface water and the return flows have much less attenuation, reaching the tributary or mainstem fairly quickly after irrigation. There are relatively large flow increases at the beginning of irrigation season, because previous irrigation season return flows have diminished and current season return flows are delayed.

A.2 "COMBINED" MODEL RESULTS

The water balance model was run to show the accumulated differences in flow changes resulting from the consumptive use transfers of the water rights in combination with the change in non-consumptive return flow timing. These simulations are referred to as "combined" model runs. As described above, the non-consumptive return flow timing change results from leaving formerly diverted water in the tributary channels. Changes in Yakima River flows were simulated for average and drought year representative conditions. The combined model output shows that the Yakima River streamflow would be reduced under the long-term, average conditions from August through March below Ellensburg. The reduction in flow is caused by the transfer of irrigation return flows (which were delayed in reaching the Yakima River) to instream tributary flows (which quickly reach the Yakima River and were not time-delayed in the model). During the winter, consumptive use on the MPR and UGA does not exceed the consumptive portion of the transferred stockwater rights. During the first half of the irrigation season, Yakima River flows would be increased by up to 9.6 cfs. As for the "consumptive use" model simulations described in Section 4.1, the combined model simulations were also run to estimate upper, middle, and lower bounds. Late in the irrigation season the most likely flows would be between the middle and lower bound simulations. The middle and lower bound simulations for the long-term average fit define a narrow range (see Tables B.4 and B.6 in Exhibit B). The greatest range of predicted flow change, expressed as a percentage of the range mid-point, is in August, when the most likely range in flow change is predicted to be -1.2 to -0.1 cfs below Reecer Creek.

Results of simulations with these combined effects display both mean monthly increases and decreases in Yakima River streamflow, and are shown in Tables A.3and A.4.

Table A.3: Mean Monthly Changes in Yakima River Flow from the "Combined Model" (Includes Tributary Irrigation Return Flow Timing Effects) under Long-term Average Year Conditions (Study Years 1991-1993, 1995)[1]

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)[2]
Jan	-0.2	0.4	-0.2	-0.2	-0.2	-0.1	-0.7
Feb	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Mar	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Apr	-0.1	0.5	-0.5	-0.5	2.3	3.7	3.1
May	0.9	1.5	0.2	3.4	8.2	10.2	9.6
Jun	1.2	1.8	-2.4	-1.1	3.0	5.2	4.6
Jul	1.2	1.8	-4.6	-2.8	-0.5	2.1	1.5
Aug	0.9	1.5	-3.5	-2.5	-1.9	0.5	-0.1
Sep	-0.5	0.1	-3.6	-4.6	-4.1	-2.2	-2.8
Oct	-0.4	0.3	-0.7	-1.4	-0.9	-0.3	-0.9
Nov	-0.3	0.4	-0.3	-0.3	-0.4	-0.3	-0.9
Dec	-0.3	0.4	-0.3	-0.3	-0.3	-0.2	-0.8

1 The middle and lower bound simulation results are shown in Tables B.4 and B.6 in Exhibit B.
2 Inclusion of tributary return flow effects in the "Combined Model" simulations causes a flow difference downstream (D/S) of Reecer Creek, whereas under the "Consumptive Use Model" simulations no further changes to Yakima River flow occur downstream of the Mill Ditch Diversion.

Table A.4: Mean Monthly Changes in Yakima River Flow from the "Combined Model" (Includes Tributary Irrigation Return Flow Timing Effects) under the Drought Year Condition (Study Year 2001)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	-0.2	0.4	-0.2	-0.2	-0.2	-0.1	-0.7
Feb	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.6
Mar	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Apr	-0.1	0.5	-0.4	-0.4	2.2	2.9	2.3
May	1.1	1.7	0.3	3.7	8.8	9.6	9.0
Jun	1.4	2.0	-2.2	-1.3	1.9	3.6	3.0
Jul	1.5	2.1	-4.3	-1.9	-0.5	0.9	0.3
Aug	0.7	1.2	-3.7	-3.0	-2.4	-0.2	-0.8
Sep	-0.5	0.1	-3.6	-4.6	-4.3	-2.4	-3.0
Oct	-0.4	0.3	-0.7	-1.3	-0.3	0.2	-0.4
Nov	-0.3	0.4	-0.3	-0.3	-0.4	-0.3	-0.8
Dec	-0.2	0.4	-0.3	-0.3	-0.3	-0.2	-0.8

EXHIBIT B: UNCERTAINTY ANALYSIS

B.1 Model Uncertainty

An analysis of model uncertainty analysis was conducted. The input parameters that were tested include tributary streamflows, irrigation and stockwater efficiencies, and lag time distributions of irrigation and alluvial aquifer return flows. From these analyses, three sets of model inputs were prepared for the combined UGA Alternative 5 plus MPR Reduced Density scenario. These were the upper and lower bound reasonable values. The lower bound inputs used low streamflow, combined with low irrigation efficiency and slow return flow (high attenuation). The upper bound inputs used high streamflow, combined with higher irrigation efficiency and rapid return low (low attenuation). The third input set used values mid-way between the two bounds. ECT provided streamflow monitoring data and inputs to the lag-time algorithms in the water balance model, based on ranges agreed as reasonable with the project team. The input values to bracket the three model simulations are described in this section.

Tributary streamflows were estimated for the study period. The estimation technique relied on USBR's Teanaway River at Forks gauge as an index for the tributaries. A statistical regression analysis of the ECT monitoring and the Teanaway gauge data was conducted (see Section 4.4.1). The regression equations were used to estimate the middle simulation values, and the upper and lower 95 percent values of the tributary streamflows to use for the upper and lower bound simulation values, respectively. The regression graphs are shown in Figures B.1, B.2 and B.3 for Big, First and Swauk Creeks, respectively.

Irrigation efficiencies were estimated using three techniques. Typical on-farm irrigation efficiencies are published in the *Washington Irrigation Guide* (Washington State Cooperative Extension Service 1990). However, actual on-farm efficiencies and conveyance efficiencies can vary. Irrigation efficiency was also determined using the annual diversion quantity specified in the adjudicated water rights from Acquavella. Efficiency was computed by dividing the annual net consumptive use (from Blanney-Criddle method estimates appearing in the *Washington Irrigation Guide*) by the annual diversion quantity. Ecology's diversion metering on the 3M Ditch in the Teanaway River Basin was used to estimate efficiency. Consumptive uses of the irrigated areas served by the ditch were estimated using the Blanney-Criddle method. Once again, the consumptive use was divided by the diversions to compute efficiency, but actual diversion measurements were used. The lowest efficiency of approximately 32 percent resulted from using the water rights approach. The highest efficiency of approximately 45 percent was the typical efficiency used in the Draft EIS, which was based on an on-farm efficiency of 60 percent and a conveyance efficiency of 75 percent. The central value of 38 percent resulted from the 3M Ditch analysis, which corresponds to a 50 percent on-farm and a 75 percent conveyance efficiency. This distribution of efficiencies results in about a 17 percent variation about the central value. The efficiency of stockwater consumptive use is uncertain. After prior agreement from the Washington State Department of Ecology, an efficiency of 10 percent of the total annual diversion volume was assumed, with an uncertainty of plus or minus 5 percent.

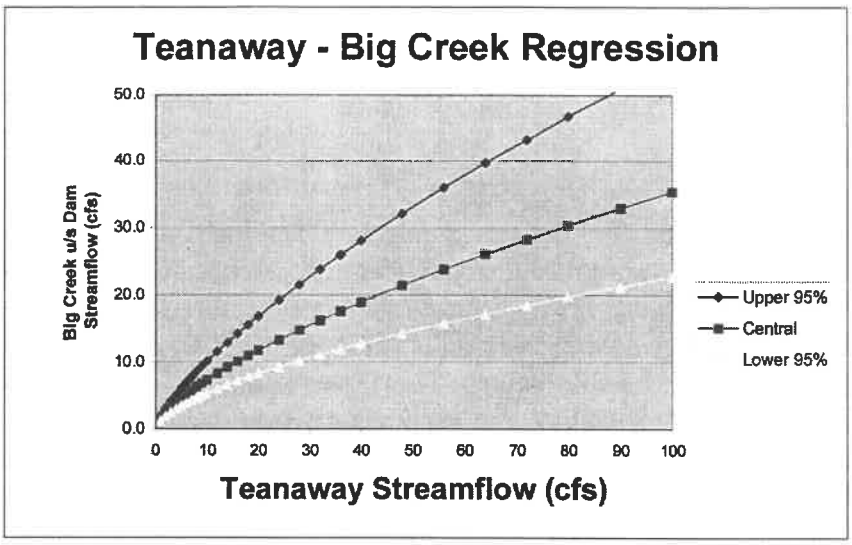


Figure B.1 Variability in Big Creek Streamflow Estimates

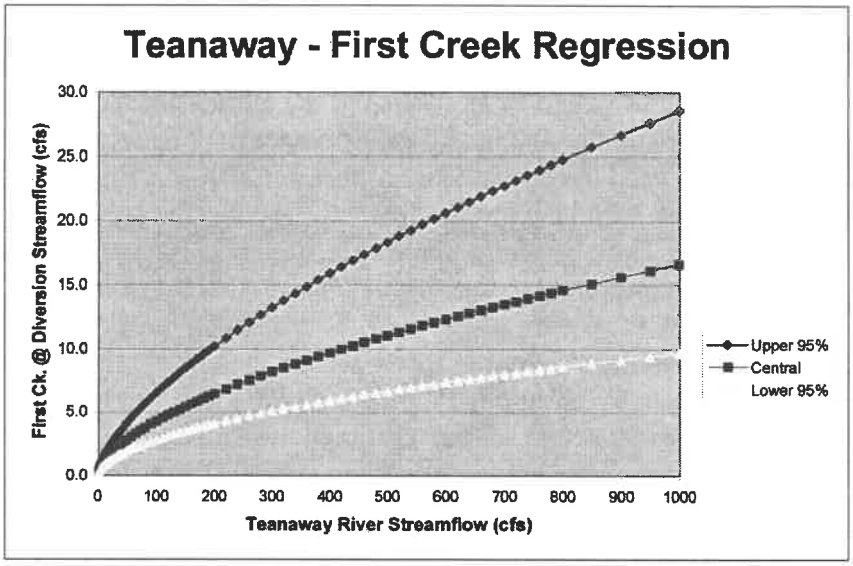


Figure B.2 Variability in First Creek Streamflow Estimates

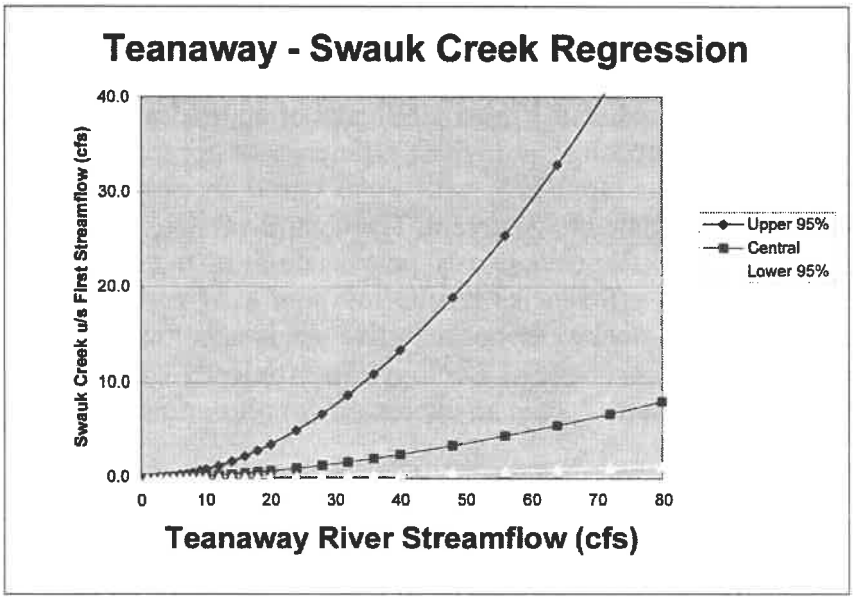


Figure B.3 Variability in Swauk Creek Streamflow Estimates

The lag time distributions of irrigation and alluvial aquifer return flows provided by ECT are shown in Figures B.4 and B.5. Only Big Creek had seepage through the creek bed, and thus required an alluvial aquifer return flow component. Where sufficient data were available, ECT developed groundwater models to derive irrigation return flow curves, which showed the lag time on a percentage basis. Lag time distributions were specified for each affected tributary sub-basin. For the Teanaway River sub-basin, a uniform lag time of 30 days, plus or minus 2 weeks was used. For the Reecer Creek sub-basin, the return flows were uniformly distributed over one year. For the Big and Swauk Creek sub-basins, the average of the two model generated curves was used as the central distribution. The curves represented high and low return flow attenuation for long-term average year conditions.

B.2 Uncertainty Analysis Results

The combined water balance and the consumptive use balance were affected differently by uncertainty in the input parameters that were tested. The consumptive use balance is affected primarily by tributary streamflows and irrigation efficiencies, but only during dry late summer and early fall seasons when water availability is low. The consumptive use balance is not affected by variability in timing of the lagged return flows because these flows are non-consumptive use components of the combined water balance. The consumptive use balance is not affected during the early irrigation season because sufficient water is available to supply all of the Trendwest water rights. Outside of the irrigation season, the total water balance is affected by lagged return flows from the previous irrigation season, but the consumptive use balance is not affected.

The results of the uncertainty analysis for the consumptive use balance under long-term average year conditions are shown in Tables B.1, B.2 and B.3. The changes in mainstem Yakima River streamflows are indicated by the "D/S Reecer Creek" column (far right) of each table. The middle values simulations show a net reduction in streamflow downstream of Reecer Creek during September (Table 4-1). The lower bound values simulations show a net flow reduction during September and July (Table 4-3). The upper bound values simulations show no net flow reductions below Reecer Creek. The greatest range in changes occurs during the months of June, July and August. The mean departure from the middle value is 0.8 cfs in July, 0.5 in August and 0.4 cfs in June. During the late irrigation season, the most likely actual result is expected between the middle and lower bound values, as described earlier. There is zero variability in April, and the mean range around the middle value is only 0.1 cfs outside of the irrigation season. The First/Swauk Creek basin availability is the primary driver of the consumptive variation shown in Tables 4-2 and 4-3.

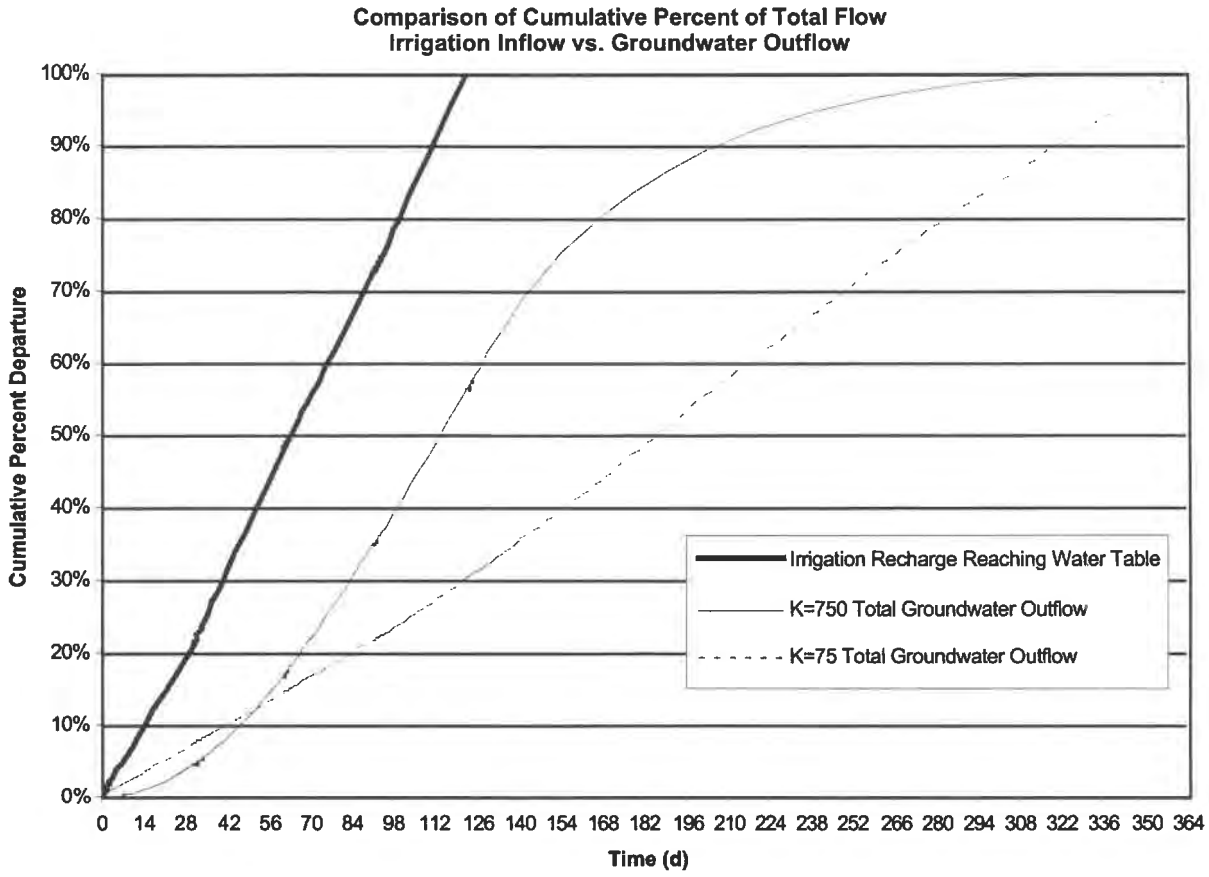


Figure B.4 ECT Big Creek Irrigation Return Flow Lag Time Distribution

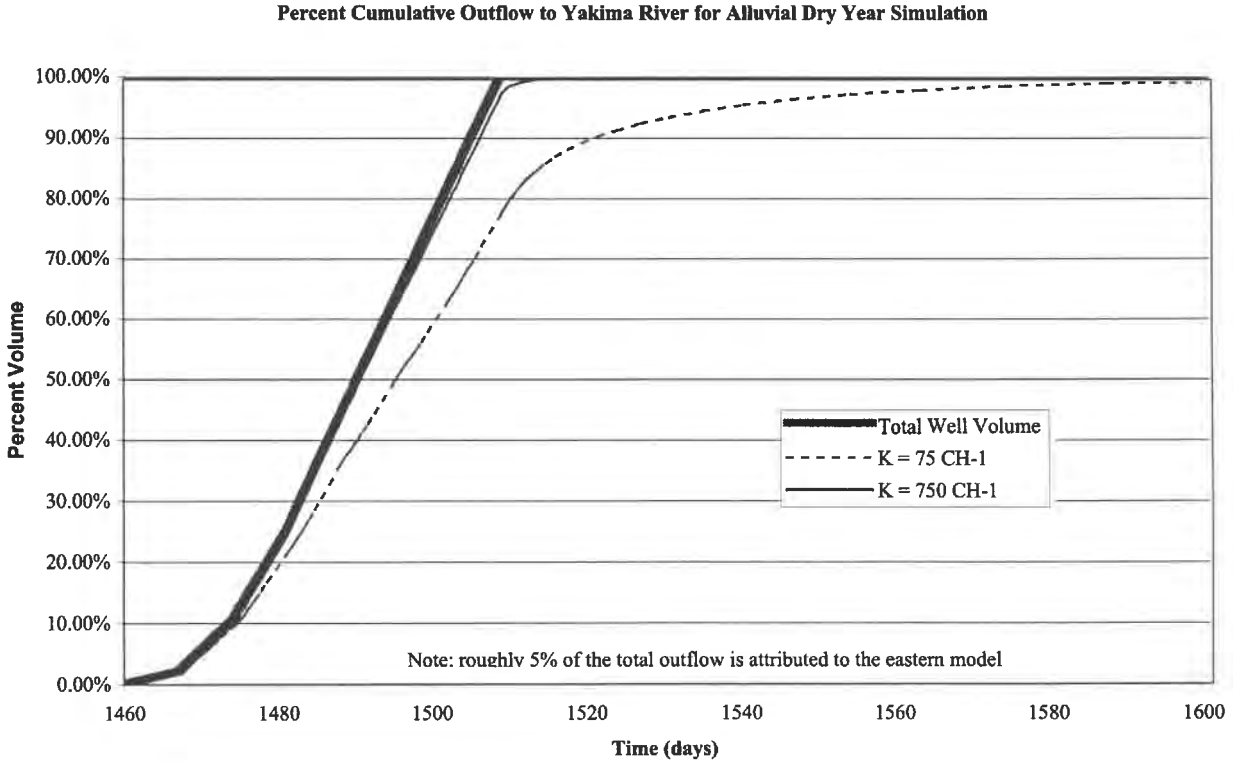


Figure B.5 ECT Big Creek Alluvial Aquifer Seepage Lag Time Distribution

Table B.1: Consumptive Use Model Results

Middle Values Simulation
Mean Monthly Changes in Yakima River Flow (Long-Term Average Flow Conditions)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.1	0.1
Feb	0.0	0.7	0.0	0.0	0.0	0.1	0.1
Mar	0.0	0.6	0.0	0.0	0.0	0.1	0.1
Apr	0.0	0.6	-0.3	-0.3	0.9	2.3	2.3
May	0.4	1.0	-0.3	0.9	3.1	5.1	5.1
Jun	0.5	1.1	-3.2	-1.8	0.3	2.5	2.5
Jul	0.6	1.2	-5.2	-3.6	-2.3	0.2	0.2
Aug	0.6	1.2	-3.8	-2.5	-2.0	0.4	0.4
Sep	0.0	0.6	-3.1	-2.7	-2.3	-0.4	-0.4
Oct	0.0	0.7	-0.3	-0.3	0.1	0.7	0.7
Nov	0.0	0.7	0.0	0.0	0.0	0.1	0.1
Dec	0.0	0.7	0.0	0.0	0.0	0.1	0.1

Table B.2: Consumptive Use Model Results

Upper Bound Values Simulation
Mean Monthly Changes in Yakima River Flow (Long-Term Average Flow Conditions)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.2	0.2
Feb	0.0	0.7	0.0	0.0	0.0	0.2	0.2
Mar	0.0	0.6	0.0	0.0	0.0	0.1	0.1
Apr	0.0	0.6	-0.3	-0.3	0.9	2.3	2.3
May	0.4	1.0	-0.3	0.9	3.1	5.1	5.1
Jun	0.5	1.1	-3.2	-1.8	0.5	2.7	2.7
Jul	0.6	1.2	-5.2	-3.6	-1.5	1.1	1.1
Aug	0.6	1.2	-3.8	-2.5	-1.3	1.1	1.1
Sep	0.0	0.6	-3.1	-2.7	-1.9	0.0	0.0
Oct	0.0	0.7	-0.3	-0.3	0.2	0.9	0.9
Nov	0.0	0.7	0.0	0.0	0.0	0.2	0.2
Dec	0.0	0.7	0.0	0.0	0.0	0.1	0.1

Table B.3: Consumptive Use Model Results

Lower Bound Values Simulation
Mean Monthly Changes in Yakima River Flow (Long-Term Average Flow Conditions)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Feb	0.0	0.7	0.0	0.0	0.0	0.1	0.1
Mar	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Apr	0.0	0.6	-0.3	-0.3	0.9	2.3	2.3
May	0.4	1.0	-0.3	0.9	3.0	5.0	5.0
Jun	0.5	1.1	-3.2	-1.8	-0.4	1.8	1.8
Jul	0.6	1.2	-5.2	-3.7	-3.1	-0.5	-0.5
Aug	0.6	1.2	-3.8	-2.5	-2.2	0.1	0.1
Sep	0.0	0.6	-3.1	-2.7	-2.5	-0.6	-0.6
Oct	0.0	0.7	-0.3	-0.3	0.0	0.6	0.6
Nov	0.0	0.7	0.0	0.0	0.0	0.1	0.1
Dec	0.0	0.7	0.0	0.0	0.0	0.0	0.0

The results of the analysis combining the consumptive use balance and changes in tributary return flow timing under long-term average year conditions are shown in Tables B.4, B.5 and B.6. The net change in mainstem Yakima River streamflows are indicated by the "D/S Reecer Creek" column (far right) of each table. The net change in Yakima River flow is positive for April through July for the range of estimates. At the end of the irrigation season, there is a drop in streamflow, because the reduction in irrigation diversions early in the summer results in a reduction in late season and wintertime return flow.

Table B.4: Combined Model Results

Middle Values Simulation
Mean Monthly Changes in Yakima River Flow (Long-Term Average Flow Conditions)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	-0.2	0.4	-0.2	-0.2	-0.2	-0.1	-0.7
Feb	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Mar	-0.2	0.5	-0.2	-0.2	-0.2	-0.1	-0.7
Apr	-0.1	0.5	-0.5	-0.5	2.3	3.7	3.1
May	0.9	1.5	0.2	3.4	8.2	10.2	9.6
Jun	1.2	1.8	-2.4	-1.1	3.0	5.2	4.6
Jul	1.2	1.8	-4.6	-2.8	-0.5	2.1	1.5
Aug	0.9	1.5	-3.5	-2.5	-1.9	0.5	-0.1
Sep	-0.5	0.1	-3.6	-4.6	-4.1	-2.2	-2.8
Oct	-0.4	0.3	-0.7	-1.4	-0.9	-0.3	-0.9
Nov	-0.3	0.4	-0.3	-0.3	-0.4	-0.3	-0.9
Dec	-0.3	0.4	-0.3	-0.3	-0.3	-0.2	-0.8

Table B.5: Combined Model Results

Upper Bound Values Simulation
Mean Monthly Changes in Yakima River Flow (Long-Term Average Flow Conditions)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	-0.1	0.6	-0.1	-0.1	-0.1	0.0	-0.5
Feb	-0.1	0.7	0.0	0.0	0.0	0.1	-0.5
Mar	0.0	0.6	-0.1	-0.1	-0.1	0.1	-0.5
Apr	0.0	0.6	-0.3	-0.3	2.1	3.5	2.9
May	0.9	1.4	0.1	2.2	6.4	8.5	7.9
Jun	1.0	1.5	-2.7	-1.4	2.6	4.8	4.2
Jul	0.9	1.5	-4.9	-3.3	0.3	2.9	2.3
Aug	0.8	1.4	-3.6	-2.4	-0.6	1.7	1.1
Sep	-0.5	0.1	-3.6	-4.0	-2.9	-1.0	-1.6
Oct	-0.4	0.3	-0.7	-0.8	0.0	0.6	-0.1
Nov	-0.2	0.5	-0.2	-0.2	-0.3	-0.1	-0.7
Dec	-0.1	0.5	-0.2	-0.2	-0.2	0.0	-0.6

Table B.6: Combined Model Results

Lower Bound Values Simulation
Mean Monthly Changes in Yakima River Flow (Long-Term Average Flow Conditions)

	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S City of Cle Elum (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
Jan	-0.4	0.2	-0.4	-0.4	-0.4	-0.4	-0.9
Feb	-0.4	0.3	-0.4	-0.4	-0.4	-0.3	-0.9
Mar	-0.4	0.3	-0.4	-0.4	-0.4	-0.3	-0.9
Apr	-0.3	0.3	-0.6	-0.6	2.5	3.9	3.3
May	1.2	1.7	0.4	4.4	9.5	11.6	11.0
Jun	2.3	2.8	-1.4	1.1	4.2	6.4	5.8
Jul	1.8	2.3	-4.0	-2.2	-1.2	1.3	0.8
Aug	0.0	0.6	-4.4	-3.2	-3.0	-0.7	-1.2
Sep	-0.3	0.3	-3.5	-5.1	-5.0	-3.1	-3.6
Oct	-0.4	0.2	-0.7	-2.8	-2.4	-1.8	-2.4
Nov	-0.4	0.3	-0.4	-0.4	-0.5	-0.4	-1.0
Dec	-0.4	0.2	-0.4	-0.4	-0.5	-0.4	-1.0

B.3 Demand Uncertainty

The water demands for diversion have been estimated on a conservative basis. The assumptions include: 1) 100 percent buildout, 2) 100 percent occupancy, and 3) that every residential lot would irrigate to the maximum allowed by water use policies. The realistic expectation is that in actual operations less water rather than more water would be diverted than has been forecast. Neither buildout nor occupancy likely would be 100 percent, but the water rights and mitigation measures necessary for such would be in place. It is not likely that every lot would be landscaped

with the maximum allowable irrigated area allowed by the water policies, but the water rights and mitigations measures necessary for such would be in place.

B.4 Mitigation for Uncertainty

Uncertainty on the water supply side due to climatic variability and to reasonable ranges in hydrogeologic inputs to the model, and to a lesser extent on the demand side due to forecasting future conditions, are both accounted for by monitoring actual water availability and actual diversion under a monitoring plan (see Section 7-6).

EXHIBIT C: WATER RIGHTS INCORPORATED IN WATER BALANCE MODEL

Water Right Name	Priority	Source	Qi (cfs)	Qa (ac-ft)	Acres
Big Creek Water Rights					
Darling	June 30, 1887	Darling Ditch	1.50	360.0	75.0
Darling	June 30, 1887	Darling Ditch	0.03	7.2	1.5
Gentry (Retained)	June 30, 1887	Lund Ditch	1.37	378.0	78.5
Gentry (Trendwest)	June 30, 1887	Lund Ditch	1.53	390.1	81.5
Lund	June 30, 1887	Lund Ditch	0.16	38.4	8.0
Lund et al	June 30, 1887	Lund Ditch	1.60	384.0	80.0
Ranch Properties, Inc.	June 30, 1887	Lund Ditch	0.48	143.7	24.0
Darling	June 30, 1889	Darling Ditch	0.04	9.6	2.0
Griffith	June 30, 1889	Lund Ditch	0.34	81.6	17.0
Church of Jesus Christ LDS	June 30, 1906	Ensign Ranch	1.70	408.0	85.0
Swauk / First Creek Water Rights					
FCWUA (Retained)	Nov. 2, 1877	First Creek	2.19	274.1	54.8
FCWUA / Trendwest	Nov. 2, 1877	First Creek	2.79	348.9	69.7
Burke	June 30, 1878	Swauk via Burke	2.00	588.6	78.4
Hartman / Trendwest	June 30, 1878	Swauk via Burke-Hartman	0.89	150.0	20.0
Burke	June 30, 1878	Swauk via Burke-Hartman	1.77	297.0	39.6
FCWUA (Retained)	June 1, 1881	First Creek	3.92	639.3	127.8
FCWUA / Trendwest	June 1, 1881	First Creek	5.00	813.7	162.7
Coe	May 24, 1884	Swauk via Coe (N)	1.79	164.0	35.0
Coe	May 24, 1884	Swauk via Coe (S)	1.50	112.5	15.0
Tang	May 24, 1884	Swauk via Tang	0.17	80.0	8.0
Hartman / Trendwest	Sept. 20, 1889	Swauk via Burke-Hartman	3.34	562.5	75.0
Burke	Oct. 31, 1889	Swauk via Burke	2.00	150.0	20.0
Tang	Sept. 21, 1892	Swauk via Tang	0.17	80.0	8.0
Coe	Apr. 9, 1901	Swauk via Coe (S)	0.38	37.5	5.0
Teanaway River Water Rights from Mainstem to Forks					
Bonetto	June 30, 1882	Teanaway	0.09	13.8	4.6
Bonetto	June 30, 1882	Teanaway	0.10	27.5	5.1
McClure	June 30, 1882	Teanaway	0.17	45.9	8.5
Osmonovich	June 30, 1882	Teanaway	0.04	13.0	2.0
Masterson	June 30, 1883	Teanaway	4.80	1,527.5	235.0
Mundy	June 30, 1883	Teanaway	0.90	292.5	45.0
Walker/Trendwest	June 30, 1883	Teanaway	1.26	340.2	63.0
Walker /Trendwest	June 30, 1883	Teanaway	1.40	378.0	70.0
Walker /Trendwest	June 30, 1883	Teanaway	0.08	21.6	4.0
Bonetto	June 30, 1884	Teanaway	0.44	66.0	22.0
Bonetto	June 30, 1884	Teanaway	0.16	24.0	8.0
Downs	June 30, 1884	Teanaway	0.16	52.0	8.0
Miller	June 30, 1884	Teanaway	0.02	5.4	1.0
Estate of Bugni	June 30, 1885	Teanaway	1.50	410.4	76.0
Dickhaus	June 30, 1885	Teanaway	0.57	184.7	28.4
Downs	June 30, 1885	Teanaway	0.44	143.0	22.0
Drotning	June 30, 1885	Teanaway	0.16	52.0	8.0
Evenden	June 30, 1885	Teanaway	0.55	178.8	27.5
Fookes	June 30, 1885	Teanaway	0.49	159.1	24.5
Hancock	June 30, 1885	Teanaway	1.39	452.0	69.5
Hollingsworth	June 30, 1885	Teanaway	0.20	65.0	10.0
Johnson	June 30, 1885	Teanaway	0.23	74.2	11.4
Livengood	June 30, 1885	Teanaway	0.26	84.5	13.0
Lixvar	June 30, 1885	Teanaway	0.49	159.0	24.5

Water Right Name	Priority	Source	Qi (cfs)	Qa (ac-ft)	Acres
Lloyd	June 30, 1885	Teanaway	0.09	27.6	4.3
Montgomery	June 30, 1885	Teanaway	0.62 4	202.8 1	31.2
Nichols	June 30, 1885	Teanaway	1.50	489.1	75.2
Osmonovich	June 30, 1885	Teanaway	0.41	132.9	20.4
Pratt	June 30, 1885	Teanaway	0.17	54.3	8.4
Sparks	June 30, 1885	Teanaway	1.01	329.9	50.8
Teanaway Associates	June 30, 1885	Teanaway	0.51	165.4	25.5
Teanaway Valley Farms, Inc.	June 30, 1885	Teanaway	0.76	245.4	37.8
Boise Cascade	June 30, 1885	Teanaway	1.10	220.0	55.0
Conner	June 30, 1888	Teanaway	1.00	325.0	50.0
Teanaway Valley Family Farm & Crosetto	June 30, 1888	Teanaway	1.40	455.0	70.0
Badda	June 30, 1889	Teanaway	0.24	78.0	12.0
Carollo	June 30, 1889	Teanaway	0.01	4.6	0.7
Evenden	June 30, 1889	Teanaway	0.05	16.3	2.5
Monroe/Torgeson	June 30, 1889	Teanaway	0.20	54.0	10.0
Teanaway Ranch, Inc.	June 30, 1889	Teanaway	3.32	1,079.0	166.0
Teanaway Valley Family Farm & Crosetto	June 30, 1889	Teanaway	0.80	237.0	30.0
Teanaway Valley Farms, Inc.	June 30, 1889	Teanaway	0.06	17.9	2.8
Tidwell	June 30, 1889	Teanaway	0.30	97.5	15.0
US Bureau of Reclamation	June 30, 1889	Teanaway	0.20	54.0	10.0
US Bureau of Reclamation	June 30, 1889	Teanaway	0.20	54.0	10.0
Blackburn	June 30, 1890	Teanaway	0.88	286.0	44.0
Blackburn	June 30, 1890	Teanaway	0.30	97.5	15.0
Blackburn	June 30, 1890	Teanaway	0.32	86.4	16.0
Blackburn	June 30, 1890	Teanaway	0.04	10.8	2.0
Walker/Trendwest	June 30, 1890	Teanaway	0.68	183.6	34.0
Cernick	June 30, 1891	Teanaway	0.32	86.4	16.0
Miller	June 30, 1891	Teanaway	0.16	43.2	8.0
Osmonovich	June 30, 1891	Teanaway	0.04	10.8	2.0
Starkovich	June 30, 1891	Teanaway	0.66	178.2	33.0
Nichols	June 30, 1894	Teanaway	0.04	10.8	2.0
Walker/Trendwest	June 30, 1898	Teanaway	0.26	69.1	12.8
Walker/Trendwest	June 30, 1898	Teanaway	0.08	21.6	4.0
Conner	June 30, 1899	Teanaway	0.80	260.0	40.0
Fruhling	June 30, 1905	Teanaway	0.40	110.0	20.0
Pederson	June 30, 1905	Teanaway	0.20	2.0	0.0
Carollo	June 30, 1910	Teanaway	0.23	73.5	11.3
Yakima River at Mill & Klein Coble Ditchs					
Pautzke Bait / Trendwest	Oct. 30, 1884	Yakima via Klein Coble	4.59	1,609.0	67.0
Pautzke Bait / Trendwest	Oct. 30, 1884	Yakima via Klein Coble	3.90	967.2	78.0
Pautzke Bait / Trendwest	May 6, 1893	Yakima via Mill Ditch	12.90	1,825.0	146.0

Order Pendente Lite entered May 11, 1990, authorized a change in point of diversion for the Pautzke Bait Co. from the Klein Coble ditch to Mill Ditch for the pendency of the adjudication. The Order required Pautzke file a change application with DOE.

Exhibit D

	AP	AQ	BG	BH		AP	AQ	BG	BH		AP	AQ	BG	BH		AP	AQ	BG	BH
10	Return Flow Schedule Lookup Tables					Return Flow Schedule Lookup Tables					Return Flow Schedule Lookup Tables					Return Flow Schedule Lookup Tables			
11	Irrigation Return Flow		Alluvial Return Flow			Irrigation Return Flow		Alluvial Return Flow			Irrigation Return Flow		Alluvial Return Flow			Irrigation Return Flow		Alluvial Return Flow	
12	Intermediate Values		Intermediate Values			Intermediate Values		Intermediate Values			Intermediate Values		Intermediate Values			Intermediate Values		Intermediate Values	
13	Day	Incremental %Return	Day	Incremental %Return		Day	Incremental %Return	Day	Incremental %Return		Day	Incremental %Return	Day	Incremental %Return		Day	Incremental %Return	Day	Incremental %Return
14	0	0.00%	0	0.00%	105	91	0.46%	91	0.06%	195	181	0.27%	181	0.00%	284	270	0.18%	270	0.00%
15	1	0.11%	1	0.19%	106	92	0.46%	92	0.06%	196	182	0.27%	182	0.00%	285	271	0.18%	271	0.00%
16	2	0.14%	2	0.25%	107	93	0.37%	93	0.06%	197	183	0.27%	183	0.00%	286	272	0.18%	272	0.00%
17	3	0.15%	3	0.27%	108	94	0.46%	94	0.06%	198	184	0.27%	184	0.00%	287	273	0.18%	273	0.00%
18	4	0.10%	4	0.39%	109	95	0.48%	95	0.06%	199	185	0.27%	185	0.00%	288	274	0.18%	274	0.00%
19	5	0.12%	5	0.26%	110	96	0.32%	96	0.04%	200	186	0.27%	186	0.00%	289	275	0.18%	275	0.00%
20	6	0.14%	6	0.31%	111	97	0.39%	97	0.04%	201	187	0.27%	187	0.00%	290	276	0.18%	276	0.00%
21	7	0.18%	7	0.37%	112	98	0.46%	98	0.04%	202	188	0.27%	188	0.00%	291	277	0.18%	277	0.00%
22	8	0.11%	8	0.68%	113	99	0.56%	99	0.04%	203	189	0.27%	189	0.00%	292	278	0.18%	278	0.00%
23	9	0.11%	9	0.92%	114	100	0.33%	100	0.04%	204	190	0.27%	190	0.00%	293	279	0.18%	279	0.00%
24	10	0.14%	10	1.01%	115	101	0.33%	101	0.04%	205	191	0.27%	191	0.00%	294	280	0.18%	280	0.00%
25	11	0.14%	11	1.50%	116	102	0.41%	102	0.04%	206	192	0.28%	192	0.00%	295	281	0.18%	281	0.00%
26	12	0.18%	12	1.00%	117	103	0.41%	103	0.04%	207	193	0.28%	193	0.00%	296	282	0.18%	282	0.00%
27	13	0.18%	13	1.21%	118	104	0.49%	104	0.04%	208	194	0.28%	194	0.00%	297	283	0.18%	283	0.00%
28	14	0.23%	14	1.46%	119	105	0.49%	105	0.03%	209	195	0.28%	195	0.00%	298	284	0.18%	284	0.00%
29	15	0.23%	15	1.21%	120	106	0.60%	106	0.03%	210	196	0.28%	196	0.00%	299	285	0.18%	285	0.00%
30	16	0.20%	16	1.53%	121	107	0.60%	107	0.03%	211	197	0.28%	197	0.00%	300	286	0.18%	286	0.00%
31	17	0.20%	17	1.69%	122	108	0.49%	108	0.03%	212	198	0.28%	198	0.00%	301	287	0.18%	287	0.00%
32	18	0.20%	18	2.52%	123	109	0.49%	109	0.03%	213	199	0.28%	199	0.00%	302	288	0.18%	288	0.00%
33	19	0.20%	19	1.68%	124	110	0.49%	110	0.03%	214	200	0.28%	200	0.00%	303	289	0.18%	289	0.00%
34	20	0.20%	20	2.04%	125	111	0.45%	111	0.03%	215	201	0.28%	201	0.00%	304	290	0.18%	290	0.00%
35	21	0.20%	21	2.48%	126	112	0.45%	112	0.03%	216	202	0.28%	202	0.00%	305	291	0.18%	291	0.00%
36	22	0.20%	22	1.59%	127	113	0.45%	113	0.03%	217	203	0.28%	203	0.00%	306	292	0.15%	292	0.00%
37	23	0.25%	23	1.89%	128	114	0.45%	114	0.03%	218	204	0.28%	204	0.00%	307	293	0.15%	293	0.00%
38	24	0.25%	24	2.08%	129	115	0.54%	115	0.03%	219	205	0.25%	205	0.00%	308	294	0.15%	294	0.00%
39	25	0.25%	25	3.10%	130	116	0.54%	116	0.02%	220	206	0.25%	206	0.00%	309	295	0.15%	295	0.00%
40	26	0.25%	26	2.08%	131	117	0.54%	117	0.02%	221	207	0.25%	207	0.00%	310	296	0.15%	296	0.00%
41	27	0.26%	27	2.53%	132	118	0.54%	118	0.02%	222	208	0.25%	208	0.00%	311	297	0.15%	297	0.00%
42	28	0.26%	28	3.07%	133	119	0.53%	119	0.02%	223	209	0.25%	209	0.00%	312	298	0.15%	298	0.00%
43	29	0.26%	29	1.67%	134	120	0.53%	120	0.02%	224	210	0.25%	210	0.00%	313	299	0.15%	299	0.00%
44	30	0.26%	30	1.83%	135	121	0.53%	121	0.02%	225	211	0.25%	211	0.00%	314	300	0.15%	300	0.00%
45	31	0.26%	31	1.97%	136	122	0.53%	122	0.02%	226	212	0.25%	212	0.00%	315	301	0.15%	301	0.00%
46	32	0.21%	32	2.93%	137	123	0.53%	123	0.02%	227	213	0.25%	213	0.00%	316	302	0.15%	302	0.00%
47	33	0.26%	33	1.96%	138	124	0.44%	124	0.02%	228	214	0.25%	214	0.00%	317	303	0.15%	303	0.00%
48	34	0.27%	34	2.39%	139	125	0.55%	125	0.02%	229	215	0.25%	215	0.00%	318	304	0.15%	304	0.00%
49	35	0.18%	35	2.91%	140	126	0.26%	126	0.02%	230	216	0.25%	216	0.00%	319	305	0.15%	305	0.00%
50	36	0.23%	36	1.72%	141	127	0.69%	127	0.02%	231	217	0.25%	217	0.00%	320	306	0.15%	306	0.00%
51	37	0.27%	37	1.84%	142	128	0.45%	128	0.02%	232	218	0.25%	218	0.00%	321	307	0.15%	307	0.00%
52	38	0.33%	38	1.94%	143	129	0.54%	129	0.01%	233	219	0.25%	219	0.00%	322	308	0.15%	308	0.00%
53	39	0.41%	39	2.85%	144	130	0.32%	130	0.01%	234	220	0.25%	220	0.00%	323	309	0.15%	309	0.00%
54	40	0.25%	40	1.90%	145	131	0.32%	131	0.01%	235	221	0.22%	221	0.00%	324	310	0.15%	310	0.00%
55	41	0.25%	41	2.31%	146	132	0.75%	132	0.01%	236	222	0.22%	222	0.00%	325	311	0.15%	311	0.00%
56	42	0.31%	42	2.81%	147	133	0.44%	133	0.01%	237	223	0.22%	223	0.00%	326	312	0.15%	312	0.00%
57	43	0.31%	43	1.82%	148	134	0.44%	134	0.01%	238	224	0.22%	224	0.00%	327	313	0.15%	313	0.00%
58	44	0.26%	44	2.01%	149	135	0.52%	135	0.01%	239	225	0.22%	225	0.00%	328	314	0.15%	314	0.00%
59	45	0.26%	45	2.11%	150	136	0.52%	136	0.01%	240	226	0.22%	226	0.00%	329	315	0.15%	315	0.00%
60	46	0.26%	46	3.07%	151	137	0.40%	137	0.01%	241	227	0.22%	227	0.00%	330	316	0.15%	316	0.00%
61	47	0.32%	47	2.02%	152	138	0.40%	138	0.01%	242	228	0.22%	228	0.00%	331	317	0.15%	317	0.00%
62	48	0.32%	48	2.44%	153	139	0.40%	139	0.01%	243	229	0.22%	229	0.00%	332	318	0.15%	318	0.00%
63	49	0.32%	49	2.95%	154	140	0.47%	140	0.01%	244	230	0.22%	230	0.00%	333	319	0.15%	319	0.00%
64	50	0.40%	50	1.81%	155	141	0.47%	141	0.01%	245	231	0.22%	231	0.00%	334	320	0.15%	320	0.00%
65	51	0.40%	51	0.93%	156	142	0.47%	142	0.01%	246	232	0.22%	232	0.00%	335	321	0.15%	321	0.00%
66	52	0.40%	52	1.24%	157	143	0.41%	143	0.01%	247	233	0.22%	233	0.00%	336	322	0.15%	322	0.00%
67	53	0.38%	53	0.47%	158	144	0.41%	144	0.01%	248	234	0.22%	234	0.00%	337	323	0.15%	323	0.00%
68	54	0.38%	54	0.50%	159	145	0.41%	145	0.01%	249	235	0.22%	235	0.00%	338	324	0.15%	324	0.00%
69	55	0.38%	55	0.52%	160	146	0.41%	146	0.01%	250	236	0.22%	236	0.00%	339	325	0.15%	325	0.00%
70	56	0.38%	56	0.54%	161	147	0.46%	147	0.01%	251	237	0.22%	237	0.00%	340	326	0.14%	326	0.00%
71	57	0.38%	57	0.55%	162	148	0.46%	148	0.01%	252	238	0.22%	238	0.00%	341	327	0.12%	327	0.00%
72	58	0.38%	58	0.56%	163	149	0.46%	149	0.01%	253	239	0.22%	239	0.00%	342	328	0.12%	328	0.00%
73	59	0.38%	59	0.28%	164	150	0.46%	150	0.01%	254	240	0.22%	240	0.00%	343	329	0.12%	329	0.00%
74	60	0.38%	60	0.28%	165	151	0.35%	151	0.01%	255	241	0.20%	241	0.00%	344	330	0.12%	330	0.00%

	AP	AQ	BG	BH		AP	AQ	BG	BH		AP	AQ	BG	BH		AP	AQ	BG	BH
10	Return Flow Schedule Lookup Tables					Return Flow Schedule Lookup Tables					Return Flow Schedule Lookup Tables					Return Flow Schedule Lookup Tables			
11	Irrigation Return Flow		Alluvial Return Flow			Irrigation Return Flow		Alluvial Return Flow			Irrigation Return Flow		Alluvial Return Flow			Irrigation Return Flow		Alluvial Return Flow	
12	Intermediate Values		Intermediate Values			Intermediate Values		Intermediate Values			Intermediate Values		Intermediate Values			Intermediate Values		Intermediate Values	
13	Day	Incremental %Return	Day	Incremental %Return		Day	Incremental %Return	Day	Incremental %Return		Day	Incremental %Return	Day	Incremental %Return		Day	Incremental %Return	Day	Incremental %Return
75	61	0.38%	61	0.26%	166	152	0.35%	152	0.01%	256	242	0.20%	242	0.00%	345	331	0.12%	331	0.00%
76	62	0.31%	62	0.26%	167	153	0.35%	153	0.01%	257	243	0.20%	243	0.00%	346	332	0.12%	332	0.00%
77	63	0.39%	63	0.18%	168	154	0.35%	154	0.01%	258	244	0.20%	244	0.00%	347	333	0.12%	333	0.00%
78	64	0.42%	64	0.18%	169	155	0.35%	155	0.01%	259	245	0.20%	245	0.00%	348	334	0.12%	334	0.00%
79	65	0.27%	65	0.18%	170	156	0.35%	156	0.01%	260	246	0.20%	246	0.00%	349	335	0.12%	335	0.00%
80	66	0.34%	66	0.18%	171	157	0.39%	157	0.01%	261	247	0.20%	247	0.00%	350	336	0.12%	336	0.00%
81	67	0.40%	67	0.18%	172	158	0.39%	158	0.01%	262	248	0.20%	248	0.00%	351	337	0.12%	337	0.00%
82	68	0.48%	68	0.18%	173	159	0.39%	159	0.01%	263	249	0.20%	249	0.00%	352	338	0.12%	338	0.00%
83	69	0.29%	69	0.13%	174	160	0.39%	160	0.01%	264	250	0.20%	250	0.00%	353	339	0.12%	339	0.00%
84	70	0.29%	70	0.13%	175	161	0.39%	161	0.01%	265	251	0.20%	251	0.00%	354	340	0.12%	340	0.00%
85	71	0.35%	71	0.13%	176	162	0.39%	162	0.01%	266	252	0.20%	252	0.00%	355	341	0.12%	341	0.00%
86	72	0.35%	72	0.13%	177	163	0.33%	163	0.01%	267	253	0.20%	253	0.00%	356	342	0.12%	342	0.00%
87	73	0.43%	73	0.13%	178	164	0.33%	164	0.00%	268	254	0.20%	254	0.00%	357	343	0.12%	343	0.00%
88	74	0.43%	74	0.13%	179	165	0.33%	165	0.00%	269	255	0.20%	255	0.00%	358	344	0.12%	344	0.00%
89	75	0.52%	75	0.13%	180	166	0.33%	166	0.00%	270	256	0.20%	256	0.00%	359	345	0.12%	345	0.00%
90	76	0.52%	76	0.13%	181	167	0.33%	167	0.00%	271	257	0.20%	257	0.00%	360	346	0.12%	346	0.00%
91	77	0.43%	77	0.10%	182	168	0.33%	168	0.00%	272	258	0.20%	258	0.00%	361	347	0.12%	347	0.00%
92	78	0.43%	78	0.10%	183	169	0.33%	169	0.00%	273	259	0.20%	259	0.00%	362	348	0.12%	348	0.00%
93	79	0.43%	79	0.10%	184	170	0.33%	170	0.00%	274	260	0.20%	260	0.00%	363	349	0.12%	349	0.00%
94	80	0.39%	80	0.10%	185	171	0.33%	171	0.00%	275	261	0.20%	261	0.00%	364	350	0.12%	350	0.00%
95	81	0.39%	81	0.10%	186	172	0.33%	172	0.00%	276	262	0.20%	262	0.00%	365	351	0.12%	351	0.00%
96	82	0.39%	82	0.06%	187	173	0.33%	173	0.00%	277	263	0.20%	263	0.00%	366	352	0.12%	352	0.00%
97	83	0.39%	83	0.06%	188	174	0.33%	174	0.00%	278	264	0.18%	264	0.00%	367	353	0.12%	353	0.00%
98	84	0.47%	84	0.06%	189	175	0.33%	175	0.00%	279	265	0.18%	265	0.00%	368	354	0.12%	354	0.00%
99	85	0.47%	85	0.06%	190	176	0.33%	176	0.00%	280	266	0.18%	266	0.00%	369	355	0.12%	355	0.00%
100	86	0.47%	86	0.06%	191	177	0.33%	177	0.00%	281	267	0.18%	267	0.00%	370	356	0.12%	356	0.00%
101	87	0.47%	87	0.06%	192	178	0.33%	178	0.00%	282	268	0.18%	268	0.00%	371	357	0.12%	357	0.00%
102	88	0.46%	88	0.06%	193	179	0.33%	179	0.00%	283	269	0.18%	269	0.00%	372	358	0.12%	358	0.00%
103	89	0.46%	89	0.06%	194	180	0.27%	180	0.00%						373	359	0.12%	359	0.00%
104	90	0.46%	90	0.06%											374	360	0.12%	360	0.00%
															375	361	0.01%	361	0.00%
															376	362	0.00%	362	0.00%
															377	363	0.00%	363	0.00%
															378	364	0.00%	364	0.00%
															379	365	0.00%	365	0.00%

Assumptions:
All Lund and Darling Ditches share same priority dates
Seepage d/s of Ensign appears in Yakima immediately

River/Crk: **Big Creek**
Owner: Gentry
Priority Date: 6/30/1887
Begin Irr: May
End Irr: Sept
Net CU May-Sept: 18.73 in

	Acres	Qa (ac-ft)	Irr Eff	Area/Eff
Lund Ditch Non-TW Rights:	207.49	1025.7	0.385	538.93506
Darling Ditch Rights:	78.5	376.8	0.385	203.8961
Gentry Trendwest Rights:	81.51	390	0.385	211.71429
Ensign Ranch Rights:	85	408	0.385	220.77922

Annual Irrigation and Seepage Sums for use in Schedule Lookups

	Tot Irr	Pre Seep	Post Seep	
1991	168.69533	913.96054	925.52686	cfs*days
1992	178.05688	660.62601	695.13061	cfs*days
1993	163.85971	760.39383	772.26828	cfs*days
1994	177.06432	710.67801	761.58582	cfs*days
1995	148.97433	766.89054	775.72985	cfs*days
2001	90.176469	590.63219	594.56094	cfs*days

						Senior Diversions		Pre Trendwest Action Q Calcs					Post Trendwest Action Q Calcs					Change in Yakima River Flow				
	Irr Yr	MonYY	Date	Withdrawl Period (1=Yes, 0=No)	Net CU	Q Natural	SumQ div Non-TW Rights	SumQ div Trendwest-Gentry Right	Q Remaining	Q lost to seepage	Q @ Ensign Ranch	Q Alluvial	Q Irrigation Return TW	Q Remaining	Q lost to seepage	Q @ Ensign Ranch	Q Alluvial	Q Irrigation Return TW	DQ @ Yakima (Surface Inputs)	DQ @ Yakima (Alluvial Inputs)	DQ @ Yakima (Irrigation Return)	DQ @ Yakima Total	Change in Daily CU
					(in/day)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
312	1991	Jul-91	26-Jul-1991	1	0.18	26.79	5.47	1.56	19.76	4.33	15.43	1.21	0.37	21.32	4.40	16.92	1.23	0.00	1.49	0.02	-0.37	1.14	0.60
313	1991	Jul-91	27-Jul-1991	1	0.18	25.12	5.47	1.56	18.09	4.26	13.83	1.17	0.45	19.65	4.33	15.32	1.18	0.00	1.49	0.01	-0.45	1.06	0.60
314	1991	Jul-91	28-Jul-1991	1	0.18	23.75	5.47	1.56	16.72	4.20	12.51	1.17	0.45	18.28	4.27	14.01	1.18	0.00	1.49	0.01	-0.45	1.06	0.60
315	1991	Jul-91	29-Jul-1991	1	0.18	22.86	5.47	1.56	15.84	4.17	11.67	1.17	0.54	17.39	4.23	13.16	1.18	0.00	1.49	0.01	-0.54	0.97	0.60
316	1991	Jul-91	30-Jul-1991	1	0.18	22.06	5.47	1.56	15.03	4.14	10.90	1.17	0.54	16.59	4.20	12.39	1.18	0.00	1.49	0.01	-0.54	0.97	0.60
317	1991	Jul-91	31-Jul-1991	1	0.18	21.09	5.47	1.56	14.06	4.10	9.97	0.89	0.44	15.62	4.16	11.46	0.90	0.00	1.50	0.01	-0.44	1.06	0.60
318	1991	Aug-91	1-Aug-1991	1	0.19	20.91	5.90	1.68	13.33	4.07	9.27	0.89	0.44	15.01	4.13	10.88	0.90	0.00	1.61	0.01	-0.44	1.18	0.65
319	1991	Aug-91	2-Aug-1991	1	0.19	19.99	5.90	1.68	12.41	4.03	8.38	0.89	0.44	14.09	4.10	9.99	0.90	0.00	1.61	0.01	-0.44	1.18	0.65
320	1991	Aug-91	3-Aug-1991	1	0.19	19.24	5.90	1.68	11.66	4.00	7.66	0.89	0.41	13.34	4.07	9.27	0.90	0.00	1.61	0.01	-0.41	1.22	0.65
321	1991	Aug-91	4-Aug-1991	1	0.19	18.85	5.90	1.68	11.28	3.98	7.29	0.89	0.41	12.96	4.05	8.91	0.90	0.00	1.61	0.01	-0.41	1.22	0.65
322	1991	Aug-91	5-Aug-1991	1	0.19	18.71	5.90	1.68	11.14	3.98	7.16	0.59	0.41	12.82	4.05	8.77	0.60	0.00	1.61	0.01	-0.41	1.22	0.65
323	1991	Aug-91	6-Aug-1991	1	0.19	26.58	5.90	1.68	19.01	4.30	14.71	0.59	0.41	20.69	4.37	16.31	0.60	0.00	1.61	0.01	-0.41	1.21	0.65
324	1991	Aug-91	7-Aug-1991	1	0.19	36.73	5.90	1.68	29.15	4.76	24.40	0.59	0.49	30.83	4.84	26.00	0.60	0.00	1.60	0.01	-0.49	1.12	0.65

A = YEAR
B = MONTH/YEAR
C = DATE
D = PERIOD OF USE
E = NET CONSUMPTIVE USE
F = NATURAL STREAMFLOW
G = SUM OF NON-TRENDWEST SENIOR WATER DIVERSIONS
H = TRENDWEST DIVERSION
J = PRE-TRANSFER STREAMFLOW D/S OF DIVERSION DAM
K = PRE-TRANSFER SEEPAGE TO ALLUVIAL AQUIFER D/S TO ENSIGN DIV.
L = PRE-TRANSFER STREAMFLOW AT ENSIGN DIVERSION
M = PRE-TRANSFER LAGGED SEEPAGE DISCHARGE AT MOUTH
N = PRE-TRANSFER LAGGED IRRIGATION RETURN FLOW TO YAKIMA RIVER
P = POST-TRANSFER STREAMFLOW D/S OF DIVERSION DAM
Q = POST-TRANSFER SEEPAGE TO ALLUVIAL AQUIFER D/S TO ENSIGN DIV.
R = POST-TRANSFER STREAMFLOW AT ENSIGN DIVERSION
S = POST-TRANSFER LAGGED SEEPAGE DISCHARGE AT MOUTH
T = POST-TRANSFER LAGGED IRRIGATION RETURN FLOW TO YAKIMA RIVER
V = CHANGE IN STREAMFLOW AT MOUTH
W = CHANGE IN SEEPAGE DISCHARGE AT MOUTH
X = CHANGE IN IRRIGATION RETURN FLOW TO YAKIMA RIVER
Y = TOTAL CHANGE IN DISCHARGE TO YAKIMA RIVER
Z = CONSUMPTIVE USE PORTION OF TOTAL CHANGE

Blanney-Criddle Net CU using mean monthly temperature and precipitation data (inches/day).
From Regression Equation and Teanaway River Data (cfs)
SUM($T$3:$T$4)/SUM($T$3:$T$5)*MIN($D338*$F338,$E338*(1/12)*SUM($T$3:$T$5)*43560/86400)
$T$5/SUM($T$3:$T$5)*MIN($D338*$F338,$E338*(1/12)*SUM($T$3:$T$5)*43560/86400)
F338-SUM(G338:H338)
MIN(J338,3.5635*EXP(0.0099*$J338),27)
J338-K338
VLOOKUP($C338-DATE($A338,5,15),$BG$14:$BH$379,2,FALSE)*IF($A338=1990,AVERAGE($X$3:$X$8),IF($A338=2000,AVERAGE($X$3:$X$8),VLOOKUP($A338,$V$3:$Y$8,3,FALSE)))
VLOOKUP($C338-DATE($A338,5,15),$AP$14:$AQ$379,2,FALSE)*IF($A338=1990,AVERAGE($W$3:$W$8),IF($A338=2000,AVERAGE($W$3:$W$8),VLOOKUP($A338,$V$3:$W$8,2,FALSE)))*(1-$S$5)
F338-G338
MIN($P338,3.5635*EXP(0.0099*$P338),27)
P338-Q338
VLOOKUP($C338-DATE($A338,5,15),$BG$14:$BH$379,2,FALSE)*IF($A338=1990,AVERAGE($Y$3:$Y$8),IF($A338=2000,AVERAGE($Y$3:$Y$8),VLOOKUP($A338,$V$3:$Y$8,4,FALSE)))
0.00 No irrigation -- no return flow
R338-L338
S338-M338
T338-N338
SUM(V338:X338)
H338*$S$5

	A	B	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	***WATER BALANCE MODEL FOR MOUNTAINSTAR RESORT***																												
2																													
3			**On Site Demands and Returns**						**Flow Increase Associated With Acquired Water Rights**							**CU Balance**				**Water Balance**			**Change in Yakima River Under Alternative 5 Reduced Density**						
4	Mon YY	Date	On Site Diversion Demand (cfs)	WW Return to Yakima (cfs)	Irrigation Return to Yakima (cfs)	Irrigation Return to Cle Elum (cfs)	**Net On Site Water Requirement (cfs)**		Big Creek (cfs)	Teanaway River (cfs)	First + Swauk Creek (cfs)	Reecer Creek (cfs)	Main Stem Rights (cfs)	**Net Water Rights Available (cfs)**		**Net CU Available from WR's (cfs)**	% On Site CU Demand Met	Change in Daily CU (cfs)		% On Site Demand Met by Acquired Water Rights	Δ Flow in Yakima River D/S Ellensburg (cfs)		D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
303	Jul-91	26-Jul-1991	8.32	1.95	0.17	0.42	5.78		1.14	2.05	3.12	-0.67	2.56	8.19		7.26	100%	1.48		100%	2.41		1.14	1.72	-4.65	-2.60	0.52	3.08	2.41
304	Jul-91	27-Jul-1991	8.32	1.95	0.17	0.42	5.78		1.06	2.05	2.70	-0.67	2.56	7.70		6.91	100%	1.12		100%	1.91		1.06	1.64	-4.72	-2.68	0.03	2.58	1.91
305	Jul-91	28-Jul-1991	8.32	1.95	0.17	0.42	5.78		1.06	2.05	2.10	-0.67	2.56	7.10		6.63	100%	0.84		100%	1.32		1.06	1.64	-4.72	-2.67	-0.57	1.99	1.32
306	Jul-91	29-Jul-1991	8.32	1.95	0.17	0.42	5.78		0.97	2.05	1.86	-0.67	2.56	6.76		6.45	100%	0.67		100%	0.97		0.97	1.55	-4.82	-2.77	-0.91	1.64	0.97
307	Jul-91	30-Jul-1991	8.32	1.95	0.17	0.42	5.78		0.97	2.05	1.77	-0.67	2.56	6.67		6.39	100%	0.61		100%	0.89		0.97	1.55	-4.82	-2.77	-1.00	1.56	0.89
308	Jul-91	31-Jul-1991	8.32	1.95	0.17	0.42	5.78		1.06	1.47	1.71	-0.67	2.56	6.13		6.33	100%	0.54		100%	0.35		1.06	1.65	-4.72	-3.25	-1.54	1.02	0.35
309	Aug-91	1-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.18	1.65	1.60	-0.67	2.36	6.12		6.24	100%	1.88		100%	1.76		1.18	1.77	-3.18	-1.53	0.07	2.43	1.76
310	Aug-91	2-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.18	1.65	1.53	-0.67	2.36	6.06		6.18	100%	1.82		100%	1.69		1.18	1.77	-3.18	-1.53	0.00	2.36	1.69
311	Aug-91	3-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.22	1.65	-0.35	-0.67	2.36	4.21		6.12	100%	1.76		97%	-0.15		1.22	1.81	-3.15	-1.49	-1.84	0.52	-0.15
312	Aug-91	4-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.22	1.65	0.32	-0.67	2.36	4.88		6.09	100%	1.72		100%	0.52		1.22	1.81	-3.15	-1.49	-1.17	1.19	0.52
313	Aug-91	5-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.22	1.65	0.30	-0.67	2.36	4.86		6.08	100%	1.71		100%	0.50		1.22	1.81	-3.15	-1.50	-1.19	1.17	0.50
314	Aug-91	6-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.21	1.65	2.86	-0.67	2.36	7.41		7.09	100%	2.72		100%	3.05		1.21	1.80	-3.16	-1.50	1.36	3.72	3.05
315	Aug-91	7-Aug-1991	6.87	1.92	0.17	0.42	4.37		1.12	1.65	3.78	-0.67	2.36	8.23		7.81	100%	3.44		100%	3.87		1.12	1.71	-3.25	-1.60	2.18	4.54	3.87

On Site Demands and Returns:
G = Trendwest Diversion
H = Wastewater Return to Yakima River
I = Trendwest Return to Yakima River
J = Trendwest Return to Cle Elum River
K = Trendwest Net Daily Consumptive Use

From Trendwest: Mean Monthly Diversion for 30-year Buildout, 100 percent Occupancy
From Trendwest: Mean Monthly Wastewater Return for 30-year Buildout, 100 percent Occupancy
From Trendwest: Mean Monthly Yakima River Return for 30-year Buildout, 100 percent Occupancy
From Trendwest: Mean Monthly Cle Elum River Return for 30-year Buildout, 100 percent Occupancy
G303-SUM(H303:J303)

Flow Increase Associated with Trendwest Rights:
M = Mainstem Flow Change Associated With Big Creek Water Rights
N = Mainstem River Flow Change Associated With Teanaway Water Rights
O = Mainstem Flow Change Associated With Swauk/First Ck Water Rights
P = Mainstem Flow Change Associated With First/Reecer Creek Water Rights
Q = Mainstem Flow Change Associated With Pautzke Water Rights
R = Net Water Rights Available from Trendwest-Acquired Rights

'[TWmodel12d2.xls]Big Ck'!Y312
[TWmodel12d2.xls]Teanaway River'!AQ312
[TWmodel12d2.xls]Swauk Ck'!R312+'[TWmodel12d2.xls]First Ck'!R312
[TWmodel12d2.xls]Reecer Ck'!V312
VLOOKUP(IF(MONTH(B303)=10,IF(DAY(B303)<=15,"10_1","10_2"),MONTH(B303)),[TWmodel12d2.xls]Main Stem'!$B$11:$G$23,6,FALSE)
SUM(M303:Q303)

Consumptive Use Balance:
T = Net Available Consumptive Use from Trendwest Water Rights
U = Percent of On-Site Net Consumptive Use Demand Met
V = Change in Daily Net Consumptive Use in Basin

[TWmodel12d2.xls]Big Ck'!Z312+'[TWmodel12d2.xls]Teanaway River'!AR312+'[TWmodel12d2.xls]First Ck'!S312+'[TWmodel12d2.xls]Swauk Ck'!S312+Q303
IF(K303<0,1,MIN(1,T303/K303))
T303-K303

Water Balance:
X = Percent On-Site Net Consumptive Use Demand Met w/lag
Y = Change in Yakima River Flow d/s of Ellensburg

IF(R303<0,0,MIN(1,R303/K303))
R303-K303

Change In Yakima River Under Alternative 5 Reduced Density
AA = Change in Yakima River Flow d/s of Big Creek
AB = Change in Yakima River Flow d/s of Cle Elum River
AC = Change in Yakima River Flow d/s of Cle Elum Diversion
AD = Change in Yakima River Flow d/s of Teanaway River
AE = Change in Yakima River Flow d/s of Swauk Creek
AF = Change in Yakima River Flow d/s of Mill Ditch Diversion
AG = Change in Yakima River Flow d/s of Reecer Creek

M303
AA303+SUM(I303:J303)
AB303-G303+H303
AC303+N303
AD303+O303
AE303+Q303
AF303+P303

Exhibit E

PRELIMINARY WATER REQUIREMENTS AT BUILDOUT (100% OCCUPANCY ANALYSIS)
Reduced Density Plan - MPR - Year 30

11-Sep-01

Element	Oct. 1-15	Oct. 16-31	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun 1-12	Jun 13 -30	Jul	Aug	Sep	Total
Diversion Demands (Ac-Ft)															
Treated Non-Irrigation	55.0	58.7	109.3	112.9	112.8	101.9	112.9	109.9	114.5	44.2	66.3	113.4	113.9	110.2	1,335.8
Treated Irrigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8	17.7	58.2	43.0	31.3	162.0
Untreated Irrigation	8.6	9.2	0.0	0.0	0.0	0.0	0.0	12.9	32.9	60.2	90.3	236.3	176.4	122.5	749.4
Misc. Uses & Losses	6.9	7.4	12.5	12.5	12.5	12.5	12.5	13.8	15.8	11.0	16.5	36.1	30.1	24.7	224.7
Total Diversion	70.5	75.2	121.8	125.4	125.2	114.4	125.4	136.6	163.3	127.2	190.8	444.0	363.3	288.7	2,471.9
Return Flows (Ac-Ft)															
Wastewater Flows (w/o I/I)	45.2	48.2	89.9	91.1	92.8	83.8	92.9	90.4	94.2	36.6	54.9	94.5	92.3	91.3	1,098.2
Treated Irrigation*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	6.0	19.8	14.6	10.7	55.2
Untreated Irrigation*	1.5	1.6	0.0	0.0	0.0	0.0	0.0	2.0	4.1	9.5	14.2	37.7	27.9	20.2	118.8
Misc. Uses & System Losses**	6.7	7.1	12.1	12.1	12.1	12.1	12.1	13.4	15.3	10.7	16.0	35.0	29.2	24.0	218.0
Total Return	53.4	57.0	102.0	103.2	104.9	95.9	105.0	105.8	113.6	60.8	91.2	187.1	164.0	146.2	1,490.1
Net Water Requirement (Diversion Less Return Flows)	17.1	18.2	19.7	22.2	20.4	18.4	20.4	30.8	49.7	66.4	99.6	256.9	199.3	142.6	981.7
Peak Instantaneous Demands (cfs)															
Treated	3.0	3.0	2.9	3.0	3.0	2.7	3.0	2.9	3.0	3.7	3.7	4.4	4.0	3.8	
Untreated	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.6	2.8	2.8	4.2	3.2	2.3	
Total Normal Peak	3.3	3.3	2.9	3.0	3.0	2.7	3.0	3.1	3.6	6.5	6.5	8.6	7.2	6.0	
Untreated Emergency Storage Makeup	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Total Normal + Makeup Peak	4.1	4.1	2.9	3.0	3.0	2.7	3.0	4.0	4.4	7.4	7.4	9.5	8.0	6.9	

* From irrigation application inefficiency.

** From irrigation application inefficiency, and system maintenance requirements and system leakage.

Notes:

1. Miscellaneous uses and losses calculated as follows: Monthly demand = (Total annual treated demand * 10%)/12 months + 10% * Untreated irrigation demand for the month.
2. Peak Instantaneous flow for treated water = (1.5 * maximum month treated water demand) + (misc. uses and losses)
3. Peak instantaneous flow for untreated water = (average demand for month) + (misc. uses and losses)
4. Untreated storage makeup for maximum month golf course emergency storage (207.6 acre-feet) = (maximum month daily demand)* 25% (makeup of 7 days emergency storage in 28 days)
5. Does not include RV campground:

Total Annual Diversion =	0.0
Total Annual Return =	0.0
Net Water Requirement =	0.0

PRELIMINARY WATER REQUIREMENTS AT BUILDOUT (100% OCCUPANCY ANALYSIS)

Alternative 5 UGA and Reduced Density MPR - Year 30

8-Nov-01

Element	Oct. 1- 15	Oct. 15 -31	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun 1 - 12	Jun 13 -30	Jul	Aug	Sep	Total
Diversion Demands (Ac-Ft)															
Treated Non-Irrigation	69.7	74.4	138.8	143.4	143.2	129.4	143.4	139.4	145.0	56.0	84.0	143.8	144.3	139.7	1,694.5
Treated Irrigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0	25.4	83.5	61.7	45.0	232.6
Untreated Irrigation	8.6	9.2	0.0	0.0	0.0	0.0	0.0	13.7	36.0	62.3	93.4	243.7	182.4	125.4	774.6
Misc. Uses & Losses	8.6	9.2	16.1	16.1	16.1	16.1	16.1	17.4	19.7	12.7	19.0	40.4	34.3	28.6	270.2
Total Diversion	86.9	92.7	154.8	159.5	159.3	145.5	159.4	170.6	200.7	147.9	221.8	511.5	422.7	338.7	2,971.9
Return Flows (Ac-Ft)															
Wastewater Flows (w/o I/I)	57.6	61.4	114.7	116.6	118.4	106.9	118.4	115.2	119.8	46.5	69.7	120.1	117.8	116.1	1,399.2
Treated Irrigation*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	8.7	28.7	21.2	15.4	79.9
Untreated Irrigation*	1.5	1.6	0.0	0.0	0.0	0.0	0.0	2.0	4.1	9.6	14.4	38.1	28.2	20.4	119.8
Misc. Uses & System Losses**	8.4	8.9	15.6	15.6	15.6	15.6	15.6	16.9	19.1	12.3	18.4	39.2	33.3	27.7	262.1
Total Return	67.5	72.0	130.3	132.2	133.9	122.5	134.0	134.1	142.9	74.2	111.2	226.1	200.5	179.6	1,861.0
Net Water Requirement (Diversion Less Return Flows)	19.5	20.8	24.6	27.3	25.4	23.0	25.4	36.4	57.7	73.7	110.6	285.4	222.2	159.1	1,110.9
Peak Instantaneous Demands (cfs)															
Treated	3.8	3.8	3.6	3.8	3.8	3.4	3.8	3.7	3.8	4.9	4.9	5.8	5.3	4.9	
Untreated	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.6	2.9	2.8	4.4	3.3	2.3	
Total Normal Peak	4.1	4.1	3.6	3.8	3.8	3.4	3.8	3.9	4.4	7.7	7.7	10.2	8.5	7.2	
Untreated Emergency Storage Makeup	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Total Normal + Makeup Peak	4.9	4.9	3.6	3.8	3.8	3.4	3.8	4.8	5.3	8.6	8.6	11.0	9.4	8.1	

* From irrigation application inefficiency.
** From irrigation application inefficiency, and system maintenance requirements and system leakage.

Notes

1. Miscellaneous uses and losses calculated as follows: Monthly demand = (Total annual treated demand * 10%)/12 months + 10% * Untreated irrigation demand for the month.
2. Peak instantaneous flow for treated water = (1.5 * maximum month treated water demand) + (misc. uses and losses)
3. Peak instantaneous flow for untreated water = (average demand for month) + (misc. uses and losses)
4. Untreated storage makeup for maximum month golf course emergency storage (207.6 acre-feet) = (maximum month daily demand)* 25% (makeup of 7 days emergency storage in 26 days)
5. Does not include RV campground:

Total Annual Diversion =	0.0
Total Annual Return =	0.0
Net Water Requirement =	0.0

PRELIMINARY WATER REQUIREMENTS AT BUILDOUT (100% OCCUPANCY ANALYSIS)

Alternative 5 - UGA - Year 30

8-Nov-01

Element	Oct. 1- 15	Oct. 15 -31	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun 1 - 12	Jun 13 -30	Jul	Aug	Sep	Total
Diversion Demands (Ac-Ft)															
Treated Non-Irrigation	14.7	15.7	29.5	30.5	30.5	27.5	30.5	29.5	30.5	11.8	17.7	30.5	30.5	29.5	358.7
Treated Irrigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	7.7	25.4	18.7	13.7	70.6
Untreated Irrigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.1	2.1	3.1	7.4	6.0	2.9	25.3
Misc. Uses & Losses	1.7	1.8	3.6	3.6	3.6	3.6	3.6	3.7	3.9	1.6	2.5	4.3	4.2	3.9	45.5
Total Diversion	16.5	17.6	33.1	34.0	34.0	31.1	34.0	33.9	37.4	20.6	31.0	67.5	59.3	50.0	500.1
Return Flows (Ac-Ft)															
Wastewater Flows (w/o I/I)	12.4	13.2	24.7	25.6	25.6	23.1	25.6	24.7	25.6	9.9	14.8	25.6	25.6	24.7	301.1
Treated Irrigation*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	2.7	8.9	6.6	4.8	24.7
Untreated Irrigation*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.3	0.2	1.0
Misc. Uses & System Losses**	1.7	1.8	3.5	3.5	3.5	3.5	3.5	3.5	3.8	1.6	2.4	4.2	4.0	3.8	44.1
Total Return	14.1	15.0	28.2	29.0	29.0	26.6	29.0	28.3	29.3	13.4	20.0	39.0	36.4	33.5	370.9
Net Water Requirement (Diversion Less Return Flows)	2.4	2.6	4.8	5.0	5.0	4.5	5.0	5.6	8.1	7.3	10.9	28.5	22.9	16.5	129.2
Peak Instantaneous Demands (cfs)															
Treated	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	1.1	1.1	1.4	1.3	1.1	
Untreated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	
Total Normal Peak	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9	1.2	1.2	1.6	1.4	1.2	
Untreated Emergency Storage Makeup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Normal + Makeup Peak	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9	1.2	1.2	1.6	1.4	1.2	

* From irrigation application inefficiency.
** From irrigation application inefficiency, and system maintenance requirements and system leakage.

Notes

1. Miscellaneous uses and losses calculated as follows: Monthly demand = (Total annual treated demand * 10%)/12 months + 10% * Untreated irrigation demand for the month.
2. Peak Instantaneous flow for treated water = (1.5 * maximum month treated water demand) + (misc. uses and losses)
3. Peak instantaneous flow for untreated water = (average demand for month) + (misc. uses and losses)
4. This analysis does not include the public demands (School expansion, community center, cemetery expansion, or business park)
5. This analysis does not include the 175 acre Reserve Area

Exhibit F

Associated Earth Sciences, Inc.

Technical Memorandum

Date	December 12, 2001		
To:	Andy Kindig A.C. Kindig & Co. Tom Martin Brown & Caldwell	**From:**	Otto Paris
Project Name:	MountainStar/UGA	**Project No:**	KH00748C
Subject:	On-Site Ground Water Return Flows from Irrigation MountainStar MPR and Cle Elum UGA		

This technical memorandum summarizes the results of Associated Earth Sciences, Inc.'s (AESI's) analysis of the timing of on-site irrigation return flows for the MountainStar Master Planned Resort (MPR) and the Cle Elum Urban Growth Area (UGA) for ground water discharge to the Yakima and Cle Elum Rivers. A brief description of the methodology used to calculate the timing and volume of the ground water return flows is also included in this document.

The objectives of AESI's analysis were to (1) estimate the time of travel for assumed irrigation return flows from proposed MPR/UGA development scenarios to be conveyed from the land surface to the Cle Elum and Yakima Rivers, and (2) to estimate the monthly volume of on-site return flow volumes reaching the rivers for the new hydraulic equilibrium conditions resulting from full buildout of the two projects. The resulting "lagged" return flows for the various development scenarios were incorporated into the existing water balance model for the upper Yakima River Basin. The water balance model will be used to evaluate potential impacts to stream flows due to the proposed transfers of surface water rights acquired by Trendwest Resorts (Trendwest). In addition, we completed estimates of the lagged irrigation return flow volumes for several time increments during buildout of the MPR and UGA development projects to ensure there were no time periods during construction when the total water demands (diversion minus return flows reaching the Cle Elum River and/or Yakima River) would exceed the total water rights available for consumptive use.

Two cumulative impact scenarios were used in the return flow analysis. The higher density scenario incorporated return flows estimated for the MPR as proposed in the Kittitas County development permit combined with Alternative 2 for the UGA. The lower density scenario incorporated return flows estimated for the reduced density MPR proposal combined with UGA Alternative 5. The following sections summarize (1) AESI's approach for calculating the timing of the estimated lagged return flow volumes, (2) the methods used to estimate the lagged return flow volumes including data inputs and underlying assumptions, and (3) the results of our analysis.

Approach

W&H Pacific, Inc. (W&H Pacific) provided tables of estimated monthly irrigation return flows for each developed subbasin for the various MPR and UGA development alternatives (W&H Pacific, 2001a). The monthly irrigation return flows calculated by W&H Pacific are defined as "non-lagged return flows" in this memorandum. AESI assumed that all of the irrigation return flow water would migrate to the water table aquifer, and the resulting additional ground water volume would eventually discharge to the Yakima and Cle Elum Rivers. The overall increase in available ground water recharge would result in increased water table elevations. A portion of this additional ground water recharge would likely result in some additional long-term aquifer storage. Assuming full buildout conditions for the two scenarios, the water table aquifer would eventually reach a new equilibrium condition. Ground water elevations under the new equilibrium conditions would fluctuate seasonally in response to the seasonal variability of the on-site return flows.

Our analysis focused on estimating the net change in the water table elevations, hydraulic gradients, and ground water velocities for the anticipated new equilibrium condition within the water table aquifer. The new equilibrium condition would reflect both the additional long-term aquifer storage properties and seasonal "pulses" of ground water recharge migrating through the aquifer system as a result of seasonal irrigation at the land surface. After the water table aquifer system has reached a new equilibrium, the amount of additional ground water recharge from the estimated return flows for a given water year should equal the amount of additional ground water discharge. The overall objective of our approach was to estimate the monthly volume of ground water discharge to the Cle Elum and Yakima Rivers attributed to the increased ground water recharge from the estimated on-site irrigation return flows. The calculated irrigation return flow volumes discharging as ground water to the Cle Elum and Yakima Rivers are referred to as the "lagged return flow" volumes in this document.

The hydraulic effect of the additional recharge to the water table aquifer would not be confined to the subsurface areas delineated by the developed surface water hydrologic basins used to calculate the non-lagged return flow volumes. Therefore, the individual developed subbasins were combined into 16 ground water subbasins based on the best available information for (1) the ground water flow directions, (2) the locations of ground water discharge points, (3) the geometry of individual developed hydrologic subbasins, and (4) the orientation of developed subbasins relative to ground water discharge locations. Figure 1 shows the locations of the 16 ground water subbasins used to calculate the lagged irrigation return flow volumes.

Methods

Spreadsheet (Excel) models were developed to calculate monthly changes in ground water conditions resulting from the estimated return flows. Darcy equations for ground water flow were used to calculate ground water flow volumes (flux) and ground water velocities. The Green-Ampt Explicit Model for unsaturated flow was used to estimate the amount of time for return flow water to reach the underlying water table aquifer. Monthly ground water return flow volumes were simulated for about 20 water years to evaluate when each of the 16 ground water subbasins had reached a new equilibrium condition, which includes additional aquifer storage. The resulting new

H-01

equilibrium return flow volumes were then compiled from the spreadsheet model to estimate the average lagged monthly return flows to the Yakima and Cle Elum Rivers at the discharge locations for the two MPR/UGA scenarios (cumulative high and low development densities).

Monthly return flows and surface acreages for full buildout of each of the MPR and UGA developed subbasins were provided by W & H Pacific (W&H Pacific, 2001a). Time periods used in our analysis are based on water years (October 1 through September 30). All known relevant subsurface data for the MPR and UGA sites were used to evaluate likely average ground water elevations and hydraulic gradients for existing conditions beneath each of the 16 subbasins. Average calculated hydraulic gradients were based on (1) average ground water elevations measured in the existing on-site wells, (2) probable subsurface stratigraphic controls on ground water flow in the water table aquifer, (3) the conceptual ground water model presented in the MPR Environmental Impact Statement (EIS), (4) gradients induced by pumping at the Cle Elum Hatchery wellfield, and (5) elevations of the Cle Elum River, the Yakima River, and Stream C.

AESI used the following average values for hydraulic characteristics of the sand and gravel water table aquifer beneath the MPR and UGA sites.

- Average total porosity of the aquifer is 0.25.
- Average effective porosity of the aquifer is 0.20.
- Average aquifer hydraulic conductivity of 300 feet per day (ft/day), which corresponds to an approximate median value for a reasonable average range of 50 to 500 ft/day.
- Using a 10:1 ratio of horizontal hydraulic conductivity to vertical hydraulic conductivity, a vertical hydraulic conductivity of 30 ft/day was used in the unsaturated flow analysis.

Additional parameters needed for the Green-Ampt Explicit Model were derived from published values for sand and gravel soils.

The spreadsheet model was designed to perform the following calculations at monthly time steps for each of the 16 subbasins.

1. Calculate the net rise in the ground water elevation resulting from the return flow recharge volumes.
2. Calculate a new hydraulic gradient based on the change in ground water elevation.
3. Calculate the volume of ground water discharging from the subbasin.
4. Calculate the residual volume of ground water derived from the return flows that remain in the subbasin at the end of the monthly time step.

5. Combine the residual ground water volume with the next month's return flow volume to calculate the subsequent month's ground water elevation, hydraulic gradient, and ground water discharge volume.

6. Continue this monthly iterative process until each subbasin reaches new hydraulic equilibrium conditions as observed by a repetitive annual cycle of monthly ground water discharge volumes.

7. Use the calculated ground water flow velocities and unsaturated flow travel times to calculate the overall lag time for the subbasin irrigation return flow volume to reach the discharge points for the Cle Elum and Yakima Rivers.

The spreadsheet model was then used to compile the monthly return flow volumes to the Yakima and Cle Elum Rivers after full buildout of the MPR and UGA sites. The discharge points were located along the edge of the Cle Elum and Yakima River floodplains based on the reasonable likelihood of direct hydraulic continuity between the rivers and the ground water table beneath the river floodplains.

Because the on-site irrigation returns would take many years to reach equilibrium, it was necessary to confirm that demands (diversion less return flows) would not exceed supply during any phase of the MPR and UGA construction. The spreadsheet model was used to estimate incremental lagged return flow volumes during buildout of the MPR and UGA sites. W&H Pacific provided total non-lagged on-site irrigation return flow volumes for Years 1, 2, 3, 4, 6, 10, 20, and 30 for the entire MPR and UGA sites during buildout for the low density scenario (W&H Pacific, 2001b, personal communication; W&H Pacific, 2001c, personal communication). On-site irrigation return flows for Years 1 through 9 were restricted to those subbasins comprising the MPR Phase 1 area and the UGA based on proposed development phases. The estimated incremental lagged irrigation return flow volumes were then added to the wastewater return flow volumes to calculate the net on-site consumptive water demands during buildout, and to compare the net on-site consumptive water demands to the total water rights acquired by Trendwest for consumptive use.

Results and Conclusions

Table 1 summarizes the lagged monthly return flows to the Cle Elum and Yakima Rivers for the two cumulative MPR/UGA development scenarios after the site has reached a new hydraulic equilibrium. The results of our analysis indicate that changes in ground water flow in the water table aquifer caused by return flows from the proposed MPR/UGA developments would reach equilibrium within a period of about 12 years after full buildout. Most of the net increase in simulated ground water elevations occurs within the first two water years for most of the subbasins. The resulting calculated rise in ground water elevations for new baseline equilibrium conditions in the individual subbasins ranged from less than 0.1 feet to 2.0 feet. Thirteen of the sixteen subbasins had simulated ground water elevation increases of less than 1.0 foot

The total time periods needed to reach the new equilibrium conditions in individual subbasins varied in response to (1) basin size relative to estimated return flows, (2) hydraulic gradients, and

H-01

(3) distance between the subbasins and the discharge locations. Effective hydraulic equilibrium conditions within individual subbasins were attained within periods ranging from 1 to 12 years, with all of the subbasins achieving 90 percent of the new equilibrium conditions within 8 years. Figures 2, 3 and 4 show the monthly lagged return flow volumes for three of the subbasins to illustrate the variability in seasonal pulses and time period needed for each of the individual subbasins to achieve new hydraulic equilibrium conditions. Simulated changes in return flow volumes for the other subbasins show similar patterns. Figure 5 shows the monthly cumulative return flows for all subbasins for a period of 12 years after full buildout for the cumulative reduced density MPR and UGA Alternative 5 projects.

Compiling all of the lagged return flows for the individual subbasins resulted in a relatively constant monthly total return flow from the MPR/UGA site to the rivers. Figures 6 and 7 are graphs comparing the lagged and non-lagged irrigation return flows to the rivers for the two cumulative MPR/UGA scenarios. Mass balance differences between the lagged and non-lagged return flow volumes for the two development scenarios were calculated to be less than 2 percent after the site reached a new hydraulic equilibrium.

A supplemental analysis using the low and high range of assumed hydraulic conductivity values (50 and 500 ft/day) indicated similar seasonal patterns in lagged return flow volumes. However, the amount of time needed for individual subbasins to reach the new effective hydraulic equilibrium varied according to the assumed hydraulic conductivity.

Using the results of our analysis of full buildout conditions, lagged return flow volumes were estimated for several time periods during buildout of the MPR (reduced density) and UGA (Alternative 5) sites. As stated previously, the on-site irrigation return flows for Years 1 through 9 were assumed to be confined to the hydrologic basins comprising the majority of the MPR Phase 1 area and the UGA areas. For the purpose of estimating the lagged return flow volumes at Year 20 and Year 30, 95 percent of the total annual non-lagged return flow volumes were assumed to be discharged to the Cle Elum and Yakima Rivers within a period of 10 years based on the results of the full buildout return flow analysis. Table 2 lists both the non-lagged and estimated lagged irrigation return flow volumes for Years 1, 2, 3, 4, 6, 10, 20, and 30 of site buildout for the low density scenario.

Our analysis of the hydraulic conditions at full buildout (Year 30) assumed instantaneous construction and initiation of return flows at the start of the model run. This model had the purpose of establishing total lagged return flows at full buildout of the MPR/UGA projects for incorporation in the water balance model. The secondary analysis of estimating return flow volumes during construction indicated that almost 90 percent of the total annual on-site irrigation return flow volumes will reach the Cle Elum and Yakima Rivers by Year 30 as the reduced density MPR and UGA Alternative 5 projects are built. Therefore, the project site should attain the new hydraulic equilibrium condition significantly sooner than 12 years after full buildout.

The lagged irrigation return flow volumes were then incorporated into an analysis of estimated on-site consumptive water demands during buildout to ensure there were no time periods when the total water demand (total diversion volume less returns) might exceed the total available

consumptive use water rights acquired by Trendwest. This question was raised by the Pacific Groundwater Group in their memorandum dated October 31, 2001. The total estimated return flow volumes, including the wastewater return flow, were subtracted from the total water demand for the MPR and UGA to calculate a total on-site consumptive water demand during buildout. Table 3 lists the estimated total on-site consumptive water demand for Years 1, 2, 3, 4, 6, 10, 20, and 30 of site buildout for the low density scenario. At no time would the total on-site consumptive water demand exceed the total water right volume for these time periods (Table 3).

References

City of Cle Elum. 2001. Trendwest Properties: Cle Elum UGA Draft EIS, Appendix D: Water Supply, March 2001.

W&H Pacific, Inc. 2001a. Return flow analysis, MountainStar Master Planned Resort Cle Elum UGA. Unpublished consultant report prepared for Trendwest Properties, Inc., September 2001

W&H Pacific, Inc. 2001b. Personal communication. Fax transmittal: preliminary estimates of diversion demands and return flows by year, reduced density MPR and UGA Alternative 5, November 7, 2001.

W&H Pacific, Inc. 2001c. Personal communication. Fax transmittal: preliminary estimates of diversion demands and return flows by year, reduced density MPR and UGA Alternative 5, November 9, 2001.

OKP/af
KH00748C10
D:\WP\af\12-01 - W2K

H-01

Table 1
Cumulative Monthly Lagged Irrigation Return Flows (Acre-Feet) Discharged to the Cle Elum and Yakima Rivers
MountainStar Master Planned Resort (MPR) and Cle Elum Urban Growth Area (UGA)

Cumulative High Density MPR / UGA Alternative 2 Scenario													
	October	November	December	January	February	March	April	May	June	July	August	September	Total
Cle Elum River	34.6	36.0	34.5	35.8	32.2	33.0	29.1	29.1	28.1	27.7	29.7	31.1	380.8
Yakima River	19.5	17.8	17.5	19.5	21.9	24.1	23.8	23.2	21.5	22.0	21.4	19.3	251.6
Total Monthly Return Flow	54.1	53.8	52.1	55.2	54.1	57.2	52.9	52.3	49.6	49.7	51.1	50.4	632.4

Cumulative Reduced Density MPR / UGA Alternative 5 Scenario													
	October	November	December	January	February	March	April	May	June	July	August	September	Total
Cle Elum River	31.1	32.2	33.3	32.0	30.2	29.7	27.1	25.4	25.0	26.0	26.0	28.4	346.4
Yakima River	9.9	9.2	9.2	9.2	9.5	10.2	9.9	9.8	9.5	10.2	10.3	9.6	116.5
Total Monthly Return Flow	41.0	41.4	42.5	41.2	39.7	39.8	36.9	35.3	34.6	36.2	36.2	38.0	462.9

Note: Water volumes are in acre-feet per month.

Table 2
Summary of Lagged Return Flow Volumes During Project Buildout
Cumulative Reduced Density MPR / UGA Alternative 5 Scenario

Year[1]	Non-Lagged Return Flow Volumes[2] (acre-feet/year)	Lagged Return Flows (acre-feet/year)
1	0.0	0.0
2	194.9	0.5
3	223.5	26.2
4	260.2	106.9
6	312.8	214.1
10	364.9	306.3
20	435.7	346.7
30	461.7	413.9

Notes:
[1]Years based on water years beginning in October.
[2]Reference: W&H Pacific, 2001b, personal communication.

Table 3
Comparison of Total Water Demand, Return Flows, and Net Consumptive Water Demand (acre-feet per year) During Project Buildout
Cumulative Reduced Density MPR / UGA Alternative 5 Scenario

Year[1]	(A) Total Water Demand[2]	(B) Wastewater Return Flow[2]	(C) Lagged Return Flow	(D) Total Return Flow (D=B+C)	(E) Net Onsite Consumptive Water Demand (E=A-D)	(F) Total Available Consumptive Water Rights[3]	(G) Surplus Consumptive Water Rights (G=F-E)
1	0.0	0.0	0.0	0.0	0.0	2050.9	2050.9
2	852.2	0.0	0.5	0.5	851.7	2050.9	1199.2
3	1071.4	143.1	26.2	169.3	902.1	2050.9	1148.8
4	1356.5	330.2	106.9	437.1	919.4	2050.9	1131.5
6	1768.8	601.2	214.1	815.3	953.5	2050.9	1097.4
10	2192.6	882.8	306.3	1189.1	1003.5	2050.9	1047.4
20	2762.4	1260.4	346.7	1607.1	1155.3	2050.9	895.6
30	2972.0	1399.3	413.9	1813.2	1158.8	2050.9	892.1

Notes:
All water volumes are in acre-feet per year.
[1]Years based on water years beginning in October.
[2]Reference: W&H Pacific, 2001b, personal communication.
[3]Reference: City of Cle Elum, 2001, Trendwest Properties: Cle Elum UGA Draft EIS.

ROSLYN

RONALD

CLE ELUM

DOMERIE CREEK

C1 C2 C3 C4 C5 C6 C7 C8 C9 C10* C11 C12* C13 C14 Y1 Y2

INTERSTATE 90

EXIT 80

N

SCALE

2500 0 1250 2500 5000

CONTOUR INTERVAL: 50 FEET

LEGEND

C1 ------ Approximate ground water subbasin boundary

* Approximate ground water subbasin midpoint

11-2 —— Developed hydrologic subbasin boundary

REFERENCE: W&H PACIFIC.

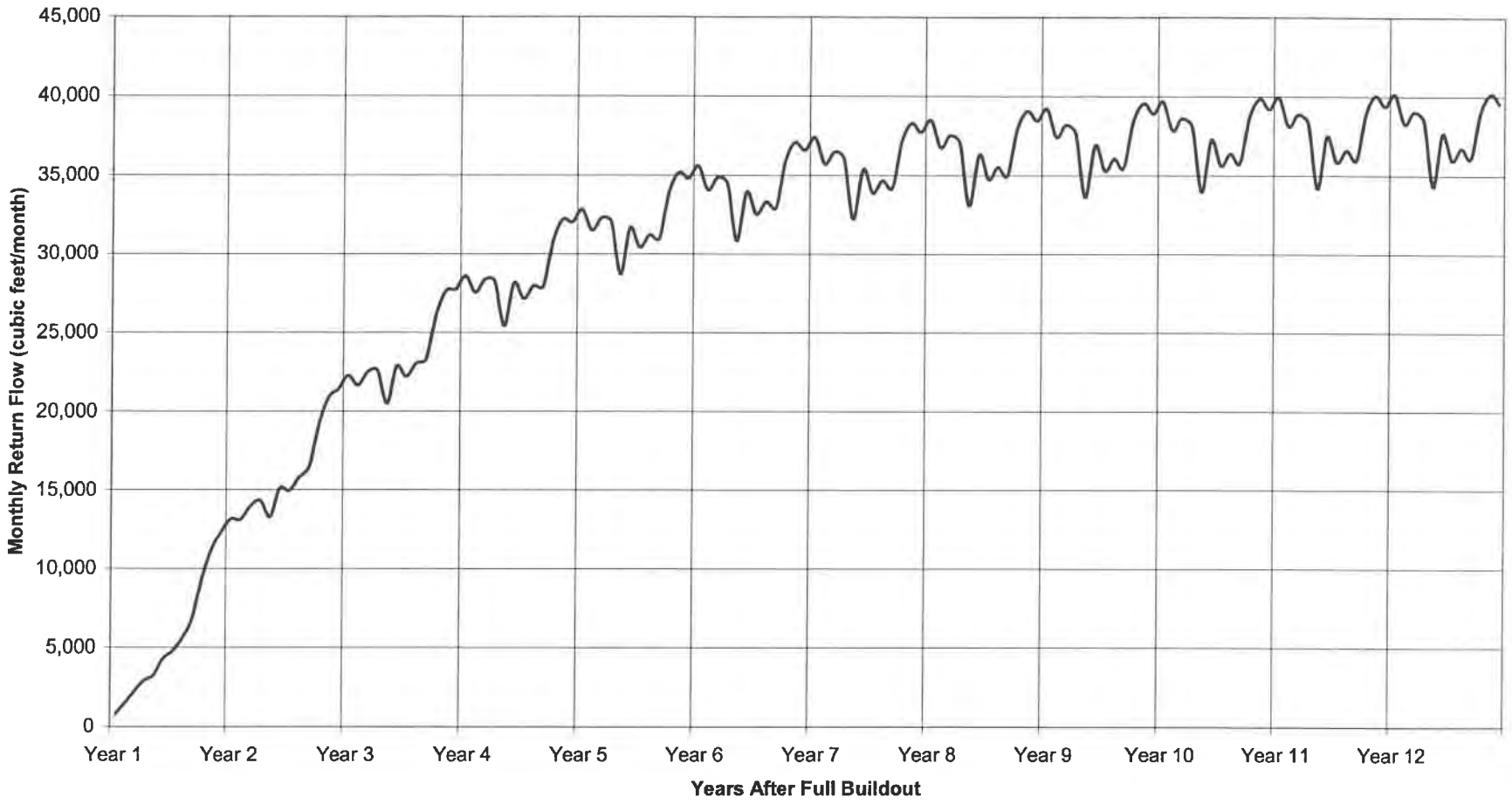
Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

FIGURE 1
GROUND WATER SUBBASINS
ONSITE RETURN FLOW ANALYSIS

S:\97193\AUTOCAD\JAMES\97193ret 01/14/01 EP9:97193--2001 mountainstar\97193--returnflow.dwg layout1



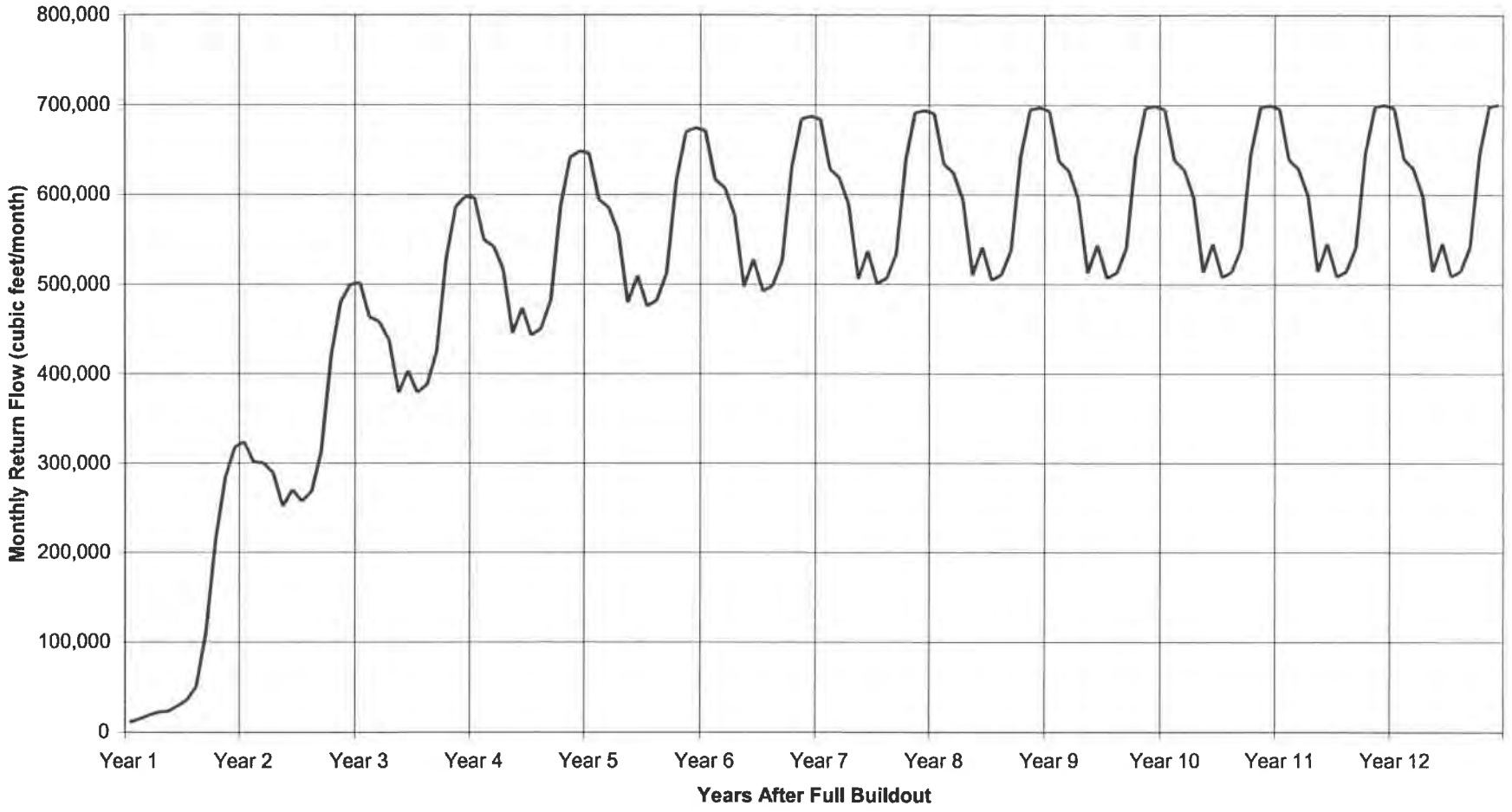
Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

Figure 2
Simulated Monthly Irrigation Return Flows
Subbasin C1
Reduced Density Scenario

00748 mountain star\00748-c1.cdr page1



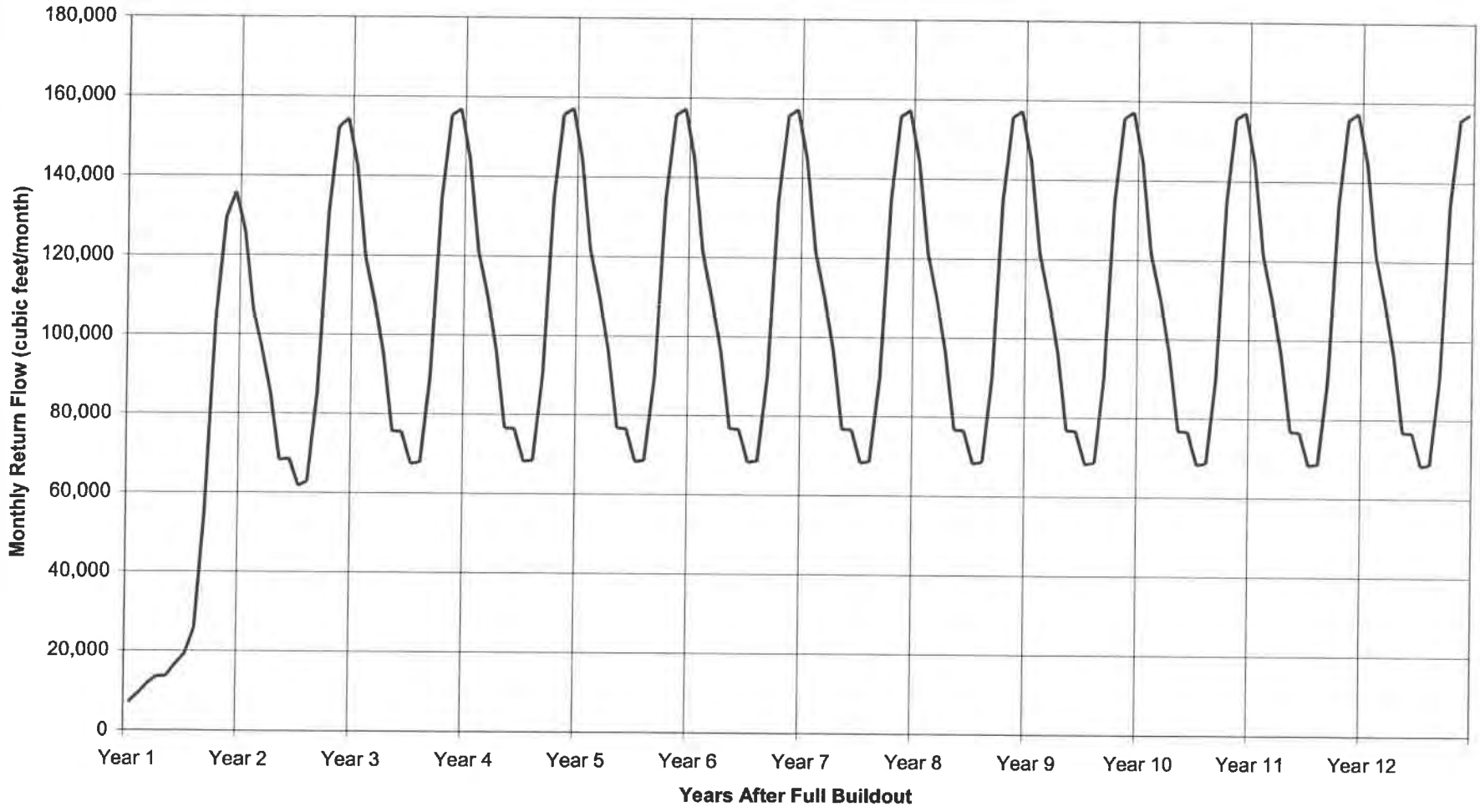
Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

Figure 3
Simulated Monthly Irrigation Return Flows
Subbasin C13
Reduced Density Scenario

00748 mountain star\00748-c13.cdr page1



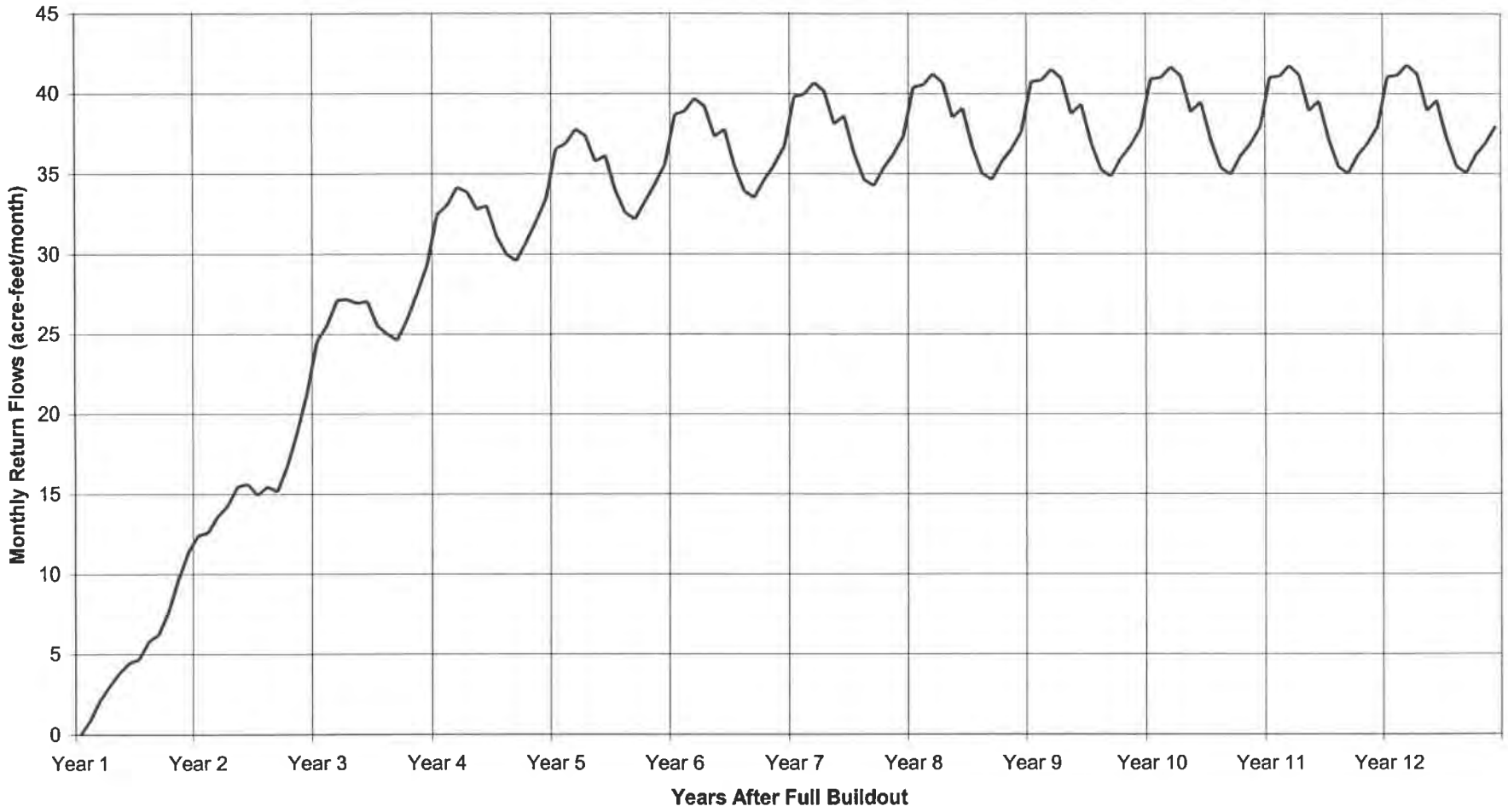
Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

Figure 4
Simulated Monthly Irrigation Return Flows
Subbasin C14
Reduced Density Scenario

00748 mountain star\00748-c14.cdr page1



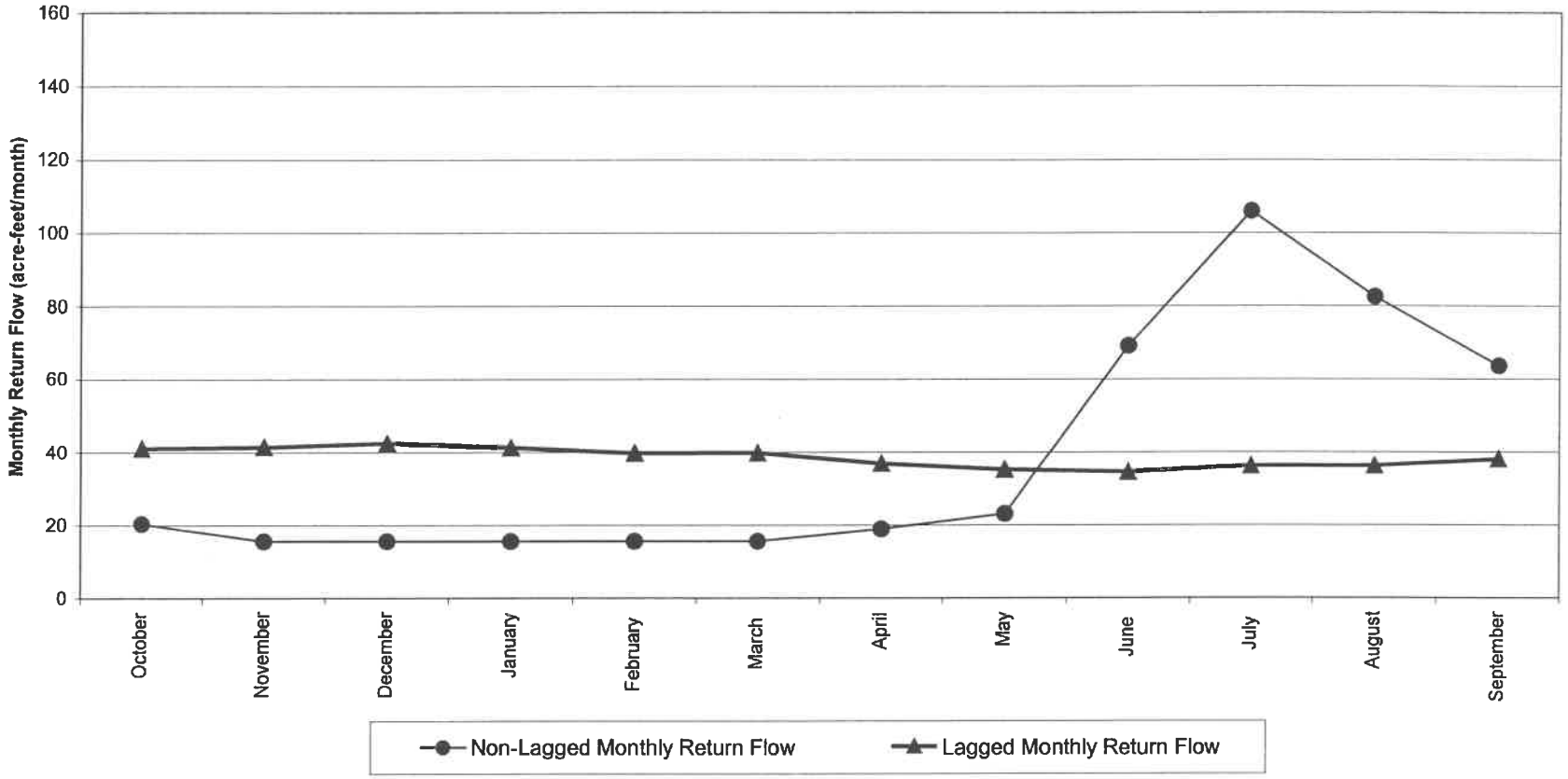
Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

Figure 5
Simulated Total Irrigation Return Flow
to Cle Elum and Yakima Rivers
Reduced Density Scenario

00748 mountain star\00748-cumulative.cdr page1



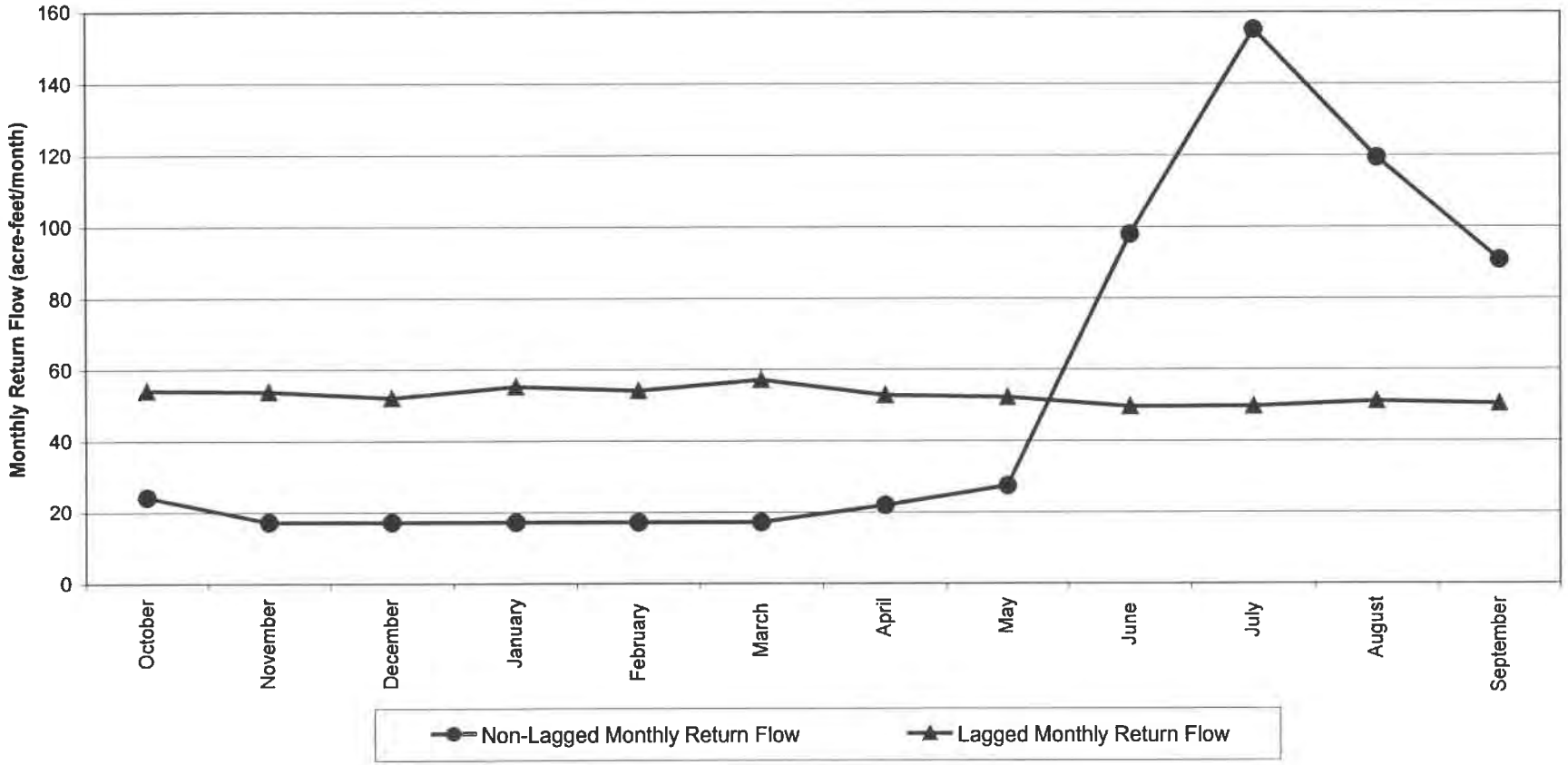
Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

Figure 6
Simulated Monthly Irrigation Return Flows
at New Hydraulic Equilibrium
Reduced Density Scenario

00748 mountain star\00748-reduced density.cdr page1



Associated Earth Sciences, Inc.

MountainStar MPR and Cle Elum UGA

Kittitas County, Washington

Figure 7
Simulated Monthly Irrigation Return Flows
at New Hydraulic Equilibrium
High Density Scenario

00748 mountain star\00748-high density.cdr page1

Exhibit G

Pacific Groundwater Group

2377 Eastlake Avenue East
Suite 200
Seattle, WA 98102
206-329-0141 v
206-329-6968 f
www.pgwg.com

Technical Memorandum

To: Randall Doneen, Department of Ecology
Joe Mentor, Mentor Law Group
Jamie Morin, Mentor Law Group
Andy Kindig, A. Kindig & Associates
Tom Martin, Brown and Caldwell

From: Peter Schwartzman, Associate Hydrogeologist, PGG
Chrysten Root, Geologist/Hydrologist, PGG

Re: **BIG CREEK BASIN HYDROLOGIC ANALYSIS**

Date: January 18, 2002

In this memorandum, Ecology's Consulting Team (ECT) estimates how Trendwest's proposed transfer of the former Gentry water right into the Yakima Basin Trust Water Program (the Trust) will affect streamflows. In the course of this evaluation, we present analysis of (1) the hydrogeology of the Big Creek Basin, (2) the hydrologic effects of leaving formerly diverted Gentry rights instream rather than routing them to crop consumptive use and subsurface irrigation return flows to the Yakima River, (3) streamflow partitioning between surface-water flow and alluvial (sub-surface) subflow, and (4) delivery of alluvial subflow to the Yakima River. Hydrogeologic conditions were analyzed based on evaluation of well logs and a field-visit to the study area. Subsurface irrigation return flows were evaluated using various models of flow through the unsaturated zone that underlies irrigated parcels and the regional water table aquifer. Partitioning of surficial and subsurface flow was based on Big Creek flow data collected by both Tom Martin and Montgomery Water Group (MWG). The timing required for alluvial subflow to reach the Yakima River was modeled for a dry-year condition, and discussed in light of model results for the average-year condition.

The water right transfer proposed by Trendwest on Big Creek is broken down into two components. Two thirds of Trendwest's total water right is proposed for transfer to mitigate Yakima River withdrawals for the Master Planned Resort (MPR), while the remaining one third is proposed for transfer to mitigate withdrawals for the City of Cle Elum Urban Growth Area (UGA). The modeling results presented in this memorandum are considered to be applicable to both the MPR and combined MPR/UGA transfers. The results are presented in a format that can be applied to both transfer scenarios (i.e. as relative percent of transferred water right vs. time). Slight variations in model response between the MPR and MPR/UGA transfer quantities appear to be too small to warrant independent analysis given other uncertainties inherent in quantifying the characteristics of the hydrologic system.

ECT's model predictions of the effect of terminating irrigation under the Gentry rights in favor of instream flows under the Trust will be used as one set of inputs to a separate model developed by Brown and Caldwell (B&C). That B&C model will simulate results of the combined Trendwest Master Plan Resort and Urban Growth Area water demand schedule and water right transfers on the Yakima River basin, from upstream of the Cle Elum River at the Big Creek confluence with the Yakima River and downstream to the Reecer Creek confluence with the Yakima River.

1 Summary of Findings

- Hydrogeologic characterization and assessment of seepage losses from Big Creek suggest that hydraulic continuity is likely absent (or very limited) between the creek and the underlying water table aquifer. Seepage gains from the groundwater flow system into Big Creek were not noted in our review of the available data.
- Trendwest's proposed water-right transfer from historic irrigation use to instream flow will result in a net addition of water to the Yakima basin downstream of Big Creek equivalent to the consumptive use of the irrigated crops. For the entire proposed transfer (MPR + UGA), B&C have estimated crop consumptive use to be 137 acre-feet per year (0.8 million gallons per year).
- Transfer of the entire water right will increase streamflows in Big Creek during the irrigation season by the amount previously diverted for irrigation use, because nonconsumptive irrigation returns from the Gentry fields went to the Yakima River, and not back into Big Creek. Estimates of historic diversions associated with the Gentry/Trendwest water right range from 1.1 cfs in May to 1.5 cfs in August. Lack of hydraulic continuity between the water-table aquifer and Big Creek dictates that the portion of historic diversions lost to seepage from the ditches and fields returned via groundwater to the Yakima River rather than Big Creek.
- One effect of leaving the Gentry rights as instream flows is that the man-caused routing of the irrigation return flow to the Yakima River via groundwater will be ended. Thus, former irrigation return flow will stay instream and reach the Yakima River more quickly than it did when the water was diverted to the Gentry fields. The water rights transfer will decrease streamflows in the Yakima River outside the irrigation season due to ending this man-caused routing of subsurface return flow from irrigation seepage losses. Modeling analysis was used to predict this change in timing of return flows using a reasonable range of aquifer permeability to predict a reasonable range of hydrologic effects. For the low-end value of aquifer permeability (75 feet/day), the model predicts a relatively constant rate of Yakima River groundwater inflow from historic irrigation seepage losses associated with Trendwest's water right. For simulation of the MPR transfer only, model predictions show an average rate of groundwater inflow of approximately 0.18 cfs, with a seasonal high of 0.22 cfs occurring about 7 months after the end of the irrigation season and a seasonal low of approximately 0.16 cfs occurring about 2 months after the beginning of the irrigation season. In contrast, simulations with the high-end aquifer permeability (750 ft/d) predict a more pronounced seasonal variation of subsurface return flow to the Yakima River. While the *average* rate of groundwater discharge is predicted to remain unaltered, a seasonal high of 0.50 cfs is predicted to occur about two weeks after the end of the irrigation season[1] and a seasonal low of approximately 0.02 cfs is predicted to occur in the first two weeks of the irrigation season.

[1] The two-week time lag is attributed to the time required for field and ditch irrigation seepage losses to reach the underlying water table.

H-01

- During the irrigation season, a portion of the water transferred to instream flow will seep through the streambed to become alluvial subflow. Seepage losses are estimated to be relatively insignificant prior to early July, when Big Creek is expected to flow all the way down to the Yakima River. However, historic observations suggest that Big Creek typically dries up near the mouth (and farther upstream) in the latter half of the irrigation season, and a significant portion of Trendwest's transferred water will likely reach the Yakima River as alluvial subsurface flow in those formerly dry reaches. For estimated "typical average" and "typical dry" years, Trendwest's added contribution to instream flow will likely extend the period of continuous streamflow down to the Yakima River, and will reduce the geographic length of the dry reach once dry conditions start to occur. Model simulations were performed to estimate how long it would take for the alluvial subflow to reach the Yakima River. Our model predicted that time lags between alluvial infiltration and outflows to the Yakima River will be relatively minor, with 90 percent of the infiltrated volume reaching the river within a week after the irrigation season ends. For the purpose of this analysis, time delays associated with alluvial subflow are considered to be insignificant.
- In summary, the net hydrologic effect of transferring Trendwest's water right will be to: 1) increase water availability to the overall hydrologic system; 2) increase instream flows in Big Creek during the irrigation season by the historic rates of diversion; and 3) shift the timing of former subsurface irrigation return flows reaching the Yakima River from the historic (year-round) condition to one where these flow volumes reach the river at a higher rate during the irrigation season (via Big Creek and alluvial subflow) but no longer reach the river during the remainder of the year. The net effect on Yakima River streamflows will be the combined effect of increased surface-water (and alluvial subflow) inflows during the irrigation season and the elimination of irrigation-caused subsurface return flows on a year-round basis.
- ECT recommends that the B&C water-balance model use an average of the return-flow schedules developed from the two groundwater model simulations for input as central, or most-reasonable estimate values. In addition, the water balance model should use the full range identified by the two groundwater model runs to assess uncertainty in the total predicted change in tributary and mainstem flows from the combined water right transfers for the MPR and UGA.

2 Hydrogeologic Conditions in the Big Creek Basin

Upstream of the Lund/Darling diversion dam, Big Creek flows through bedrock terrain composed of middle-to-late Eocene inter-bedded sandstone and volcanic rocks and occurrences of Easton schist (Frizzel et al, 1984). Just upstream of the diversion dam, Big Creek flows between knobs of Easton Schist and between deposits of alpine glacial drift. The creek encounters the Yakima River alluvium just upstream of the diversion dam at an elevation of about 2240 feet. It then flows over the alluvium at a gradual slope towards its confluence with the Yakima River (elevation 2060 feet).

The alluvial sediments were characterized based on well driller's logs on file with the Washington State Department of Ecology. Well logs were reviewed in Sections 20, 21, 28, and 29 of Township 20 North, Range 14 East. Well locations are reported by drillers to the nearest quarter-quarter section, and may exhibit some inaccuracies due to driller's estimates. Most of the wells in the area are reported to be domestic and are less than 100 feet deep. The logs in the immediate vicinity of Big Creek reported clean sand and gravel which we refer to as Big Creek Alluvium. Well logs farther away from Big Creek reported silt and clay from the surface to varying depths with

underlying clean sand and gravel found at depth. These logs likely indicate well completions in the Yakima River Alluvium. The thickness of the alluvial sediments (Big Creek and Yakima River) is unknown based on the well logs. The soils that overlie the alluvial sediments are reported by the Kittitas Conservation District to be Kladnick Sandy Loam, Roslyn Sandy Loam, and Andic Xerumbrepts (characterized as a gravelly loam).

Groundwater elevations were reviewed and estimated to the accuracy of the topographic maps and reported well locations. Based on reported well locations, depth to groundwater in the alluvial aquifer commonly ranges from 5 to 30 feet below land surface in the Big Creek Basin (most of the reviewed wells are located east of the creek). Three deep wells (119, 140 and 196 feet deep) have very shallow and/or flowing water levels, thus suggesting regional upward flow from a deep confined aquifer to the shallow unconfined aquifer. In accordance with measured streamflow losses (discussed in Section 4), interpretation of the groundwater level data suggests that Big Creek is losing flow to the groundwater system over much of its course across the alluvial sediments. The water level (stage) in Big Creek is higher than nearby groundwater elevations estimated for adjacent locations in the alluvial aquifer. Direct hydraulic continuity between the creek and the underlying water table does not exist where the water table occurs below the streambed. This condition was locally confirmed in a domestic well near the creek, located near the northern boundary of the SW ¼ of the SW ¼ of Section 21, Township 20N, Range 14E. ECT estimated that groundwater beneath the creek was approximately 10.4 feet lower than the streambed by measuring depth to water in the well and surveying the vertical offset to the creek[2]. Seepage losses from Big Creek to adjacent groundwater are also suggested by mapping of estimated groundwater elevations, which shows groundwater contours bulging in a downstream direction along the creek (higher water level elevations in the immediate vicinity of the creek and lower levels ¼ to ½ mile away). Based on this understanding of the groundwater flow system, seepage losses from Big Creek and from irrigated areas adjacent to the creek would discharge to the Yakima River and not back to Big Creek.

3 Analysis of Subsurface Irrigation Return Flows

PGG estimated the timing of subsurface return flow to the Yakima River from seepage losses associated with irrigation. Irrigation seepage loss is conventionally defined as the portion of irrigation application that is not consumed by the crops, and instead percolates beyond the root zone to recharge directly-underlying groundwater. The procedure used to estimate the timing of return flow was to:

1. Estimate former ditch and field seepage loss to groundwater associated with the Gentry water right acquired by Trendwest based on site measurements, calculations and reasonable assumptions;
2. Estimate the timing for irrigation seepage losses from the land surface to reach the water table using a numerical model of downward unsaturated flow over a variety of soil properties; and
3. Estimate the timing of recharge at the water table to reach the Yakima River using a groundwater flow model of the Big Creek vicinity over a reasonable range of aquifer properties.

[2] Depth to water in the well, formerly owned by Jones and now owned by Starr, was measured at 25.4 feet below top of casing (BTC) on 6/14/01 and 27.6 feet BTC on 9/22/01. The streambed was estimated to be 17.2 feet BTC.

H-01

3.1 Estimation of Irrigation Seepage Loss to Groundwater

Irrigation seepage loss to groundwater was estimated by MWG for the entire Trendwest/Gentry water right based on measurements of ditch seepage and estimates of field irrigation efficiency. Ditch seepage was measured for a single flow condition in July 2001 and scaled to other flows using physical characteristics of the ditch. Field efficiency[3] was assumed to be 65 percent, except during the month of July when irrigation efficiency was assumed to rise to 73 percent to compensate for high crop demand and limitations in water available to the associated water right. During the irrigation season, periods occur when the ditches are flowing but water is not being applied to the fields. At these times, ditch water is either stored in ponds or allowed to infiltrate back into the ground. MWG estimated all three components of seepage loss to groundwater (ditch, field, and tailwater). For the purposes of our modeling, ECT assumed that both the field and tailwater losses infiltrated over the irrigated area associated with the Gentry water right, and that ditch seepage infiltrated over a section of ditch that supplied the Gentry property. The ditch seepage is a relatively large portion of the total groundwater recharge from the irrigation diversion. A more detailed discussion of MWG's seepage loss estimations is included as an attachment at the end of this memorandum, and the irrigation seepage losses applied to the model as groundwater recharge are summarized below:

Table 1 – MWG Estimates of Former Irrigation Seepage Losses for the Trendwest/Gentry Water Right

	Estimated Diversion (cfs)	Estimated Crop Consumptive Use (cfs)	Estimated Field + Tailwater Seepage Losses to Groundwater (cfs)	Estimated Ditch Seepage Loss to Groundwater (cfs)
May	1.1	0.4	0.4	0.25
June	1.4	0.5	0.6	0.25
July	1.5	0.7	0.6	0.25
August	1.5	0.6	0.6	0.25
Average	1.4	0.6	0.3	0.25

3.2 Timing of Subsurface Return Flow Transport Through the Unsaturated Zone

The timing required for field and tailwater irrigation seepage loss to reach the underlying water table was estimated using Hydrus-2D (Simunek et al, 1999), a finite element model of variably saturated flow in porous media. The modeled depth to the water table was 20 feet, consistent with PGG's hydrogeologic characterization in the vicinity of the Gentry property. A range of soil characteristics was used for the modeling in order to evaluate sensitivity to possible variations in soil texture. Hydrus-2D was run to simulate the following two soil types:

Table 2 – Properties of Soils Modeled with Hydrus-2D

Property:	Soil 1	Soil 2
Sand Content	100%	85%
Silt Content	0%	15%
Clay Content	0%	0%
Bulk Density (g/cm^3)	1.8	1.8
Saturated Hydraulic Conductivity (ft/d)	28.0	3.1

[3] Efficiency is defined as the ratio of seepage loss to consumptive use.

H-01

Soil 1 is characterized as sand, whereas soil 2 is characterized as sandy loam. Hydrus-2D estimates the hydraulic properties of the soils based on distributions between sand, silt and clay contents and bulk density. A "neural network analysis" uses these data to extract key hydraulic parameters from the U.S. Department of Agriculture UNSODA database, a large database compiled from rigorously tested soil characteristics and hydraulic properties. Soil moisture retention curves are estimated by Hydrus-2D using the method of van Genuchten (1980). **Figure 1** presents model predictions for the timing of the recharge pulse (defined in **Table 1**) to the water table. The time lags predicted for arrival of the recharge pulse to the water table are noted in the legend, but have been removed from the plot so that time zero is defined as the time when the recharge pulse is predicted to first reach the water table. The figure shows that the irrigation recharge pulse from the land surface occurs over a 17-week (four-month) irrigation season. The time lag for the recharge pulse to reach the water table for Soil 1 is approximately two weeks, and about 93 percent of the pulse has reached the water table over a 16-week period. In contrast, Soil 2 has a predicted time lag of 6.6 weeks, and requires considerably more time for the majority of the recharge pulse to reach the water table. Model predictions suggest that Soil 2 requires 27 weeks for 90 percent of the recharge to reach the water table.

Model predictions for Soil 1 showed very little dampening (spreading over time) of the recharge pulse and a two-week time lag. These results were used to define the input for the groundwater flow model developed to estimate the time lag and dampening of the recharge pulse to reach the Yakima River via saturated (groundwater) flow. Soil 1 was selected because:

1. sensitivity analysis of the Big Creek Groundwater Flow Model (discussed below) showed that aquifer materials had hydraulic conductivities reflecting very low silt content;
2. aquifer materials are known to have variable gravel contents, and gravelly regions within the unsaturated zone will conduct irrigation recharge to the water table at faster rates; and,
3. non-field (ditch) recharge will result from more aerially concentrated infiltration and therefore occur faster than the field recharge.

Because of the low degree of dampening predicted for Soil 1, MWG's original schedule of field seepage loss was applied to the groundwater flow model[4]. MWG irrigation recharge values were multiplied by 2/3 to represent the Master Planned Resort (MPR) component of the water right transfer. The groundwater flow model was run with the understanding that a two-week lag exists between the beginning of the irrigation season and the onset of seasonal irrigation recharge to the water table.

3.3 Timing of Subsurface Return Flow in the Water Table Aquifer

PGG obtained the Big Creek Groundwater Flow Model from Brown & Caldwell (B&C) in early September, 2001. Documentation of B&C revisions made to the model after issuing the UGA DEIS was attached. The B&C model specified an aquifer hydraulic conductivity (K_{sat}) of 750 ft/d, which is relatively high (e.g. representative of a clean gravel deposit). Recharge inflows specified for the B&C model were also considered to be high-end estimates[5]. PGG performed a sensitivity analysis on the model over a range of K_{sat} and recharge values, which also incorporated flexibility in

[4] Ditch seepage loss was applied at the near constant monthly rates shown on Table 1.
[5] Recharge was specified for agricultural lands, Big Creek, Little Creek, KRD Canal and natural background.

H-01

specifying the constant head values along the east and western boundaries of the model domain[6]. Our sensitivity analysis revealed that reasonable calibration to existing groundwater level targets could be achieved with hydraulic conductivity values as low as 50 ft/d with associated recharge reductions and boundary condition adjustments. Based on this information, PGG defined two model scenarios based on high-end K_{sat} (750 ft/d) and low-end K_{sat} (75 ft/d) estimates. Steady-state versions of both models were run, and inflows from upgradient constant head boundaries were converted to specified fluxes so that they would not be altered by adding estimated irrigation recharge (formerly associated with the Trendwest water right) to the model. **Figure 2** shows that the results of both model scenarios predict similar groundwater elevations and flow patterns. **Table 3** summarizes the parameters used in the two model scenarios. Additional description of the Big Creek Model can be found in the UGA DEIS.

Table 3 - Summary of Model Input Parameters

	K = 750		K = 75	
	Model Input	Model Flux	Model Input	Model Flux
Background Recharge	0.0023 ft/d	10.0 in/yr	0.0023 ft/d	10.0 in/yr
Recharge from Irrigated Areas	0.068 ft/d	297.2 in/yr	0.016 ft/d	70.1 in/yr
Recharge from Big Creek Seepage Loss	0.262 ft/d	11.0 cfs	0.130 ft/d	5.5 cfs
Recharge from KRD Canal Seepage Loss	1.05 ft/d	58.3 cfs	0.13 ft/d	7.2 cfs
Recharge from Little Creek Seepage Loss	0.022 ft/d	1.2 cfs	0.022 ft/d	1.2 cfs
Constant Head Value at NE Corner of Model	2039 ft msl		2039 ft msl	
Constant Head Value at SE Corner of Model	2107 ft msl		2096 ft msl	
Constant Head Value at W end of Southern Model Boundary	2185 ft msl		2164 ft msl	
Constant Head Value at NW Corner of Model	2100 ft msl		2100 ft msl	
Constant Head Value at S end of Western Model Boundary	2183 ft msl		2162 ft msl	

The timing required for the estimated irrigation recharge to reach the Yakima River was estimated by using the steady state predicted groundwater levels for the model's initial condition, and then running the model in transient mode for a period of at least 20 years with the Trendwest irrigation recharge seasonally added. After as many as 10 years, the model had achieved a "cyclic steady state" – at which point the aquifer responses to recharge were unchanged from year to year[7]. The estimated arrival schedule for the recharge pulse to reach the Yakima River was extracted from the model by removing the steady-state discharge from the hydrograph of discharge to the river predicted by the final-year transient simulation. This schedule is considered to reflect the delivery schedule for former irrigation seepage loss associated with Trendwest's Gentry water right to reach the Yakima River via its groundwater flowpath. In running the model, PGG noted that a portion of the model outflow discharges in a northeast direction across the eastern model boundary, rather than directly to the Yakima River boundary. This flow is assumed headed towards the Yakima River, further away to the northeast. Model discharge hydrographs to both the Yakima River and the eastern boundary were extracted from the model, and show similar seasonal timing.

Model predictions show a time lag for seasonal irrigation recharge originating at the Gentry property to cause seasonally increased groundwater flow to the Yakima River and a dampening

[6] Constant head values representing the Yakima River were not adjusted.
[7] The model reached cyclic steady state after 2 years for the K=750 ft/d simulation and after 10 years for the K=75 ft/d simulation.

H-01

(spreading over time) of the recharge pulse between its point of origin and the river. **Figure 3** and **Figure 4** present comparisons of recharge inflow and groundwater outflow hydrographs to the Yakima River for the K_{sat}=75 ft/d and K_{sat}=750 ft/d scenarios. The figures present charts of cumulative flow volume with respect to time, and show a bold dashed line that represents a uniform rate of delivery to the river throughout the year. Predicted time lags for irrigation recharge to the water table to cause increased groundwater discharge to the Yakima River range from several days for the K_{sat}=750 ft/d scenario to seven weeks for the K_{sat}=75 ft/d. Predicted dampening is greatest for the K_{sat}=75 ft/d scenario, with near uniform groundwater outflow throughout the year[8]. Dampening is less for K_{sat}=750 ft/d, because the higher hydraulic conductivity allows the recharge pulse to move through the aquifer more quickly. For the K_{sat}=750 ft/d simulation, approximately 54 percent of the annual irrigation recharge inflow is predicted to reach the Yakima River within 3 months of recharge reaching the water table, 83 percent within 6 months, and 95 percent within 9 months. Recall that an additional two-week delay is predicted between the onset of the irrigation season and recharge to the water table aquifer.

While both simulations suggest year-round delivery of sub-surface return flow to the Yakima River, the K_{sat}=75 ft/d scenario shows a more uniform rate of baseflow input throughout the year. The actual delivery schedule to the Yakima River is likely somewhere in between the schedules presented on **Figure 3** and **Figure 4**. In order to apply these model results to predict subsurface return flows for irrigators within the Big Creek Basin, we recommend using the average between the two model scenarios as the central best estimate. However, the full range of predictions should be used as a basis to evaluate uncertainty in the B&C water balance model for the total change in tributary and mainstem flows from all of the Trendwest water right transfers. The predicted schedules of sub-surface return flow to the Yakima River, expressed as cumulative percent of seasonal irrigation recharge from the Gentry property, can be reasonably used to simulate the effects of either the MPR water-rights transfer and the combined MPR+UGA water-rights transfer. ECT performed a separate simulation of the combined transfer using the full historic recharge rates (**Table 1**) and found insignificant difference between model predictions.

4 Streamflow Datasets Used for Flow Partitioning Analysis

Tom Martin collected spot measurements of streamflow between May 1999 and October 2000 at two locations, one upstream of the Lund-Darling diversion dam, and one 50 feet upstream of West Nelson Siding Road. Montgomery Water Group (MWG) collected both spot measurements and continuous flow data from May to October 2001 (this memorandum addresses the spot measurements). MWG measured flow at points upstream and downstream of the diversion dam, at Ensign Ranch, and within flumes at the heads of the various diversions. MWG also collected flow data from July to October 2001 at the Kallio's property, located about 800 feet downstream of West Nelson Siding Road. Data for both sets of spot measurements are displayed on **Figure 5** with the year of acquisition noted in the legend[9]. Based on a review of stream gage accuracy and measurement resolution, MWG concluded that Big Creek flow below the diversion dam can be best estimated by subtracting the measured diversions in the Lund and Darling flume from the gaging data collected at the station located upstream of the diversion dam. Since Tom Martin did not collect diversion measurements from the Lund and Darling flumes, ECT has estimated this flow by

[8] Note that even though K_{sat} is lower in this simulation, there is no apparent time lag from the beginning of the irrigation application because of carry-over groundwater outflow from the previous modeled year.

[9] At the original time of writing for this memorandum, 2001 flow data were available only though early September.

H-01

subtracting the average estimated rates of irrigation diversions on a seasonal basis. **Table 4** shows the corrections applied to Tom Martin's upstream flow data for average estimated irrigation diversions.

Table 4 – Water Rights for Lund and Darling Diversion Ditches

Lund Ditch Diversions:		Darling Ditch Diversions:	
Dates	Water Right (cfs)	Dates	Water Right (cfs)*
5/1 – 9/1	3.95	5/1 – 9/1	1.57
9/2 – 11/15	2.59	9/2 – 11/15	1.57
11/16 – 2/28	3.70	11/16 – 2/28	1.57
3/1 – 4/30	2.61	3/1 – 4/30	1.57

* Field checks show occurrences when diversions exceed water right.

We have observed some discrepancy between Tom Martin's and MWG's data sets regarding streambed seepage out of Big Creek. Since Big Creek is losing baseflow via seepage to the underlying water table, streambed seepage is also referred to here as seepage loss. Tom Martin's data indicate 3-6 cfs of seepage loss from Big Creek to the underlying alluvial aquifer during low flow conditions (<15 cfs flow downstream of the diversion) from below the Diversion Dam to West Nelson Siding Road ("Reach 1"). This results in only a minimal flow between West Nelson Siding Road and Ensign Ranch ("Reach 2") during the irrigation season (**Figure 5**). The MWG data indicate a smaller amount of streambed seepage loss over Reach 1 (1-3 cfs during low flow conditions), suggesting that the majority of the seepage occurs below West Nelson Siding Road.

The difference in seepage distributions between the two data sets could reflect natural conditions (e.g. variation between years) or measurement error. Under natural conditions, one would typically expect streambed seepage to vary as a function of stream discharge and/or variations in hydraulic continuity with groundwater. However, data from Tom Martin and MWG show different seepage losses at similar streamflows. Streamflow does not appear to be the dominant parameter to explain this inconsistency. In addition, should hydraulic continuity actually occur between Big Creek and shallow groundwater over a portion of Reach 1, the lower values of seepage loss estimated for year 2001 are counterintuitive to expected groundwater elevation changes. Under 2001 drought conditions, groundwater levels are expected to be lower than the prior years from which Tom Martin's flow data were collected. If hydraulic continuity did exist, lower groundwater levels would cause increased seepage losses. The relationship observed is opposite, with lower seepage losses expressed during the drier year. If hydraulic continuity does not exist (as suggested by hydrogeologic characterization performed to date), changes in groundwater levels would have no effect on changes in streambed seepage rates.

Thus, it appears that neither streamflow nor changes in hydraulic continuity can fully explain the discrepancy between the two data sets. The remaining factor is measurement error. In order to evaluate the degree of error in the MWG measurements, Julie Daigneau revisited the gaging sites to perform quality assurance checks. Her results were consistent with MWG's 2001 data set. Julie also noted that the streambed in the vicinity of Tom Martin's West Nelson Siding Road gaging location has a high component of cobbles and boulders. This type of streambed could accommodate a portion of the surface flow as shallow subflow. More importantly, a substrate of cobbles and boulders causes increased measurement error.

5 Analysis of Seepage Loss from Big Creek to Alluvial Groundwater Flow

The MWG data set is the most detailed data set available since flume measurements were taken concurrently with instream flow measurements and QA/QC was performed at the measurement stations. As a result, we have used this data set to assess the partition between surface flow and alluvial groundwater flow. We used MWG's data set to:

1. estimate seepage loss to groundwater as a function of streamflow;
2. apportion total seepage to stream reaches;
3. estimate flow conditions for average and dry years; and,
4. estimate change in seepage loss (as a function of time and stream location) due to transfer of Trendwest's Gentry water rights for both average and dry years.

5.1 Seepage as a Function of Streamflow

The spot measurements collected by MWG are shown in **Figure 6**, with the difference in flow between downstream of the diversion dam and Ensign Ranch (seepage loss to groundwater) plotted on the secondary axis. Since MWG only measured flow below the Ensign Ranch diversion, we have calculated flow above the diversion by adding the measured amount of the Ensign Diversion to the downstream measurement. The relationship between seepage loss and flow below the diversion dam is somewhat scattered. We have created an idealized curve to characterize seepage loss as a function of flow in Big Creek (**Figure 7**), which has the equation:

$$y=3.5635e^{0.0099x} \qquad \textit{Equation 1}$$

where x= flow downstream of the diversion dam (CFS)
y= net seepage loss from Big Creek to alluvial groundwater (CFS)

The correlation coefficient for the idealized seepage curve is slightly low (R= 0.77); however, this curve appears representative of the trends in the flow data set collected by MWG.

5.2 Differences in Total Seepage Loss Between Reaches

As shown on **Figure 8**, seepage loss from Big Creek is not evenly distributed across the channel length. Instead, approximately 25% of the observed seepage occurs over Reach 1 (average seepage rate = 0.0003 cfs/ft), and the remaining 75% over Reach 2 (average seepage rate = 0.0007 cfs/ft). While the difference between the two reaches is notable, the actual geographic distribution of seepage cannot be characterized based on comparison between the reaches alone because the reach boundaries are defined by gaging locations that may not correspond to actual transitions in seepage rates

5.3 Flow Conditions for Average and Dry Years

Although one would expect rates of summer streamflow to vary between average and dry water years, this pattern is not visible in the available data sets (**Figure 5**). Year 2001 is significantly drier than the preceding years 2000 and 1999, and yet does not show lower summer streamflows. The lack of distinguishable differences in our data set may be due to other controls on snowmelt and streamflow (e.g. temperature).

H-01

Hydrologic observations on Big Creek, however, do indicate a difference in the location of the wet/dry interface between average and dry water years. Stan Isley of the US Bureau of Reclamation has observed that during average water years (prior to Trendwest's purchase of the Gentry water right), the wet/dry interface typically receded back to the Ensign Ranch Bridge (60 feet downstream of the I-90 Bridge) by early August and remained in this vicinity through early September before migrating back towards the Yakima River. Isley noted that during the last several years (e.g. post Trendwest water rights purchase), conversations with Ensign Ranch personnel suggest that the wet/dry interface extended further downstream, perhaps halfway downstream from the Ensign Ranch Bridge towards the Yakima River. During extremely dry years (e.g. 1994), Isley notes that the wet/dry interface has migrated up to the Ensign Ranch Bridge by early August and continued as far upstream as halfway between the I-90 and West Nelson Siding Road bridges over a two-week period. Isley reported that the interface has remained in this vicinity through the end of September, and then migrated downstream to restore flow to the mouth by mid-October.

Larry Hallows of Ensign Ranch has observed conditions in Big Creek from 1998 to 2001 (Trendwest began leaving their allocated diversion instream starting 1999). He has noticed the wet/dry interface reaching approximately 600 feet downstream of the Ensign Ranch Bridge between the third week of July and the second week of August. Although this year is a low water year, he did not observe the channel drying faster than usual. In early September of 2001, MWG observed that the wet/dry interface had receded to approximately 800 feet downstream of the Ensign Ranch Bridge (200 feet below the Ensign Ranch gaging site) and continued to recede at approximately 50 feet per week. The data appear to indicate that the wet/dry interface has moved downstream since Trendwest began leaving their allocated diversion instream. The data period is too short and the descriptions too approximate to estimate exactly how much wet reach has been gained with the extra water left instream by Trendwest.

5.4 Changes in Seepage Loss due to the Transfer of Trendwest Water Rights

Hydrogeologic characterization by PGG and Brown and Caldwell suggests a low likelihood for hydraulic continuity between the water table aquifer and Big Creek along its entire reach. Based on the existing characterization, irrigation subsurface return flow discharges to the Yakima River rather than Big Creek. Under the proposed transfer, the entire former water use associated with Trendwest's water right (shown on **Table 4**) can be considered to be an increase in Big Creek flow. PGG estimated the increased seepage loss to alluvial subflow associated with leaving this amount of water in Big Creek over the irrigation season for both average-year and dry-year conditions. For the purpose of this analysis, two components of streambed seepage loss to alluvial subflow were identified and estimated:

1. seepage loss from reaches that exhibited summer flow prior to the Trendwest transfer, and
2. seepage loss from reaches that went dry prior to the Trendwest transfer, and are now expected to remain wet due to Trendwest's flow contribution.

The distinction between these two seepage components is based on delineation of reaches that typically remained wet over the irrigation season and those that went dry. Approximate locations of wet/dry interfaces throughout the irrigation season are discussed Section 5.3. The consistently wet reach (both pre- and post- Trendwest transfer) occurs upstream of Ensign Ranch. Seepage losses from this reach can be estimated based on the seepage relationships discussed in Section 5.1. During

average years, the wet/dry transition likely extended as far upstream as the Ensign Ranch Bridge prior to the Trendwest transfer and is expected to occur farther downstream after the transfer. Equation 1, developed to estimate seepage loss between the diversion dam and the Ensign Ranch gage, can be used to estimate seepage loss in this reach before and after the Trendwest transfer. To do this, ECT defined a "typical hydrograph" based on the available spot measurements (see **Figure 5**) and extracted estimated biweekly streamflows over the irrigation season. This hydrograph was used to estimate seepage before and after the introduction of additional flow due to the Trendwest transfer, as shown below in **Table 5**.

Table 5 – Estimated Trendwest Increased Seepage Between the Diversion Dam and Ensign Ranch

Season	Estimated Flow Downstream of Diversion (Average Year)	Trendwest Flow Contribution	Total Seepage Pre-Trendwest	Total Seepage Post-Trendwest	Change in Seepage
Early May	125	1.10	12.28	12.42	0.13
Late May	95	1.10	9.13	9.23	0.10
Early June	60	1.40	6.45	6.54	0.09
Late June	20	1.40	4.34	4.40	0.06
Early July	13	1.50	4.05	4.11	0.06
Late July	10	1.50	3.93	3.99	0.06
Early August	8	1.50	3.86	3.91	0.06
Late August	6	1.50	3.78	3.84	0.06
Early September	6	0.00	3.78	3.78	0.00
Late September	6	0.00	3.78	3.78	0.00
Early October	10	0.00	3.93	3.93	0.00

*All flow units are in Cubic Feet per Second (CFS)

During the average-year condition, the first component of seepage loss to alluvial subflow associated with additional streamflow from the Trendwest transfer is expected to be relatively small, ranging from 0.06 to 0.13 cfs. This is because the rate of change in seepage loss as a function of flow is estimated to be minimal during the lower flows typical of the irrigation season (**Figure 7**). As a result, the addition of 1.0 to 1.5 cfs does not have a significant effect on the amount of seepage loss from Big Creek. During the dry-year condition, the length of the consistently wet reach is shorter because the wet/dry transition extends further upstream. Thus, estimates for the first component of seepage loss will be smaller during dry-years than during wet years, and remain minimal.

The second component of seepage, which occurs downstream of the consistently wet reach, comprises a more significant portion of the additional flow resulting from the Trendwest transfer. This is because the portion of additional Trendwest streamflow that remains in Big Creek downstream of the consistently wet reach can seep into the streambed alluvium and flow as alluvial subflow during portions of the irrigation season. For instance, observations regarding the location of the wet/dry interface during the month of August suggest that addition of Trendwest's water right may have caused the wet/dry interface to shift from the Ensign Ranch Bridge to a point halfway downstream towards the Yakima River. While the additional streamflow assumably caused the wet/dry interface to shift downstream, it is still estimated to occur upstream of the Yakima River. Thus the major portion of Trendwest's water right (that remains in the stream after minor losses to the first component of seepage) is fully transferred via seepage loss to alluvial subflow on its pathway to the Yakima River.

H-01

Under average-year conditions, this dominant component of seepage loss to alluvial subflow is expected to occur relatively close to the Yakima River. The proximity of alluvial seepage to the river's active floodplain suggests that it will appear in the river relatively quickly, and can be treated as a relatively immediate contribution to the Yakima River system. Under the dry-year condition, the majority of alluvial seepage loss from Trendwest's water right occurs farther upstream on Big Creek. Based on described locations of the wet/dry interface during historic dry years, addition of Trendwest's water right is assumed to have shifted the wet/dry interface from a September location halfway between I-90 and the West Nelson Siding Road to its observed 2001 location downstream of the Ensign Ranch Bridge. Although available data are limited, our analysis assumes that all of Trendwest's water right would contribute to alluvial subflow between these two points during a "typical dry year". The increased distance from the Yakima River floodplain during a dry year will cause a longer time lag for this component of seepage to reach the river. ECT used the Big Creek model to estimate the timing for alluvial seepage to reach the Yakima River during a dry year. The time lag and dampening during an average year would be substantially less.

6 Model Simulation of Alluvial Subflow

The Big Creek model was modified by placing specified flux conditions in each model cell containing Big Creek and distributing the second component of seepage loss (described above) among those cells located where losses were expected to occur. The locations of the specified-flux cells are shown on **Figure 9**, with each cell assigned an index number over a consecutive series (1 through 24) starting at the confluence with the Yakima River. The model was run to estimate the timing for streamflow losses to alluvial subflow from Trendwest's transferred water right to reach the Yakima River under the assumed "typical dry-year" condition. Under this condition, the mouth of Big Creek is expected to begin drying out sometime in early July. The wet/dry interface then recedes up the creek until the onset of autumn rainstorms, at which time the wet/dry interface moves downstream, eventually regaining continuity with the Yakima River. The maximum distance to the wet/dry interface is estimated to be approximately 0.75 miles from the Yakima River.

In order to estimate seepage loss to alluvial groundwater from the Trendwest water right for input to the model, PGG assumed that all of the water input to the stream by Trendwest reaches the historic upstream point of the wet/dry interface with negligible loss to the first component of seepage (the analysis presented in Section 5 indicated that this component of Trendwest seepage loss is minimal in the upper reaches). Any additional instream flow, beyond the historical location of the wet/dry interface, was attributed to the Trendwest water rights transfers. Based on interpolation from observations, the location of the wet/dry interface was estimated on a weekly basis under both pre- and post- Trendwest transfer conditions. In our model, we assumed that Trendwest's water use (**Table 4**) seeped into alluvial subflow at a uniform rate between these two points[10]. During earlier portions of the season when the post-Trendwest transfer condition is likely to extend the wet/dry interface to the Yakima River, seepage rates (per model cell) were assumed equivalent to rates estimated when all of Trendwest's water seeps into alluvial subflow. Our weekly estimates of the geographic distribution of seepage loss to alluvial subflow associated with Trendwest's proposed transfer (used as input to the model) are presented below.

[10] The model actually simulated seepage from 5/6 of the estimated historic water use associated with Trendwest's water right in order to split the difference between the proposed MPR transfer (2/3) and the combined MPR/UGA transfer (3/3). Model results are considered applicable to both transfer scenarios.

H-01

Table 6 – Model Input: Estimate of Seepage Losses from Big Creek (Trendwest Portion Only)

Gage Locations	Model Cell Index #	2nd wk Jul		3rd wk Jul		4th wk Jul		1st wk Aug		2nd wk Aug		3rd wk Aug		4th wk Aug	
		Pre TW	Post TW	Pre TW	Post TW	Pre TW	Post TW	Pre TW	Post TW	Pre TW	Post TW	Pre TW	Post TW	Pre TW	Post TW
West Nelson	24														
	23														
	22														
Kallio	21														
	20														
	19														
	18														
	17														
Halfway Pnt	16											Dry	0.167	Dry	0.167
	15											Dry	0.167	Dry	0.167
	14											Dry	0.167	Dry	0.167
	13									Dry	0.167	Dry	0.167	Dry	0.167
	12									Dry	0.167	Dry	0.167	Dry	0.167
	11									Dry	0.167	Dry	0.167	Dry	0.167
Ensign RB	10							Dry	0.167	Dry	0.167	Dry	0.167	Dry	0.167
	9							Dry	0.167	Dry	0.167	Dry	0.167	Dry	0.167
Ensign	8							Dry	0.167	Dry	0.167	Dry	0.167	Dry	0.167
	7					Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry
	6					Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry
	5					Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry
	4			Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry	Dry	Dry
	3			Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry	Dry	Dry
	2			Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry	Dry	Dry
	1	Dry	0.167	Dry	0.167	Dry	0.167	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

The model simulation was performed for a single, isolated dry-year event with additional alluvial infiltration from Trendwest's water beginning to occur near the Yakima River in the middle of July, and reaching its maximum length and extent (from the half-way point upstream to the Ensign gage downstream) by the third week in August. The alluvial infiltration was only modeled through the beginning of September, when Trendwest's water right ends. Thus the "recharge pulse" from alluvial seepage was modeled to occur over a 7-week (49-day) period. The model results predict relatively fast delivery to the Yakima River, with very little dampening (spreading-out over time) of the recharge pulse for both model scenarios.

Figure 10 presents model estimates of the cumulative percent of the seepage loss to alluvial subflow reaching the Yakima River over time. The model predictions suggest that the timing required for alluvial subflow to reach the Yakima River when K_{sat} = 750 ft/d is nearly coincident with the timing of the seepage loss itself. In the early portion of the recharge pulse, seepage loss is expected to reach the Yakima River quickly because the seepage location is immediately adjacent to the river. Later in the 7-week simulation period, the seepage moves farther upstream and a minor time lag is predicted to develop between the return flow and the seepage loss. By the end of the 7-week period for which seepage recharge is simulated, approximately 98.6 percent of the seepage lost to alluvial subflow is predicted to have reached the Yakima River, with most of the remainder reaching the river over the following 10 days. For the K_{sat} = 75 ft/d simulation, a more significant time lag is predicted for alluvial seepage to reach the Yakima River. By the end of the 7-week

H-01

period for which seepage recharge is simulated, approximately 77 percent of the seepage to alluvial subflow is predicted to have reached the Yakima River. Approximately 90 percent of the seepage to alluvial subflow is predicted to reach the river about two weeks afterwards, and 95 percent is predicted to reach the river about one month afterwards. The remaining 5 percent is predicted to slowly reach the river over the following 4 months. In both cases, the predicted timing for the majority (e.g. 90 percent) of the alluvial seepage to reach the Yakima River is relatively fast, and only a small component continues to trickle into the river beyond a month's time delay.

Figure 1
Cumulative Flux vs. Time for Vadose Zone Time Lag Estimates

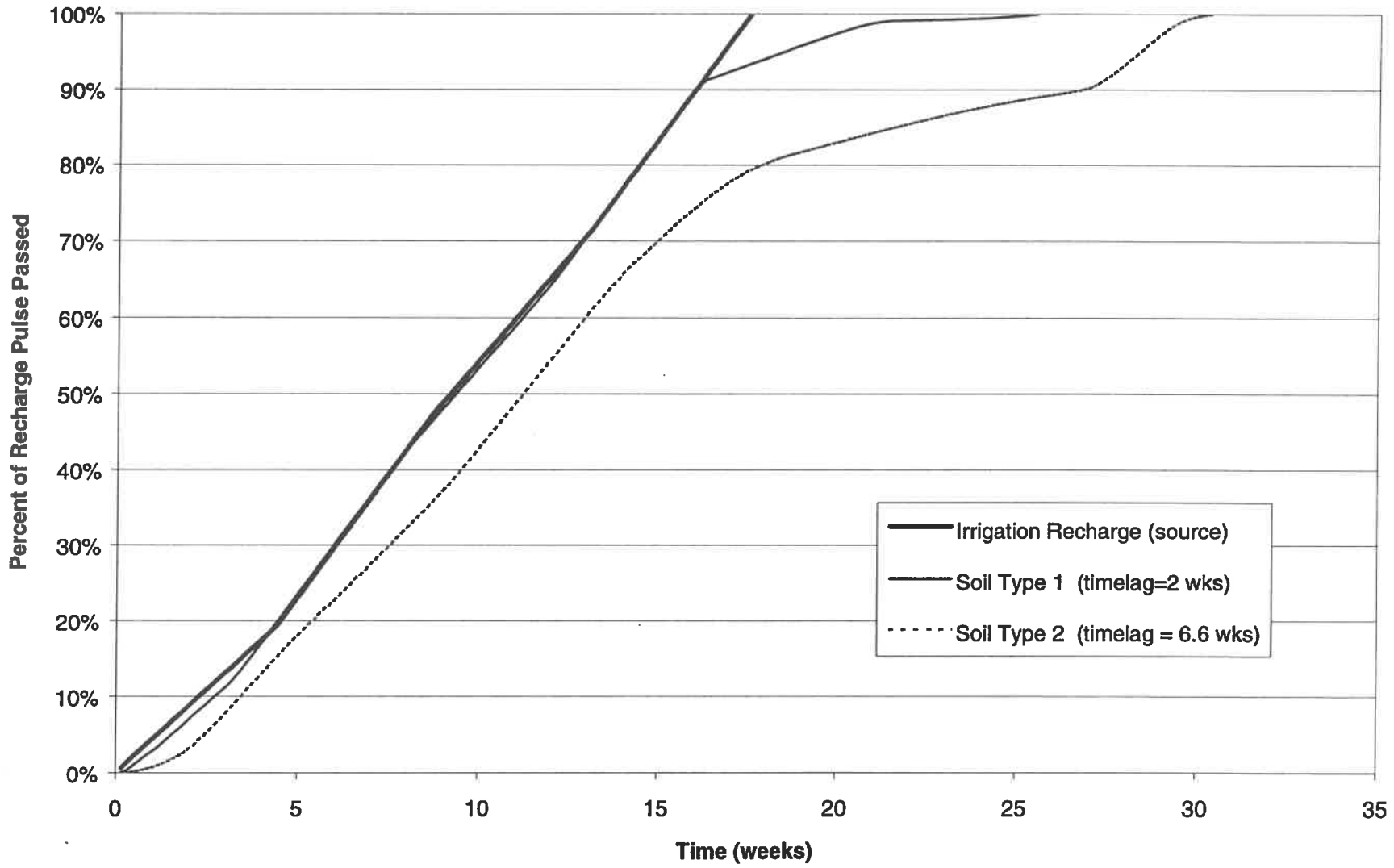
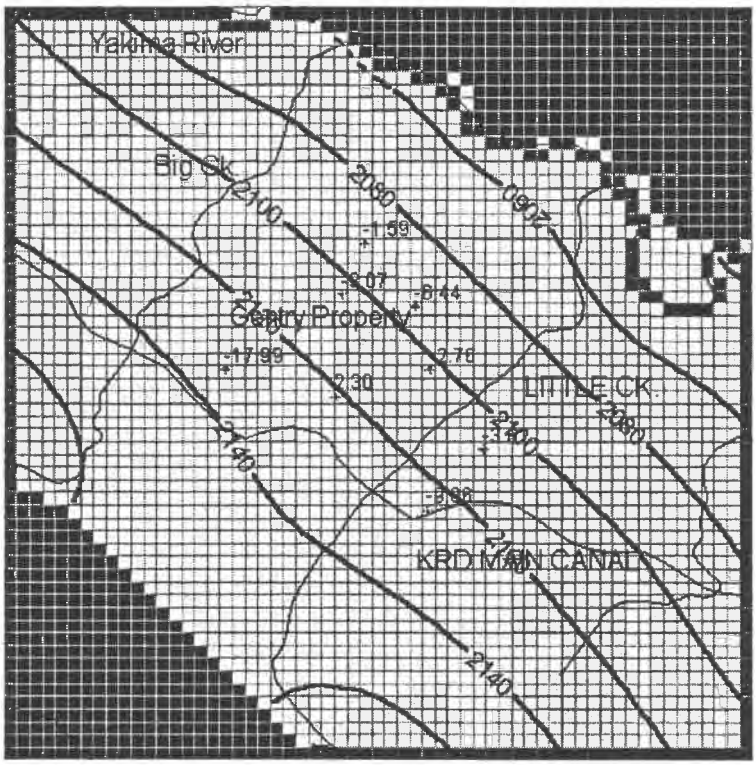


Figure 2
Comparison of Model Scenario Predictions

Hydraulic Conductivity = 750 ft/d



Hydraulic Conductivity = 75 ft/d

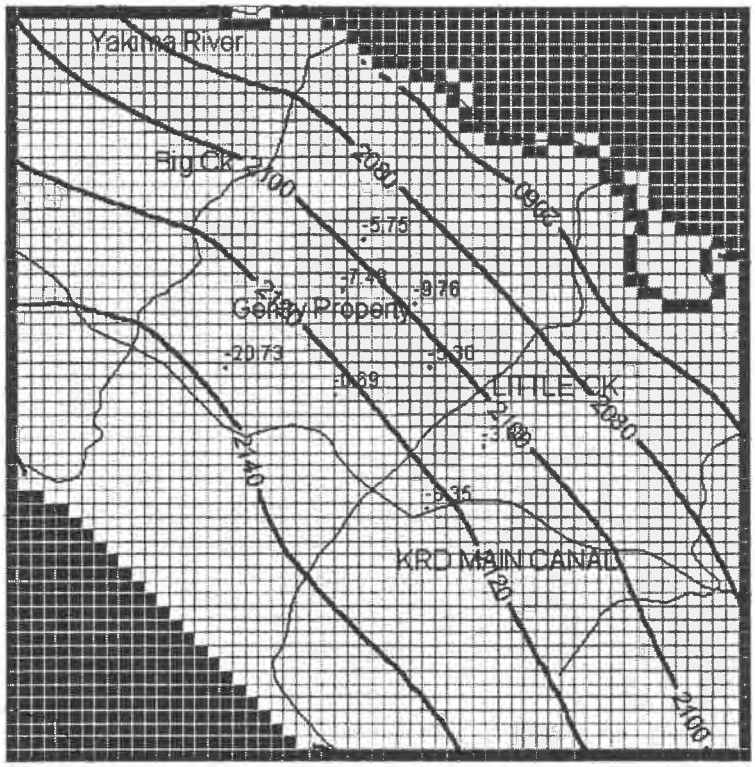


Figure 3
Comparison of Cumulative Percent of Total Flow
Irrigation Inflow vs. Groundwater Outflow (K=750 ft/d)

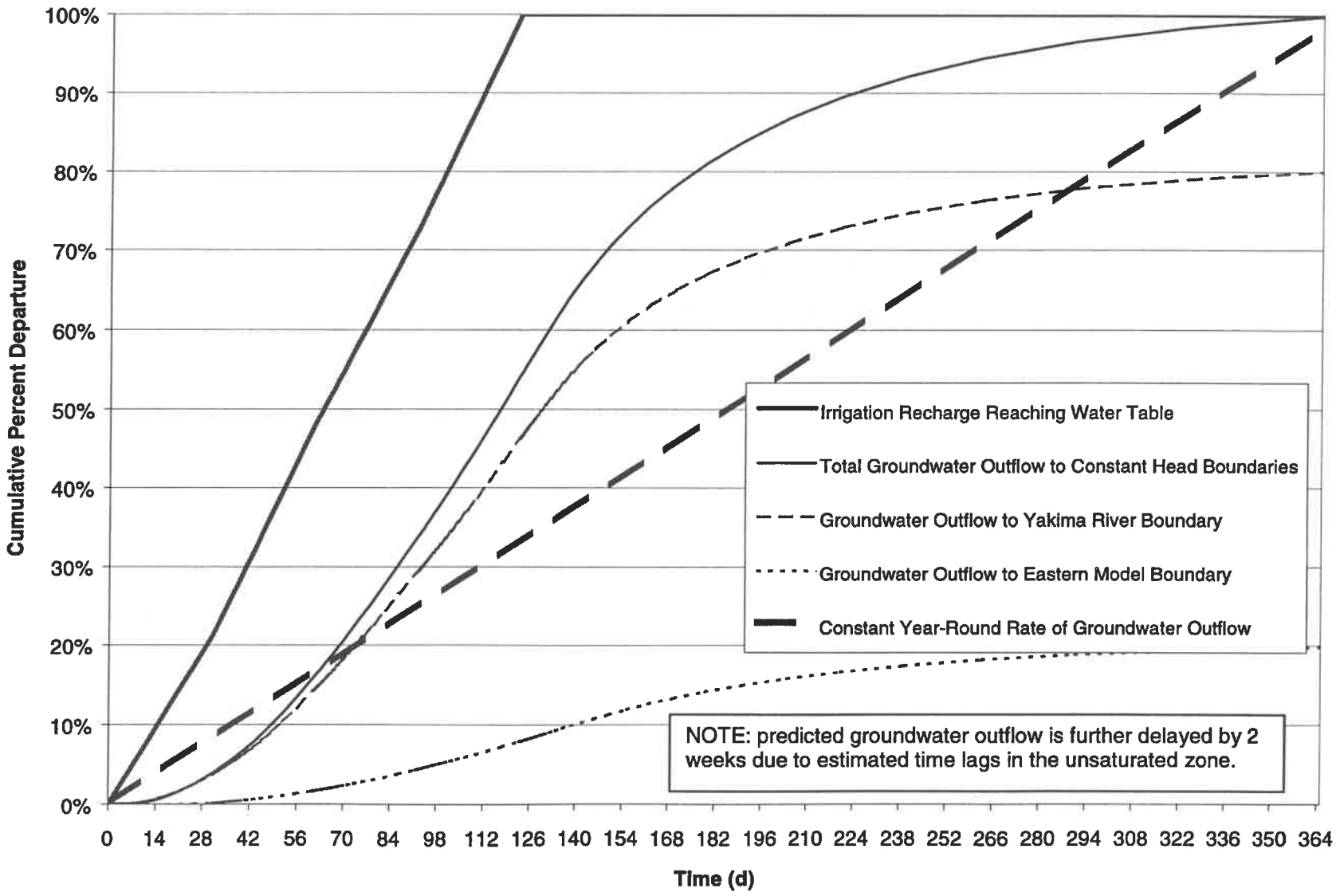


Figure 4
Comparison of Cumulative Percent of Total Flow
Irrigation Inflow vs. Groundwater Outflow (K=75 ft/d)

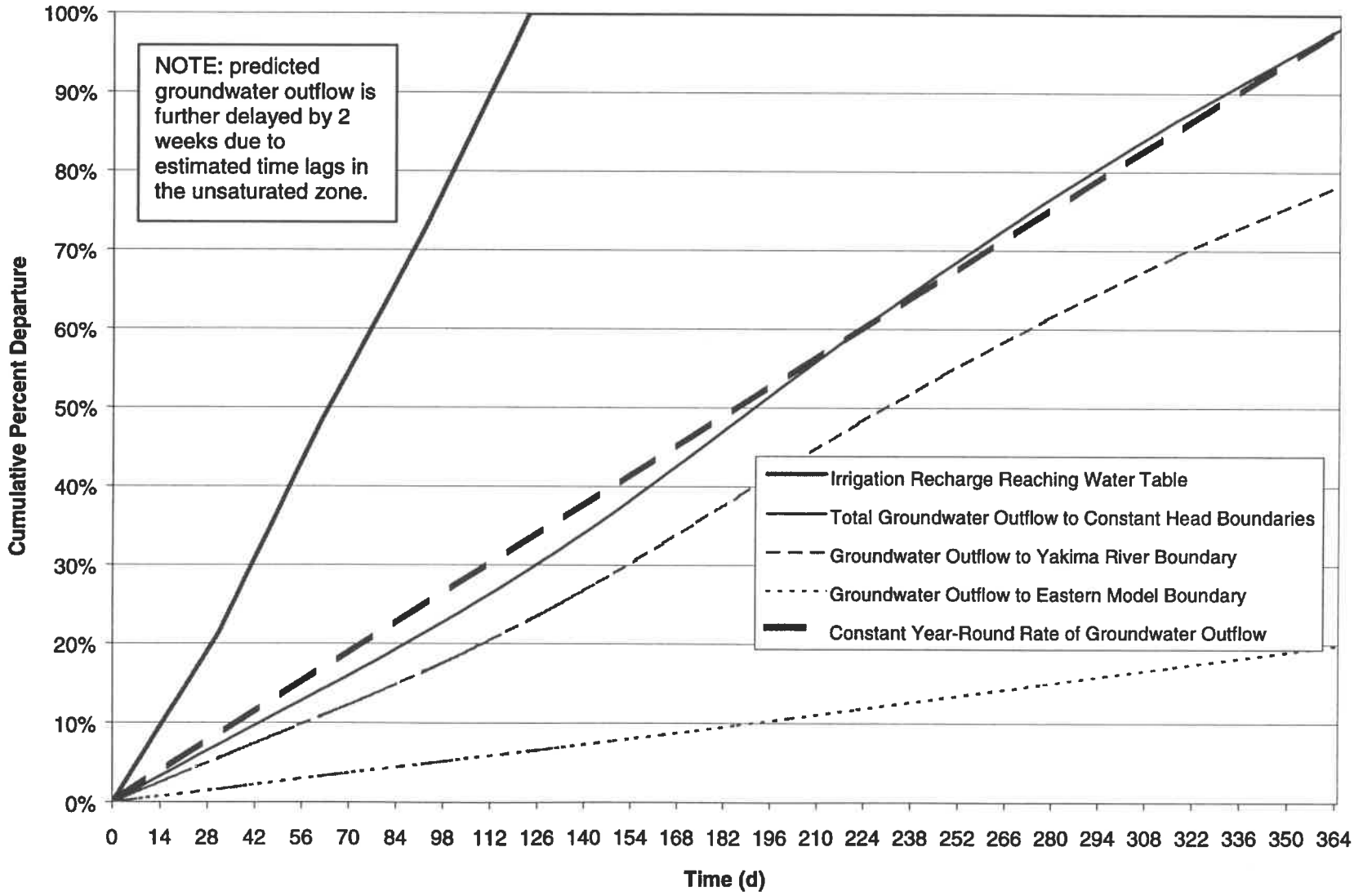


Figure 5
Compiled Flow Measurements on Big Creek
Tom Martin and Montgomery Water Group Data

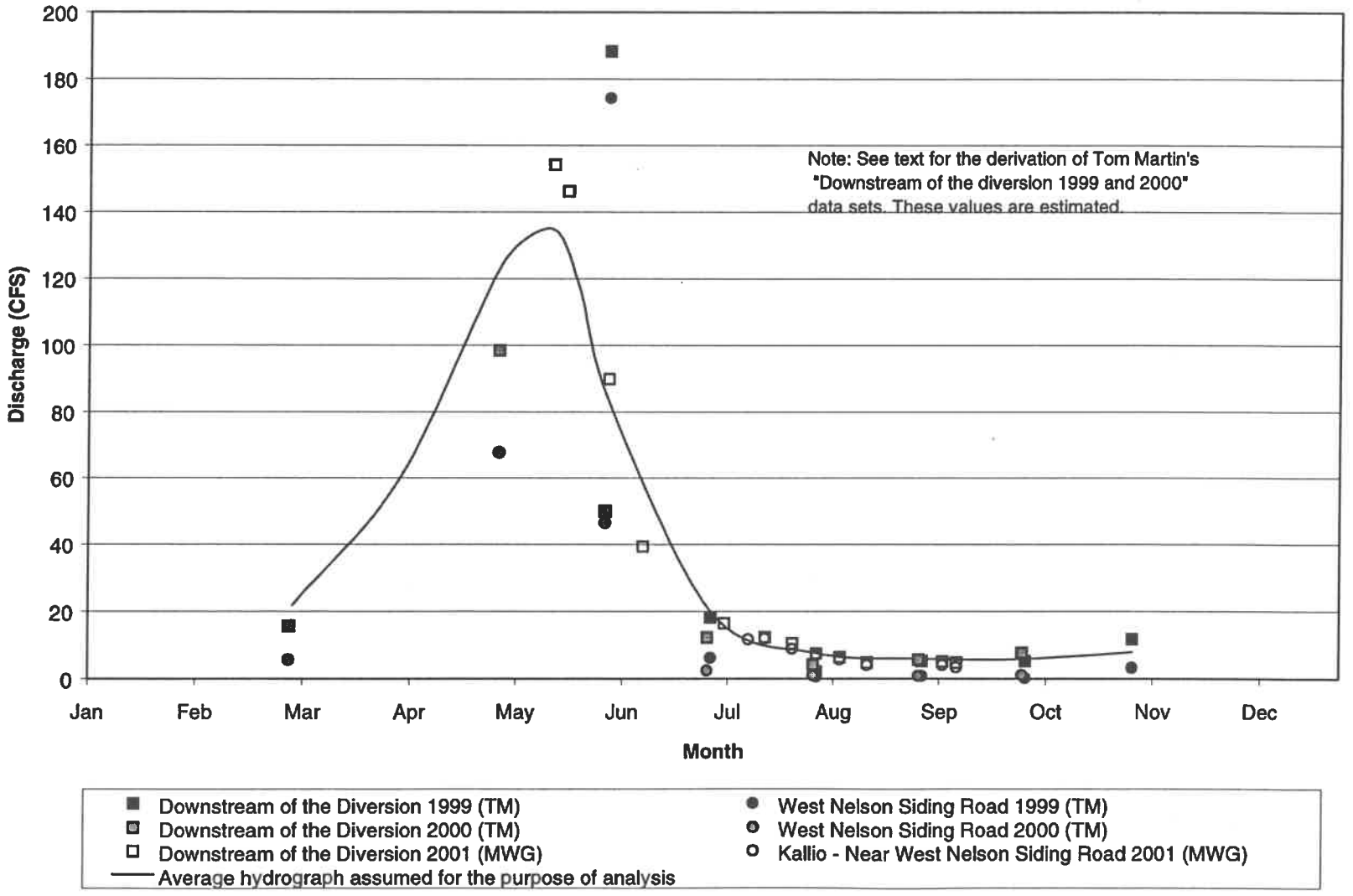


Figure 6
Big Creek Flow Measurements and Estimated Seepage
Montgomery Water Group Data

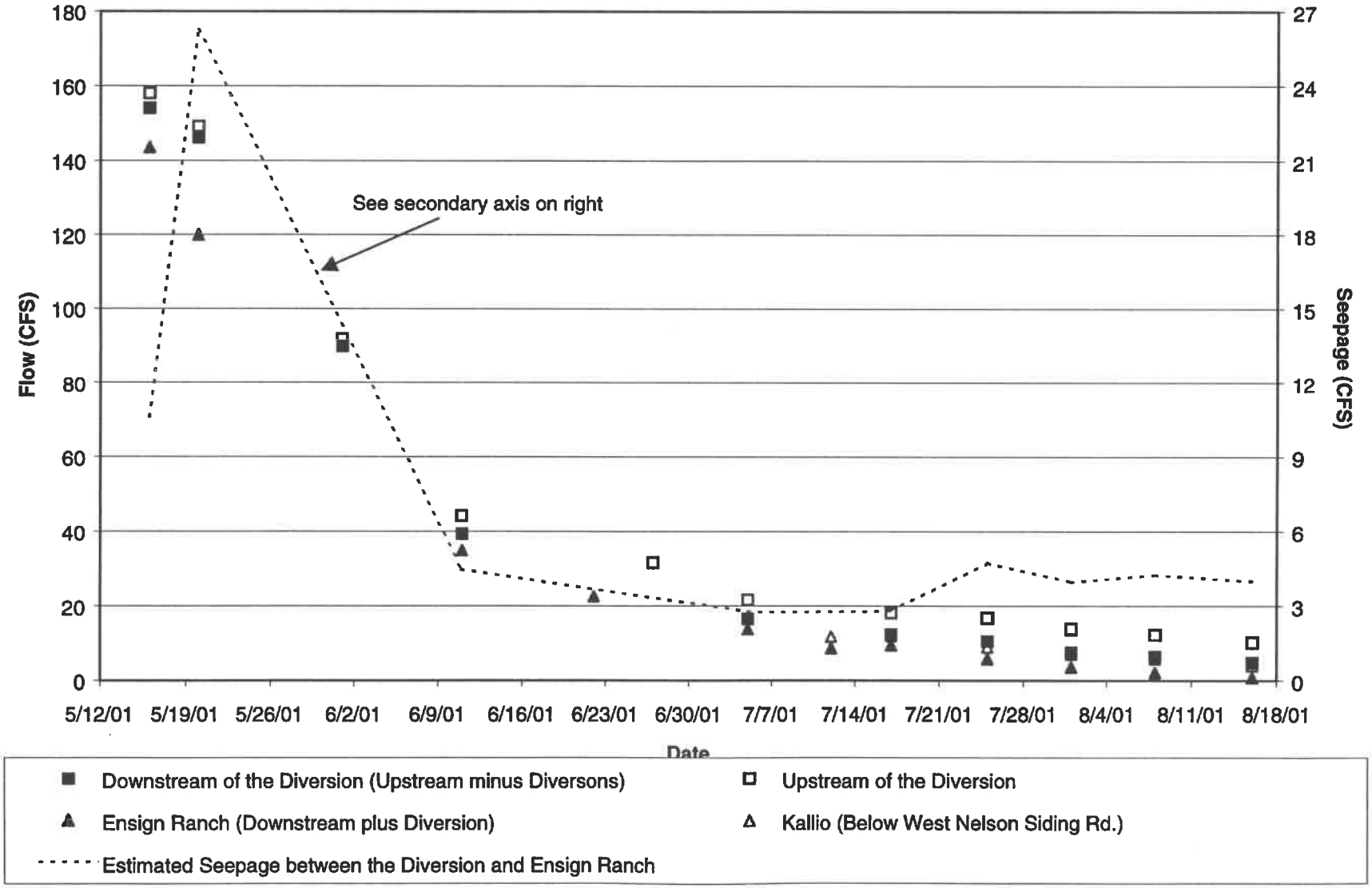


Figure 7
Idealized Seepage Curve for Big Creek (Reaches 1 and 2 Combined)
Montgomery Water Group Data

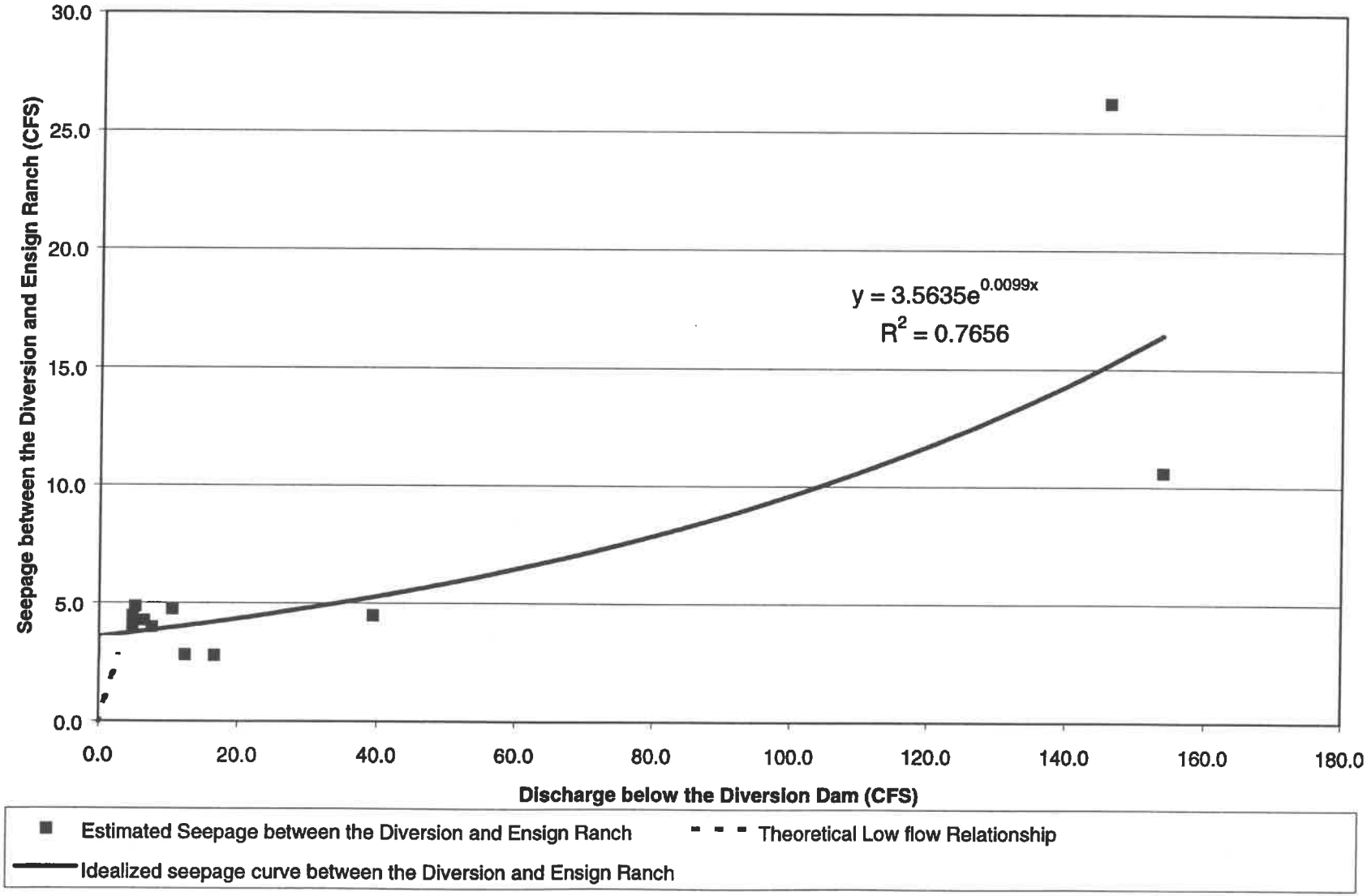


Figure 8
Comparison of Estimated Seepage Loss between Reach 1 (Diversion Dam to Kallio) and Reach 2 (Kallio to Ensign)

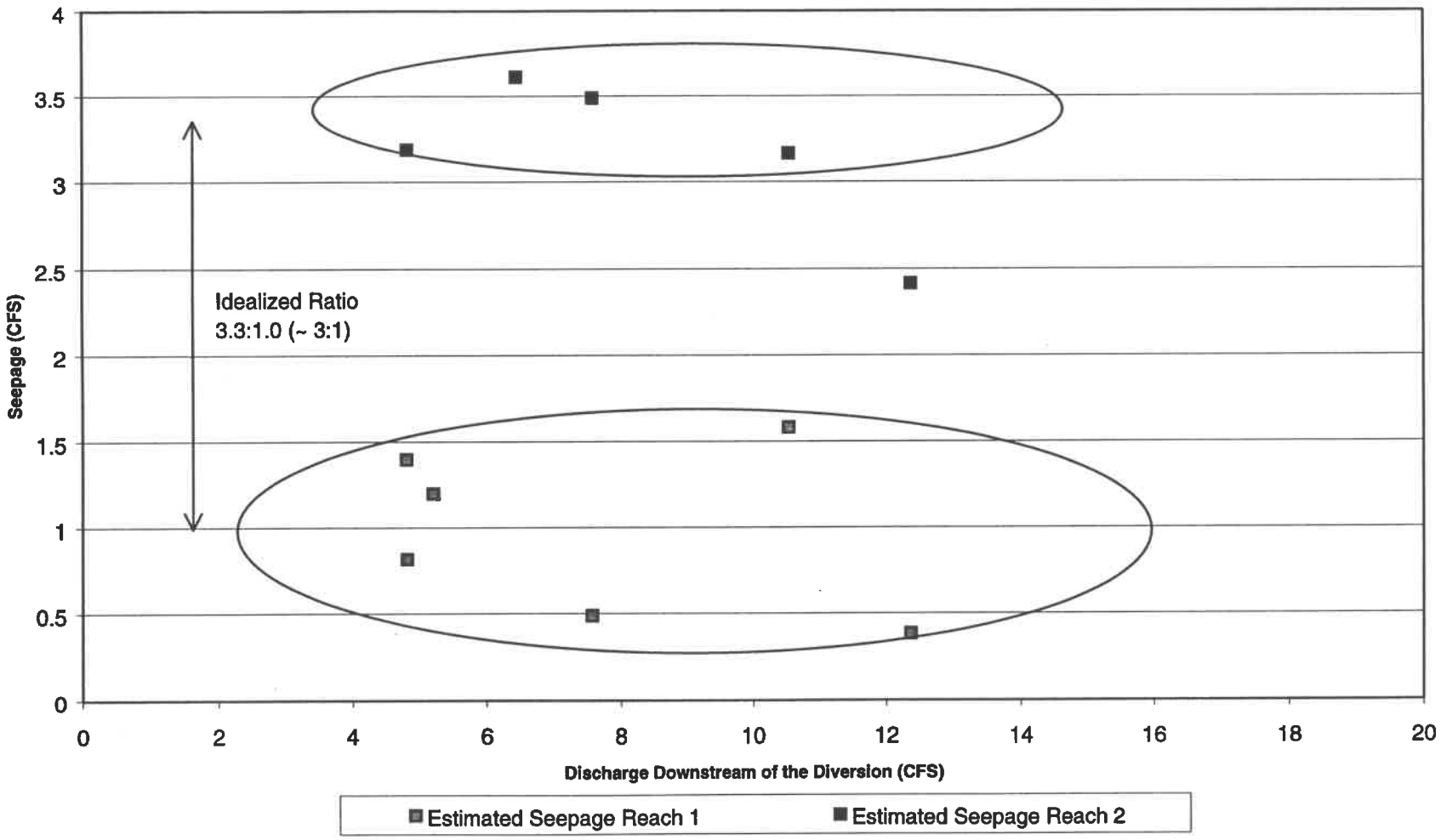
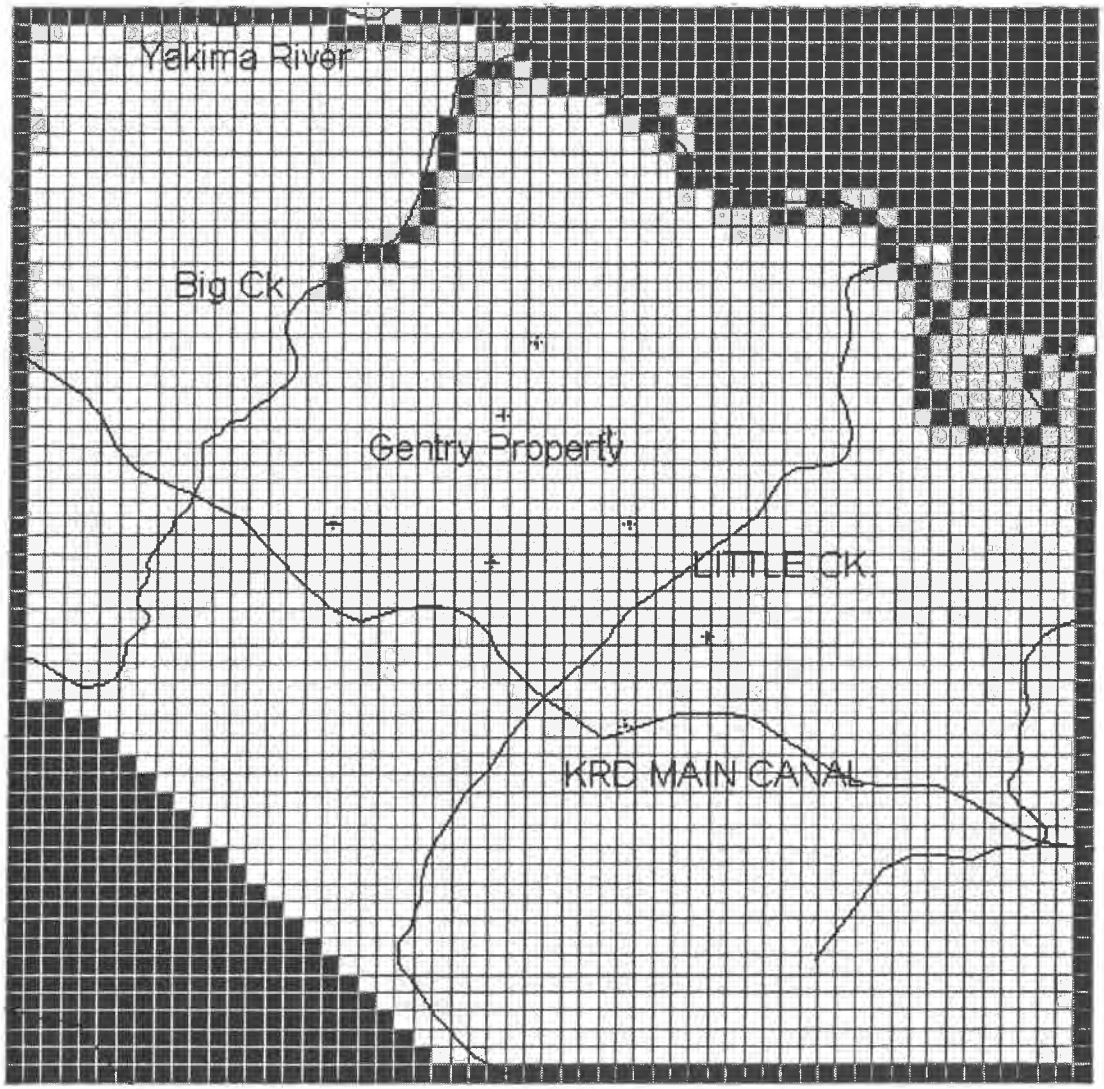


Figure 9
Model Domain for Simulation of Alluvial Subflow

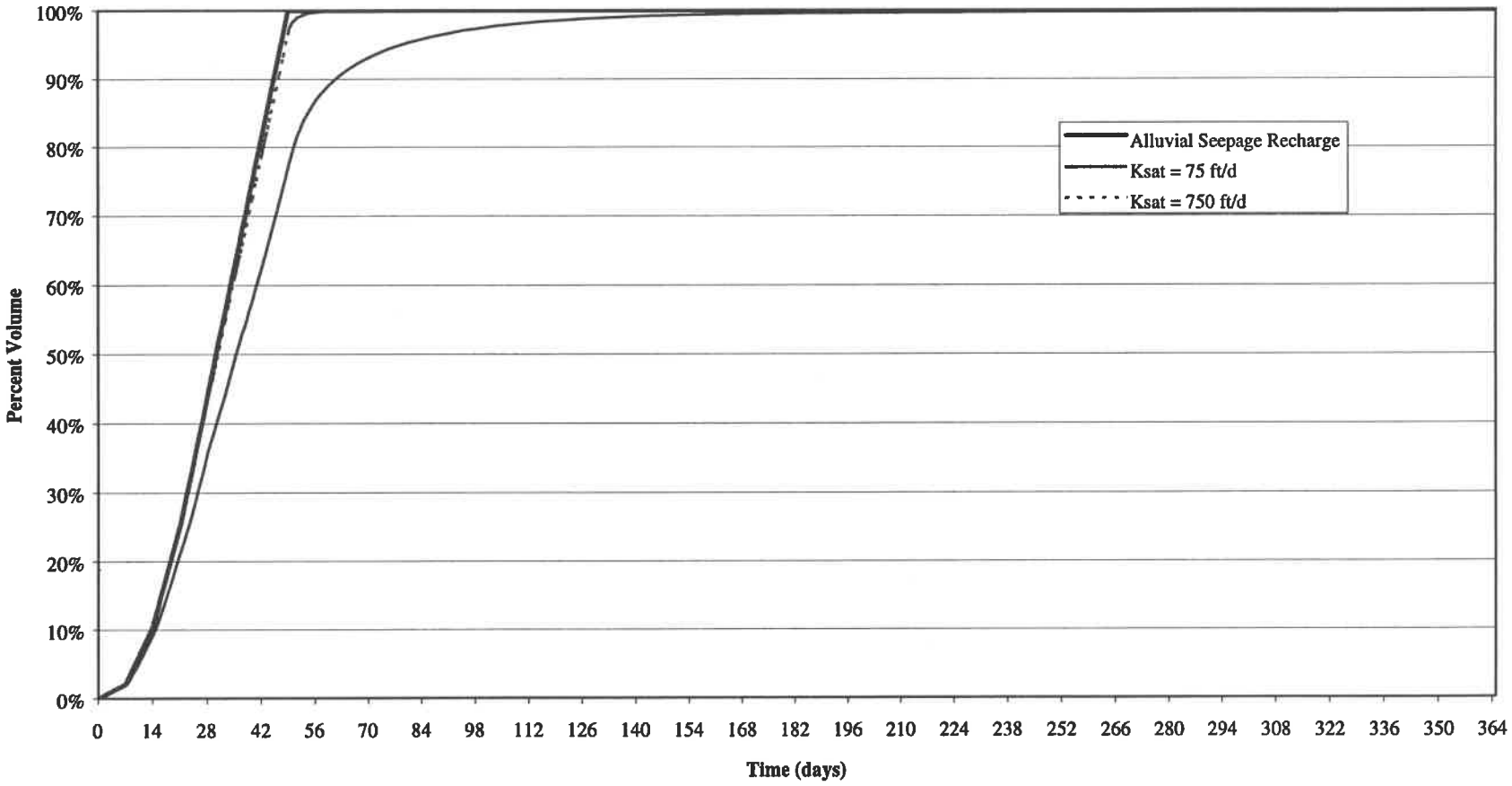


LEGEND

- Specified Flux Cell
- Constant Head Cell
- Inactive ("no-flow") Cell

Cell dimension 250x250 feet.

Figure 10
Comparison of Cumulative Percent of Total Flow
Yakima River Inflow vs. Alluvial Seepage Loss



Pacific Groundwater Group

2377 Eastlake Avenue East
Suite 200
Seattle, WA 98102
206-329-0141 v
206-329-6968 f
www.pgwg.com

Technical Memorandum

To: Randall Doneen, Department of Ecology
Joe Mentor, Mentor Law Group
Jamie Morin, Mentor Law Group
Andy Kindig, A. Kindig & Associates
Tom Martin, Brown and Caldwell

From: Peter Schwartzman, Associate Hydrogeologist, PGG
Chrysten Root, Geologist/Hydrologist, PGG

Re: **TEANAWAY RIVER BASIN HYDROLOGIC ANALYSIS**

Date: January 17, 2002

The purpose of this analysis is to estimate how Trendwest's proposed transfer of six water rights from the Teanaway River into the Yakima Basin Trust Water Program (the Trust) will affect streamflows. This memorandum describes how those transfers to the Trust are likely to affect streamflow in the Teanaway River down to the Yakima River. The results of this analysis will be used as one set of inputs to a separate model developed by Brown and Caldwell (B&C). That model will simulate the combined effects of the Trendwest Master Plan Resort (MPR) and Urban Growth Area (UGA) water demand schedule and the water right transfers on the Yakima River basin, from upstream of the Cle Elum River confluence downstream to the Reecer Creek confluence.

The six water rights Trendwest proposes to transfer were previously owned and used by the Walker family for irrigation of fields very near the Teanaway River. Water diverted under those rights was either consumed by evaporation and evapotranspiration, or returned to the Teanaway River system and the Yakima River as non-consumptive irrigation return flow. Changes in streamflow relative to pre-existing conditions would result from the cessation of irrigation withdrawals. Water would no longer be diverted, ending consumptive losses and non-consumptive irrigation returns from fields irrigated under those rights in the Teanaway River basin. Cessation of diversion would result in increased instream flows during the irrigation season. Irrigation returns are delayed in time between diversion and return as subsurface (groundwater) inflow to the Teanaway and/or Yakima Rivers. Terminating the diversion and resulting return flows from the six Walker irrigation rights would change the temporal pattern of streamflow and increase the volume of water available in the basin annually by the former annual volume of crop consumptive use.

For the purpose of this analysis, changes in the timing and volume of streamflow were estimated by evaluating subsurface return flow and alluvial subflow. Subsurface return flow is the non-consumptive portion of irrigation lost to seepage from ditches and fields that returns to the stream via groundwater. Changes in streamflow also affect the proportion of water moving downstream as alluvial subflow. Alluvial subflow occurs when a portion of the newly added streamflow seeps into alluvial sediments along the stream channel, and travels through a subsurface pathway on (all or part) of its way down to the Yakima River. Alluvial subflow is usually significantly slower than streamflow, which also affects when the diversions transferred to instream flows under the Trust would reach the Yakima River.

The water right transfer proposed by Trendwest on the Teanaway River is broken down into two components. Two thirds of Trendwest's total Teanaway water rights is proposed for transfer to mitigate Yakima River withdrawals for the MPR, while the remaining one third is proposed for transfer to mitigate withdrawals for the UGA. The modeling results presented in this memorandum are considered to be applicable to both the MPR and combined MPR/UGA transfers. The results are presented in a format that can be applied to both transfer scenarios (i.e. as relative percent of transferred water right vs. time).

The findings presented in this memorandum reflect our best estimate of Teanaway basin hydrology that could be reasonably achieved given available data. Where possible, Ecology's Consultant Team (ECT) made efforts to supplement available data with our own field investigations. Given uncertainties inherent in the available data, a degree of uncertainty cannot be avoided in the results of this analysis. However, the findings of this memorandum are considered the best available and most reasonable interpretations of the available data.

1 Overview of Findings

ECT's analysis of readily available data and information collected during our own field surveys show that a shallow alluvial aquifer exists in the Teanaway River floodplain that is comprised of both coarser grained sediments (gravels, cobbles and boulders) and finer grained sediments (clay and clay-bound materials). The Teanaway River is actively migrating over its floodplain, and the coarser sediments likely occur where prior river channels existed. Groundwater level measurements by ECT and other available information suggest that hydraulic continuity[1] likely exists between the alluvial aquifer and the Teanaway River. Streamflow data collected by the U.S. Bureau of Reclamation (USBR) are partly inconsistent with the interpretation of hydraulic continuity; however, this may be due to inaccuracies in the rating curve at the Lambert Gage. A conceptual model consistent with the USBR data would require a highly transmissive alluvial flow system not in continuity with the Teanaway River, which does not match many of the field observations in the basin. Our approach to estimating changes in streamflow associated with Trendwest's proposed transfer was based on the preponderance of evidence, which supports an assumption of hydraulic continuity between the Teanaway River and the shallow alluvial aquifer. For the purpose of comparison, the alternative conceptual model is also discussed in this memorandum.

[1] In this memorandum, hydraulic continuity is defined as a saturated hydraulic connection between the aquifer and the stream by which a change in groundwater conditions adjacent to the stream alters nearby streamflow.

H-01

The net effect of transferring the six Walker water rights to the Trust on Teanaway River streamflow was assessed. At any given moment, flow changes would result from the combined influences of (1) leaving the former diversion instream (both the consumptive and non-consumptive return flow portions) and (2) the change in timing of delivery of the non-consumptive return flows back to the Teanaway River (instantaneous after transfer versus delayed under irrigation). Both of these changes would influence seepage losses to alluvial subflow, as seepage would increase when streamflow increased (and vice versa).

Irrigation return flow schedules to the Teanaway River were estimated under the hydraulic continuity assumption by evaluating a reasonable aquifer permeability value of 300 ft/d (and the implications of reasonably higher values). The model results predict that non-consumptive irrigation recharge will likely reach the Teanaway River within one month or less of the onset of irrigation. The "recharge pulse" caused by irrigation return flows will also exhibit minor "spreading out" (dampening) over time. After transfer of the Walker rights, Teanaway River instream flows would increase from 3.39 cfs in May to between 0.78 to 1.67 cfs over the remainder of the irrigation season. Instream flows would be reduced by 2.2 cfs for a single month after the irrigation season, as a result of ending the delayed irrigation return flow.

ECT estimated incremental increases in alluvial subflow associated with transfer of Trendwest's water right by evaluating seepage losses at both high-end and low-end values of streamflow. Seepage loss to alluvial subflow was estimated to be insignificant at all flow levels.

2 Study Approach and Data Sources

In order to estimate streamflow credit, ECT performed supporting analysis of:

- hydrogeologic conditions in the Teanaway River floodplain;
- Teanaway River streamflows
- hydraulic continuity between the groundwater flow system and the river;
- former consumptive use, ditch losses and field losses associated with the six Walker/Trendwest water rights;
- the likely magnitude and timing of historic non-consumptive irrigation return flows (both surface and subsurface) from the former Walker water rights to their receiving surface-water body; and,
- the likely magnitude of "alluvial subflow" from seepage losses associated with leaving Trendwest's water right as instream flow, and the timing required for such subflow to reach the Yakima River.

ECT first compiled and reviewed readily available hydrogeologic and streamflow data and technical reports, and spoke with researchers and water managers in the study area. Driller's logs of water wells were obtained from the Department of Ecology (Ecology), and continuous streamflow data were downloaded from the U.S. Bureau of Reclamation (USBR) web site. Aerial photographs and summaries of the Walker water rights were obtained from Mentor Law Group, and diversion measurements were obtained from USBR. Topographic and geologic maps

were obtained from the U.S. Geological Survey (USGS). Technical reports were acquired from the USGS and Ecology, but were of limited value for the purposes stated above. Data from the most recent Kittitas County Soil Survey (in press) were obtained from the Natural Resources Conservation Service (NRCS). ECT interviewed Stan Isley (the USBR irrigation enforcement officer for the Teanaway Basin) and Eric Snyder, a post-doctoral researcher with the University of Montana, who is investigating subsurface flow in the Teanaway River alluvium.

The groundwater and surface water flow systems could not be confidently described from readily available, existing information. There were inconsistencies that could not be resolved without additional data collection. ECT performed three site visits to gather additional data to reduce or resolve apparent inconsistencies. ECT's understanding of the groundwater flow system and hydraulic continuity was augmented by Pacific Groundwater Group (PGG) field reconnaissance of the Teanaway River floodplain near the Walker property (formerly appurtenant to Trendwest's water rights). Our understanding of river losses and gains was augmented by a Montgomery Water Group (MWG) seepage study on the Teanaway River below Red Bridge Road, completed after the 2001 irrigation season ended. These field visits filled data gaps and helped to resolve apparent inconsistencies in the available data. Detailed descriptions of these analyses and associated findings are presented in the sections below:

3 Characterization of Hydrogeologic Conditions

3.1 Review of Existing Data and Interviews with Researchers/Water Managers

Based on its broad, flat floodplain and the minimal degree of channel incision observed, the Teanaway River appears to be actively migrating across its floodplain. Soil survey data from the Teanaway River floodplain (NRCS, in press) indicate the presence of gravelly sub-soils (Patnish-Meirmick-Myzel soil complex). Patnish and Meirmick sub-soils are characterized as "extremely gravelly sand and extremely cobbly sand", whereas Myzel sub-soils range from "clay loam" to "very gravelly very sandy clay loam". The NRCS soil map groups all three soils into one unit, thus making distinction between the three impossible from the maps. The variable texture of the sub-soils is not surprising given alluvial deposition within the floodplain.

Driller's logs of wells located near the Walker property were reviewed from Sections 25, 26, 27 and 34 of Township 20 N, Range 16 E. Most of the well locations were specified to the nearest quarter-quarter section, and in some cases ECT was unable to determine whether wells were located on the floodplain or surrounding uplands based on information provided by the drillers. Near the bend in the river at Red Bridge, well logs show variable thicknesses of alluvium (from zero to over 72 feet) overlying the bedrock that can be seen in outcrop near the bridge. Driller's descriptions of the alluvial materials are highly variable, ranging from clay to "river rock" to mixtures of clay, cobbles and boulders[2]. Red Bridge Road defines the northern extent of the floodplain along the Walker property. Well logs from homes along Red Bridge road show 10 to 20 feet of alluvium overlying bedrock described as "sandstone" or "shale". Farther south into the floodplain, well logs suggest a thickening of the alluvium overlying bedrock or "hard clay". Driller's descriptions of the alluvial materials range from clay; to clay mixed with sand, cobbles or boulders; to clean sands, gravels, cobbles and boulders (i.e., without mention of clay). Well

[2] To further complicate the geologic interpretation, wells drilled in the northern upland (Cle Elum Ridge) have also encountered a mixture of granular and fine-grained soils of the Swauk Prairie Drift mapped by Tabor, et al (1982).

H-01

logs along the Teanaway River near State Route 970 in Section 26 suggest that the alluvial thickness could reach several hundred feet[3].

Some well logs describe the alluvium as dominated by fine-grained (clayey) materials, while others show the presence of coarser grained materials such as cobbles and boulders. In general, coarser materials appear to occur closer to the land surface. About two thirds of the logs on record in alluvial-valley portions of Sections 25 and 26 reported cobbles or boulders, mostly within 30 feet of the land surface. In Section 34, about 60 percent of the logs in the alluvial valley reported cobbles and boulders at a wider range of depths from the land surface. Near Lambert and Seaton Roads, some logs report the alluvium overlying a substantial thickness of clay. The fact that the upper portions of the alluvium generally contain higher amounts of boulders, cobbles, and clean gravels suggests that these coarse sediments were derived from channel migration by the Teanaway River.

Most of the well logs located on the floodplain are completed into bedrock below the alluvial sediments. Well depths of 100 to 400 feet are common. As expected, yields from bedrock wells vary significantly, as do static water level elevations. A continuum exists between wells with static water levels close to the land surface (or providing artesian flow) to wells with water levels 200 feet below land surface. Several wells on record are less than 75 feet deep and are completed in the alluvium. Water levels in these wells range from several feet below land surface to 50 feet below land surface.

The relative absence of wells completed in the shallow alluvial aquifer cannot be used to make inferences regarding the permeability of the associated coarse-grained deposits. Current regulations on well drilling require that surface seals be completed to a depth of 18 feet, which may rule out screening many of the more shallow productive zones. More importantly, saturation of the coarse-grained materials may be relatively thin and insufficient to maintain pump submergence, either seasonally or year-round. Seasonal variations in saturation may occur if the shallow zones are dependent on river stage and/or river seepage. Finally, wells completed in recent years are generally drilled into deeper aquifers in order to reduce the risk of contaminants from the land surface reaching the well water.

Current research on the Teanaway River floodplain indicates the occurrence of shallow, coarse-grained sediments deposited as former channels of the river ("paleochannel deposits"). Eric Snyder is a University of Montana post-doctoral researcher investigating groundwater flow in the alluvial sediments near the mouth of the Teanaway River. He has installed a series of shallow (<30-foot) wells in the floodplain alluvium just upstream of Highway 10, and is monitoring water levels, temperature, electrical conductance, dissolved oxygen and biological parameters. He notes that these paleochannels have higher permeability than the surrounding finer-grained alluvium, and therefore can represent preferential pathways for groundwater flow. **Figure 1** presents spot measurements of groundwater and river elevations available for two wells in Eric Snyder's study area. ECT's interpretation of the data appears to show that groundwater conditions vary throughout the year without a discernable, direct correlation to streamflow. Groundwater levels are sometimes higher than river levels and sometimes the opposite.

[3] Driller's locations showed some of these wells on the uplands; however sediment descriptions suggest that they are located in the floodplain.

Observed differences between river and groundwater elevations are commonly less than 1.5 feet in wells installed between 100 and 250 feet from the river.

3.2 Interviews with Local Residents

PGG interviewed residents for local knowledge regarding groundwater sources and how irrigation water infiltrates into the groundwater flow system. The compiled information is anecdotal and subject to some inconsistencies. We spoke with Don Walker (the farmer who irrigated the Walker property over many years), his son Earl, and a resident renting a house on their property. The following reported observations are presented in order to provide an overview of hydrogeologic impressions. We note the source of the information, and sometimes qualify information that we believe to be suspect. For the analyses presented in this memorandum, we weight actual measurements and research findings higher than anecdotal observations. However, we do relate our findings to anecdotal observations where appropriate.

- Don Walker describes the existence of "rock bars" in his fields that cover approximately 10 percent of his irrigated acreage. These rock bars are comprised of coarse-grained materials and absorb about as much irrigation water as he had available to apply. The irrigation water would infiltrate rapidly into the ground in these locations.
- Earl Walker notes that some of the water absorbed by the rock bars would emerge from the ground out of other rock bars. He also notes that some of the return flow from irrigation returns to the Teanaway River via ditches. Don Walker states that he hasn't observed water coming back out of the rock bars, and that irrigation ditches transmit only a small portion of the return flow (e.g. 0.2 cfs) back to the river.
- Don Walker describes two shallow hand-dug wells on his property. The first is at his residence along Red Bridge Road. Don believes that water levels in this well went down after the Masterson ditch was retired, about five years ago. After this point, the well went temporarily dry at Thanksgiving when high use (and potentially low groundwater levels) limited well production.
- The second hand-dug well is located closer to SR-970 near a U-fish pond on the Walker property. Don knows less about the water levels in this well, however his renter noted that she observed a muddy bottom in the well in early summer of 2001. PGG inspected the well and noted a mat of organic material floating over a portion of the water surface. It is unknown whether the renter's observation reflected the well going dry or the presence of this organic mat.
- Don Walker has observed the groundwater table to be approximately 8 feet below ground surface (bgs) on the floodplain based on excavations in several areas.
- Don Walker believes that the depth to water in the hand dug wells responds more to river elevation (coming up in the winter and spring) than it responded to past irrigation of his fields.
- Earl and Don Walker report that prior to selling their water rights to Trendwest and the retiring of the Masterson ditch, the Teanaway River used to go dry immediately downstream of the Masterson diversion. When water was being diverted under those rights, it would begin seeping back into the river about 0.5 to 1 mile downstream

H-01

3.3 PGG Field Investigations

PGG visited the Teanaway basin on September 22 and 27, 2001 to directly observe and measure hydrologic features on the floodplain near the Walker Property. Our activities included:

- measuring groundwater levels in the two hand-dug wells;
- inspecting two springs that emit from the Walker's property, one of which flows to a U-Fish pond via ditches;
- augering soil borings to depths of up to 5.5 feet in the field near the springs to evaluate local soil saturation;
- measuring elevation differences between hydrologic features using a hand level; and
- inspecting the USBR gaging station above Lambert Road to assess channel complications that could contribute to rating curve inaccuracy.

Figure 2 is an aerial photograph of the Walker property that shows the location of the residences, U-fish pond, ditches, springs, wells, and the Teanaway River. A pattern of greener vegetation occurs east of the springs. This area had been planted in dry-land alfalfa. Auger borings revealed a loamy soil overlying a gravelly subsoil. The higher yielding (southern) spring emits into a perforated collector sunk approximately 2.5 feet into the ground. The downgradient ditch is similar in depth, and transmits water to the U-Fish pond (approximately 0.2 cfs measured at the pond's inflow culvert). The lower yielding spring emits to a ditch sunk approximately 1 foot into the ground, with seepage appearing about 6 inches below ground surface. The first boring was augured approximately 20 feet east of the main spring, and reached gravel at about 5 feet below ground surface (bgs). This gravel may be conducting shallow groundwater, but there was no saturation at a five-foot depth. The second boring was augured approximately 5 feet north of the southern ditch. It reached gravel at 4 feet bgs and some moisture was observed. The third boring was augured on the eastern boundary of the Walker property and reached unsaturated gravel at 3.5 feet bgs. The soil boring data were too shallow to explain the springs. Differences in permeability and elevation likely cause groundwater to emit from the land surface.

The green area observed near the springs may reflect soils with a greater water-holding capacity. The pattern of greener vegetation suggests the presence of paleochannels; however, the channelized areas appear to be greener whereas gravels should be better drained. The number and depth of PGG auger borings was insufficient to discern a possible relationship between the green and brown (wet/dry) areas and the occurrence of paleochannels. The wetter area below the springs is approximately four feet higher in elevation than the U-Fish pond. The U-Fish pond appears to be perched over the shallow water table, and may be contained by silty or clayey soils. Mentor Law Group surveyed a 5.5-foot elevation difference between the pond and the Teanaway River. PGG used a hand level to measure the pond elevation at about 6.7 feet above the water table measured in a nearby hand-dug well. The water level in the hand dug well along Red Bridge Road is estimated to be within ± 2 feet of the water level in the well near the pond. The water table elevation of the pond well appears to be about 1.2 (± 0.5) feet below the river at its nearest point. Given the local river gradient of approximately 7 feet elevation drop per 1,000 feet distance, the elevation similarity between the river and the shallow water table suggests hydraulic continuity between the two water bodies. Paleochannel deposits observed in the bank of the Teanaway River also support the likelihood of hydraulic continuity. The paleochannel

deposits were exposed by recent flooding, and showed gravelly channel deposits within a finer grained groundmass (**Figure 3**).

Potential sources of recharge to the shallow alluvial aquifer include groundwater flow from the surrounding uplands, seepage losses from irrigation (where present), upward flow from deeper aquifers, and seepage from the Teanaway River in upstream locations. Upstream of the river bend east of the Walker property, the Teanaway River flows through an alluvial valley about as wide as the valley downstream. Although the upstream alluvial valley is constrained by bedrock on either side, the lateral extent of the alluvium appears sufficient to contain similar paleochannels and groundwater conditions. About 1.5 miles downstream of the Walker property, the Teanaway River valley joins the floodplain of the Yakima River. The Yakima River is about 1.3 miles downstream of the downstream border of the Walker property.

4 Teanaway River Streamflow

ECT compiled and evaluated streamflow data from the Teanaway River to characterize seasonal variations in flow, gaining and losing behavior of specific river reaches, and hydraulic continuity with groundwater. This information was required to predict how additional water introduced from the application of the Trendwest water rights to instream flow use would partition between surface and subsurface (alluvial) flow, and how changes in streamflow could be estimated based on the time required for (the former) irrigation return flow from the Walker property to reach the river.

Streamflow data are available on the Teanaway River at two gages, one located "below the forks" (record: 1909-15, 1948-50, 1966-present) and the other located downstream "above Lambert Road" (record: late 1998 to present). The relatively long period of record at the Forks gage allowed ECT to prepare a chart of average daily flow over the period of record (**Figure 4**). Streamflow tends to increase from late fall through winter, and still higher flows are derived from snowmelt between April and June during the spring freshet. Freshet flows recede into early- to mid-July, at which point streamflow falls into an extended low-flow period through early October. Fall rains allow flows to recover during October and November as the winter season is approached.

ECT compared flows at the Forks and Lambert gages to evaluate how the Teanaway River gains and/or loses flow over the course of the year. Our analysis identified likely problems with the flow data at the Lambert gage, discussed later in this section. The flows reported at the Lambert gage are typically higher than flows reported at the Forks gage during the winter and early freshet. This relationship likely exists due to the fact that winter and early spring precipitation goes into snow storage in the upper watershed elevations, but may fall as rain to provide surface runoff and shallow recharge in the lower elevations. During the late freshet, however, the Lambert gage shows significantly less flow than the Forks gage. **Figures 5 thru 7** show flow comparisons at the two gages from the late freshet through the end of the irrigation season. Acknowledging the possible limitations of the Lambert flow data, several observations can be derived for the time period towards the end of the freshet:

1) Flow losses of 50 cfs to over 100 cfs are reported between the two gages during the tail end of the freshet (mid-July through mid-August);

H-01

2) The Lambert gage falls dramatically until it reaches a minimum baseflow of 8 to 10 cfs, and then shows only a minor flow reduction over the remainder of the irrigation season; and

3) Periods of record occur when flows reported at the two gages have either parallel or differing trends. Differing flow trends do not occur in any consistent pattern.

These observations raise a number of questions regarding the hydrology of the Teanaway River flow system and the accuracy of the flow measurements collected by the U.S. Bureau of Reclamation (USBR). The alluvial aquifer would need to have a transmissivity of 1,300,000 gallons per day per foot (equivalent to a 50-foot thick aquifer with a permeability of 3,500 ft/d) to conduct a subsurface flow of 50 cfs[4]. This value is on the far upper end of what would be reasonably expected for an alluvial aquifer associated with a stream the size of the Teanaway River. Moreover, if this were truly the case, it seems unlikely that late summer baseflows of 8-10 cfs would be maintained in the river. A conceptual hydrogeologic model consistent with direct interpretation of the USBR flow data at the Lambert gage can only be supported by assuming a complex set of field conditions that cannot be substantiated by the existing data[5].

ECT has reviewed the rating curve of the Lambert gage and noted that a significant discontinuity exists in the curve at approximately 9 cfs **(Figure 8)**. The curve was developed in 1998, and has been used over three years of record by applying a "shift" to the stream stage measurement. Given the gravelly nature of the streambed, and the variability of flows in the Teanaway, shifting the rating curve may not sufficiently adjust for changes in the streambed configuration. Furthermore, a large number of spot measurements at a variety of flows would be required to accurately develop the "shift". Flow measurements by MWG on September 19, 2001 showed a discrepancy between the measured flow of (11.2 cfs) and the flow reported by USBR (8.5 cfs). Field observations of the gaging site made by PGG on September 27, 2001, indicate that the shape of the channel is inconsistent with the existing rating curve. Although, the USBR has stated that the rating curve for the lower gage is highly dependant on the presence and location of a gravel bar located near the gage, PGG observed no evidence of a "lip" or other channel feature that would require a discontinuity in the rating curve. A photograph of the gaging site is presented as **Figure 9**.

The behavior of the hydrograph reported for the lower gage also suggests inaccuracies in the associated rating curve. Over the three years of available data, the lower gage typically tracks closely with the flows observed at the Forks gage. However, there are periods when the two gages diverge. During the end of the spring freshet the upper gage exhibits a relatively gradual recession towards a baseflow condition (as would be expected), whereas the lower gage shows an abrupt drop to from flood flow to baseflow. The reported drop appears to be far too abrupt and inconsistent with typical river hydrographs, and the magnitude of reported flow losses is

[4] At the river gradient of 0.01, an aquifer 2,500 feet wide and 50 feet thick would require a permeability of 3,500 ft/d (1.2 cm/sec) to pass 50 cfs of water. If 50 cfs of water went into storage over a 30-day period, the same aquifer would show a 10-foot rise assuming that all the leakage occurs over a 4-mile reach and porosity equals 0.25.

[5] In order to explain the presence of 8-10 cfs baseflow in the stream, one could postulate inflow from a shallow perched system or perhaps subsurface flow off the southern valley upland. Late summer baseflow could also be explained by the theory that streamflow losses to groundwater from upstream locations gradually make their way through the alluvial system and contribute to downgradient baseflow, with the associated time lag perhaps explaining observed late-summer seepage gains.

inconsistent with losses observed at other flow levels and during other times of the year. The slow recessional pattern observed on the Forks gage is much more typical. The apparent large amount of seepage loss observed between the two gages during the spring freshet may be an artifact of the inaccuracies in the gaging sites and associated rating curves. Although some loss between the gages during the spring freshet likely occurs, the magnitude of that loss may be significantly lower than the USBR hydrographs suggest. In order to understand the gains and losses that occur in the Teanaway river basin, additional quality assurance on both ratings curves would be necessary.

Under an assumption that the USBR's flow data are more accurate during the summer low flow period, ECT reviewed these data to evaluate whether the Teanaway River loses or gains flow between the two gages. The USBR data show flow losses ranging from 5 to 20 cfs between the two gages during the late irrigation season (August and September). During the late year 2000 season and immediately following the 2001 irrigation season, an apparent flow gain was observed between the two gages. Flow losses can be compared to typical irrigation diversions between the two gages ranging from 5 to as much as 20 cfs. If the summer flow data can be trusted, both losing and gaining conditions can be interpreted at various times between the two gages. Over most of the irrigation season, distinction between loss and gain is obscured by the fact that irrigation diversions are on the same order of magnitude as measured flow losses.

The locations of the two USBR gages, and potential inaccuracies in the existing data, required field assessments be performed to evaluate gains or losses over the river reach adjacent to the Walker property. MWG performed a seepage survey from Red Bridge to State Route 10 on September 19, 2001, four days after the irrigation season ended (**Table 1**). Flow between the four measurement points did not vary more than the likely measurement error of ten percent[6]. While a small loss of 0.9 cfs is noted over the surveyed reach, measurement error could account for this flow variability. ECT concluded that no significant gain or loss was observed over this reach.

Table 1 – Teanaway River Seepage Study Measurements

Location on Teanaway River	Distance from Red Bridge Site (ft)	Discharge (cfs) on 9/19/2001
Upstream Of Red Bridge	0	12.1
Upstream Of USBR Gage	5500	11.6
Upstream Of Lambert Bridge	9300	13.1
Upstream Of SR 10 Bridge Near Mouth	10400	11.2

5 Hydraulic Continuity Assessment

For the purposes of this analysis, hydraulic continuity is defined as a direct, saturated connection between an aquifer and the adjacent reach of a stream. When hydraulic continuity occurs, a change in groundwater level will affect seepage to or from the stream. Under conditions of hydraulic continuity, a stream can be either losing or gaining. Whereas observation of a gaining

[6] Measurement error may be higher at the Lambert Road site, where the stream bed was significantly more cobbly and bouldery.

H-01

stream ensures hydraulic continuity, observation of a losing stream does not determine hydraulic continuity (losses can occur through an unsaturated zone beneath the streambed). The efficiency of hydraulic coupling between an aquifer and a stream is reduced when a lower permeability streambed impedes seepage gains or losses. The degree of hydraulic continuity determines the magnitude, location, and timing of stream gains or losses in response to changes in the groundwater flow system.

Our evaluation of hydraulic continuity on the Teanaway River was drawn from the information presented above, and is summarized below. Hydraulic continuity on the river reach adjacent to the Walker property means that former non-consumptive irrigation return flows from fields and ditches would have returned locally to the Teanaway River. Without hydraulic continuity, former irrigation losses would have returned to the Yakima River. Identifying receiving water bodies is an important detail for evaluating changes in streamflow associated with Trendwest's proposed water rights transfer. Evaluation of hydraulic continuity has remained a primary focus throughout ECT's investigation. The information collected by ECT supports the likely existence of hydraulic continuity adjacent to the Walker property. In contrast, the USBR flow data, identified as suspect at the Lambert gage, support a conceptual model where hydraulic continuity is more questionable. The following bullets summarize observations related to hydraulic continuity, and in some cases include necessary qualification:

- Hydraulic continuity is supported by the similarity between groundwater levels and river stage during 2001 field studies by ECT, both near the Walker property and further downstream near Highway 10;
- Hydraulic continuity is supported by the existence of a steady late-season baseflow at the Lambert gage, regardless of possible error in the rating curve;
- Hydraulic continuity is supported by the historic observation that flow would return to the Teanaway river within 0.5 to 1 mile downstream of the former Masterson ditch where diversion dewatered the river;
- The USBR streamflow data, if accurate, support a conclusion of hydraulic continuity towards the end of the irrigation season, by virtue of gaining conditions between the two gages reported during some seasons;
- Hydraulic continuity is neither indicated nor disproved by the USBR data (if accurate) during the early irrigation season (late freshet) because a losing condition is observed.

The most likely conceptual model suggests a shallow alluvial aquifer in continuity with the Teanaway River, with coarse-grained paleochannels supporting moderately high permeability.

6 Water Use Associated with the Trendwest Water Right

ECT compared estimates of consumptive crop use for the lower Teanaway Basin reported in the UGA DEIS to the allocated water right, to estimate how much of the total diversion was used by crops and how much returned to the river as non-consumptive return flow. The following table presents a summary of the water use estimates for total use associated with all six Walker water rights.

H-01

Table 2 - Estimated Irrigation Water Use Associated with the Trendwest Water Right

Month	Net Consumptive Use (cfs)	Field & Ditch Loss (cfs)	Total Diversion[6] (cfs)	1-Month Lag Streamflow Change (cfs)
May	1.18	2.21	3.39	3.39
Jun	1.43	2.33	3.76	1.55
Jul	1.67	2.09	3.76	1.43
Aug	1.46	2.30	3.76	1.67
Sep 1-15	0.98	2.10	3.08	0.78
Sep 15-30	n/a*	n/a*	n/a*	-2.30
Oct 1-15	n/a*	n/a*	n/a*	-2.10

* Irrigation season includes only the first 15 days of September.

Values for net consumptive use were used to estimate field loss based on an assumed irrigation efficiency of 65 percent. During the hot months of July and August, the difference between the maximum instantaneous diversion rate (Qi) and crop consumptive use requires an assumption of increased irrigation efficiency by the farmer. Ditch irrigation loss was assumed constant throughout the irrigation season, and raised to the maximum value allowable without exceeding either allocated Qi or the maximum total diversion volume (Qa)[7]. Ditch loss estimates could not be confirmed through field studies, as the Walker property is no longer used for irrigated agriculture. Based on Acquavella adjudication (Yakima River Basin Surface Water Rights Adjudication) maps, several miles of irrigation ditches formerly crossed the Walker property. Acquavella documentation also presents measurements of ditch gain/loss performed by Ecology on selected Teanaway Basin ditches, which can be used to estimate gain/loss per 1,000 feet of ditch. The gain/loss values vary widely, with a number of ditch reaches gaining water presumably from return flow. The losses estimated for Trendwest's water right in **Table 2** fall within the range of losses estimated from the Acquavella data.

The monthly values of total diversion, consumptive use, and field/ditch loss presented above were used to estimate changes in streamflow associated with transferring the irrigation water right to Teanaway River instream flows under the Trust. The following section evaluates the timing of irrigation return flow to the river and estimates the streamflow change resulting from the Walker water rights transfer to the Trust.

7 Irrigation Subsurface Return Flows

Trendwest's water rights allow up to 3.76 cfs to be diverted from the Teanaway River from two former points of diversion immediately below Red Bridge. The actual diversion is limited by the

[7] Trendwest holds six separate water rights with different dates of priority that total 3.76 cfs. The water rights include three 1883 priority water rights (totaling 2.74 cfs) and one 1890 priority water right, which are expected to be typically available for the full irrigation. Stan Isley notes that the last two water rights are 1898 priority rights (totaling 0.34 cfs) that are junior in priority and are usually only available only for the May 1 through July 15 period each year (i.e., they enjoy only "half season availability"). This information became available after performing the analyses described in this memorandum; however, these junior water rights comprise only about 10% of the total late-season diversion. In addition, the B&C Water Balance Model will account for actual water availability and water right seniority.

H-01

Qi limit rather than the Qa limit. The portion of the diversion lost to ditch and field seepage returns to the Teanaway River via both subsurface and surface return flow. Conversations with Don Walker (pers. comm., 2001) suggest that the majority of this return flow infiltrates to the subsurface. In order for nonconsumptive irrigation losses to reach the Teanaway River, they must first pass through the unsaturated zone down to the water table and then flow laterally to the river. Groundwater level measurements and conversations with Don Walker suggest that the unsaturated zone is about 6 to 8 feet thick beneath the Walker property. While some of the irrigation loss may infiltrate directly into paleochannels for fast transmittal to the water table, most likely moves more slowly through arable soils. PGG performed a series of calculations using Hydrus-2D (a variably-unsaturated numerical flow model) under varying soil textures at the average rate of former irrigation loss on the Walker property. PGG's evaluation suggests that estimated ditch loss comprises about two thirds of the total irrigation loss. A series of ditches cross the Walker property, which would infiltrate water considerably faster than the fields. High infiltration rates lead to fast rates of transmittal through the unsaturated zone. PGG's calculations show that estimated time lags required for irrigation losses to reach the water table are likely to range from very short periods below ditches and via paleochannels to about three weeks below fields.

The southern boundary of the Walker property is nowhere more than 1,000 feet from the Teanaway River, and the northern boundary is nowhere more than 3,000 feet. Once the irrigation seepage loss reaches the water table, the travel time required to reach the Teanaway River depends on the geometry of the alluvial flow system and former place of use, aquifer properties (permeability (K) and storage coefficient (S)), and degree of hydraulic continuity with the Teanaway River. The fastest return flows will occur where permeability is high, storage coefficient is low, and full hydraulic continuity exists between the alluvial aquifer and the Teanaway River. Paleochannel deposits are considered to be high permeability, and have the capacity to return irrigation losses quickly to the river if the network of paleochannels is continuously connected between the areas of irrigation recharge and the river. If paleochannels are not well interconnected, the bulk permeability of the alluvial flow system will be limited by the permeability of the finer-grained matrix in which the channels occur. Bulk permeability can also affect the degree to which the 4.5-month irrigation recharge pulse gets spread out over time (dampened) before reaching the river. Data available to ECT did not allow assessment of the connectivity of the paleochannels or the permeability of the finer grained matrix. In order to estimate a likely range of the time lag and dampening required for irrigation losses to reach the Teanaway River, PGG developed groundwater flow models with the USGS MODFLOW code and constrained modeled aquifer permeabilities to reasonable values.

Figure 10 presents the flow model used for PGG's model simulations. The model simulates a 60-foot thick alluvial valley aquifer confined by relatively impermeable bedrock on either side. The aquifer receives a small amount of year-round recharge (0.4 cfs) along its bedrock contacts and approximately 5 in/yr of year-round areal recharge. Full hydraulic continuity with the Teanaway River is defined by a "drain" boundary, which allows streamflow gain from groundwater but does not allow outflow back to the alluvial aquifer. The rates of recharge were selected over a reasonable range to ensure that the drain gained flow from groundwater over the modeled reach. The absolute accuracy of these recharge estimates is of low importance relative to the fact that they define a flow system that discharges to the Teanaway River. Constant head

boundaries were defined at the upstream and downstream ends of the alluvial valley based on the river elevation mapped on USGS topographic maps of the project vicinity. The model was run in transient mode, with 4 years of simulation without any input from former Walker irrigation followed by 6 years with seasonal irrigation losses. Viewed as irrigation recharge rates, estimated irrigation seepage losses range from 0.26 to 0.3 inches per day. Specified flux boundaries were used to define transient recharge from the Walker property at an average irrigation-season rate consistent with seepage loss from the full Walker water right[8] (documented on **Table 2**).

An S value of 0.25 and a range of aquifer permeability between 30 to 300 ft/d were originally defined to constrain estimates of the timing of former return flows to the Teanaway River. However, springflow rates estimated during PGG's second field visit suggested that a K value of 30 ft/d was too low to match the observed conditions. The spring that emanates from the Walker property east of the U-Fish pond has an estimated discharge of about 0.2 cfs. Screening level calculations of groundwater flow in the alluvial aquifer, similar to those presented in Section 4, suggest that a K value of 30 ft/d corresponds to a total groundwater flow of 0.43 cfs through the alluvial aquifer. It is highly unlikely that the Walker's spring, which "skims" water off the top of the alluvial water table over a limited width of the valley, is able to capture almost half the groundwater flow in the valley. A much smaller proportion of the total groundwater flow is likely warranted. Thus, we adjusted our range of model simulation to K values of 300 ft/d and above (corresponding to alluvial aquifer capacities of 4.3 cfs and above). Time series predictions of inflow to the Teanaway River from the model results were used to estimate the timing of irrigation return flow reaching the Teanaway River.

Figure 11 presents predicted hydrographs of the groundwater inflow to the Teanaway River resulting from the former Walker irrigation recharge based on an aquifer permeability of 300 ft/d. Within the first two weeks of irrigation, only a small portion (less than 50 percent) of the rate of non-consumptive irrigation return is predicted to reach the river. After the season has ended, approximately 80 percent of the irrigation return volume has reached the river (**Figure 12**). About 10 percent of the total irrigation return volume is predicted to reach the river over the next three weeks, with the remaining 10 percent reaching the river over the remainder of the year. With a K value of 300 ft/d, a time lag of about one month is a reasonable upper-end limit for the irrigation return to the Teanaway River. This time lag represents a combined lag from unsaturated flow through the soil profile and saturated flow to the river. If higher K values were modeled, associated time lags would likely be shortened to no more than one or two weeks. The "tail end" of the modeled return flow schedule represents only a small portion of the total irrigation seepage loss.

Given the estimated upper-end time lag of one month associated with the K=300 ft/d model simulation, the change in streamflow from the instream transfer of Trendwest's water rights averaged over a given month during the irrigation season can be estimated as the total diversion returned to the stream minus the irrigation return flow that would have returned to the stream under historic irrigation practices during the same period. If the return flow were instantaneous (i.e. for K values much greater than 300 ft/d), the change in streamflow would be an increase

[8] The values used in the model were actually 10% higher than the full Walker water right; however, this should have little bearing on model results.

H-01

equivalent to the estimated consumptive use. This portion of the diversion was historically used by the crops, and would now be available to contribute to increased streamflows. **Table 2** presents estimates of consumptive use and changes in streamflow based on a one-month delay for irrigation returns. During the month of May, increased flows in the Teanaway below the points of diversion would equal the estimated consumptive use (3.39 cfs) because prior irrigation is unavailable to provide return flow to the stream. Starting in June, streamflow increases would be a result of the added instream flows from ceasing diversions, minus non-consumptive return flow from irrigation during the prior month (0.78 to 1.67 cfs). Streamflow reductions of 2.1 to 2.3 cfs would occur for one month after the irrigation season is over relative to historic conditions, because historic irrigation return flow would no longer occur for that portion of the streamflow.

The simplified method discussed above presents estimates of streamflow change for the full water-rights transfer (MPR+UGA); however, the same approach can be used to estimate return flows for the MPR transfer alone. In both cases, change in streamflow is approximated by subtracting the prior month's return flow from the current month's diversion returned to Trust. As noted earlier, the proposed MPR transfer represents about 2/3 the total transfer for the MPR and UGA combined. ECT recommends that B&C use a one-month time delay for non-consumptive irrigation returns in its modeling. A plus or minus 2-week error range should be used as inputs to the upper and lower model bound simulations to represent uncertainty associated with the model results.

The analytical model discussed above is based on the conceptual model that incorporates hydraulic continuity between the alluvial aquifer and the Teanaway River. This conceptual model is best supported by the available data, and is considered to be the most reasonable representation of the hydrologic system. However, interpretation of the USBR streamflow data could support an alternative model with limited (or zero) hydraulic continuity between the alluvial aquifer and the Teanaway River. For the purpose of completeness, ECT notes that this alternative conceptual model would indicate that prior irrigation return flows would discharge to the Yakima River (rather than the Teanaway River) over a more spread-out, year-round schedule. Under this model, the proposed transfer would result in larger increases in irrigation-season streamflow in the Teanaway and Yakima Rivers, but reductions in Yakima River streamflow outside the irrigation season.

8 Alluvial Subflow and Associated Time Lag

Theoretically, a portion of the streamflow credit delivered to the Teanaway River could flow in the alluvium along the river rather than in the river itself. This subsurface flow component, termed "alluvial subflow", occurs at a slower velocity than flow in the stream. If a significant portion of the former irrigation diversions returned to instream flow were to flow in the alluvium along the stream, some time lag might occur between the former points of diversion and the Yakima River. The timing of water delivery to the Yakima River is significant because the water balance accounting for the Trendwest MPR and UGA will require estimates of monthly water availability for the water rights transferred to the Trust.

ECT estimated the contribution to alluvial subflow associated with Trendwest's water right transfer over two portions of the irrigation season: the period dominated by the spring freshet

(May through early July) and the period dominated by summer low flows (early July to the middle of September). During the freshet, streamflows are relatively high and addition of 1 to 4 cfs is expected to have negligible impact on seepage loss. Despite questions about the rating curve for the Lambert Road gage, it is still worthwhile to note that at 200 cfs, a 4 cfs change in flow causes a 0.01 foot change in stream stage. While this example is specific to the Lambert gage, significant incremental stage increases at such high flows are not expected for 1 to 4 cfs additional streamflow. We estimate that the change in seepage loss is negligible when flows at the Forks gage are above 200 cfs (typically until early July).

In contrast, during low flow conditions significant stage increases are expected due to the addition of Trendwest's water rights to instream flows. Summer low flows are generally observed at the Lambert gage after early July. Based on MWG's seepage survey, little natural gain/loss is expected to occur over the reach between Red Bridge and SR-10 under the summer low flow regime. MWG performed hydraulic calculations based on cross-sections measured during their seepage survey to estimate how average values of wetted perimeter and hydraulic radius would vary with streamflow variations of ±4 cfs, as a departure from the 11 cfs measured in the field. As a conservative measure, the field-measured loss of 0.89 cfs along this reach of the river was used as a basis for the seepage loss estimates. Seepage loss was assumed to increase proportionally with relative increases in both wetted perimeter (representing the surface area of the streambed) and hydraulic radius (representing the height of the stream stage above the streambed). While these calculations are hypothetical and approximate, they suggest that changing the flow by ±4 cfs would result in a change in seepage loss of ±0.2 cfs. The calculations are presented on **Table 3** at the end of this memorandum. Thus, during the summer low flow season, seepage loss to alluvial subflow associated with Trendwest's water right transfer to instream flows under the Trust is likely to be insignificant.

Table 3
Hydraulic Analysis of Streambed Seepage

Teanaway River Seepage Calculations
Rev. 9/20/01

Location on Teanaway River	Distance from Red Bridge Site (ft)	discharge (cfs) on 9/19/2001	estimated Manning's n	wetted perimeter (ft)	area (sq. ft)	hydraulic radius (ft)	calc. friction slope
UPSTREAM OF RED BRIDGE	0	12.1	0.05	34.4	16.5	0.480	0.00161
UPSTREAM OF USBR GAGE	5500	11.6	0.05	31.0	24.2	0.781	0.00036
UPSTREAM OF LAMBERT BRIDGE	9300	13.1	0.05	34.2	18.3	0.535	0.00133
UPSTREAM OF SR 10 BRIDGE NEAR MOUTH	10400	11.2	0.05	36.2	20.9	0.577	0.00067
	Average W.P.	34.0					
	Surface Area (sq.ft)	353080				0.593	

Assuming same friction slope and Manning's n at 9/19/2001 flow plus 4 cfs, an extrapolated bank (because we do not have a surveyed bank cross section), and that top width approximates wetted perimeter in wide shallow streams, the following estimates give wetted perimeter and area at the cross sections with the additional TW water. ManningSolver was used to calculate top width and area at the Q+4 cfs flows.

Location on Teanaway River	9/19/01 Q + 4 cfs	wetted perimeter (ft)	delta w.p.	flow area (sq. ft)	delta A		hydraulic radius
UPSTREAM OF RED BRIDGE	16.1	37.8	3.4	20.5	4.0		0.542
UPSTREAM OF USBR GAGE	15.6	32.4	1.4	29.6	5.4		0.914
UPSTREAM OF LAMBERT BRIDGE	17.1	34.4	0.2	21.9	3.6		0.637
UPSTREAM OF SR 10 BRIDGE NEAR MOUTH	15.2	38.1	1.9	25.8	4.9		0.677
	Average W.P.	35.7					
	Surface Area (sq.ft)	371020					
	Delta S.A (sq. ft)	17940				Ave.	0.692

Similar calculation as above except with Q minus 4 cfs...

Location on Teanaway River	9/19/01 Q - 4 cfs	wetted perimeter (ft)	delta w.p.	flow area (sq. ft)	delta A		hydraulic radius
UPSTREAM OF RED BRIDGE	8.1	30.8	-3.6	12.5	-4.0		0.406
UPSTREAM OF USBR GAGE	7.6	29.4	-1.6	18.5	-5.7		0.629
UPSTREAM OF LAMBERT BRIDGE	9.1	30.7	-3.5	14.3	-4.0		0.466
UPSTREAM OF SR 10 BRIDGE NEAR MOUTH	7.2	34	-2.2	15.7	-5.2		0.462
	Average W.P.	31.2					
	Surface Area (sq.ft)	324740					
	Delta S.A (sq. ft)	-28340				Ave.	0.491

Calculations	Surface Area	Hydraulic Radius	Multiplying Factors	Seepage cfs	Change in Seepage, cfs
12.1 cfs	353080	0.5930		0.89	0
16.1 cfs	371020	0.6924		1.09	0.20
8.1 cfs	324740	0.4907		0.68	-0.21
% change +4 cfs	1.05	1.1676	1.23		
% change - 4 cfs	0.92	0.8275	0.76		

Note: Seepage loss was assumed to increase proportionally with relative increases in both wetted perimeter (representing the surface area of the streambed) and hydraulic radius (representing the height of the stream stage above the streambed).

Figure 1
Comparison of Water Elevations Near the Teanaway River at Highway 10

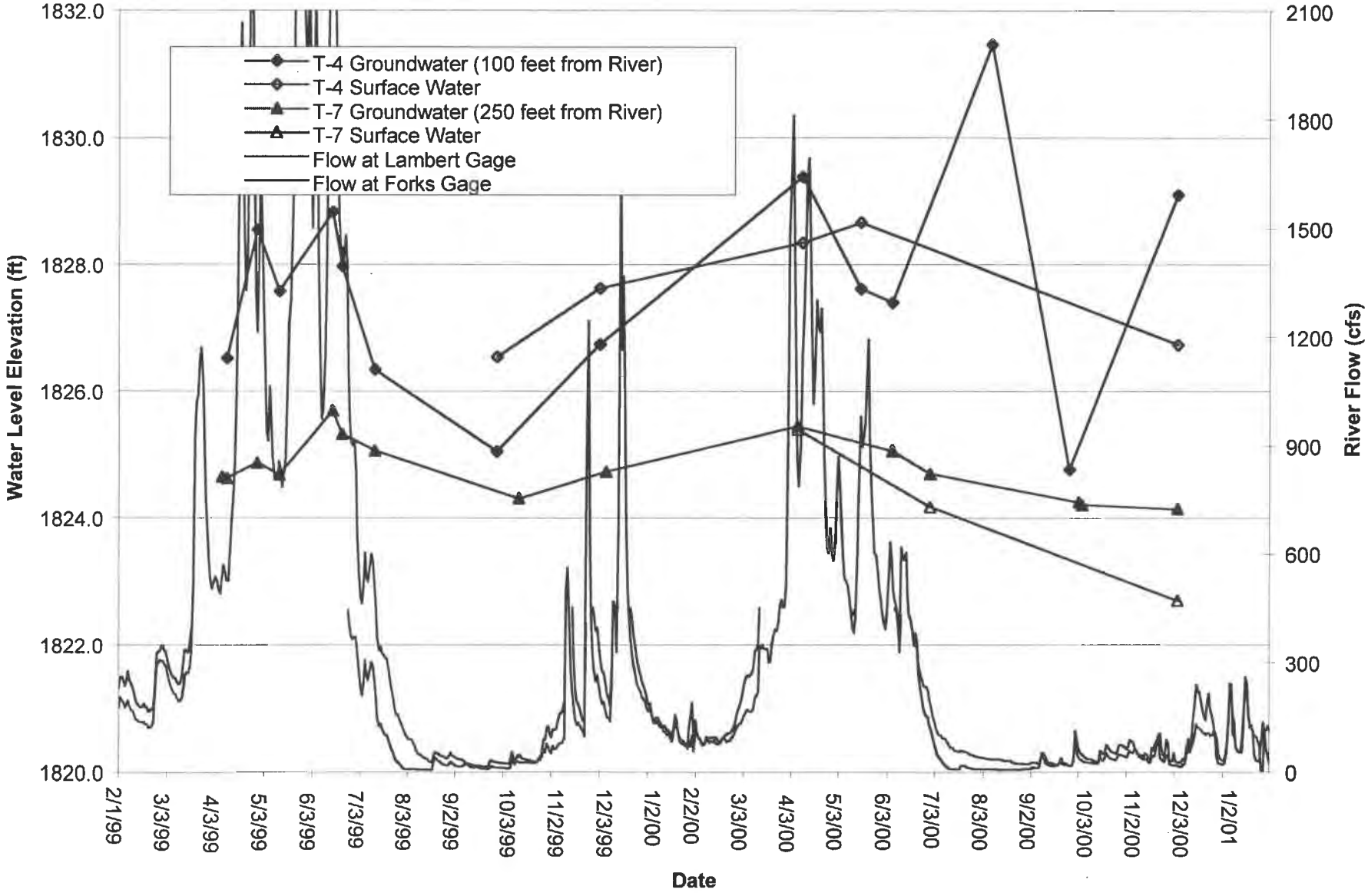


Figure 2
Aerial Photograph of Walker Property Dated 8/11/01

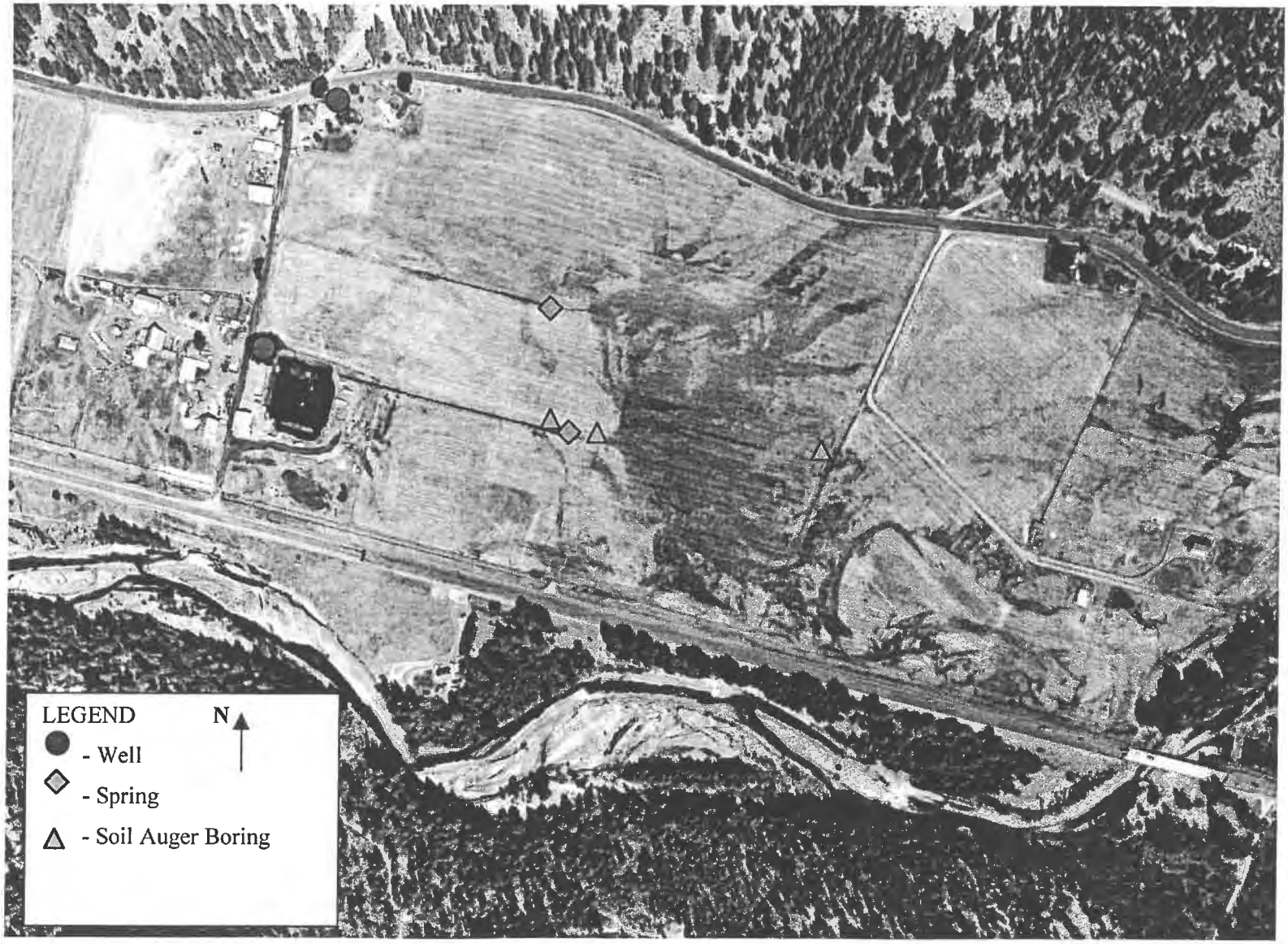


Figure 3
Paleochannel Gravels Exposed in the Teanaway River Bank



Figure 4
Average Daily Flows at the Teanaway Forks Gage

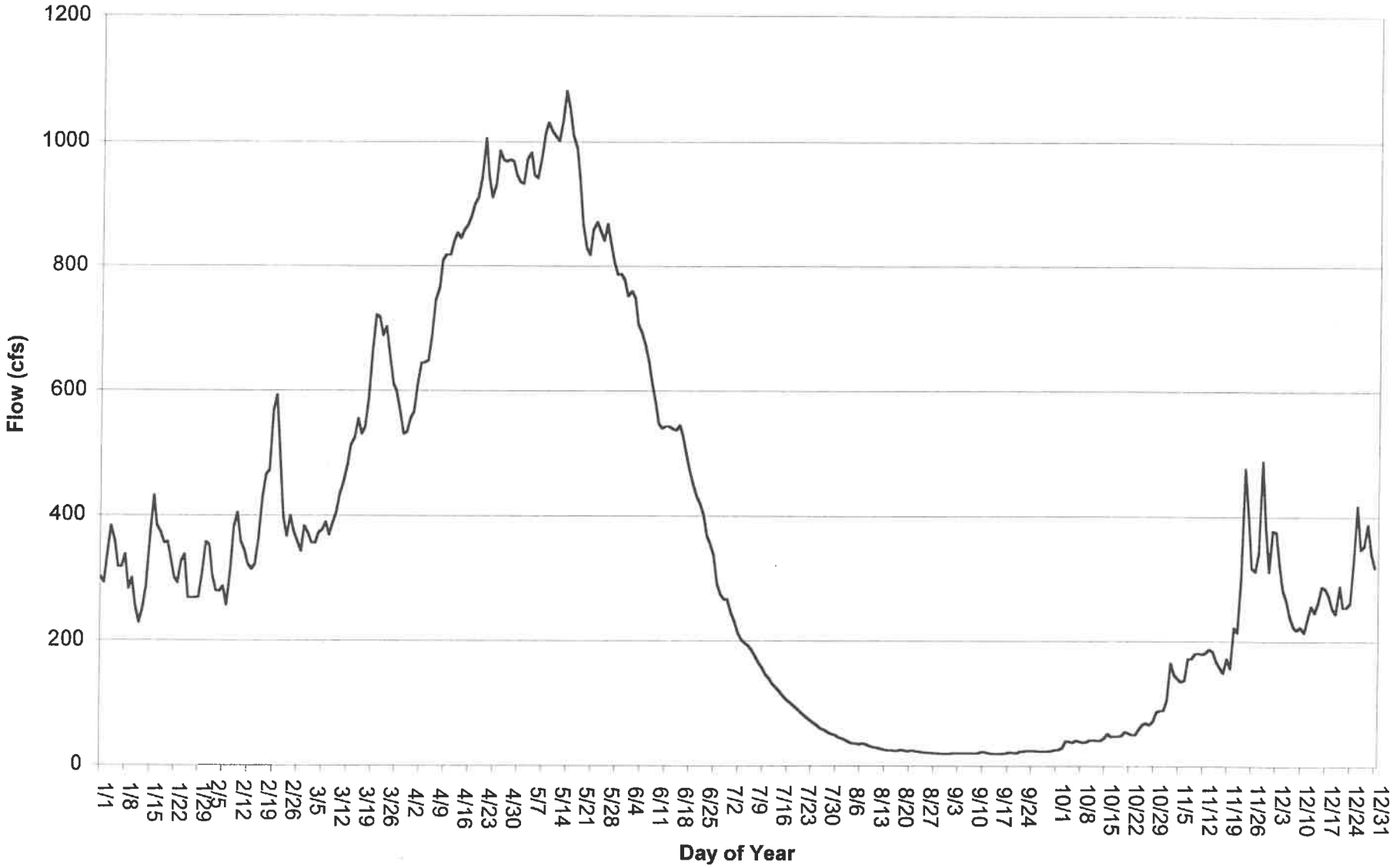


Figure 5
1999 Teanaway River Daily Average Discharge

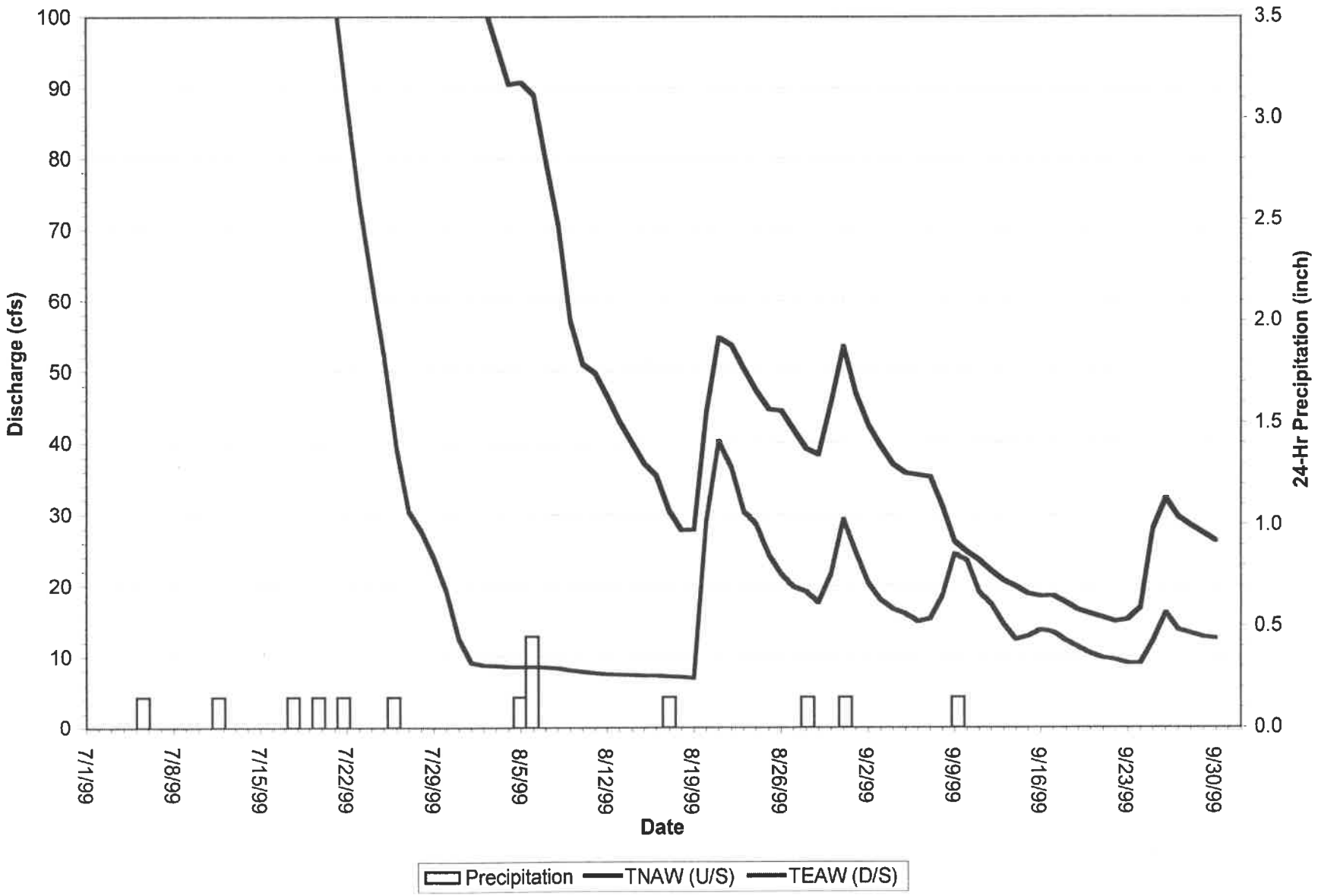


Figure 6
2000 Teanaway River Daily Average Discharge

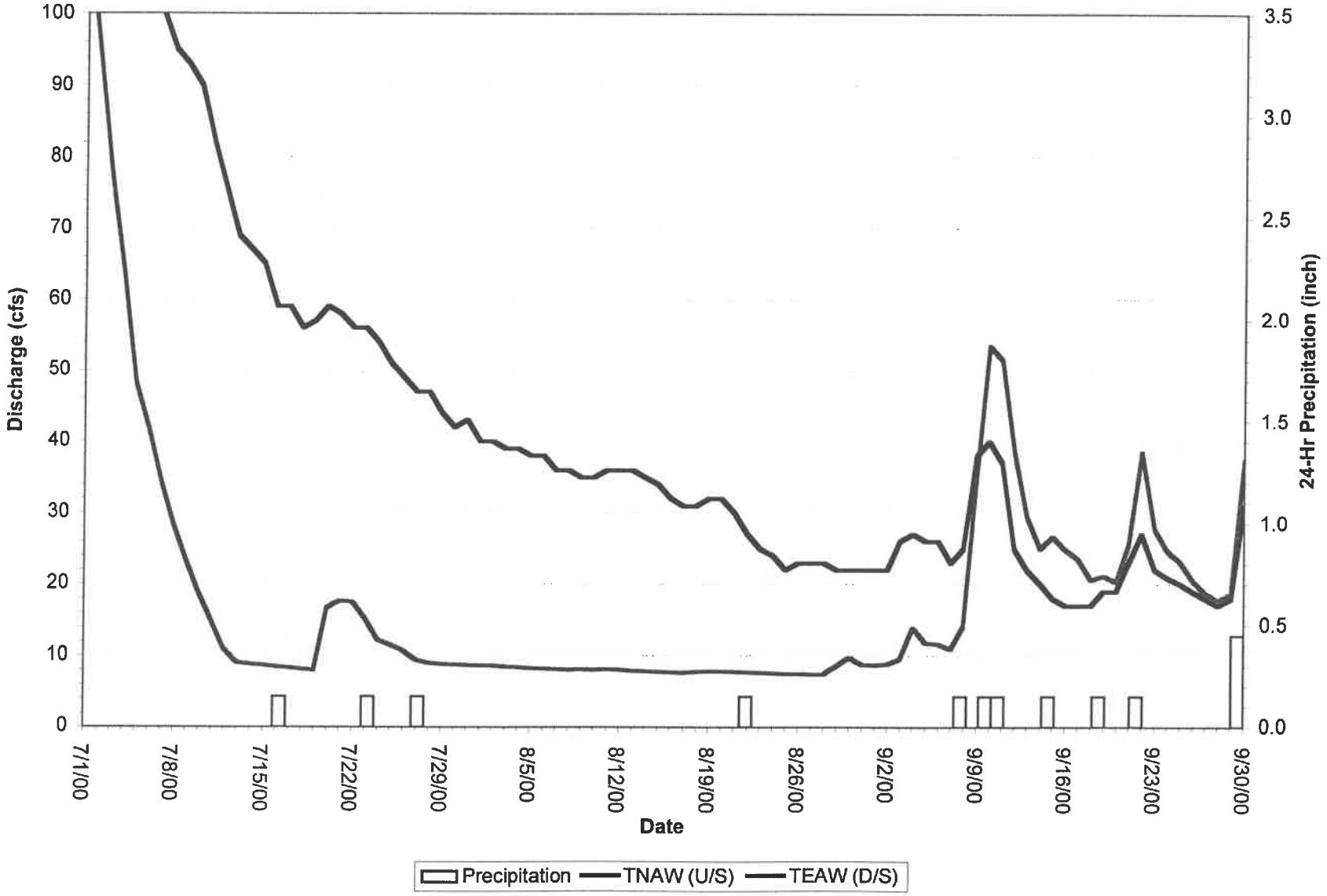


Figure 7
2001 Teanaway River Daily Average Discharge

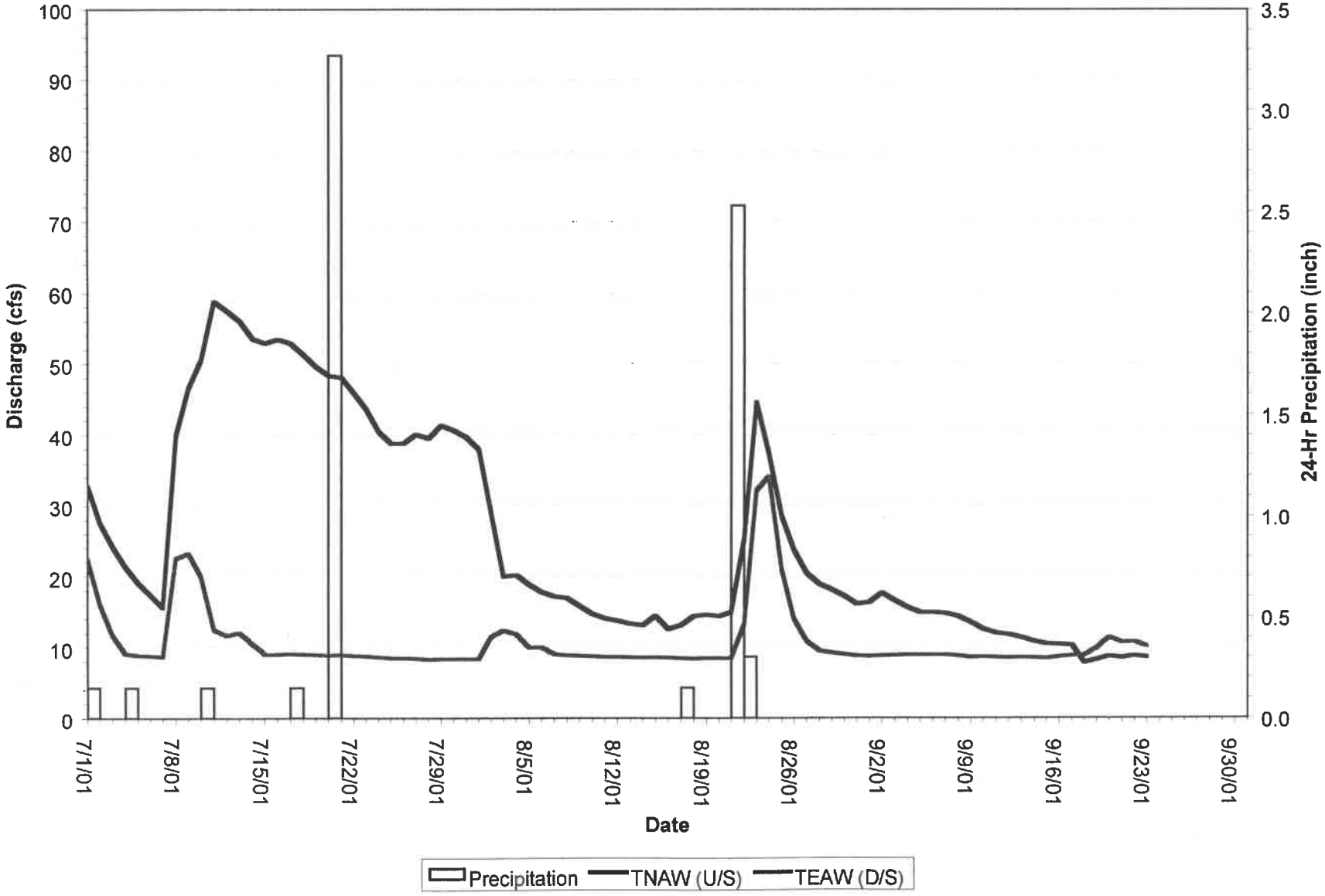


Figure 8
Rating Curve for the Teanaway River Streamflow Gage Above Lambert Road

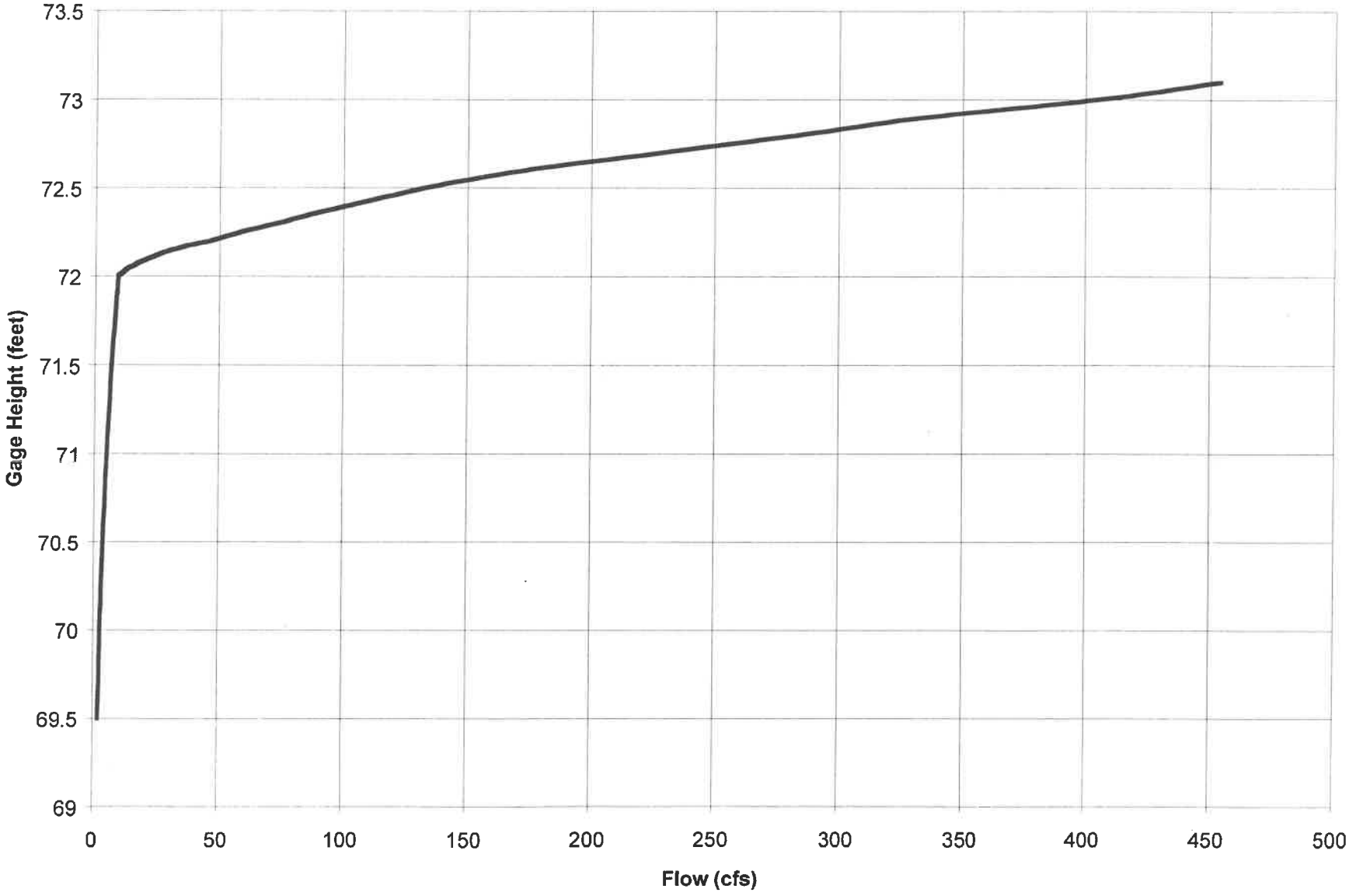


Figure 9
Stream Channel at the Teanaway River Streamflow Gage Above Lambert Road

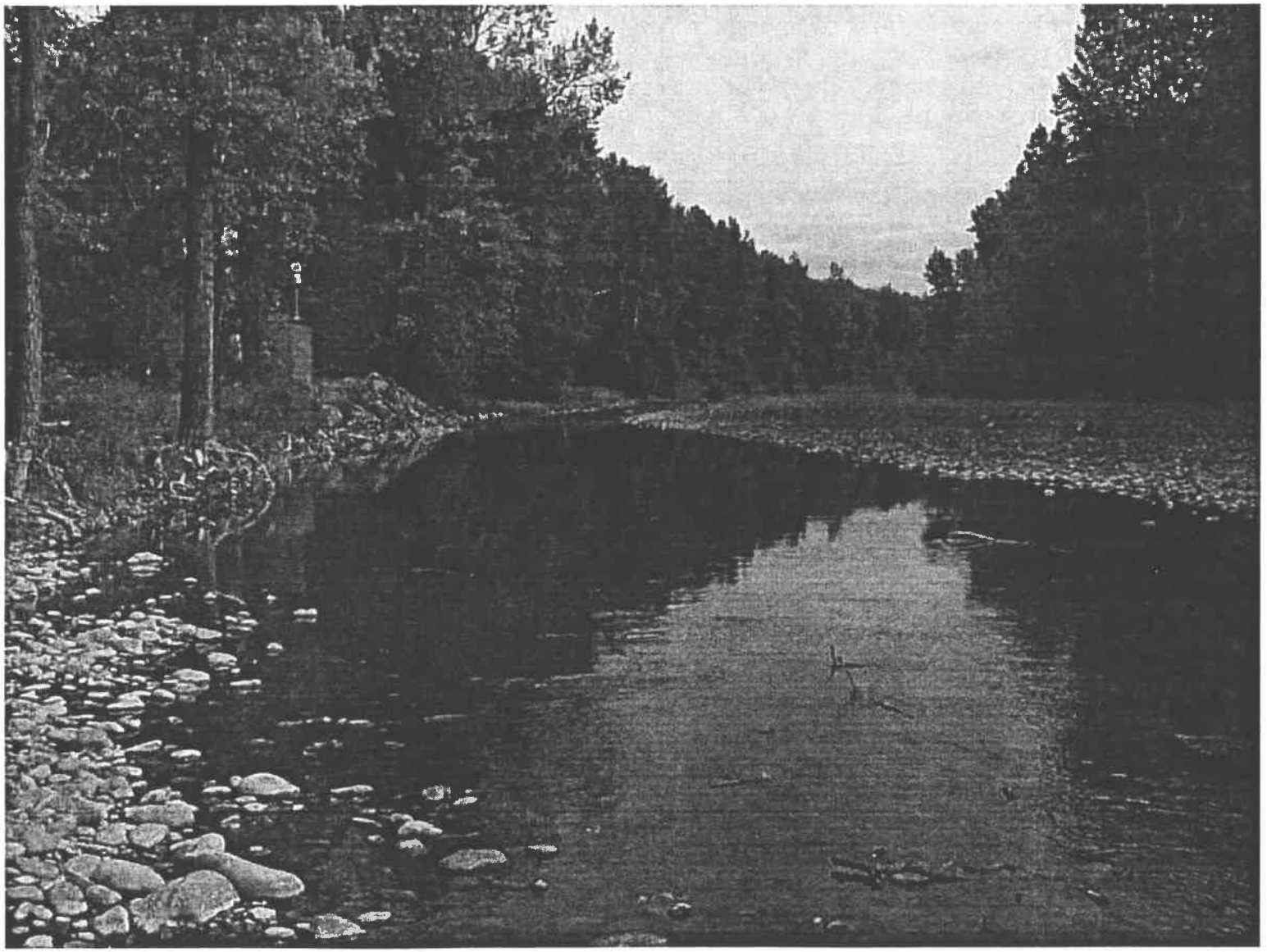


Figure 10
MODFLOW Model for Used for Teanaway River Simulations

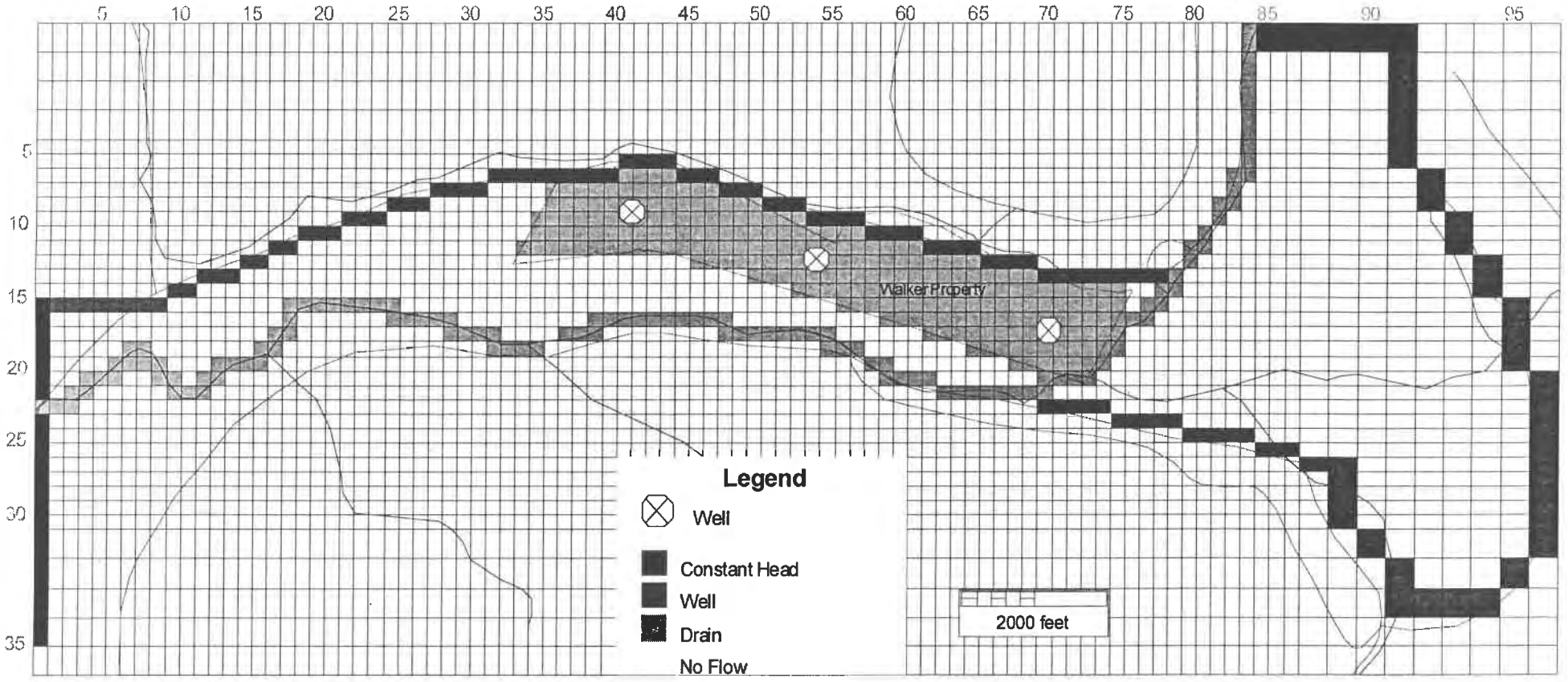


Figure 11
Predicted Rates of Irrigation Recharge vs. Stream Inflow for the Hydraulic Continuity Model Scenarios

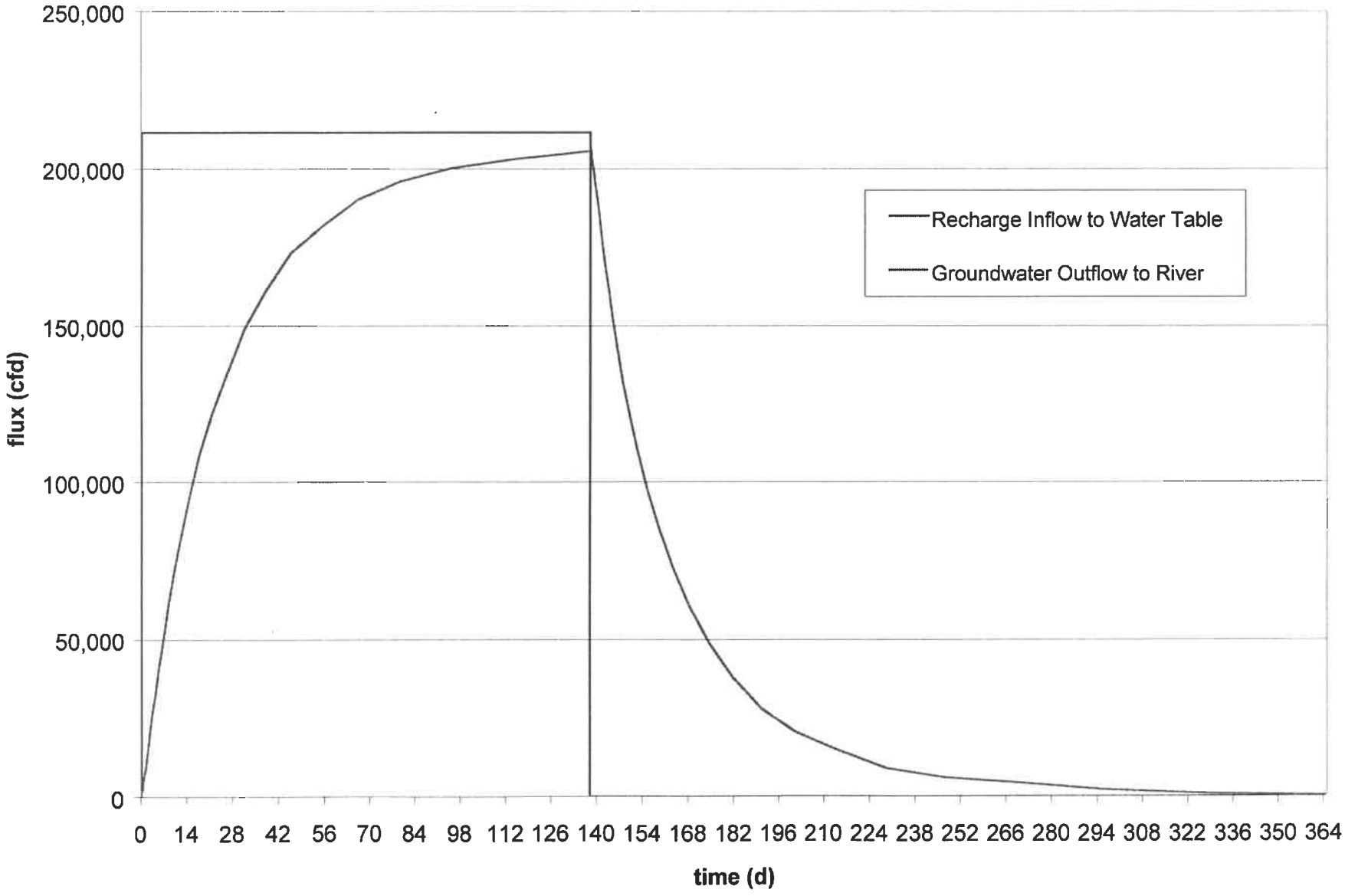
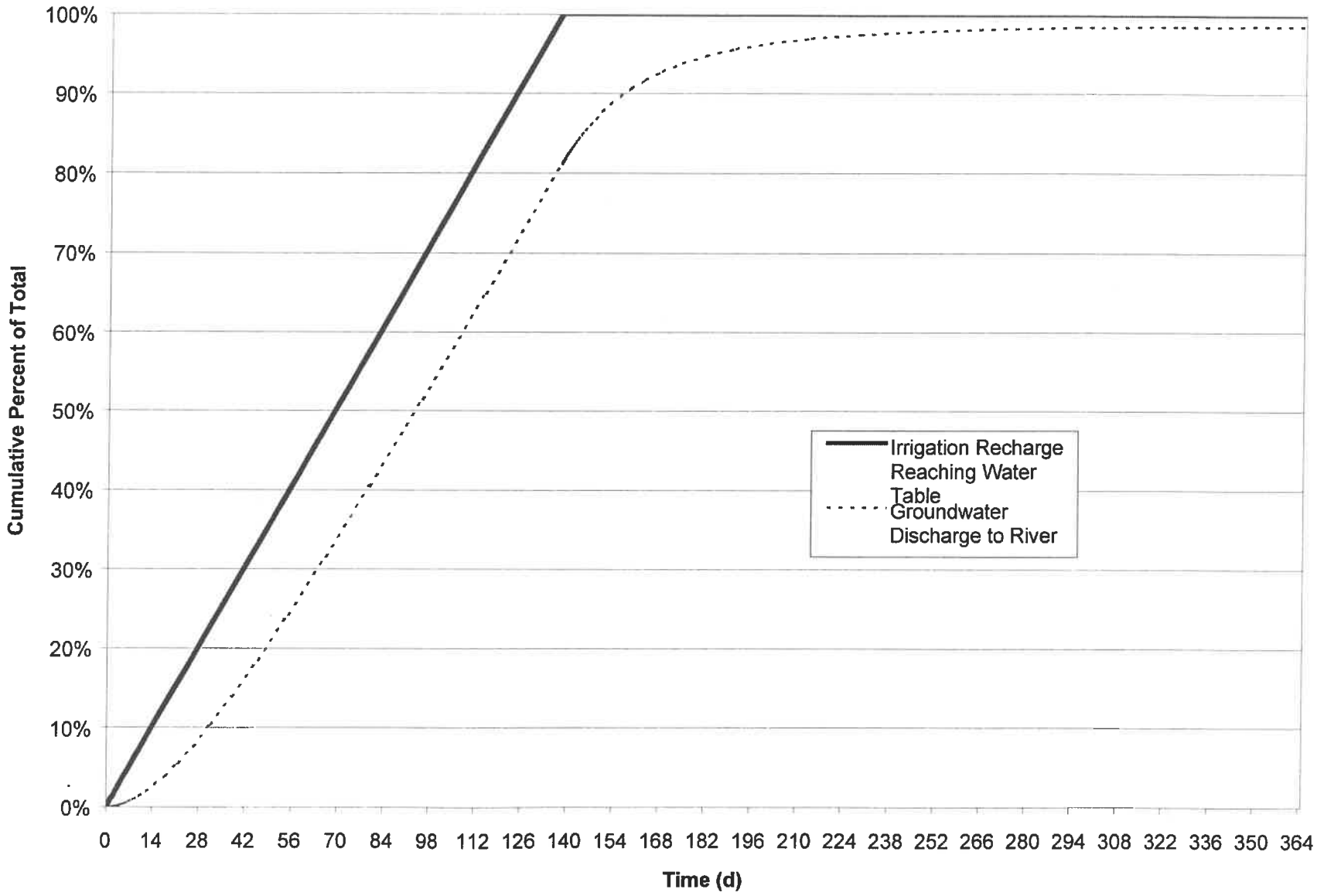


Figure 12
Predicted Cumulative Percent of Irrigation Recharge vs. Stream Inflow for the Hydraulic Continuity Model Scenarios



Pacific Groundwater Group

2377 Eastlake Avenue East
Suite 200
Seattle, WA 98102
206-329-0141 v
206-329-6968 f
www.pgwg.com

Technical Memorandum

To: Randall Doneen, Department of Ecology
Joe Mentor, Mentor Law Group
Jamie Morin, Mentor Law Group
Andy Kindig, A. Kindig & Associates
Tom Martin, Brown and Caldwell

From: Peter Schwartzman, Associate Hydrogeologist, PGG
Chrysten Root, Geologist/Hydrologist, PGG

Re: **FIRST AND SWAUK CREEK BASIN HYDROLOGIC ANALYSIS**

Date: January 24, 2002

The purpose of this analysis is to estimate how Trendwest's proposed transfer of the former Hartman and First Creek Water User's Association (FCWUA) irrigation water rights into the Yakima Basin Trust Water Program (the Trust) will affect streamflows. This memorandum describes how that transfer to the Trust is likely to affect streamflow in the First Creek and Swauk Creek tributary system down to the Yakima River. The results of this analysis will be used as one set of inputs to a separate model developed by Brown and Caldwell (B&C). That model will simulate results of the combined Trendwest Master Plan Resort and Urban Growth Area water demand schedule and water right transfers on the Yakima River basin, from upstream of the Cle Elum River confluence downstream to the Reecer Creek confluence.

The former Hartman water rights proposed for transfer to the Trust were used for irrigation in the fields adjacent to Swauk Creek in the Hidden Valley area. Water diverted under the Hartman rights was either consumed by evaporation and evapotranspiration, or returned to the tributary system and the Yakima River as non-consumptive irrigation return. Changes in streamflow relative to pre-existing conditions would result from the cessation of irrigation withdrawals. Water would no longer be diverted, ending consumptive losses and non-consumptive irrigation returns from fields. Irrigation returns are delayed in time between diversion and return as groundwater discharge to streamflow. Terminating the Hartman diversion would increase overall flow availability in Swauk Creek by the former quantity of consumptive use, and would change the temporal pattern of streamflow. Swauk Creek streamflows would increase during portions of the year when former diversions exceeded former return flows, but would decrease when former return flows exceeded diversions.

First Creek, a tributary to Swauk Creek, has water diverted to irrigation in the Reecer Creek Basin through the First Creek Water Users Association (FCWUA) ditch. Trendwest proposes to transfer its FCWUA irrigation rights to Trust, thus leaving approximately 56 percent of the

historic FCWUA diversion in First Creek and increasing flow in both First and Swauk Creeks. Irrigation return flows from fields supplied by the FCWUA ditch historically remained in the Reecer Basin, and did not return to First Creek. The proposed FCWUA transfer would result in increased First and Swauk Creek flows amounting to Trendwest's entire FCWUA water right, including the former consumptive and non-consumptive (return flow) portions. The effects of Trendwest's proposed transfer of First Creek FCWUA water rights on flows in the Reecer Creek basin is analyzed separately in the Reecer Creek Basin Hydrologic Analysis (PGG, January 2002).

For the purpose of this analysis, Ecology's Consulting Team (ECT) estimated changes in streamflow by evaluating two elements of the flow system: subsurface return flow and alluvial subflow. Subsurface return flow is the non-consumptive portion of irrigation lost to seepage from ditches and fields that returns to the stream via a groundwater pathway. Alluvial subflow occurs when a portion of the newly added streamflow seeps into alluvial sediments along the stream channel, and travels through a subsurface pathway on (all or part) of its way down to the Yakima River. Alluvial subflow is usually significantly slower than streamflow, which also affects when the diversions transferred to the Trust would reach the Yakima River.

This memorandum evaluates and describes the following as part of the First and Swauk Creek hydrologic analysis:

- Hydrogeologic conditions in the First Creek and Swauk Creek subbasins;
- Streamflow hydrographs from First Creek and Swauk Creek,
- Streamflow gains from and losses to groundwater, and the hydraulic continuity between surface water and groundwater in the two subbasins;
- Consumptive use and non-consumptive recharge (ditch losses and field losses) associated with historic irrigation practices; and,
- Water-right availability relative to observed or estimated streamflows.

A vicinity map of Swauk Creek is presented in **Figure 1**. The map shows surficial geology and the locations of roads, streams, stream gages, identified wells and test pits.

1 Summary of Findings

1. Hydrogeologic data for Hidden Valley and downstream portions of Swauk Creek are limited in their ability to characterize the groundwater flow system and its interaction with Swauk Creek. Only four wells could be located on the Hidden Valley floodplain, and the relationship between groundwater and surface water is poorly defined along lower reaches of Swauk Creek. This analysis provides our best estimation of the groundwater and surface-water flow systems, but the uncertainty associated with this characterization should be considered relatively high. For this and all other memoranda on the tributary basins, the best prediction for hydrologic changes is identified along with a reasonable range about that best estimate to establish a reasonable range of uncertainty.
2. Geologic logs from two of the four Hidden Valley wells, along with conversations with a locally experienced well driller, suggest the presence of a shallow alluvial aquifer below the

H-01

valley floodplain. For the purpose of analysis, the presence of this aquifer was assumed, as was its capability to transmit recharge from natural rainfall and irrigation seepage losses.

3. Streamflow data were collected on Swauk and First Creeks between 1998 and late October 2001 by Tom Martin (Brown & Caldwell) and Montgomery Water Group (MWG). The data indicate that Swauk Creek gains groundwater from just upstream of First Creek to approximately 0.8 miles downstream. Further downstream, Swauk Creek loses water over an intermediate reach and then is likely to gain water as it approaches a bedrock constriction in the Hidden Valley. The geographic extent of the intermediate (losing) reach is not well known, and may vary over the course of the year.

4. Flow data also reveal that First Creek loses flow to groundwater close to its mouth. The majority of First Creek seepage loss to alluvial subflow is believed to return to Swauk Creek in the gaining reach immediately downstream of the confluence, although portions may recharge the creek at locations further downstream[1].

5. Historic streamflow diversions associated with Trendwest's Hartman water rights were estimated to range from 0.3 to 2.6 cfs over the irrigation season. Seepage losses associated with irrigation inefficiencies were estimated to range from 0.2 to 1.8 cfs over the irrigation season, and were assumed wholly infiltrated into the alluvial aquifer. These non-consumptive seepage losses are heretofore referred to as "irrigation recharge".

6. A groundwater flow model was constructed to estimate the historic return flow schedule of the irrigation recharge from fields irrigated by the former Hartman water rights, and to predict the future return flow schedule for alluvial subflow generated by increased First Creek flows associated with the proposed FCWUA transfer. The model was used to constrain uncertainties about the hydraulic properties of the alluvial aquifer, and sensitivity analysis was used to address uncertainties about hydraulic properties of the Swauk Creek streambed and locations where hydraulic continuity between the stream and the alluvial aquifer are likely to occur.

7. Model simulations of Hartman irrigation recharge showed that most of the reasonable combinations assumed for key variables resulted in a well-grouped set of subsurface return flow schedules. Subsurface return flow estimates are highest towards the end of the irrigation season, lowest at the start of a new irrigation season, and suggest a year-round component of groundwater discharge to Swauk Creek. While the year-round component is estimated to be approximately 0.2 cfs, the seasonal component is estimated to reach a maximum of 0.9 cfs.

8. On Lower First Creek, seepage loss associated with the proposed FCWUA transfer was estimated to range from about 0.4 to 0.8 cfs out of a proposed transfer to instream flow ranging from about 1.1 to 5.2 cfs. Model simulations predict that this addition to alluvial subflow will return to Swauk Creek under a relatively rapid return schedule due to occurrence of hydraulic continuity in a 0.8-mile reach downstream of the First/Swauk Creek confluence.

---

[1] Seepage loss is defined as infiltration of water from above the land surface to below the land surface. For instance, water flowing within a stream channel or applied to fields as irrigation can seep into the subsurface and recharge the groundwater flow system. Seepage loss remains in the hydrologic system, but is transferred from surface water to groundwater.

9. Analysis of in-stream seepage losses to alluvial subflow, associated with the proposed Trendwest transfer, was based on limited data and related inference on seepage loss as a function of streamflow. The analysis suggests that seepage loss from Swauk Creek is likely to vary from several tenths of a cfs to just over 1 cfs between low- and high-flow conditions. Based on this analysis, seepage losses to alluvial subflow associated with Trendwest's proposed water-right transfer are expected to range from 0.01 to 0.08 cfs. These seepage losses are considered to be insignificant relative to estimates of the amount of water Trendwest proposes to transfer to instream flow.

10. Net changes in streamflow resulting from Trendwest's transfer to the Trust can be calculated for any period of time from estimations of subsurface return flows and the estimated water available for transfer back into the stream during that period. For the proposed Hartman transfer, estimates for the first 15 weeks of the irrigation season show an increase in streamflow ranging from 1 to 2 cfs. Due to an abrupt reduction in streamflow availability and thus the historic Hartman diversion in late July, net streamflows are reduced during the middle 9 weeks of the irrigation season because predicted non-consumptive return flows from earlier in the irrigation season exceeded diversions during this period. Water availability increases at the end of the irrigation season, and thus the proposed transfer to the Trust would increase streamflows during this period because diversions historically exceeded return flows. The net increase in flow estimated over the final 4 weeks of the irrigation season is predicted to range from 0.05 to 0.9 cfs. After the irrigation season, streamflows would be reduced by between –0.63 cfs immediately following the end of irrigation to –0.2 cfs prior to the beginning of the next season, because of the effect of eliminating non-consumptive irrigation return flow pathways in favor of transfer to instream flow during the irrigation season.

11. The proposed FCWUA transfer will increase flows in First and Swauk Creeks during the irrigation season. When combined with predicted effects of the Hartman transfer, increased flows from the FCWUA transfer are estimated to offset the mid- irrigation season flow reductions discussed above. While the cumulative affect of the two transfers results in increased flows in both creeks throughout the irrigation season, flow reductions from discontinued subsurface return flows are not significantly offset outside of the irrigation season.

2 Hydrogeology of First Creek

Geologic maps show First Creek predominantly flows through a narrow, bedrock-confined valley. However, in the final mile upstream of its mouth, the valley widens and the creek flows over alluvial sediments, portions of which were deposited by both First Creek and Swauk Creek. The 1:100,000 surficial geology map shows that First Creek flows across the Rosslyn Formation (lower member) conglomerate and pebbly sandstone for two miles below the First Creek Water Use Association (FCWUA) diversion ditch (Tabor, et. al.). Downstream of the conglomerate, the creek flows across a patch of landslide debris and then over Teanaway basalt. The creek continues flowing over basalt until it reaches its own alluvium (and eventually the Swauk Creek alluvium) approximately one mile above its mouth. The Swauk Creek alluvial valley is significantly wider than First Creek's, and is also likely to be deeper.

In the upper reaches of First Creek, existing alluvium is likely to be shallow and well confined by the bedrock. Its capacity to transmit subsurface flow is defined by its thickness, lateral extent, permeability and hydraulic gradient. Field reconnaissance of lower First Creek revealed that existing alluvium is fairly coarse grained, but can also include fractions of lower permeability silty materials. Measurement of seepage loss in First Creek during a September 1999 test indicates that the alluvium has capacity to store and transmit water. The "First Creek Test" started at a nearly dry streamflow condition and increased flow at the point of diversion from 0.3 to 2 cfs. Portions of the newly released flow were lost to alluvial storage and later drained back into streamflow. However, the narrow bedrock valley limits the amount of water that can be lost from the stream to alluvial subflow. A higher potential for alluvial subflow exists near the confluence of First Creek and Swauk Creek where the alluvial fill is more extensive and the valley less confined by bedrock. Historic placer mining operations along Swauk Creek near its confluence with First Creek suggest that the alluvium is largely composed of gravel in this vicinity[2]. PGG observed a hand dug well along First Creek just east of Highway 97 that was reportedly constructed entirely in alluvial gravels.

3 Hydrogeology of Swauk Creek

In order to assess and understand the hydrogeology of Swauk Creek, ECT obtained all well logs on record with Department of Ecology and evaluated those located in Sections 27, 28, and 33 (Township 20 N, Range 17 E). ECT also interviewed a local driller with many years of experience in the area (pers. comm., John Riebe, 2001) and an Ecology Eastern Regional Office hydrogeologist (pers. com., Gene Potts, 2001). Finally, ECT performed field reconnaissance in the area and obtained parcel maps from Mentor Law Group to help locate wells. Our analysis focused largely on the alluvial valley, where irrigation and groundwater/surface-water interactions occur. Very few logs are on record for the area, and some of those available could not be accurately located as in the valley or on the surrounding uplands. Our ability to characterize the geology of the alluvial valley is largely limited to the existing large-scale (1:100,000) geologic map (Tabor, et. al.), discussions with John Riebe, and four well logs that could be reasonably located on the valley floor.

Available geologic mapping (Tabor, et. al.) shows that upper Swauk Creek flows through a narrow alluvial valley underlain by sandstone, conglomerate, and conglomeratic sandstones from the Wenatchee Mountains until approximately 1.5 miles above its confluence with First Creek. From this point down to First Creek, the stream's alluvium is underlain mostly by the Teanaway Basalts. Below the First Creek confluence, Swauk Creek is no longer confined by bedrock. At this point, Swauk Creek opens out into the wide alluvial floodplain of Hidden Valley. Within Hidden Valley, ECT observed exposures of coarse-grained sediments in the near surface layer overlain by several feet of finer-grained soil. At the lower end of the valley, Swauk Creek is again confined to a narrow bedrock canyon where the creek flows through basalt bedrock (Yakima subgroup of the Columbia River Flood Basalts). This canyon (herein referred to as "Swauk Canyon") is about 4 miles long and opens out just above the confluence of the Yakima River. Based on the topographic map, the width of the floodplain within Swauk Canyon varies from approximately 50 to 750 feet.

[2] Historic placer mining was reported by a resident of the area (pers. com, Irvin Benesh, 2001).

Available well logs and field observations in Hidden Valley suggest that the upper portion (near the First Creek confluence) contains a significant portion of gravel, sand, and other high permeability soils. One well log, located near where Highway 97 crosses Swauk Creek, was completed at 20-feet below land surface after drilling through clay, clayey gravels and cobbles, and clean gravels and cobbles. A second well, hand dug near the confluence of First Creek, was reported by the owner to be completed in alluvial gravels. These well data, combined with a history of placer mining along Swauk Creek in this vicinity, suggest that the alluvium is coarse-grained in texture. The coarse-grained materials could represent a local alluvial fan immediately downstream from where Swauk Creek emerges from its bedrock constriction, or could suggest the texture of alluvium in other portions of Hidden Valley.

Farther downstream, near Lauderdale Junction, four well logs could be associated by parcel ownership to locations on the east side of Swauk Creek. Only one of these wells is located on the valley floor, and reports 25 feet of "cemented cobbles" underlain by 90 feet of blue-gray clay with occasional gravels and sandstone bedrock. The cobbles likely represent streamside alluvium whereas the clay likely represents the glacial materials in which the valley has eroded. Alluvial materials in Hidden Valley are typically underlain by glacial deposits, which are further underlain by consolidated sedimentary or basaltic bedrock (pers. comm., Riebe, 2001). The glacial materials typically show an abundance of clay, but can also include gravelly, water-bearing zones (ibid.). Farther downstream, near the area where Hidden Valley opens to its maximum width, an additional well was drilled to 161 feet and abandoned for lack of water. While the exact location of the well is unknown, the log shows clay and gravel, clay, and sand and gravel down to a depth of 40 feet predominantly underlain by clay to the bottom of the boring. The driller did not believe that the 40-feet of alluvial deposits could yield sufficient water for the owner. According to Holly Duncan of the Kittitas County Department of Environmental Health, the owner chose to drill three wells on the adjacent hillside to obtain the required water supply (pers. com., Duncan, 2001). No additional well logs were encountered on the valley floor; however, John Riebe reports that hand dug wells on the valley floor were historically used by residents (pers. comm., Riebe, 2001).

Well logs were unavailable in the lower portion of Hidden Valley and in the alluvial valley of Swauk Canyon. Hidden Valley becomes narrower downstream of the abandoned well, and any alluvial aquifer present in the Swauk Canyon is likely very limited in both width and depth. Relative to the constrained floodplains of upper Swauk Creek, First Creek and Swauk Canyon, the highest potential for alluvial groundwater storage is likely to occur within Hidden Valley. While development of a well-documented conceptual hydrogeologic model of Hidden Valley is limited by the scarcity of well logs, available data do suggest the presence of a shallow alluvial aquifer along the creek. Aquifer permeability likely varies from relatively high in areas where subsurface gravels and cobbles occur absent of silt or clay, to relatively low where silt and clay are abundant.

The alluvial aquifer is likely to exhibit hydraulic continuity (a saturated hydraulic connection) with Swauk Creek in portions of Hidden Valley. Data suitable for evaluating this hydraulic connection were very sparse. A soil test pit located about 10 feet from Swauk Creek, approximately 2000 feet downstream of Highway 97 (**Figure 1**), was visited by Andy Kindig on July 18, 2001 and by ECT on September 27, 2001. The pit showed an alluvial groundwater level about 2 to 2.5 feet below Swauk Creek in both cases, thus indicating lack of hydraulic continuity

in its vicinity between mid and late summer. Both the bottom of the test pit and the streambed were observed to be quite cobbly, but the hydraulic disconnect between the two suggests that water is retained in the stream due to lower permeability streambed materials. Groundwater levels relative to the creek at other locations in Hidden Valley are unknown; however, it stands to reason that hydraulic continuity will occur near the bottom of the valley where shallow bedrock forces groundwater flow from the alluvial aquifer into the stream. Groundwater flow modeling (discussed in Sections 7 and 8) suggests that groundwater levels likely drop in the vicinity of the test pit because the wider valley requires less aquifer thickness to conduct subsurface flow. Modeling further predicts that the aquifer thickness will increase (causing water levels closer to the land surface) farther downstream where the valley narrows. The following two sections discuss gains and losses and hydraulic continuity along First and Swauk creeks.

4 First Creek Streamflow and Hydraulic Continuity Analysis

Flow data from First Creek were collected by Tom Martin as monthly spot measurements between 1998 and 2000, and continuously during the 8-day "First Creek Test" in 1999. First Creek flow data were also collected by Montgomery Water Group (MWG) as both spot and continuous measurements during the summer of 2001. Tom Martin collected spot data at three locations on First Creek: downstream of the FCWUA diversion dam, upstream of highway 97, and at the confluence of First and Swauk Creeks. MWG collected streamflow data at two gaging sites: one downstream of the FCWUA diversion ditch, and the second at a point approximately 0.5 miles upstream of the confluence with Swauk Creek (shown on **Figure 1**). Data collected from the FCWUA diversion ditch by both Tom Martin and MWG (concurrent with measurements taken below the diversion) were used to estimate flows above the diversion **(Figure 2)**. While limited over time, the data show flows in First Creek ranging from a maximum of almost 50 cfs during the Spring freshet, to a minimum of approximately 1 cfs in August and September. Tom Martin provided an estimated "representative" historic hydrograph for streamflow above the diversion **(Figure 2)**. His flow estimates are based on regression analysis with Teanaway River streamflow, and represent an average (e.g. non-drought) year. Monthly values derived from these flow estimates were used for various aspects of the analyses presented herein[3].

ECT evaluated gains and losses on First Creek during low-flow months based on MWG's 2001 data and observations from the 1999 First Creek Test[4]. Spot measurements taken at the two MWG gaging sites do not show any consistent pattern of flow gain or loss from the creek over this reach **(Figure 3)**. The difference between measurements at the two gages ranged between 0.0 cfs and 0.2 cfs, suggesting that any observed difference in flow could be associated with measurement error. The continuous data collected from these gages show a more constant pattern of seepage loss between the two gages **(Figure 3)**, however this difference is again within the measurement error of the gages and the associated rating curves, and is not a definitive observation of actual flow losses. Because seepage loss at low flows is within associated

[3] The flow estimates were generated with a prior version of Brown & Caldwell's regression-based streamflow prediction model (Tom Martin, pers. comm., 10/6/01) and are sufficient for use in the analyses presented in herein.
[4] The test involved the removal of an upstream diversion to release a 2 cfs pulse of water into the creek system. Alterations to the diversion were periodically made by outside parties resulting in a test that consisted of a series of pulses and lags.

measurement error and is also relatively small, the data collected during the 2001 sampling period do not suggest that loss to alluvial subflow has appreciable effect on the water budget for this reach. Given the bedrock confinement and limited extent of alluvial deposits along the reach, it is reasonable to expect that a prolonged input of additional water (such as Trendwest's proposed water rights transfer) will not exhibit much loss to alluvial subflow between the diversion dam and MWG's downstream gage.

ECT also evaluated gains and losses on First Creek during high-flow months based on spot measurements by Tom Martin. These data show large gains in flow between the FCWUA diversion and the mouth of First Creek during the winter months, and smaller gains during April and May **(Table 1)**. The data suggest that during the early irrigation season, net seepage losses are negligible over the entire stream length (although localized areas of streambed seepage may exist).

Table 1: Tom Martin's First Creek Spot Measurements (High Flow Conditions)

	March-99	April-99	May-99	June-99	March-00
First Creek Downstream of FCWUA Diversion	0.17 cfs	0.55 cfs	20.1 cfs	3.7 cfs	6.2 cfs
First Creek at Mouth	12.1 cfs	10.7 cfs	27.5 cfs	11.4 cfs	9.36

In the middle-to-late irrigation season, seepage loss from First Creek to the surrounding alluvium appears to occur below MWG's lower gage. During the late irrigation season, when flows were not high enough to be accurately measured at the mouth, MWG observed that when flow at the lower gage was approximately 0.5 cfs, flow at the mouth was approximately 0.2 cfs. Data from the First Creek Test can also be used to evaluate seepage losses on this lower reach. Streamflows were measured continuously at several locations along the creek. The "diversion" gage was located near MWG's upstream gaging site, the "bridge" gage was located near MWG's downstream gaging site, the "waters end" gage was located half way between the bridge site and the "mouth" gage, which was located at the confluence of First and Swauk Creeks. Flow measurements taken during the First Creek Test suggest that about 0.6 cfs is lost to alluvial subflow when flow at the "bridge" gage is on the order of 1.5 cfs. A hydrograph of seepage losses measured below the "bridge" gage during the First Creek Test is presented on **Figure 4**. The hydrograph shows an asymptotic decline of seepage loss to about 0.6 cfs, which occurs as the alluvium near the stream is resaturated by the added streamflow. Once this period of "rewetting" is completed, seepage loss appears to stabilize into a steady state of about 0.6 cfs.

In order to analyze gains and losses in Swauk Creek streamflow later in this memorandum, ECT required estimates of stream inflow from First Creek at its mouth. To estimate the amount of seepage loss near the mouth of First Creek, ECT employed estimates from the First Creek Test, MWG observations, and analysis of channel cross-sections surveyed by Tom Martin. As discussed above, two seepage estimates were available during low-flow conditions: loss of 0.3 cfs at a flow of 0.5 cfs, and loss of 0.6 cfs at a flow of 1.5 cfs. In order to estimate seepage loss during high flows, ECT compared the amount of wetted channel perimeter and the amount of hydraulic head over the streambed, estimated during low flow and high flow conditions. To make this comparison we looked at photographs of the channel between MWG's lower gage and the mouth (taken at flows of approximately 2 cfs), as well as at a channel cross-section surveyed by Tom Martin at the mouth when the flow was 27.5 cfs. In the portion of the channel near

MWG's lower gage the channel is wide and flat, so increases in flow will result in large increases in wetted channel perimeter but only negligible increases in hydraulic head. At this location, we estimate that when flows are increased from 2 to 25 cfs the wetted perimeter will increase by a factor of 4. Since increases in hydraulic head are negligible, this would likely correlate to a 4-fold increase in seepage loss. Further down the channel, near Highway 97, the channel is still wide, but the banks are steeper and the channel somewhat more confined. In this reach we estimate that an increase in flow to 25 cfs would result in a 2-fold increase in wetted perimeter, and the hydraulic head would increase by a factor of 1.5. This suggests that net seepage would likely increase by a factor of 3. Near the mouth of First Creek the channel is narrow with steeper banks. Increases in flow in this reach will result in large increases in hydraulic head, but only negligible increases in wetted perimeter. At 2 cfs, we estimate the average water depth in the channel to be 0.2 ft. The cross-section that Tom Martin surveyed at a similar location when the flow was 27.5 cfs shows an average water depth 0.6 ft. This suggests a 3-fold increase in seepage at this location. Based on these estimates we will assume that an increase in flow from 1.5 cfs to 25 cfs at MWG lower gage will result in a 3-fold increase in net seepage, or a seepage loss of 1.8 cfs. The estimated relationship between streamflow and seepage loss between MWG's lower gage and the mouth is presented as a best-fit logarithmic curve on **Figure 5**.

5 Swauk Creek Streamflow and Hydraulic Continuity Analysis

Flow data from Swauk Creek were collected by Tom Martin as monthly spot measurements between 1998 and 2000, and by Montgomery Water Group (MWG) as both spot and continuous measurements in the summer of 2001. Tom Martin collected data at two locations on Swauk Creek: upstream of the confluence with First Creek, and at the mouth. MWG collected streamflow data at the same two locations as well as at the Martin Property. The upstream and Martin gaging station locations are shown on **Figure 1**. Although limited in time, the data collected above the confluence with First Creek reveal that flows in Swauk Creek exhibit significant variation. Flows during the spring freshet in 1999 were estimated as high as 225 cfs, whereas flows during the 2000 freshet were considerably lower. From these data, ECT derived a "representative hydrograph" for Swauk Creek above the confluence with First Creek **(Figure 6)**. The hydrograph assigns less weight to the 1999 freshet data due to an associated unseasonably wet winter, and should only be construed as a best available representation given the (limited) existing data. The hydrograph suggests that typical flows during the spring freshet reach a maximum of about 100 cfs but generally drop to 1-2 cfs in the late summer. As a result, flows in the late summer are heavily influenced by the amount of water discharged from First Creek into Swauk. **Figure 7** shows that below First Creek, late summer flows in Swauk Creek (calculated by adding estimated flows at the First Creek mouth to concurrent Swauk Creek measurements upstream) ranged from about 1.7 to 3.6 cfs.

To evaluate whether significant flow losses from Swauk Creek occur in the Hidden Valley region, ECT analyzed gains and losses in flow between MWG's gaging sites. The flow measurements taken above the confluence with First Creek were combined with the estimated flow contributions from First Creek (MWG data minus the seepage loss estimates described in Section 3), to derive an estimate of the flow in Swauk Creek below its confluence with First

Creek[5]. However, between the confluence with First Creek and the Martin gage, an additional tributary flows into Swauk Creek that has not been gaged. Limited visual observation by MWG during the summer of 2001 suggested that tributary flow did not commonly exceed 0.25-0.50 cfs, except possibly during rainstorm events. The tributary was observed to go dry in early July, 2001. In addition, the Burke diversion ditch is located between the two gages (return flow from the Burke diversion enters Swauk Creek below the Martin gage). The maximum instantaneous water right (Qi) from this diversion is 4.25 cfs, although only 2.25 cfs is available after June 15 in a typical water year[6]. Actual use of this water right could not be determined due to property access limitations. Areal photographs of area taken on August 11, 2001 suggest that approximately 50 of the allowable 100 acres were being actively irrigated from the Burke diversion.

The year-2001 flow curves derived from the Upstream and Martin Property gages show this reach to be gaining from May through mid July **(Figure 8)**. After mid July, a drop in flow occurs at the Martin gage, making the reach appear to be losing water from mid-July through September. Since the magnitude of the inputs and outputs of water to Swauk Creek in this reach are not known, exact calculations of streamflow gains and/or losses cannot be performed. However, interpretations of the curves should consider the additional inputs and outputs to the stream. Even if the ungaged tributary adds 0.5 cfs throughout May, June, and early July, gains between the upstream and Martin gages are still observed for this period. In addition, the Burke diversion ditch was probably active during portions of this period, which would also increase the observed gain. For the period from mid July through September, the flow curves suggest the channel is losing water between the gages. This loss is likely attributed to irrigation diversion from the Burke ditch rather than seepage. In the time-series plot, the shift from a gaining to a losing reach occurs on July 14 when a 1.8 cfs drop in flow is observed at the lower gage. The 15-minute continuous flow data show that this drop in flow occurred over a 3-hour period. Since 1.8 cfs is less than the water right owned by Mary Burke, this drop likely resulted from a change in the amount of diversion at the Burke ditch.

These data suggest that no net seepage loss occurred on this reach of Swauk Creek during the summer 2001 monitoring season, and that seepage gains occurred in early summer and may have continued through the mid- to late- irrigation season. If gaining conditions occur, the likely source is alluvial subflow along portions of Swauk and First creeks immediately upstream. Several interpretations can be formulated to explain the gaining behavior as follows:

1. Spatial variations in the thickness of streambed alluvium can cause variations in measured streamflow;
2. A local drop in stream elevation could allow the stream to cut deeper into saturated alluvial deposits and gain additional groundwater; or,
3. If alluvial fan sediments exist immediately downstream of where Swauk Creek emerges from bedrock confinement (near First Creek), the gaining behavior could be explained by a change in texture between the fan and downstream alluvium. A transition between more

[5] The remaining discussion in this section pertains to the combined flow estimate.
[6] The total Burke water right is for 4.25 cfs, but 2.00 cfs of that has a priority date junior to other water rights on Swauk Creek.

H-01

transmissive fan deposits and less transmissive valley alluvium would force water back into the stream.

Gaining conditions also suggest hydraulic continuity between the alluvial aquifer and Swauk Creek upstream of the Martin gage. However, these gaining conditions are most likely to occur in the upstream portion of the reach. The soil test pit, located about 800 feet downstream of the Martin gage, showed groundwater below the streambed elevation, thus implying no hydraulic continuity and conditions characteristic of a losing stream reach. The location of the transition between gaining and losing conditions is unknown.

From late July to September 2001, flow curves presented on **Figure 9** suggest that the lower reach of Swauk Creek (Martin Property to Mouth) is losing most of its flow. During this time period, the average flow loss between the two gages was 0.4 cfs, and the stream was dry at the mouth from early August through September (except during short-term rainstorm events). However, since the water rights for this reach are greater than the amount of water lost, discerning which portion of the loss is attributed to seepage and which to irrigation diversions is impossible.

ECT attempted to assess seepage gains/losses in the lower portion of Hidden Valley between the Martin gage and the head of Swauk Canyon. In September 2001, MWG performed a seepage survey over a 1.2-mile reach between the Martin gage and the downstream end of the Martin property. Due to the size of the channel substrate and the relatively low flow conditions in September, MWG was unable to accurately gage flows during the study. Observations of flows during the study indicated that about 0.1 cfs of water was present and flowing at either end of the study reach. This suggests that seepage losses under very low flow conditions are minimal, however, these observations cannot be extended to higher flow conditions, since seepage losses may be reduced during low flow periods due to the deposition of silt in the channel bed.

Further analysis suggests that seepage losses during low flow periods can be constrained by comparing measured streamflow with downstream irrigation diversions. Bruce Coe owns a large portion of the water rights for Swauk Creek in the valley. Although he leased most of his rights this summer, he maintained a right of 0.375 cfs. In conversions with Mr. Coe (personal comm., 2001) he indicated that he actively used his water right to irrigate his property on a daily basis from dawn to dusk throughout the 2001 irrigation season. Based on the allocated Qa of 37.5 acre-feet, this irrigation schedule results in an average rate of instantaneous diversion of 0.19 cfs over the entire 6.5-month irrigation season (or 0.28 cfs if most of the diversion is assumed to occur over 4.5 months of the irrigation season between June 1 to October 15). Mr. Coe's statement that he is able to use his entire water right throughout the irrigation season becomes significant for estimating seepage losses in Swauk Creek during the period in which Swauk Creek flows decline to close to the amount of his water right. In order to constrain the maximum amount of seepage loss likely in Hidden Valley during low flow conditions, it can be assumed that only enough water for the Coe irrigation diversion remains instream at his property (located near the downstream end of the valley). In mid August, when flows at the Martin property drop to 0.30 cfs, the maximum possible seepage loss would be 0.11 cfs or 36%, since 0.19 cfs are likely being removed at the Coe diversion. Based on this set of assumptions and data, seepage losses are expected to be less than 36% of August flows since August irrigation rates are likely higher than the season average. For the purpose of analysis, a maximum low-flow seepage loss of 25 percent was assumed.

Few data are available on channel conditions in the lower portion of Hidden Valley during high flows. Relative seepage loss could be increased due to scouring of the channel bed but could also be reduced because stage and wetted channel perimeter do not increase linearly with increases in flow. In order to estimate seepage losses during high flow conditions (up to 130 cfs), MWG evaluated photographs of the channel at flows up to approximately 15-20 cfs, and channel cross-sections surveyed at a variety of flows up to 14.1 cfs. MWG used the cross-sections from low and moderate flows to interpolate average cross-sections for higher flow conditions. These cross-sections were used to estimate the flow parameters that control seepage loss such as the wetted perimeter and hydraulic head (average depth). The estimated cross-section data are presented in **Table 2** (below). Similar to estimates of seepage loss on First Creek, seepage was assumed to increase linearly with both increases in wetted perimeter and increases in hydraulic head. For example, a 2-fold increase in hydraulic head and a 3-fold increase in wetted perimeter would result in a 6-fold increase in seepage. Using the estimates of seepage loss under a variety of flow conditions, a polynomial describing seepage loss was derived (**Figure 10**). This curve was used to estimate the likely additional alluvial subflow associated with Trendwest's proposed water right transfer (Section 9).

Table 2

Estimates of hydraulic parameters for Swauk Creek at the Martin Gage

Cross-sections were solved for using *ManningSolver*

Q (cfs)	TW=WP (ft)	Average Depth (ft)	Increase factor	Estimated Seepage (cfs)
0.3	9.3	0.55	1.0	0.1
14.1	22.0	0.86	3.7	0.3
30.0	24.5	1.16	5.6	0.4
130.0	*35.8*	*2.23*	*15.6*	1.2

Assumptions:

1. Friction slope is the same at high flows as low flows.
2. Right and left banks were extropolated based on field observations of cross sectional geometry at low flows:
   Assumed the right bank is steep and vertical.
   Assumed left bank slope is same as slope of the last few measurements on left bank during low flows.
3. The Manning's n value derived for low flows applies to high flows.
4. The top width approximates the wetted perimeter at the Swauk Creek Martin cross section.
6. Increases in seepage at high flows are proportional to the increase in depth and wetted perimeter.

Downstream of Hidden Valley, other water rights (Qi = 0.334 cfs) are held by Tang that were not leased during the 2001 irrigation season. The actual amount and frequency of use on this diversion is unknown, although aerial photographs from August, 2001 indicate that a portion of the fields located near the Tang diversion was irrigated. Although little seepage loss is expected within Swauk Canyon due to bedrock confinement, the short stream reach below the canyon crosses alluvial deposits of the Yakima River, and may exhibit a higher degree of seepage loss. Any loss that occurs in the Yakima River alluvium is expected to flow rapidly to the Yakima River since Swauk Creek is less than 2,000 feet from the river in this area.

H-01

6 Water Use and Water Right Availability

The amount of water that Trendwest can potentially transfer to instream flow is not only dependent on the amount of the purchased water rights, but also on the availability of water in First and Swauk Creeks during the irrigation season. Based on flow data collected by both Tom Martin from the years 1998-2000, B&C estimated a representative hydrograph of First Creek flow (shown on **Figure 2**) and ECT estimated a representative hydrograph for Swauk Creek (**Figure 6**). These representative streamflows were used to estimate historic water use and to develop input for analyzing the timing and relative magnitude or subsurface return flows and alluvial subflow associated with the water right transfers. The historic water use estimates are considered approximate, but sufficient for the analyses contained in this memorandum.

ECT compared the estimates of available instream flow to the amount and priority of existing water rights. On First Creek, the water rights from the FCWUA ditch total 13.9 cfs, and on Swauk Creek, the water rights for the reach below the confluence with First Creek total 14.25 cfs. Based on the existing streamflow data, this amount of water is not available in either of the creeks from early June through the end of the irrigation season, so the availability of water rights is determined by the priority dates of the rights (summarized below on **Table 3**) and actual irrigation requirements (discussed below).

Table 3: Swauk / First Creek Water Rights

Name	Priority	Source	CFS	AF	Acres
FCWUA (Retained)	Nov. 2, 1877	First Creek	2.19	274.12	54.8
FCWUA / Trendwest	**Nov. 2, 1877**	**First Creek**	**2.79**	**348.88**	**69.7**
Burke	June 30, 1878	Swauk via Burke	2.25	589.00	78.4
Hartman / Trendwest	**June 30, 1878**	**Swauk via Burke-Hartman**	**0.89**	**150.00**	**20.0**
Burke	June 30, 1878	Swauk via Burke-Hartman	1.77	297.00	39.6
FCWUA (Retained)	June 1, 1881	First Creek	3.92	639.32	127.8
FCWUA / Trendwest	**June 1, 1881**	**First Creek**	**5.00**	**813.68**	**162.7**
Coe, Bruce	May 24, 1884	Swauk via Coe (N)	1.79	164.00	
Coe, Bruce	May 24, 1884	Swauk via Coe (S)	1.50	112.50	
Tang (Michael Coe, SV Ranch)	May 24, 1884	Swauk via Tang	0.167	80.00	
Hartman / Trendwest	**Sept. 20, 1889**	**Swauk via Burke-Hartman**	**3.34**	**563.00**	**75.0**
Burke	Oct. 31, 1889	Swauk via Burke	2.00	150.00	20.0
Tang (Michael Coe, SV Ranch)	Sept. 21, 1892	Swauk via Tang	0.167	80.00	
Coe, Bruce	Apr. 9, 1901	Swauk via Coe (S)	0.375	37.50	
			28.149	**4,299.00**	

Data from Mentor Law Group. Trendwest Water Rights are shown in bold face type.

The most senior water rights in the basin (1877) are located on First Creek. Of the 4.98 cfs with this priority, Trendwest owns 56%. An additional 8.92 cfs of water rights are held on First Creek that are dated 1881. Trendwest also owns 56% of these junior First Creek rights. Based on the estimated representative monthly flows, instream flows are typically insufficient to meet the entire FCWUA allocated instantaneous diversion throughout the irrigation season (**Figure 2**). MWG estimated historic FCWUA water use based on monthly values of the representative monthly streamflows provided by B&C, estimates of crop water requirements, and estimates of field and ditch irrigation seepage losses. **Table 4** presents MWG's water-use estimates for the average (i.e. non-drought) year. All of the data in **Table 4** were derived from the Montgomery Water Group technical memorandum entitled "FCWUA Ditch Seepage Loss Analysis" (10/12/01), and a copy of this memorandum is attached. Historic diversions for April and May were estimated to be less than available flows based on consideration of crop requirements and

FCWUA's allocated annual water right volume (Qa). In the month of June, historic water use by the junior (1881) water right holders is limited by estimated flow availability. After June, water is estimated to be unavailable to the junior water right holders and flow limited to the senior (1877) water right holders. During the driest portions of the year (August and September) when total First Creek streamflow is on the order of about 2 cfs, only about 1.1 cfs is generally available for Trendwest to leave instream given 56% of the total water right.

Table 4 – Estimated Historic FCWUA Water Use

	Estimated Flow in First Creek[1]	Total Historic FCWUA Diversion	Roan (Sr) and Olson Diversions (Retained)	Nelson and Roan (Jr) Diversions (Trendwest)
Apr	11.7	9.00	3.96	5.04
May	12.5	9.30	4.09	5.21
Jun	7.8	7.80	3.43	4.37
Jul	3.4	3.40	1.50	1.90
Aug	2.1	2.10	0.92	1.18
Sept	1.9	1.90	0.84	1.06
Oct 1-15	2	2.00	0.88	1.12

On Swauk Creek there are three water rights dated 1878 that total 4.91 cfs. Although these rights take priority over the 1881 rights on First Creek, once Swauk Creek flows drop to a level that requires additional flow from First Creek, First Creek flows are not sufficient to provide the additional water. **Figure 2** shows that flows on First Creek are less than FCWUA's 1877 water rights (4.98 cfs) from late June through the end of the irrigation season. As a result, any instream flow in First Creek is likely used to satisfy the 1877 water rights that have priority over all Swauk Creek water rights. Of the 4.91 cfs of water rights dated 1878, Trendwest owns 0.89 cfs (18%). **Figure 11** is a detailed plot of low flow conditions in Swauk Creek (downstream of the confluence with First Creek) from 1998-2000. The 2001 data are not included on the figure because Trendwest's water rights were left instream in 2001, and therefore 2001 flow conditions are not representative of the historical conditions. **Figure 11** suggests that from early July through the end of the irrigation season, less than 4.91cfs typically flows through Swauk Creek, therefore Trendwest may only dedicate 18% of the available water to instream flow. Earlier in the irrigation season, additional water is available for other water rights **(Figure 6)**. Three water rights totaling 3.457 cfs are dated 1884, and Trendwest owns a right for 3.34 cfs dated 1889 that should be available from the beginning of the irrigation season through early June. All other water rights on Swauk Creek have junior priority to the Trendwest water rights.

On Swauk Creek, ECT estimated historic diversions associated with Trendwest's water rights by comparing estimated typical streamflows to typical irrigation requirements along the stream. Irrigation requirements were estimated based on Tom Martin's estimates of typical crop consumptive use (based on the Blaney-Criddle equation and local climatic conditions), and then applying an irrigation efficiency of 33 percent[7]. ECT developed a spreadsheet that took estimated streamflows in Swauk Creek below the First Creek confluence, and removed the estimated water requirements of irrigators in the order of water-right priority. Irrigation

[7] The Report of Referee from the Aquavella water-right adjudication assigns a water duty of 7.5 feet for irrigation on the Burke and Hartman properties, based on a technical report on local irrigation conditions. Blaney-Criddle calculations estimate a crop consumptive use requirement of 2.5 feet, thus implying an efficiency of 33 percent.

H-01

diversions were assumed to be taken continuously, in order to maximize the use of available water. **Table 5** presents the results of the analysis:

Table 5 – Estimated Historic Water Use for Hartman Water Rights

Period of Irrigation Season	Historic Water Available Below First Creek	Estimated Irrigation Require-ment	Sr. Burke & Sr. Hartman Historic Irrigation Use	Sr. Coe & Sr. Tang Historic Irrigation Use	Jr. Hartman Historic Irrigation Use	Total Hartman Irrigation Use (Jr. + Sr.)	Total Hartman Non-Consumptive Use (Jr. + Sr.)	Total Hartman Irrigation Use with 2-month Return Flow
April 1-15	130 cfs	0.026 ft/d	1.8 cfs	0.8 cfs	1.0 cfs	1.2 cfs	0.8 cfs	1.2 cfs
April 16-30	110 cfs	0.026 ft/d	1.8 cfs	0.8 cfs	1.0 cfs	1.2 cfs	0.8 cfs	1.2 cfs
May 1-15	45 cfs	0.039 ft/d	2.7 cfs	1.1 cfs	1.5 cfs	1.9 cfs	1.3 cfs	1.9 cfs
May 16-31	25 cfs	0.037 ft/d	2.6 cfs	1.1 cfs	1.4 cfs	1.8 cfs	1.2 cfs	1.8 cfs
June 1-15	20 cfs	0.045 ft/d	3.2 cfs	1.3 cfs	1.7 cfs	2.2 cfs	1.5 cfs	2.2 cfs
June 16-30	14 cfs	0.045 ft/d	3.2 cfs	1.3 cfs	1.7 cfs	2.2 cfs	1.5 cfs	2.2 cfs
July 1-15	10 cfs	0.055 ft/d	3.8 cfs	1.6 cfs	2.1 cfs	2.6 cfs	1.8 cfs	2.6 cfs
July 16-31	4 cfs	0.051 ft/d	3.6 cfs	0.4 cfs	0.0 cfs	0.5 cfs	0.3 cfs	1.2 cfs
Aug. 1-15	3 cfs	0.048 ft/d	3.0 cfs	0.0 cfs	0.0 cfs	0.4 cfs	0.3 cfs	0.5 cfs
Aug. 15-31	3 cfs	0.045 ft/d	3.0 cfs	0.0 cfs	0.0 cfs	0.4 cfs	0.3 cfs	0.5 cfs
Sept. 1-15	3 cfs	0.032 ft/d	2.2 cfs	0.8 cfs	0.0 cfs	0.3 cfs	0.2 cfs	0.3 cfs
Sept. 16-30	4 cfs	0.032 ft/d	2.2 cfs	0.9 cfs	0.8 cfs	1.1 cfs	0.8 cfs	1.5 cfs
Oct. 1-15	5 cfs	0.014 ft/d	1.0 cfs	0.4 cfs	0.5 cfs	0.7 cfs	0.5 cfs	0.7 cfs

The analysis suggests that the historic water use associated with Trendwest's Hartman water rights ranged from 0.3 cfs in early September to 2.6 cfs in early July. The water availability analysis was performed prior to ECT analysis of irrigation return flow, and initial calculations did not include possible return flows to the stream. ECT evaluated the sensitivity to return flow with the same spreadsheet, assuming that the non-consumptive portion of the irrigation requirement returns to the stream after a 2-month time lag. Estimates of historic Hartman diversions, along with the 33-percent irrigation efficiency, were used to estimate the non-consumptive portion of Hartman's water use. This water was assumed to return to Swauk Creek via subsurface return flow downstream of the Burke-Hartman diversion. **Table 5** shows that estimates of subsurface return flow range from 0.2 cfs in early September to 1.8 cfs in early July. Supplemental consideration of return flow caused minor increases in availability for the Hartman water rights. For the purpose of evaluating the timing and relative magnitude of subsurface return flows and alluvial subflow, consideration of return flow was regarded unnecessary.

7 Construction of Groundwater Flow Model

ECT developed a groundwater flow model of the Hidden Valley area (including the First Creek confluence) to assess:

1. The timing and relative magnitude of former subsurface return flows from irrigation recharge associated with the Hartman water right back to Swauk Creek, and
2. The timing and relative magnitude of future subsurface return flows from First Creek seepage loss to alluvial subflow back to Swauk Creek.

Both assessments were necessary to evaluate the change in streamflow associated with the proposed water rights transfers. The model was constructed using the USGS finite difference code "MODFLOW" and the graphical user's interface "Groundwater Vistas". The assumptions used to design the model are consistent with the elements of the conceptual hydrogeologic model presented in Sections 2 through 5. The most significant model design assumptions were that the following:

- An alluvial aquifer exists that is capable of conducting both natural and irrigation recharge down-valley and back to the stream;
- The majority of groundwater flowing through Hidden Valley discharges back to Swauk Creek upstream of the Swauk Canyon (i.e. upstream of the bedrock constriction);
- Narrowing of Hidden Valley below the (former) Hartman property may also cause groundwater to discharge to Swauk Creek;

Uncertainties identified in the conceptual model were evaluated with the groundwater flow model by performing constraining analyses and uncertainty analyses. These analyses evaluated reasonable ranges of aquifer permeability (or transmissivity), streambed conductance, and the location(s) of hydraulic continuity between the alluvial aquifer and Swauk Creek.

Figure 12 presents an overview of the model design in both map and cross-section view. The active areal extent of the model domain is defined topographically by the "valley floor" and geologically by mapping of the valley alluvium. Thus, the model footprint widens and narrows with the areal extent of the valley. In the vertical dimension, the model included two layers, with top and bottom elevations constructed as sloping planes defined by the average gradient of Swauk Creek over the entire model domain. The top layer is 32 feet thick and the bottom layer is 25 feet thick. The top layer extends above the creek level and is modeled as unconfined; therefore, only a portion of the top layer was saturated and total model saturation varied as a function of location. Constant head cells were positioned at the upstream end of the model at the elevations of First and Swauk Creeks. The fluxes out of these cells were extracted from the model under steady-state simulation, and their values were used to convert the constant head cells into specified flux cells (shown in red on **Figure 12**). For the purpose of simplicity, Swauk Creek was represented as a "drain" with bottom elevation defined based on stream elevations shown on the topographic map. Drain cells allow water to flow *into* a simulated surface-water feature (e.g. gaining conditions on a stream), but do allow losing conditions from the stream. Areal recharge was not simulated, as the purpose of the analysis was to use superposition to evaluate the timing and magnitude of subsurface irrigation return flows. Aquifer specific yield was assumed to be 0.25.

7.1 Constraining Analyses

Aquifer permeability (K) was estimated by using the model as a constraining tool to evaluate various possibilities. The two constraining criteria employed were the following:

1. Model predictions of groundwater level mounding from irrigation recharge should not exceed the estimated thickness of the unsaturated zone below the Hartman field, which was measured with a hand level to be about 7 or 8 feet near the upstream end of the property; and
2. Model predictions of total flux through the valley alluvium should be sufficient to accommodate 3 in/yr of areal recharge (approximately 0.44 cfs of valley through-flow) with

H-01

extra capacity for other sources of recharge, such as recharge from groundwater subflow along the edges of the valley and upstream seepage losses from First and Swauk Creeks.

The constraining analyses simulated historic Burke and Hartman irrigation of the west side of Swauk Creek, with the assumed initial condition being observations made in 2001 (when Burke was irrigating on the east side of the creek). Hydraulic continuity, discussed later in this section, was assumed to occur though out the reach extending from the southern end of the Hartman property downstream. Groundwater levels were initially assumed to occur about 2.5 feet below the streambed near the soil test pit (**Figure 1**); however, simulated irrigation recharge mounded groundwater levels sufficiently to cause hydraulic continuity with the stream. The constraining models were run in transient mode to simulate a one-year period with an 198-day irrigation season. Initially, a K range of 30 to 3000 feet per day (ft/d) was considered. However, 30 ft/d was eliminated because calculated steady-state flux through the valley during the pre-irrigation condition was only 0.3 cfs and predicted groundwater mounding exceeded 8 feet (thus "swamping" the field). A K value of 100 ft/d was chosen as a lower end for the simulated K value because it allowed about 1 cfs to pass through the valley as steady groundwater flow, and showed up to 7 feet of estimated mounding. **Figure 13** shows a map of mounding and a hydrograph at various observation points developed in our predictive simulations using a K value of 100 ft/d (predictive simulations are discussed later in this section). Locations of the observation points are shown on the mounding map. A K value of 500 ft/d caused mounding from irrigation recharge up to 3 feet (over a wider area than the K=100 ft/d simulation), and allowed about 5.2 cfs of subsurface flow through the modeled valley. This K value translated to a transmissivity value of nearly 200,000 gallons per day per foot (gpd/ft). Both the transmissivity and the steady flow capacity associated with 500 ft/d were considered to be upper limits for the Swauk Valley system. **Figure 14** presents a mounding map and hydrographs associated with the K=500 ft/d simulations.

ECT's constraining analysis also addressed the effect of streambed conductance on predicted mounding. ECT evaluated streambed permeability (K') values of 1, 10 and 30 ft/d over various values of aquifer permeability. The constraining analysis showed that predicted mounding from irrigation recharge was not very sensitive to K'. Additional sensitivity analysis to K' was performed when running the predictive models for subsurface return flow, and showed that modeled return-flow schedules to the stream were only mildly sensitive to K'. Calculations presented on **Table 6** indicated that a K' value of 1 ft/d supports low flow seepage losses on the order of about 0.15 cfs/mile and high-flow seepage losses on the order of 1.2 cfs/mile. These values are consistent with the estimates of Swauk Creek seepage loss discussed in Section 5. A K' value of 1 ft/d was used in all models except on one sensitivity run.

Table 6 – Estimates of Streambed Seepage Under Low and High Flow Conditions

	Low Flow	Low Flow	Low Flow	High Flow	High Flow	High Flow
Length of Losing Channel (miles)	1	1	1	1	1	1
Wetted Perimeter (ft)	2	2	2	10	10	10
Head Over Channel Bottom (ft)	0.2	0.2	0.2	1	1	1
Thickness of Streambed Skin (ft)	1	1	1	1	1	1
Gradient Across Streambed Skin (ft/ft)	1.2	1.2	1.2	2	2	2
Streambed Permeability (ft/d)	1	10	30	1	10	30
Seepage Rate (cfs)	0.15	1.5	4.4	1.2	12	37

8 Analysis of Former Subsurface Return Flow from Hartman Irrigation Applications

The model was run to predict the timing of subsurface irrigation return flows using K values of 100 ft/d to 500 ft/d and a K' value of 1 ft/d. The model was first run in steady-state mode without any irrigation recharge from the former Hartman diversion. The model was then run in transient mode over a relatively long time period (at least 15 years) to simulate repeated year-after-year application of the Hartman diversion. In this manner, the model achieved a "cyclic steady state" (repeating condition from one year to the next). Hydrographs of groundwater inflow to Swauk Creek resulting from the irrigation recharge were extracted from the model by subtracting transient values of drain outflow from the steady state (pre-irrigation) value.

Model inflows from irrigation recharge were represented by a series of specified flux cells that occupy the footprint of former Hartman irrigation. The discharge rates from these cells were defined over a series of two-week stress periods to provide model inflows equivalent to the estimated irrigation recharge (non-consumptive use values on **Table 5**). Two sets of cells were defined: 42 cells were modeled as irrigated throughout the entire season, and 165 cells were forced to discontinue irrigation between late July and early September. The two groups of cells are shown with blue and green colors (respectively) on **Figure 12.**

Because field information was limited regarding the location(s) of hydraulic continuity between the alluvial aquifer and Swauk Creek, predictive simulations were used to consider the following range of hydraulic continuity scenarios[8]:

1. "Local Hydraulic Continuity" is represented by pre-irrigation continuity as far upstream as the southern Hartman property line. Farther upstream, pre-irrigation conditions specify a streambed elevation as high as 2.5 feet above the water table at the northern end of the Hartman property. During irrigation simulations, local mounding causes hydraulic continuity along the Hartman property, but hydraulic continuity is not permitted beyond 2000 feet upstream of the Hartman property.
2. "Enhanced Local Hydraulic Continuity" is represented by pre-irrigation continuity as far upstream as the southern Hartman property line. Along the Hartman property, pre-irrigation conditions specify a streambed elevation within several tenths of a foot above the water table. During irrigation simulations, local mounding causes enhanced hydraulic continuity along the Hartman property, but hydraulic continuity is not permitted beyond 2000 feet upstream of the Hartman property.
3. "Maximum Hydraulic Continuity" is represented by pre-irrigation continuity along the *entire* length of Swauk Creek, except along the Hartman property where streambed elevations are within several tenths of a foot above the water table. During irrigation simulations, local mounding causes hydraulic continuity along all of Swauk Creek.
4. "No Local Hydraulic Continuity" is represented by pre-irrigation and post-irrigation continuity as far upstream as the southern Hartman property line. No hydraulic continuity is allowed farther upstream.

[8] For the purpose of this analysis, the term "hydraulic continuity" is defined on page 6.

H-01

In addition, a single model sensitivity run was performed to evaluate the significance of increasing the streambed conductance to 10 ft/d using the K=100 ft/d, "local hydraulic continuity" model scenario.

Figure 15 presents model predictions of seepage inflow associated with former Hartman irrigation into Swauk Creek under the various simulated hydraulic continuity scenarios. For the first three scenarios listed above, the model showed very little sensitivity to K values and degree of hydraulic continuity. These model predictions suggest that subsurface return flow ranges from about 0.2 to 0.9 cfs, with a year-round component of constant return flow of 0.2 cfs. Assuming local hydraulic continuity, the model exhibited higher sensitivity to streambed conductance. Increasing K' from 1 ft/d to 10 ft/d caused a more rapid response to seasonal irrigation recharge and a faster "flush-through" of the irrigation pulse, but did not significantly affect the predicted year-round component of discharge to Swauk Creek. The model was also sensitive to limiting the capacity for hydraulic continuity to reaches downstream of the Hartman property ("no local continuity"). The K=100 ft/d simulation predicts an almost steady, year-round discharge of 0.5 cfs to Swauk Creek; however, this simulation should be discarded because predicted mounding would surely cause the very same hydraulic continuity disallowed by the model. However, mounding associated with the K=500 ft/d simulation causes hydraulic continuity over a limited portion of the irrigation season, and the K=500 ft/d simulation of no local continuity could be considered a reasonable endpoint for the limited continuity suggested under K=500 ft/d mounding.

Based on the sensitivity analyses performed, limited estimation of streambed conductance, and the general likelihood for local hydraulic continuity suggested by modeling results, ECT recommends using the simulations that allow local continuity at a K' value of 1 ft/d to predict changes in streamflow resulting from the Hartman water right transfer to the Trust. An average of the two "local hydraulic continuity" runs (K=100 ft/d and K=500 ft/d) is presented on **Figure 16**. This is the input recommended as the most reasonable "central value" estimate to the Brown and Caldwell model. In addition, based on agreement between Ecology, Brown & Caldwell and PGG, the results of the "K=100 ft/d, local continuity" and "K=500 ft/d, no local continuity" model runs were considered the most reasonable estimates of upper- and lower- bounds for the Brown & Caldwell model.

It is worthwhile to note that hydraulic continuity (a saturated hydraulic connection) was not observed at the test pit in late June and mid September of 2001. This may partly be due to drought conditions this year, but is more likely due to the fact that both the Burke and (former) Hartman irrigation applications were not occurring this year on the west side of the creek. Mounding from these two irrigation applications could have put shallow groundwater in full continuity with the stream. However, the observation that it wasn't in full continuity when only Burke (east of the Creek) was irrigating is indicative of uncertainty over where local continuity would occur in the future with transfer of the former Hartman irrigation rights to the Trust. The implications of this are that future return flow schedules for remaining nearby water users (i.e. both Burke diversions) could shift to one showing less seasonality than the historic curve predicted for the Hartman diversion. The longer the distance the groundwater needs to travel to reach the stream, the greater the time lag and smaller the seasonal variation.

9 Timing of Subsurface Return Flows from First Creek Seepage to Swauk

Transfer of Trendwest's FCWUA water rights will allow more water to remain in First Creek at the FCWUA diversion. Because a portion of this water will be lost to alluvial subflow near the First Creek mouth, the model was used to estimate the timing for this subsurface flow to discharge downstream into Swauk Creek. For the purpose of this analysis, the average estimated additional First Creek flow is assumed equivalent to the average estimated diversion associated with Trendwest's water rights shown on **Table 4**. Once transferred, the additional water will flow down First Creek, into Swauk Creek, and ultimately to the Yakima River. Analysis of seepage loss to alluvial subflow on First Creek (Section 4) indicates that little net seepage is expected between the FCWUA diversion and MWG's lower gage. However some seepage to alluvial subflow is expected over the one-mile stretch between MWG's lower gage and the mouth.

ECT assessed the relationship between First Creek flow and seepage loss below MWG's lower gage to estimate the portion of Trendwest's transferred water right to become alluvial subflow when the diverted water is left instream. Our analysis is documented in **Table 7**, at the end of this report. During the high-flow months of April and May, Trendwest's addition to First Creek flow (about 5.0 to 5.2 cfs) is estimated to result in about 0.4 to 0.5 cfs of seepage to alluvial subflow, with about 4.6 to 4.8 cfs additional surface flow to Swauk Creek. In the lower-flow months of July and August, Trendwest's addition to First Creek flow (about 1.2 to 1.9 cfs) is estimated to result in about 0.6 to 0.8 cfs of seepage to alluvial subflow, with about 0.6 to 1.3 cfs additional surface flow to Swauk Creek. Alluvial subflow is a higher proportion of Trendwest's streamflow contribution during the lower-flow months because predicted streamflows are almost entirely comprised of Trendwest's transfer to instream flow (thus almost *all* the seepage to alluvial subflow is generated by the Trendwest contribution). During April and May, natural flows in First Creek (generated predominantly as inflow from smaller tributaries between the diversion dam and the mouth) represent a significant portion of the total streamflow and are thus associated with a significant portion of the seepage loss.

Seepage loss from lower First Creek will become alluvial subflow in the First Creek alluvium. It will then flow into the Swauk Creek alluvium and return to Swauk Creek where hydraulic continuity and gaining conditions occur. ECT concluded that gaining conditions occurred over some, if not all, of the 2001 irrigation season between the First Creek confluence and the Martin gage (approximately one-half mile downstream). ECT used the groundwater flow model of the alluvial aquifer along Swauk Creek (including the mouth of First Creek) to predict the timing required for return flow from First Creek seepage losses to re-enter Swauk Creek via alluvial subflow. The modeling assumed that all of the First Creek seepage loss associated with Trendwest's transfer re-enters Swauk Creek within Hidden Valley[9]. Seepage loss was simulated with a series of specified flux cells along the portion of First Creek included within the model domain[10]. Seepage loss was specified over bimonthly portions of the irrigation season based on calculations shown on **Table 7**. The primary set of model runs specified hydraulic continuity

[9] Although a small portion of the seepage loss may travel as alluvial subflow along the full length of Swauk Creek and ultimately discharge to the Yakima River alluvium.

[10] Five specified flux cells were used along First Creek where hydraulic continuity was modeled up to the First Creek confluence, whereas a single specified flux cell was used where hydraulic continuity was modeled far from the First Creek confluence.

H-01

between Swauk Creek and the alluvial aquifer in a manner most consistent with the characterization presented in Section 5. The model simulated a gaining reach between the First Creek confluence and Lauderdale Junction, a losing reach between Lauderdale Junction and the downstream end of the former Hartman property, and gaining conditions farther downstream. The model was run using aquifer permeability values of 100 and 500 ft/d.

The results of the model predictions are shown on **Figure 17**, with First Creek seepage loss to alluvial subflow shown in dark blue and estimated inflow back to Swauk Creek shown in green and red. The model predicts that Swauk Creek surface flow begins to climb immediately after Trendwest's additional seepage loss becomes alluvial subflow. The increase in surface flow continues to rise in parallel to the increase in First Creek seepage loss over a 4-month period and then begins to decline in parallel to reductions in seepage loss. Over the first 4 months of the irrigation season, predicted subsurface return flow to Swauk Creek is less than seepage loss from First Creek. Over the next 2.5 months, predicted return flows are similar to seepage estimated losses. A significant portion of the alluvial subflow from seepage loss continues to contribute to Swauk Creek surface flows for about 4 to 6 weeks after the irrigation season. The model predicts that a small portion of the seasonal seepage loss to alluvial flow (about 0.03 cfs) recharges Swauk Creek on a year-round basis.

ECT evaluated the model's sensitivity to the location of hydraulic continuity by performing two additional sets of simulations (both run at aquifer permeability values of 100 and 500 ft/d). The first sensitivity run allowed hydraulic continuity to occur from the downstream end of the model domain (at Swauk Canyon) to the soil test pit in the middle of the Hartman property (shown as a purple triangle on **Figure 12**). The second sensitivity allowed hydraulic continuity to occur from the downstream end of the model domain to the downstream boundary of the Hartman Property (shown as a orange square on **Figure 12**). **Figure 17** shows that increasing the distance from the location of First Creek seepage to the reach showing hydraulic continuity dramatically reduces seasonal variation of the predicted return-flow "pulse". Dampening of the pulse (i.e. "smearing" over time) occurs because the alluvial aquifer stores and slowly releases the water added from First Creek seepage. The second sensitivity simulation predicted a nearly constant year-round return flow to Swauk Creek at an aquifer permeability value of 100 ft/d.

Among the return flow curves shown on **Figure 17**, the curves derived from the assumption of hydraulic continuity both above and below the Hartman property are considered to be most consistent with the available hydrogeologic model, and therefore most representative of the timing of actual return flow from First Creek seepage. For this reason, these curves are shown in bold lines on the figure. ECT recommends that an average return-flow schedule derived from these two curves be used for assessment of the change in timing of Yakima River inflow associated with the proposed transfer.

The transferred FCWUA water that flows within Swauk Creek down to the Yakima River is expected to have minor seepage loss to alluvial subflow within the Hidden Valley, as discussed in the following section.

10 Analysis of Swauk Creek Alluvial Subflow

Assessment of potential seepage losses to alluvial subflow along Swauk Creek was performed to estimate whether a significant portion of Trendwest's water rights transfer to instream flow might infiltrate into near-stream alluvium and take a subsurface pathway for a portion of its migration to the Yakima River. Were this to occur, increased Swauk Creek surface flows associated with Trendwest's water rights transfers would be reduced by the seepage to alluvial subflow. In addition, because alluvial subflow typically travels much slower than surface flow, subflow originating from Trendwest's water rights transfers would reach the Yakima River later than water conveyed via surface flow

The highest potential for significant seepage loss to alluvial subflow is likely to occur in strongly losing reaches of Swauk Creek. Data regarding seepage loss on Swauk Creek are limited, and as a result, no definitive conclusions regarding seepage gains and losses could be drawn. However, available data and the inductive reasoning necessary to make coarse estimates of seepage loss are presented in Section 5. Gaging data suggest that a portion of the reach between First Creek and the Martin gage is gaining, however losing conditions are likely directly downstream of the gage. Locations of the transition between gaining to losing conditions upstream of the Martin gage, and losing to gaining conditions downstream of the Martin gage, are unknown. Based on existing analysis and available data, the most likely location for seepage losses occurs between the Martin gage and some location upstream of the Coe diversion. Our analysis of the available data also suggests that best estimates of net seepage losses between the Martin gage and the Coe diversion may range from several tenths of a cfs at low flows to slightly over 1 cfs at high flows (typically outside the irrigation season). This relationship between streamflow and seepage loss, illustrated on **Figure 10**, was used to estimate seepage to alluvial subflow associated with the proposed Hartman and FCWUA water rights transfers.

Changes in alluvial subflow associated with the proposed water rights transfers were estimated by comparing predicted streambed seepage losses over the irrigation season with and without Trendwest's proposed instream transfers to the Trust. The irrigation season was divided into a series of half-month periods, and average flows with and without the transfers to instream flows were estimated. In addition, changes in streamflow associated with the Hartman transfer were distinguished from those associated with the FCWUA transfer to facilitate distinction of the contribution to alluvial subflow associated with each transfer. Seepage loss was assumed to occur between the Martin gage and the Coe property at the rates predicted in Section 5 and presented on **Figure 10**. The following bullets summarize the procedure used to estimate Trendwest's contributions to alluvial subflow, and the results are presented at the end of this report in **Table 7**. The table is divided up into three calculation sub-sections (7a, 7b, 7c), and the reader is recommended to refer to these sections when reviewing the calculation procedure.

1. Estimates of historic irrigation-season streamflow at the Martin gage were taken from the streamflow availability analysis discussed in Section 6. Initial values were the available streamflows after all irrigation requirements, down to the priority of Hartman (1889), were taken. These values were adjusted by adding in the Coe/Tang water rights (1884), since the Coe/Tang diversions occur significantly downstream and, rather than reducing physical streamflows in the reach of concern, only reduce streamflow *availability*. *(Section 7a)*

H-01

2. Historic water use from the Hartman diversion, as limited by the water availability analysis in Section 6, was added to historic streamflows at the Martin gage to estimate future streamflows due to transferring the diversion back to the stream. *(Section 7a)*

3. Swauk Creek inflow from First Creek was estimated to calculate the total addition to Swauk Creek streamflow from both the Hartman transfer and the FCWUA transfer in the following manner:

   - Historic flows at the mouth of First Creek were estimated based on data collected by Tom Martin from 1998 to 2000 and presented on **Figure 18.** Using the First Creek seepage loss curve (**Figure 5**), flows at the mouth were used to back-calculate flows at MWG's lower gage. *(Section 7b)*

   - Historically available Trendwest FCWUA water rights, estimated by MWG, were added to historic flows at the lower MWG gage to estimate future flows at the gage. The seepage loss curve was then used to estimate losses to alluvial subflow below the lower MWG gage and future flows at the mouth of First Creek. *(Section 7b)*

   - Trendwest's portion of the future seepage loss on lower First Creek were calculated by multiplying Trendwest's portion of the future flow at the MWG gage by the total seepage loss, and then subtracted from Trendwest's contribution to future increased First Creek flow, thus yielding Trendwest's *surface-water* contribution to First Creek inflow to Swauk Creek. As a reasonable simplification, Trendwest's groundwater contribution to Swuak Creek via return of alluvial subflow was estimated by lagging Trendwest seepage losses by one month. *(Section 7b)*

   - Future Swauk Creek flows below the Martin gage were estimated by adding the increased flow from First Creek to the predicted flows in Swauk Creek. Trendwest's total contribution to future Swauk Creek streamflow at the Martin gage was considered the sum of *surface-water* components of their contributions from the Hartman and FCWUA transfers plus the return flow from alluvial subflow originating from the lower portion of First Creek *(Section 7c)*

4. Total Trendwest seepage loss on Swauk Creek was estimated by multiplying the portion of the total future flow at the Martin gage associated with Trendwest's transfer by the seepage loss estimated for that total flow, as calculated by the curve shown on **Figure 10**. *(Section 7c)*

5. Trendwest seepage loss associated with the Hartman diversion alone was estimated by multiplying the total estimated Trendwest seepage loss on Swauk Creek by the portion of the increased flow (below Hartman) from the Hartman transfer relative to the increased flow from the combined Hartman and FCWUA transfer. The seepage loss associated with the FCWUA was estimated as the remainder of the Hartman seepage loss minus the total seepage loss. *(Section 7c)*

Although the above analysis simplifies some of the hydrologic functions in the First-Swauk Creek complex resulting from the proposed water rights transfers, it allows reasonable estimation of the magnitude of seepage loss to Swauk Creek alluvial subflow associated with the two transfers. **Table 6** presents results of the above analysis where historic water availability for the Hartman water right was estimated without consideration of return flow; however parallel calculations with consideration of return flow showed no appreciable difference in results (±0.01

cfs). Estimated total Trendwest seepage loss from Swauk Creek ranges from 0.05 to 0.11 cfs, with from 0.01 to 0.06 cfs attributed to the Hartman transfer and 0.03 to 0.08 cfs attributed to the FCWUA transfer. Relative to the total magnitude of each transfer (expressed as increased flow below Hartman), average seepage loss to alluvial subflow represents about 3 percent of the Hartman transfer and 2 percent of the FCWUA transfer. Due to the small magnitude of the seepage loss estimates, the alluvial subflow component of the proposed water right transfers was considered to be relatively insignificant and not worthy of detailed groundwater flow modeling.

11 Changes in Streamflow Associated with the Transfers

Based on the finding that seepage losses to Swauk Creek alluvial subflow from Trendwest's proposed water right transfers are relatively insignificant, estimation of the net change in streamflow is based on changes in consumptive use and the timing of non-consumptive subsurface return flow. For the proposed Hartman transfer, the change from historic to future conditions involves restoring the full historic diversion (both consumptive and non-consumptive components) into instream flow, but losing the historic time-lagged sub-surface return flows from non-consumptive irrigation losses. ECT calculated the net change in flow over time by subtracting the predicted (time-delayed) subsurface return flow from the estimated water available for transfer back into the stream[11]. **Figure 19** presents the estimated change in streamflow associated with the proposed Hartman transfer predicted over a one-year period. During the first 15 weeks of the irrigation season, streamflow would increase by 1 to 2 cfs. Due to an abrupt reduction in streamflow availability and associated historic Hartman diversion in late July, streamflow would be reduced during the middle 9 weeks of the irrigation season because return flows from earlier in the season historically exceeded estimated diversions. Under the proposed transfer, the water that used to supply these lagged return flows would be left instream earlier in the season discontinuing the historic diversion. Increased availability at the end of the irrigation season once again results in a net increase in streamflow, when historic diversions exceeded historic return flows. The net increase in stream flow estimated over the final 4 weeks of the irrigation season ranges from 0.05 to 0.9 cfs. After the irrigation season, streamflows would be reduced by approximately –0.63 cfs to –0.2 cfs, because time-lagged irrigation returns would have been transferred to instream flows during the irrigation season. The jagged appearance of the calculated streamflow-credit curve is due to the fact that irrigation water availability was estimated on a two-week basis.

For the proposed FCWUA transfer, the change from historic to future conditions involves allowing the full historic diversion to remain instream. For the purpose of this analysis, the historic diversion was estimated to range from 1.06 to 5.21 cfs (**Table 6**). Streamflows in all but the lower mile of First Creek are expected to benefit by these amounts during the irrigation season. Between lower First Creek and upper Hidden Valley (Swauk Creek), predicted increases in flow from the FCWUA transfer will be slightly reduced by seepage loss to alluvial subflow. Losses to alluvial subflow are estimated to range from 0.41 to 0.77 cfs, so that remaining flow increases range from 0.52 to 4.7 cfs (**Table 6**). On Swauk Creek, flow increases associated with the FCWUA transfer are expected to be restored back to values ranging from 1.06 to 5.21 cfs with increasing distance from the First Creek confluence. The location(s) where subsurface return flow from First Creek seepage loss returns to Swauk Creek are unknown;

[11] The water available for transfer (i.e. the historically available diversion) equals the historic irrigation seepage loss shown of Figures 15 and 16 divided by 1 minus the irrigation efficiency (1-0.33 = 0.66).

H-01

however, gaining conditions above the Martin gage and results of model simulations suggest that most of the flow returns to Swauk Creek above the gage.

The combined effect of the proposed Hartman and FCWUA transfers is estimated to result in increased First and Swauk Creek flow throughout the irrigation season, decreased Swauk Creek flow outside the irrigation season, and no change in First Creek flow outside the irrigation season[12]. **Figure 20** presents estimated changes in Swauk Creek flow for lower Hidden Valley, where former subsurface return flows from former Hartman irrigation likely returned to the stream. The figure was prepared by subtracting the estimated loss in historic Hartman irrigation subsurface return flows from the sum of the estimated historic Hartman diversion and total inflow to Swauk Creek (below Hartman) from the Trendwest FCWUA transfer[13]. The values shown on **Figure 20** should be considered approximate, since they employ various simplifying assumptions discussed in previous sections and because discrete bi-weekly values of irrigation subsurface return flow were estimated from the continuous model results on **Figure 16**. Nevertheless, the figure shows the general net increase in streamflow predicted from the combined transfers to trust throughout the irrigation season ranging from 0.8 to 6.7 cfs, and a general decrease in streamflow predicted outside the irrigation season ranging from –0.06 to –0.48 cfs.

[12] In actuality, First Creek flows will likely increase from historic levels outside the irrigation season because improvements to the diversion structure and new management will likely discontinue the past practice of diverting the entire streamflow throughout the year.

[13] As shown on **Table 6**, this value incorporates a one-month time lag for subsurface return flow from First Creek seepage loss near the Swauk Creek confluence.

Table 7
Analysis of Seepage Losses to Alluvial Subflow
(All Values in CFS)

7a: Hartman Transfer - Change in Streamflow Below Burke-Hartman (B-H) Diversion

	Historic Water Available Below Burke & Hartman	Historic Coe/Tang Diversion	Historic Actual Flow Below B-H Diversion	Historic Total Hartman Diversion	Future Flow Below B-H Diversion w/ Transferred Hartman					
Apr 1-15	126.5	0.8	127.2	1.2	128.5					
Apr 16-30	106.5	0.8	107.2	1.2	108.5					
May 1-15	39.7	1.1	40.8	1.9	42.7					
May 16-31	20.0	1.1	21.1	1.8	22.8					
Jun 1-15	13.8	1.3	15.1	2.2	17.3					
Jun 16-30	7.8	1.3	9.1	2.2	11.3					
Jul 1-15	2.5	1.6	4.1	2.6	6.7					
Jul 16-31	0.0	0.4	0.4	0.5	1.0					
Aug 1-15	0.0	0.0	0.0	0.4	0.4					
Aug 16-31	0.0	0.0	0.0	0.4	0.4					
Sep 1-15	0.0	0.8	0.8	0.3	1.1					
Sep 16-31	0.0	0.9	0.9	1.1	2.1					
Oct 1-15	3.1	0.4	3.5	0.7	4.2					

7b: Change in Flow and Seepage Loss from FCWUA Transfer

	Estimated Historic First Creek Inflow to Swauk Creek	Historic First Creek Flow at MWG Gage (Back Calculated)	Available TW First Creek Water Rights	Future First Creek Flow at MWG Gage	Total Seepage Loss Associated with Future Flow	Future First Creek Inflow to Swauk Creek	TW Percent of Future Flow at MWG Gage	TW Seepage Loss on Lower First Creek	TW Surface Inflow to Swauk Creek	TW GW Inflow to Swauk Creek
Apr 1-15	14.50	16.11	5.04	21.15	1.71	19.43	24%	0.41	4.63	0.00
Apr 16-30	14.50	16.11	5.04	21.15	1.71	19.43	24%	0.41	4.63	0.00
May 1-15	13.00	14.56	5.21	19.77	1.69	18.08	26%	0.44	4.76	0.41
May 16-31	10.00	11.48	5.21	16.69	1.62	15.07	31%	0.51	4.70	0.41
Jun 1-15	5.00	6.24	4.37	10.61	1.44	9.17	41%	0.59	3.77	0.44
Jun 16-30	2.00	2.95	4.37	7.32	1.30	6.02	60%	0.77	3.59	0.51
Jul 1-15	0.50	1.04	1.90	2.94	0.94	2.00	65%	0.61	1.30	0.59
Jul 16-31	0.00	0.00	1.90	1.90	0.77	1.13	100%	0.77	1.13	0.77
Aug 1-15	0.00	0.00	1.18	1.18	0.58	0.60	100%	0.58	0.60	0.61
Aug 16-31	0.00	0.00	1.18	1.18	0.58	0.60	100%	0.58	0.60	0.77
Sep 1-15	0.00	0.00	1.06	1.06	0.54	0.52	100%	0.54	0.52	0.58
Sep 16-31	0.00	0.00	1.06	1.06	0.54	0.52	100%	0.54	0.52	0.58
Oct 1-15	0.00	0.00	1.12	1.12	0.56	0.56	100%	0.56	0.56	0.54

7c: Seepage Loss from Swauk Creek on Martin-Coe Reach

	TW Total Inflow to Swauk Creek (Below B-H Diverson) from FCWUA Transfer	Future Flow Below B-H Diversion with First Creek Increase	Trendwest Total Addition to Future Surface Flow Below B-H Diversion	Trendwest Addition to Future Surface Flow (%)	Martin-Coe Seepage Loss Associated with Future Flow	Total Trendwest Portion of Future Martin-Coe Seepage Loss	Trendwest Hartman Portion of Future Martin-Coe Seepage Loss	Trendwest FCWUA Portion of Future Martin-Coe Seepage Loss		
Apr 1-15	4.6	133.4	5.87	4%	1.22	0.05	0.01	0.04		
Apr 16-30	4.6	113.4	5.87	5%	1.11	0.06	0.01	0.05		
May 1-15	5.2	48.2	7.05	15%	0.62	0.09	0.02	0.07		
May 16-31	5.1	28.3	6.87	24%	0.41	0.10	0.03	0.07		
Jun 1-15	4.2	21.9	6.39	29%	0.34	0.10	0.03	0.07		
Jun 16-30	4.1	15.8	6.27	40%	0.27	0.11	0.04	0.07		
Jul 1-15	1.9	8.8	4.51	51%	0.19	0.10	0.06	0.04		
Jul 16-31	1.9	2.9	2.43	85%	0.12	0.10	0.02	0.08		
Aug 1-15	1.2	1.6	1.64	100%	0.10	0.10	0.03	0.08		
Aug 16-31	1.4	1.8	1.80	100%	0.11	0.11	0.03	0.08		
Sep 1-15	1.1	2.2	1.43	65%	0.11	0.07	0.02	0.06		
Sep 16-31	1.1	3.2	2.25	70%	0.12	0.09	0.04	0.04		
Oct 1-15	1.1	5.3	1.78	34%	0.15	0.05	0.02	0.03		

Figure 1
Location Map of Hidden Valley and Swauk Creek

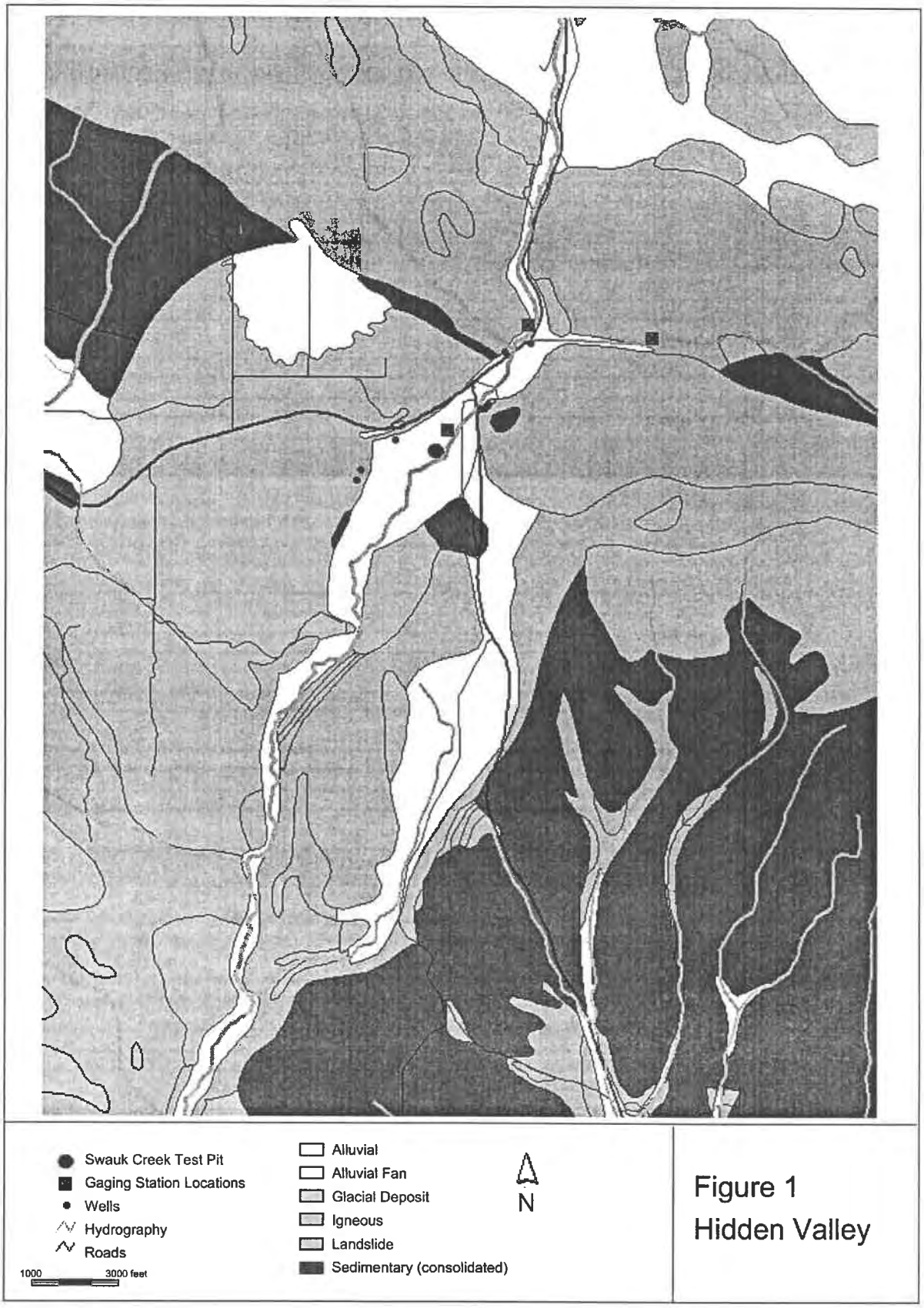


Figure 2
First Creek Flow Data for 1998-2001
Estimated Above the FCWUA Diversion

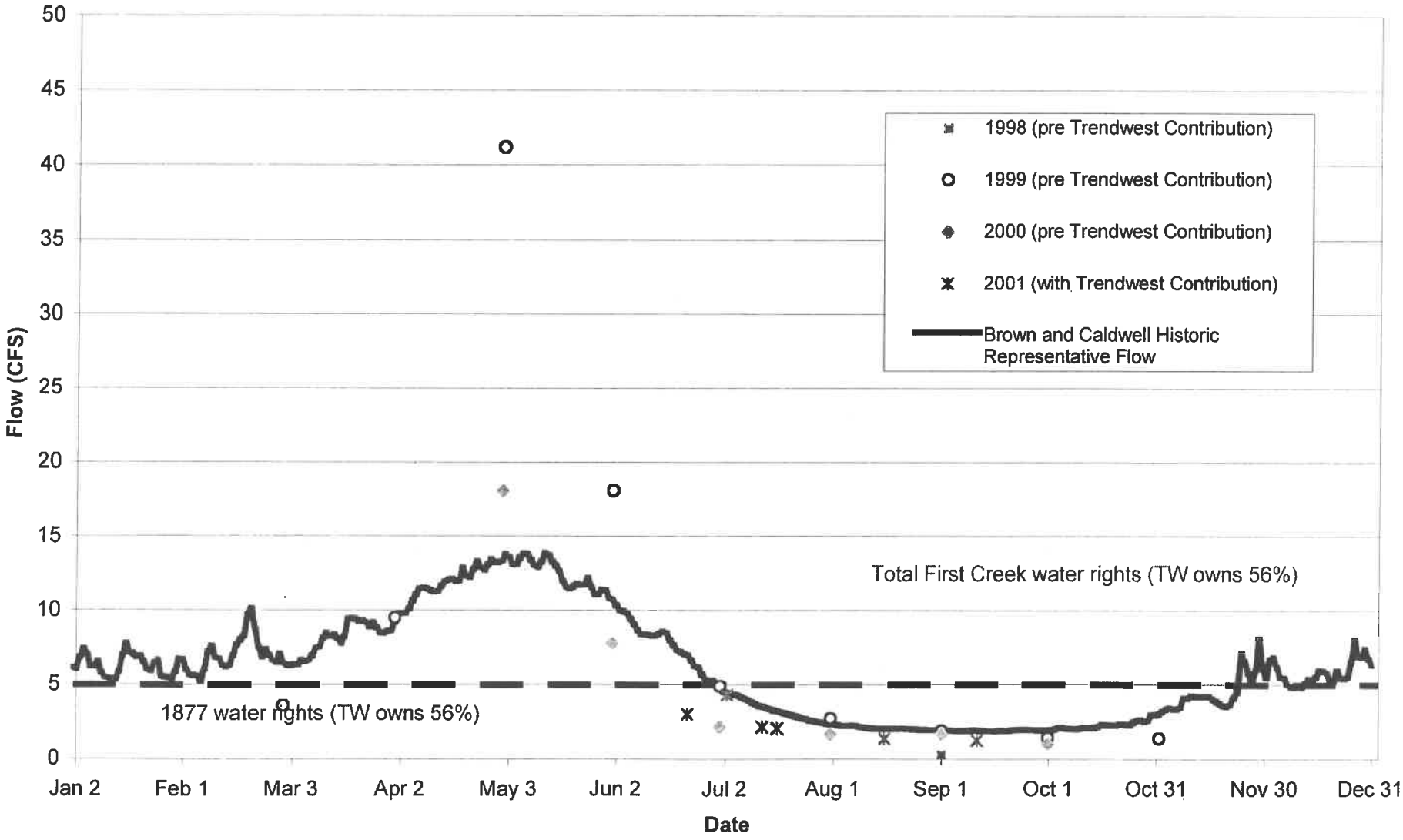


Figure 3
First Creek Flow Data for 2001

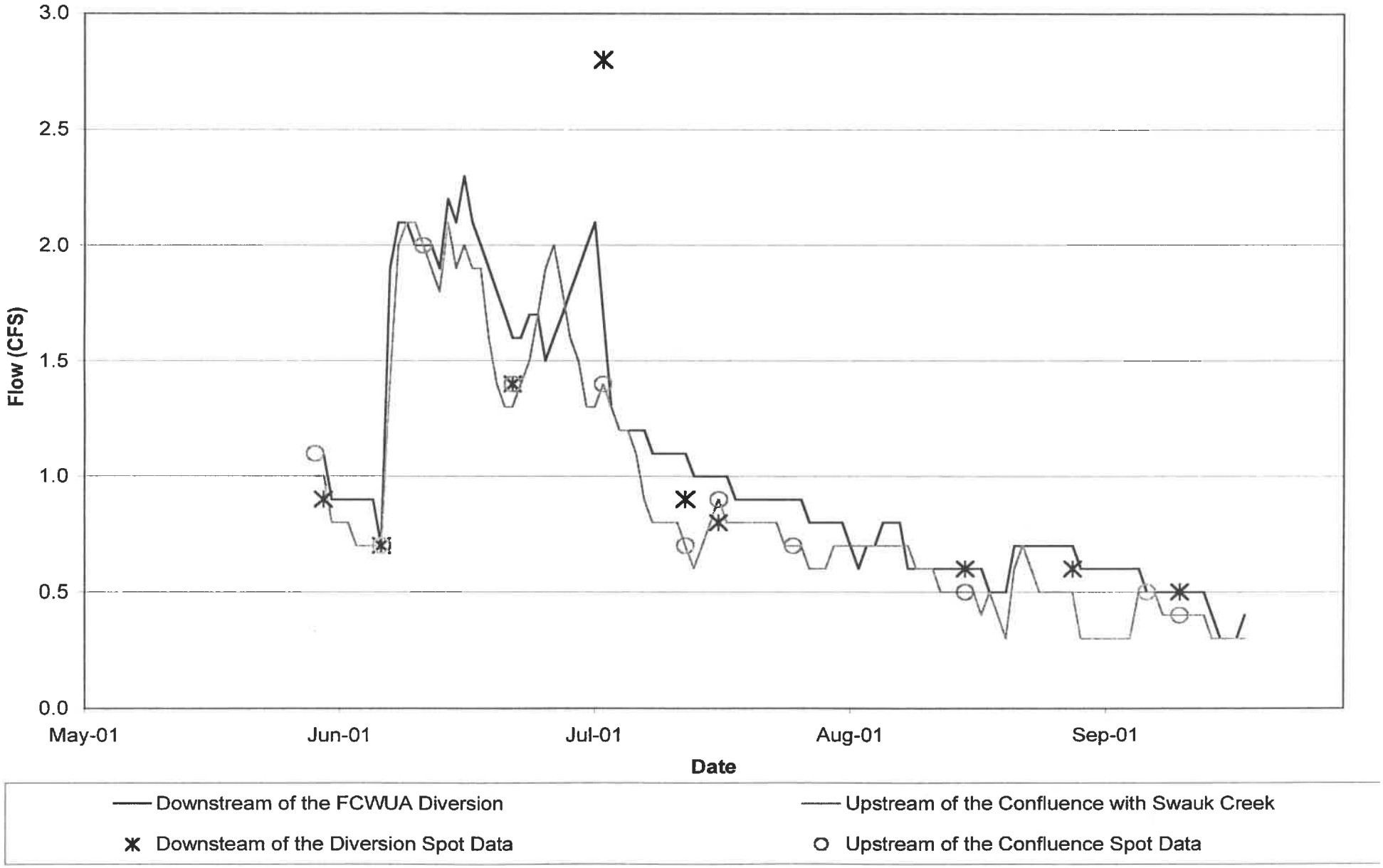


Figure 4
Seepage Losses Between Lower Gages from 1999 First Creek Test

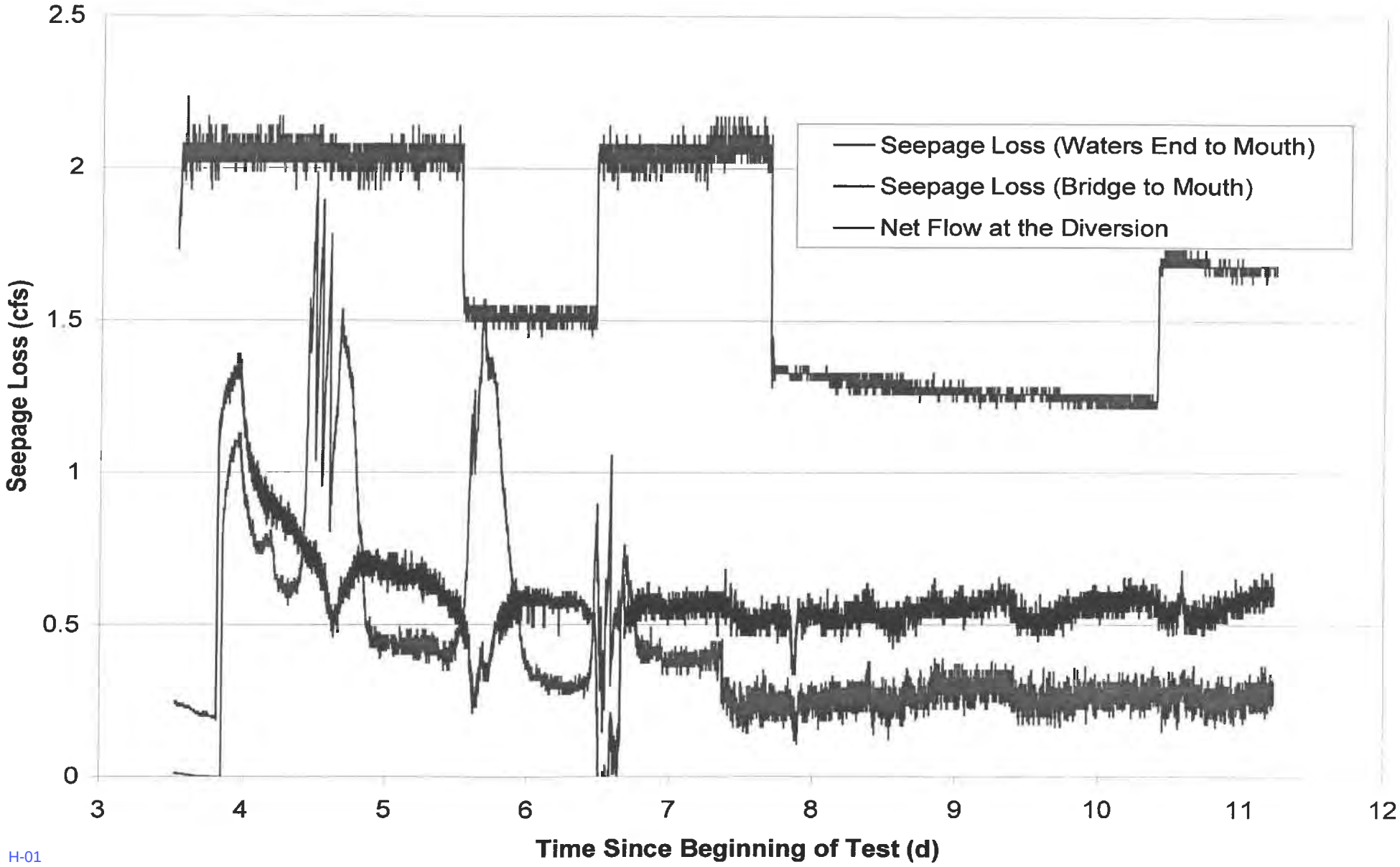


Figure 5
Estimated Seepage Loss on First Creek
Between MWG's Downstream Gage and the Mouth

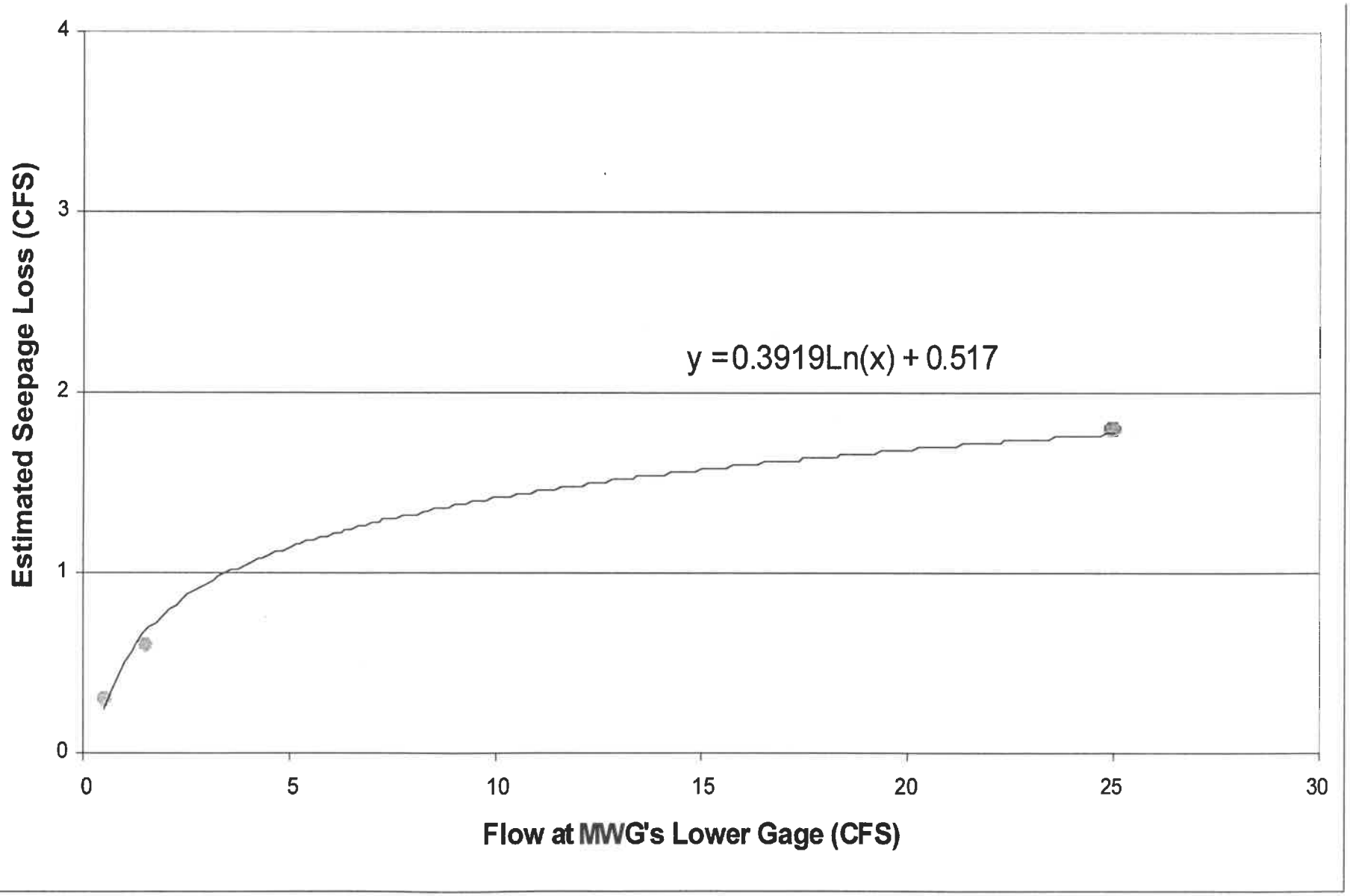


Figure 6
Swauk Creek Flows (1998-2001)
Upsteam of the Confluence with First Creek

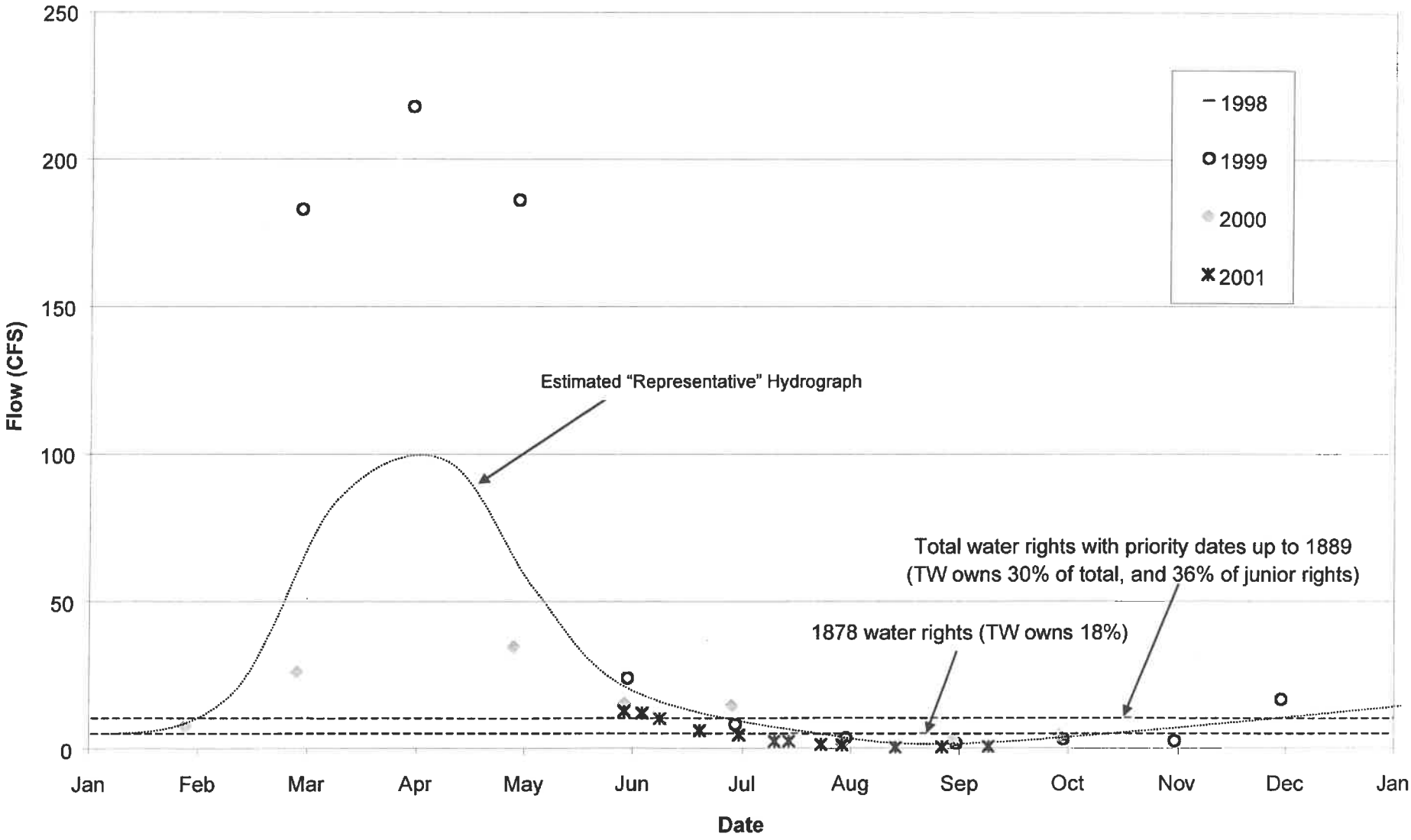


Figure 7
Spot Measurements of Swauk Creek Flows (1998-2001 Data)

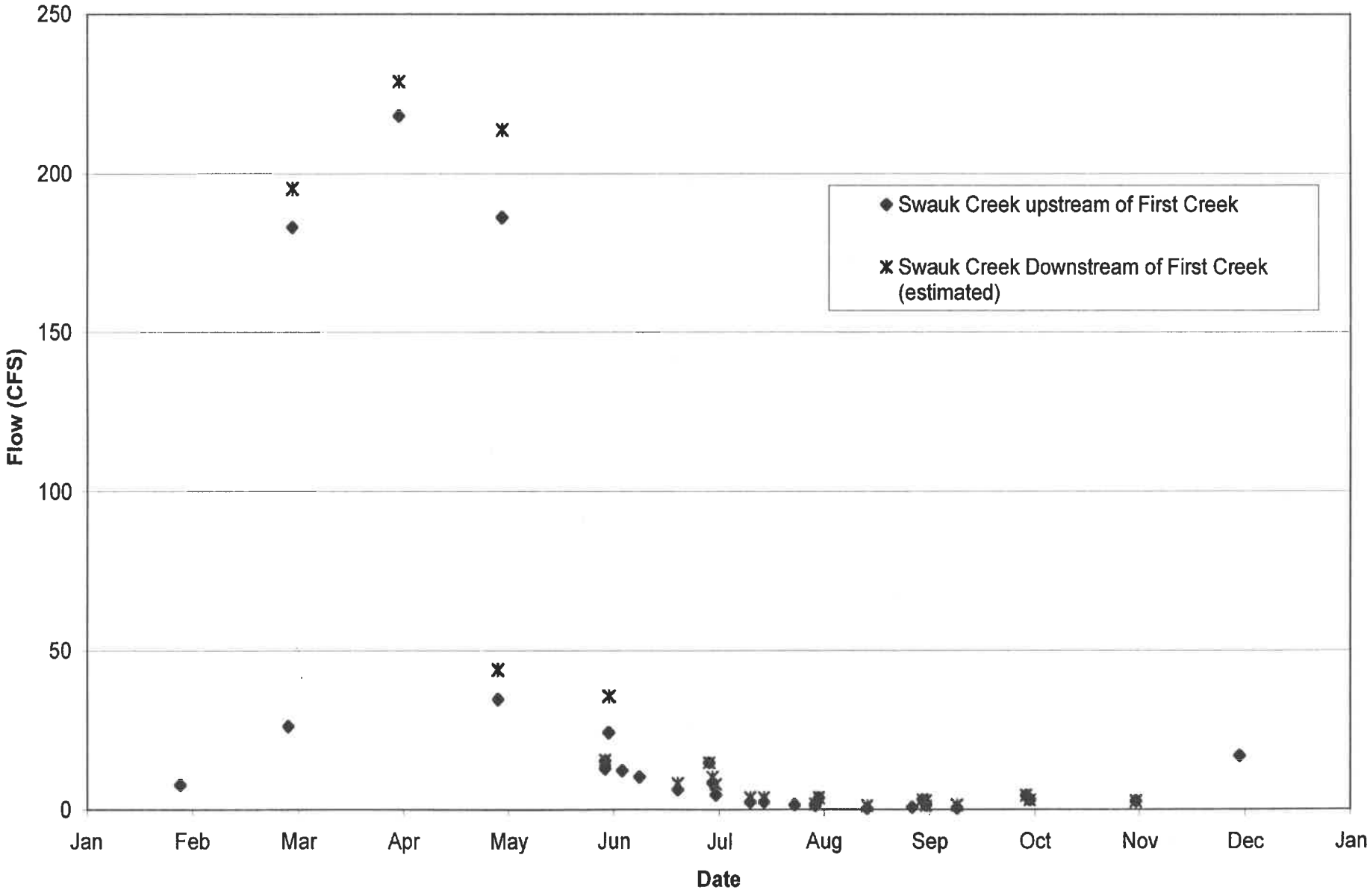


Figure 10
Estimated Seepage Loss in Hidden Valley below the Martin Property Gage

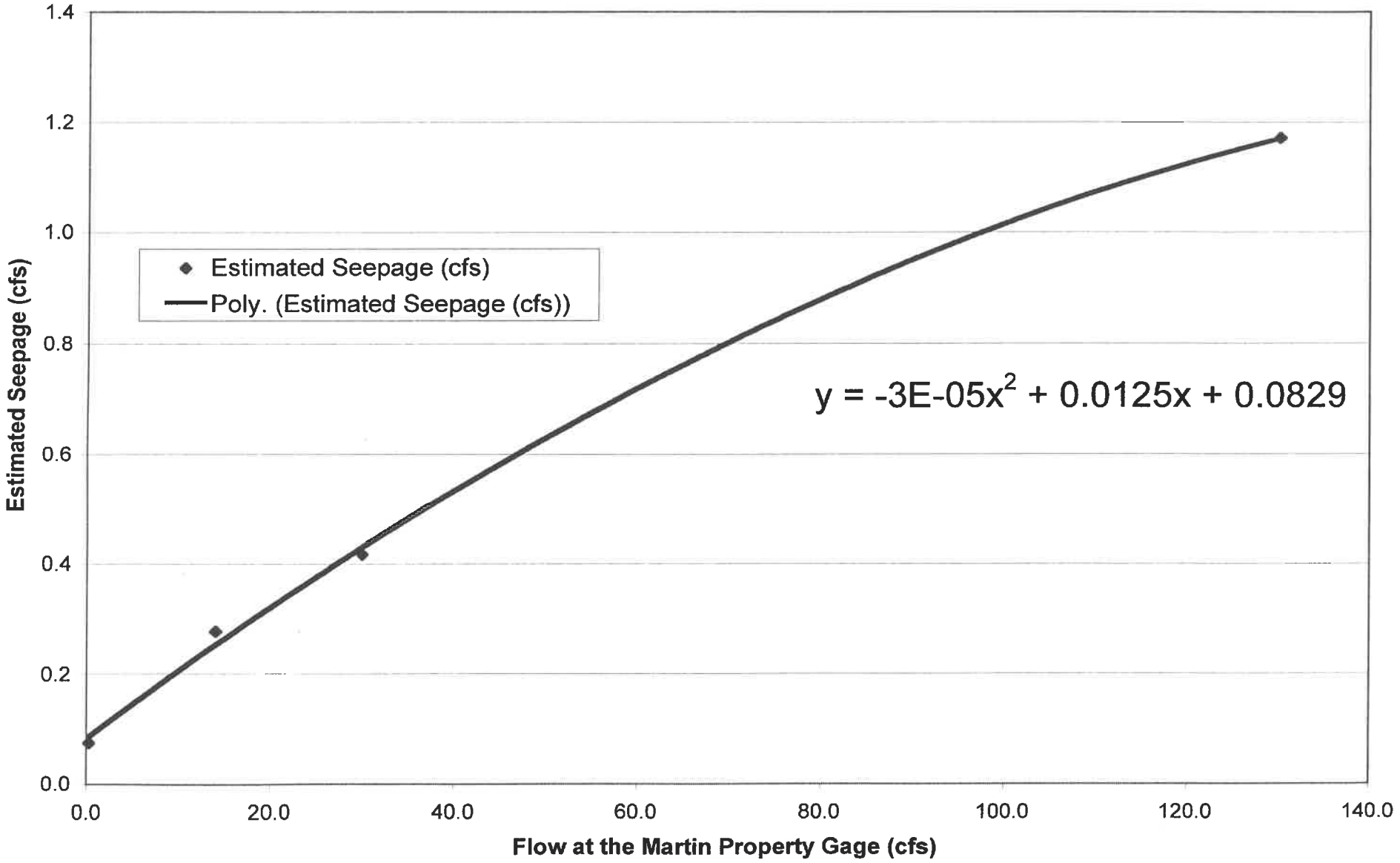


Figure 11
Detail of Low Flow Conditions in Swauk Creek
(Downstream of the Confluence with First Creek)

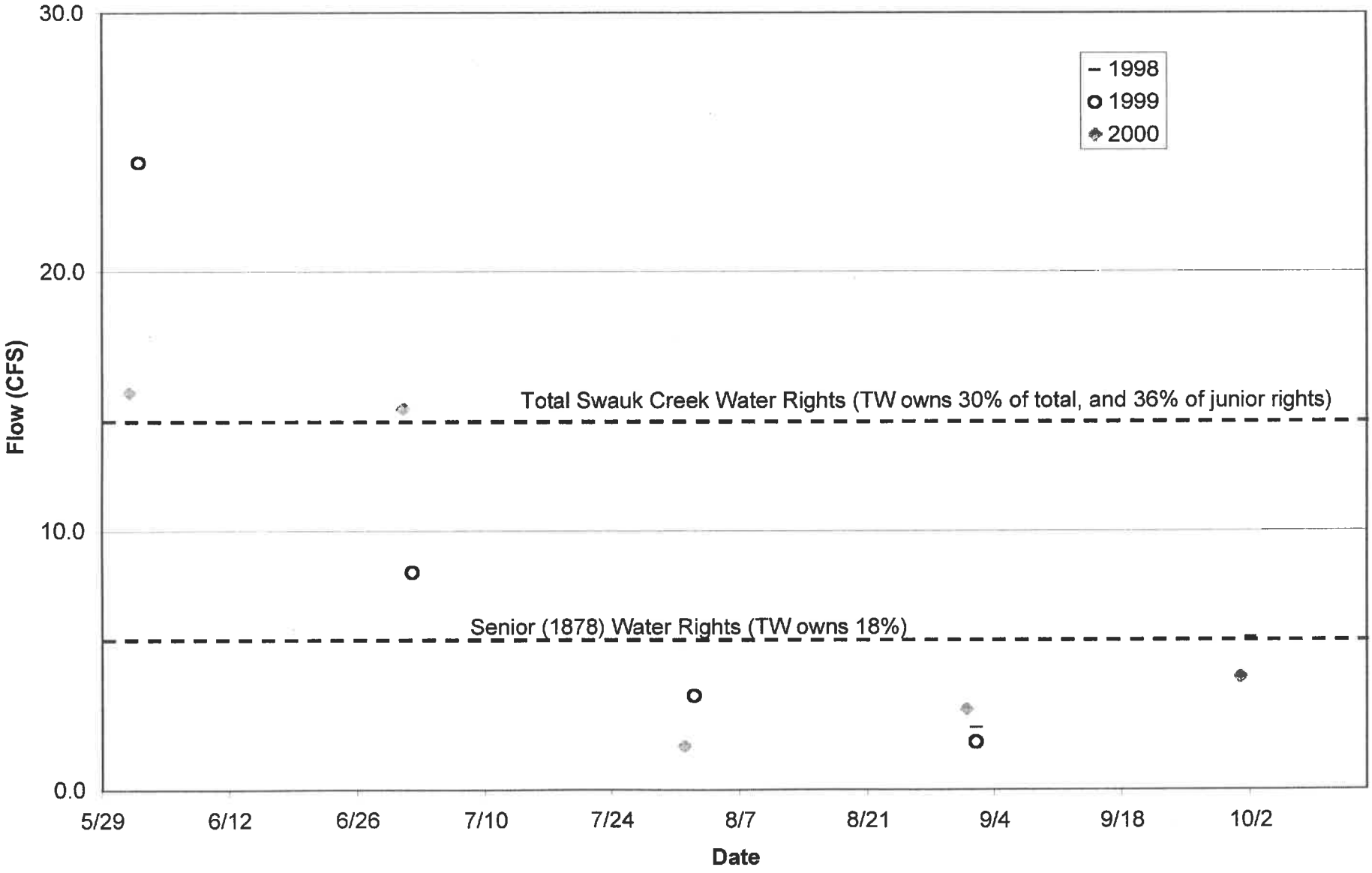
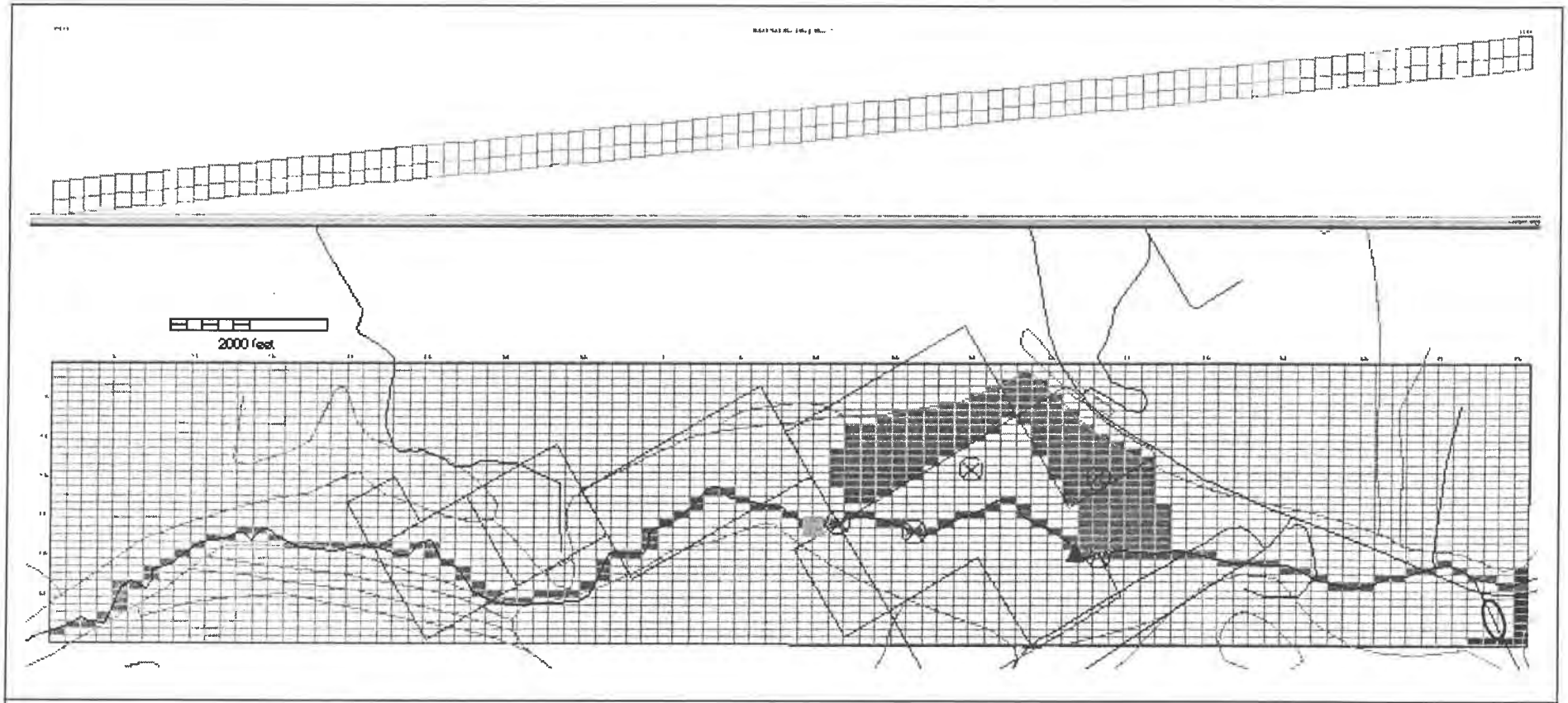


Figure 12
MODFLOW Model Design in Cross-Section and Map Views

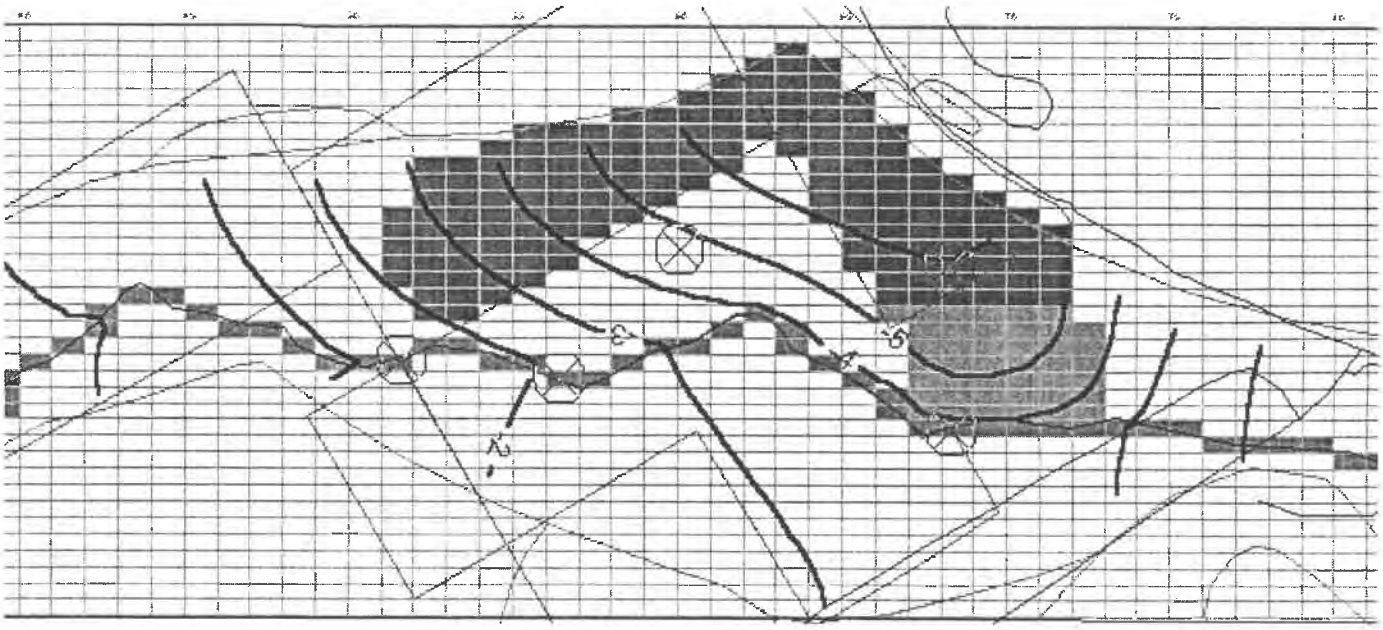


LEGEND

- Model Inflow Location for First Creek Seepage Loss
- Location of Soil Test Pit
- Downstream Location of Former Hartman Property
- Monitoring Points for Hydrograph Extraction
- Specified Flux Cells Receiving Recharge Throughout Irrigation Season
- Specified Flux Cells Receiving Recharge Over a Limited Portion of the Irrigation Season
- Specified Flux Cells Simulating Inflow Along Model Boundary

Figure 13
Groundwater Mounding and Water Level Hydrographs
Predicted with Local Hydraulic Continuity and K=100

Mid-Summer Mounding (feet drawdown) and Irrigated Acreage (green & blue cells)



Hydrographs at Observation Points (feet drawdown)

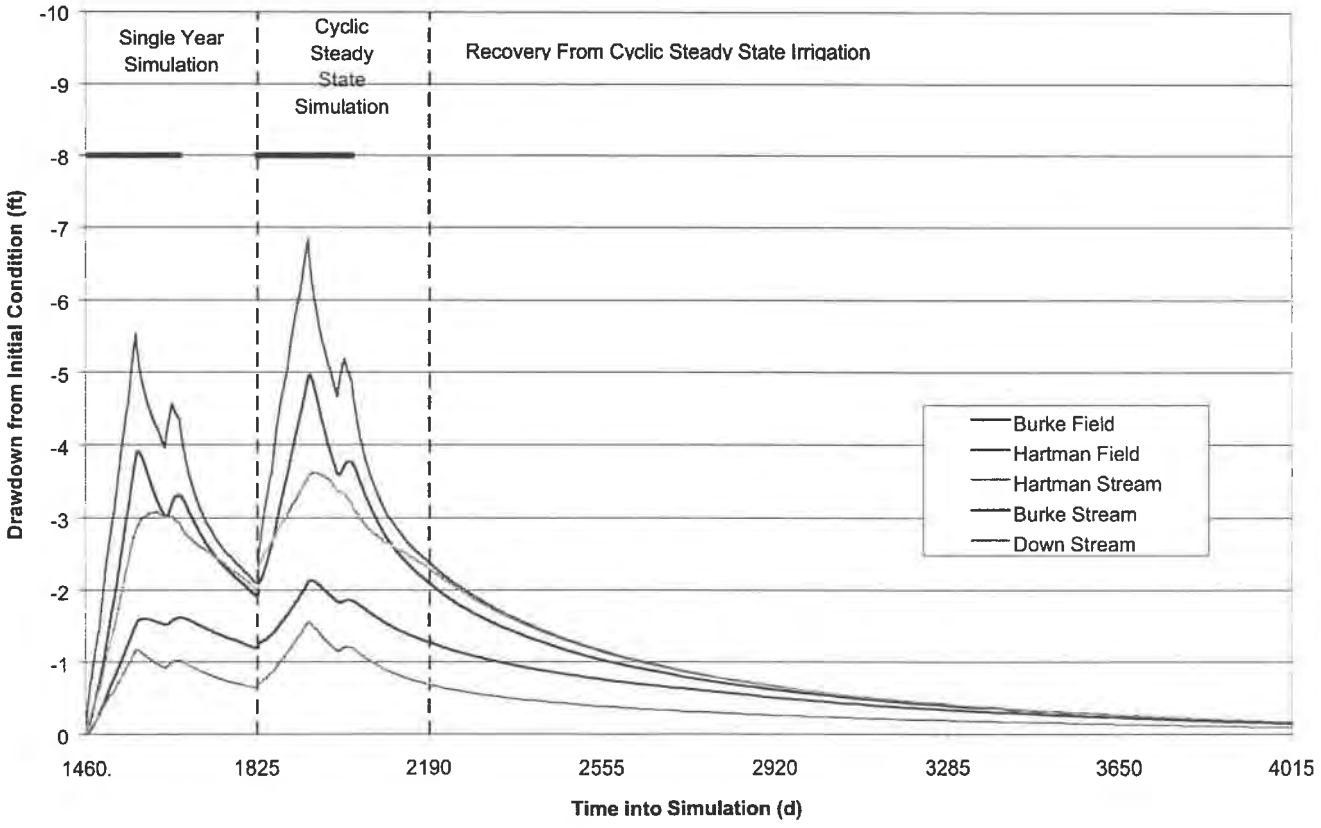
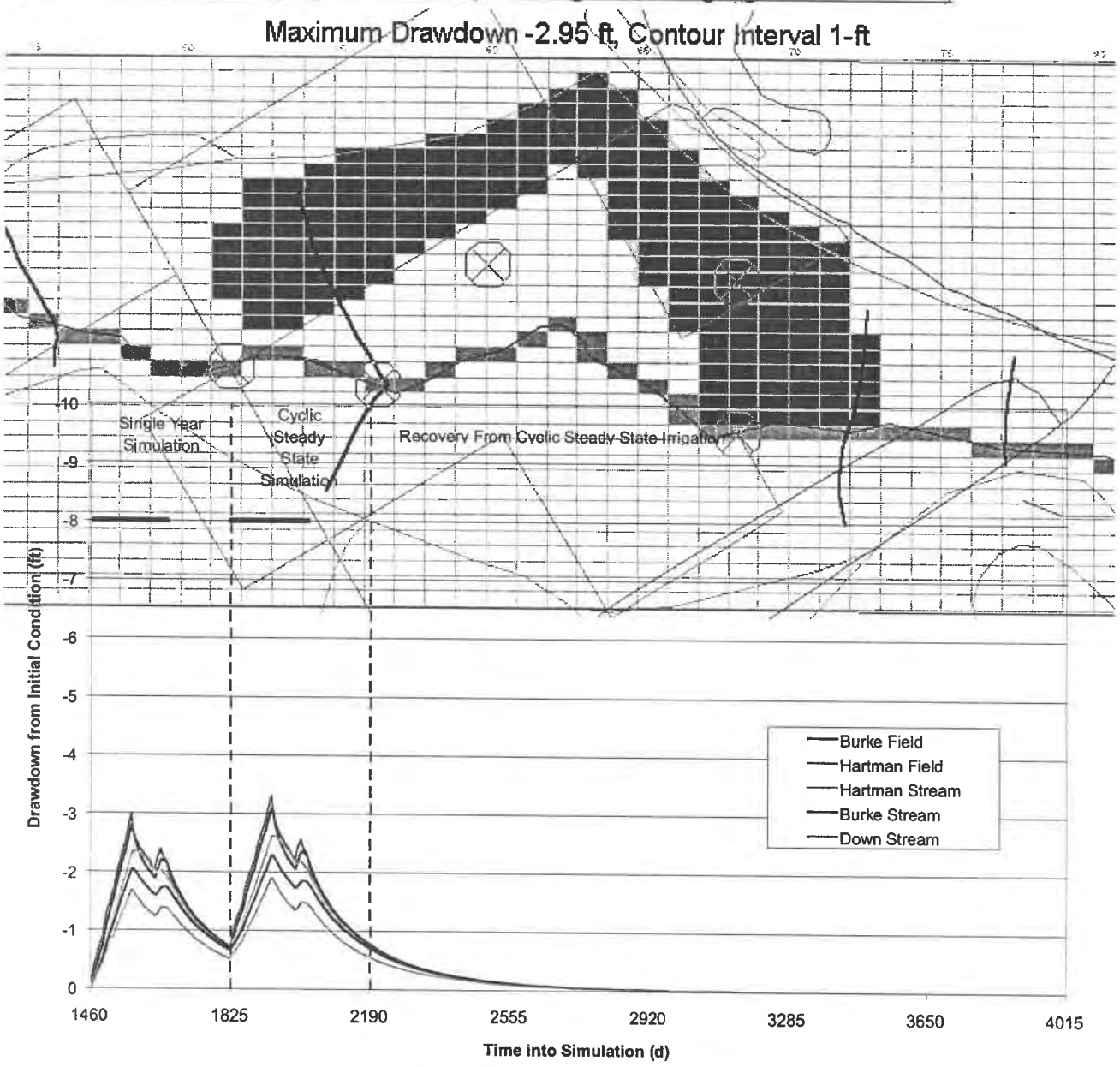


Figure 14
Groundwater Mounding and Water Level Hydrographs
Predicted with Local Hydraulic Continuity and K=500

Mid-Summer Mounding (feet drawdown) and Irrigated Acreage (green & blue cells)



Hydrographs at Observation Points (feet drawdown)

Figure 15
MODFLOW Predictions of Subsurface Return Flow to Swauk Creek

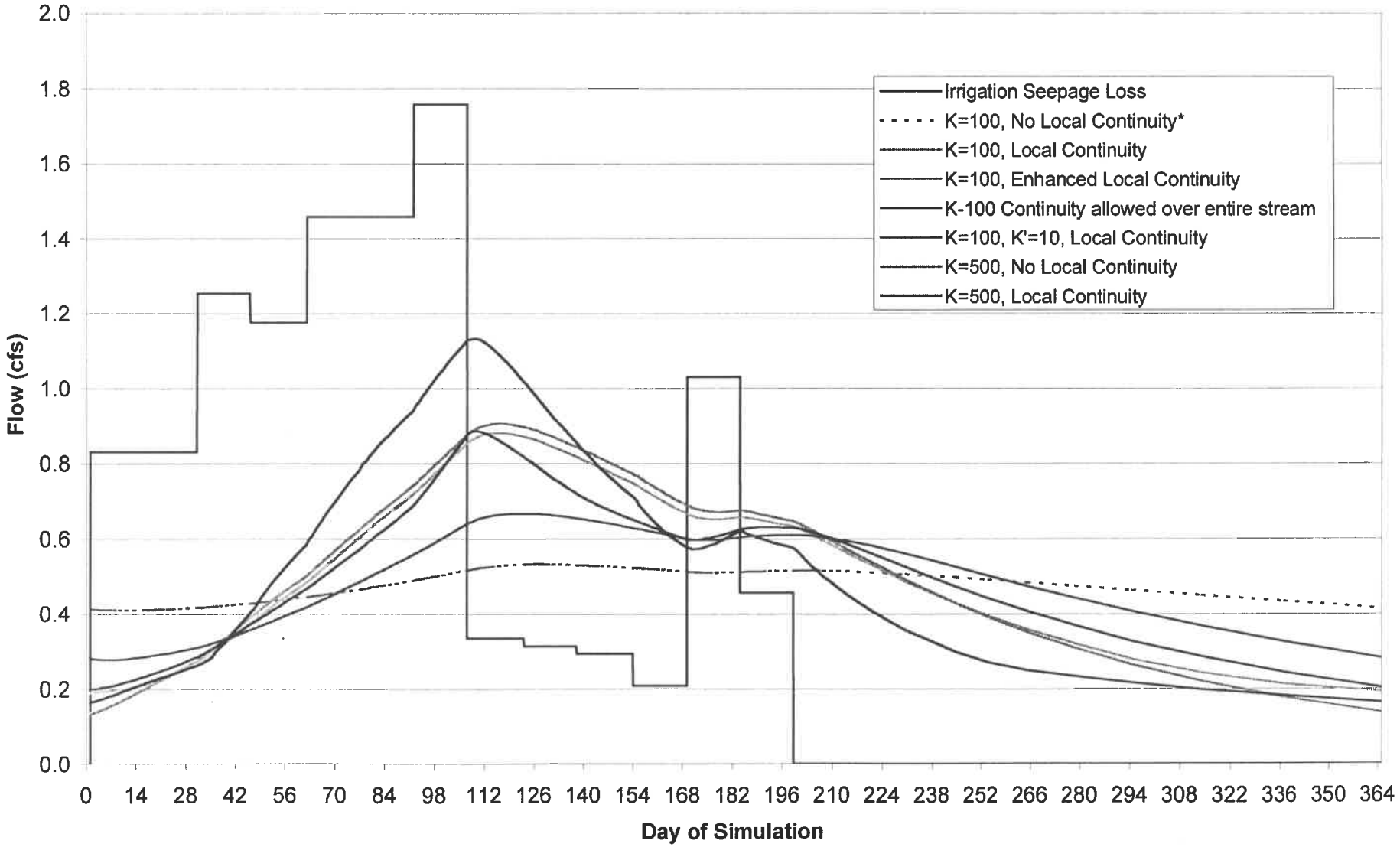


Figure 16
Recommended Schedule for Subsurface Return Flow to Swauk Creek

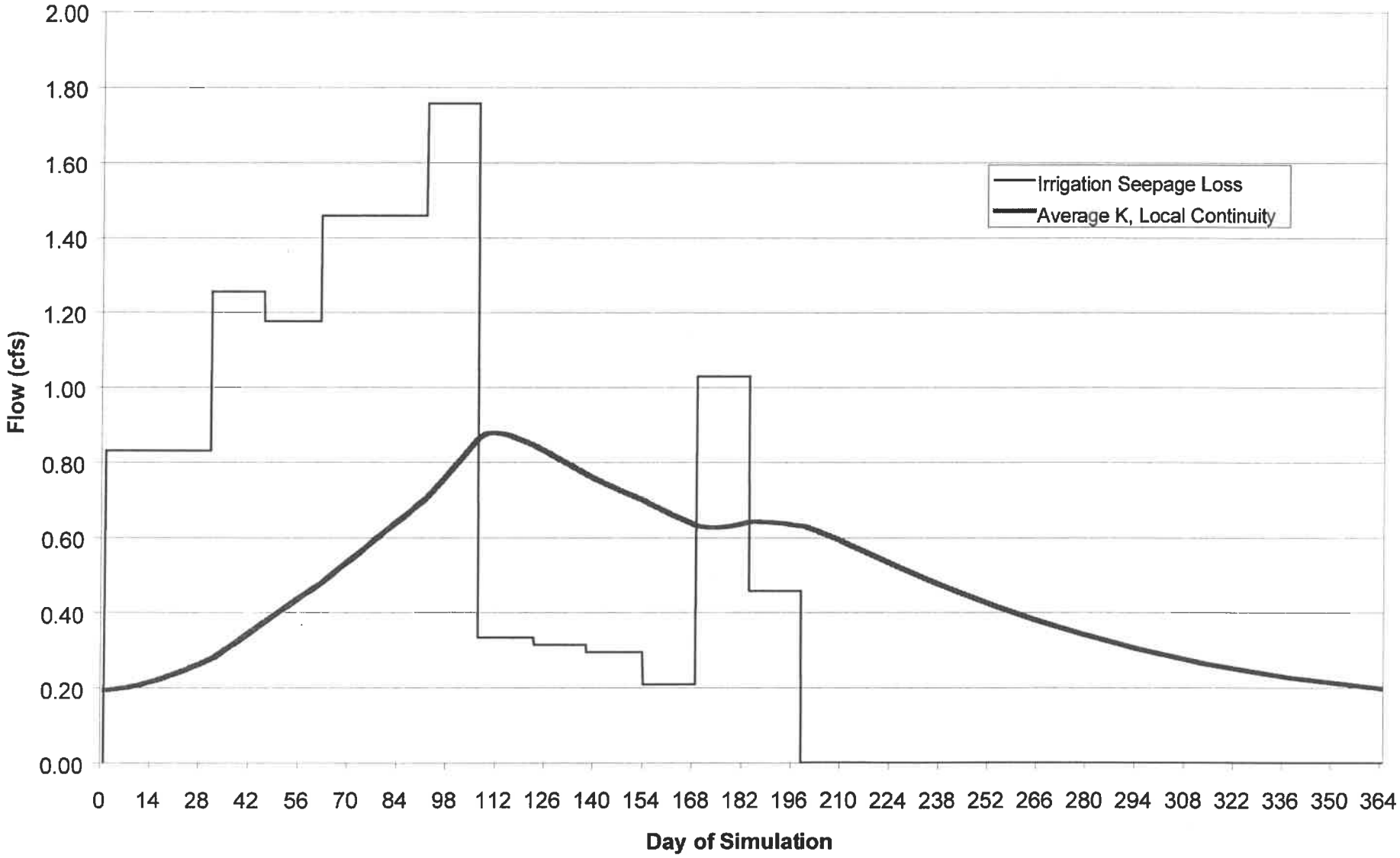


Figure 17
Predicted Return Flows to Swauk Creek from First Creek Seepage to Alluvial Subflow

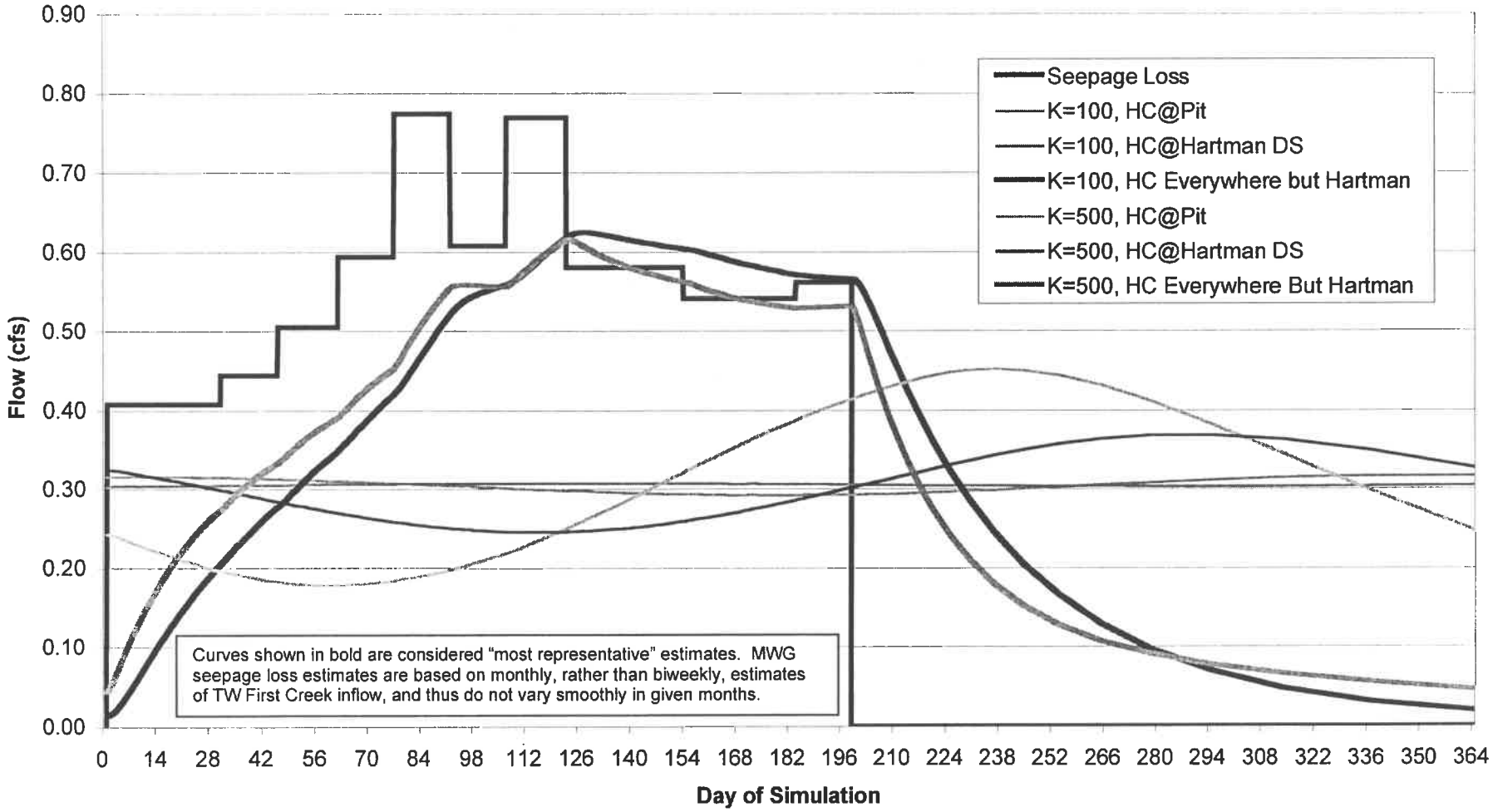


Figure 18
Streamflow Recorded at the Mouth of First Creek

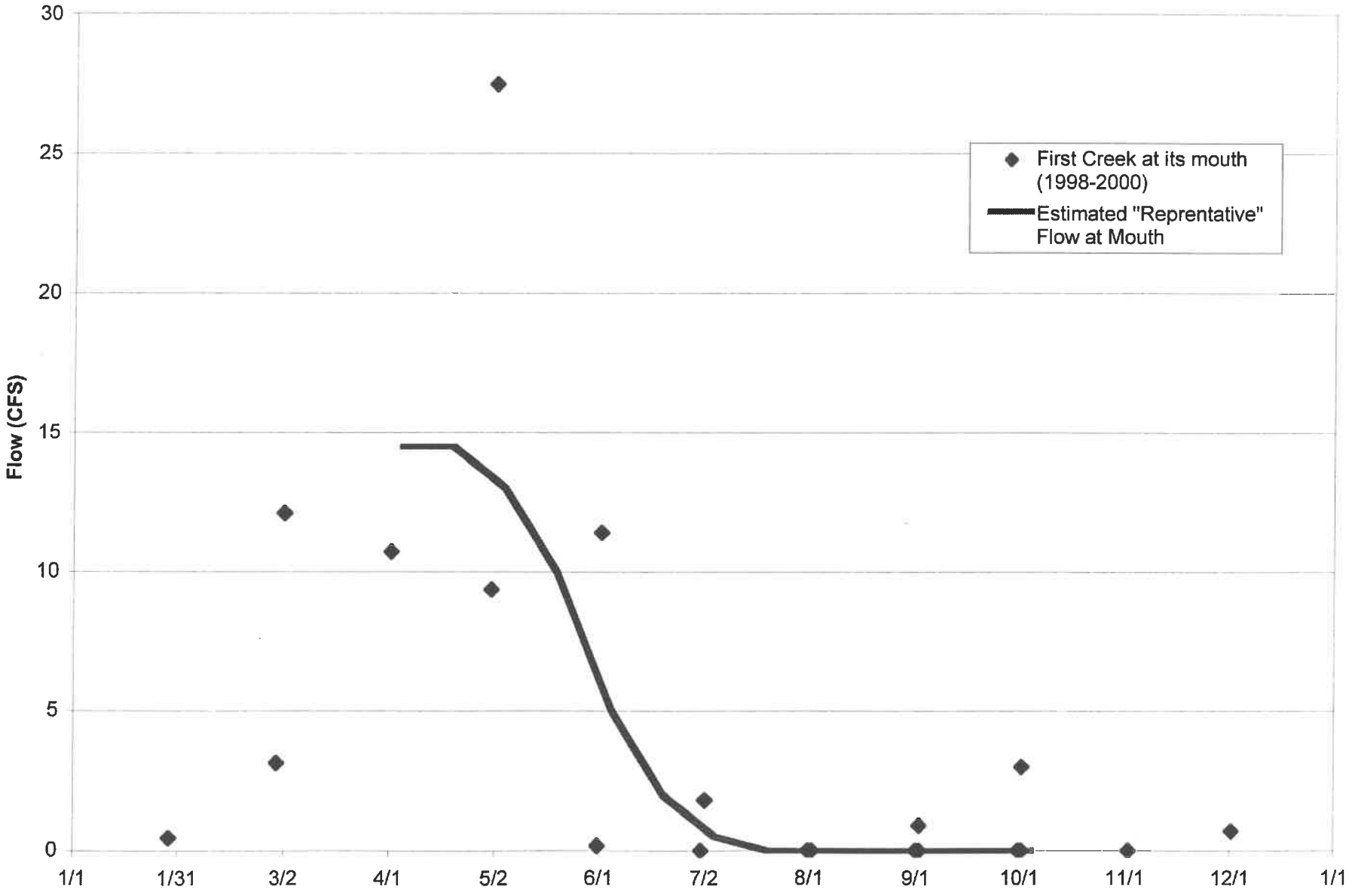


Figure 19
Estimated Total Irrigation Diversion and Change in Streamflow
Associated with Trendwest's Proposed Hartman Water Right Transfer

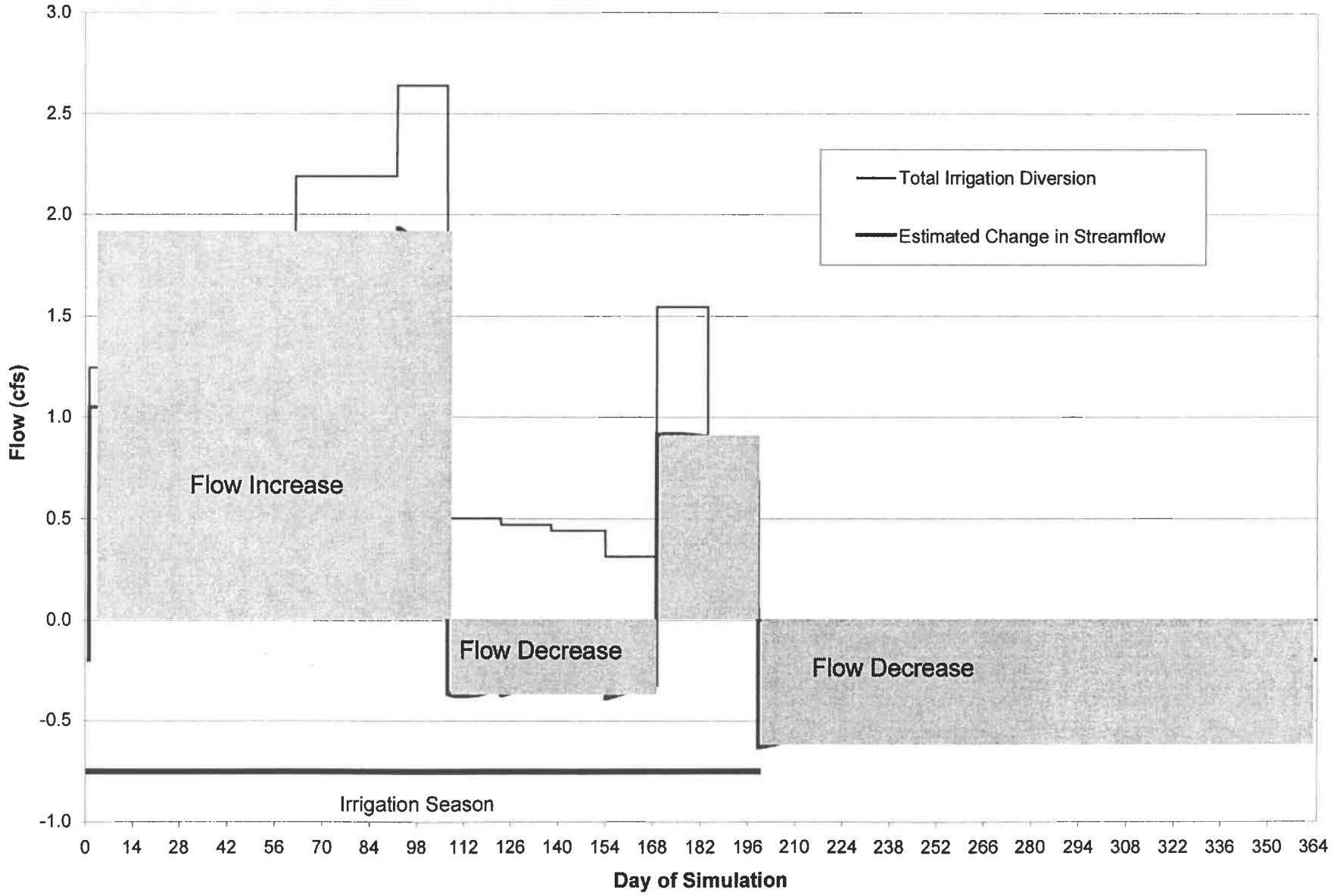


Figure 20
Estimated Net Change in Swauk Creek Flow from Combined Trendwest Hartman and FCWUA Water Right Transfer

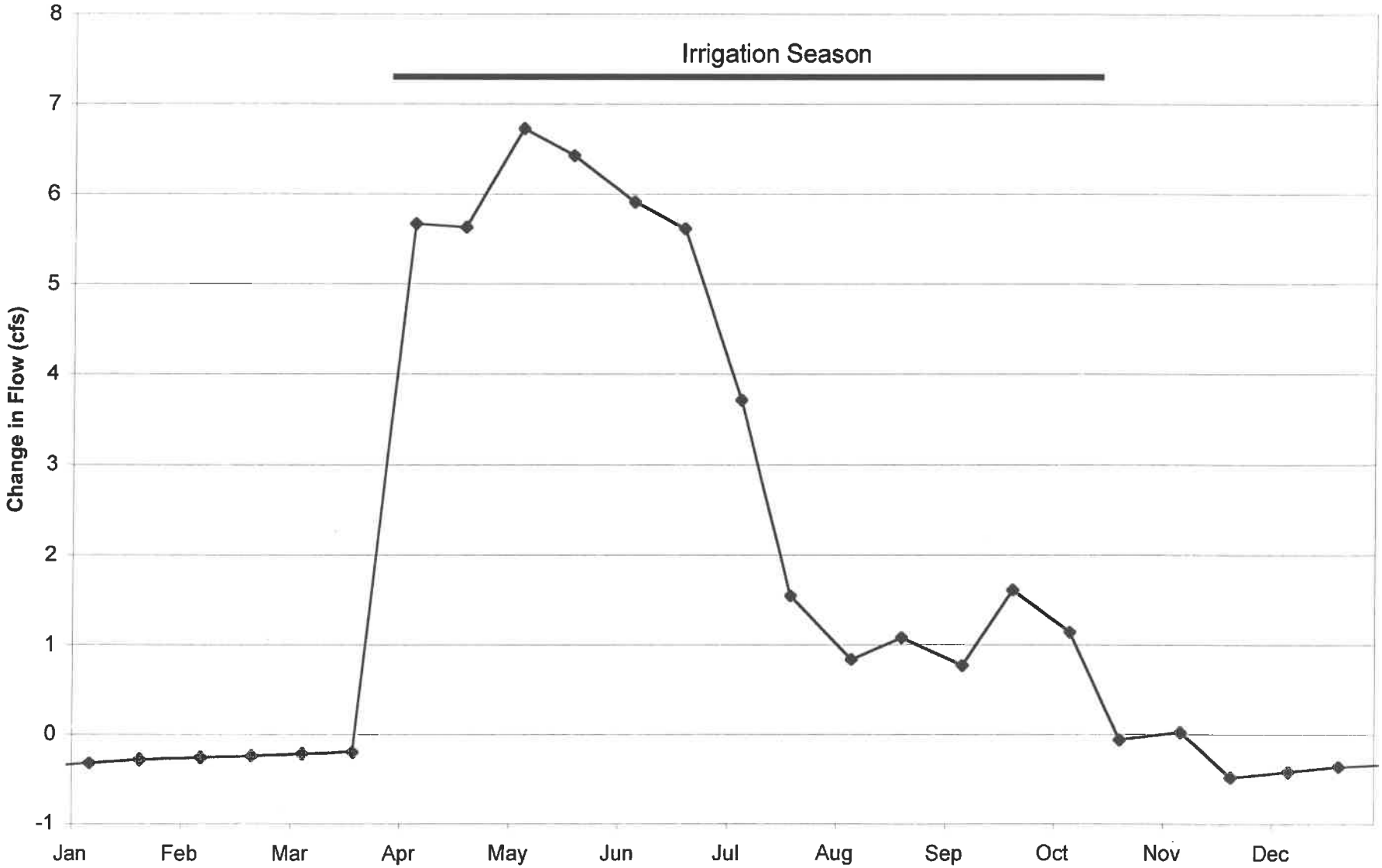


Table 1 - Big Creek Area Well Information
(T20N R14E)

Section	Quarter-Quarter Section	Estimated Land Surface Elevation (ft)	Depth to Water (ft)	Hole Depth (ft)	Water Column (ft)	Tested Well Yield (gpm)	Test Drawdown (ft)	Specific Capacity (gpm/ft)	Low Water Column	DD Exceeds Water Column
Sec 20	NW NW	2090	1	196	195	15	80	0.2		
Sec 20	NW NW	2090	10	40	30	25	20	1.3		
Sec 20	NW NW	2090	8	32	24					
Sec 20	NW NW	2090	Dry	42						
Sec 20	NW NW	2090	10	42	32	75				
Sec 20	NE NW	2085	40	80	40	10				
Sec 20	SW NW	2095	20	58	38	30				
Sec 20	SW NE		Flowing	119	119					
Sec 20	SE NE	2085	18	40	22	50	28	1.8		Yes
Sec 20	SE SE	2130	26	67	41	100	39	2.6		
Sec 20	SE SE	2130	23	67	44	60	65	0.9		Yes
Sec 20	SE SE	2130	18	52	34	15	15	1.0		
Sec 20	SW SW		Flowing	140	140					
Sec 20	SW SW	Dry Hole								
Sec 20	SW SW	2120	10	35	25	12	20	0.6		
Sec 20	SW SW	2120	20	78	58	40				
Sec 20	SW SW	2120	20	59	39	40				
Sec 20	SE SW	2120	23	35	12	10	0.1	100		
Sec 20	SE SW	2120	15	38	23	10	0.1	100		
Sec 21	NE NE	?	19	63	44	30	41	0.73		
Sec 21	NW NE	Dry Hole								
Sec 21	NW? NW	?								
Sec 21	NE NW	2075	16	40	24					
Sec 21	SE SE	2085	23	54	31	40				
Sec 21	SE SE	2085	26	50	24	100				
Sec 21	SW SE	2085	10	80	70	20	70	0.29		
Sec 21	SW SW	2120	20	60	40	20				
Sec 21	NW SW	2110	18	27	9	80	4	20	Yes	
Sec 21	NE SW	2090	12	40	28	45	26	1.7		
Sec 21	NE SW	2090	14	80	66	30	66	0.5		
Sec 21	SE SW	2110	19	40	21	35	18	1.9		
Sec 21	SE SW	2110	13	71	58	20	57	0.4		
Sec 28	NW NW	2130	10	45	35	30	30	1.0		
Sec 28	NE NW	2120	20	60	40	25				
Sec 28	NE NW	2120	80	100	20	30	15	2.0		
Sec 28	SW NW	2140	15	50	35	100	33	3.0		
Sec 28	NE SW	2170	70	100	30	10	25	0.4		
Sec 28	NW SE	2150	15	80	65	20	60	0.3		
Sec 28	NE SE	2140	19	75	56	100				
Sec 28	NE SE	2140	16	40	24	50	22	2.3		
Sec 28	SE SE	2155	15	30	15	10	15	0.7	Yes	
Sec 28	SE SE	2150	49	120	71	15	66	0.2		
Sec 28	SE SE	2150	14	92	78	100	78	1.3		
Sec 28	SE SE	2150	28	90	62	18				
Sec 28	NW NE	2115	14	92	78	300	76	3.9		
Sec 28	SE NE	2125	20	55	35	30	35	0.9		
Sec 28	SE NE	2125	21	50	29	65				
Sec 28	SW NE	2140	220	320	100	25	90	0.3		
Sec 28	NE NE	2115	19	70	51	30				
Sec 28	NE NE	2115	20	64	44	80	40	2.0		
Sec 28	NE NE	2115	19	63	44	60	36	1.7		
Sec 28	NE NE	2115	18	120	102	75				
Sec 28	NE NE	2115	20	80	60	100	50	2.0		
Sec 29	NE NE	2150	20	42	22	20				
Sec 29	NE NE	2150	46	60	14	22	19	1.2	Yes	Yes
Sec 29	NE NE	2150	44	59	15	8	24	0.3	Yes	Yes
Sec 29	NE NE	2150	22	52	30	15	28	0.5		
Sec 29	NE NE	2150	46	69	23	25	19	1.3		
Sec 29	NE NE	2150	38	63	25	22	17	1.3		
Sec 29	NW NE	2150	18	60	42	25	6	4.2		
Sec 29	SW NE	2150				60				

Table 2 - Teanaway River Area Well Information
(T20N R16E)

Section	Quarter-Quarter Section	Estimated Land Surface Elevation (ft)	Depth to Water (ft)	Hole Depth (ft)	Water Column (ft)	Tested Well Yield (gpm)	Stem Setting for Airlift Test (ft)	Test Drawdown* (ft)	Specific Capacity (gpm/ft)	Estimated gal/day/ft
Sec 25	S1/2 NW	1940	3	160	157	8				
Sec 25	S1/2 NW	1940	-2	260	260	5				
Sec 25	S1/2 NW	1940	50	160	110	10	150	100	0.1	200
Sec 25	SW NW	1940	-2	265	265	30	260	262	0.1	229
Sec 25	NE NW	2010	?	245		20				
Sec 25	SE NW	1900	20	400	380	100		2.5	40	80000
Sec 25	NW NE	1950	205	400	195	4	359	154	0.03	52
Sec 25	NE NE	1960	-2	320	320	4				
Sec 25	SW NE	1950	28	205	177	3				
Sec 25	SE NE	1955	47	72	25	8				
Sec 25	NE	1955	6	185	179	15	185	179	0.1	168
Sec 25	NE SW	1950	4	127	123	33	190	186	0.2	355
Sec 25	NE SW	1950	6	160	154	17				
Sec 25	SW SW	2040	80	116	36	4	115	35	0.1	229
Sec 25	SW	2200	80	280	200	25	275	195	0.1	256
Sec 25	SE SE	2200	35	115	80	5				
Sec 25	SE SE	2200	127	245	118	12				
Sec 25	SE SE	2200	66	103	37	30				
Sec 25	SE SE	2200	272	525	253	10	435	163	0.1	123
Sec 25	NE SE	2000	93	109	16	15	108	15	1.0	2000
Sec 25	SE	?	120	310	190	5				
Sec 26	NW NW	2150	117	425	308	4				
Sec 26	NE NW	2150	2	185	183	20	180	178	0.1	225
Sec 26	SW NW	2100		165		10				
Sec 26	SW NW	2100		160						
Sec 26	N1/2 NE	2150	110	365	255	50				
Sec 26	NW NE	2150	-2	285	285	30				
Sec 26	N NE		100	86	?	30	175	75	0.4	800
Sec 26	NW SW	2000	130	300	170	3	360	230	0.01	26
Sec 26	NW SW	1950	38	200	162	10	180	142	0.1	141
Sec 26	NE SW	1925	-1	340	340	35	320	321	0.1	218
Sec 26	SW SW	1890	220	360	140	7	340	120	0.1	117
Sec 26	SW SW	1890	30	190	160	15	180	150	0.1	200
Sec 26	SW SW	1890	49	69	20					
Sec 26	SW SW	1890	77	123	46					
Sec 26	SE SW	1900	10	303	293	10				
Sec 26	SE SW	1900	6	240	234	30	240	234	0.1	256
Sec 26	SW		10	197	187	25	195	185	0.1	270
Sec 26	SW SE	1910	60	215	155	10	255	195	0.1	103
Sec 26	SE SE	1915	7	50	43	40	18	11	3.6	7273
Sec 26	SE SE	2000	84	182	98	22	72	-12		Values transcribed c
Sec 26	SE SE	2000	6	56	50	50				
Sec 26	SE SE	2000	205	380	175	7	380	175	0.04	80
Sec 26	SE SE	2000	-1	265	265	38				
Sec 26	SE SE	2000	35	140	105					
Sec 26	SE SE	2000	90	157	67	10	155	65	0.2	308

* Estimated for airlift tests by subtracting depth-to-water from stem setting.

Table 3 - Swauk Creek Area Well Information
(T20N R17E)

Section	Quarter-Quarter Section	Depth to Water (ft)	Hole Depth (ft)	Water Column (ft)	Tested Well Yield (gpm)	Completion Type
Sec 22	S1/2 SW	71	190	119		Open Hole
Sec 22	S1/2 SW	106	386	280	1	Perforated
Sec 22	SW SW	190	500	310	1.5	Perforated
Sec 22	SW SW		264	264	0.5	Open Hole
Sec 22	SW SW	90	210	120	2.5	Perforated
Sec 22	SW SW		300	300	3	Open Hole
Sec 22	SE SE	30	80	50	20	Open Hole
Sec 27	N1/2 NW	100	145	45	10	Open Hole
Sec 27	N1/2 NW	93	380	287	3.5	Open Hole
Sec 27	NE NW	15	232	217	4	Open Hole
Sec 27	SW NE	147	265	118		Screened
Sec 27	SW SW	8	145	137	5	Perforated
Sec 27	SW SW	10	205	195		Screened
Sec 27	SW SE	80	145	65		Perforated
Sec 27	SE SE	200	705	505	15	Perforated
Sec 28	SW	110	190	80	15	Open Hole
Sec 28	SW	80	167	87	20	Open Hole

Table 4 - Reecer Creek Area Well information
(T19N R18E)

Section	Quarter-Quarter Section	Estimated Land Surface Elevation (ft)	Depth to Water (ft)	Hole Depth (ft)	Geology of Completion Interval	Water Column (ft)	Tested Well Yield (gpm)	Stem Setting for Airlift Test (ft)	Test Drawdown* (ft)	Specific Capacity (gpm/ft)	Completion Note
Sec 6	N? NW	2920	30	100	Bas	70	5	70	40	0.13	
Sec 6	NW NW	3000	23	80	Bas	57	15				
Sec 6	NW NW	3000	471	800	Bas	329	11				
Sec 6	SE NW	2900	100	180	Bas	80	20	175	75	0.27	
Sec 6	SE NW	3000	150	245	Bas	95	7				
Sec 7	E1/2 NE	2700	410	832	Bas	422	35	775	365	0.1	
Sec 8	NW NW	2735	510	626	EF	116	25	600	90	0.3	
Sec 8	SW NW	2665	480	600	Bas	120	10	595	115	0.1	
Sec 8	NE NE	2880	312	435	Sed	123	5				
Sec 8	SE SW	2570	500	660	EF	160	15				
Sec 8	SW SE	2560	465	640	Bas/EF	175	15	630	165	0.1	
Sec 8	SW SE	2560	470	560	Bas	90	4	550	80	0.1	
Sec 8	SW SE	2560	485	560	Bas	75	3	560	75	0.04	
Sec 17	NW NW	2530	340	440	Sed	100	12				
Sec 17	SE NW	2460		520	EF	520	7				
Sec 17	SE NW	2460	380	540	Bas	160	15				
Sec 17	NW NE	2510	400	550	Sed	150	10				
Sec 17	NW NE	2510	408	640	Sed	232	35				
Sec 17	NE NE	2500	375	480	EF	105	15	475	100	0.2	
Sec 17	SW NE	2460	390	600	Bas	210	15	430	40	0.4	
Sec 20	NE NE	2340	186	380	Bas/EF	194	30				
Sec 21	NE NE	2360	180	700	Bas	520	400	pump test	120	3.3	Perf 300-325, completed in broken basall
Sec 22	NW NW	2360	230	370	Sed	140					
	SE NW	2340	180	300	Bas/EF	120	25				
	SE NE	2320	205	300	Sed	95	25	29			Log says stem set at 29 feet but it doesn'
	NE SE	2300	163	285	Sed	122	45				
	E E		96.6	154	Sed	57.4	15				Elevation ranges from 2200 to 2440
	E E		253	380	Sed	127	40				Elevation ranges from 2200 to 2440
Sec 27	SE NE	2100	195	282	Sed	87	10			0.0	
	SE SE	2050	138	200	Sed	62	16	180	42	0.4	Log says zero feet drawdown
Sec 28	NW	2160	250	390	Sed	140	20	330	80	0.25	
Sec 28	NW NW	2192	?	940	Bas/EF		?				
Sec 28	SE NE	2110	230	343	Sed	113	60	pump test	123	0.49	No perfs, no screens, in sand and gravel
Sec 30	NE SE	2100	15	160	Sed	145	20	140	125	0.16	
Sec 31	NE	2020	90	160	Sed	70	20	158	68	0.29	
Sec 31	NE	2020	100	160	Bas	60	15	155	55	0.27	
Sec 31	NE NE	2030	85	160	Sed	75	16	155	70	0.23	
Sec 31	NE NE	2030	82	170	Sed	88	30				
Sec 31	NE NE	2030	120	207	EF	87	20	180	60	0.33	
Sec 31	SW	1950	50	100	Bas	50	20	98	48	0.42	
Sec 31	SW SW	1920	27	131	Sed	104	18	pump test	4	4.50	Screened 5' length, in sand and gravel.
Sec 31	SW SW	1920	30	160	Sed	130	20	95	65	0.31	
Sec 31	NE SE	1970	33	180	Sed	147	27	160	127	0.21	
Sec 31	SE SE	1930	80	240	Sed	160	20	235	155	0.13	
Sec 31	SE SE	1930	64	167	Sed	103	22				
Sec 32	SW NW	1980	18	103	Sed	85	25				
Sec 32	SE NW	2000	40	100	Bas	60	15				
Sec 32	SE NW	2000	55	142	Sed	87	20				
Sec 32	E1/2 SW	1960	60	125	Sed	65	15	pump test	20	0.75	No Screen, No Perfs, in sand.
Sec 32	SW SW	1900	13	40	Sed	27	20	30	17	1.18	

* Estimated for airlift tests by subtracting depth-to-water from stem setting.

GEOLOGIC DESIGNATIONS:
Sed - Unconsolidated sedimentary aquifer above basalt
Bas - Basalt (obvious Columbia River Basalt or no other rock type likely near completion zone)
EF - Ellensburg Formation - well is completed in sedimentary material encounterd below basalt
Bas/EF - open to both basalt and EF

Pacific Groundwater Group

2377 Eastlake Avenue East
Suite 200
Seattle, WA 98102
206-329-0141 v
206-329-6968 f
www.pgwg.com

Technical Memorandum

To: Randall Doneen, Department of Ecology
Joe Mentor, Mentor Law Group
Jamie Morin, Mentor Law Group
Andy Kindig, A. Kindig & Associates
Tom Martin, Brown and Caldwell

From: Peter Schwartzman, Associate Hydrogeologist, PGG
Chrysten Root, Geologist/Hydrologist, PGG

Re: **REECER BASIN HYDROLOGIC ANALYSIS**

Date: January 25, 2002

The purpose of this memorandum is to discuss how the proposed transfer of Trendwest's First Creek water rights from irrigation in the Reecer Creek basin to instream flow in the Swauk Creek basin would affect the timing and volume of return flows through the Reecer Creek basin to the Yakima River. All water rights from First Creek were historically diverted at the First Creek Waters Users Association (FCWUA) diversion into the FCWUA ditch. The ditch runs through Green Canyon, and is distributed to lateral ditches approximately two to three miles below its exit from the canyon. The lateral ditches historically supplied four water rights owned by Roan, Nelson and Olson. As shown on **Table 1**, Trendwest has purchased the senior Nelson and the junior Roan water rights. Because FCWUA water was historically taken from the Swauk Creek Basin via First Creek and used in the Reecer Creek Basin, the proposed transfer would result in a reduction of water imported into the Reecer Creek Basin and an equivalent increase in water availability to the Swauk Creek Basin (via First Creek). The proposed transfer would leave 56% of the historically diverted water in First Creek rather than diverting it to the Reecer Creek basin. This water would then be transmitted to the Yakima River via Swauk Creek and associated groundwater flow. **Figure 1** is a study-area map that presents the locations of streams, ditches, and referenced properties[1].

Trendwest's proposed transfer would also result in a net increase in water availability to the Yakima River in an amount equivalent to the consumptive use associated with former irrigation practices. However, estimating the change in timing by which this newly available water reaches the Yakima River requires consideration of a number of factors. Water rights transfer from irrigation use to instream flow means that the entire former diversion would become immediately

[1] The property locations shown on Figure 1 are generalized, and were provided by Mentor Law Group. There are minor discrepancies between the locations shown and the legal descriptions of the historic places of use.

available to supplement streamflow in the Swauk Creek basin. However, much of the non-consumptive portion of the former diversion historically seeped into the groundwater system and therefore took a slower flowpath to the Yakima River, both during and after the irrigation season. Changing the water right from irrigation to instream flow would make the entire (former) diversion available to streamflow in First Creek during the irrigation season, but would also result in discontinuation of the irrigation return flow that historically reached the Yakima River via a slower groundwater pathway.

In this memorandum, Ecology's Consultant Team (ECT) presents analysis of the change in volume and timing of irrigation return flows through the Reecer Creek basin to the Yakima River due to the proposed water rights transfer. Our analysis also addresses changes in flow available to First Creek due to the proposed transfer. Hydrologic responses to increases in First Creek flow are discussed in the First and Swauk Basin Hydrologic Analysis (PGG, 1/24/02). During our Reecer Basin investigation, ECT examined the following:

- hydrogeologic conditions in the Reecer Creek basin;
- potential hydraulic continuity between streams and aquifers in the Reecer Creek basin;
- typical historic streamflow in First Creek and its affect on water availability to FCWUA irrigators;
- historic and predicted future seepage gains/loss from the FCWUA ditch, and the associated groundwater return-flow pathway;
- historic irrigation seepage loss[2] associated with Trendwest's water rights, and the associated groundwater return-flow pathway;
- changes in the amount of water travelling through the Reecer Creek basin between the historic and proposed future conditions.

For the purpose of this analysis, water reaching the Yakima River via surface-water pathways is considered to reach the river instantaneously. Delivery schedules for water reaching the Yakima River via groundwater pathways in the Reecer Creek basin were estimated using hydrogeologic characterization. Under both conditions (historic and future), the apportionment between surface-water and groundwater return-flow pathways was estimated based on historic water availability and estimates of seepage losses associated with how the water right is routed through the hydrologic system. Characterization of hydrogeology, streamflow and seepage losses in the Swauk Creek Basin are contained in the Swauk Creek Memorandum (PGG, 1/24/02) and are incorporated by reference into this memorandum.

1 Summary of Findings

- There is no evidence of hydraulic continuity[3] in the area of the Roan and Nelson properties (the historic place of use of the Trendwest water rights). As a result, field and ditch seepage

[2] Seepage loss is defined as infiltration of water from above the land surface to below the land surface. For instance, water flowing within a stream channel or applied to fields as irrigation can seep into the subsurface and recharge the groundwater flow system. Seepage loss remains in the hydrologic system, but is transferred from surface water to groundwater.

H-01

return flows reach the Yakima River via subsurface pathways. Tailwater from irrigation is assumed to return to Reecer Creek and the Yakima River via surface flow.

- Subsurface return flows to the Yakima River from the Reecer Creek basin were estimated to occur at a near constant rate year-round. Historic water use associated with Trendwest's FCWUA water rights is estimated to have resulted in about 56 percent of the historic total subsurface return flows from the First Creek Water User's Association irrigators (equal to Trendwest's water right percentage of the total FCWUA diversion).
- The proposed transfer of Trendwest water rights to instream flows at the point of diversion in First Creek would result in a net increase in flow to the Yakima equal to the consumptive use formerly associated with those water rights (about 377 acre-feet per year).
- The proposed transfer would increase flows in First Creek and Swauk Creek during the irrigation season. At the former point of diversion, irrigation-season flows in First Creek flows would increase by an estimated 1.1 to 5.2 cfs.
- The proposed transfer would cause a reduction in subsurface return flows to the Yakima River via the Reecer Basin. Historic subsurface return flows associated with the water rights proposed for transfer are estimated at approximately 0.66 cfs, and likely discharged to the Yakima River in a fairly constant, year-round manner.
- The most significant effect of the proposed transfer on Reecer Creek streamflow would be a loss of historic tailwater returns, estimated to have ranged from about 2.9 to 0.71 cfs during April, May, and June. Rather than reaching the Yakima River via the Reecer Creek pathway, these flows would reach the river via First and Swauk Creeks.
- The transfer is estimated to result in higher flows on the Yakima River throughout the irrigation season. Specifically, flow increases would occur on the 9-mile reach between the Yakima River confluences with Swauk and Reecer creeks, and further downstream. However, flow reductions on the order of about 0.66 cfs are predicted to occur below Reecer Creek over most of the non-irrigation season.

2 Hydrogeology of the Reecer Creek Basin

In order to assess and understand the hydrogeology of the Reecer Creek basin, ECT evaluated geologic maps and well logs from the region and completed one day of field reconnaissance. Our hydrogeologic evaluation focused on the portion of the irrigation system downstream of Green Canyon, since this is the portion of the basin where most of the seepage losses from ditches and fields occurs (Section 3). Our study area included Sections 6, 7, 8, 17, 20, 21, 28, 31, and 32 of Township 19 N, Range 18 E. The land parcels that were historically irrigated with Trendwest water rights are located in Sections 21 and 28. **Figure 1** presents a map of surficial geology and the locations of irrigated parcels associated with the FCWUA diversion.

2.1 Geology

Based on previously published geologic mapping (Tabor et al, 1982) and field reconnaissance, Reecer Creek flows through two unconsolidated units called the Kittitas Drift and sidestream

[3] For the purpose of this memorandum, hydraulic continuity is defined as a saturated hydraulic connection.

H-01

alluvium. The drift is characterized by basalt gravel in silty matrixes. In well driller's logs, the drift is often logged as "cemented gravel". The sidestream alluvium mapped near Reecer Creek on the hillslope extending down to the Yakima River is comprised of silty gravels. The lithology of the gravel in the sidestream alluvium is dependent on nearby rock exposures, which in the case of Reecer Creek is also basalt. The FCWUA ditch flows over the drift unit from the mouth of Green Canyon until approximately 3000 feet upstream of the Roan/Olsen weirs. The remainder of FCWUA ditch is primarily located on the sidestream alluvium. Most of the Roan and Nelson properties are located on the sidestream alluvium, as only the western 1000 feet of the Roan property and western 800 feet of the Nelson property are underlain by the Kittitas Drift. Downstream of the Roan and Nelson properties, Reecer Creek flows over sidestream alluvial deposits, although exposures of the Kittitas Drift and the Thorp gravel (a Pliocene consolidated sedimentary unit) are observed near the creek. Near its confluence with the Yakima River, Reecer Creek flows over Yakima River alluvium.

The geology of the Reecer Creek hillslope is mapped based on geomorphic criteria rather than lithology or soil texture. Kittitas Drift units are mapped based on small topographic expressions that protrude 2 to 3 feet above the sidestream alluvium, while deposits of granular material from individual small streams are mapped as sidestream alluvium. Since the two mapped units have similar soil textures, subsurface infiltration and groundwater flow likely behave in a similar manner in both units.

2.2 Hydrogeology

Driller's logs of wells located near the Roan and Nelson properties were reviewed from Sections 6, 7, 8, 17, 20, 21, 28, 31, and 32 of Township 19 N, Range 18 E. Most of the well locations were specified to the nearest quarter-quarter section, however some were located in the field with the assistance of Mr. Roan. In the study area, hydrogeologic parameters can be roughly divided into two sub-areas – north and south (uphill and downhill) of the east-west power line located approximately one mile north of the North Branch Canal (KRD). The historic place of use for the water rights purchased by Trendwest is within 2000 feet of the power line. Portions of the properties are located to both the north and the south of the power line in sections 21 and 28.

The well logs suggest that the thickness of the drift and alluvial deposits increases from north to south. In the north near the mouth of Green Canyon, three well logs in Section 6 indicate thicknesses of 58, 78, and 110 feet for the drift and/or alluvial deposits. Two logs in Section 6, indicate thicknesses of 8 and 35 feet, but appear to be drilled in landslide material that overlies basalt bedrock based on their quarter-quarter section locations. Sections 20 and 21, where the power lines are located, each have one well in the NE _ of the NE _. These well logs indicate drift or alluvium thicknesses of 55 and 150 feet. In the south, the well logs from Section 31 indicated that basalt bedrock was not encountered within depths ranging from 100 to 240 feet. This suggests that beneath the Roan and Nelson properties, the alluvium is roughly 100 feet thick.

Well depths and associated depths to groundwater also vary from North to South. North of the power line all wells are greater than 400 feet deep and are completed in bedrock, except for three wells in Section 6. The three wells are located far from the FCWUA places of use, and may suggest locally perched conditions near the mouth of Green Canyon (by a small side stream,

downhill from a small surface water impoundment). Water levels in the northern area are generally 300 to 500 feet below ground surface with the exception of the shallow wells in Section 6 noted above. Well yields from wells north of the powerline that tap bedrock are relatively low. Most of the yields from wells in Section 8 are less than 5 gallons per minute (gpm) based on air discharge tests by the drillers. In wells drilled in Sections 20, 21, 28, which are located near the power lines (and the Roan and Nelson properties), intermediate water levels of 180 to 250 feet deep are found. In this area, the wells are also completed in the bedrock rather than in the alluvium, and well yields based on discharge tests by the drillers range from 20 to 50 gpm. One additional well in this area was drilled into the basalt bedrock as a source of irrigation water, and produces 400 gpm. South of the power line, wells are generally completed within the drift or alluvial sediments. All wells are less than 400 feet deep, and most are less than 200 feet deep, except in Section 28 where two wells exist that are 390 and 343 feet deep. In the south, static water levels are generally 30 to 100 feet below ground surface and well yields are generally 15 to 20 gpm based on air discharge tests by the drillers. One anomolously deep well (940 feet) was drilled in the NW _ of the NW _ of Section 28 as a source for irrigation water (pers. comm., JP Roan, 2001) and likely does not tap the first water encountered.

On a regional scale, groundwater appears to flow north to south along a water table that generally follows the topography (although at a less steep angle). The difference between the land surface slope and the (gentler) groundwater gradient explains why depth to groundwater is less in the south. In addition, well logs suggest that a significant thickness of unsaturated material exists throughout most of the study area. The water table occurs within bedrock (usually basalt) in the northern portion of the study area and within unconsolidated material (Kittitas Drift and sidestream alluvium) in the southern portion. The depth to water beneath the Roan and Nelson properties ranges from 180 to 250 feet deep. Although data are limited, there is no indication of shallow or perched aquifer in the vicinity of the Roan and Olson properties.

3 Surface Water Flows and Hydraulic Continuity in the Reecer Creek Basin

Surface water in the Reecer Creek basin flows not only through Reecer Creek, but also through an extensive network of irrigation ditches. ECT evaluated flow data collected on both the Reecer Creek and the FCWUA ditch to assess whether the ditches and streams in this area gain or lose flow, and if they are in hydraulic continuity with the groundwater system.

Little data are available on flow conditions and potential seepage losses in the upper reaches of Reecer Creek beyond one streamflow survey completed by Tom Martin in early April of 1999. The available data from Tom Martin's survey indicate that flows declined from 6.0 cfs at the First Creek Canal crossing to 1.2 cfs downstream at the North Branch of the KRD Canal. Between the KRD Canal and the Cascade Irrigation Canal, flow in Reecer Creek increased to 2.8 cfs. The Roan and Nelson properties are located in the reach between the First Creek Canal Crossing and the KRD Canal, where Reecer Creek appears to be losing. This suggests that hydraulic continuity is not present along this reach. However, several irrigation diversions are shown in this reach on the Aquavella adjudication maps. Since the magnitude of April 1999 diversions from Reecer Creek in this area is unknown, definitive conclusions on the amount of gains or losses from the creek cannot be made.

In the lower portion of Reecer Creek, from Mill Ditch down to the Yakima River, Montgomery Water Group (MWG) evaluated gaining/losing conditions observed during a single set of spot flow measurements. In October 2001, flows in Reecer Creek were gaged at 13.1 cfs upstream of Dolarway Road and 12.8 cfs downstream of Dolarway Road near I-90. With measurement error, these data do not show any gains or losses over this one mile reach, however conditions in the creek may vary during higher flows. MWG observed that water levels in ponds adjacent to the creek were similar to those in the creek, suggesting that hydraulic continuity may occur in this reach.

MWG completed a seepage survey on the FCWUA ditch during the 2001 irrigation season from the FCWUA diversion down to the ditch laterals leading to irrigation places of use (see attached memorandum). The results of the survey suggest that seepage gains generally occur where the ditch passes through Green Canyon, and that seepage losses to groundwater generally occur in the portion of the FCWUA ditch between the Green Canyon Diversion and the Roan /Olsen Weir **(Table 2)**. In the reach between the weir and the Roan property, no change in flow was observed. Since seepage losses were observed in the middle portion of the FCWUA ditch, hydraulic continuity is not likely present in that area. However, for the lower portion of the ditch where no gains or losses were observed, the data do not provide any information about the presence or lack of hydraulic continuity.

Although the seepage surveys only provide limited evidence for a lack of hydraulic continuity in the study area, this conclusion is supported by the deep groundwater levels observed in the area of the Roan and Nelson properties. Since the groundwater elevations in this region are significantly lower than the surface water elevations, our best professional judgement is that hydraulic continuity is not present in the study area.

4 Magnitude and Timing of Historic Subsurface Return Flows in the Reecer Creek Basin

Historic subsurface return flows originated as groundwater recharge from FCWUA ditch losses during conveyance from First Creek to the Reecer basin, and from field and ditch losses on the irrigated properties. Quantities of field and ditch loss vary with irrigation rates throughout the growing season, which are in turn limited by First Creek streamflow available for FCWUA diversion. **Figure 2** shows Tom Martin's estimates of long-term average streamflow available at the First Creek diversion. All analyses related to water availability in this memorandum are based on these streamflow estimates[4]. Actual streamflow is likely to depart both seasonally and annually from this average due to variability in climate and precipitation. Monthly averages of total FCWUA diversions, as well as estimates of ditch and field seepage loss are summarized in **Table 3** on a monthly basis for the irrigation season. **Table 3a** presents estimates of the historic distribution of seepage loss between water rights now owned by Trendwest (Nelson and junior-priority Roan) and those retained by Olson and Roan (senior priority). **Table 3b** presents estimates of the proposed future condition, with total diversions divided to the portion left in the basin (labeled "post water rights transfer") and the resulting change to the irrigation system. The data in **Table 3a** were derived from personal communication with Montgomery Water Group,

[4] The flow estimates were generated with a prior version of Brown & Caldwell's regression-based streamflow prediction model (Tom Martin, pers. comm., 10/6/01) and are sufficient for estimating the timing of discontinued return flows in the Reecer Creek basin.

H-01

and the data in **Table 3b** were derived from the Montgomery Water Group technical memorandum entitled "FCWUA Ditch Seepage Loss Analysis" (1/24/02), and a copy of this memorandum is attached.

Based on the flow availability estimated on **Figure 2**, irrigation diversions become limited by available streamflow starting in June. The diversion estimates in **Tables 3a and 3b** assume that the irrigators do not exceed the maximum net volume (Qa) limits of their water rights. However, anecdotal information suggests that the irrigators generally diverted all of the water in First Creek into the FCWUA ditch unless First Creek flows exceeded ditch capacity[5].

Based on **Table 3a**, estimates of historic average monthly seepage losses associated with the water rights purchased by Trendwest range from 2.07 cfs in June to 0.64 cfs in September, while the tailwater component is greatest in April and May (2.7 and 1.9 cfs), but is negligible during most of the irrigation season when crop requirements exceed available streamflow.

Estimating the timing of subsurface return flows depends on the velocity of the seepage loss as it travels in the subsurface. This rate depends on several factors:

- The depth to groundwater,
- The length of the flowpath from areas of seepage loss to the receiving surface-water body,
- The hydraulic conductivity and storage of the unsaturated portion of the flowpath, and
- The hydraulic conductivity, storage and gradient of the saturated portion of the flowpath.

For the study area, the receiving body for subsurface return flow is considered to be the Yakima River. However it is possible that creeks and ditches located near the base of the Reecer Creek basin hillside are also receiving bodies. Given that the distance from the irrigated parcels to such ditches is almost as long as from the irrigated parcels to the Yakima River, we believe there is no merit in distinguishing between these two flow paths.

The expected pathway of seepage loss to groundwater from fields and ditches in the irrigated parcels to the Yakima River is long. Seepage is expected to flow vertically downward until it encounters the water table, generally at depths of over 100 feet. The apparent low permeability of the geologic units that comprise the unsaturated zone delay the irrigation recharge pulse and spread it out over time. Once the seepage loss encounters groundwater, it must then travel along a groundwater flowpath for several miles to reach the surface water receiving body, generally the Yakima River. Seepage loss from the fields and ditches will be greater during high surface water flow periods and smaller during low flow periods. This mechanism has the potential to create a "pulse" of water as it travels along the flowpath. However, in the case of the Reecer Creek basin, the length and permeability of the flowpath is such that any pulse would likely be attenuated before reaching the Yakima River. The net effect is that water lost from ditches and irrigated parcels likely discharges to the Yakima River at a near-constant rate.

[5] If the anecdotal information is accurate, the estimates of historic diversion rates shown in Table 3a would increase in the early irrigation season (April – May) when the available streamflow exceeds the historic diversion estimates based on water rights (Qa). However, given the estimates of irrigation requirements, any additional water diverted into the Reecer basin in April and May would have become tailwater and returned rapidly to the Yakima River, thereby not effecting the magnitude of subsurface return flows.

Terminating the Trendwest portion of the FCWUA water rights into First Creek will reduce the amount of water traveling from the Reecer Creek basin to the Yakima River via subsurface flow paths. Under historic conditions, we estimate that total subsurface return flow to the Yakima River amounted to approximately 1.18 cfs, of which Trendwest's water rights accounted for approximately 0.66 cfs (**Table 4**). However, under the historic conditions, not all of the diverted water was routed through subsurface pathways. The tailwater portion of the diversion returned to the Yakima River via Reecer Creek and a series of ditches. **Table 5** summarizes both the historic groundwater and surface-water discharges to the Yakima River, and shows that average estimated monthly tailwater flows to Reecer Creek associated with the Trendwest water rights ranged from 2.7 to 0.5 cfs between April and June. As data are generally unavailable to estimate seepage losses from Reecer Creek below the FCWUA places-of-use, this analysis assumed that all of this tailwater reached the Yakima River rapidly through surface water pathways[6].

The changes in Reecer Basin subsurface return flow and tailwater flow to the Yakima River associated with Trendwest's proposed FCWUA transfer are unlikely to *exactly* equal the historic estimates of these return flows. When Trendwest ceases diversion of 56 percent of the FCWUA water right, the remaining water users will likely devote a larger portion of their retained water rights to offsetting seepage losses in the FCWUA ditch. This is because ditch seepage will not be reduced by 56 percent of historic losses, but instead by only about 15 to 30 percent (based on values in **Table 3b**). Because future seepage losses are estimated to become a higher portion of the total ditch flow, the remaining irrigators will have less water to apply to their fields. Consumptive use by remaining FCWUA user's crops will therefore be reduced, and a higher portion of the retained water right will go to subsurface return flows. ECT's calculations show that the estimated future reduction in subsurface return flow will be about 9 percent less than the historic return flows attributed to Trendwest's water rights. The proposed transfer would also result in a reduction of tailwater flow to the Yakima River larger than the tailwater flow historically attributable to Trendwest's FCWUA water rights. **Table 3b** shows that while Trendwest's estimated historic tailwater flows ranged from 0.53 to 2.69 cfs, the predicted change in tailwater flows ranges from 0.71 to 2.9 cfs. However, since tailwater is considered to be transmitted quickly to the Yakima River, changes in tailwater flows have little effect on downstream flows in the Yakima River.

It should be noted that the above distinction, on which changes to the future condition are differentiated from historic values associated with Trendwest's water rights, assumes that the hydraulics of the FCWUA irrigation ditch will remain the same. If the ditch were modified, these estimates would vary from the discussion presented above. For example, if the ditch were lined over reaches with high seepage loss, seepage could be reduced and more water would again become available to supply historic rates of field application and consumptive use by crops..

5 Effect of Proposed Transfer on the Timing of Associated Flow to the Yakima River

The proposed water-rights transfer will cause a net increase in water availability to the Yakima River equivalent to the historic consumptive use associated with Trendwest's water right.

[6] Ecology, ECT and Trendwest agreed upon this assumption on a 10/15/01 conference call.

H-01

Consumptive use over the irrigation season is estimated to be approximately 377 acre-feet. Under the proposed transfer, this volume of water will reach the Yakima River through the Swauk Creek basin. In addition, the proposed transfer would alter the timing and flowpath by which the non-consumptive portion of the Trendwest water right reaches the Yakima River. Under the historic condition, a significant amount of the non-consumptive irrigation water returned to the Yakima via sub-surface pathways in the Reecer basin at relatively constant, year-round rates (**Table 5**). If this water is left in the First and Swauk Creek basins, almost all of the water will reach the Yakima River via surface water pathways[7] (PGG, 1/24/02). Thus, more of the non-consumptively used portion of the water will reach the Yakima River as a seasonal pulse, rather than as a constant rate subsurface input to the river.

In the Swauk Creek Basin, the most significant noticeable change associated with the transfer is additional surface flows in First and Swauk Creek. The magnitude and timing of these additional flows is discussed in the First and Swauk Basin Memorandum (PGG, 1/24/02). In the Reecer Basin, the most significant noticeable change associated with the proposed transfer is the loss of tailwater inflows during portions of the irrigation season. As previously noted, historic average monthly tailwater inflows are estimated to range from 2.7 to 0.53 cfs between April and June, and likely future changes in tailwater flows will likely show reductions between 0.71 and 2.9 cfs (**Table 3**). Actual values will vary on a year-to-year basis depending on climatic conditions. The overall transfer will cause an increase in streamflow in First Creek, Swauk Creek and the Yakima River during the irrigation season. For most of the non-irrigation season, Yakima River flows will be reduced by discontinuation of historic year-round subsurface return flows via the Reecer Basin (approximately 0.66 cfs)[8].

Changing the water routing from the Reecer Creek Basin to the Swauk Creek Basin causes a geographic shift in the associated tributary contribution to the Yakima River. In the future condition, the entire former diversion under Trendwest's water right will flow though approximately 9 more miles of the Yakima River than was the case when water was diverted to the Reecer Creek basin (where a portion was lost to crop consumption).

6 References

Pacific Groundwater Group (PGG), 2002. First and Swauk Creek Basin Hydrologic Analysis. Technical Memorandum dated January 24, 2002.

Martin, Tom. 2001. Personal communication to Peter Schwartzman (PGG) regarding preliminary estimates of long-term stream hydrographs. Email dated October 16, 2001.

[7] A portion of this water experiences a short timelag in its path to the Yakima River due to the time required for seepage losses near the First Creek mouth to discharge back to Swauk Creek at locations immediately downstream.
[8] The timelag discussed immediately above (footnote 7) will partially offset subsurface return flow reductions during the first several weeks following the irrigation season (PGG, 1/24/02).

Table 1
Swauk / First Creek Water Rights

Name	Priority	Source	CFS	AF	Acres
FCWUA (Retained)	Nov. 2, 1877	First Creek	2.19	274.12	54.8
FCWUA / Trendwest	**Nov. 2, 1877**	**First Creek**	**2.79**	**348.88**	**69.7**
Burke	June 30, 1878	Swauk via Burke	2.25	589.00	78.4
Hartman / Trendwest	**June 30, 1878**	**Swauk via Burke-Hartman**	**0.89**	**150.00**	**20.0**
Burke	June 30, 1878	Swauk via Burke-Hartman	1.77	297.00	39.6
FCWUA (Retained)	June 1, 1881	First Creek	3.92	639.32	127.8
FCWUA / Trendwest	**June 1, 1881**	**First Creek**	**5.00**	**813.68**	**162.7**
Coe, Bruce	May 24, 1884	Swauk via Coe (N)	1.79	164.00	
Coe, Bruce	May 24, 1884	Swauk via Coe (S)	1.50	112.50	
Tang (Michael Coe, SV Ranch)	May 24, 1884	Swauk via Tang	0.167	80.00	
Hartman / Trendwest	**Sept. 20, 1889**	**Swauk via Burke-Hartman**	**3.34**	**563.00**	**75.0**
Burke	Oct. 31, 1889	Swauk via Burke	2.00	150.00	20.0
Tang (Michael Coe, SV Ranch)	Sept. 21, 1892	Swauk via Tang	0.167	80.00	
Coe, Bruce	Apr. 9, 1901	Swauk via Coe (S)	0.375	37.50	
			28.149	**4,299.00**	

*Trendwest Water Rights are shown in bold face type

Table 2
Summary of FCWUA Ditch Seepage Loss Measurements

Location No.	Location	Measured Discharge (cfs)				
		5/31/2001	7/13/2001	8/8/2001	8/29/2001	9/11/2001
1 to 2	FCWUA Flume to Green Canyon	0.8	-0.2	ND*	0.3	0.1
2 to 4	Green Canyon to Weirs Minus Green Canyon Diversion	0.5	-0.1	ND	-0.5	-0.4
5b to 6	Roan Weir to Top of Roan Property	ND	0.0	0.0	0.1	0.0
	Net Loss (negative) or Gain in Main Ditch (positive)	1.3	-0.3	-0.4	-0.2	-0.3

* ND = No Data

H-01

Table 3
Summary of Seepage Losses Associated with FCWUA Water Rights

3a – Historic Condition

		Average FCWUA Diversion			FCWUA Ditch Seepage Loss			Onsite Field/Ditch Seepage Loss			Losses to Surface Water		
	Estimated Flow in First Creek[1]	Total	Roan (Sr) and Olson	Nelson and Roan (Jr)	Total	Roan (Sr) and Olson	Nelson and Roan (Jr)	Total	Roan (Sr) and Olson	Nelson and Roan (Jr)	Total	Roan (Sr) and Olson	Nelson and Roan (Jr)
Apr	11.7	9.00	3.96	5.04	0.50	0.22	0.28	1.85	0.81	1.03	4.81	2.11	2.69
May	12.5	9.30	4.09	5.21	0.60	0.26	0.34	2.64	1.16	1.48	3.41	1.50	1.91
Jun	7.8	7.80	3.43	4.37	0.53	0.23	0.30	3.16	1.39	1.77	0.95	0.42	0.53
Jul	3.4	3.40	1.50	1.90	0.42	0.18	0.24	1.49	0.66	0.83	0.00	0.00	0.00
Aug	2.1	2.10	0.92	1.18	0.39	0.17	0.22	0.86	0.38	0.48	0.00	0.00	0.00
Sept	1.9	1.90	0.84	1.06	0.39	0.17	0.22	0.76	0.33	0.42	0.00	0.00	0.00
Oct 1-15	2	2.00	0.88	1.12	0.39	0.17	0.22	0.81	0.36	0.45	0.00	0.00	0.00

3b – Post Trendwest Transfer Condition

		Average FCWUA Diversion			FCWUA Ditch Seepage Loss			Onsite Field/Ditch Seepage Loss			Losses to Surface Water		
	Estimated Flow in First Creek[1]	Prior to Transfer	Post Transfer	Change	Prior to Transfer	Post Transfer	Change	Prior to Transfer	Post Transfer	Change	Prior to Transfer	Post Transfer	Change
Apr	11.70	9.00	3.96	5.04	0.50	0.43	0.07	1.85	0.81	1.03	4.81	1.90	2.90
May	12.50	9.30	4.09	5.21	0.60	0.43	0.17	2.64	1.16	1.48	3.41	1.33	2.08
Jun	7.80	7.80	3.43	4.37	0.53	0.41	0.12	3.16	1.39	1.77	0.95	0.24	0.71
Jul	3.40	3.40	1.50	1.90	0.42	0.36	0.06	1.49	0.57	0.92	0.00	0.00	0.00
Aug	2.10	2.10	0.92	1.18	0.39	0.32	0.07	0.86	0.30	0.55	0.00	0.00	0.00
Sept	1.90	1.90	0.84	1.06	0.39	0.32	0.07	0.76	0.26	0.50	0.00	0.00	0.00
Oct 1-15	2.00	2.00	0.88	1.12	0.39	0.32	0.07	0.81	0.28	0.53	0.00	0.00	0.00

NOTES: 1) Long term average monthly streamflow in First Creek above diversion provided by Tom Martin, Brown and Caldwell.
2) The diversion in April and May has been adjusted downward to meet the total annual water right.

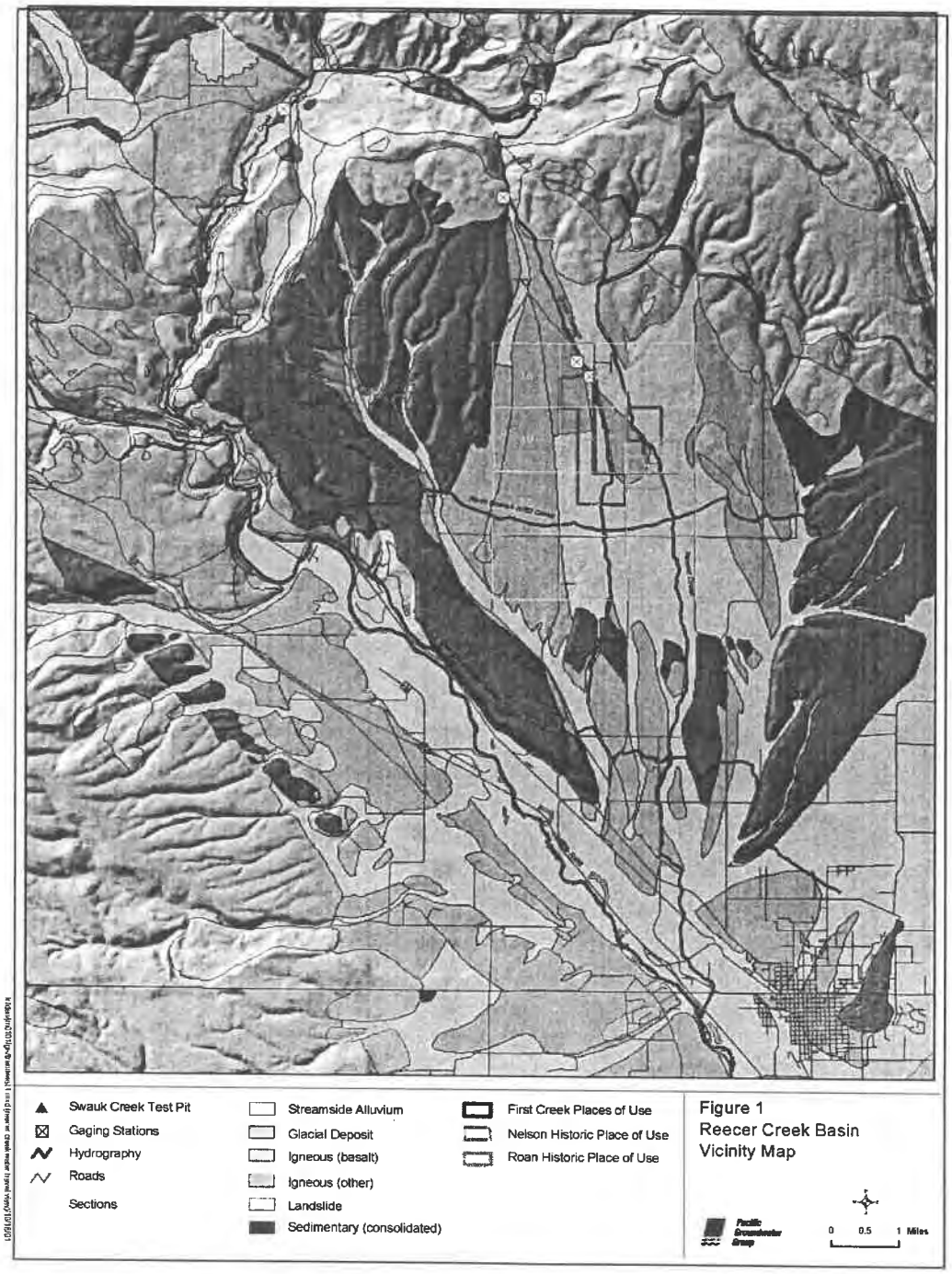
Table 4
Estimated Subsurface Return Flows to the Yakima River from the Reecer Creek Basin

	Diversion (af)	Ditch Seepage Loss (af)	Field Seepage Loss (af)	Field + Ditch Loss (af)	Field + Ditch Loss (cfs) (annual)
FCWUA Total	2,082	183	674	856	1.18
Roan (Sr) and Olson	916	80	296	377	0.52
Nelson and Roan (Jr)	1,166	102	377	480	0.66

Table 5
Historic Discharges of Trendwest's FCWUA Water Rights to the Yakima River

	Reecer Creek Basin		
	Historic Groundwater Discharge (cfs)	Historic Surface Water Discharge (cfs)	Historic Net Discharge to the Yakima (cfs)
Jan	0.66	0.00	0.66
Feb	0.66	0.00	0.66
Mar	0.66	0.00	0.66
Apr	0.66	2.69	3.35
May	0.66	1.91	2.57
Jun	0.66	0.53	1.19
Jul	0.66	0.00	0.66
Aug	0.66	0.00	0.66
Sep	0.66	0.00	0.66
Oct 1-15	0.66	0.00	0.66
Oct 16-31	0.66	0.00	0.66
Nov	0.66	0.00	0.66
Dec	0.66	0.00	0.66

Figure 1
Location Map



H-01

Figure 2
Long Term Average Daily Streamflow at First Creek FCWUA Diversion
Estimated by Tom Martin (Brown & Caldwell)

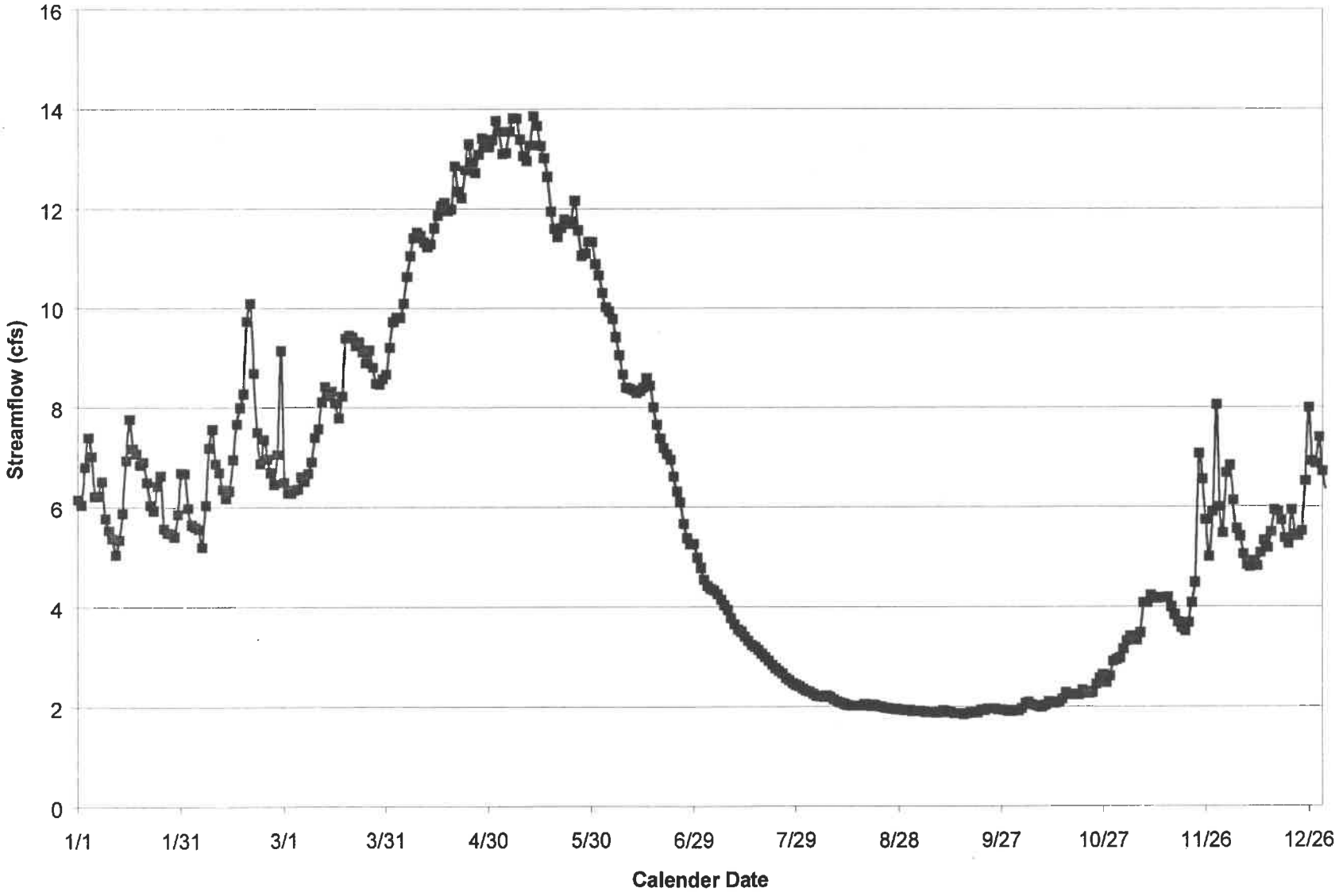


Exhibit H

WATER DEMANDS FROM FALLOWED LANDS
Trendwest Properties: Cle Elum UGA Final EIS
Draft Report

INTRODUCTION

This analysis describes the likely future condition of the properties from which Trendwest Resorts, Inc., purchased water rights and the estimated water demands from those properties.

ANTICIPATED FUTURE DEVELOPMENT OF FALLOWED LANDS

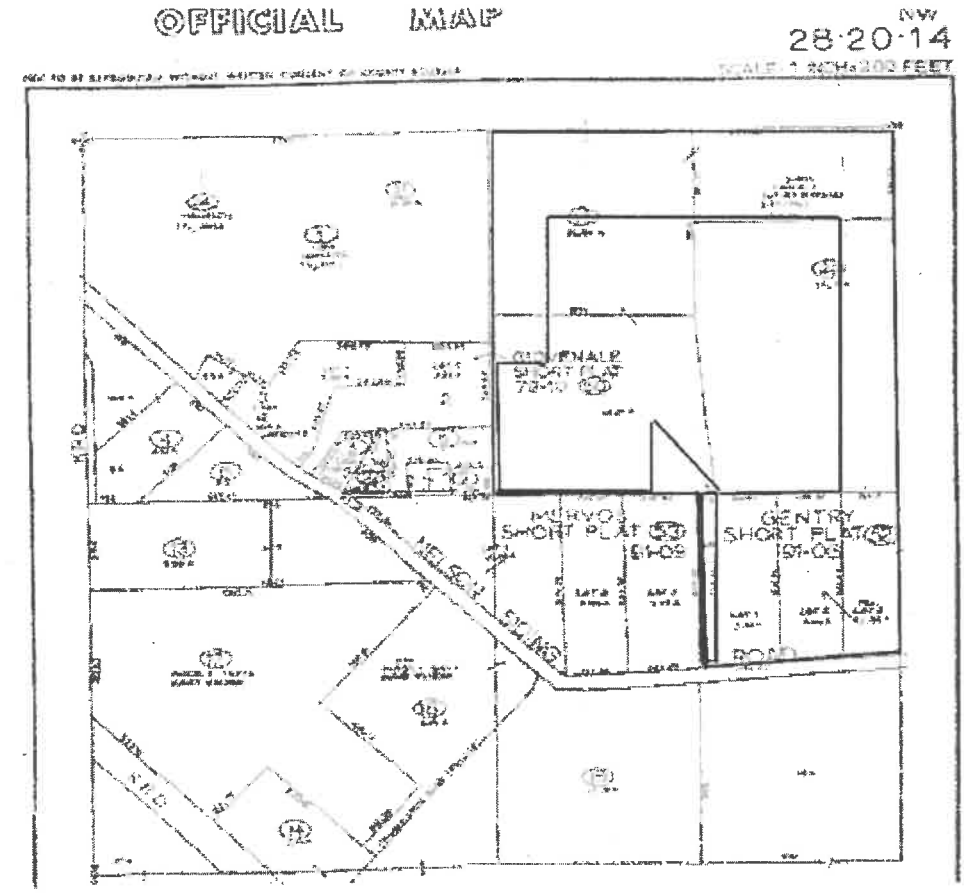
Big Creek

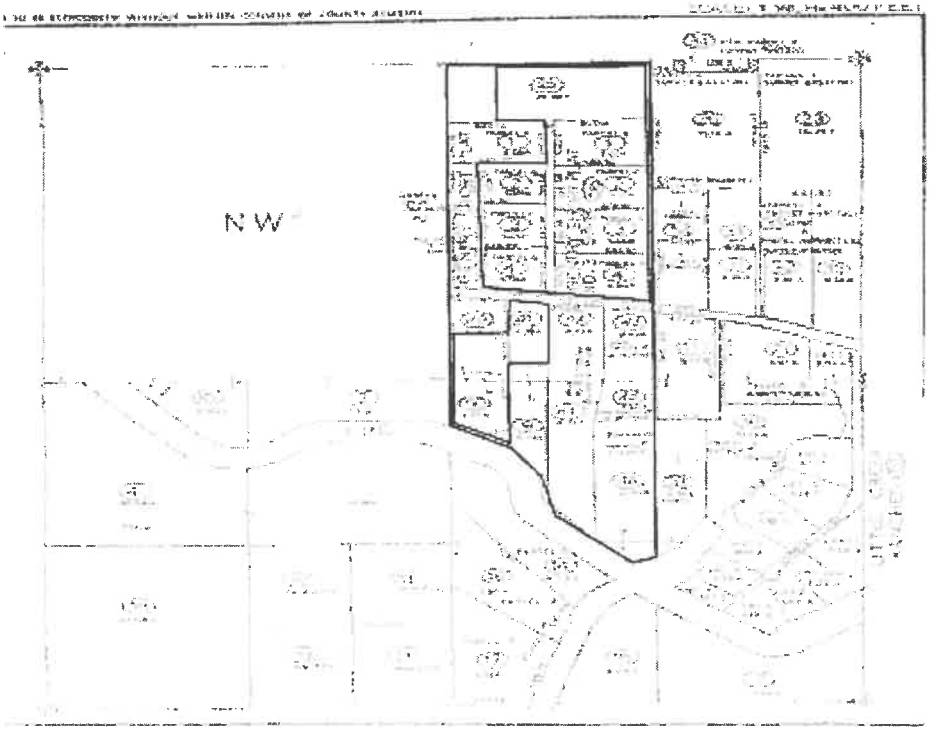
Trendwest purchased water rights appurtenant to approximately 81.5 acres of land in the Big Creek watershed under Court Claim No. 00755 (known as the Gentry water right). The Acquavella Court has conditionally confirmed the Gentry water right for 3.0 cfs, not to exceed 768 acre-feet each year, with the addition of up to an additional 3.0 cfs, not to exceed 166 additional acre-feet when the rights to Big Creek are otherwise fully satisfied. Trendwest owns 50.9% of the water Gentry water right. Trendwest is entitled to 1.53 cfs, not to exceed 390.1 acre-feet each year plus and an additional 1.53 cfs, not to exceed 84.49 acre-feet when the rights to Big Creek are otherwise fully satisfied.

The Gentry property is located in Section 28 of Township 20 North, Range 14 East in Kittitas County. The Gentry property lies north of the Kittitas Reclamation District Canal and is formerly part of the Lund and Richards homesteads. Before 1998, water was diverted from Big Creek into Lund Ditch primarily for irrigation and for stockwater. The 81.5 acres is part of a larger 160 acre property in private ownership that is currently surveyed and platted into 25 parcels ranging from 2.86 to 26.34 acres in size. The subdivision of the Gentry property dates back to the early 1990's with Gentry Short Plat No. 1, recorded in December 1991; Gentry Short Plats No's. 2 and 3 recorded in June 1994; and additional surveys recorded in July 1993 and September 1994.

Trendwest purchased rights from 14 of the 25 Gentry parcels, however only four of the five acre parcels were fallowed completely as a result of Trendwest's water right purchases. The remaining ten parcels retained a portion of the existing water rights for use within each parcel. Figure 1 is a Kittitas County Assessors Map showing the historic place of use under the Gentry water right claim (area within the red boundary line) and the Trendwest portion of that water right (area within the blue boundary line).

Figure 1: Big Creek Property





Teanaway River

Trendwest purchased water rights appurtenant to approximately 188 acres of land formerly irrigated from two points of diversion on the Teanaway River under Court Claim No. 02255 (known as the Walker water rights). As recommended for confirmation in the Supplemental Report of Referee for Subbasin No. 3, these water rights entitle Trendwest to divert approximately 3.76 cfs, not to exceed 1,016 acre-feet each year.

The property is located in Sections 25 and 26 of Township 20 North, Range 16 East in Kittitas County. The property lies west of the Teanaway River, north of State Route 970 and south of East Masterson Road. Before 1996, water was diverted from the Teanaway River into Masterson Ditch and Seaton Ditch primarily for irrigation of timothy hay and for stockwater.

In September 1986, a survey was filed with the Kittitas County Auditor subdividing the property into 16 individual lots, 15 of which are between 10 and 12 acres in size, and one 48 acre lot. Trendwest purchased water rights from the entire property. Figure 2 shows the survey maps as filed with the County Auditors office.

Figure 2: Teanaway River Property

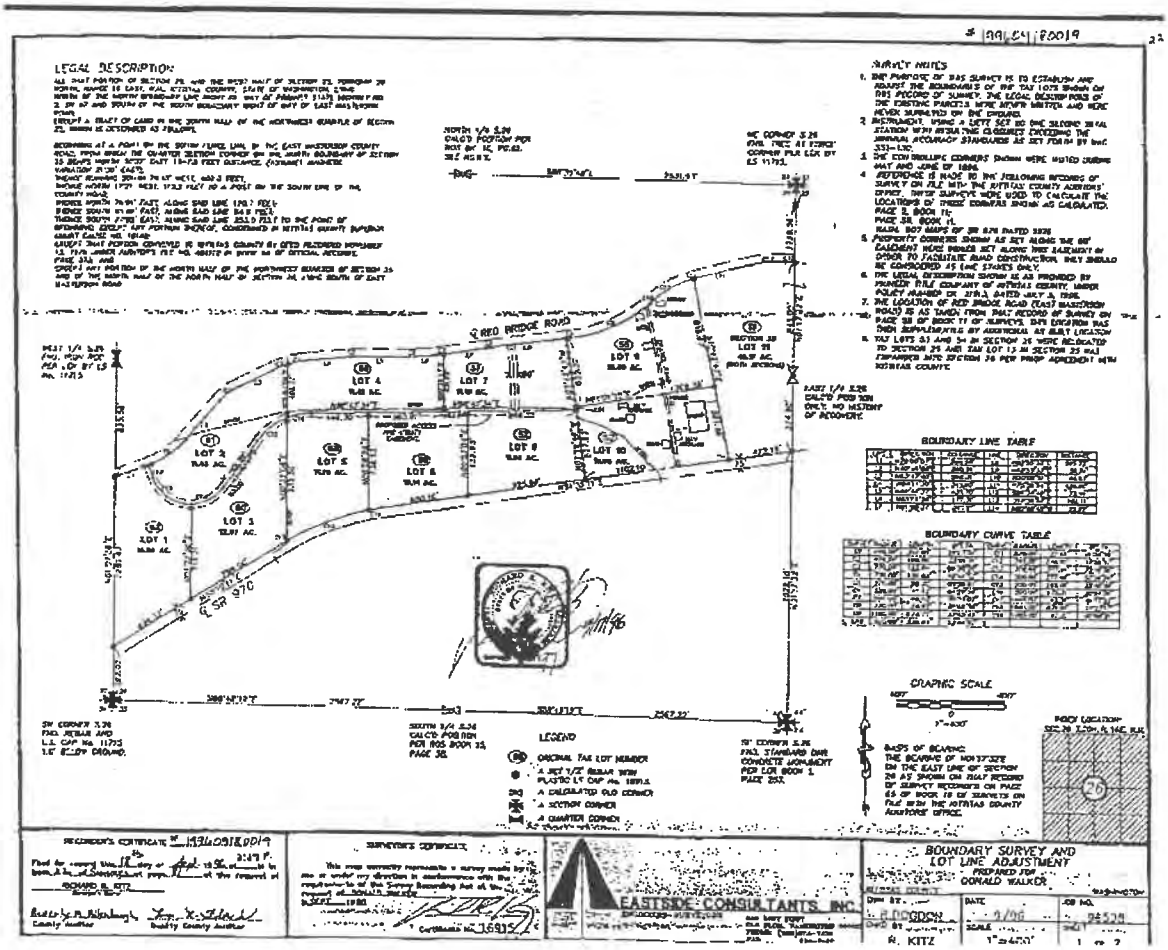
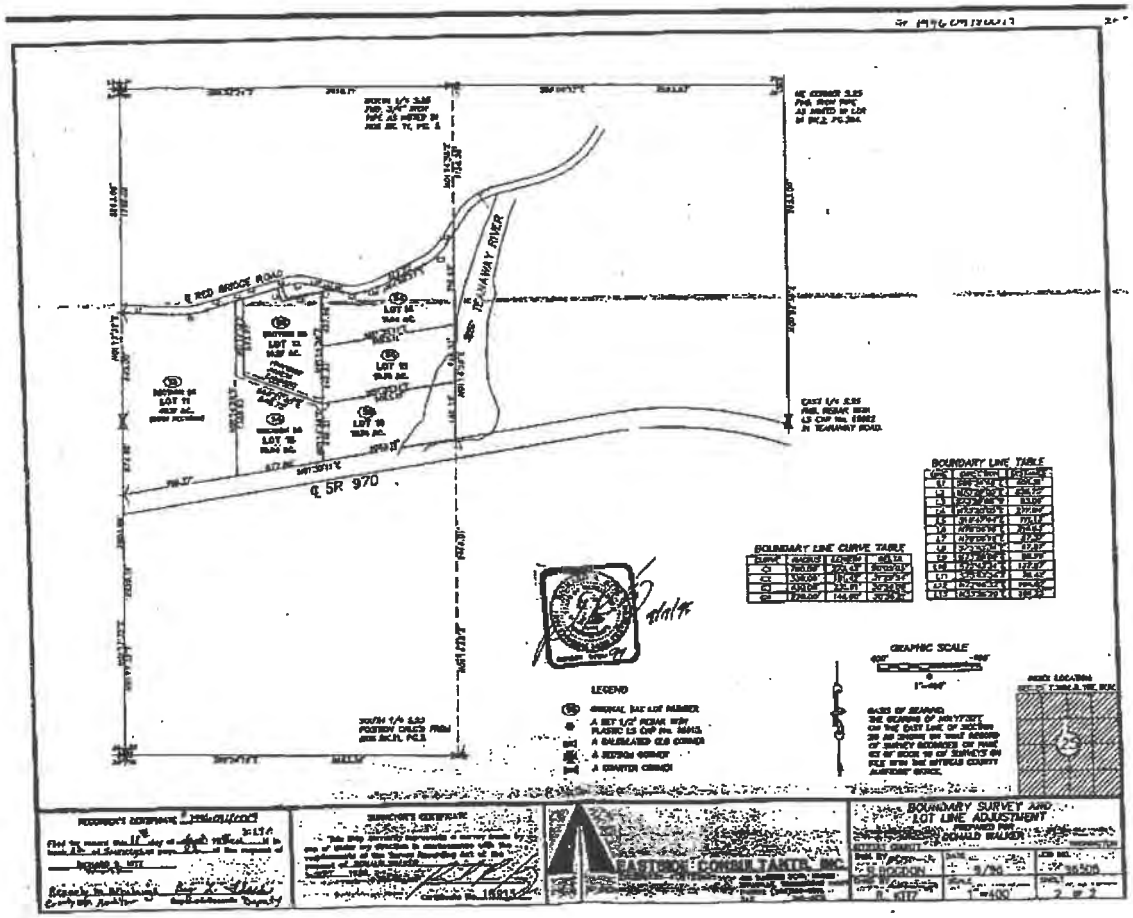


Figure 2: Continued



Swauk Creek

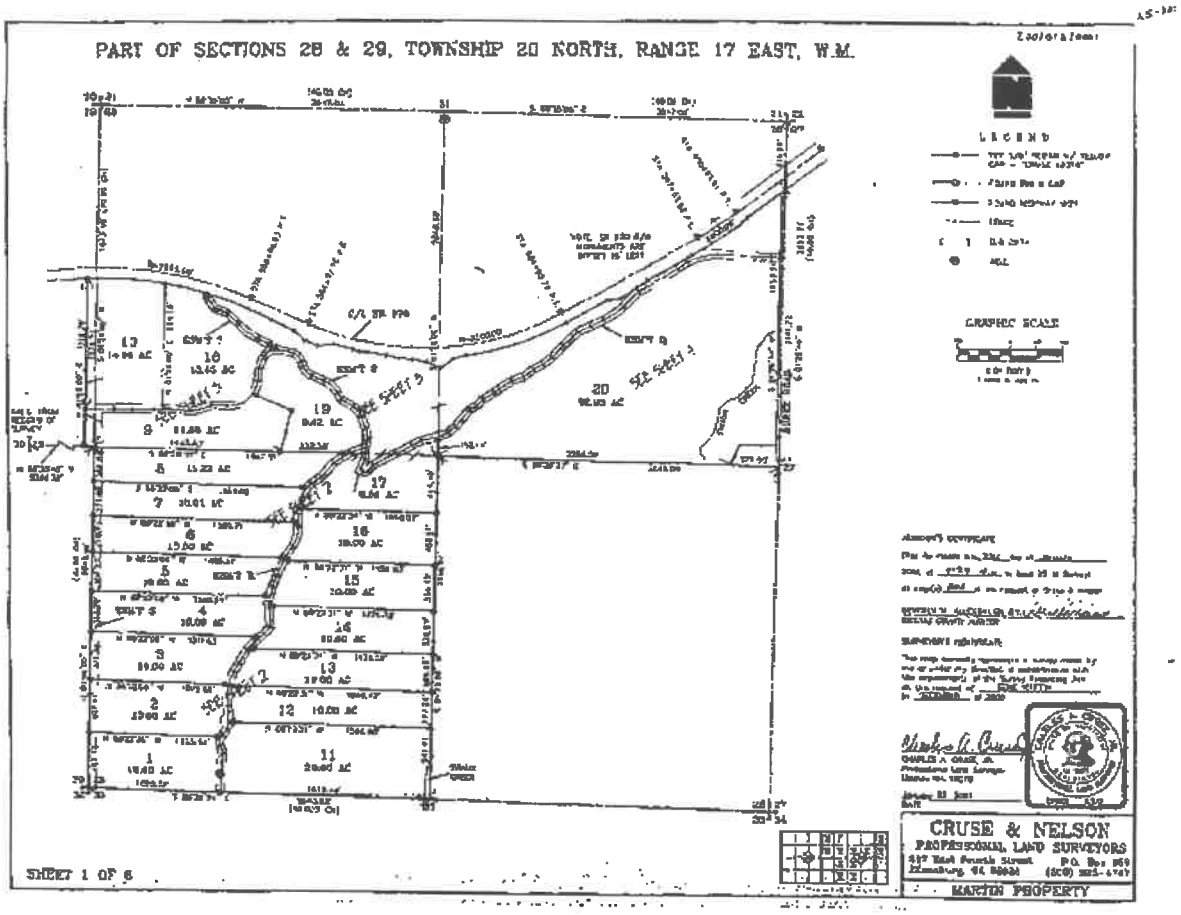
Trendwest purchased Swauk Creek water rights appurtenant to 95 acres of land formerly irrigated from Swauk Creek under Court Claim No. 01685 (known as the Hartman water rights). The Supplemental Report of Referee for Subbasin No. 4 recommends confirmation of 4.05 cfs plus 0.18 cfs for conveyance loss, not to exceed 712.5 acre-feet each year.

The 95 acre property is located in Section 28 of Township 20 North, Range 17 East in Kittitas County, south of Highway 970. This property has historically been irrigated from the Burke-Hartman Ditch from Swauk Creek.

The 95 acres is part of a larger 260 acre property in private ownership. In January 2001, a survey plat was filed with the Kittitas County Auditor's office. The short plat divides the property into 20 parcels, eight of which are located all or in part on the formerly irrigated portion of the property. Specifically, the formerly irrigated portion of the property is divided into eight parcels, six of which are approximately 10 acres and two of which are 20 or more acres.

Figure 3 shows the subdivision as filed with the County Auditor's office.

Figure 3: Swauk Creek Properties



First Creek

Trendwest purchased First Creek water rights from two separate landowners. These water right arise under Court Claim No. 00648, filed by the First Creek Water Users Association (FCWUA Claim). A dam owned by the FCWUA diverts almost the entire flow of First Creek into the Wold-Munson Ditch. The Wold-Munson Ditch delivers water to meet the irrigation needs of several farmers in the upper Reecer Creek Basin north of Ellensburg.

Trendwest owns water rights appurtenant to two properties under the FCWUA Claim. The water right for an approximately 150 acre property entitles Trendwest to divert approximately 5.0 cfs, not to exceed 754.2 acre-feet each year. The water right for an approximately 83 acre property entitles Trendwest to divert approximately 2.8 cfs, not to exceed 419 acre-feet each year. Together, Trendwest's water rights under the FCWUA Claim total 7.8 cfs, not to exceed 1,173.2 acre-feet each year.

The 150 acre property is part of a 667 acre tax parcel which has not been subdivided, and which is not intended for subdivision in the foreseeable future (Mentor Law Group 2001). The 83 acre property has been divided into eight separate parcels, comprised of two 20 acre parcels, four three acre parcels, and parts of two 30 to 40 acre parcels.

Yakima Mainstem/Reecer Creek

Trendwest purchased water rights to Reecer Creek and the mainstem of the Yakima River, appurtenant to three parcels of approximately 291 acres of land formerly owned by Pautzke Bait Company, Inc., arising under Court Claim No. 01724 (Pautzke water rights). These water rights entitle Trendwest to divert up to 27.4 cfs, not to exceed about 6,053 acre-feet of water each year.

The Pautzke properties are located within the Ellensburg city limits, in Sections 3 and 10 of Township 17 North, Range 18 East. The first property, formerly known at Hundley Ranch, is 117 acres historically irrigated for timothy hay with grain rotation and pasture through the Klein, Castle, and Coble Ditch and later through Mill Ditch to Reecer Creek. Of this property, Trendwest purchased water appurtenant to 67 acres. The second and third properties, formerly known as Riverside Farm, comprise 146 acres and 78 acres, respectively, that were historically irrigated for hay and pasture grass through Mill Ditch and the Klein, Castle, and Coble Ditch.

The Pautzke property has since been acquired by the City of Ellensburg. A number of development proposals have been discussed for this property. The City anticipates hiring a contract planning consultant to develop a comprehensive master plan for the property sometime in 2002. The City expects to use the property for an 81 acre ball field complex and to leave approximately 60 acres undeveloped for flood control. This would leaving approximately 130 acres available for future development. At this time, however, the only reasonably foreseeable development of this property is for flood control and an 81 acre ball field complex.

WATER DEMAND ASSOCIATED WITH FUTURE USES OF FALLOWED LANDS

Water demand for unincorporated Kittitas County was calculated based on the average household domestic water use less domestic return flows plus irrigation of one-half acre of lawn. This analysis assumes a domestic diversion of 240 gallons per household (100 gallons per person per day x 2.4 persons per household), less 80% return flows. Irrigation demands were calculated using the Blanney-Criddle Method for the specific properties consistent with the methodology used to determine the net consumptive use available under the Trendwest water rights. A more detailed discussion of these calculations can be found in Draft EIS, Appendix D: Water Supply Technical Report, at Exhibit B.1.3.

Water demand for parcels 20 acres or larger was doubled, in keeping with the Kittitas County land use code, which allows two residential units on parcels of that size. Table 1 shows water demands for fallowed lands. Table 2 shows water demands from the ball field complex proposed by the City of Ellensburg on the former Pautzke property.

Table 1: Water Demands from Future Use of Fallowed Lands

Sub-Basin	No. of Lots		Net CU in/yr	Domestic Div/ERU gpd	Domestic Return %	Domestic CU/ERU gpd	Domestic CU Total gpd	Domestic CU Total ac ft/yr	Irrigation CU/unit ac ft/yr	Irrigation CU Total ac ft/yr	Total CU ac ft/yr
	< 20 ac	>= 20 ac									
Big Creek (Gentry)	4	0	18.73	240	80	48	192	0.215	0.780	3.122	3.337
Teanaway R (Walker)	15	1	23.19	240	80	48	816	0.914	0.966	16.426	17.340
Swauk Creek (Martin)	6	2	28.69	240	80	48	480	0.538	1.195	11.954	12.492
First Creek (Nelson)	4	4	28.61	240	80	48	576	0.645	1.192	14.305	14.950
First Creek (Roan)	0	0	28.61	240	80	48	0	0.000	1.192	0.000	0.000
Total	29	14									48.119

Source: Brown & Caldwell, 2001; Mentor Law Group, 2001.

Table 2: Water Demands from Development of Pautzke Property

	Irrigated Area Acres	CU Total in/yr	CU total acft/yr
City of Ellensburg Ball Field Complex	81.0	32	216.0
Total			216.0

Source: Brown & Caldwell, 2001; Mentor Law Group, 2001.

Exhibit I

Pacific Groundwater Group

2377 Eastlake Avenue East
Suite 200
Seattle, WA 98102
206-329-0141 v
206-329-6968 f
www.pgwg.com

Technical Memorandum

To: Randall Doneen, Department of Ecology
Joe Mentor, Mentor Law Group
Andy Kindig, A. Kindig & Associates
Tom Martin, Brown and Caldwell

From: Peter Schwartzman, Associate Hydrogeologist, PGG
Russell Prior, Principal Geologist, PGG

Re: Assessment of Impacts to Groundwater Levels and Wells from Discontinued Irrigation Seepage Recharge

Date: January 24, 2001

1 Purpose and Approach

This memorandum presents estimates of how discontinued diversion of water rights held by Trendwest and associated reductions in ditch/field seepage losses would affect underlying groundwater levels. In addition, wells in the vicinity of areas with altered groundwater levels are listed and a general description of potential impacts to these wells is provided.

ECT has reviewed well logs on file with Ecology to characterize subsurface conditions and identify wells located near to formerly-appurtenant properties associated with Trendwest's water rights. This analysis assumes that review of driller's logs on file with Ecology is sufficient to identify nearby wells to be included in the analyses. For the Big Creek, Swauk Creek and Teanaway River basins, Ecology's Consultant Team (ECT) has used modeling results to define a reasonable range of change in groundwater levels in the vicinity of the formerly-appurtenant properties. Data are insufficient to predict groundwater level changes in the Reecer Creek Basin. For all four basins, ECT has provided a general discussion of well completion information and relatively susceptibility to impacts from changes in groundwater levels.

The following text summarizes the results of the analyses employed and provides a general overview as to whether known wells in the affected areas could be adversely affected. Maps are included that show estimated groundwater level changes in areas surrounding formerly-appurtenant properties, and tables summarize known wells by location (public land survey) to be related to the maps. The evaluation of potential impacts to wells is limited to providing general observations about typical well completions and discussing how projected changes in groundwater levels would generally affect wells completed in this manner. However, the evaluation does not estimate potential impacts to any particular well.

It should be noted that our analyses of potential changes in groundwater levels associated with discontinued irrigation recharge from ditch/field losses predicted impacts to the *uppermost* aquifer underlying the formerly-appurtenant properties. Because of limited saturated thickness and local variations in aquifer permeability, many wells are not constructed in uppermost aquifers. For those wells completed in deeper aquifers (such as bedrock aquifers that underlie alluvium), the magnitude of predicted groundwater level changes is expected to be smaller. The vertical permeability between shallow and deep zones will control the degree to which deep zones are affected by water-level changes in shallow zones. Where vertical permeability is relatively low, impacts to the deep zones are likely to be insignificant.

The text presented herein references ECT technical memoranda that provide estimates of changes in irrigation subsurface return flows associated with the proposed water right transfers and detailed descriptions of the models used to estimate changes in groundwater levels. The reader is also recommended to refer to these memoranda for hydrogeologic descriptions of the aforementioned basins.

2 Big Creek

2.1 Estimated Changes in Groundwater Levels

The Big Creek model (PGG, 1/18/02) was used to estimate changes in groundwater levels associated with discontinuation of groundwater recharge from irrigation seepage losses associated with the proposed Trendwest water right transfer. Mounding associated with former seepage recharge from the portion of the Gentry property for which Trendwest purchased water rights was estimated by running the model with estimates of pre-transfer irrigation recharge and then adding a change in recharge equivalent to the former irrigation seepage. Changes in recharge were modeled for the full water rights transfer (MPR+UGA), and impacts independently associated with either development will be less than those presented herein. The model was run in steady-state mode for pre-transfer conditions, and was then run in transient mode for a series of years to simulate seasonal water-level variations associated with former recharge from irrigation seepage loss. The difference between the steady-state and transient runs represents the mounding effect of the water rights, and equivalently, the predicted groundwater level decline associated with discontinuing associated irrigation practices. The model was run at both endpoints of the hydraulic conductivity (K) range agreed upon by ECT, Ecology, and Trendwest's consultants (75 ft/d and 750 ft/d).

Figure 1 presents predicted groundwater hydrographs extracted from model results for selected locations beneath the formerly irrigated field and beneath a section of irrigation ditch leading to the field. The figure shows 4 years of modeled groundwater levels with no variation in recharge input (equivalent to the steady-state simulation) followed by 20 years where seasonal recharge from irrigation seepage loss is superimposed on top of existing steady recharge. The figure shows that a groundwater mound builds up over the irrigation season and then dissipates over the remainder of the year. On an annual basis, the modeled irrigation recharge also causes a year-round increase in groundwater level. Groundwater mounding estimated at the two monitoring points for the K=75 ft/d model simulation reaches a maximum increase from pre-change conditions on the order 1.5 to 2 feet, whereas the maximum water-level increase predicted for the K=750 ft/d simulation is on the order of 0.3 feet. **Figure 2** shows a "snapshot" of the seasonal

H-01

maximum change in groundwater levels for the mound predicted under the K=75 ft/d simulation. Predicted water-level changes are consistent with the hydrograph and are all less than 2 feet. A similar figure was not prepared for the K=750 ft/d; however, all associated water-level changes are predicted to be less than 0.5 feet. Discontinued irrigation over portions of the Gentry property is predicted to cause an equivalent maximum seasonal decline in groundwater levels.

2.2 Summary of Wells in the Vicinity of Area of Predicted Groundwater Level Change

The area of predicted groundwater level change encompasses portions of sections 20, 21, 28, and 29 in township 20N, range 14E. A total of 61 wells are estimated to exist in these four sections based on well logs on file with Ecology. All of the wells are completed in an unconsolidated aquifer comprised of Yakima River alluvium, and are reported to encounter unconsolidated soils ranging from clay to gravel. **Table 1** summarizes the pertinent data for these wells. The wells in these four sections average about 70 feet deep with yields that average 45 gpm. The depth to the water level is, on average, about 26 feet below ground surface. Only one well among the 61 evaluated is completed with perforations. The others are fully cased and completed as open holes, which means the only entrance area is the bottom of the open casing. This is a common completion design for domestic wells that tap aquifers with significant quantities of gravel. Most of the wells are used for domestic purposes, and likely penetrate only a limited thickness of the alluvial aquifer from which they draw water. A section-by-section summary of well depth, well yield, and depth to water is presented in the following bullets:

- In Section 20, well depth averages 68 feet deep, well yields average 35 gpm, and the depth to water averagtes 17 feet. Of note, are three relatively deep wells that are 119, 140, and 196 feet deep. The averages indicated above include these three wells. These wells have water levels that are either shallow (1 foot below ground) or are flowing (static water level is above ground surface). Most of the wells have depths to water that are closer to the average value of 17 feet. Reported water columns within the well casings (the distance between the well bottom and the water level) are greater than 30 feet.

- In Section 21, the well depth averages 55 feet deep, well yields average 42 gpm, and the depth to water averages 17 feet. Most of the wells are located in the southern half of the section. Reported water columns within the well casings are typically greater than 20 feet; however, one well is reported to have a water column of only 9 feet.

- In Section 28, the well depth averages 86 feet deep, well yields average 61 gpm, and the depth to water averages 34 feet. Well yield values range from 10 to 300 gpm. One well in the NE quarter is 320 feet deep; it appears to be an outlier as the next deepest well is 120 feet deep. Reported water columns within the well casings are typically greater than 20 feet; however, one well is reported to have a water column of only 15 feet.

- In section 29, the well depth averages 58 feet deep, well yields average 25 gpm, and the depth to water averages 33 feet. Based on Ecology well logs, only the east half of the section has wells. Reported water columns within the well casings are typically greater than 20 feet; however, two wells are reported to have water columns of 14 and 15 feet.

2.3 Potential Impacts to Nearby Wells

The area with predicted groundwater level changes is centered in the northern half of Section 28 where maximum seasonal declines are predicted to be about 1.75 feet for the K=75 ft/d model simulation. The area of groundwater level change is roughly circular with a diameter of about 1_ miles. A section-by-section summary of potential well impacts relative to maximum predicted groundwater declines is presented in the following bullets. Relevant well information is presented in **Table 1**.

- In Section 20 the groundwater level decline is predicted to be largest in the SW quarter where 0.5 feet is predicted. The predicted decline in the NW is 0.25 feet. The west half of Section 20 has no predicted effects. Predicted groundwater level declines are small relative to reported water columns present in wells.

- The groundwater level decline is predicted to be largest in the southern half of Section 21 with 0.5 to 1.25 feet of change in the SW quarter and 0.25 to 1.25 feet of change in the SE quarter. Small declines are predicted in the northern half with values of 0.25 to 0.5 feet in the NW quarter and 0.25 feet in the NE quarter. Predicted groundwater level declines are small relative to reported water columns present in wells. The single well with a water column of 9 feet appears to have a sufficiently high specific capacity to provide domestic yields under the predicted maximum water level decline.

- Section 28, groundwater level declines are predicted to be highest among the four sections in the Big Creek area. In both the NW and NE quarters of Section 28, the effects are predicted to be 0.75 to 1.75 feet. In the SW quarter, the effects are predicted to range from 0.75 to 1.25 feet and in the SE quarter, the effects are predicted to be 0.5 to 1.25 feet. Predicted groundwater level declines are small relative to reported water columns present in wells. The single well with a water column of 15 feet is yield-limited due to its lesser penetration of the water-table aquifer. The predicted groundwater level decline at this location is about 0.75 feet, and could cause minor reductions in the yield of this well.

- Predicted declines in groundwater levels in Section 29 occur only the eastern half. Both the NE and the SE quarters have predicted to have changes that range from 0.5 to 0.75 feet. Predicted groundwater level declines are small relative to reported water columns present in wells. The two wells with water columns of 14 and 15 feet are yield-limited due to lesser penetration of the water-table aquifer. The predicted groundwater level decline at this location is about 0.65 feet, and could cause minor reductions in the yields of these wells.

3 Teanaway River

3.1 Estimated Changes in Groundwater Levels

The Teanaway River model (PGG, 1/17/02) was used to estimate changes in groundwater levels in the shallow alluvial aquifer associated with discontinuation of groundwater recharge from irrigation seepage losses on the Walker property associated with the proposed Trendwest water right transfer. Although depth to groundwater can be relatively shallow in the Teanaway River Valley, the alluvial deposits can be as much as several hundred feet thick with sedimentary

textures ranging from clay to gravel (ibid). Mounding in shallow water-bearing zones associated with seepage recharge formerly associated with Trendwest water rights was estimated by running the model both with and without estimated (Walker property) irrigation recharge. The change in recharge was modeled for the full water rights transfer (MPR+UGA), and impacts independently associated with either development will be less than those presented herein. The model was run in transient mode, first simulating 4 years without the Walker irrigation recharge and then simulating 6 years with recharge from irrigation seepage loss. The difference in water levels between the two conditions represents the mounding effect of the water rights, and equivalently, the predicted groundwater level decline associated with discontinuing associated irrigation practices.

Figure 3 presents predicted groundwater hydrographs extracted from model results for locations beneath the formerly irrigated Walker property (near the center, upstream and downstream sides of the property). The figure shows 4 years of modeled groundwater levels without Walker irrigation recharge input followed by 6 years where seasonal recharge from irrigation seepage loss is superimposed on top of background recharge. The figure shows that a groundwater mound historically built up over the irrigation season and then dissipated over the remainder of the year. On an annual basis, the modeled irrigation recharge also caused a year-round increase in groundwater level. Estimated historic groundwater mounding reached a maximum seasonal increase from non-irrigated conditions on the order 0.8 to 1.6 feet. **Figure 4** shows a "snapshot" of the seasonal maximum change in groundwater levels for the mound. Predicted water-level changes are consistent with the hydrograph and reach a maximum of just over 1.6 feet. Discontinued irrigation at the Walker property is predicted to cause an equivalent maximum seasonal decline in groundwater levels.

3.2 Summary of Wells in the Vicinity of Area of Predicted Groundwater Level Change

The area of predicted groundwater level declines encompasses portions of the following four sections: 25, 26, 27, and 34. Only Sections 25 and 26 have well logs on file with Ecology in the area with predicted groundwater level change. Section 34 has well logs but none are located in the NE quarter, the only quarter of Section 34 with predicted groundwater level change. Section 27 has no well logs on file. A total of 46 wells are estimated to exist in these two sections based on well logs on file with Ecology. Most of the wells tap consolidated materials of either sandstone or basalt. Most of the wells appear to be located on or near the bottom of the hillsides and do not tap Teanaway River alluvium. **Table 2** summarizes the pertinent data for the well log in Sections 25 and 26. The wells in these two sections average about 223 feet deep with yields that average about 20 gpm. The depth to the water level is, on average, 61 feet below ground surface. Water columns reported for most wells exceed 100 feet; however, several shallow wells exist with water columns as low as 16 to 25 feet. About half the wells are completed with hand slotted perforations and half are completed as open holes. In wells completed in bedrock, the entrance area is that portion of the hole that is uncased.

In addition to the wells on file with Ecology, PGG identified two shallow, hand-dug wells on the Walker property that are completed in the alluvial aquifer. The dug depths of these wells are unknown, but it is unlikely that the wells were excavated far below the seasonal low water table. One well, located at the Walker residence, is no longer used for domestic purposes. The use status of the second well, located near the fish pond, is unknown.

3.3 Potential Impacts to Nearby Wells

The area with predicted groundwater level declines is centered in the valley portion of Section 26 where maximum predicted groundwater level changes are about 1.6 feet. The area of groundwater level change is confined to the valley area and is about 2 miles long. It extends into the NE quarter of Section 25 and into the NE quarter of Section 34. Predictions of groundwater level decline apply to the alluvial aquifer. Lesser declines are expected in deeper water-bearing zones in the consolidated rocks. A section-by-section summary is presented below, and relevant well information is presented in **Table 2**.

In Section 25, the magnitude of groundwater level decline is predicted to range from none to about 1.4 feet. The six wells in the NW quarter are predicted to have groundwater level declines of 0.6 to 1.4 feet. The five wells in the NE quarter are predicted to have a groundwater level decline of zero to 0.4 feet. The four wells in the SW quarter are predicted to have a groundwater level change of decline to 1.2 feet. No effect is predicted in the SE quarter of Section 25 where six wells are known to exist based on Ecology files. Wells in this section with water columns of 16 and 25 feet may exhibit minor reductions in potential yield under the predicted maximum water level decline.

In Section 26, the magnitude of groundwater level change is predicted to range from none to about 1.6 feet. No effect is predicted in the NW quarter of Section 26 where four wells are known to exist based on Ecology files. The three wells in the NE quarter are predicted to have groundwater level changes of around 1.6 feet. The ten wells in the SW quarter are predicted to have a groundwater level change of 0.2 to 1.6 feet. The eight wells in the SE quarter are predicted to have groundwater level changes ranging from 0.2 to 1.6 feet. Predicted groundwater level declines are small relative to reported water columns present in most wells. However, water production capacity in the two hand-dug wells is already noted as seasonally intermittent (Don Walker, personal communication, 2001) and will likely be further reduced due to the predicted groundwater level declines.

In Section 27, only the SE quarter lies in the valley area, which has predicted groundwater level changes. However, no well logs are on file with Ecology for Section 27 even though a few houses are indicated on the USGS map. The predicted groundwater level change ranges from 0.2 to 1.2 feet in the SE quarter.

In Section 34, only the NE quarter is predicted to have groundwater level changes. The predicted changes range from zero to 0.4 feet. Other portions of Section 34 lie in the valley but the effect dissipates to zero in the NE quarter.

4 Swauk Creek

4.1 Estimated Changes in Groundwater Levels

The Swauk Creek model (PGG, 1/24/02) was used to estimate changes in groundwater levels in the shallow alluvial aquifer associated with discontinuation of groundwater recharge from irrigation seepage losses associated with the proposed Trendwest water right transfer. The

H-01

alluvial aquifer along Swauk Creek is likely between tens-of-feet to about 100 feet thick in most places within Hidden Valley, and known wells completed in associated water-bearing zones are typically no more than 25 feet deep. Mounding in shallow water-bearing zones associated with seepage recharge formerly associated with Trendwest water rights was estimated by running the model both with and without estimated irrigation recharge from the formerly-appurtenant Hartman property. The model was first run in steady-state mode to simulate conditions without the formerly-appurtenant irrigation recharge, then in transient mode over 20 years to simulate long-term trends in seasonal groundwater levels with the irrigation recharge. The difference between the steady-state and transient runs represents the mounding effect of the water rights, and equivalently, the predicted groundwater level decline associated with discontinuing associated irrigation practices. The model was run at both endpoints of the hydraulic conductivity (K) range (50 ft/d and 500 ft/d) with a streambed permeability (K') of 1 ft/d. The change in recharge was modeled for the full water rights transfer (MPR+UGA) for both K values, and for the MPR water rights transfer for the K=100 ft/d simulation (where predicted water-level changes were larger). Unless otherwise specified, the discussion below presents model results for the full water rights transfer.

Figures 5a and 5b present predicted groundwater hydrographs extracted from model results for locations in the alluvial aquifer beneath the formerly irrigated Hartman property and adjoining Burke property (near the center of irrigated fields, near Swauk Creek, and immediately downstream of both properties). Both figures show the change in groundwater level over the course of a year relative to the base condition (without formerly-appurtenant irrigation). The figures show that groundwater mounding historically built up over the irrigation season and then dissipated over the remainder of the year. The greatest mounding is predicted to have occurred about 110 days after the onset of the irrigation season, which begins on April 1. On an annual basis, the modeled irrigation recharge also caused a year-round increase in groundwater level. Groundwater mounding estimated for the K=100 ft/d model simulation reached a maximum increase from pre-change conditions on the order 7 feet, whereas the maximum water-level increase predicted for the K=500 ft/d simulation was on the order of 3 feet. Water level changes for (deeper) aquifers that underlie alluvial aquifer are likely to be significantly less than those changes predicted for the alluvial aquifer.

Figures 6a and 6b show "snapshots" of the seasonal maximum change in alluvial aquifer water levels for the mound predicted for the K=100 ft/d and K=500 ft/d simulations, respectively. The water-level change maps are consistent with the hydrographs in the scale of the predicted mounding[1]. Because the formerly-appurtenant property covers a relatively large portion of Hidden Valley, the predicted mounding also occurs over a large portion of the alluvial aquifer. Discontinued irrigation at the former Hartman property is predicted to cause an equivalent range in maximum seasonal declines in alluvial aquifer groundwater levels.

PGG performed supplemental analysis of the maximum historic mounding associated with the MPR water right transfer alone for the K=100 ft/d model scenario (total irrigation recharge was reduced by 33 percent). The predicted mounding was reduced by less than 33 percent, with maximum water-level changes of about 5.4 feet relative to 7 feet for the MPR and UGA

[1] The contouring package does not show a 3-foot contour for the K=500 simulation due to the small area with water-level change above 3 feet and the coarser resolution of the contouring grid.

combined. In reality, the distribution of reduced recharge associated with the MPR-only transfer would likely differ from a uniform recharge reduction of 33 percent. Instead, portions of the formerly appurtenant area would likely be retired whereas others would remain in irrigation. ECT did not attempt to predict what the future distribution of irrigation recharge might be should the water rights transfer be approved for the MPR only.

Although Trendwest's proposed FCWUA transfer to First Creek is expected to result in 0.4 to 0.8 cfs of seepage inflow to the alluvial aquifer near the First/Swauk Creek confluence, this additional inflow is unlikely to significantly offset the predicted groundwater level changes associated with the proposed Hartman transfer in Hidden Valley. Seepage losses from First Creek enter the Swauk Creek alluvial aquifer upstream of a constriction between Swauk Creek and the eastern valley wall (**Figure 7**). Field investigations reveal that Swauk Creek is gaining in the reach that includes this constriction (PGG, 1/24/02), and model simulations suggest that most of the seepage loss from lower First Creek returns to Swauk Creek above this constriction (ibid.). While model simulations predict that the increased First Creek seepage associated with the FCWUA transfer may increase groundwater levels near the Swauk/First confluence by nearly 10 feet, groundwater discharge to Swauk Creek above the constriction results in predicted groundwater level changes in the Hartman vicinity of less than 0.1 feet.

4.2 Summary of Wells in the Vicinity of Area of Predicted Groundwater Level Change

The area of predicted groundwater level decline occurs in the valley areas in the Swauk Creek vicinity. Most of the predicted groundwater level decline occurs substantially in Section 28 with small portions of Sections 27 and 33 also affected. A portion of Section 22 also occurs in the valley area, however, maximum predicted groundwater level declines in this section are less than 0.5 feet. Sections 27 and 28 have 8 and 2 (respectively) well logs on file with Ecology. Apparently no logs are filed for Section 33.

Most of the wells tap consolidated materials composed of either sandstone or basalt. The two wells located in Section 28 (SW quarter) apparently tap gravel zones at depth (e.g. greater than 150 feet). Most of the wells appear to be located on the hillsides and do not tap Swauk Creek River alluvium; however, undocumented wells are known to exist in the Lauderdale Junction area of Section 22. It should be noted that wells completed in shallow alluvium (especially hand-dug wells) may not penetrate the full thickness of the alluvial deposit, and therefore may not provide full access to groundwater available in the alluvial aquifer. **Table 3** summarizes the pertinent data for well logs submitted to Ecology in Sections 22, 27, and 28. For sections 27 and 28 (where predicted groundwater declines exceed 0.5 feet), reported wells range in depth from 145 to 705 feet deep. They average about 258 feet deep including the 705 foot deep well. Well yields average about 10 gpm for wells in Section 27 and 28. The depth to the water level is, on average, 84 feet below ground surface. This relatively deep value is indicative of the location of most of the wells on the hillside. Water columns in these wells range from 45 to 505 feet. Five of the wells are completed as open holes and five are completed with either perforations or well screens. In wells completed in bedrock, the entrance area is that portion of the hole that is uncased.

During ECT's evaluation of the Swauk Basin (PGG, 1/24/02), several additional well logs were encountered that were not on file with Ecology. Two of these wells were completed in the

H-01

shallow alluvial aquifer. One well log, located near where Highway 97 crosses Swauk Creek, was completed at 20-feet below land surface after drilling through clay, clayey gravels and cobbles, and clean gravels and cobbles. A second well, hand dug near the confluence of First Creek, was reported by the owner to be completed in alluvial gravels (no well log available). Further downstream, near Lauderdale Junction and beyond, several wells were reported to penetrate alluvial sediments but were completed in deeper aquifers.

4.3 Potential Impacts to Nearby Wells

The area with predicted groundwater level declines is centered in the valley portion of Section 28 where maximum predicted groundwater level changes depends on the permeability used in the simulation. For the K=100 ft/day simulation, maximum predicted seasonal water-level declines reach as much as 7 feet. For the K=500 ft/day simulation, maximum predicted seasonal water-level declines approach 3 feet. The area of groundwater level change is confined to the valley area and is about 1_ miles long. A section-by-section summary is presented in the following bullets. Relevant well information is presented in **Table 3.**

In Section 27, the alluvial valley of Swauk Creek occurs only in the NW quarter of the section. Because the model simulates changes only in the alluvial valley, water-level declines are predicted only for this portion of Section 27. In this quarter section, three wells are known to exist based on Ecology well log files. The predicted groundwater level changes range from 0.5 to 1.5 feet based on the high permeability (K=500 ft/day) simulation. Using the low permeability (K=100 ft/day) simulation, the predicted groundwater change ranges from 1 to 3 feet. Predicted groundwater level declines are small relative to reported water columns present in wells. All other quarter sections (NE, SW, and SE quarters) of Section 27 are likely to have insignificant effects due to their distance from the alluvial valley. A total of five wells exist in these three quarter sections.

In Section 28, the magnitude of groundwater level change is predicted to range from 1.5 to almost 3 feet under the high K simulation and from 2 to 7 feet under the low K simulation. The maximum predicted groundwater level changes occur in the center of the section. Only the SW quarter of Section 28 has well logs in Ecology files. Here, the predicted groundwater level change ranges from 1.5 to 2.5 feet under the high K simulation and from 2 to 6 feet under the low K simulation. Predicted groundwater level declines are small relative to reported water columns present in wells. The other three quarter sections have no well logs on file.

5 Reecer Creek Basin (FCWUA Transfer)

5.1 Estimated Changes in Groundwater Levels

Transfer of Trendwests First Creek Water User's Association (FCWUA) water rights from use in the Reecer Creek Basin to instream flow in First Creek will result in a reduction in groundwater recharge from field/ditch seepage losses on the formerly-appurtenant Trendwest properties and ditch seepage losses from the main FCWUA ditch. The uppermost aquifer is comprised of Kittitas glacial drift and streamside alluvium. These unconsolidated deposits are estimated to be 100 feet thick beneath the formerly appurtenant properties, and are further underlain by water-bearing basalt bedrock, which is further underlain by sedimentary Ellensberg Formation. Wells

located in the immediate vicinity of the formerly appurtenant properties draw water from the basalt aquifer, whereas wells located further to the south gain water from the unconsolidated drift and alluvium. Irrigation seepage losses to groundwater are expected to discharge to the Yakima River at a relatively constant rate due to the thickness of the unsaturated zone between the land surface and the regional water table and the distance between the formerly-appurtenant properties and the river (PGG, 1/25/01).

The change in field/ditch seepage from the formerly-appurtenant properties associated with the proposed Trendwest transfer (MPR+UGA) is estimated to average 1.0 cfs during the irrigation season (ibid). The associated change in recharge to the underlying regional aquifer is estimated to average approximately 0.56 cfs annually and to occur in a relative uniform manner throughout the year (ibid). The change in seepage from the main FCWUA ditch associated with the proposed transfer is estimated to be about 0.1 cfs during the irrigation season (ibid). Due to shallower depths to water along portions of the main FCWUA ditch, seepage losses from the ditch may recharge the underlying water table with a more pronounced seasonal variation.

Available hydrogeologic data were insufficient to support prediction of groundwater level declines in the uppermost regional aquifer due to discontinued irrigation on formerly appurtenant properties for which Trendwest holds water rights. Both modeling and analytical calculations require estimates of aquifer properties, particularly aquifer transmivity (T) when year-round (steady-state) predictions are desired. Data available to estimate T values for the uppermost regional aquifer were limited to specific capacity (SC) measured in wells, because driller's descriptions of aquifer materials (e.g. "clay and gravel") were too general to be used for aquifer property estimation. Twenty-five driller's logs were available for wells completed in this area, showing specific capacity values ranging from 0.04 to 4.5 gpm/ft (**Table 4**). However, 24 of the specific capacity values were considered unreliable because they were either obtained from airlift tests, from wells completed with an open-ended casing (no perforations or screen), or from wells completed in the deeper (basalt) regional aquifer. The remaining SC value of 4.5 gpm/ft was assessed using methods of Driscoll (1986) and Razack & Huntley (1991) to obtain approximated T values ranging from 9,000 to 23,000 gpd/ft (1,200 to 3,100 ft^2/d). While calculations could be performed to estimate steady-state groundwater level declines associated with this range of T values, it is not recommended to estimate T from a single SC capacity from a single well. Variability in SC is typically high among wells completed in the same aquifer, and it would likely be misleading to use a single value to characterize a regionally extensive aquifer.
Because information was lacking to estimate groundwater level declines associated with Trendwest's proposed water right transfers (due to discontinued irrigation seepage losses), the following section provides a description of the wells located in the vicinity of the formerly appurtenant properties associated with Trendwest's water rights.

5.2 Summary of Wells in the Vicinity of Area of Discontinued Irrigation

A vicinity map in the area of the formerly appurtenant properties is provided on **Figure 7**. The area in which groundwater declines are likely to occur is unknown. The largest water-level declines are expected to occur beneath and immediately surrounding the formerly appurtenant properties. Smaller declines are expected to occur in the vicinity of the main FCWUA irrigation ditch. For this reason, ECT has evaluated well logs submitted to Ecology for Sections 6, 7, 8, 17, 20, 21, 22, 27, 28, 29, 30, 31 and 32 of Township 19N, Range 18E (Sections 16, 18, and 19 have

H-01

no well logs on file). The formerly appurtenant properties occur in the NW quarter of Section 28 and the southern half of Section 21. Based on well logs on file with Ecology, four wells are located in these two sections. Section 21 has one well (owned by Mr. Roan) in the NE quarter. Section 28 has two wells in the NW quarter and one well in the NE quarter.

The wells can be divided into two groupings that are demarcated north and south of Sections 27, 28, and 29. In general, the well grouping north of these sections contains wells that average 491 feet deep and the grouping south of these sections contains wells that average 147 feet deep. The northern group of wells generally taps Columbia River Basalt while the southern group of wells generally taps unconsolidated materials (clay, sand, and gravel). Sections 27 and 28 are the only transitional sections that have well logs on file. In Section 27 two logs are on file. One well is 280 feet deep and taps clay and basalt boulders and sandstone. The other well is 200 feet deep and taps cemented gravel and sand. Three wells occur in Section 28. Two of these wells are in the 350 to 400 foot depth range and tap unconsolidated materials. The third well is 955 feet deep and taps basalt. It should be noted that wells completed in the unconsolidated deposits may not penetrate the full thickness of the deposits, and therefore may not provide full access to groundwater available in the unconsolidated aquifer.

The water levels in the northern group of wells average 326 feet deep. The water levels in the southern group of wells average 57 feet deep. The northern group is slightly more productive on average compared to the southern group of wells. In the north the average yield is 34 gpm while in the south the average yield is 20 gpm. The northern group has water columns that range from 57 to 520 feet, and the southern group has water columns that range from 27 to 160 feet. The majority of the wells in the northern group are completed with perforations while the majority of the wells in the southern group are completed as fully cased open holes.

Effects on the function of any particular well depends on the degree of water-level decline, the amount of water column in the well available for drawdown during pumping, and the specific capacity of the well. For a given groundwater level decline, greater impacts to well yield will occur where the thickness of the water column and/or the well's specific capacity is more limited. **Table 4** includes a summary of water column and specific capacity data derived from the driller's logs submitted to Ecology. While water columns in the well casings appear to be relatively thick, specific capacity values are on the low side (typically several tenths of a gallon per minute per foot of drawdown). Further evaluation of potential impacts on well yields would require additional hydrogeologic characterization, particularly quantification of transmissivity for the uppermost, regionally extensive, unconsolidated aquifer.

6 References

Pacific Groundwater Group (PGG), 2002. Teanaway River Basin Hydrologic Analysis. Technical Memorandum dated January 17, 2002.

Pacific Groundwater Group (PGG), 2002. Big Creek Basin Hydrologic Analysis. Technical Memorandum dated January 18, 2002.

Pacific Groundwater Group (PGG), 2002. First and Swauk Creek Basin Hydrologic Analysis. Technical Memorandum dated January 24, 2002.

Pacific Groundwater Group (PGG), 2002. Analysis of Hydrologic Changes in the Reecer Creek Basin Associatedwith Trendwest Proposed First Creek Water Rights Transfer. Technical Memorandum dated January 25, 2002.

H-01

Figure 1 - Predicted Hydrographs for Model Observation Points in the Gentry Property Vicinity (Big Creek)

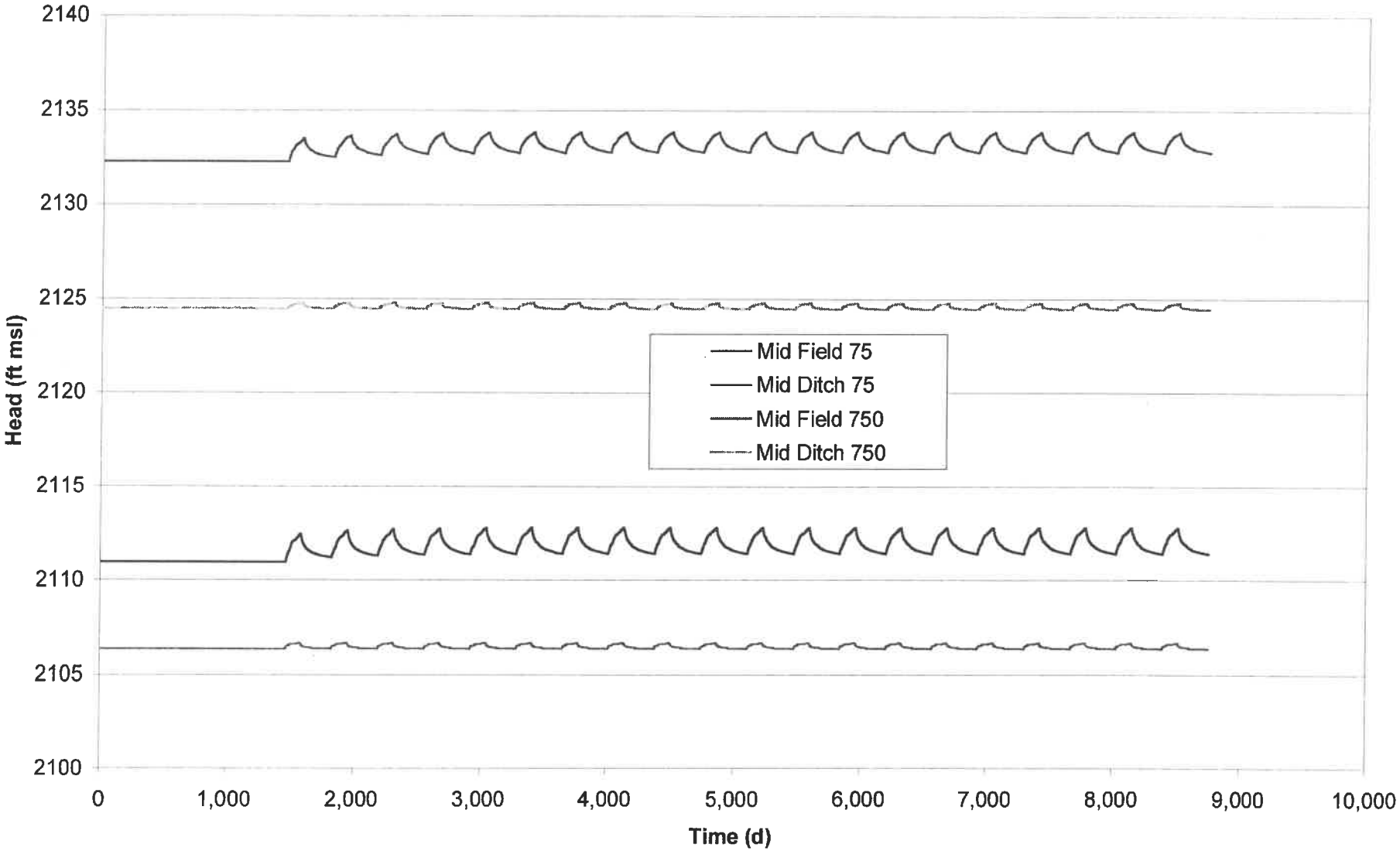


Figure 2 - Maximum Predicted Drawdown in Gentry Property Vicinity (Big Creek)
(Model K = 75 ft/d; Contour Interval = 0.25 feet)

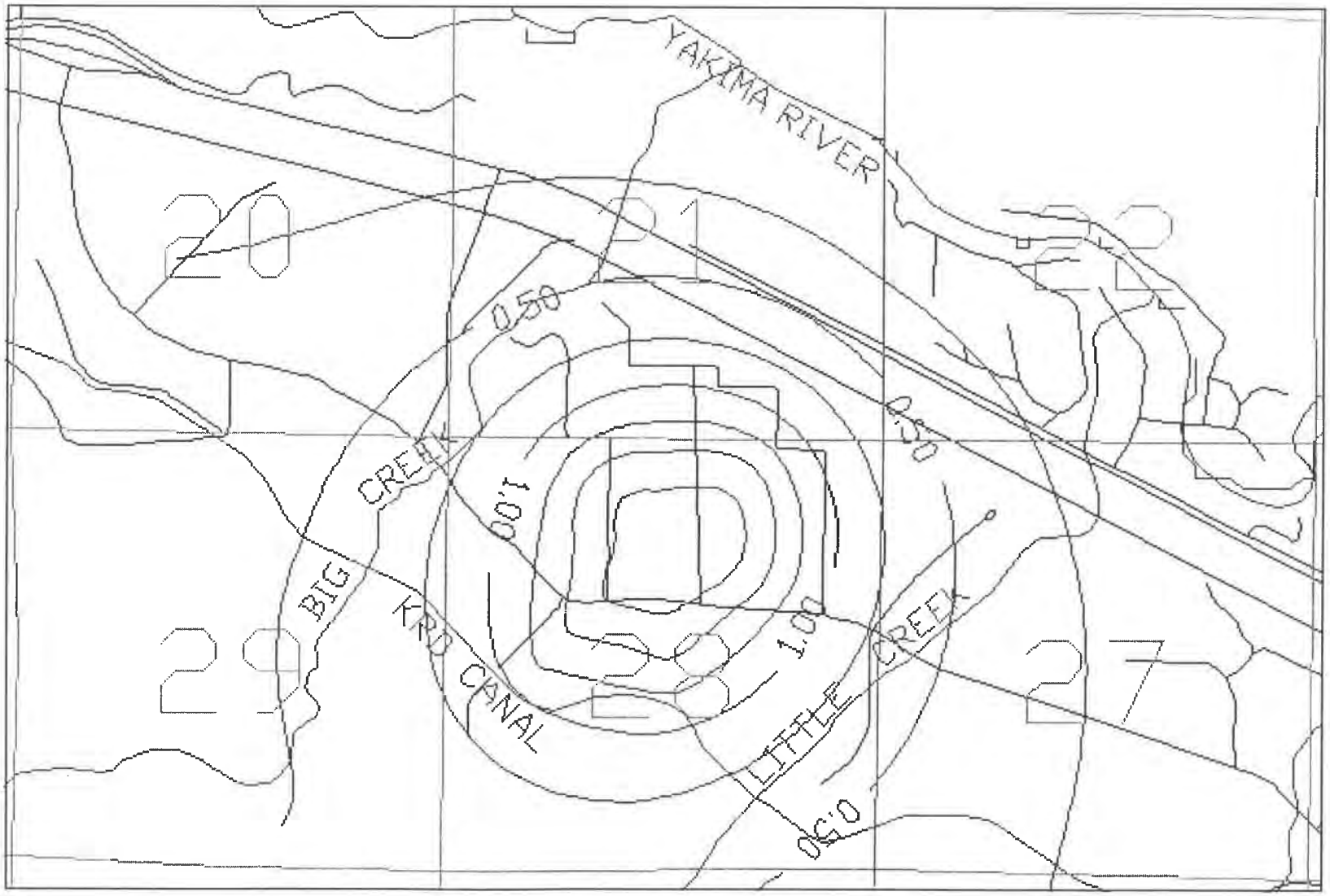


Figure 3 - Predicted Hydrographs for Model Observation Points in the Walker Property Vicinity (Teanaway River)

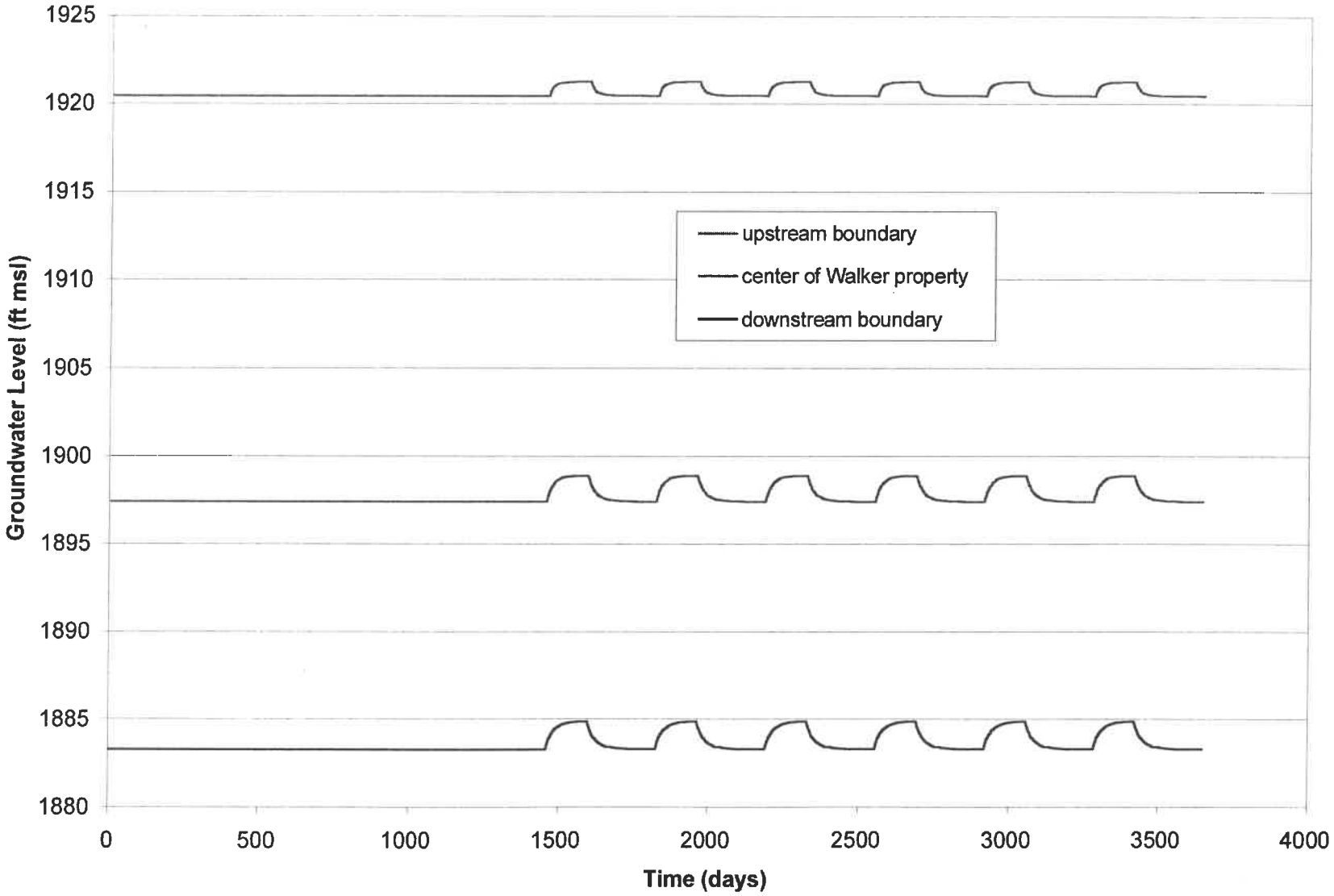


Figure 4 - Maximum Predicted Drawdown in Walker Property Vicinity (Teanaway River)
(Contour Interval = 0.2 feet)

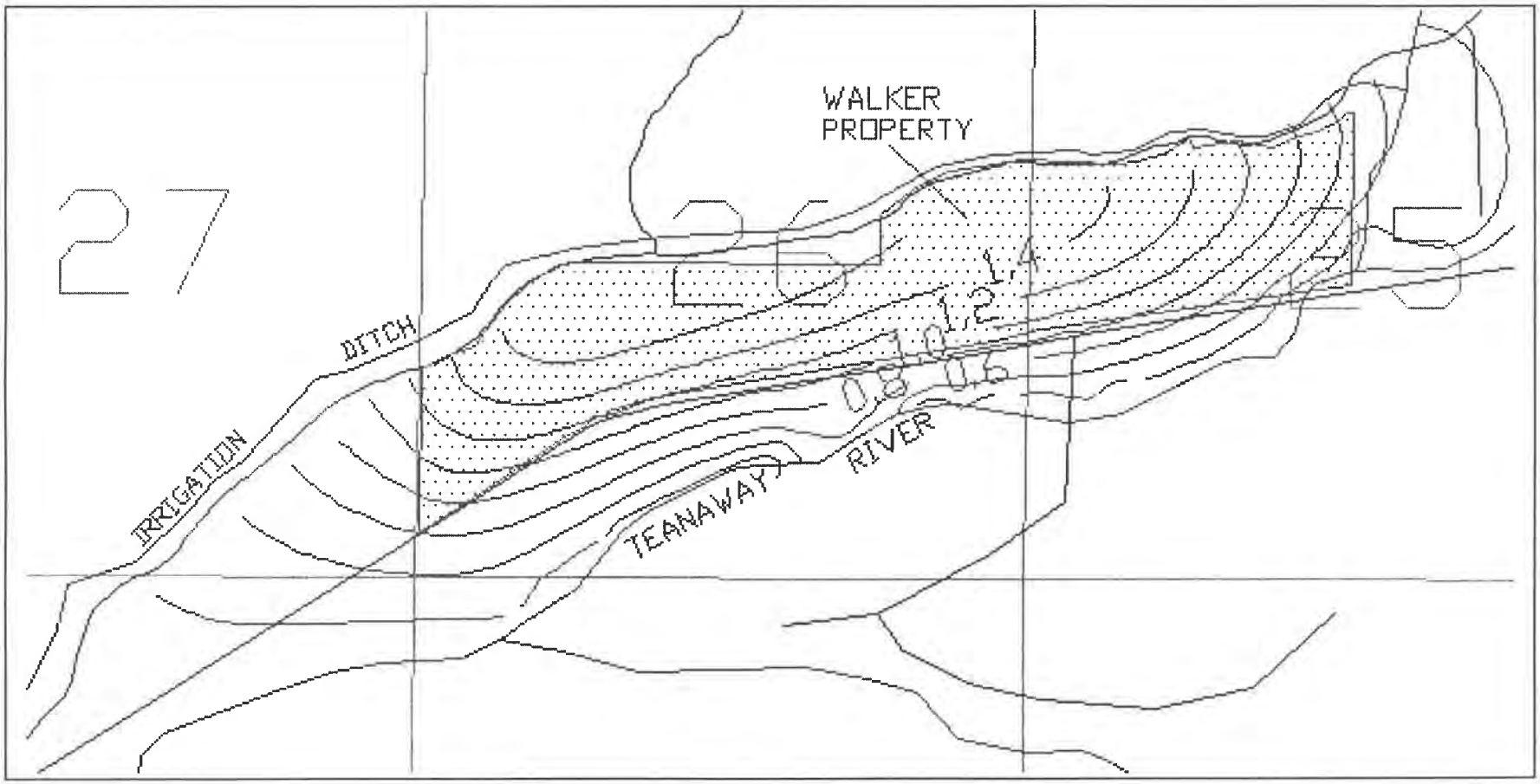


Figure 5a - Predicted Seasonal Water Level Changes from Non-Irrigated Condition Swauk Creek Model Simulation - K=100 ft/d

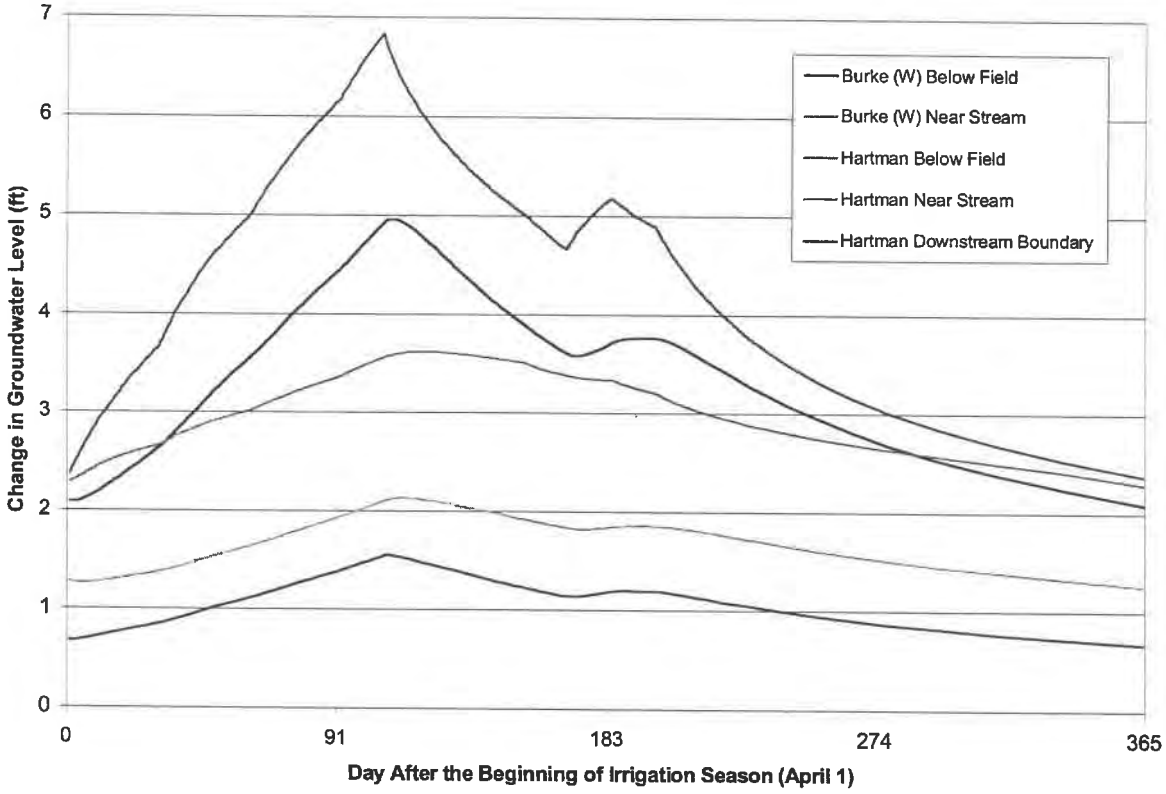


Figure 5b - Predicted Seasonal Water Level Changes from Non-Irrigated Condition Swauk Creek Model Simulation - K=500 ft/d

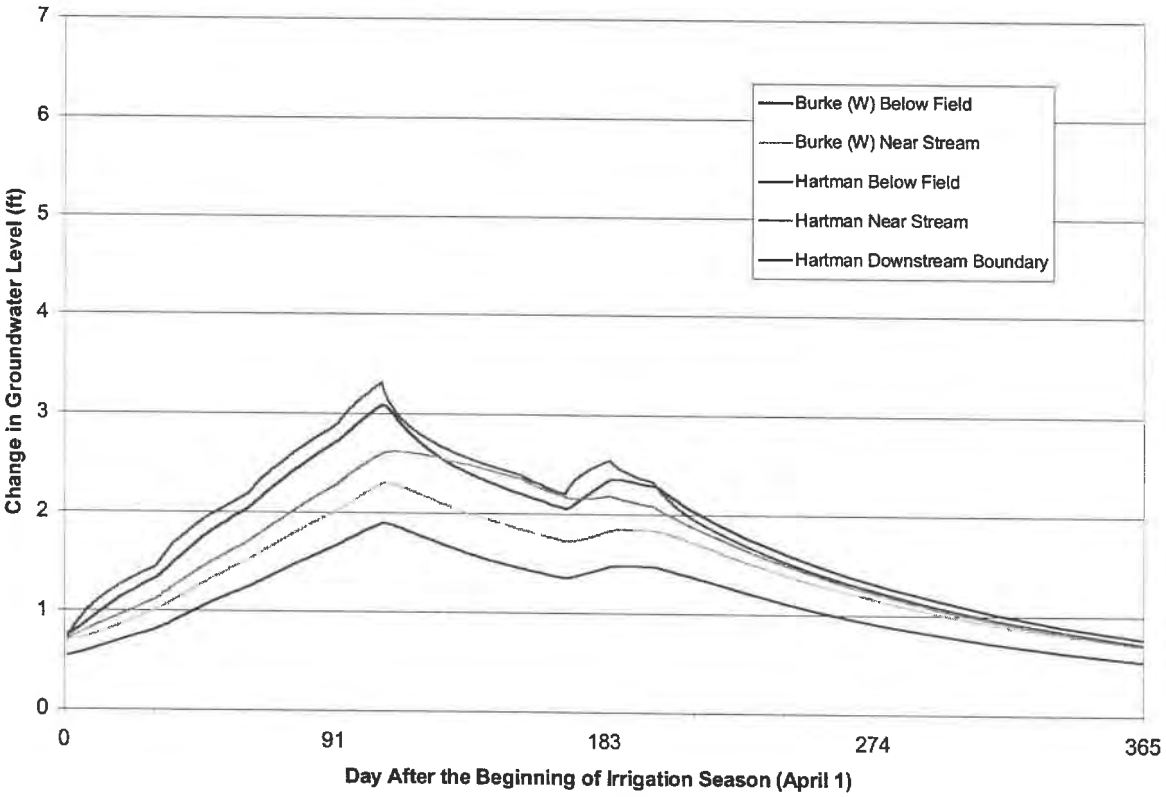


Figure 6a - Maximum Predicted Drawdown in Hartman Property Vicinity (Swauk Creek)
(Model K = 100 ft/d; Contour Interval = 1 foot)

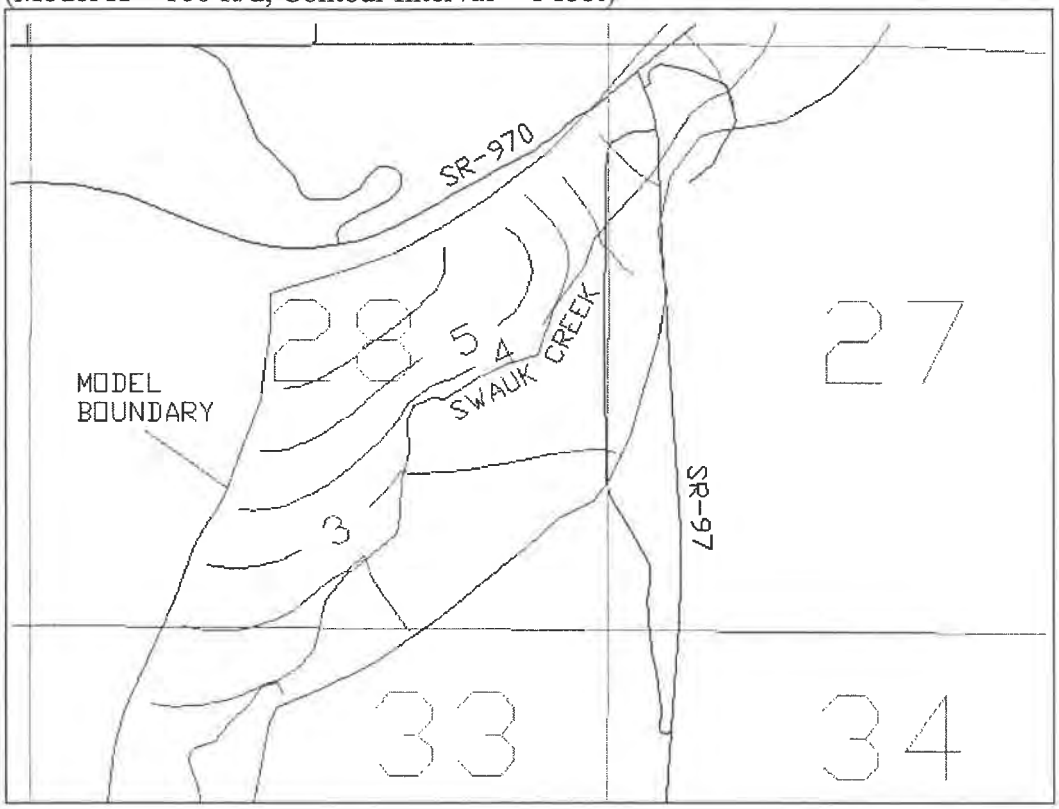


Figure 6b - Maximum Predicted Drawdown in Hartman Property Vicinity (Swauk Creek)
(Model K = 500 ft/d; Contour Interval = 0.5 feet)

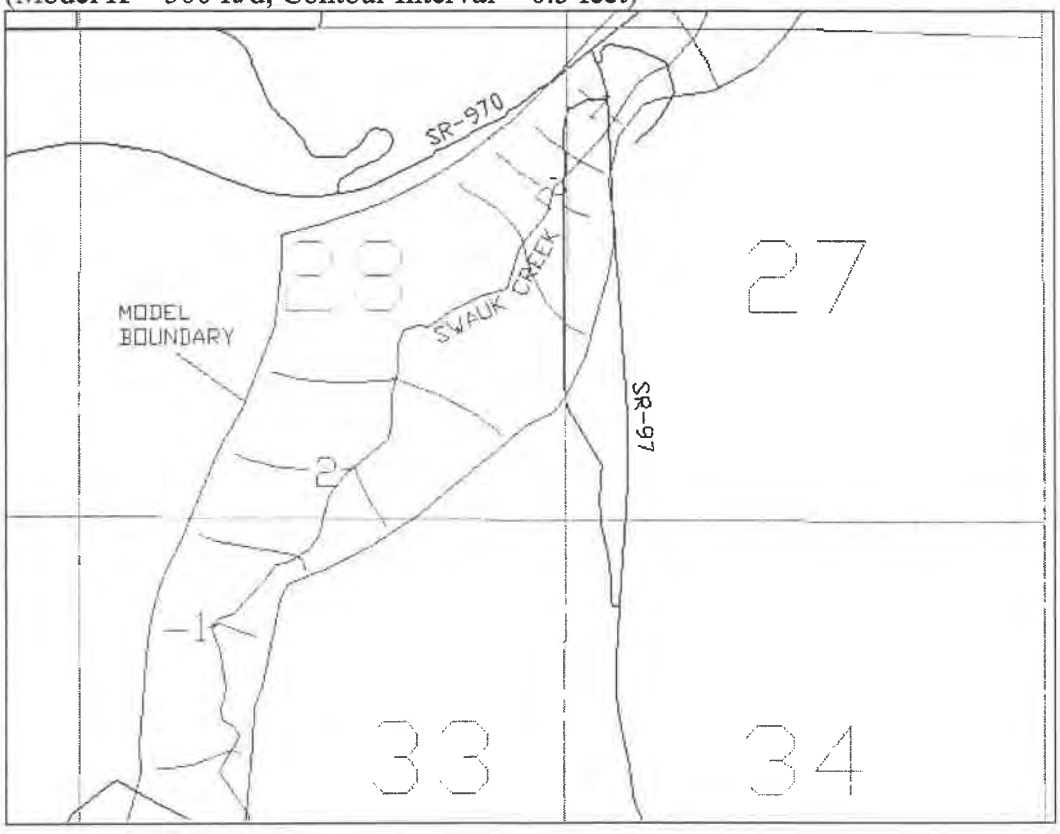


Figure 7 – Locations of First Creek Water User's Association Points of Use

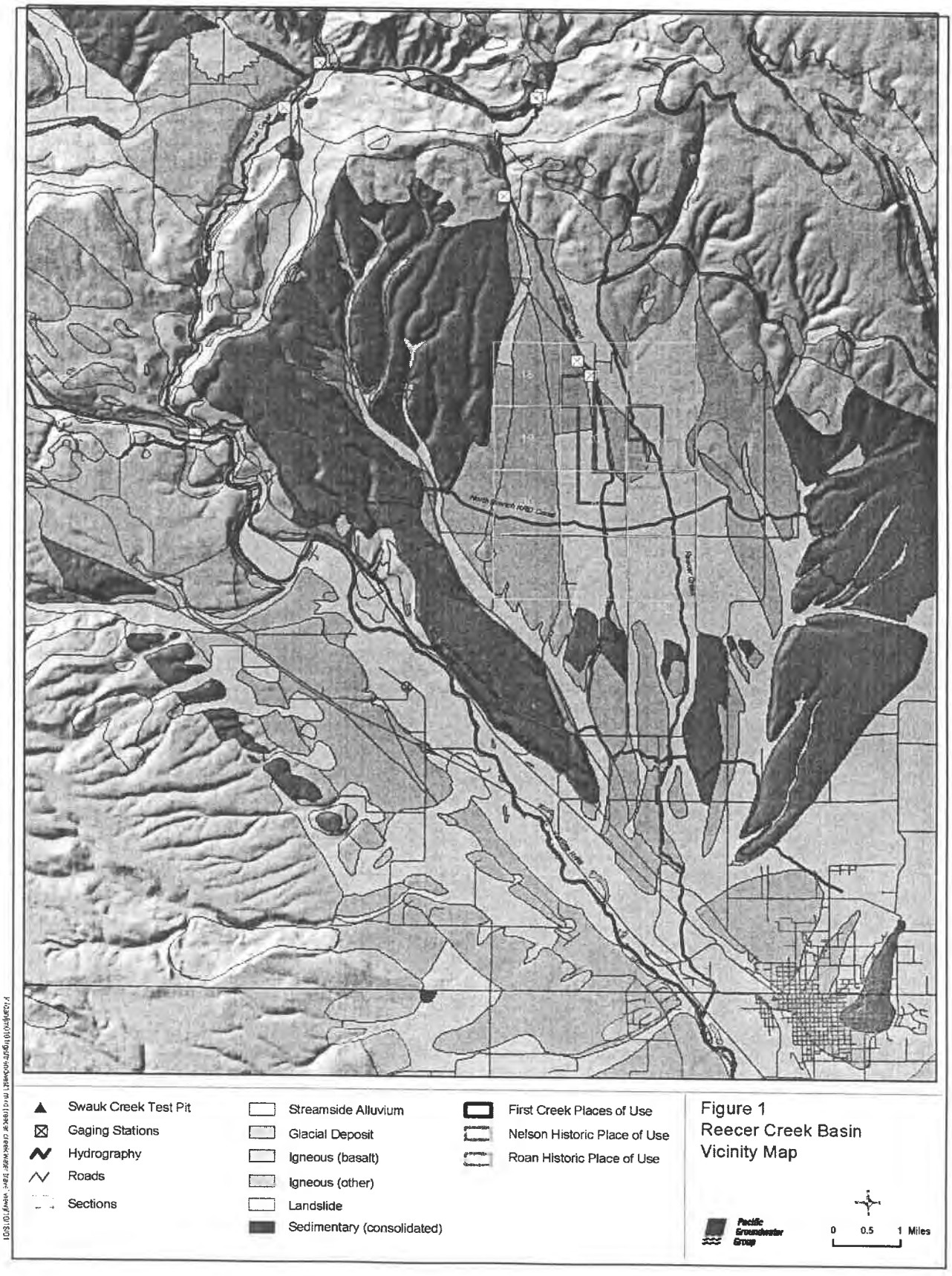


Table 1 - Big Creek Area Well Information
(T20N R14E)

Section	Quarter-Quarter Section	Estimated Land Surface Elevation (ft)	Depth to Water (ft)	Hole Depth (ft)	Water Column (ft)	Tested Well Yield (gpm)	Test Drawdown (ft)	Specific Capacity (gpm/ft)
Sec 20	NW NW	2090	1	196	195	15	80	0.2
Sec 20	NW NW	2090	10	40	30	25	20	1.3
Sec 20	NW NW	2090	8	32	24			
Sec 20	NW NW	2090	Dry	42				
Sec 20	NW NW	2090	10	42	32	75		
Sec 20	NE NW	2085	40	80	40	10		
Sec 20	SW NW	2095	20	58	38	30		
Sec 20	SW NE		Flowing	119	119			
Sec 20	SE NE	2085	18	40	22	50	28	1.8
Sec 20	SE SE	2130	26	67	41	100	39	2.6
Sec 20	SE SE	2130	23	67	44	60	65	0.9
Sec 20	SE SE	2130	18	52	34	15	15	1.0
Sec 20	SW SW		Flowing	140	140			
Sec 20	SW SW	Dry Hole						
Sec 20	SW SW	2120	10	35	25	12	20	0.6
Sec 20	SW SW	2120	20	78	58	40		
Sec 20	SW SW	2120	20	59	39	40		
Sec 20	SE SW	2120	23	35	12	10	0.1	100
Sec 20	SE SW	2120	15	38	23	10	0.1	100
Sec 21	NE NE	?	19	63	44	30	41	0.73
Sec 21	NW NE	Dry Hole						
Sec 21	NW? NW	?						
Sec 21	NE NW	2075	16	40	24			
Sec 21	SE SE	2085	23	54	31	40		
Sec 21	SE SE	2085	26	50	24	100		
Sec 21	SW SE	2085	10	80	70	20	70	0.29
Sec 21	SW SW	2120	20	60	40	20		
Sec 21	NW SW	2110	18	27	9	80	4	20
Sec 21	NE SW	2090	12	40	28	45	26	1.7
Sec 21	NE SW	2090	14	80	66	30	66	0.5
Sec 21	SE SW	2110	19	40	21	35	18	1.9
Sec 21	SE SW	2110	13	71	58	20	57	0.4
Sec 28	NW NW	2130	10	45	35	30	30	1.0
Sec 28	NE NW	2120	20	60	40	25		
Sec 28	NE NW	2120	80	100	20	30	15	2.0
Sec 28	SW NW	2140	15	50	35	100	33	3.0
Sec 28	NE SW	2170	70	100	30	10	25	0.4
Sec 28	NW SE	2150	15	80	65	20	60	0.3
Sec 28	NE SE	2140	19	75	56	100		
Sec 28	NE SE	2140	16	40	24	50	22	2.3
Sec 28	SE SE	2155	15	30	15	10	15	0.7
Sec 28	SE SE	2150	49	120	71	15	66	0.2
Sec 28	SE SE	2150	14	92	78	100	78	1.3
Sec 28	SE SE	2150	28	90	62	18		
Sec 28	NW NE	2115	14	92	78	300	76	3.9
Sec 28	SE NE	2125	20	55	35	30	35	0.9
Sec 28	SE NE	2125	21	50	29	65		
Sec 28	SW NE	2140	220	320	100	25	90	0.3
Sec 28	NE NE	2115	19	70	51	30		
Sec 28	NE NE	2115	20	64	44	80	40	2.0
Sec 28	NE NE	2115	19	63	44	60	36	1.7
Sec 28	NE NE	2115	18	120	102	75		
Sec 28	NE NE	2115	20	80	60	100	50	2.0
Sec 29	NE NE	2150	20	42	22	20		
Sec 29	NE NE	2150	46	60	14	22	19	1.2
Sec 29	NE NE	2150	44	59	15	8	24	0.3
Sec 29	NE NE	2150	22	52	30	15	28	0.5
Sec 29	NE NE	2150	46	69	23	25	19	1.3
Sec 29	NE NE	2150	38	63	25	22	17	1.3
Sec 29	NW NE	2150	18	60	42	25	6	4.2
Sec 29	SW NE	2150				60		

Table 2 - Teanaway River Area Well Information
(T20N R16E)

Section	Quarter-Quarter Section	Estimated Land Surface Elevation (ft)	Depth to Water (ft)	Hole Depth (ft)	Water Column (ft)	Tested Well Yield (gpm)	Stem Setting for Airlift Test (ft)	Test Drawdown* (ft)	Specific Capacity (gpm/ft)
Sec 25	S1/2 NW	1940	3	160	157	8			
Sec 25	S1/2 NW	1940	-2	260	260	5			
Sec 25	S1/2 NW	1940	50	160	110	10	150	100	0.1
Sec 25	SW NW	1940	-2	265	265	30	260	262	0.1
Sec 25	NE NW	2010	?	245		20			
Sec 25	SE NW	1900	20	400	380	100		2.5	40
Sec 25	NW NE	1950	205	400	195	4	359	154	0.03
Sec 25	NE NE	1960	-2	320	320	4			
Sec 25	SW NE	1950	28	205	177	3			
Sec 25	SE NE	1955	47	72	25	8			
Sec 25	NE	1955	6	185	179	15	185	179	0.1
Sec 25	NE SW	1950	4	127	123	33	190	186	0.2
Sec 25	NE SW	1950	6	160	154	17			
Sec 25	SW SW	2040	80	116	36	4	115	35	0.1
Sec 25	SW	2200	80	280	200	25	275	195	0.1
Sec 25	SE SE	2200	35	115	80	5			
Sec 25	SE SE	2200	127	245	118	12			
Sec 25	SE SE	2200	66	103	37	30			
Sec 25	SE SE	2200	272	525	253	10	435	163	0.1
Sec 25	NE SE	2000	93	109	16	15	108	15	1.0
Sec 25	SE	?	120	310	190	5			
Sec 26	NW NW	2150	117	425	308	4			
Sec 26	NE NW	2150	2	185	183	20	180	178	0.1
Sec 26	SW NW	2100		165		10			
Sec 26	SW NW	2100		160					
Sec 26	N1/2 NE	2150	110	365	255	50			
Sec 26	NW NE	2150	-2	285	285	30			
Sec 26	N NE		100	86	?	30	175	75	0.4
Sec 26	NW SW	2000	130	300	170	3	360	230	0.01
Sec 26	NW SW	1950	38	200	162	10	180	142	0.1
Sec 26	NE SW	1925	-1	340	340	35	320	321	0.1
Sec 26	SW SW	1890	220	360	140	7	340	120	0.1
Sec 26	SW SW	1890	30	190	160	15	180	150	0.1
Sec 26	SW SW	1890	49	69	20				
Sec 26	SW SW	1890	77	123	46				
Sec 26	SE SW	1900	10	303	293	10			
Sec 26	SE SW	1900	6	240	234	30	240	234	0.1
Sec 26	SW		10	197	187	25	195	185	0.1
Sec 26	SW SE	1910	60	215	155	10	255	195	0.1
Sec 26	SE SE	1915	7	50	43	40	18	11	3.6
Sec 26	SE SE	2000	84	182	98	22	72	-12	
Sec 26	SE SE	2000	6	56	50	50			
Sec 26	SE SE	2000	205	380	175	7	380	175	0.04
Sec 26	SE SE	2000	-1	265	265	38			
Sec 26	SE SE	2000	35	140	105				
Sec 26	SE SE	2000	90	157	67	10	155	65	0.2

* Estimated for airlift tests by subtracting depth-to-water from stem setting.

Table 3 - Swauk Creek Area Well Information
(T20N R17E)

Section	Quarter-Quarter Section	Depth to Water (ft)	Hole Depth (ft)	Water Column (ft)	Tested Well Yield (gpm)	Completion Type
Sec 22	S1/2 SW	71	190	119		Open Hole
Sec 22	S1/2 SW	106	386	280	1	Perforated
Sec 22	SW SW	190	500	310	1.5	Perforated
Sec 22	SW SW		264	264	0.5	Open Hole
Sec 22	SW SW	90	210	120	2.5	Perforated
Sec 22	SW SW		300	300	3	Open Hole
Sec 22	SE SE	30	80	50	20	Open Hole
Sec 27	N1/2 NW	100	145	45	10	Open Hole
Sec 27	N1/2 NW	93	380	287	3.5	Open Hole
Sec 27	NE NW	15	232	217	4	Open Hole
Sec 27	SW NE	147	265	118		Screened
Sec 27	SW SW	8	145	137	5	Perforated
Sec 27	SW SW	10	205	195		Screened
Sec 27	SW SE	80	145	65		Perforated
Sec 27	SE SE	200	705	505	15	Perforated
Sec 28	SW	110	190	80	15	Open Hole
Sec 28	SW	80	167	87	20	Open Hole

Table 4 - Reecer Creek Area Well Information
(T19N R18E)

Section	Quarter-Quarter Section	Estimated Land Surface Elevation (ft)	Depth to Water (ft)	Hole Depth (ft)	Geology of Completion Interval	Water Column (ft)	Tested Well Yield (gpm)	Stem Setting for Airlift Test (ft)	Test Drawdown* (ft)	Specific Capacity (gpm/ft)
Sec 6	N? NW	2920	30	100	Bas	70	5	70	40	0.13
Sec 6	NW NW	3000	23	80	Bas	57	15			
Sec 6	NW NW	3000	471	800	Bas	329	11			
Sec 6	SE NW	2900	100	180	Bas	80	20	175	75	0.27
Sec 6	SE NW	3000	150	245	Bas	95	7			
Sec 7	E1/2 NE	2700	410	832	Bas	422	35	775	365	0.1
Sec 8	NW NW	2735	510	626	EF	116	25	600	90	0.3
Sec 8	SW NW	2665	480	600	Bas	120	10	595	115	0.1
Sec 8	NE NE	2880	312	435	Sed	123	5			
Sec 8	SE SW	2570	500	660	EF	160	15			
Sec 8	SW SE	2560	465	640	Bas/EF	175	15	630	165	0.1
Sec 8	SW SE	2560	470	560	Bas	90	4	550	80	0.1
Sec 8	SW SE	2560	485	560	Bas	75	3	560	75	0.04
Sec 17	NW NW	2530	340	440	Sed	100	12			
Sec 17	SE NW	2460		520	EF	520	7			
Sec 17	SE NW	2460	380	540	Bas	160	15			
Sec 17	NW NE	2510	400	550	Sed	150	10			
Sec 17	NW NE	2510	408	640	Sed	232	35			
Sec 17	NE NE	2500	375	480	EF	105	15	475	100	0.2
Sec 17	SW NE	2460	390	600	Bas	210	15	430	40	0.4
Sec 20	NE NE	2340	186	380	Bas/EF	194	30			
Sec 21	NE NE	2360	180	700	Bas	520	400	pump test	120	3.3
Sec 22	NW NW	2360	230	370	Sed	140				
	SE NW	2340	180	300	Bas/EF	120	25			
	SE NE	2320	205	300	Sed	95	25	29		
	NE SE	2300	163	285	Sed	122	45			
	E E		96.6	154	Sed	57.4	15			
	E E		253	380	Sed	127	40			
Sec 27	SE NE	2100	195	282	Sed	87	10			0.0
	SE SE	2050	138	200	Sed	62	16	180	42	0.4
Sec 28	NW	2160	250	390	Sed	140	20	330	80	0.25
Sec 28	NW NW	2192	?	940	Bas/EF		?			
Sec 28	SE NE	2110	230	343	Sed	113	60	pump test	123	0.49
Sec 30	NE SE	2100	15	160	Sed	145	20	140	125	0.16
Sec 31	NE	2020	90	160	Sed	70	20	158	68	0.29
Sec 31	NE	2020	100	160	Bas	60	15	155	55	0.27
Sec 31	NE NE	2030	85	160	Sed	75	16	155	70	0.23
Sec 31	NE NE	2030	82	170	Sed	88	30			
Sec 31	NE NE	2030	120	207	EF	87	20	180	60	0.33
Sec 31	SW	1950	50	100	Bas	50	20	98	48	0.42
Sec 31	SW SW	1920	27	131	Sed	104	18	pump test	4	4.50
Sec 31	SW SW	1920	30	160	Sed	130	20	95	65	0.31
Sec 31	NE SE	1970	33	180	Sed	147	27	160	127	0.21
Sec 31	SE SE	1930	80	240	Sed	160	20	235	155	0.13
Sec 31	SE SE	1930	64	167	Sed	103	22			
Sec 32	SW NW	1980	18	103	Sed	85	25			
Sec 32	SE NW	2000	40	100	Bas	60	15			
Sec 32	SE NW	2000	55	142	Sed	87	20			
Sec 32	E1/2 SW	1960	60	125	Sed	65	15	pump test	20	0.75
Sec 32	SW SW	1900	13	40	Sed	27	20	30	17	1.18

* Estimated for airlift tests by subtracting depth-to-water from stem setting.

GEOLOGIC DESIGNATIONS:
Sed - Unconsolidated sedimentary aquifer above basalt
Bas - Basalt (obvious Columbia River Basalt or no other rock type likely near completion zone)
EF - Ellensburg Formation - well is completed in sedimentary material encounterd below basalt
Bas/EF - open to both basalt and EF

Exhibit J

MONTGOMERY
WATER GROUP, INC.

MEMORANDUM

To: Peter Schwartzman, Pacific Groundwater Group (PGG) ***Date:*** January 18, 2002
From: Julie L. Daigneau, Water Resources Engineer
Robert A. Montgomery, P.E., Principal Engineer
RE: Review of Effects of Water Rights Transfers on Tributary and Ditch Hydraulics

1.0 INTRODUCTION

This draft memorandum presents our review of the hydraulic effects of changes in streamflows on the tributaries and irrigation ditches for which Trendwest proposes to transfer water rights. Hydraulic conditions in the tributaries were analyzed by estimating changes in stage and depths associated with changes in flow at the tributary gauging stations. Rating curves developed on stations monitored during the 2001 irrigation season were used to assess the changes in stage expected from the increased streamflow in the creeks. Changes in ditch hydraulics at key locations on the irrigation ditches relative to pre-existing conditions were evaluated using data from seepage surveys performed during summer 2001 and hydraulic analyses. Pacific Groundwater Group provided average monthly flow data for the creeks and estimates of changes in streamflow attributable to Trendwest based on their analysis of the surface and subsurface hydrology in the basins. These estimates of changes in streamflow do not include the portion of consumptive use that is associated with consumptive use for future residential development on formerly appurtenant properties (those properties are assumed to have exempt wells to provide their water supply).

This discussion is divided into two main sections: 1) the estimated effects of the transfers on the stage and depth at applicable gauging locations on the tributary streams and 2) the estimated effects of the transfer on depths in the irrigation ditches that deliver water to other water users on the ditch. The tributaries affected by the water rights transfers include Big Creek, Swauk Creek, First Creek, Reecer Creek, and the Teanaway River. Water rights will be transferred from the Lund/Gentry, First Creek Water Users Association (FCWUA), Mill, Burke-Hartman, and Walker ditches. However, the Burke-Hartman ditch was not analyzed because we were unable to collect data to estimate the change in ditch hydraulics due to this year's drought transfers. Additionally, the Walker diversion has been retired.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

2.0 HYDRAULIC EFFECTS ON TRIBUTARIES AFFECTED BY THE TRENDWEST WATER RIGHTS TRANSFERS

2.1 Big Creek

Montgomery Water Group (MWG) installed and monitored four continuous water level recording stations on Big Creek from late May to late October 2001. The four monitoring stations were located above and below the Darling/Lund diversion dam, approximately 800 feet downstream of West Nelson Siding Road and at Ensign Ranch (approximately 800 feet downstream of the I-90 bridge over Big Creek.) The Darling and Lund diversion ditches were also monitored weekly to compare measured diversions to differences in the measured streamflows upstream and downstream of the diversion dam. Weekly to bi-weekly flow measurements were collected with a Swoffer current meter throughout the monitoring period. Rating curves were developed at each of the stations from the spot measurements and are included in Appendix A.

The rating curves were used to determine expected changes in stage at the monitoring stations resulting from the transfer of a portion of the Gentry water rights on the Lund/Gentry Ditch to Trendwest. Trendwest proposes to designate the purchased water right (390 acre-feet annual volume, 81.51 irrigated acres, and 1.53 cubic feet per second (cfs) instantaneous flow) for in-stream flows and mitigation for increased consumptive use associated with proposed water right changes for the MPR and UGA, under the Department of Ecology's Yakima River Trust Water Program. The stations that will be affected by the increase in streamflow are below the Lund/Gentry diversion and consist of the following stations: Big Creek Below the Diversion Dam, Big Creek Downstream of West Nelson Siding Road and Big Creek at Ensign Ranch.

Table 1 shows estimated changes in hydraulic conditions at each of the monitoring stations as a result of the water rights transfer from the Lund/Gentry Ditch. Average semi-monthly flows in Big Creek during the irrigation season were used to determine expected changes in stage and depth as well as the estimated maximum depth at a cross section near the gauging station. Field reconnaissance indicates that irrigation return flows follow a subsurface pathway via groundwater, and that most or all of the return flows likely discharge to the Yakima River rather than Big Creek due to the general lack of hydraulic continuity between the water-table aquifer and the creek (PGG memorandum dated January 18, 2002 entitled "Big Creek Basin Hydrologic Analysis"). PGG estimated that the transfer of the entire water right would increase streamflow by the amount previously diverted for irrigation. PGG also estimated the increased seepage associated with this additional water. For purposes of this analysis, the increased streamflow associated with the proposed Trendwest transfer was based on the estimated average monthly diversion associated with the Trendwest water right and the associated increased seepage estimated by PGG. The methodology to determine the estimated

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

monthly diversion is described in MWG's memorandum dated January 4, 2002 entitled "Seepage Loss Analysis for the Lund/Gentry Ditch." Estimates of flows at the West Nelson Siding Road site and Ensign Ranch site incorporate the seepage estimates from PGG, and the Darling and Lund/Gentry diversions.

The maximum depth in Big Creek at the three stations is estimated using the streamflow measurements. The maximum depth was estimated from one point in a single cross section near the gauging station and would not necessarily be representative of the maximum depths at other locations in the stream. The change in depth after the water right transfer is assumed to be equal to the estimated change in stage.

Changes in stage or depth are highest at the end of the season when average flows in Big Creek are significantly lower. The change in stage varies from 0.01 to 0.04 feet at the three stations throughout the irrigation season. We could not estimate the expected change of stage at West Nelson Siding Road for the average May flows because our rating curve does not extend to these flowrates. The highest measurement at the West Nelson Siding Road site was 24.3 cfs on October 24, 2001. USGS does not recommend extrapolating rating curves to more than twice the highest flow measurement. However, it is our professional opinion that changes in stage at these higher flowrates are likely to be small (i.e. less than 0.01 feet), as they are at the other two stations on Big Creek.

2.2 Swauk Creek

Three continuous water level recorders were installed and monitored on Swauk Creek over the irrigation season. The stations were located: 1) upstream of the confluence of Swauk Creek with First Creek; 2) downstream of the Burke and Burke-Hartman diversions; and 3) upstream of the mouth of Swauk Creek near the Yakima River. Rating curves were developed from bi-weekly to weekly flow measurements taken from early June to late October and are included in Appendix A.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

Table 1
Estimated Changes in Hydraulic Conditions at Big Creek Monitoring Stations Below Lund/Gentry Diversion Resulting From the Trendwest Water Rights Transfer

Irrigation Season for the Big Creek Water Users	Estimated Change in Flow After Water Rights Transfer (cfs)	Big Creek Below Darling/Lund Diversion Dam				Big Creek Below West Nelson Siding Road				Big Creek At Ensign Ranch			
		Average Historic Flow at Site Below Div.	Est. Future Flow after Water Rights Transfer	Est. Change in Stage (ft)	Est. Max. Depth at Station After Water Rights Transfer[1] (ft)	Average Historic Flow at W. Nelson Site	Est. Future Flow after Water Rights Transfer [2] (ft)	Est. Change in Stage (ft)	Est. Max. Depth at Station After Water Rights Transfer (ft)	Average Historic Flow at Ensign Ranch Site	Est. Future Flow After Water Rights Transfer	Est. Change in Stage (ft)	Est. Max. Depth at Station After Water Rights Transfer (ft)
May 1-15	1.1	125	126.1	0.00	2.19	121.9	123.0	ND[3]	ND	112.7	113.7	0.00	1.64
May 16-31	1.1	95	96.1	0.01	2.05	92.7	93.8	ND	ND	85.9	86.9	0.01	1.52
June 1-15	1.5	60	61.5	0.01	1.85	58.4	59.9	0.01	2.19	53.6	54.6	0.01	1.33
June 16-30	1.5	20	21.5	0.02	1.47	18.9	20.4	0.02	1.78	15.7	16.7	0.01	0.98
July 1-15	1.5	13	14.5	0.03	1.36	12.0	13.5	0.03	1.66	9.0	10.0	0.02	0.87
July 16-31	1.5	10	11.5	0.03	1.30	9.0	10.5	0.04	1.60	6.1	7.1	0.03	0.81
August 1-15	1.5	8	9.5	0.04	1.26	7.0	8.5	0.04	1.55	4.1	5.2	0.03	0.76
Aug 16-Sept 1	1.5	6	7.5	0.05	1.20	5.1	6.5	0.05	1.50	2.2	3.3	0.04	0.70

1 The estimated maximum depth in a cross section at the monitoring station is based on the depths obtained from one point in a single cross section measurement near the water level sensor location and does not necessarily represent the expected depths at other locations in the reach. Flow measurements were taken at the best gauging location near the sites and therefore were not always at the same cross section. Change in stage is assumed to equal change in maximum depth.

2 The estimated average historic flows and future flows after water rights transfers at the W. Nelson Siding Road and the Ensign Ranch sites include PGG's estimates of the change in seepage in these reaches as documented in PGG's memorandum dated January 18, 2002 titled "Big Creek Basin Hydrologic Analysis." Seepage losses after the transfer of the water right are expected to be slightly greater due to the increase streamflow associated with the transferred water right.

3 ND =No data were available at these high flows at the site. The rating curve does not extend to high flow region to allow estimate of change in stage.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

The rating curve at the monitoring station below the Burke-Hartman diversion was used to determine the expected change in stage and depth at this location as a result of an increase in streamflow from the transferred Hartman water right and the increased inflow to Swauk Creek from First Creek as part of the Trendwest's transferred water rights on First Creek. Trendwest proposes to designate the purchased water rights (713 acre-feet annual volume, 95 irrigated acres, and 4.23 cubic feet per second (cfs) instantaneous flow on Swauk Creek and 56 percent of the available flow in First Creek during the irrigation season) for in-stream flows and mitigation for increased consumptive use associated with the proposed water right changes for the MPR and UGA, under the Department of Ecology's Yakima River Trust Water Program. Trendwest's water rights transfers on First and Swauk Creeks do not affect the station on Swauk Creek upstream of First Creek. Estimates of change in stage and depth are not included for the station at the mouth of Swauk Creek near the Yakima River because there are no historical monthly flow data available and the rating curve does not extend to flows higher than 6 cfs. This station was installed late in the monitoring season (July 25, 2001) when there was little flow left in the creek at the mouth. Additionally, the rating curve consists of only five measurements at flows between 0.2 and 3.2 cfs.

PGG provided MWG with estimates of average historical monthly flows on the Swauk Creek below the Burke and Burke-Hartman diversions and estimates of the changes in streamflow due to the transfer of the Trendwest water rights on First and Swauk Creeks. Their estimates of changes in streamflow attributable to Trendwest's water rights transfers is based on a detailed analysis of streamflow, subsurface return flow, and alluvial sub-flow in the Swauk and First Creek basins and is detailed in a memorandum dated January 24, 2002 entitled "First and Swauk Creek Basin Hydrologic Analysis" and in subsequent communication (Peter Schwartzman, pers. communication, January 8, 2002). Table 2 gives estimates of the change in stage and depth at the station below the Burke-Hartman diversions (also referred to as the Martin Property gage) based on PGG's estimates of changes in streamflow at this station.

The values of historic flow below the Burke-Hartman diversions reflect best estimates of typical conditions prior to the transfer of Trendwest's Hartman and FCWUA water rights. The Martin gage is located downstream of both the Burke and Burke-Hartman diversions, and the historic flow values represent Swauk Creek flows above the First Creek confluence plus historic inflow from First Creek (when present) minus both diversions. Actual historic flows may be slightly higher due to return flows from water use on the Burke and Hartman properties; however, the locations that subsurface return flows re-enter Swauk Creek and the amount of return flow discharging above the Martin gage are not well known. The estimated change in flow at the Martin gage after the water rights incorporates best estimates of: 1) diversions associated with Trendwest's Hartman and FCWUA water rights; 2) return flow to Swauk Creek associated with Trendwest's Hartman water rights; and

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

3) seepage losses near the mouth of First Creek and associated return flows to Swauk Creek associated with Trendwest's FCWUA water right. The values shown in Table 2 assume that the entire change in flow associated with the transfer of Trendwest's Hartman water right (diversion minus return flow as estimated in PGG's "First and Swauk Creek Basin Hydrologic Analysis") occurs upstream of the Martin gage. In the likely scenario that only a portion of this return flow discharges to Swauk Creek upstream of the Martin gage, estimated changes in flow at the gage would be higher. However, data were insufficient to determine the portion of former Hartman return flow discharging to Swauk Creek upstream of the gage.

Table 2
Estimated Changes in Hydraulic Conditions at the Swauk Creek Monitoring Station on the Martin Property Below Burke-Hartman Diversions

Irrigation Season for the Swauk and First Creek Water Users[1]	Average Historical Flow in Swauk Creek below Burke-Hartman Diversions	Estimated Change in Flow After Water Rights Transfer (cfs)	Estimated Change in Stage at Martin Property Station (ft)	Estimated Maximum Depth at Station After Water Rights Transfer[3] (ft)
April 1-15	127.2	5.6	ND[2]	ND
April 16-30	107.2	5.6	ND	ND
May 1-15	40.8	6.6	ND	ND
May 16-31	21.1	6.6	0.11	1.58
June1-15	15.1	5.8	0.11	1.47
June 16-30	9.1	5.7	0.14	1.35
July 1-15	4.1	3.6	0.13	1.17
July 16-31	1.5	1.6	0.09	0.99
August 1-15	0.0	0.9	0.19	0.84
August 16-31	0.0	1.0	0.20	0.85
September 1-15	0.9	0.8	0.06	0.91
September 16-31	0.9	1.6	0.11	0.96
October 1-15	3.5	1.1	0.05	1.06

1 Swauk and First Creek water users irrigation season is April 1 through October 15. Increased inflow from Trendwest's First Creek water right transfer contributes to flow change on Swauk Creek at the Martin Property Gage.
2 ND = No data
3 The estimated maximum depth in a cross section at the monitoring station is based on the depths obtained from one point in a single cross section measurement near the water level sensor location and does not necessarily represent the expected depths at other locations in the reach. Flow measurements were taken at the best gauging location near the sites and therefore were not always at the same cross section. Change in stage is assumed to equal change in maximum depth.

The estimated change in stage and depth at the Swauk Creek Martin gage associated with changes in flow of 0.8 to 6.6 cfs ranges from 0.05 feet to 0.20 feet. Note that the increase in streamflow as a result of the Trendwest water rights transfers on Swauk and First Creeks are greater than the

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

historical average flows in the creek from several biweekly periods during the season, especially in late summer. It is in these months where the greatest change of stage is represented. We could not estimate the expected change in stage at the Swauk Creek Martin property gage (below Burke-Hartman diversions) for the average April and early May streamflows because our rating curve does not extend to these higher flowrates. The highest measurement at the Martin site was 14.1 cfs on June 1, 2001, which is significantly lower than the average spring flows in Swauk Creek.

2.3 First Creek

Data were collected at two monitoring stations on First Creek. The upper First Creek station was located just downstream of the First Creek Water Users Association (FCWUA) diversion. The lower station was installed approximately 0.5 mile upstream of the confluence of First Creek and Swauk Creek. Rating curves for the station downstream of the FCWUA diversion and the station upstream of the mouth were developed from weekly to bi-weekly flow measurements throughout the 2001 monitoring season and are attached in Appendix A.

Table 3 shows our estimates of the expected changes in stage and depth calculated from the rating curves developed for the upper and lower First Creek stations. PGG provided estimates of the average semi-monthly flows in First Creek below the FCWUA diversion over the irrigation season, and MWG estimated changes in flow associated with the proposed water rights transfer. These estimated flow changes are based on the Trendwest's transfer of 56 percent of the available water in First Creek from FCWUA back to First Creek during the irrigation season. Trendwest proposes to designate the purchased First Creek water right for in-stream flows and mitigation for increased consumptive use associated with the proposed water right changes for the MPR and UGA under the Department of Ecology's Yakima River Trust Water Program. Continuous flow data from the summer monitoring program indicates that there is little loss between the upper and lower gages of First Creek. Therefore, we assumed that the same flow is present at the upper and lower gages. Frequent field reconnaissance of flow conditions at the mouth of First Creek at the low flows indicated that there were seepage losses in the alluvial section of the creek located just upstream of the confluence with Swauk Creek. These losses were not measured but were estimated to be on the order of 0.3 cfs to 0.6 cfs at flow rates ranging from 0.5 cfs to 1.5 cfs at the lower gage. Seepage losses in the First Creek and Swauk Creek basins are described in detail in PGG's memorandum dated January 24, 2002 titled "First and Swauk Creek Basin Hydrologic Analysis."

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

Table 3
Estimated Changes in Hydraulic Conditions
at the First Creek Monitoring Stations

Irrigation Season for the First Creek Water Users	Average Historical Flow in First Creek (cfs) [1]	Estimated Change in Flow from Water Rights Transfers (cfs)	First Creek Below FCWUA Diversion		First Creek Upstream of the Confluence with Swauk Creek	
			Estimated Change in Stage (ft)	Est. Maximum Depth at Station After Water Rights Transfer (ft) [2]	Estimated Change in Stage (ft)	Est. Maximum Depth at Station After Water Rights Transfer (ft)
April 1-15	16.1	5.0	ND[3]	ND	ND	ND
April 16-30	16.1	5.0	ND	ND	ND	ND
May 1-15	14.6	5.2	ND	ND	ND	ND
May 16-31	11.5	5.2	ND	ND	ND	ND
June 1-15	6.2	4.4	ND	ND	ND	ND
June 16-30	3.0	4.4	0.22	0.97	0.20	0.82
July 1-15	1.0	1.9	0.17	0.77	0.14	0.60
July 16-31	0.0	1.9	0.39	0.70	0.28	0.52
August 1-15	0.0	1.2	0.32	0.64	0.22	0.45
August 16-31	0.0	1.2	0.32	0.64	0.22	0.45
September 1-15	0.0	1.1	0.30	0.63	0.21	0.43
September 16-31	0.0	1.1	0.30	0.63	0.21	0.43
October 1-15	0.0	1.1	0.31	0.64	0.22	0.44

1 The average historical flow in First Creek was estimated below the FCWUA diversion.
2 The estimated maximum depth in a cross section at the monitoring station is based on the depths obtained from one point in a single cross section measurement near the water level sensor location and does not necessarily represent the expected depths at other locations in the reach. Flow measurements were taken at the best gauging location near the sites and therefore were not always at the same cross section. Change in stage is assumed to equal change in maximum depth.
3 ND =No data

The estimated increase in stage and depth ranges from 0.17 to 0.39 feet at the upper First Creek station and 0.14 to 0.28 feet at the lower First Creek station. Similar to the other stations at higher (spring freshet) flows, we could not estimate change in stage at the First Creek stations for flows higher than 6 cfs. The highest flow measurement at the upper First Creek station was 2.8 cfs on July 3, 2001 and was taken when all the flow above the FCWUA diversion was diverted into First Creek. The highest flow measurement at the lower First Creek station was 2.0 cfs on June 11, 2001. Trendwest water rights transfers to First Creek from mid-June to mid-October represent more flow than what was historically in the creek and therefore represent modest increase in stage.

2.4 Reecer Creek

Montgomery Water Group installed and monitored continuous water level recording stations on Reecer Creek downstream of the confluence of Mill Ditch and immediately downstream of the Mill

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

Ditch intake structures at the Mill Ditch rectangular weir. A portion of the flow in Mill Ditch (including the former Pautzke water rights purchased by Trendwest) is conveyed by Reecer Creek in the reach from Hwy 97 to just upstream of the Klein-Coble Castle diversion located near the mouth of Reecer Creek at the Yakima River. Weekly flow measurements were also taken on Mill Ditch upstream of the confluence with Reecer Creek. Rating curves were developed from the spot measurements collected throughout the irrigation season and are included for reference in Appendix A.

Trendwest's purchase of the Pautzke water rights consisted of a total instantaneous water right of 21.39 cfs and an annual water right volume of 4401.2 ac-ft for 291 formerly irrigated acres. Trendwest did not divert the former Pautzke water right in 2001. Additionally, the Lamb water right of 4 cfs, 1054 ac-ft, and 85 irrigated acres was also not diverted into Mill Ditch during the 2001 irrigation season because it was leased this year to the Department of Ecology. The total of the leased water rights for the 2001 monitoring season on Mill Ditch was 25.4 cfs instantaneous, 5455.2 ac-ft annual volume, and 376 irrigated acres. There were little historical monthly flow data available to evaluate differences in stage at the Reecer Creek gauging site upstream of Dolarway Road. Tom Martin, Brown and Caldwell, collected the only data on Reecer Creek that we are aware of prior to this year's leasing of the former Pautzke water rights and the Lamb water right. His data consists of spot measurements taken monthly from September 1998 to October 2000.

It is our experience from the 2001 monitoring program at the gauging site that flows in Reecer Creek are highly variable. For that reason, we were unable to use Tom Martin's 1999 and 2000 data on Reecer Creek for estimates of historical flows since these measurements are not necessarily indicative of the average monthly historical flows in Reecer Creek prior to the water rights transfer. Additionally, there were no data available to indicate what the average monthly historical diversions were on Mill Ditch. Therefore our estimates of change in stage at the Reecer Creek station are based on the assumption that the average monthly historical flows at this station can be represented by the average monthly flow from the 2001 monitoring program plus the sum of the leased Trendwest (formerly Pautzke) water rights, the Lamb water right, and the former monthly FCWUA surface water return flows. The reduced FCWUA surface water return flows are credited to Reecer Creek because excess flow on the irrigated properties of the FCWUA ditch return to Reecer Creek rather than the First Creek basin. These assumptions may not account for all of the changes in flow due to the water right transfers and leases by Trendwest and others.

There were no data available during the summer 2001 monitoring season in the months of April through June since the monitoring station on Reecer Creek was not installed until July 11, 2001. As a result, we assumed that the average flows for April through June are the same as the average monthly flows calculated for July. This is probably a conservative assumption since spring runoff

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

and wetter soil conditions in the early months of the irrigation season likely result in higher Reecer Creek flows and changes in stage are smaller at the higher flows. Estimates of change in stage and maximum depth at the gauging station are given in Table 4. It should be noted that Mill Ditch/Reecer Creek water users are able to manipulate check structures in the reach downstream of Dolarway Road to facilitate water delivery to ditch laterals (i.e. the top of the Pautzke property and Klein-Coble ditch. Data taken in October 2001 have also indicated that the rating curve developed during the 2001 monitoring program shifted several times at the Reecer Creek Upstream of Dolarway station. The cause of that shift is unknown but may be related to a downstream diverter adjusting check structures or otherwise backing up the water in the creek. Therefore, the changes in stage and maximum depths given in Table 4 may change as configuration of the check structures changes throughout the irrigation season.

Table 4
Estimated Changes in Hydraulic Conditions at the Reecer Creek Upstream of Dolarway Road Monitoring Station

Irrigation Season for Reecer Creek/Mill Ditch Users	Average Monthly Flows Recorded during the 2001 Monitoring Season After the Water Rights Transfer[1] (cfs)	Estimated Additional Flow Before Water Rights Transfer[3] (cfs)	Estimated Change in Stage at Reecer Creek Station After Transfer (ft)	Estimated Maximum Depth at the Station After Water Rights Transfer (ft)[4]
April	18.9[2]	28.2	-0.6	0.98
May	18.9[2]	27.4	-0.6	0.98
June	18.9[2]	26.1	-0.6	0.98
July	18.9	25.4	-0.6	0.98
August	23.3	25.4	-0.6	1.10
September 1-15	19.8	25.4	-0.6	1.01
October 1-15	16.6	25.4	-0.6	0.92

1 Historical average monthly flow data was not available. Therefore, this analysis is based on average monthly flow data from the 2001 monitoring season at the Reecer Creek Upstream of Dolarway Road site.

2 Data were not available for the months of April through June because the monitoring station was not installed until July 11, 2001. Therefore, we assumed that average monthly flows in April through June were the same as the average monthly flow in July.

3 There were no data to indicate historical diversions on Mill Ditch. The estimated change in flow was assumed to be the sum of the FCWUA diversion surface water return flows and the total of the 2001-leased Trendwest (formerly Pautzke) and Lamb instantaneous water rights (25.4 cfs).

4 The estimated maximum depth in a cross section at the monitoring station is based on the depths obtained from one point in a single cross section measurement near the water level sensor location and does not necessarily represent the expected depths at other locations in the reach. Flow measurements were taken at the best gauging location near the sites and therefore were not always at the same cross section. Change in stage is assumed to equal change in maximum depth.

The reduction in stage associated with a reduction in flow of 25.4 to 28.2 cfs is approximate 0.6 feet at the Reecer Creek station upstream of Dolarway Road. This estimate is based on the check structure configuration present from July 11, 2001 to September 26, 2001. Changes in the check structures since the September 26th measurement have changed the rating curve and thus this

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

relationship between flow and stage a t the Reecer Creek Upstream of Dolarway Road site.

2.5 Teanaway River

The United States Bureau of Reclamation (USBR) monitors flows in the reach of the Teanaway River near the former Walker Diversion (USBR-TEAW upstream of Lambert Road). Continuous flow data and a rating curve were obtained from USBR and are included in Appendix A. Evaluation by PGG and MWG suggests that the Lambert gage rating curve and associated flow data may include some degree of error, as described in PGG's technical memorandum "Teanaway River Basin Hydrologic Analysis" dated January 17, 2002. Trendwest proposes to transfer the former Walker water right of 3.76 cfs (instantaneous) and 1014.2 acre-feet (annual volume) on 187.8 irrigated acres for in-stream flows and mitigation for increased consumptive use associated with the proposed water right changes for the MPR and UGA, under the Department of Ecology's Yakima River Trust Water Program. PGG provided estimates of the changes in streamflow and associated timing (Peter Schwartzman, pers. communication, 11/6/2001) for use in the analysis of expected changes in hydraulic conditions at the USBR Teanaway River gage near Lambert Road as a result of the water rights transfer. The flow changes shown in Table 5 are included in the average monthly flows measured at the Teanaway USBR gage for the 2001 irrigation season. These flow increases were subtracted from the average monthly flows to obtain an estimate of change in stage associated with the transfer of the water right. There were no data to provide estimates of maximum depth at this gauging location.

Table 5
Estimated Changes in Hydraulic Conditions at the USBR Station on the Teanaway River Upstream of Lambert Road

Irrigation Season for the Teanaway Water Users	Average Monthly Flows at the USBR Teanaway Gage (TEAW) for the 2001 Monitoring Season (cfs)[1]	Estimated Change in Flow After Water Rights Transfer (cfs)[2]	Estimated Change in Stage at USBR Teanaway Station (TEAW) from USBR Rating Curve (ft)
May	393.2	3.39	<0.01
June	87.6	1.55	<0.01
July	11.1	1.43	0.02
August	11.4	1.67	0.02
September 1-15	8.7	0.78	0.16
September 16-30	11.5	-2.3	-0.02
October 1-15	26.5	-2.1	-0.01

1 Provisional data for the TEAW gage obtained from the USBR web site (http://mac1.pn.usbr.gov/yakima/index.html).
2 Estimates provided by PGG's analysis (Peter Schwartzman, pers. communication, 11/6/01).
3 Estimated from USBR rating curve attached in Appendix A.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

The change in stage associated with increases in flow of 0.78 to 3.39 cfs ranges from approximately less than 0.01 to 0.16 feet from May to September 15. Immediately after the end of the season (September 16 through October 15), a decrease in flow and a corresponding decrease in stage of 0.01 to 0.02 ft are expected because of loss of typical return flows associated with irrigation practices on the Walker properties. These results are based upon the USBR Lambert Road rating curve and flow data and any errors associated with that data will similarly affect the accuracy of these estimations.

3.0 HYDRAULIC CHANGES ON IRRIGATION DITCHES WHERE TRENDWEST PROPOSES THE TRANSFER OF WATER RIGHTS

Evaluation of the effects of changes in flow in the affected irrigation ditches due to the proposed transfer of Trendwest water rights were based on field observations, flow measurements, cross-sectional geometry surveys, and continuous monitoring data in the associated tributaries. Seepage analyses were conducted on three of the ditches where Trendwest holds water rights: 1) Lund/Gentry ditch; 2) FCWUA ditch; and 3) Mill Ditch. Flow measurements were taken at key points on the Lund/Gentry, FCWUA, and Mill ditches during the irrigation season. MWG performed the seepage surveys on Lund/Gentry and FCWUA ditches. Dick Bain conducted the Mill Ditch seepage survey (detailed in memorandums dated July 26, 2001 and September 4, 2001 to Mr. Mark Anderson of Anderson Hay & Grain). No flow measurements or monitoring occurred on the Burke-Hartman ditch this season because drought transfers have rendered the ditch dry. As a result, data could not be collected to analyze how the proposed water rights transfer would affect hydraulic conditions in this ditch.

3.1 Lund/Gentry Ditch

Irrigation diversions on the Lund/Gentry ditch were monitored weekly over the summer 2001 irrigation season. A seepage survey was conducted on July 12, 2001. Measurements were taken at laterals used by the remaining irrigators on the ditch. Changes in hydraulic conditions due to the water rights transfer at these key turnouts were evaluated and the analysis is described in MWG's memorandum titled "Seepage Loss Analysis of the Lund/Gentry Ditch" dated November 5, 2001 Table 6 provides a summary of expected changes in depth at key locations on the Lund Ditch.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

Table 6
Summary of Estimated Changes in Depth and Maximum Depth at Typical Cross Sections on the Lund/Gentry Ditch

Month of Irrigation Season	Average Diversion Prior to Water Rights Transfer (cfs)	Estimated Change in Diversion Due to Water Rights Transfer (cfs)	Upper Lund Ditch Typical Cross Section		Lower Lund Ditch Typical Cross Section	
			Estimated Change in Depth from Water Rights Transfer (ft)	Estimated Maximum Depth After Water Rights Transfer (ft)	Estimated Change in Depth from Water Rights Transfer (ft)	Estimated Maximum Depth After Water Rights Transfer (ft)
May	4.3	1.1	0.2	0.85	0.2	0.50
June	5.4	1.5	0.3	1.00	0.3	0.70
July	5.6	1.5	0.3	1.05	0.3	0.75
August	5.6	1.5	0.3	1.05	0.3	0.75
Average	5.2	1.4	0.3	0.95	0.3	0.70

Depths in the upper and lower Lund ditches are estimated to be 0.2 to 0.3 feet lower than the typical depths observed prior to the water rights transfer. Lund ditch users have a number of laterals that serve the irrigated properties on the lower end of the ditch as well as a number of storage ponds and irrigation pumps.

3.2 FCWUA Ditch

Montgomery Water Group monitored weekly irrigation diversions on the FCWUA ditch over the irrigation season. Weekly measurements were taken at the FCWUA flume just downstream of the irrigation diversion and at the Roan/Olsen weir split near the end of the ditch in the Reecer Creek basin. In addition, several seepage surveys were conducted on the ditch during the irrigation season to evaluate seasonal changes in the hydraulic conditions along the ditch. Analyses of expected changes in hydraulic conditions in the FCWUA ditch are described in MWG's memorandum titled "FCWUA Ditch Seepage Loss Analysis" dated October 17, 2001. Table 7 provides a summary of expected changes in flow depth at typical cross sections (average cross section in the respective reach of the ditch) of the FCWUA ditch as a result of the proposed transfer of Trendwest water rights.

The transfer of the former Roan and Nelson water rights represent 56% of the water right on the FCWUA ditch. Depths in the FCWUA ditch at Green Canyon and upstream of the Roan/Olsen weir are estimated to change by 0.1 to 0.5 feet and 0.2 to 0.5 feet, respectively.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

Table 7
Summary of Estimated Changes in Depth and Maximum Depth at Typical Cross-Sections on the FCWUA Ditch

Irrigation Season Months for the Lund/ Gentry Ditch Water Users	Average Monthly FCWUA Diversion		Change in Average Depth at Typical Cross Section After Water Rights Transfer (ft)		Estimated Maximum Depth in a Typical Cross Section After Water Rights Transfer (ft)	
	Prior to Water Rights Transfer (cfs)	Change in Amount Diverted (cfs)	Reach between Diversion and Green Canyon	Reach between Green Canyon and Roan/Olsen Weirs	Reach between Diversion and Green Canyon	Reach between Green Canyon and Roan/Olsen Weirs
April	9.0	5.0	0.4	0.5	0.7	0.8
May	9.3	5.2	0.5	0.5	0.7	0.8
June	7.8	4.4	0.3	0.5	0.6	0.8
July	3.4	1.9	0.2	0.3	0.5	0.5
August	2.1	1.2	0.1	0.2	0.4	0.4
September	1.9	1.1	0.1	0.2	0.4	0.3
October	2.0	0.9	0.1	0.2	0.4	0.4

3.3 Mill Ditch

Analyses of how hydraulic conditions in Mill Ditch would change as a result of the proposed Trendwest water rights transfer were complicated by the relocation of a quarter mile section of Mill Ditch upstream of Hwy 97 in June 2001. Channel hydraulics and seepage characteristics in the ditch have changed both due to the water rights transfers and as a result of the relocation of the ditch along I-90. These geometric and hydraulic changes, as well as leasing of other water rights during the 2001 irrigation season, preclude the ability to separate the effects of the water rights transfer from the effects of the ditch relocation. In addition, there are a number of check structures on Mill Ditch and on Reecer Creek below the Mill Ditch confluence that facilitate water user's ability to alter water depths and improve delivery to their laterals. For these reasons, we were unable to compare depths at the key turnouts relative to the pre-existing conditions.

A review of previous reports and our own field observations and measurements throughout the monitoring season indicate that although the transfer of the Pautzke Water Rights to Trendwest represents a significant change in Mill Ditch diversion flows and likely a change in seepage losses in the reach, delivery of water to the remaining users is allowed by the existence and placement of a number of check structures in both Mill Ditch and Reecer Creek. Dick Bain determined from seepage survey measurements collected in August 2001 that adjustment of the check structures in the reach between the intake and Hwy 97 allowed adequate delivery of water to the Becker Ditch and lateral serving the house behind Blue Grouse Restaurant (the two turnouts in the reach). These measurements were taken without diversion of the full remaining water right on Mill Ditch. His

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

findings are detailed in memorandums dated July 26, 2001 and September 4, 2001 to Mr. Mark Anderson of Anderson Hay & Grain. Our field observations of the ditch lateral at the top of the Pautzke property south of Dolarway Road and the Klein-Coble intake, similarly indicate that manipulation of the check structures allows adequate delivery to the remaining water users.

3.4 Burke-Hartman Ditch

Drought transfers on the Burke-Hartman ditch during the 2001 irrigation season prevented flow measurements at key points along the ditch. No data were available to evaluate changes in hydraulic conditions within the Burke-Hartman ditch.

4.0 SUMMARY OF HYDRAULIC CHANGES IN TRIBUTARY STREAMS AND DITCHES WHERE TRENDWEST PROPOSES WATER RIGHTS TRANSFERS

A review of the expected changes in hydraulic conditions in the tributary streams indicated that changes in stage and depth are expected to be greatest during the months of the irrigation season when flows in the tributary streams are the lowest. The greatest increases in flow, stage, and depths will occur at the Swauk Creek gage below the Burke Hartman diversions and at the First Creek gages because the water rights transfers from FCWUA to First Creek represent a significant increase in flow over the pre-existing historical conditions. Swauk Creek below the Burke-Hartman diversions will benefit both from the increase in inflow from First Creek and the transferred Hartman water right. Reecer Creek upstream of Dolarway Road is estimated to absorb the greatest decrease in stage or depth from historical conditions. However, Mill Ditch and Reecer Creek water users have the use of a number of check structures in the reach between Mill Ditch to the Yakima River that allow them to alter water depths in the reaches to facilitate delivery of water to their ditch laterals.

The largest decreases in flow and depth for a ditch with no check structures will occur in FCWUA ditch. Changes in depth in the upper and lower ditch reaches of FCWUA are estimated to be as large as 0.5 feet as a result of the water rights transfer. These changes did not appear to affect the ability of other water users to take water from the FCWUA ditch during the 2001 irrigation season when the Trendwest water rights were not diverted. Changes in depths due to a decrease in the diversion on the Lund/Gentry Ditch will result in changes in depth as great as 0.3 feet. Similarly, the changes in flow and depth in the Lund/Gentry ditch did not appear to affect the remaining water users ability to divert water from the main ditch and associated laterals. Although the transfer of the former Pautzke water right on Mill Ditch to Trendwest represents the largest flow transfer (19.5 cfs), the existence of a number of check structures on the ditch both upstream of the Hwy 97 and in the reach downstream of Dolarway Road allow Mill Ditch water users to manipulate water levels to their desired stage and reduce changes in depth at laterals as diversions change.

620 Kirkland Way, Suite 202
P.O. Box 2517
Kirkland, WA 98083-2517

PHONE **425-827-3243**
FAX **425-827-3509**
www.mwater.com

APPENDIX A

RATING CURVES FOR 2001 MONITORING STATIONS ON TRENDWEST TRIBUTARY STREAMS AND THE USBR GAGE ON THE TEANWAY RIVER (TEAW)

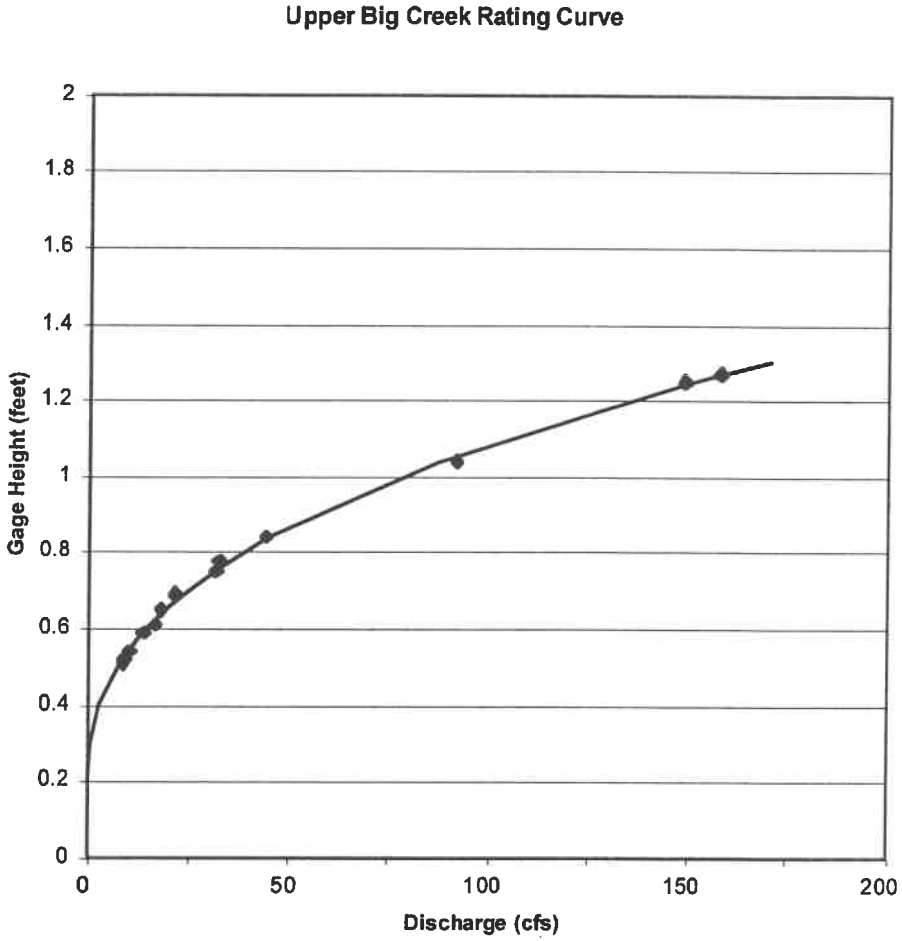
Big Creek Upstream of the Darling/Lund Diversion Dam

PROVISIONAL DATA Rev. 1/7/02

Q=C(ght-A)^r

c=	133.6	
a=	0.2	
r=	2.43	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.2		0	
	0.3		0.5	
	0.4		2.7	
9/12/2001	0.51	8.5	7.7	9.4
9/7/2001	0.52	8.9	8.4	5.6
8/16/2001	0.54	10.2	9.7	4.9
8/1/2001	0.59	13.7	13.5	1.5
7/25/2001	0.61	16.7	15.3	8.4
7/17/2001	0.65	18.1	19.2	-6.1
7/5/2001	0.69	21.6	23.6	-9.3
6/27/2001	0.75	31.7	31.2	1.6
10/24/2001	0.78	32.5	35.5	-9.2
6/11/2001	0.84	44.3	45.1	-1.8
5/29/2001	1.04	91.9	87.4	4.9
5/20/2001	1.25	149.2	150.5	-0.9
5/16/2001	1.27	158.1	157.5	0.4
	1.305		170.4	



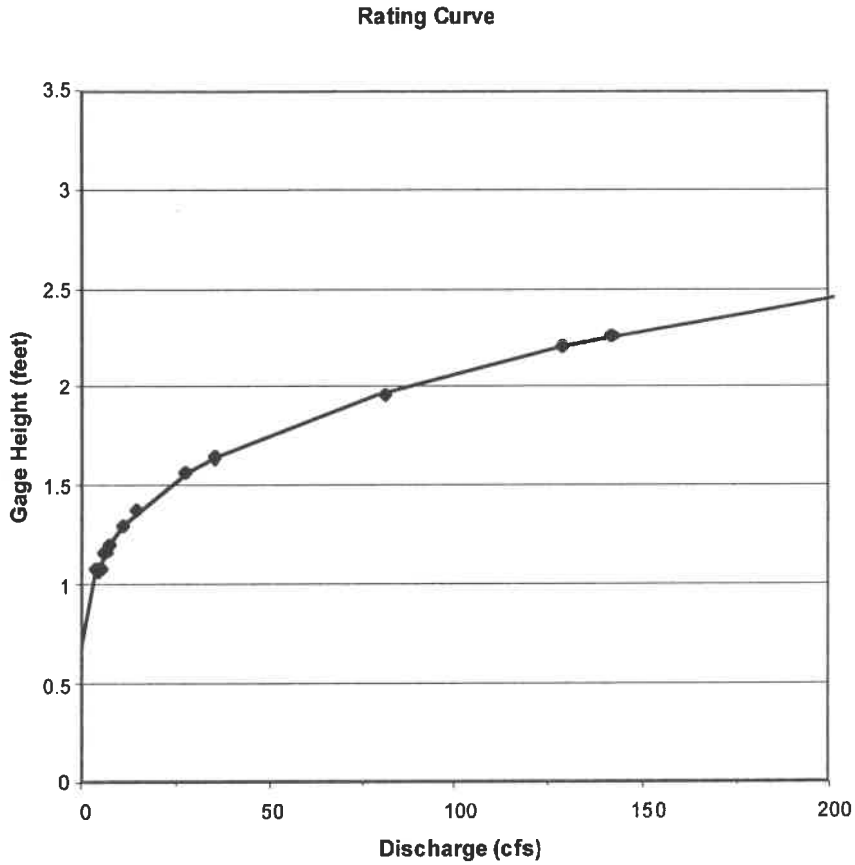
Big Creek Downstream of the Darling/Lund Diversion Dam

PROVISIONAL DATA REV. 1/7/02

Q=C(ght-A)^r

c=	23.4	
a=	0.5	
r=	3.21	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.7		0.0	
	1		2.5	
9/12/2001	1.07	4.5	3.8	15.6
9/7/2001	1.08	4.7	4.1	12.8
8/16/2001	1.08	3.8	4.1	-7.9
8/1/2001	1.16	6	6.2	-3.3
7/25/2001	1.20	7.1	7.4	-4.2
7/17/2001	1.29	10.7	11.0	-2.8
7/5/2001	1.38	14.2	15.5	-9.2
10/24/2001	1.56	27.2	28.2	-3.7
6/11/2001	1.64	35.1	35.6	-1.4
5/29/2001	1.96	81.2	78.8	3.0
5/20/2001	2.2	128.8	128.4	0.3
5/16/2001	2.26	142	143.5	-1.1
	2.5		216.3	



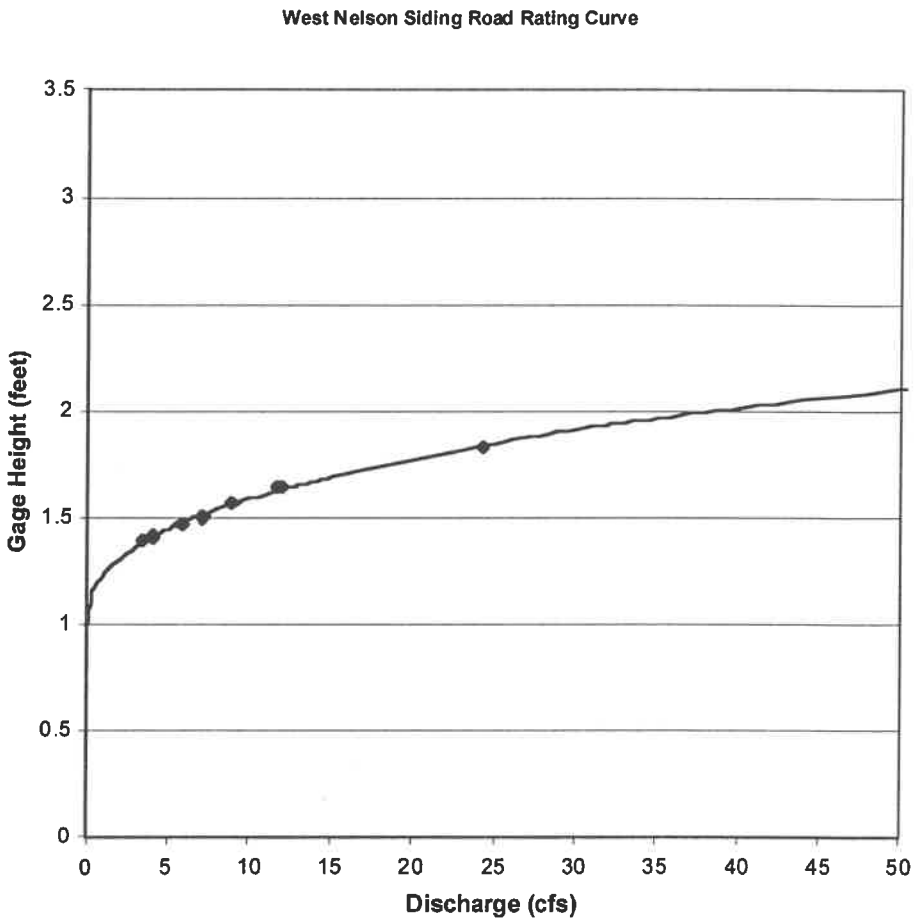
Big Creek Below West Nelson Siding Road

PROVISIONAL DATA Rev. 1/7/02

Q=C(ght-A)^r

c=	38.3	
a=	1	
r=	2.54	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	1		0	
	1.2		0.6	
9/12/2001	1.39	3.4	3.5	-2.9
9/7/2001	1.41	4.0	4.0	0.0
8/16/2001	1.41	4.0	4.0	0.0
8/8/2001	1.47	5.8	5.6	3.4
8/1/2001	1.50	7.1	6.6	7.0
7/25/2001	1.57	8.9	9.2	-3.4
7/17/2001	1.64	12.0	12.3	-2.5
7/11/2001	1.64	11.7	12.3	-5.1
10/24/2001	1.83	24.3	23.8	2.1
	1.96		34.5	
	2.2		60.9	
	2.26		68.9	
	2.5		107.4	



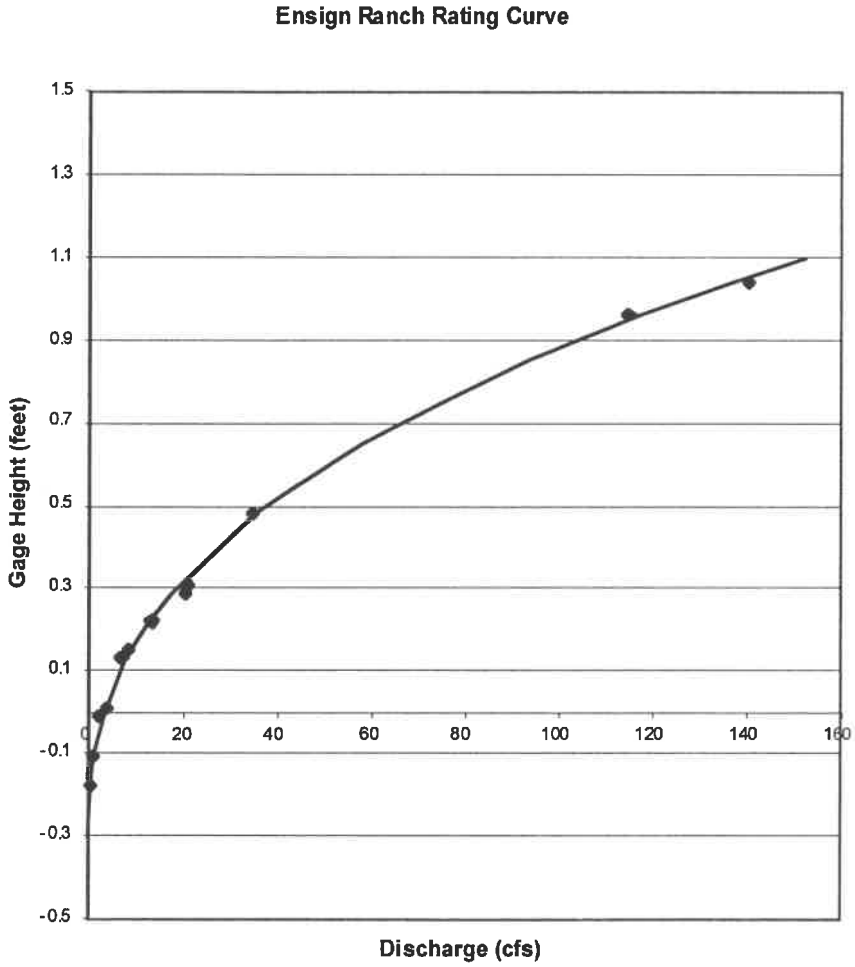
Big Creek at Ensign Ranch Campground

PROVISIONAL DATA Rev. 1/7/02

Q=C(ght-A)^r

c=	66.0	
a=	-0.3	
r=	2.49	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	-0.3		0	
8/16/2001	-0.18	0.3	0.3	0.0
8/8/2001	-0.11	0.9	1.1	-22.2
8/1/2001	-0.01	2.3	3.0	-30.4
7/25/2001	0.01	4.0	3.6	10.0
7/11/2001	0.13	6.9	8.1	-17.4
7/17/2001	0.15	8.3	9.0	-8.4
7/5/2001	0.22	13.3	12.9	3.0
10/24/2001	0.29	20.5	17.7	13.7
6/22/2001	0.31	21.0	19.2	8.6
6/11/2001	0.48	34.7	35.5	-2.3
	0.55		44.0	
	0.65		58.1	
	0.75		74.5	
	0.85		93.5	
5/20/2001	0.96	115.0	117.4	-2.1
5/16/2001	1.04	140.5	136.9	2.6
	1.1		152.7	



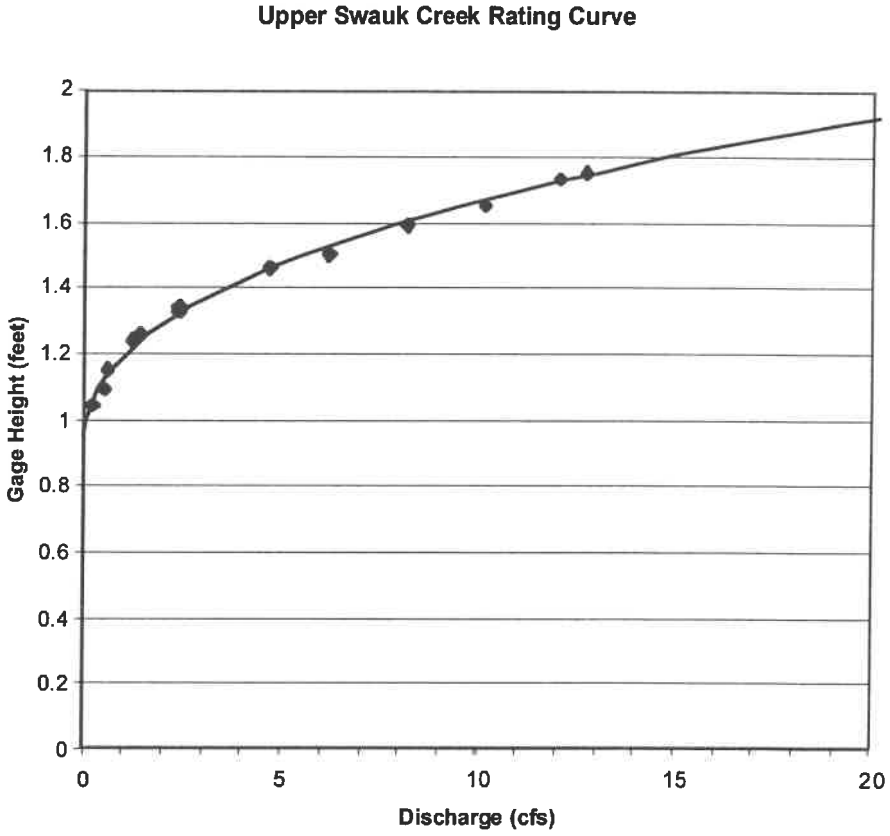
Swauk Creek Upstream of the Confluence with First Creek

PROVISIONAL DATA Rev. 1/7/02

Q=C(ght-A)^r

c=	19.2	
a=	0.9	
r=	2.41	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.95		0	
	1		0.1	
8/16/2001	1.04	0.2	0.2	0.0
9/11/2001	1.09	0.5	0.4	20.0
8/29/2001	1.15	0.6	0.7	-16.7
8/1/2001	1.24	1.2	1.4	-16.7
7/26/2001	1.26	1.4	1.6	-14.3
7/17/2001	1.33	2.4	2.5	-4.2
7/13/2001	1.34	2.4	2.7	-12.5
7/3/2001	1.46	4.7	4.8	-2.1
6/22/2001	1.5	6.2	5.6	9.7
10/24/2001	1.59	8.2	7.9	3.7
6/11/2001	1.65	10.2	9.6	5.9
6/6/2001	1.73	12.1	12.3	-1.7
6/1/2001	1.75	12.8	13.0	-1.6
	1.8		14.9	
	1.9		19.2	
	2		24.1	



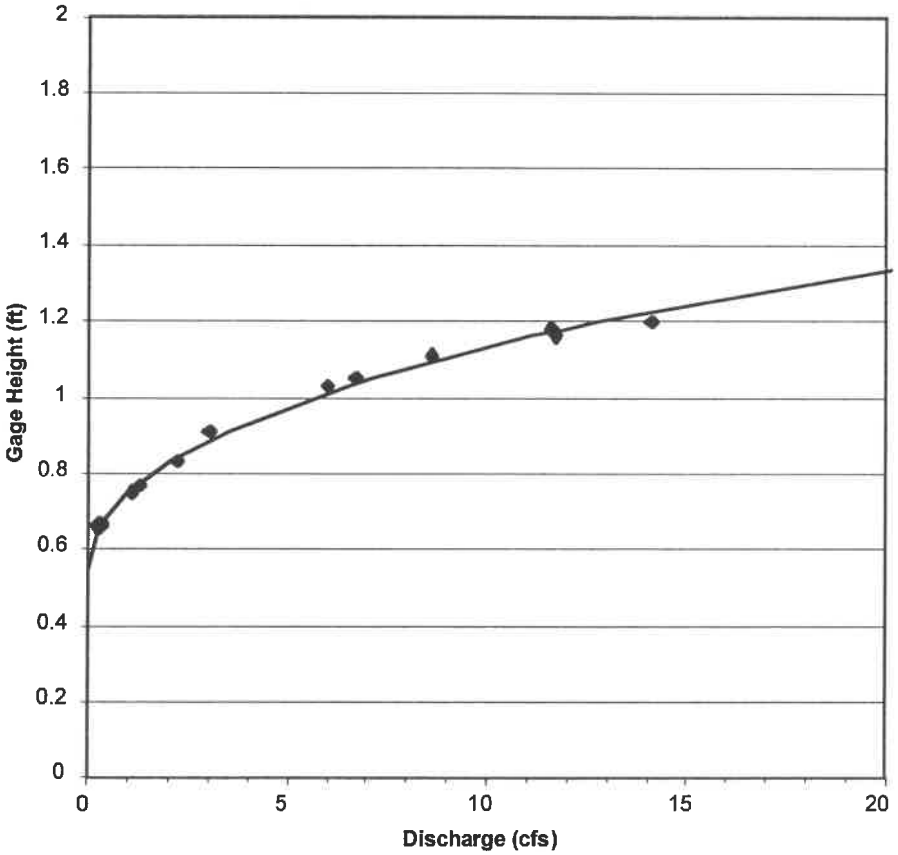
Swauk Creek at the Martin Property

PROVISIONAL DATA Rev. 1/7/02

Q=C(ght-A)^r

c=	32.7	
a=	0.55	
r=	2.19	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.55		0	
9/11/2001	0.66	0.2	0.3	-50.0
9/7/2001	0.67	0.3	0.3	0.0
8/16/2001	0.66	0.3	0.3	0.0
8/1/2001	0.75	1.1	1.0	9.1
7/26/2001	0.77	1.3	1.2	7.7
7/17/2001	0.83	2.2	2.0	9.1
7/13/2001	0.91	3	3.5	-16.7
7/3/2001	1.03	6	6.5	-8.3
6/22/2001	1.05	6.7	7.2	-7.5
10/23/2001	1.11	8.6	9.2	-7.0
6/11/2001	1.16	11.7	11.1	5.1
6/6/2001	1.18	11.6	11.9	-2.6
6/1/2001	1.2	14.1	12.7	9.9
	1.5		29.2	
	1.6		36.4	
	1.7		44.4	



Mouth of Swauk Creek

PROVISIONAL DATA Rev. 1/7/02

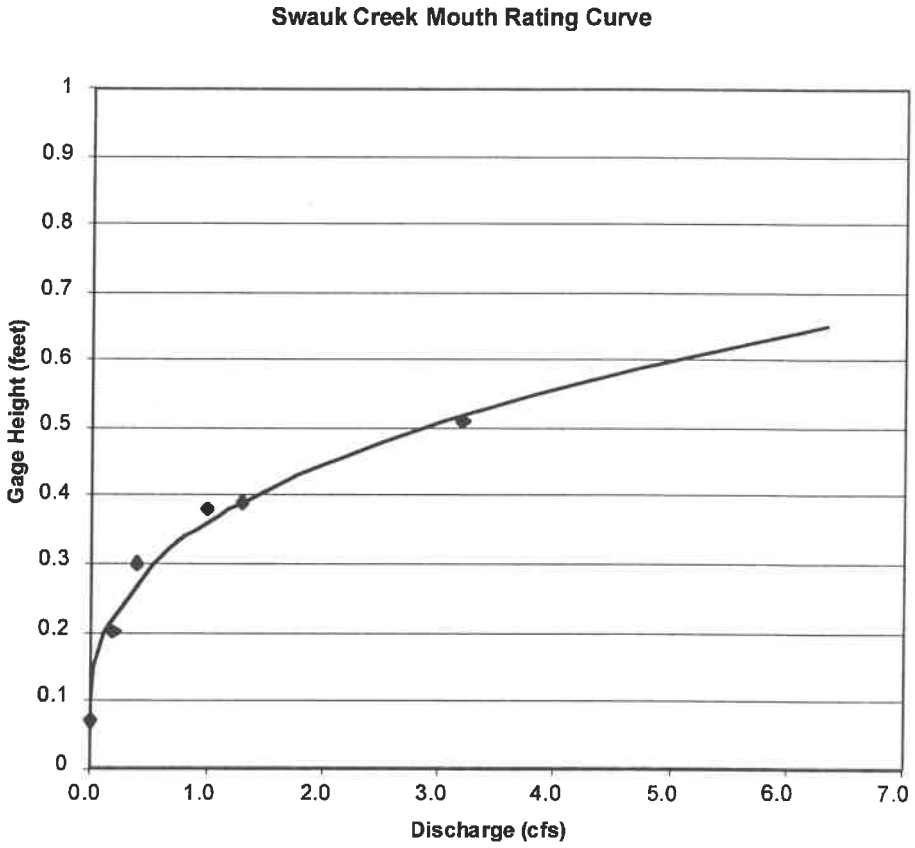
Q=C(ght-A)^r

c= 27.1

a= 0.07

r= 2.7 1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.07	0	0.0	
	0.1		0.0	
	0.15		0.0	
8/8/2001	0.2	0.2	0.1	50.0
8/1/2001	0.3	0.4	0.5	-25.0
	0.32		0.7	
	0.34		0.8	
	0.35		0.9	
	0.37		1.1	
7/25/2001	0.38	1	1.2	-20.0
10/12/2001	0.39	1.3	1.3	0.0
	0.43		1.8	
	0.48		2.5	
10/23/2001	0.51	3.2	3.0	6.3
	0.55		3.8	
	0.59		4.7	
	0.65		6.3	



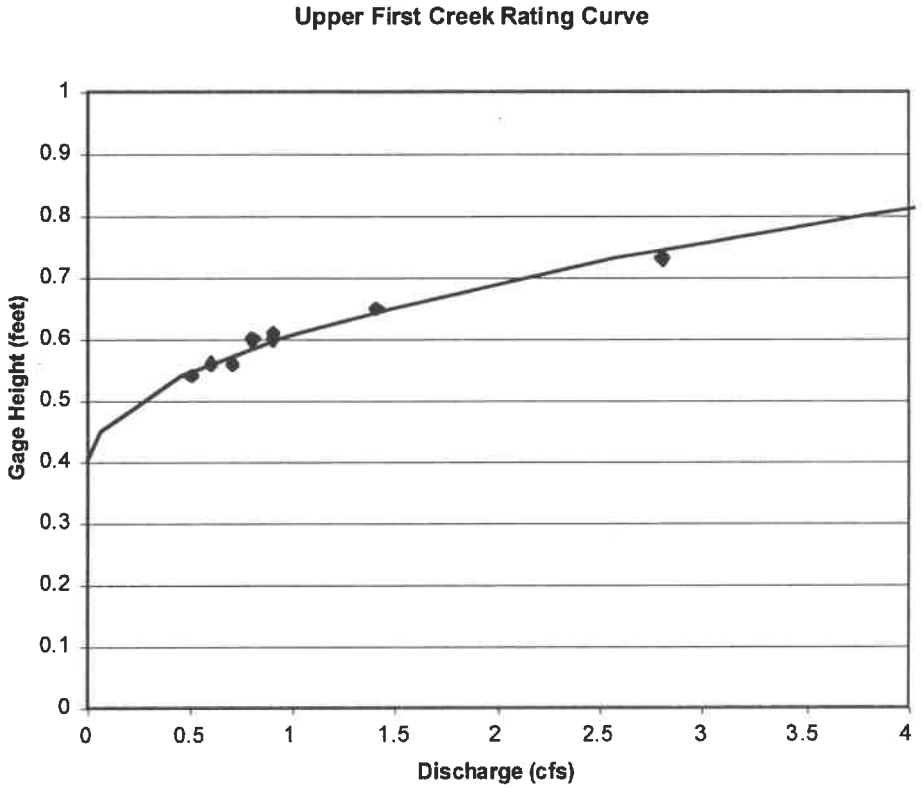
First Creek Downstream of FCWUA Diversion

PROVISIONAL DATA Rev.1/7/02

Q=C(ght-A)^r

c=	24.2	
a=	0.4	
r=	2.02	1.00

Date	ght	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.4		0.0	
	0.45		0.1	
9/11/2001	0.54	0.5	0.5	0.0
8/29/2001	0.56	0.6	0.6	0.0
8/16/2001	0.56	0.6	0.6	0.0
6/6/2001	0.56	0.7	0.6	14.3
7/17/2001	0.60	0.8	0.9	-12.5
5/30/2001	0.60	0.9	0.9	0.0
7/13/2001	0.61	0.9	1.0	-11.1
6/22/2001	0.65	1.4	1.5	-7.1
7/3/2001	0.73	2.8	2.6	7.1
	0.75		2.9	
	0.8		3.8	
	0.85		4.8	
	0.9		6.0	



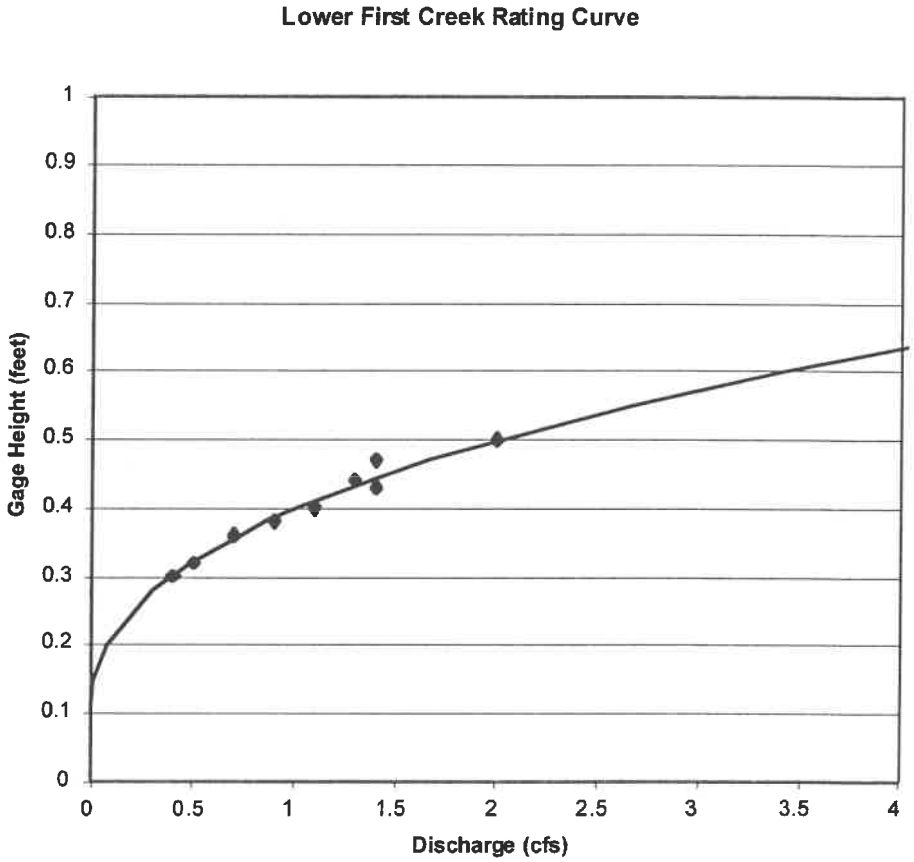
First Creek Upstream of the Confluence with Swauk Creek

PROVISIONAL DATA Rev. 1/702

Q=C(ght-A)^r

c=	17.6	
a=	0.1	
r=	2.36	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error
	0.1		0.0	
	0.15		0.0	
	0.2		0.1	
	0.28		0.3	
9/11/2001	0.3	0.4	0.4	0.0
9/7/2001	0.32	0.5	0.5	0.0
8/16/2001	0.32	0.5	0.5	0.0
6/6/2001	0.36	0.7	0.7	0.0
7/26/2001	0.36	0.7	0.7	0.0
7/13/2001	0.36	0.7	0.7	0.0
7/17/2001	0.38	0.9	0.9	0.0
5/29/2001	0.40	1.1	1.0	9.1
6/22/2001	0.43	1.4	1.3	7.1
10/24/2001	0.44	1.3	1.4	-7.7
7/3/2001	0.47	1.4	1.7	-21.4
6/11/2001	0.5	2	2.0	0.0
	0.55		2.7	
	0.6		3.4	
	0.65		4.3	



Reecer Creek Upstream of Dolarway Road

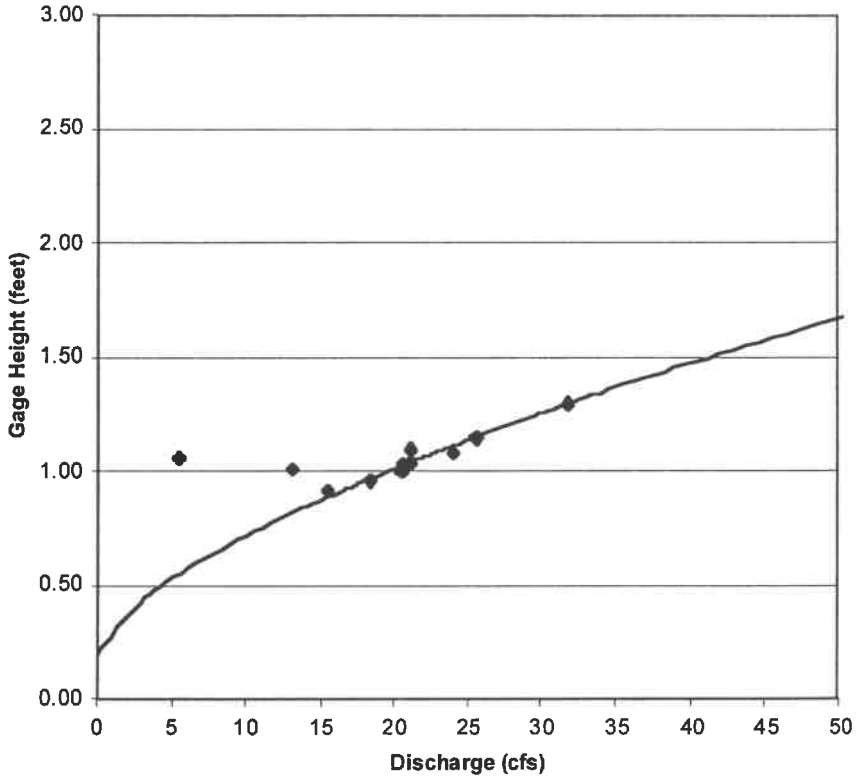
PROVISIONAL DATA Rev. 1/7/02

Q=C(ght-A)^r

c=	27.5	
a=	0.2	
r=	1.54	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error	Notes
	0.20		0.0		
	0.50		4.3		
	0.80		12.5		
7/17/2001	0.92	15.5	16.6	-7.1	
7/11/2001	0.96	18.4	18.0	2.2	
7/25/2001	1.00	20.5	19.5	4.9	
9/12/2001	1.03	20.6	20.6	0.0	
8/16/2001	1.04	21.1	21.0	0.5	
8/1/2001	1.08	24.0	22.6	5.8	
9/26/2001	1.10	21.1	23.4	-10.9	
8/8/2001	1.15	25.6	25.4	0.8	
	1.20		27.5		
	1.25		29.6		
8/23/2001	1.30	31.8	31.8	0.0	
	1.50		41.2		
	1.80		56.8		
10/12/2001	1.01	13.1	19.9	-51.9	*Rating Shift*
10/23/2001	1.06	5.5	21.8	-296.4	*Rating Shift*

Reecer Creek Rating Curve



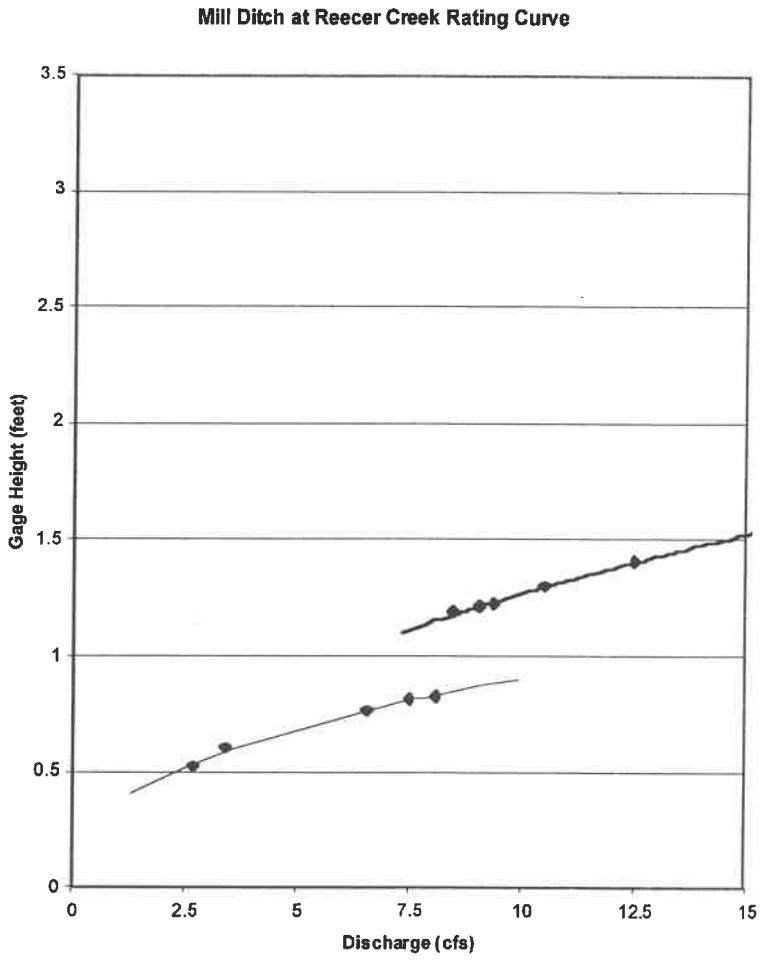
Mill Ditch Upstream of Reecer Creek at Hwy 97

PROVISIONAL DATA Rev. 1/7/02

Rating Equation 1			*Rating Equation 2*		
Q=C(ght-A)^r			Q=C(ght-A)^r		
c=	5.9		c=	12.9	
a=	0		a=	0	
r=	2.19	1.00	r=	2.48	1.00

Date	ght (ft)	Measured Discharge (cfs)	Estimated Discharge (cfs)	Percent Error	Notes
	0.4		1.3		
10/12/2001	0.52	2.7	2.6	3.7	*Rating Shift- Eqn 2*
10/4/2001	0.6	3.4	3.6	-5.9	*Rating Shift- Eqn 2*
9/12/2001	0.76	6.6	6.5	1.5	*Rating Shift- Eqn 2*
9/26/2001	0.81	7.5	7.7	-2.7	*Rating Shift- Eqn 2*
8/27/2001	0.82	8.1	7.9	2.5	*Rating Shift- Eqn 2*
	0.87		9.1		
	0.9		9.9		
	1.1		7.3		
	1.15		8.1		
8/16/2001	1.19	8.5	8.7	-2.4	*Eqn 1*
8/8/2001	1.21	9.1	9.0	1.1	*Eqn 1*
7/25/2001	1.22	9.4	9.2	2.1	*Eqn 1*
8/1/2001	1.3	10.5	10.6	-1.0	*Eqn 1*
	1.35		11.5		
8/23/2001	1.41	12.5	12.6	-0.8	*Eqn 1*
	1.5		14.5		
	1.75		20.3		

Rating Curve shifted because of change in check structures
along the ditch. Rating equation 1 applies through August 23, 2001.
Rating Equation 2 applies post August 23rd to end of monitoring program.



UNITED STATES BUREAU OF RECLAMATION

TEAW TEANAWAY RIVER ab. LAMBERT BRIDGE 1998 WY

ating # 2 from 07/20/98

SUBJECT TO REVISION

DISCHARGE IN CUBIC FEET PER SECOND

gH	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	1.00	2.00
69.6	2.00	2.01	2.02	2.04	2.05	2.06	2.07	2.09	2.10	2.11	0.13	
69.8	2.13	2.14	2.16	2.17	2.19	2.19	2.21	2.22	2.25	2.25	0.13	0.000
69.7	2.26	2.27	2.29	2.30	2.32	2.33	2.34	2.36	2.37	2.38	0.14	0.000
69.6	2.40	2.42	2.43	2.45	2.46	2.48	2.49	2.51	2.52	2.54	0.15	0.000
69.9	2.55	2.57	2.58	2.60	2.62	2.63	2.65	2.66	2.68	2.70	0.16	0.000
70.0	2.71	2.73	2.75	2.76	2.78	2.80	2.81	2.83	2.85	2.87	0.17	0.000
70.1	2.88	2.90	2.92	2.94	2.95	2.97	2.99	3.01	3.03	3.05	0.18	0.000
70.2	3.08	3.09	3.11	3.12	3.14	3.16	3.18	3.20	3.22	3.24	0.19	0.001
70.3	3.28	3.27	3.29	3.31	3.33	3.35	3.38	3.40	3.42	3.44	0.20	0.001
70.4	3.46	3.48	3.50	3.52	3.54	3.56	3.59	3.61	3.63	3.65	0.22	0.001
70.5	3.67	3.70	3.72	3.74	3.76	3.79	3.81	3.83	3.86	3.88	0.23	0.001
70.6	3.90	3.93	3.95	3.97	4.00	4.02	4.05	4.07	4.09	4.12	0.24	0.001
70.7	4.14	4.17	4.19	4.22	4.25	4.27	4.30	4.32	4.35	4.37	0.26	0.002
70.8	4.40	4.43	4.45	4.48	4.51	4.54	4.56	4.59	4.62	4.65	0.27	0.002
70.9	4.67	4.70	4.73	4.76	4.79	4.82	4.85	4.87	4.90	4.93	0.29	0.002
71.0	4.96	4.99	5.02	5.05	5.08	5.11	5.14	5.18	5.21	5.24	0.31	0.017
71.1	5.27	5.30	5.33	5.36	5.40	5.43	5.46	5.49	5.53	5.56	0.33	0.018
71.2	5.59	5.63	5.66	5.70	5.73	5.76	5.80	5.83	5.87	5.90	0.34	0.020
71.3	5.94	5.97	6.01	6.05	6.08	6.12	6.15	6.19	6.23	6.27	0.37	0.021
71.4	6.30	6.34	6.38	6.42	6.46	6.49	6.53	6.57	6.61	6.65	0.39	0.023
71.5	6.69	6.73	6.77	6.81	6.85	6.89	6.93	6.97	7.02	7.06	0.41	0.025
71.6	7.10	7.14	7.18	7.23	7.27	7.31	7.36	7.40	7.45	7.49	0.44	0.026
71.7	7.53	7.58	7.62	7.67	7.72	7.76	7.81	7.85	7.90	7.95	0.46	0.028
71.8	8.00	8.04	8.09	8.14	8.19	8.24	8.28	8.33	8.38	8.43	0.49	0.030
71.9	8.48	8.53	8.58	8.64	8.69	8.74	8.79	8.84	8.89	8.95	0.52	0.032
72.0	9.00	9.05	10.10	11.40	12.60	13.70	15.00	16.30	17.70	19.30	13.00	11.000
72.1	21.0	22.70	24.60	26.80	28.70	31.30	33.60	36.40	39.30	42.80	25.00	13.000
72.2	46.0	49.40	51.0	53.30	55.80	58.30	61.00	63.80	66.70	69.80	27.00	2.000
72.3	73.0	76.50	78.10	83.70	85.80	90.30	89.20	92.20	95.40	98.80	29.00	2.000
72.4	102.0	104.30	108.80	109.0	112.10	115.40	118.70	122.10	125.70	129.30	31.00	3.000
72.5	133.0	136.80	140.30	143.80	147.60	151.30	155.10	159.00	164.10	168.00	40.00	3.000
72.6	173.0	177.60	182.60	187.80	188.30	188.60	194.30	204.50	215.80	221.80	55.00	15.000
72.7	226.0	233.70	239.80	246.60	251.70	258.7	262.80	267.70	272.70	277.80	55.00	5.000
72.8	283.0	287.70	292.80	297.40	302.40	307.80	312.80	317.80	323.10	328.80	54.00	
72.9	334.0	340.40	347.00	353.80	360.40	367.20	374.40	381.80	388.80	396.40	70.00	10.000
73.0	404.0	408.70	413.80	418.40	423.80	428.20	433.20	438.40	443.80	448.70	50.00	
73.1	454.0											

skeletal rating point
ite rating is provisional and subject to change

Exhibit K

Review of Yakima River Diversion Intakes - Cle Elum to Ellensburg Reach

Analysis of Potential Hydraulic Impacts of Proposed Relocation of Trendwest Point of Diversion

Final Report

Prepared for:
Trendwest Resorts, Inc.

Prepared by:
northwest hydraulic consultants, inc.

February 1, 2002

TABLE OF CONTENTS

Introduction 1

Approach 1

Flow Data 3

Limitations 4

Younger Ditch Diversion 7

Wallace Ranch (Bristol Flats) Diversion 10

Westside Diversion 13

Thorp Diversion 17

Packwood Diversion 20

Cascade Irrigation Company Diversion 22

Mill Ditch Diversion 27

References 29

Appendix A – Flow Data

Appendix B – Survey Data

Appendix C – Yakima River Water Rights Data

Appendix D – Westside Irrigation District Facility Plans

INTRODUCTION

Trendwest Resorts, Inc. proposes to develop the MountainStar Master Planned Resort (MPR) and a master planned community within Cle Elum's Urban Growth Area (UGA), on approximately 7,300 acres west of the City of Cle Elum, Washington. To provide water for the proposed development, Trendwest has acquired water rights sufficient to meet project-related demands. Trendwest's proposal calls for diverting water from the Yakima River at a location upstream of the historic point of diversion of the acquired water rights. The Yakima River reach between Cle Elum (the proposed new diversion location) and Ellensburg (the historic diversion location) will hereinafter be referred to as the "study reach". Flows in the study reach would be altered by the diversion relocation and other aspects of Trendwest's proposal as described in the Water Supply Technical Report (Brown and Caldwell, 2002).

Trendwest retained northwest hydraulic consultants, inc. (**nhc**) to investigate, at a reconnaissance level, potential impacts of the proposal on other diversions in the study reach. From the standpoint of irrigation diversions, the most significant anticipated impact of lower flows would be lower water levels at diversion intakes. Hydraulic impacts at the following diversion locations on the Yakima River (listed in order from upstream to downstream) have been investigated:

- Younger Ditch
- Wallace Ranch (Bristol Flats)
- Westside Irrigation Diversion
- Thorp Diversion
- Packwood Diversion
- Cascade Irrigation Diversion
- Mill Ditch

Figure 1 is a map of the Yakima River showing the approximate location of each of these diversions. For each diversion site a description of the diversion facilities and a discussion of the present hydraulic/geomorphic setting and the results from the hydraulic analysis is provided below. The descriptions include photographs, location maps, and a written summary of possible hydraulic, geomorphic, and sedimentation issues at the diversion. River cross sections and other survey data collected by W&H Pacific, Inc. are provided as an appendix to this report.

APPROACH

Where feasible, potential impacts on Yakima River water levels at the diversion sites, resulting from the relocation of the Trendwest point of diversion, were estimated. For the Packwood, Wallace Ranch (Bristol Flats), Thorp, and Younger Ditch sites, differences were estimated using the ManningSolver© computer program. ManningSolver computes "normal depth" based on a user supplied channel cross section, energy slope, Mannings roughness value (Mannings 'n'), and input flow data. Note that throughout this report the water surface slope was used as an estimate of the energy slope. The terms energy slope and water surface slope are thus used interchangeably in this report.

Using surveyed cross section and water surface slope data the normal flow depth near each diversion intake was estimated for the date of the survey. The Mannings "n" for each site was calibrated based on the observed flows (approximately 1300 cfs at the Younger ditch site, 600 cfs at the Wallace Ranch (Bristol Flats) site, and 2000 cfs at the other sites) and the surveyed water levels. The stream channel geometry, energy slope, and Mannings "n" were then used to estimate flow depths for the anticipated low flow conditions. A sensitivity analysis was also performed to examine the impact that higher roughness values (which might be expected with lower flows) would have on the results. Based on this analysis, a slightly higher Mannings "n" (increased by 0.01) was used for the evaluation of impacts for all of the diversion sites except the Wallace Ranch (Bristol Flats) site. The calibration flow at the Wallace Ranch (Bristol Flats) site of about 600 cfs was in the middle to low range of the flows used in the analysis so it was not felt necessary to adjust the roughness value.

It is our understanding that the Westside Irrigation Company (Westside) places ecology blocks in the river channel downstream of their diversion site annually during low flow periods to create a constriction and backwater into their diversion (Vern Burkhardt, Westside Irrigation District, Pers. Comm.). Therefore the normal depth approach discussed above would not be appropriate for this site. For the Westside diversion site a simple hydraulic backwater model (HEC-RAS) was developed and used to estimate the impact of the Trendwest withdrawal relocation. The model was created based on three cross sections field surveyed by W&H Pacific located: 1) downstream of the diversion site at the point at which the irrigation district places ecology blocks, 2) at the diversion intake structure, and 3) approximately 100 feet upstream of the diversion structure.

Using the HEC-RAS model the anticipated water levels at the diversion site for current and proposed low flow conditions were estimated. Simulations were performed for the existing stream channel without ecology blocks and with the assumption of ecology blocks placed as described by Mr. Burkhardt. The HEC-RAS model was also used to evaluate possible mitigation measures (i.e. additional ecology blocks) that could be used to offset the estimated impact of the Trendwest withdrawal relocation.

Complexities at the Cascade Irrigation Diversion (Cascade) site make estimation of potential water level impacts at this location infeasible without substantial effort beyond the scope of this study. Analysis of this site would require hydraulic and sedimentation studies to assess the current condition and likely future conditions. Furthermore, field reconnaissance indicates that Cascade is likely to experience significant difficulties getting adequate flow to their intake regardless of the Trendwest diversion. Thus, review of the Cascade site was limited to a discussion of current conditions and a proposed approach for examining alternatives for improving the long-term reliability of this diversion. In a separate but related study, **nhc** investigated geomorphic issues at the Cascade diversion site and alternatives for improving the reliability of the Cascade intake (**nhc**, 2001).

The hydraulics of the Mill Ditch diversion are also complicated. Water diverted at the Mill Ditch site originates from several sources in addition to the Yakima River including irrigation return flows. Diversions from the Yakima River first enter a side channel with some of the side channel flow splitting off into a smaller channel leading under I-90, which joins with seepage

H-01

return flows and ultimately pass down a constructed channel to the diversion intake. The Mill Ditch intake structure was observed during the field reconnaissance but the Yakima River channels were not. The Mill Ditch site is the original point of diversion for the water rights that were acquired by Trendwest, thus Yakima River flows (and water levels) downstream of this point would theoretically not be affected by the proposed transfer. In fact, the tributary water rights and return flows incorporated in the Trendwest proposal would result in higher flows at this location than under baseline conditions (Brown and Caldwell, 2002). Therefore, our discussion of potential impacts at the Mill Ditch diversion is limited.

Finally, it should be noted that the Ellensburg Water Company/Olson Ditch diversion is also within the study reach. However, considering the design of the Ellensburg Water Company diversion structure, in particular the dam across the Yakima River, the potential hydraulic impacts of a small flow reduction at this site were considered to be negligible, and were not investigated in detail.

FLOW DATA

To examine the potential hydraulic impact of the Trendwest proposal, estimates of water levels were required for existing (baseline) and proposed conditions. This, in turn, required the development of baseline and proposed condition flow data. Baseline flows at each of the diversion sites were assumed to be equal to the observed flows on the Yakima River at Cle Elum gage currently operated by the USBR (USGS gage 12479500). The period of analysis was chosen as water years 1991-1993, 1995, and 2001 to maintain consistency with the Water Supply Technical Report (Brown and Caldwell, 2002). Observed mean daily flow data for this period were obtained from USBR records. Observed data for water years 1991-1995 were provided to **nhc** by Tom Martin of Brown and Caldwell. Provisional observed flow data for water year 2001 were provided to **nhc** by the USBR Yakima Basin Field Office.

To examine the potential impact of the proposal on low flow conditions throughout the irrigation season (May 1 to October 31) the season was split into 12 increments of approximately 15 days each. For each 15 day period, the minimum mean daily flow from the five year period of analysis was determined. These data are summarized in Table 1. The use of flow data from across the entire range of irrigation conditions (i.e. prior to storage control, during storage control, and post flip-flop) facilitates evaluation of potential impacts of the proposal for all likely hydrologic scenarios.

Observed data from the Cle Elum gage were then adjusted to provide an estimate of proposed condition flows at each of the diversion sites. Flow adjustments were based on modeled diversions, return flows, and tributary inflows computed by Brown and Caldwell and provided to **nhc** for use in this study. The development of these data is described in detail in Section IV.A. of the Water Supply Technical Report (Brown and Caldwell, 2002). Adjusted flow time series were computed by **nhc** for the Yakima River at the Water Supply Diversion site, the Yakima River at the Teanaway River confluence and the Yakima River at the Swauk Creek confluence. The computed minimum daily flows over the 5 year analysis period for each 15-day time increment are shown in Table 1. Figure 1 shows the locations on the Yakima River at which flows were computed.

It should be noted that the data used in this study (water years 1991-1993, 1995 and 2001) encompassed a particularly dry cycle and included water year 2001, which is generally considered to be one of the lowest flow irrigation seasons in recent memory. Use of the minimum flow data from these dry years maintains consistency with the project's Water Supply Technical Report and provides a reasonable estimate of extremely low flow conditions.

Table 1. Baseline and Proposed Condition Flows

Dates	Baseline	Proposed Condition			
	All sites based on Yakima River at Cle Elum Gage (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)
May 1 - May 15	504	504	507	513	515
May 16 - May 31	580	580	583	588	590
June 1 - June 15	935	932	933	938	940
June 16 - June 30	1434	1431	1433	1438	1441
July 1 - July 15	1920	1916	1918	1922	1925
July 15 - July 31	2852	2847	2849	2850	2853
Aug 1 - Aug 15	2655	2652	2652	2652	2655
Aug 16 - Aug 31	1322	1317	1318	1318	1321
Sept 1 - Sept 15	380	376	377	377	379
Sept 16 - Sept 30	407	404	402	403	405
Oct 1 - Oct 15	363	362	361	361	362
Oct 16 - Oct 31	210	209	209	209	209

The hydraulic computations for each diversion site used the computed proposed condition flows from the nearest upstream location. The diversion sites that were analyzed in detail and the corresponding proposed condition flow are as follows:

- Younger Ditch Diversion Site – Yakima River at Water Supply Diversion Site flow
- Wallace Ranch (Bristol Flats) Diversion Site – Yakima River at Teanaway River flow
- Westside Irrigation Diversion Site – Yakima River at Swauk Creek flow
- Thorp Diversion Site – Yakima River at Swauk Creek flow
- Packwood Diversion Site – Yakima River at Swauk Creek flow

LIMITATIONS

A comparison of the estimated Yakima River flow depths for the current and proposed conditions provides an indication of the potential relative impact of the Trendwest diversion relocation at each of the diversion sites in the study reach. Because the surveyed cross sections

H-01

collected for this study were typically referenced to an arbitrary vertical datum, and data were generally not collected for hydraulic structures, it is not possible to report actual water levels at the intakes or fish screens. Furthermore, the limited model calibration performed for this study, and the simplified normal depth approach being used, does not lend itself to the computation of accurate absolute water levels. However, for the purposes of this study the approach taken herein was considered to be appropriate.

It should be noted that **nhc** has not conducted a comprehensive study of impacts of the proposed relocation of the Trendwest point of diversion. Sufficient information is not available at this time to comprehensively evaluate potential impacts of reduced Yakima River water levels on the irrigator's operations. A comprehensive analysis of this sort would require significantly greater effort and additional information including:

- Information about current operations at each of the diversions including maintenance issues,
- detailed survey data for all hydraulic structures and diversion channels,
- detailed information about the timing, location, and design of temporary in-channel dams,
- knowledge of the rate of water to be diverted at each location coincident with all Yakima River flow levels, and
- an understanding of current irrigation diversion shortfalls

The following pages document the findings of this reconnaissance level investigation.

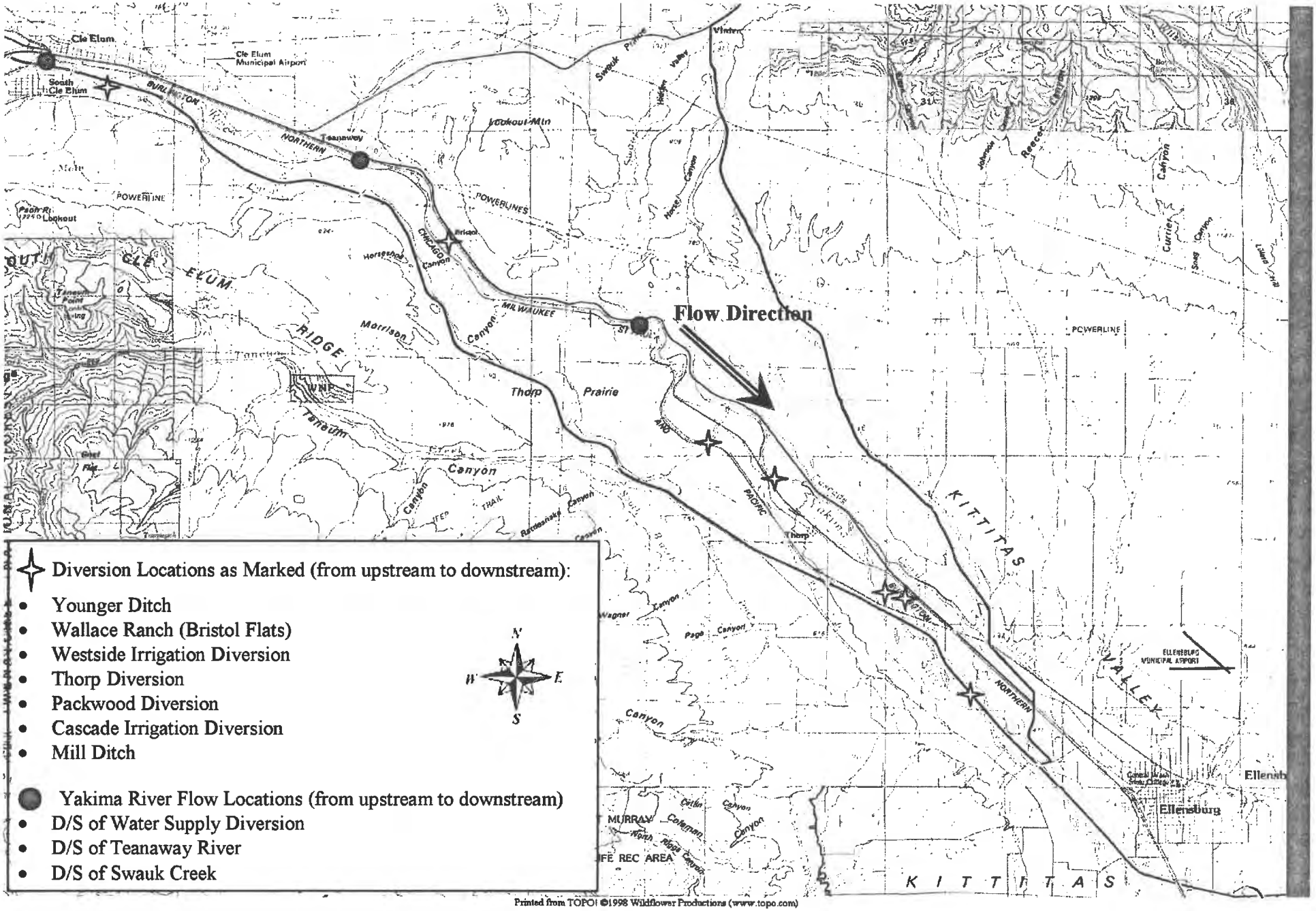
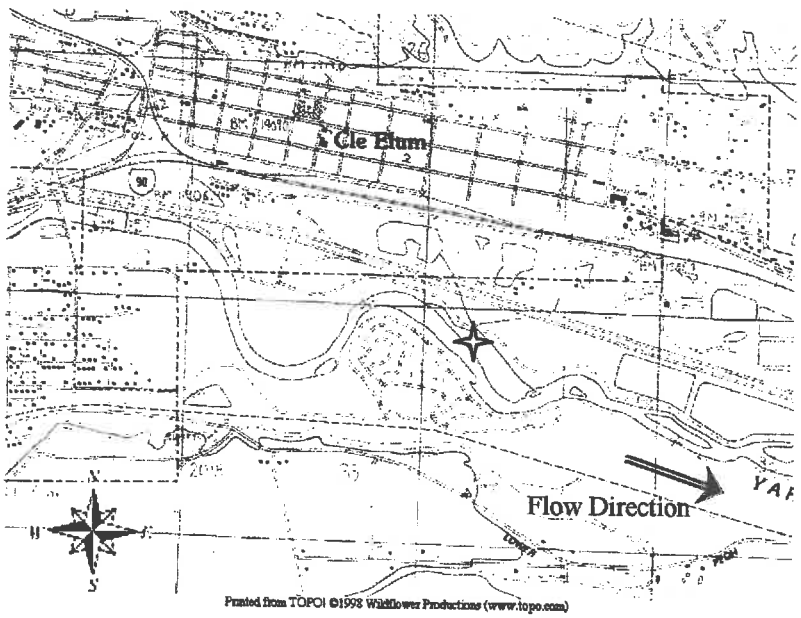


Figure 1. Location Map of study diversion sites and locations for which Yakima River flows were derived

YOUNGER DITCH DIVERSION

Location: The Younger Ditch Diversion is located on the left (north) bank of the Yakima River approximately 6600 feet downstream of the East 4th Street bridge in South Cle Elum (see Figure at right).



Facilities: The diversion consists of a side channel diversion from the Yakima River which directs flow into a 15 foot wide channel leading approximately 200 feet to an intake structure. The intake includes a rolling drum fish screen, several gated diversion openings, and a return flow bypass to the Yakima River. Downstream of the intake structure diverted flows pass over a measurement weir and enter the Younger Ditch irrigation canal.

Hydraulic/Geomorphic Setting: The Younger Ditch diversion channel sits on the left bank of the Yakima River on the outside of a large meander bend. Because of the meander bend the river is deepest and flows are swiftest along the left bank near the diversion channel. The higher flow along this bank would also tend to carry more entrained sediments. Flow in the Yakima River at Cle Elum at the time of the site reconnaissance was approximately 1300 cfs. Flow along the left bank near the diversion site was approximately 5 feet deep. Flow appeared to be relatively uniform across the river upstream of the diversion. Yakima River flows would tend to form an eddy at the diversion channel as the river expands at the channel opening. Because of this eddy it is likely that fine-grained sediments are deposited at this location and accumulate in the diversion channel. This was evidenced both by the current condition of the channel inlet and by the dredge spoils piled upstream and downstream of the inlet.

Hydraulic Analysis: The water level impacts of the Trendwest relocation for this site were computed with ManningSolver. The water levels were calculated for existing and proposed low flow conditions using the surveyed cross section provided by W&H Pacific, a Manning 'n' estimate of 0.045 and a water surface slope of 0.00234 ft/ft. The water surface slope was calculated from the W&H Pacific survey data. Over the range of low flows used in this analysis, water levels at the inlet of the diversion channel under the proposed conditions (Trendwest diversion relocation) are 0.00 to 0.01 feet less than under baseline conditions. The largest difference (0.01 feet) is seen in the month of September when the Trendwest diversion as a percentage of Yakima River flow is the highest. Based on our analysis the Trendwest proposal may result in up to a 0.01 foot drop in water levels at the inlet of the Younger Ditch diversion channel, but differences of 0.01 feet or more are only anticipated in the months of August through October.

Table 2. Younger Ditch Diversion Site Analysis Results

Time Period	Minimum Flow (cfs)		Water Surface Elevation (feet assumed datum)		
	Baseline Conditions	Proposed Conditions	Current Conditions	Proposed Conditions	Difference
May 1 – May 15	504	504	96.27	96.27	0.00
May 16 – May 31	580	580	96.44	96.44	0.00
June 1 – June 15	935	932	96.95	96.95	0.00
June 16 – June 30	1434	1431	97.46	97.46	0.00
July 1 – July 15	1920	1916	97.89	97.89	0.00
July 16 – July 31	2852	2847	98.59	98.59	0.00
Aug 1 – Aug 15	2655	2652	98.45	98.45	0.00
Aug 16 – Aug 31	1322	1317	97.36	97.35	-0.01
Sep 1 – Sep 15	380	376	96.04	96.03	-0.01
Sep 16 – Sep 30	407	404	96.09	96.08	-0.01
Oct 1 – Oct 15	363	362	96.00	96.00	-0.01
Oct 16 – Oct 31	210	209	95.50	95.50	-0.01

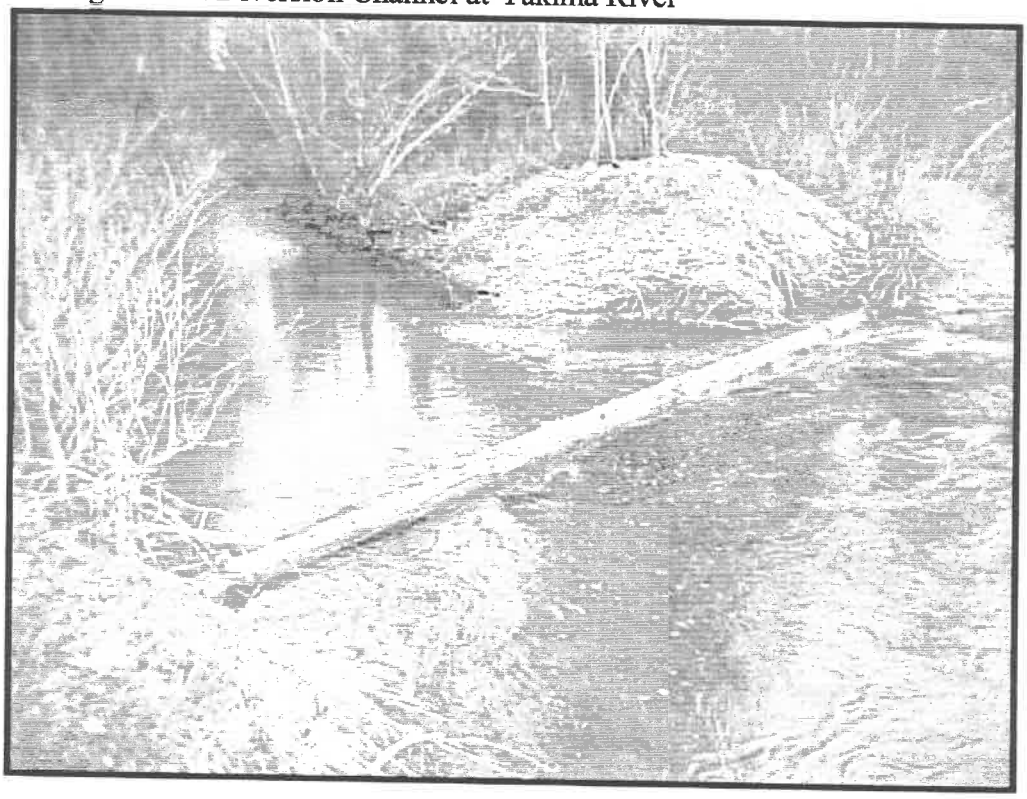
H-01

Younger Ditch Diversion

Diversion Intake Structure

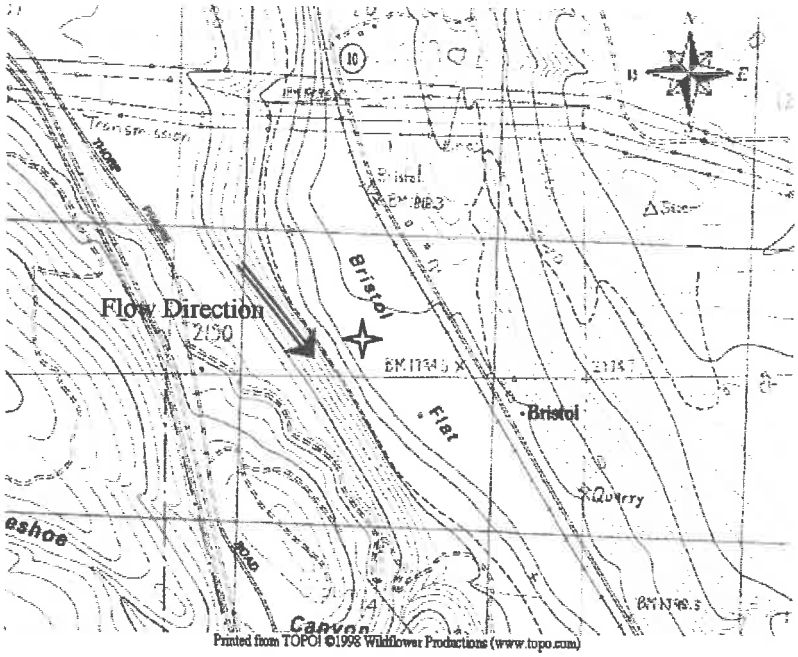


Younger Ditch Diversion Channel at Yakima River



WALLACE RANCH (BRISTOL FLATS) DIVERSION

Location: The Wallace Ranch (Bristol Flats) Diversion is located on the left (northeast) bank of the Yakima River approximately 7.5 miles downstream from the City of Cle Elum (see Figure at right).



Facilities: The diversion consists of a backwater channel off the Yakima River which allows flow into a pump intake. The diversion channel is approximately 20 feet wide and 80 feet long.

Hydraulic/Geomorphic Setting: The Wallace Ranch (Bristol Flats) diversion channel sits on the left bank of the Yakima River on a relatively straight reach of the river. The diversion is located approximately 100 feet downstream of a small constriction and riffle in the river. The river width at the inlet to the diversion channel is approximately 210 feet. The flow depth in the main channel near the diversion site was approximately 1.8 feet at the time of the survey (corresponding to a flow of about 624 cfs). It appears that there is considerable sedimentation in the backwater channel leading from the Yakima River to the pump intake. At the time of the survey, the water depth at the inlet to the backwater channel was approximately 8 inches. If Yakima River water levels drop below the level of the sediment deposits, diversions at this site would be precluded.

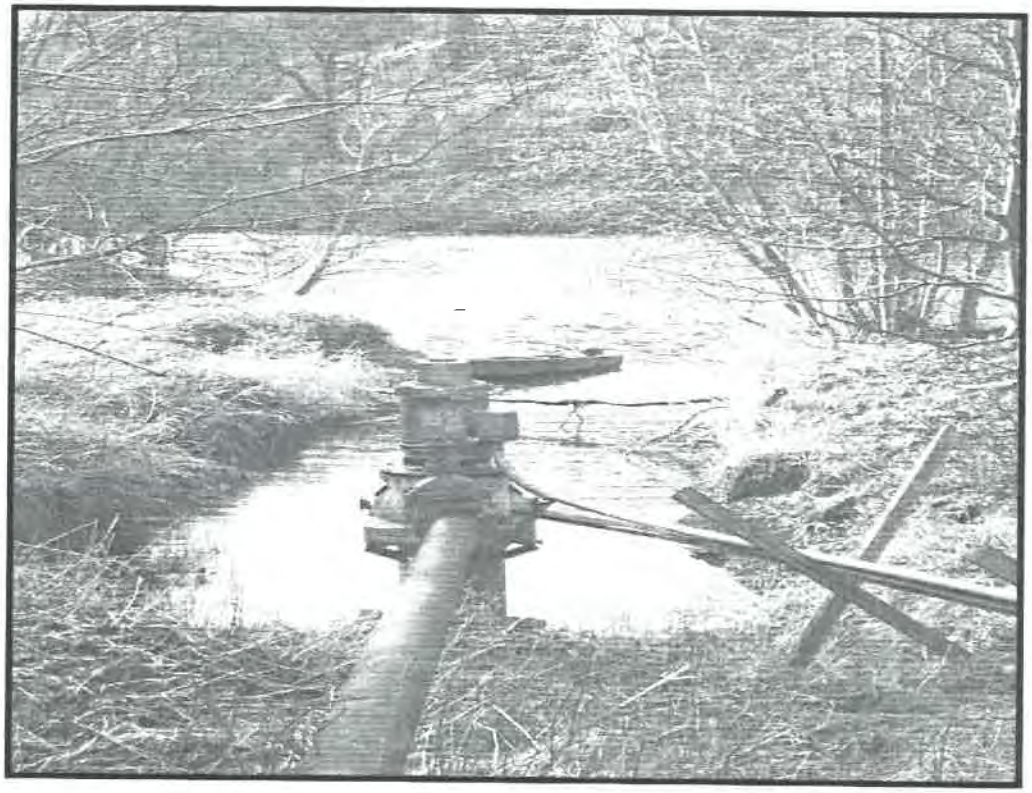
Hydraulic Analysis: The potential water level impacts of the proposed Trendwest point of diversion relocation for this site were computed using ManningSolver. The water levels were calculated for existing and proposed low flow conditions using the surveyed cross sections provided by W&H Pacific, a Mannings 'n' estimate of 0.043 and a water surface slope of 0.00152 ft/ft. The water surface slope was calculated from the W&H Pacific survey data. Comparing the proposed and baseline condition, computed water level differences at the inlet to the Wallace Ranch diversion channel range from +0.01 feet early in the irrigation season to -0.01 feet later in the season. The largest reduction in water surface is seen in the month of September when the Trendwest diversion, as a percentage of Yakima River flow, is the highest. Based on our analysis the proposed diversion relocation may result in small increases or decreases in water levels at the inlet to the Wallace Ranch diversion channel but computed differences were in the range of ±0.01 feet.

Table 3. Wallace Ranch (Bristol Flats) Diversion Site Analysis Results

Time Period	Minimum Flow (cfs)		Water Surface Elevation (feet assumed datum)		
	Baseline Conditions	Proposed Conditions	Current Conditions	Proposed Conditions	Difference
May 1 – May 15	504	507	93.85	93.86	0.01
May 16 – May 31	580	583	93.98	93.99	0.01
June 1 – June 15	935	933	94.51	94.50	-0.01
June 16 – June 30	1434	1433	95.11	95.11	0.00
July 1 – July 15	1920	1918	95.61	95.61	0.00
July 16 – July 31	2852	2849	96.46	98.45	-0.01
Aug 1 – Aug 15	2655	2652	96.29	96.29	0.00
Aug 16 – Aug 31	1322	1318	94.98	94.98	0.00
Sep 1 – Sep 15	380	377	93.63	93.62	-0.01
Sep 16 – Sep 30	407	402	93.68	93.67	-0.01
Oct 1 – Oct 15	363	361	93.59	93.59	0.00
Oct 16 – Oct 31	210	209	93.26	93.26	0.00

Wallace Ranch (Bristol Flats) Diversion

View looking from the Wallace Ranch pump towards the Yakima River along the backwater channel



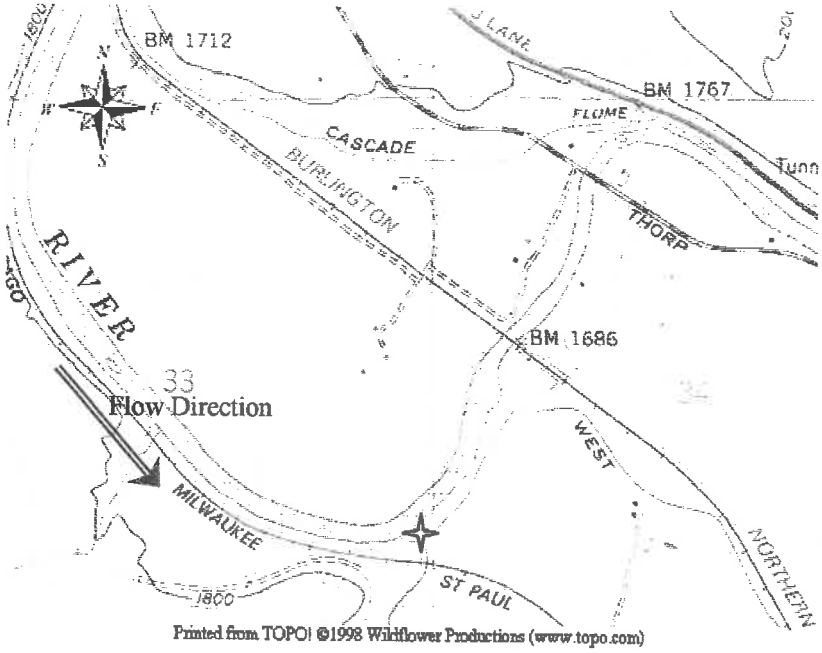
View looking southwest across the Yakima River just downstream of the diversion channel



H-01

WESTSIDE DIVERSION

Location: The Westside Irrigation Company diversion is located on the right (south) bank of the Yakima River approximately 2000 feet upstream of the Burlington Northern Railroad Bridge and approximately 5700 feet upstream of the Thorp Highway bridge north of Thorp, Washington.



Facilities: The Westside diversion consists of a gated intake structure on the right bank of the Yakima River which directs flow into a 20 foot wide trapezoidal channel leading approximately 1500 feet to a second hydraulic structure. The second facility includes a rolling drum fish screen with a return flow bypass to the Yakima River and several gated openings leading to irrigation canals.

Hydraulic/Geomorphic Setting: The Westside diversion intake structure is located on the right bank of the Yakima River on the outside of a large meander bend. The Yakima River is approximately 160 feet wide near the location of the diversion. As a result of the meander bend, channel is deeper along the right bank than at other points across this section. Thus, the siting of this diversion structure is appropriate from a hydraulic standpoint. Although the diversion structure is located appropriately, it is our understanding that flow depths in this wide reach of the river are typically too low for the Westside Irrigation Company to make their full diversion during the low flow season. It is our understanding that Westside annually places ecology blocks part way across the Yakima River downstream from the diversion site to backwater into the intake structure (Vern Burkhardt, Westside, Pers. Comm..). The placement (location, design, size) of these ecology blocks was described to us by Mr. Burkhardt as two rows high across about 2/3 of the river channel (i.e. approximately 110 feet out from the right (south) channel bank).

Hydraulic Analysis: The water level impacts of the Trendwest relocation for the Westside diversion site with and without ecology blocks were computed with the HEC-RAS hydraulic model. The model was created based on three cross sections field surveyed by W&H Pacific located: 1) downstream of the diversion site at the point at which the irrigation district places ecology blocks, 2) at the diversion intake structure, and 3) approximately 100 feet upstream of the diversion structure. Using the HEC-RAS model the anticipated water levels at the diversion site for the existing and proposed low flow conditions were estimated. Simulations were performed for the existing stream channel without ecology blocks and with the assumption of ecology blocks placed as described by Vern Burkhardt.

Based on the simulations, the Trendwest diversion relocation would result in water level differences

ranging from an increase of 0.02 feet to a reduction of 0.01 feet at the diversion site if ecology blocks are not in place (i.e. for the natural river condition). With the ecology blocks in place the simulated differences in water levels at the diversion site range from +0.03 to -0.01 feet. The largest reduction in water level is predicted in the month of September when the diversion as a percentage of flow is the highest.

Potential mitigation measures to offset the impacts of the proposed diversion relocation were evaluated using HEC-RAS. These simulations indicate the ecology blocks would need to be extended approximately 1.0 feet further into the river to offset the effects of the Trendwest proposal in any of the periods being studied.

Table 4. Westside Diversion Site Analysis Results (With No Ecology Blocks in Place)

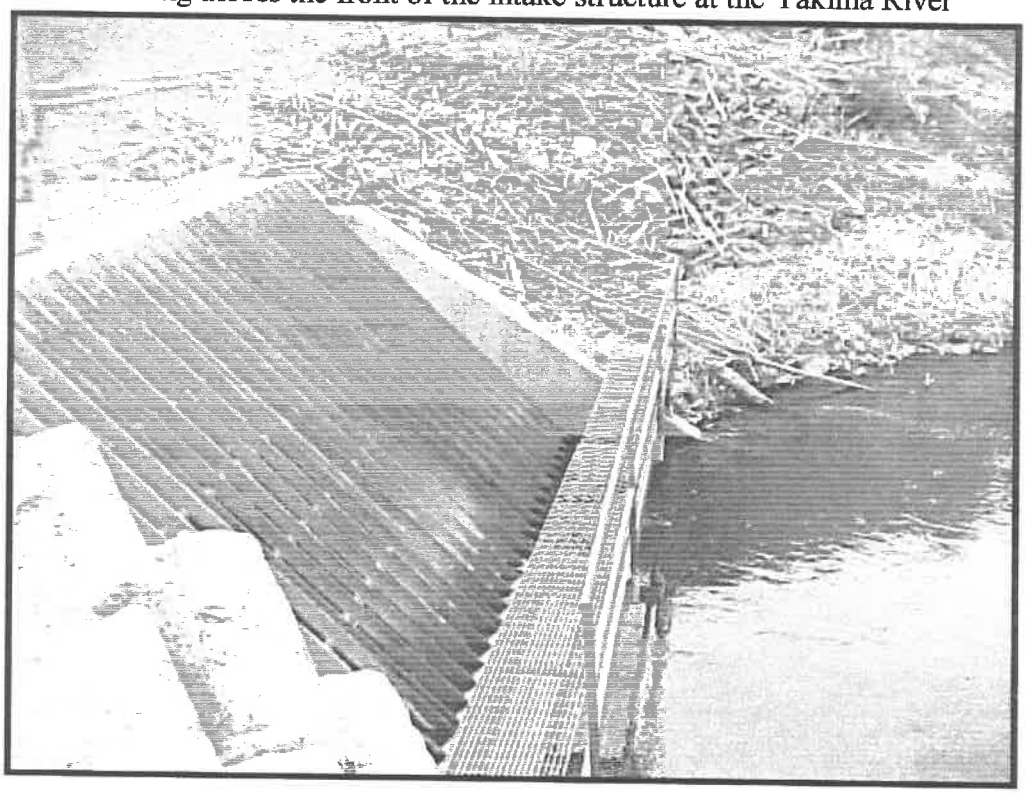
Time Period	Minimum Flow (cfs)		Water Surface Elevation (feet assumed datum)		
	Baseline Conditions	Proposed Conditions	Current Conditions	Proposed Conditions	Difference
May 1 – May 15	504	513	88.80	88.82	0.02
May 16 – May 31	580	588	88.95	88.97	0.02
June 1 – June 15	935	938	89.53	89.54	0.01
June 16 – June 30	1434	1438	90.18	90.18	0.00
July 1 – July 15	1920	1922	90.70	90.70	0.00
July 16 – July 31	2852	2850	91.54	91.54	0.00
Aug 1 – Aug 15	2655	2652	91.38	91.37	-0.01
Aug 16 – Aug 31	1322	1318	90.04	90.04	0.00
Sep 1 – Sep 15	380	377	88.54	88.53	-0.01
Sep 16 – Sep 30	407	403	88.60	88.59	-0.01
Oct 1 – Oct 15	363	361	88.48	88.48	0.00
Oct 16 – Oct 31	210	209	87.99	87.99	0.00

Table 5. Westside Diversion Site Analysis Results (With Ecology Blocks in Place)

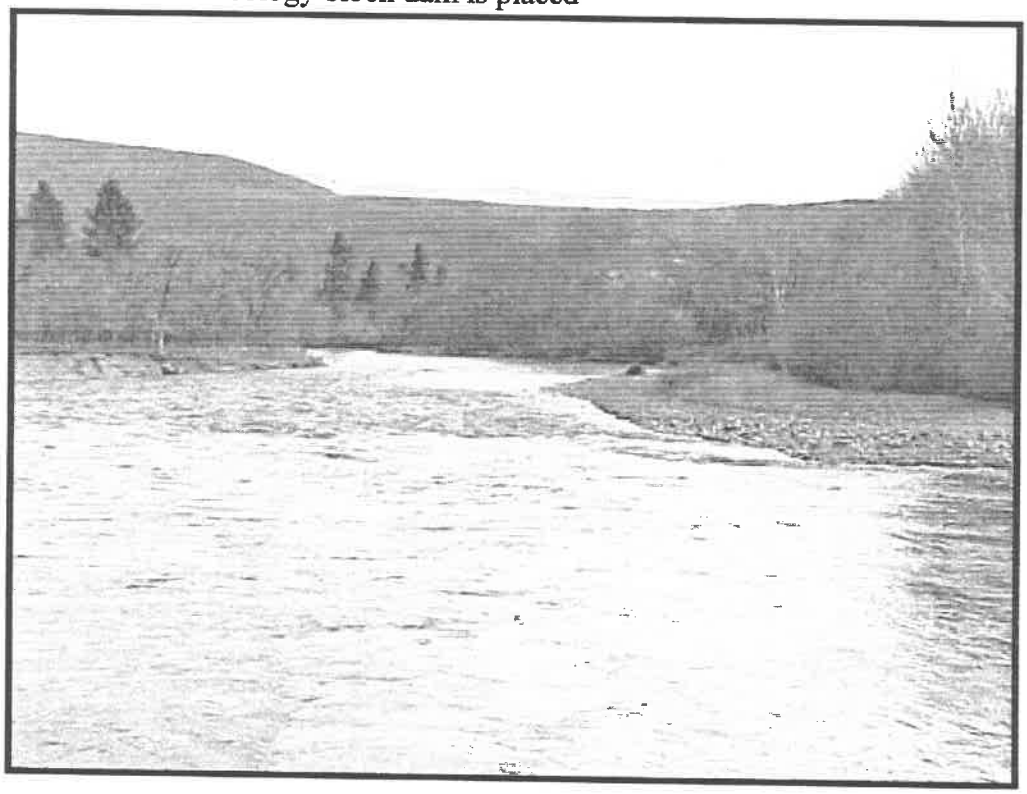
Time Period	Minimum Flow (cfs)		Water Surface Elevation (feet assumed datum)		
	Baseline Conditions	Proposed Conditions	Current Conditions	Proposed Conditions	Difference
May 1 – May 15	504	513	89.66	89.69	0.03
May 16 – May 31	580	588	89.90	89.92	0.02
June 1 – June 15	935	938	90.83	90.83	0.00
June 16 – June 30	1434	1438	91.73	91.73	0.00
July 1 – July 15	1920	1922	92.20	92.20	0.00
July 16 – July 31	2852	2850	93.02	93.01	-0.01
Aug 1 – Aug 15	2655	2652	92.85	92.85	0.00
Aug 16 – Aug 31	1322	1318	91.60	91.60	0..00
Sep 1 – Sep 15	380	377	89.26	89.25	-0.01
Sep 16 – Sep 30	407	403	89.35	89.34	-0.01
Oct 1 – Oct 15	363	361	89.20	89.19	-0.01
Oct 16 – Oct 31	210	209	88.57	88.57	0.00

Westside Irrigation Company Diversion

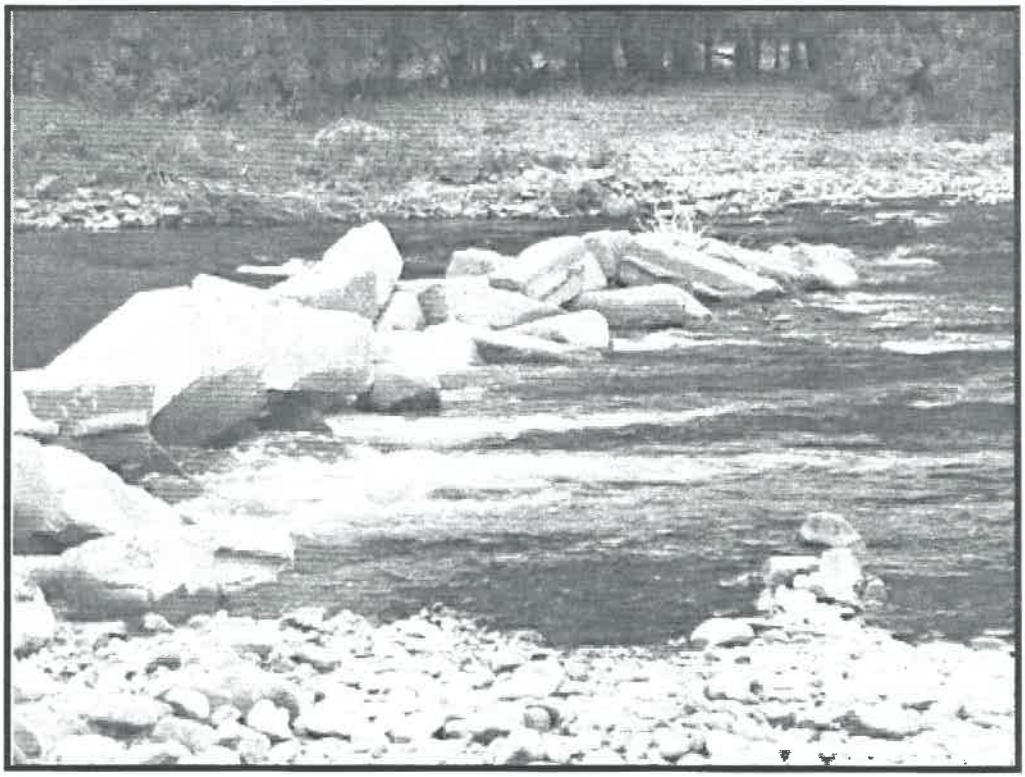
View looking across the front of the intake structure at the Yakima River



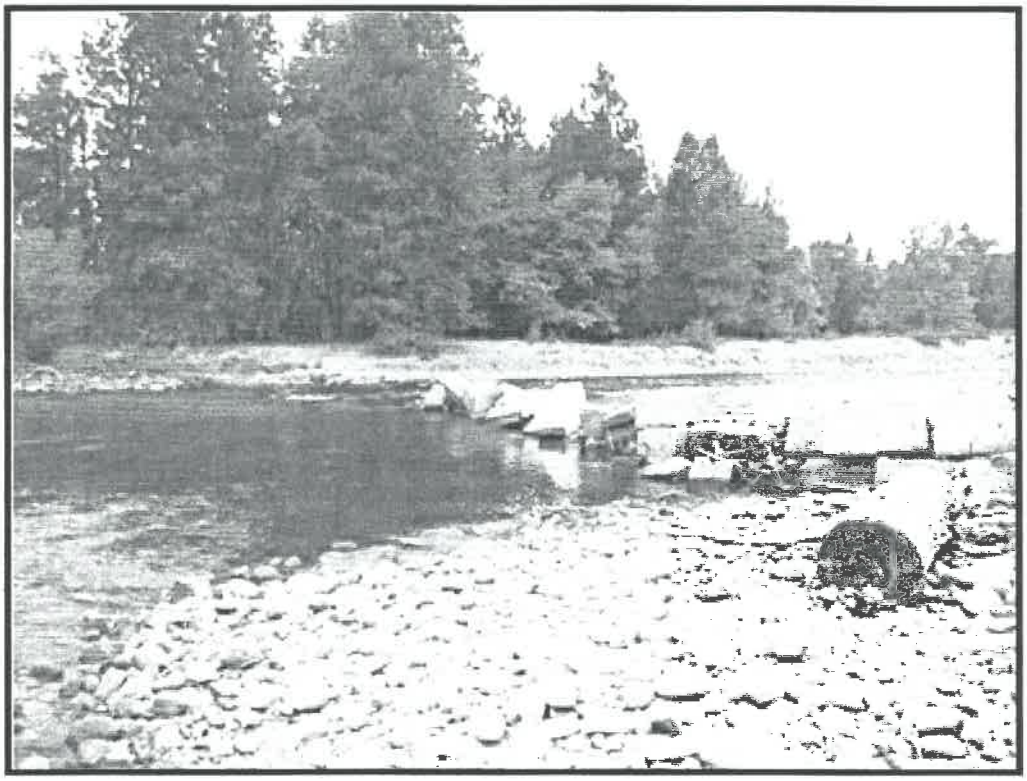
View looking across Yakima River downstream of diversion site at approximate location where ecology block dam is placed



View looking north at ecology block dam in Yakima River (10/31/2001)



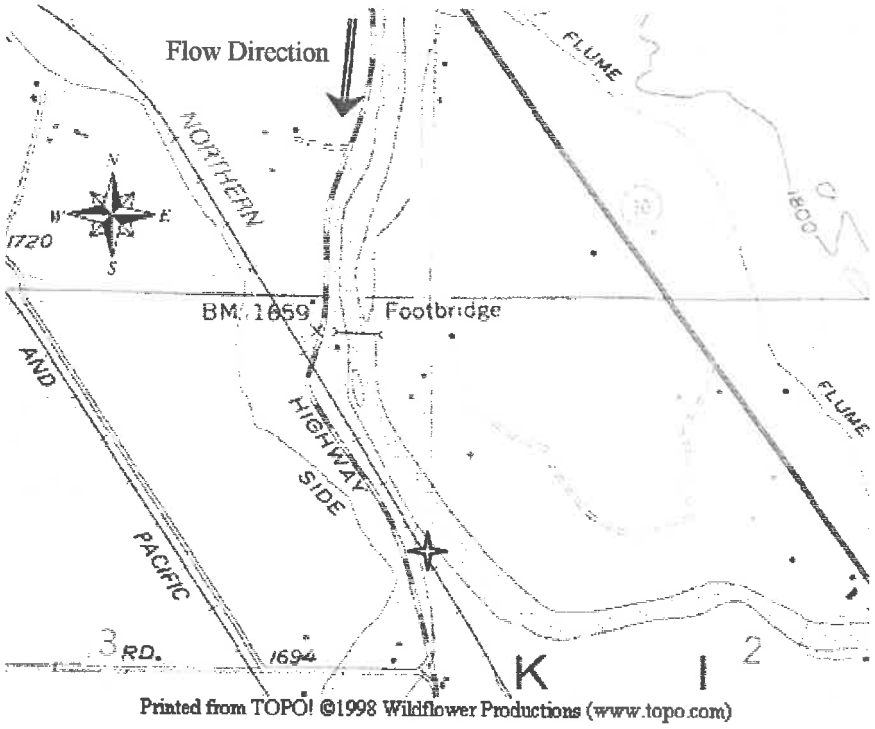
View looking at ecology block dam in Yakima River from upstream (10/31/2001)



H-01

THORP DIVERSION

Location: The Thorp Diversion is located on the right (south) bank of the Yakima River approximately 2.8 miles downstream of the Thorp Highway Bridge north of the town of Thorp, Washington.



Facilities: The Thorp diversion consists of an ungated side channel diversion from the Yakima River which directs flow into a 3-5 foot wide diversion channel. The diversion structure consists of 4 side by side box culverts that pass under the Burlington Northern railroad track. At the time of the site reconnaissance most of the intake structure was blocked with fine-grained sediments. The section of the diversion channel near the Yakima River was also very overgrown, with tall grasses and some trees encroaching on the channel. The irrigation ditches and any hydraulic structures associated with the diversion were not observed during the March field reconnaissance.

Hydraulic/Geomorphic Setting: The Thorp diversion channel sits on the right bank of the Yakima River in a relatively straight reach of the river which is constrained from lateral movement by the Burlington Northern Railroad fill. At the time of the site visit flows in this section of the river were shallow and swift moving. As noted above much of the diversion structure is currently blocked with fine-grained sediments. At the time of the site reconnaissance, with estimated Yakima River flows of about 2,000 cfs, the water in the one open box was about 8 inches deep and formed a channel about 3 feet wide.

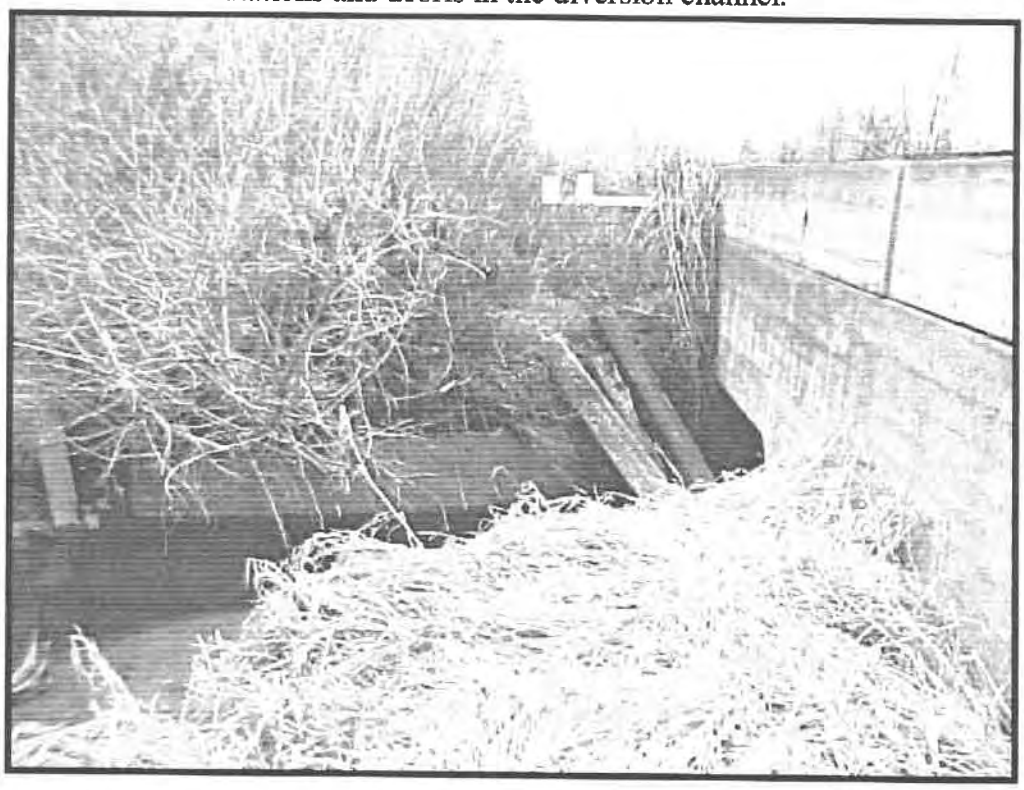
Hydraulic Analysis: The water level impacts of the Trendwest relocation for this site were computed with ManningSolver. The water levels were calculated for existing and proposed low flow conditions using the surveyed cross section provided by W&H Pacific, a Manning 'n' estimate of 0.045 and a water surface slope of 0.00182 ft/ft. The water surface slope was calculated from the W&H Pacific survey data. Comparing the proposed and baseline condition, computed water level differences at the inlet to the Thorp diversion channel range from +0.02 feet early in the irrigation season to -0.01 feet later in the season. The largest reduction in water surface is seen in the month of September when the Trendwest diversion as a percentage of Yakima River flow is the highest. Based on this analysis the proposed diversion relocation may result in a small increase or decrease in water levels at the inlet to the Thorp diversion channel but the largest computed reductions were less than or equal to 0.01 feet.

Table 6. Thorp Diversion Site Analysis Results

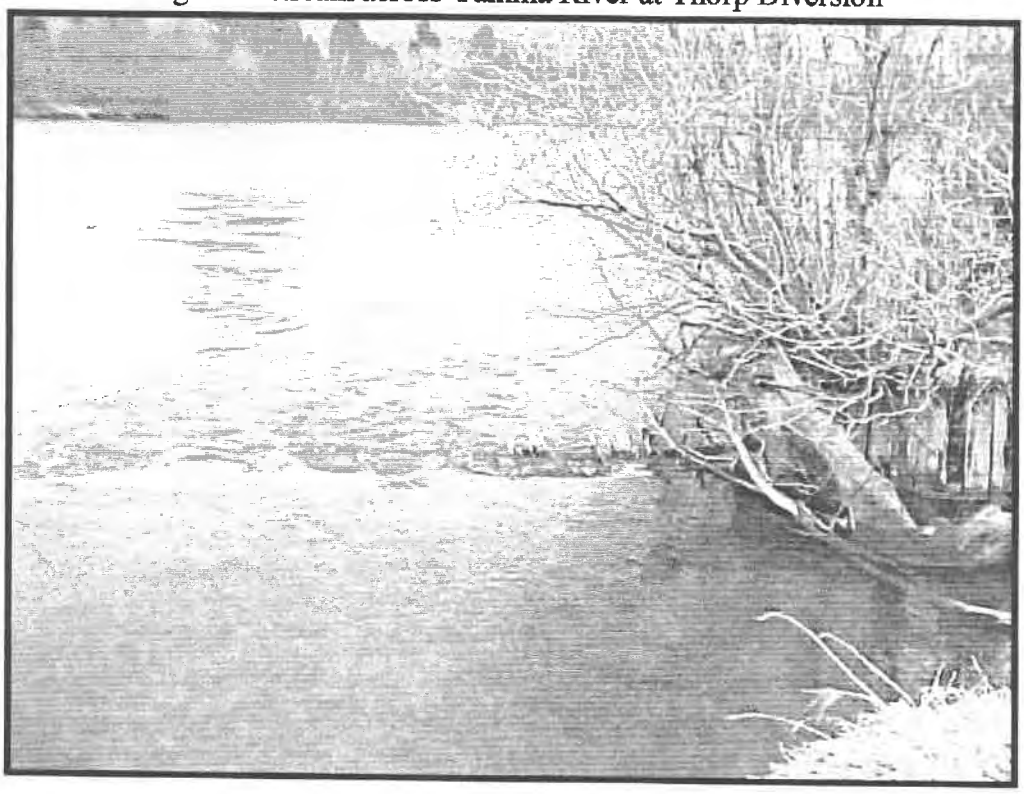
Time Period	Minimum Flow (cfs)		Water Surface Elevation (feet assumed datum)		
	Baseline Conditions	Proposed Conditions	Current Conditions	Proposed Conditions	Difference
May 1 – May 15	504	513	89.46	89.48	0.02
May 16 – May 31	580	588	89.60	89.61	0.01
June 1 – June 15	935	938	90.17	90.17	0.00
June 16 – June 30	1434	1438	90.83	90.83	0.00
July 1 – July 15	1920	1922	91.35	91.35	0.00
July 16 – July 31	2852	2850	92.20	92.20	0.00
Aug 1 – Aug 15	2655	2652	92.03	92.03	0.00
Aug 16 – Aug 31	1322	1318	90.69	90.68	-0.01
Sep 1 – Sep 15	380	377	89.20	89.19	-0.01
Sep 16 – Sep 30	407	403	89.26	89.25	-0.01
Oct 1 – Oct 15	363	361	89.15	89.15	0.00
Oct 16 – Oct 31	210	209	88.70	88.69	-0.01

Thorp Diversion

View looking downstream at Thorp Diversion structure showing sediment accumulations and debris in the diversion channel.

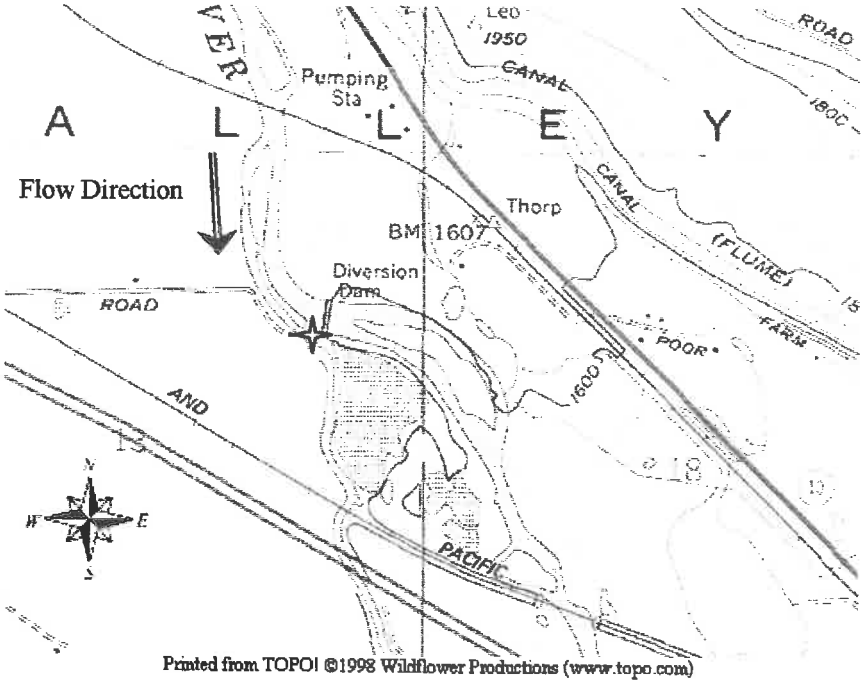


View looking downstream across Yakima River at Thorp Diversion



PACKWOOD DIVERSION

Location: The Packwood Diversion is located on the right (west) bank of the Yakima River approximately 2000 feet downstream of the Burlington Northern Railroad Bridge near Thorp, Washington.



Facilities: The diversion consists of an ungated side channel diversion from the Yakima River that directs flow into the Ellensburg canal. The intake was only viewed from across the Yakima River, thus it is not known what hydraulic controls are present. The USGS topographic maps for this location indicate that the irrigation canal leading from this diversion structure is quite large. We are not aware of any operational difficulties due to low flows at the Packwood diversion.

Hydraulic/Geomorphic Setting: The Packwood Diversion structure protrudes out from the right bank of the Yakima River on the outside of a large meander bend. As a result of this meander, flow depths are likely to be deeper along the right channel bank than at other points across this section. Thus, the siting of this diversion structure is appropriate from a hydraulic standpoint. Analysis of aerial photos of this reach of the river indicate that there is extensive erosion and deposition occurring near the diversion and significant human induced modifications have been undertaken over the last 40 years (see discussion of Cascade Irrigation diversion which follows). For example, it is clear that the river has been eroding the right bank upstream of the diversion over time. It is also apparent that bank protection measures (armoring and barbs) have been installed to constrain additional channel migration. Without the bank protection measures it is likely that the meander would continue to move downstream and could crate problems for the Packwood diversion. During the field visit, the Packwood diversion structure looked to be full of wood debris. This debris was not accounted for in any of our computations

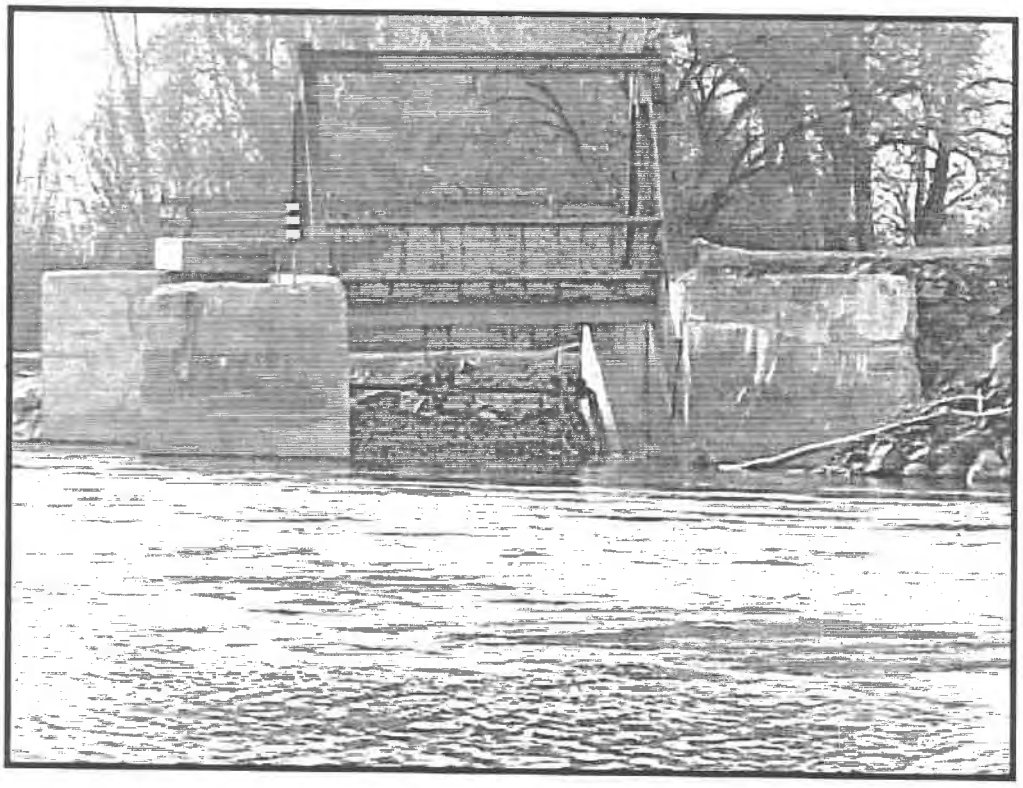
Hydraulic Analysis: The water level impacts of the Trendwest relocation for this site were computed with ManningSolver. The water levels were calculated for existing and proposed low flow conditions using the surveyed cross section provided by W&H Pacific, a Manning 'n' estimate of 0.045 and a water surface slope of 0.00078 ft/ft. The water surface slope was calculated from the W&H Pacific survey data. Comparing the proposed and baseline conditions, computed water level differences at the inlet to the Packwood diversion channel range from +0.04 feet early in the irrigation season to -0.02 feet later in the season. The largest reduction in water surface is seen in the month of September when the Trendwest diversion as a percentage of Yakima River flow is the highest. Based on our analysis the water surface elevation reductions anticipated under the proposed diversion relocation would be 0.02 feet or less.

Table 7. Packwood Diversion Site Analysis Results

Time Period	Minimum Flow (cfs)		Water Surface Elevation (feet assumed datum)		
	Baseline Conditions	Proposed Conditions	Current Conditions	Proposed Conditions	Difference
May 1 – May 15	504	513	95.21	95.25	0.04
May 16 – May 31	580	588	95.54	95.57	0.03
June 1 – June 15	935	938	96.84	96.85	0.01
June 16 – June 30	1434	1438	98.57	98.58	0.01
July 1 – July 15	1920	1922	99.56	99.57	0.01
July 16 – July 31	2852	2850	101.15	101.15	0.00
Aug 1 – Aug 15	2655	2652	100.84	100.83	-0.01
Aug 16 – Aug 31	1322	1318	98.33	98.32	-0.01
Sep 1 – Sep 15	380	377	94.62	94.60	-0.02
Sep 16 – Sep 30	407	403	94.75	94.73	-0.02
Oct 1 – Oct 15	363	361	94.53	94.52	-0.02
Oct 16 – Oct 31	210	209	93.64	93.63	-0.01

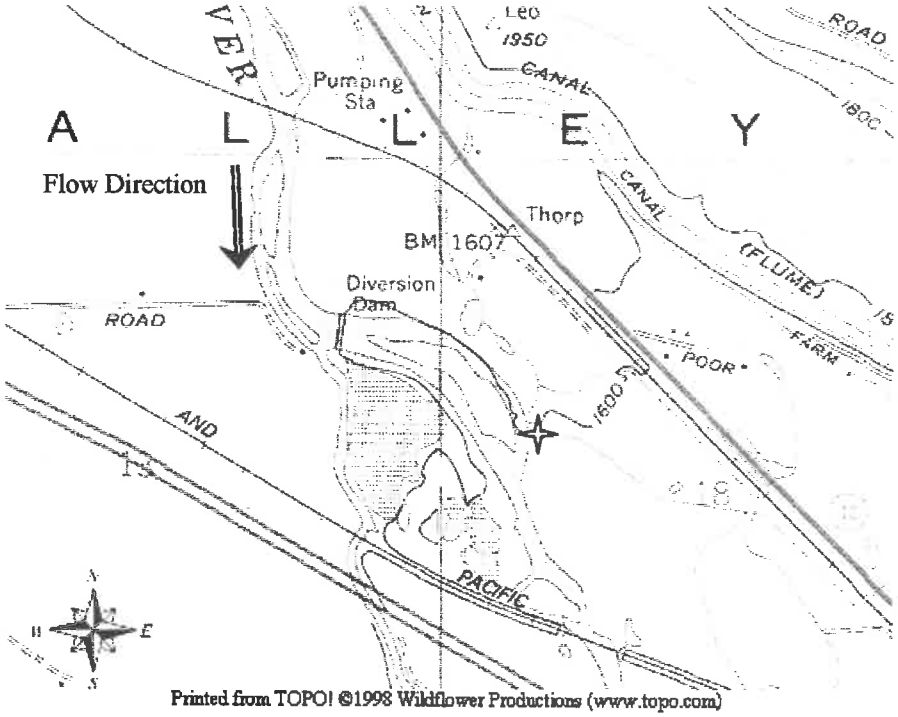
Packwood Diversion

View looking downstream (west) across Yakima River to Packwood diversion structure



CASCADE IRRIGATION COMPANY DIVERSION

Location: The Cascade Irrigation Co. diversion is located on the left (north) bank of the Yakima River approximately 4000 feet downstream of the Burlington Northern Railroad Bridge near Thorp, Washington.



Facilities: The Cascade diversion consists of an intake structure on the left bank of a side channel of the Yakima River. The intake structure comprises 4 independently operable gates that direct flow into a large irrigation canal. Approximately 100 feet along the irrigation canal is another hydraulic structure and a measurement flume. A pump station is also located at this point.

Hydraulic/Geomorphic Setting: The Cascade Irrigation diversion intake sits on the left bank of a side channel of the Yakima River downstream of a complex flow split. Upstream of the diversion flow is divided among the following four potential routes: 1) the Packwood diversion, 2) the Gladmar channel, 3) the main stem Yakima River, and 4) the Cascade side channel. At the time of the site reconnaissance the total flow in the Yakima River upstream of the flow split was estimated to be about 2,000 cfs. It appeared that discharges to the Gladmar channel were larger than the combined discharges down the Yakima River main stem and Cascade side channel. It didn't appear that there were any discharges down the Packwood diversion.

The hydraulic complexities upstream of the Cascade irrigation diversion are a result of ongoing natural geomorphic processes and human induced river modifications. Extensive sediment movement and deposition by the river results in continually changing hydraulic conditions. Review of aerial photographs spanning the period 1972 through 1998 show that the Cascade side channel has been transformed from the primary flow path to a small side channel that likely requires extensive sediment removal to keep flowing. Analysis of the aerial photos indicates that human modifications to this stretch of the river over the last 40 years include levee building, bank armoring, construction of barbs, dredging of channels, and opening the Gladmar channel. Each of these modifications has had an effect on sediment deposition, and by extension, flows in the Cascade side channel.

H-01

Some of these modifications, for instance the armoring of the left bank upstream of the Packwood diversion and the opening of the Gladmar channel, have likely had a significant effect on depositional processes that affect the ongoing operation of the Cascade Irrigation diversion. As observed at the site reconnaissance, it appears that the head of the Cascade irrigation side channel is being infilled with sediment as a result of deposition associated with the upstream point bar. Furthermore, initial review of aerial photos indicates that the Yakima River may be shifting towards the south at the location of the Gladmar channel opening. If the revetment blocking the Gladmar channel opening is not maintained, it is possible that the Gladmar channel might become the main flow path for the Yakima River. If this were to occur, it is possible that the side channel leading to the Cascade Irrigation diversion could be cutoff from the flow entirely.

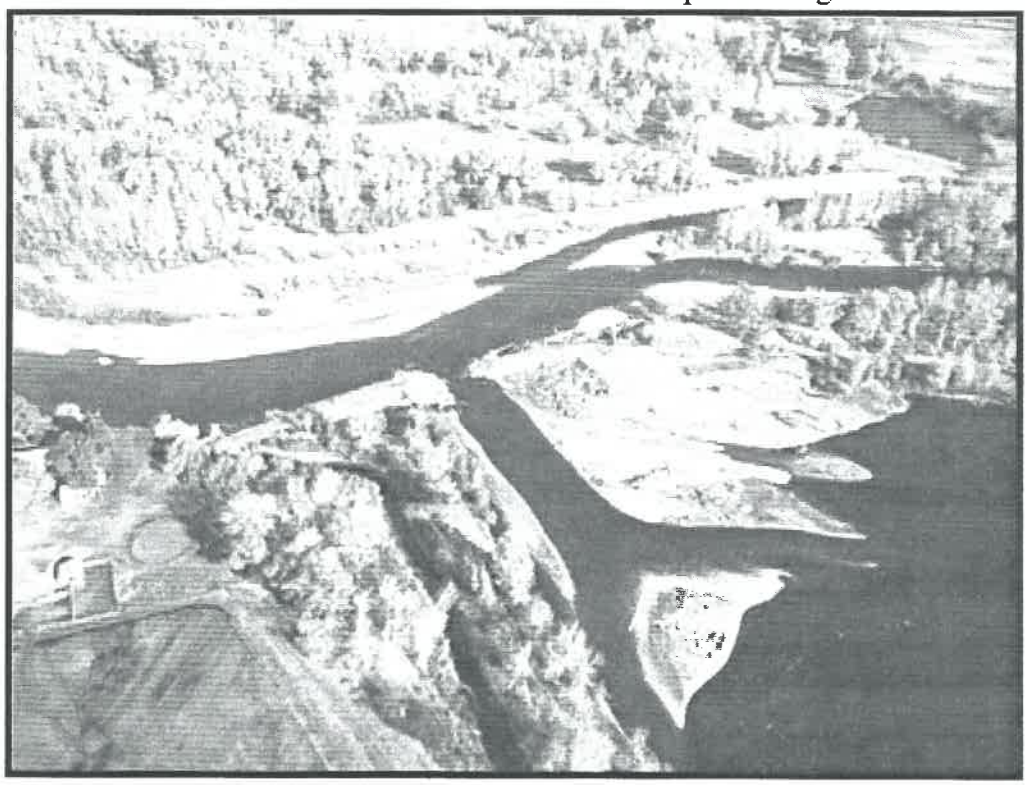
In addition to the human related river modifications described above we understand that the Cascade Irrigation Company annually installs temporary structures in the Yakima River (Tony Jantzer, Cascade Irrigation, Pers. Comm.). According to Mr. Jantzer, ecology block dams are installed in the main stem at the head of the island that divides the river, and in the Cascade side channel downstream of the diversion intake. We do not know the exact nature of these structures but we understand they are necessary if full irrigation diversions are to be made during periods of low flow.

Considering the ongoing geomorphic processes at this site, the history of human induced modifications to this reach of the river, and Cascade Irrigation's current program of in-channel structure placement, the impact of Trendwest's proposed diversion cannot be reasonably estimated at this time. However, we believe that any potential impacts will be minimal compared to changes that are occurring due to natural river processes. Clearly there are long-term geomorphic issues associated with this diversion that should be investigated and remediated. It was previously recommended that Cascade undertake a geomorphic review of the Yakima river near the Gladmar channel to examine current sedimentation processes, potential future sedimentation at the head of the Cascade side channel, the impacts of past river modifications on sedimentation in this reach, and alternatives for improving flow down the Cascade side channel. **nhc,** under contract to Trendwest, recently completed such an analysis for Cascade (2001).

Hydraulic Analysis: Considering the complexity of the flow split upstream of the Cascade Irrigation diversion and the ongoing geomorphic changes, low flow discharges at the diversion site could not be reasonably estimated for this preliminary analysis. Therefore no hydraulic analysis was undertaken for the Cascade diversion site. In lieu of hydraulic analysis, Trendwest is assisting Cascade with a geomorphic review and the development of mitigation alternatives for this site.

Cascade Irrigation Diversion

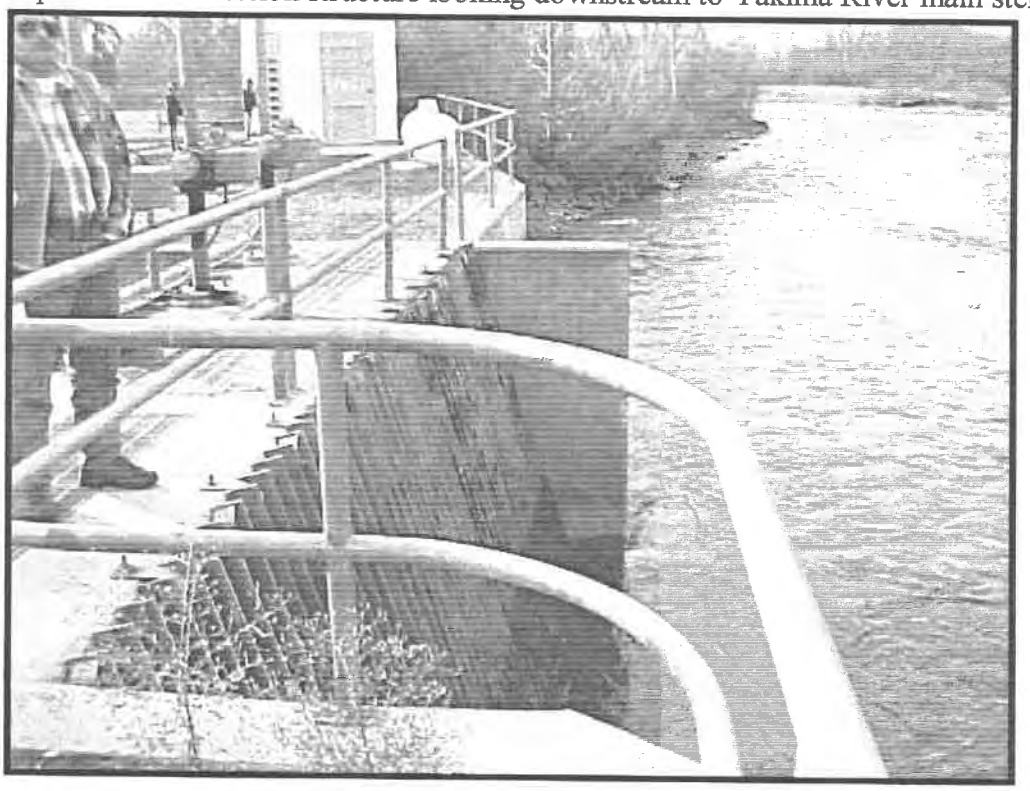
Aerial View of Packwood-Gladmar-Cascade Flow split looking north



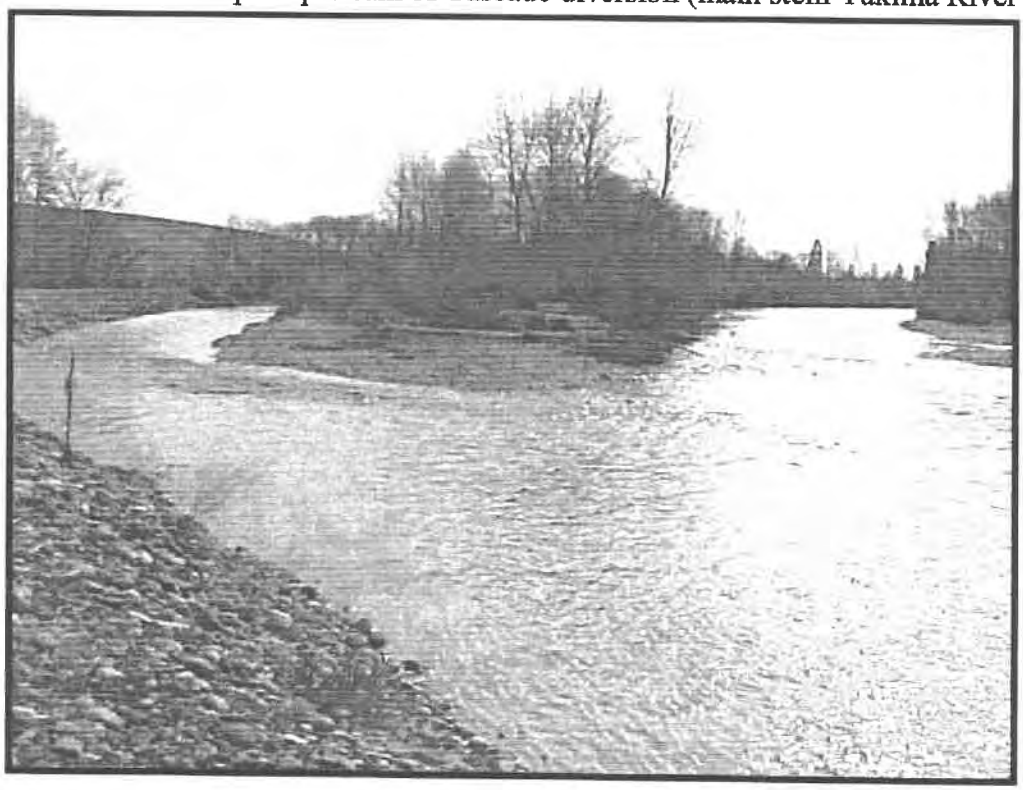
Aerial View of Packwood-Gladmar-Cascade Flow split looking south



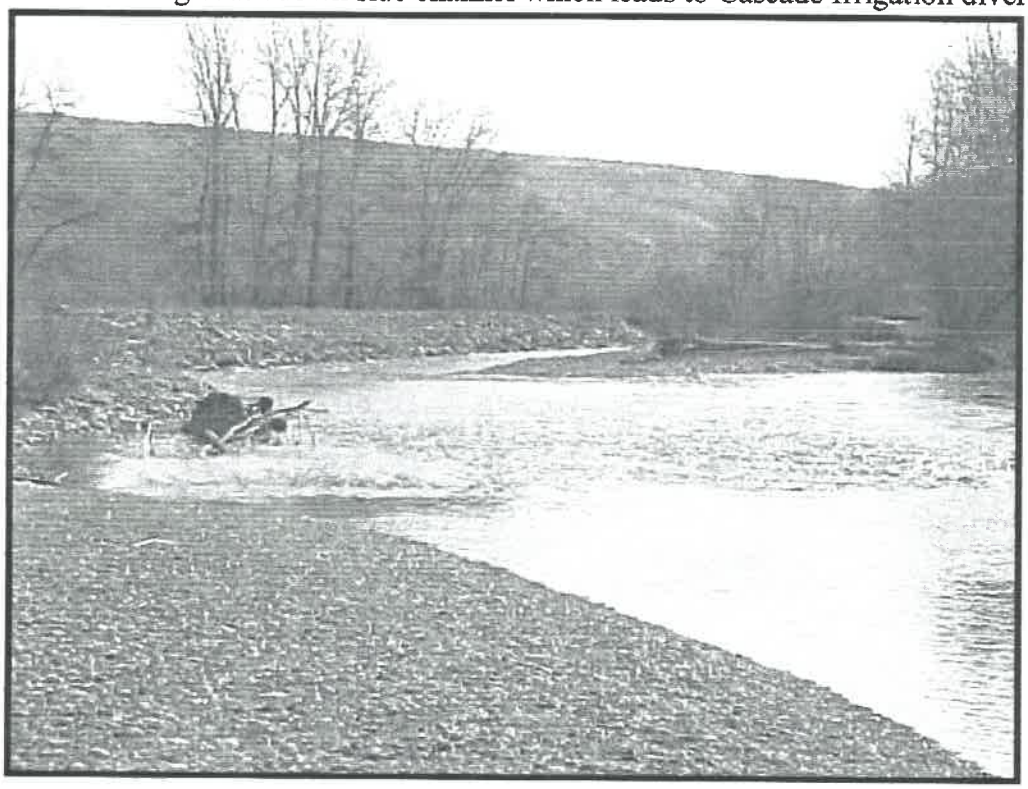
Upstream of diversion structure looking downstream to Yakima River main stem



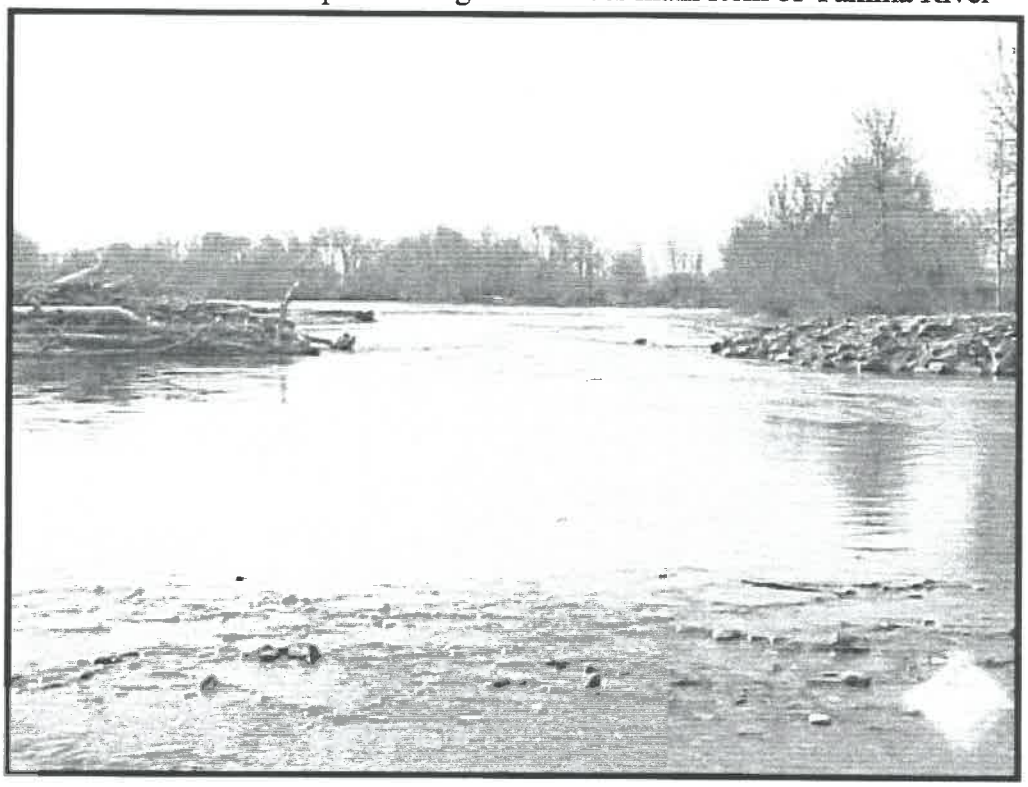
Island and flow split upstream of Cascade diversion (main stem Yakima River to right of island)



View looking south down side channel which leads to Cascade Irrigation diversion structure

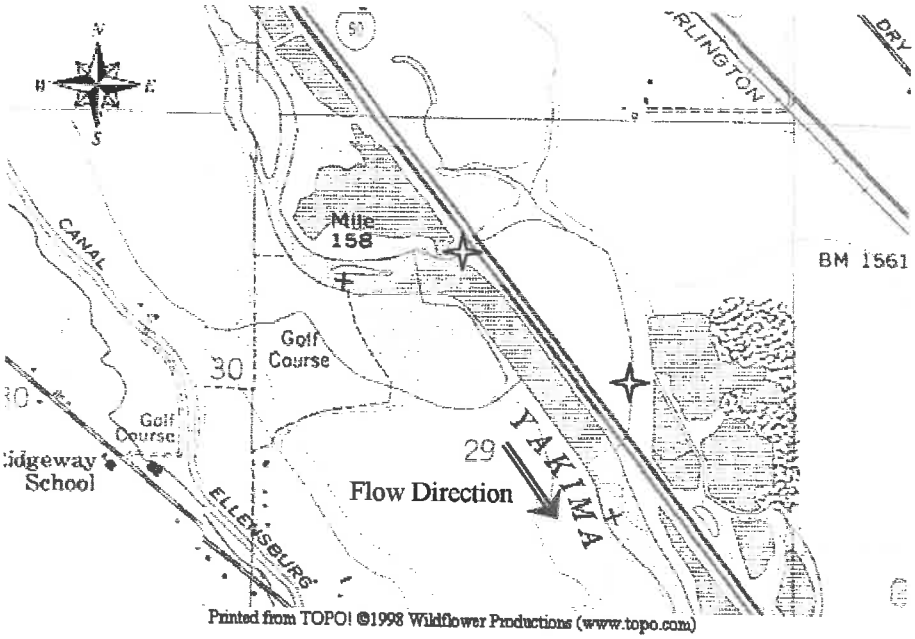


Gladmar channel flow split looking west across main stem of Yakima River



MILL DITCH DIVERSION

Location: The Mill Ditch Diversion is located on the left (north) bank of the Yakima River near Ellensburg, Washington.



Facilities: The diversion consists of a lateral diversion off a side channel of the Yakima River. Flow diverted from the Yakima River side channel is directed into a 15 foot wide ditch leading approximately 100 feet to a twin culvert crossing under I-90. Approximately 500 feet downstream of the I-90 crossing the diversion ditch joins with flow from a small groundwater fed lake and discharges from Dry Creek. From there, flow passes approximately 1750 feet before reaching the Mill Ditch diversion intake structure. A rock weir across the channel maintains water levels at the diversion structure with return flows bypassing to the Yakima River via another channel under I-90. The intake includes several gated diversion openings. Downstream of the intake structure diverted flows pass over a measurement weir and then enter the Mill Ditch irrigation system.

Hydraulic/Geomorphic Setting: The Mill Ditch diversion channel sits on the left bank of a side channel of the Yakima River. Discharges to the diversion channel are controlled by the level of water in the side channel and the level of a gravel bar on the left bank of the side channel. Discharges (and by extension water levels) in the side channel are controlled by a flow split in the Yakima River. This flow split was not visited during the field reconnaissance. It is our understanding that the Washington Department of Transportation periodically removes gravel from the side channel entrance to increase flows being directed towards the diversion channel (Lathrop, Pers. Comm.). We do not know if this includes maintenance dredging only at the main stem of the Yakima River, maintenance dredging only in the side channel, or both.

Hydraulic Analysis: No hydraulic analysis was undertaken for this site. The hydraulics and hydrology of the Mill Ditch diversion are complicated by a number of factors including the dynamics of flow splits off the Yakima River, the hydrology of the groundwater lake, and the quantity of surface and subsurface flows in Dry Creek. Because Yakima River flows (and stages) downstream of the Mill Ditch site would theoretically not be affected by simply moving the point of diversion further upstream, and because the hydrologic modeling indicated that flows at this site would actually be increased in most months under the Trendwest proposal (due to additional tributary flows) the proposal should not result in any significant hydraulic impacts. Furthermore if WSDOT continues to manage sediment and maintain the Yakima River flow split, it appears that potential changes, resulting from either modified flows or future sedimentation at this site, could be dealt with through the current maintenance dredging program.

Mill Ditch Diversion

Mill Ditch Diversion intake structure (looking downstream)



Mill Ditch Diversion Channel Split from Side Channel of Yakima River (looking west)



H-01

REFERENCES

Northwest Hydraulic Consultants, Inc., December 2001, "Yakima River - Cascade Irrigation District Intake - Reconnaissance Of Sedimentation Problems", Letter Report prepared for Trendwest Resorts, Inc.

Brown and Caldwell, Inc., January 2002, Water Supply Technical Report - MountainStar Master Planned Resort and Cle Elum Urban Growth Area, Report prepared for Trendwest Resorts, Inc.

Appendix A

Flow Data

Summary of Upper Yakima River Water Balance Model Output
WY 1991 to 1993 and 1995 represent the average year condition
WY 2001 represents the drought condition
The individual columns show the change in flow at specific river locations due to the MPR and UGA resort development.

Minimum Flow (All Study Periods)

Dates	Yakima River at Cle Elum Gage (cfs)	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
May 1 - May 15	504	505	505	504	507	513	515	514
May 16 - May 31	580	581	581	580	583	588	590	590
June 1 - June 15	935	936	937	932	933	938	940	940
June 16 - June 30	1434	1435	1436	1431	1433	1438	1441	1440
July 1 - July 15	1920	1921	1922	1916	1918	1922	1925	1924
July 15 - July 31	2852	2853	2854	2847	2849	2850	2853	2852
Aug 1 - Aug 15	2655	2656	2657	2652	2652	2652	2655	2654
Aug 16 - Aug 31	1322	1321	1322	1317	1318	1318	1321	1320
Sept 1 - Sept 15	380	379	380	376	377	377	379	379
Sept 16 - Sept 30	407	407	407	404	402	403	405	404
Oct 1 - Oct 15	363	363	363	362	361	361	362	362
Oct 16 - Oct 31	210	210	210	209	209	209	209	208

Minimum Flow (Oct 1990 - Sept 1993, Oct 1994 - Sept 1995)

Dates	Yakima River at Cle Elum Gage (cfs)	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
May 1 - May 15	504	505	505	504	507	513	515	514
May 16 - May 31	580	581	581	580	583	588	590	590
June 1 - June 15	935	936	937	932	933	938	940	940
June 16 - June 30	1434	1435	1436	1431	1433	1438	1441	1440
July 1 - July 15	1920	1921	1922	1916	1918	1922	1925	1924
July 15 - July 31	2852	2853	2854	2847	2849	2850	2853	2852
Aug 1 - Aug 15	2900	2901	2902	2897	2898	2899	2902	2901
Aug 16 - Aug 31	1322	1321	1322	1317	1318	1318	1321	1320
Sept 1 - Sept 15	380	379	380	376	377	377	379	379
Sept 16 - Sept 30	425	425	425	421	420	420	422	422
Oct 1 - Oct 15	363	363	363	362	361	361	362	362
Oct 16 - Oct 31	210	210	210	209	209	209	209	208

Minimum Flow (Oct 2000 - Sept 2001)

Dates	Yakima River at Cle Elum Gage (cfs)	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
May 1 - May 15	901	901	902	900	902	904	906	906
May 16 - May 31	710	710	711	709	711	713	715	715
June 1 - June 15	1414	1414	1415	1411	1412	1415	1417	1416
June 16 - June 30	1725	1725	1726	1722	1723	1726	1728	1727
July 1 - July 15	1980	1981	1982	1975	1977	1978	1981	1980
July 15 - July 31	2941	2942	2942	2936	2938	2940	2942	2941
Aug 1 - Aug 15	2655	2656	2657	2652	2652	2652	2655	2654
Aug 16 - Aug 31	2077	2078	2079	2074	2074	2075	2078	2077
Sept 1 - Sept 15	437	437	437	434	434	434	436	435
Sept 16 - Sept 30	407	407	407	404	402	403	405	404
Oct 1 - Oct 15	548	548	548	547	546	547	548	548
Oct 16 - Oct 31	516	516	516	515	515	516	517	516

		Change In Yakima River Under Alternative 5 Reduced Density						
Date	Yakima River at Cle Elum Gage (cfs)	D/S Big Creek (cfs)	D/S Cle Elum River (cfs)	D/S Water Supply Diversion (cfs)	D/S Teanaway River (cfs)	D/S Swauk Creek (cfs)	D/S Mill Ditch Diversion (cfs)	D/S Reecer Creek (Ellensburg) (cfs)
10/1/90	363.0	362.62	363.30	362.31	360.89	361.11	362.28	361.69
10/2/90	363.0	362.56	363.24	362.25	360.82	361.33	362.49	361.91
10/3/90	442.0	441.56	442.24	441.25	439.82	440.55	441.72	441.13
10/4/90	468.0	467.56	468.24	467.25	465.82	467.02	468.19	467.60
10/5/90	434.0	433.62	434.30	433.31	431.88	433.08	434.25	433.66
10/6/90	394.0	393.62	394.30	393.31	391.88	393.55	394.72	394.13
10/7/90	370.0	369.62	370.30	369.31	367.88	369.50	370.67	370.08
10/8/90	363.0	362.62	363.30	362.31	360.88	362.29	363.46	362.87
10/9/90	363.0	362.56	363.24	362.26	360.83	361.87	363.04	362.45
10/10/90	378.0	377.56	378.24	377.26	375.83	377.07	378.24	377.65
10/11/90	386.0	385.56	386.24	385.26	383.83	384.86	386.03	385.44
10/12/90	442.0	441.56	442.24	441.26	439.83	441.70	442.87	442.28
10/13/90	418.0	417.67	418.35	417.37	415.94	417.84	419.01	418.43
10/14/90	434.0	433.67	434.35	433.37	431.94	433.85	435.01	434.43
10/15/90	580.0	579.67	580.35	579.37	577.94	579.85	581.01	580.43
10/16/90	590.0	589.67	590.31	589.32	589.32	590.56	590.68	590.09
10/17/90	477.0	476.67	477.31	476.32	476.32	477.56	477.68	477.09
10/18/90	504.0	503.67	504.31	503.32	503.32	502.95	503.06	502.47
10/19/90	477.0	476.63	477.27	476.28	476.28	476.37	476.49	475.90
10/20/90	434.0	433.63	434.27	433.28	433.28	433.84	433.95	433.37
10/21/90	610.0	609.63	610.27	609.28	609.28	610.30	610.41	609.83
10/22/90	706.0	705.63	706.27	705.28	705.28	706.30	706.42	705.83
10/23/90	739.0	738.63	739.27	738.28	738.28	739.30	739.42	738.83
10/24/90	762.0	761.63	762.27	761.28	761.28	762.31	762.42	761.83
10/25/90	798.0	797.69	798.32	797.34	797.34	798.59	798.70	798.12
10/26/90	846.0	845.69	846.32	845.34	845.34	846.59	846.70	846.12
10/27/90	810.0	809.69	810.32	809.34	809.34	810.59	810.71	810.12
10/28/90	651.0	650.69	651.32	650.34	650.34	651.59	651.71	651.12
10/29/90	600.0	599.69	600.32	599.34	599.34	600.59	600.71	600.12
10/30/90	580.0	579.69	580.32	579.34	579.34	580.59	580.71	580.12
10/31/90	590.0	589.69	590.32	589.34	589.34	590.60	590.71	590.13
11/1/90	590.0	589.69	590.37	589.70	589.70	589.49	589.60	589.01
11/2/90	570.0	569.69	570.37	569.70	569.70	569.56	569.68	569.09
11/3/90	540.0	539.69	540.37	539.70	539.70	539.56	539.68	539.09
11/4/90	861.0	860.69	861.37	860.70	860.70	860.56	860.68	860.09
11/5/90	1194.0	1193.69	1194.37	1193.70	1193.70	1193.60	1193.71	1193.13
11/6/90	998.0	997.69	998.37	997.70	997.70	997.60	997.71	997.13
11/7/90	812.0	811.69	812.37	811.70	811.70	811.60	811.71	811.13
11/8/90	839.0	838.69	839.37	838.70	838.70	838.60	838.71	838.13
11/9/90	2141.0	2140.69	2141.37	2140.70	2140.70	2140.62	2140.74	2140.15
11/10/90	6013.0	6012.69	6013.37	6012.70	6012.70	6012.62	6012.74	6012.15
11/11/90	2559.0	2558.74	2559.43	2558.75	2558.75	2558.67	2558.79	2558.20
11/12/90	1572.0	1571.74	1572.43	1571.75	1571.75	1571.67	1571.79	1571.20
11/13/90	1367.0	1366.74	1367.43	1366.75	1366.75	1366.67	1366.79	1366.20
11/14/90	1206.0	1205.74	1206.43	1205.75	1205.75	1205.68	1205.79	1205.20
11/15/90	1098.0	1097.74	1098.43	1097.75	1097.75	1097.68	1097.79	1097.20
11/16/90	1022.0	1021.74	1022.43	1021.75	1021.75	1021.68	1021.79	1021.20
11/17/90	899.0	898.74	899.43	898.75	898.75	898.68	898.79	898.20
11/18/90	880.0	879.74	880.43	879.75	879.75	879.68	879.79	879.20
11/19/90	839.0	838.74	839.43	838.75	838.75	838.70	838.82	838.23
11/20/90	798.0	797.74	798.43	797.75	797.75	797.70	797.82	797.23
11/21/90	552.0	551.74	552.43	551.75	551.75	551.70	551.82	551.23
11/22/90	1251.0	1250.74	1251.43	1250.75	1250.75	1250.70	1250.82	1250.23
11/23/90	2013.0	2012.73	2013.42	2012.75	2012.75	2012.70	2012.81	2012.22
11/24/90	7426.0	7425.73	7426.42	7425.75	7425.75	7425.70	7425.81	7425.22
11/25/90	10600.0	10599.73	10600.42	10599.75	10599.75	10599.70	10599.81	10599.22
11/26/90	3606.0	3605.73	3606.42	3605.75	3605.75	3605.70	3605.81	3605.23

11/27/90	2732.0	2731.73	2732.42	2731.75	2731.75	2731.70	2731.81	2731.23
11/28/90	2168.0	2167.73	2168.42	2167.75	2167.75	2167.70	2167.81	2167.23
11/29/90	2732.0	2731.73	2732.42	2731.75	2731.75	2731.70	2731.81	2731.23
11/30/90	5047.0	5046.73	5047.42	5046.75	5046.75	5046.70	5046.81	5046.23
12/1/90	5847.0	5846.73	5847.41	5846.71	5846.71	5846.66	5846.78	5846.19
12/2/90	6080.0	6079.73	6080.41	6079.71	6079.71	6079.66	6079.78	6079.19
12/3/90	5754.0	5753.73	5754.41	5753.71	5753.71	5753.68	5753.79	5753.21
12/4/90	5717.0	5716.73	5717.41	5716.71	5716.71	5716.68	5716.79	5716.21
12/5/90	5828.0	5827.73	5828.41	5827.71	5827.71	5827.68	5827.79	5827.21
12/6/90	5717.0	5716.77	5717.44	5716.74	5716.74	5716.71	5716.82	5716.24
12/7/90	5643.0	5642.77	5643.44	5642.74	5642.74	5642.71	5642.82	5642.24
12/8/90	5606.0	5605.77	5606.44	5605.74	5605.74	5605.71	5605.82	5605.24
12/9/90	5606.0	5605.77	5606.44	5605.74	5605.74	5605.71	5605.82	5605.24
12/10/90	5717.0	5716.77	5717.44	5716.74	5716.74	5716.71	5716.82	5716.24
12/11/90	5754.0	5753.77	5754.44	5753.74	5753.74	5753.71	5753.82	5753.24
12/12/90	5643.0	5642.77	5643.44	5642.74	5642.74	5642.71	5642.82	5642.24
12/13/90	5569.0	5568.77	5569.44	5568.74	5568.74	5568.71	5568.83	5568.24
12/14/90	5680.0	5679.77	5680.44	5679.74	5679.74	5679.71	5679.83	5679.24
12/15/90	5606.0	5605.77	5606.44	5605.74	5605.74	5605.71	5605.83	5605.24
12/16/90	5532.0	5531.77	5532.44	5531.74	5531.74	5531.71	5531.83	5531.24
12/17/90	5791.0	5790.77	5791.44	5790.74	5790.74	5790.71	5790.83	5790.24
12/18/90	5421.0	5420.77	5421.44	5420.74	5420.74	5420.71	5420.83	5420.24
12/19/90	3875.0	3874.77	3875.44	3874.74	3874.74	3874.71	3874.83	3874.24
12/20/90	2239.0	2238.77	2239.44	2238.74	2238.74	2238.71	2238.83	2238.24
12/21/90	2115.0	2114.77	2115.44	2114.74	2114.74	2114.71	2114.83	2114.24
12/22/90	2140.0	2139.80	2140.47	2139.77	2139.77	2139.75	2139.86	2139.27
12/23/90	2165.0	2164.80	2165.47	2164.77	2164.77	2164.75	2164.86	2164.27
12/24/90	2232.0	2231.80	2232.47	2231.77	2231.77	2231.75	2231.87	2231.28
12/25/90	2280.0	2279.80	2280.47	2279.77	2279.77	2279.75	2279.87	2279.28
12/26/90	2349.0	2348.80	2349.47	2348.77	2348.77	2348.75	2348.87	2348.28
12/27/90	2287.0	2286.80	2287.47	2286.77	2286.77	2286.75	2286.87	2286.28
12/28/90	1285.0	1284.80	1285.47	1284.77	1284.77	1284.75	1284.87	1284.28
12/29/90	1167.0	1166.80	1167.47	1166.77	1166.77	1166.75	1166.87	1166.28
12/30/90	1215.0	1214.80	1215.47	1214.77	1214.77	1214.75	1214.87	1214.28
12/31/90	1230.0	1229.80	1230.47	1229.77	1229.77	1229.75	1229.87	1229.28
1/1/91	1260.0	1259.80	1260.45	1259.78	1259.78	1259.76	1259.88	1259.29
1/2/91	1230.0	1229.80	1230.45	1229.78	1229.78	1229.76	1229.88	1229.29
1/3/91	1185.0	1184.80	1185.45	1184.78	1184.78	1184.76	1184.88	1184.29
1/4/91	1155.0	1154.80	1155.45	1154.78	1154.78	1154.76	1154.88	1154.29
1/5/91	1140.0	1139.80	1140.45	1139.78	1139.78	1139.76	1139.88	1139.29
1/6/91	1112.0	1111.80	1112.45	1111.78	1111.78	1111.77	1111.88	1111.29
1/7/91	1112.0	1111.80	1112.45	1111.78	1111.78	1111.77	1111.88	1111.29
1/8/91	1126.0	1125.80	1126.45	1125.78	1125.78	1125.77	1125.88	1125.29
1/9/91	1098.0	1097.80	1098.45	1097.78	1097.78	1097.77	1097.88	1097.29
1/10/91	1098.0	1097.80	1098.45	1097.78	1097.78	1097.77	1097.88	1097.29
1/11/91	1084.0	1083.81	1084.46	1083.79	1083.79	1083.78	1083.90	1083.31
1/12/91	1140.0	1139.81	1140.46	1139.79	1139.79	1139.78	1139.90	1139.31
1/13/91	1381.0	1380.81	1381.46	1380.79	1380.79	1380.78	1380.90	1380.31
1/14/91	1698.0	1697.81	1698.46	1697.79	1697.79	1697.78	1697.90	1697.31
1/15/91	2430.0	2429.81	2430.46	2429.79	2429.79	2429.78	2429.90	2429.31
1/16/91	2164.0	2163.81	2164.46	2163.79	2163.79	2163.78	2163.90	2163.31
1/17/91	1872.0	1871.81	1872.46	1871.79	1871.79	1871.78	1871.90	1871.31
1/18/91	1828.0	1827.81	1828.46	1827.79	1827.79	1827.78	1827.90	1827.31
1/19/91	1750.0	1749.81	1750.46	1749.79	1749.79	1749.78	1749.90	1749.31
1/20/91	1692.0	1691.81	1692.46	1691.79	1691.79	1691.78	1691.90	1691.31
1/21/91	1549.0	1548.81	1549.46	1548.79	1548.79	1548.78	1548.90	1548.31
1/22/91	1478.0	1477.81	1478.46	1477.79	1477.79	1477.78	1477.90	1477.31
1/23/91	1665.0	1664.81	1665.46	1664.79	1664.79	1664.78	1664.90	1664.31
1/24/91	1662.0	1661.81	1662.46	1661.79	1661.79	1661.78	1661.90	1661.31
1/25/91	1605.0	1604.81	1605.46	1604.79	1604.79	1604.78	1604.90	1604.31
1/26/91	1551.0	1550.81	1551.46	1550.79	1550.79	1550.78	1550.90	1550.31
1/27/91	1514.0	1513.81	1514.46	1513.79	1513.79	1513.78	1513.90	1513.31
1/28/91	1495.0	1494.81	1495.46	1494.79	1494.79	1494.78	1494.90	1494.31

1/29/91	1458.0	1457.81	1458.46	1457.79	1457.79	1457.78	1457.90	1457.31
1/30/91	1422.0	1421.81	1422.46	1421.79	1421.79	1421.78	1421.90	1421.31
1/31/91	1420.0	1419.81	1420.46	1419.79	1419.79	1419.78	1419.90	1419.31
2/1/91	1401.0	1400.81	1401.52	1400.82	1400.82	1400.81	1400.93	1400.34
2/2/91	1398.0	1397.81	1398.52	1397.82	1397.82	1397.81	1397.93	1397.34
2/3/91	1494.0	1493.83	1494.54	1493.85	1493.85	1493.84	1493.95	1493.37
2/4/91	1508.0	1507.83	1508.54	1507.85	1507.85	1507.84	1507.95	1507.37
2/5/91	1696.0	1695.83	1696.54	1695.85	1695.85	1695.84	1695.95	1695.37
2/6/91	1765.0	1764.83	1765.54	1764.85	1764.85	1764.84	1764.95	1764.37
2/7/91	1708.0	1707.83	1708.54	1707.85	1707.85	1707.84	1707.95	1707.37
2/8/91	1669.0	1668.83	1669.54	1668.85	1668.85	1668.84	1668.95	1668.37
2/9/91	1630.0	1629.83	1630.54	1629.85	1629.85	1629.84	1629.95	1629.37
2/10/91	1609.0	1608.83	1609.54	1608.85	1608.85	1608.84	1608.95	1608.37
2/11/91	1505.0	1504.83	1505.54	1504.85	1504.85	1504.84	1504.96	1504.37
2/12/91	1639.0	1638.83	1639.54	1638.85	1638.85	1638.84	1638.96	1638.37
2/13/91	1780.0	1779.83	1780.54	1779.85	1779.85	1779.84	1779.96	1779.37
2/14/91	2182.0	2181.83	2182.54	2181.85	2181.85	2181.84	2181.96	2181.37
2/15/91	2442.0	2441.83	2442.54	2441.85	2441.85	2441.84	2441.96	2441.37
2/16/91	2530.0	2529.83	2530.54	2529.85	2529.85	2529.84	2529.96	2529.37
2/17/91	2457.0	2456.83	2457.54	2456.85	2456.85	2456.84	2456.96	2456.37
2/18/91	2254.0	2253.83	2254.54	2253.85	2253.85	2253.84	2253.96	2253.37
2/19/91	4326.0	4325.83	4326.54	4325.85	4325.85	4325.84	4325.96	4325.37
2/20/91	5828.0	5827.83	5828.54	5827.85	5827.85	5827.84	5827.96	5827.37
2/21/91	4321.0	4320.83	4321.54	4320.85	4320.85	4320.84	4320.96	4320.37
2/22/91	2140.0	2139.83	2140.54	2139.85	2139.85	2139.84	2139.96	2139.37
2/23/91	1960.0	1959.83	1960.54	1959.85	1959.85	1959.84	1959.96	1959.37
2/24/91	1622.0	1621.83	1622.54	1621.85	1621.85	1621.84	1621.96	1621.37
2/25/91	1437.0	1436.83	1437.54	1436.85	1436.85	1436.84	1436.96	1436.37
2/26/91	1343.0	1342.83	1343.54	1342.85	1342.85	1342.84	1342.96	1342.37
2/27/91	1266.0	1265.83	1266.54	1265.85	1265.85	1265.84	1265.96	1265.37
2/28/91	1222.0	1221.83	1222.54	1221.85	1221.85	1221.84	1221.96	1221.37
3/1/91	1193.0	1192.83	1193.47	1192.81	1192.81	1192.80	1192.92	1192.33
3/2/91	1135.0	1134.83	1135.47	1134.81	1134.81	1134.80	1134.92	1134.33
3/3/91	1123.0	1122.85	1123.50	1122.83	1122.83	1122.82	1122.94	1122.35
3/4/91	1138.0	1137.85	1138.50	1137.83	1137.83	1137.82	1137.94	1137.35
3/5/91	1111.0	1110.85	1111.50	1110.83	1110.83	1110.82	1110.94	1110.35
3/6/91	1245.0	1244.85	1245.50	1244.83	1244.83	1244.82	1244.94	1244.35
3/7/91	1217.0	1216.85	1217.50	1216.83	1216.83	1216.82	1216.94	1216.35
3/8/91	1203.0	1202.85	1203.50	1202.83	1202.83	1202.82	1202.94	1202.35
3/9/91	1190.0	1189.85	1190.50	1189.83	1189.83	1189.82	1189.94	1189.35
3/10/91	1161.0	1160.85	1161.50	1160.83	1160.83	1160.82	1160.94	1160.35
3/11/91	1140.0	1139.85	1140.50	1139.83	1139.83	1139.82	1139.94	1139.35
3/12/91	1134.0	1133.85	1134.50	1133.83	1133.83	1133.82	1133.94	1133.35
3/13/91	1108.0	1107.85	1108.50	1107.83	1107.83	1107.82	1107.94	1107.35
3/14/91	1095.0	1094.85	1095.50	1094.83	1094.83	1094.82	1094.94	1094.35
3/15/91	1082.0	1081.85	1082.50	1081.83	1081.83	1081.82	1081.94	1081.35
3/16/91	1070.0	1069.85	1070.50	1069.83	1069.83	1069.82	1069.94	1069.35
3/17/91	1057.0	1056.85	1057.50	1056.83	1056.83	1056.82	1056.94	1056.35
3/18/91	1044.0	1043.85	1044.50	1043.83	1043.83	1043.82	1043.94	1043.35
3/19/91	1060.0	1059.85	1060.50	1059.83	1059.83	1059.82	1059.94	1059.35
3/20/91	1047.0	1046.85	1047.50	1046.83	1046.83	1046.82	1046.94	1046.35
3/21/91	1062.0	1061.85	1062.50	1061.83	1061.83	1061.82	1061.94	1061.35
3/22/91	1049.0	1048.85	1049.50	1048.83	1048.83	1048.82	1048.94	1048.35
3/23/91	1037.0	1036.85	1037.50	1036.83	1036.83	1036.82	1036.94	1036.35
3/24/91	1066.0	1065.85	1066.50	1065.83	1065.83	1065.82	1065.94	1065.35
3/25/91	997.0	996.85	997.50	996.83	996.83	996.82	996.94	996.35
3/26/91	999.0	998.85	999.50	998.83	998.83	998.82	998.94	998.35
3/27/91	1014.0	1013.85	1014.50	1013.83	1013.83	1013.82	1013.94	1013.35
3/28/91	1080.0	1079.85	1080.50	1079.83	1079.83	1079.82	1079.94	1079.35
3/29/91	1132.0	1131.85	1132.50	1131.83	1131.83	1131.82	1131.94	1131.35
3/30/91	1292.0	1291.85	1292.50	1291.83	1291.83	1291.82	1291.94	1291.35
3/31/91	1335.0	1334.85	1335.50	1334.83	1334.83	1334.82	1334.94	1334.35
4/1/91	1442.0	1441.85	1442.47	1441.54	1441.54	1445.01	1446.40	1445.73

4/2/91	1556.0	1555.85	1556.47	1555.54	1555.54	1558.83	1560.22	1559.54
4/3/91	1534.0	1533.85	1534.47	1533.54	1533.54	1536.46	1537.85	1537.18
4/4/91	1722.0	1721.85	1722.47	1721.54	1721.54	1724.64	1726.03	1725.36
4/5/91	2576.0	2575.85	2576.47	2575.54	2575.54	2578.64	2580.03	2579.36
4/6/91	2829.0	2828.87	2829.49	2828.55	2828.55	2831.84	2833.23	2832.56
4/7/91	2381.0	2380.88	2381.50	2380.57	2380.57	2383.85	2385.24	2384.57
4/8/91	1646.0	1645.88	1646.50	1645.57	1645.57	1648.85	1650.24	1649.57
4/9/91	1804.0	1803.88	1804.50	1803.57	1803.57	1806.85	1808.24	1807.56
4/10/91	1726.0	1725.88	1726.50	1725.57	1725.57	1728.94	1730.33	1729.66
4/11/91	2075.0	2074.88	2075.50	2074.57	2074.57	2077.94	2079.33	2078.66
4/12/91	2957.0	2956.88	2957.50	2956.57	2956.57	2959.94	2961.33	2960.66
4/13/91	3522.0	3521.88	3522.50	3521.57	3521.57	3524.94	3526.33	3525.66
4/14/91	3550.0	3549.88	3550.50	3549.57	3549.57	3552.94	3554.33	3553.65
4/15/91	3254.0	3253.88	3254.50	3253.57	3253.57	3256.94	3258.33	3257.65
4/16/91	3202.0	3201.88	3202.50	3201.57	3201.57	3204.93	3206.32	3205.65
4/17/91	3202.0	3201.88	3202.50	3201.57	3201.57	3204.93	3206.32	3205.65
4/18/91	3075.0	3074.88	3075.50	3074.57	3074.57	3077.40	3078.80	3078.12
4/19/91	2732.0	2731.88	2732.50	2731.57	2731.57	2734.61	2736.00	2735.33
4/20/91	3125.0	3124.88	3125.50	3124.57	3124.57	3127.60	3128.99	3128.32
4/21/91	3100.0	3099.88	3100.50	3099.57	3099.57	3102.82	3104.21	3103.54
4/22/91	3438.0	3437.88	3438.50	3437.57	3437.57	3440.81	3442.20	3441.53
4/23/91	3410.0	3409.88	3410.50	3409.57	3409.57	3412.81	3414.20	3413.53
4/24/91	3254.0	3253.88	3254.50	3253.57	3253.57	3256.81	3258.20	3257.53
4/25/91	3025.0	3024.88	3025.50	3024.57	3024.57	3027.92	3029.31	3028.64
4/26/91	2732.0	2731.88	2732.50	2731.57	2731.57	2734.92	2736.31	2735.64
4/27/91	2614.0	2613.88	2614.50	2613.57	2613.57	2616.92	2618.31	2617.63
4/28/91	2684.0	2683.88	2684.50	2683.57	2683.57	2686.92	2688.31	2687.63
4/29/91	2828.0	2827.88	2828.50	2827.57	2827.57	2830.91	2832.30	2831.63
4/30/91	2876.0	2875.88	2876.50	2875.57	2875.57	2878.91	2880.30	2879.63
5/1/91	2780.0	2780.86	2781.43	2780.12	2783.22	2787.92	2789.99	2789.31
5/2/91	2756.0	2756.85	2757.42	2756.11	2759.21	2763.91	2765.98	2765.31
5/3/91	2660.0	2660.84	2661.42	2660.10	2663.21	2667.25	2669.31	2668.64
5/4/91	2637.0	2637.83	2638.41	2637.09	2640.20	2644.49	2646.56	2645.89
5/5/91	2684.0	2684.82	2685.40	2684.08	2687.19	2691.47	2693.53	2692.86
5/6/91	2732.0	2732.82	2733.40	2732.08	2735.19	2739.74	2741.80	2741.13
5/7/91	2684.0	2684.83	2685.40	2684.09	2687.19	2691.74	2693.80	2693.13
5/8/91	2950.0	2950.81	2951.39	2950.07	2953.18	2957.72	2959.78	2959.11
5/9/91	3050.0	3050.83	3051.41	3050.09	3053.20	3057.73	3059.79	3059.12
5/10/91	3150.0	3150.85	3151.42	3150.11	3153.21	3157.89	3159.95	3159.28
5/11/91	3306.0	3306.95	3307.53	3306.21	3309.32	3313.99	3316.06	3315.39
5/12/91	3280.0	3280.94	3281.52	3280.20	3283.31	3287.98	3290.04	3289.37
5/13/91	2930.0	2930.94	2931.51	2930.20	2933.30	2937.97	2940.04	2939.37
5/14/91	2766.0	2766.94	2767.52	2766.20	2769.31	2773.97	2776.03	2775.36
5/15/91	2842.0	2842.95	2843.52	2842.21	2845.31	2849.97	2852.04	2851.37
5/16/91	2017.0	2017.86	2018.43	2017.12	2020.23	2024.88	2026.94	2026.27
5/17/91	2147.0	2147.83	2148.41	2147.09	2150.20	2154.85	2156.92	2156.25
5/18/91	1692.0	1692.80	1693.38	1692.07	1695.17	1698.94	1701.00	1700.33
5/19/91	1552.0	1552.84	1553.42	1552.10	1555.21	1559.32	1561.38	1560.71
5/20/91	1370.0	1370.79	1371.37	1370.05	1373.16	1377.25	1379.32	1378.65
5/21/91	1386.0	1386.77	1387.34	1386.03	1389.13	1393.59	1395.65	1394.98
5/22/91	1501.0	1501.77	1502.34	1501.03	1504.13	1508.58	1510.65	1509.97
5/23/91	1467.0	1467.90	1468.48	1467.16	1470.27	1474.71	1476.78	1476.10
5/24/91	1434.0	1434.95	1435.53	1434.21	1437.32	1441.95	1444.01	1443.34
5/25/91	1501.0	1501.95	1502.52	1501.21	1504.31	1508.94	1511.01	1510.34
5/26/91	1322.0	1323.01	1323.59	1322.27	1325.38	1329.80	1331.87	1331.19
5/27/91	1386.0	1386.92	1387.49	1386.18	1389.28	1393.90	1395.97	1395.30
5/28/91	1338.0	1338.94	1339.52	1338.20	1341.31	1345.93	1347.99	1347.32
5/29/91	1418.0	1418.91	1419.49	1418.17	1421.28	1425.96	1428.03	1427.36
5/30/91	1402.0	1402.88	1403.46	1402.14	1405.25	1409.93	1412.00	1411.33
5/31/91	1552.0	1552.95	1553.53	1552.21	1553.41	1558.09	1560.16	1559.49
6/1/91	1840.0	1840.94	1841.57	1837.31	1838.28	1842.51	1844.72	1844.04
6/2/91	1900.0	1901.02	1901.66	1897.40	1898.37	1902.59	1904.80	1904.13
6/3/91	1960.0	1960.94	1961.57	1957.31	1958.28	1961.37	1963.58	1962.91

6/4/91	1920.0	1921.00	1921.63	1917.37	1918.34	1921.87	1924.08	1923.41
6/5/91	1710.0	1711.05	1711.69	1707.43	1708.40	1711.91	1714.13	1713.45
6/6/91	1728.0	1728.94	1729.58	1725.32	1726.29	1730.26	1732.48	1731.80
6/7/91	1710.0	1710.92	1711.55	1707.29	1708.26	1712.23	1714.44	1713.77
6/8/91	2000.0	2000.94	2001.57	1997.32	1998.29	2002.25	2004.46	2003.79
6/9/91	3100.0	3101.06	3101.69	3097.43	3098.40	3102.35	3104.56	3103.89
6/10/91	2732.0	2732.94	2733.57	2729.31	2730.28	2734.48	2736.69	2736.02
6/11/91	3466.0	3466.97	3467.60	3463.34	3464.31	3468.51	3470.72	3470.04
6/12/91	3466.0	3467.05	3467.68	3463.42	3464.39	3468.58	3470.79	3470.12
6/13/91	2105.0	2105.90	2106.45	2102.19	2103.16	2107.35	2109.56	2108.89
6/14/91	1620.0	1620.92	1621.47	1617.22	1618.19	1622.37	1624.58	1623.91
6/15/91	1518.0	1518.94	1519.50	1515.24	1516.21	1520.39	1522.60	1521.93
6/16/91	1674.0	1675.11	1675.67	1671.41	1672.38	1676.55	1678.76	1678.09
6/17/91	1764.0	1764.95	1765.51	1761.25	1762.22	1766.39	1768.60	1767.93
6/18/91	1764.0	1764.99	1765.54	1761.28	1762.25	1765.02	1767.23	1766.56
6/19/91	2084.0	2085.14	2085.69	2081.43	2082.40	2085.72	2087.93	2087.26
6/20/91	2125.0	2125.94	2126.49	2122.23	2123.20	2126.50	2128.72	2128.04
6/21/91	2296.0	2296.90	2297.45	2293.19	2294.17	2298.03	2300.24	2299.57
6/22/91	2611.0	2611.86	2612.41	2608.16	2609.13	2612.99	2615.20	2614.53
6/23/91	2472.0	2472.89	2473.44	2469.18	2470.16	2474.01	2476.22	2475.55
6/24/91	2121.0	2121.95	2122.50	2118.24	2119.21	2123.06	2125.27	2124.60
6/25/91	1834.0	1835.00	1835.55	1831.29	1832.26	1836.40	1838.61	1837.94
6/26/91	1953.0	1953.99	1954.54	1950.28	1951.25	1955.39	1957.60	1956.93
6/27/91	2118.0	2118.88	2119.43	2115.17	2116.14	2120.28	2122.49	2121.82
6/28/91	2311.0	2311.96	2312.51	2308.25	2309.22	2313.35	2315.56	2314.89
6/29/91	2465.0	2465.97	2466.52	2462.26	2463.23	2467.36	2469.57	2468.90
6/30/91	2487.0	2488.08	2488.63	2484.37	2485.34	2489.47	2491.68	2491.01
7/1/91	2395.0	2396.35	2396.93	2390.56	2392.61	2398.08	2400.64	2399.97
7/2/91	2262.0	2263.39	2263.97	2257.61	2259.66	2265.13	2267.69	2267.02
7/3/91	2645.0	2646.45	2647.03	2640.66	2642.71	2646.51	2649.07	2648.40
7/4/91	3235.0	3236.24	3236.82	3230.45	3232.50	3236.96	3239.52	3238.85
7/5/91	2369.0	2370.14	2370.73	2364.36	2366.41	2370.84	2373.40	2372.73
7/6/91	2046.0	2047.19	2047.77	2041.40	2043.45	2048.56	2051.12	2050.45
7/7/91	2548.0	2549.13	2549.71	2543.35	2545.39	2550.28	2552.84	2552.17
7/8/91	2455.0	2456.13	2456.72	2450.35	2452.40	2457.15	2459.71	2459.04
7/9/91	2615.0	2616.14	2616.72	2610.35	2612.40	2617.05	2619.61	2618.94
7/10/91	2852.0	2853.14	2853.72	2847.36	2849.41	2854.33	2856.89	2856.22
7/11/91	3075.0	3076.15	3076.73	3070.36	3072.41	3077.12	3079.68	3079.01
7/12/91	3332.0	3333.15	3333.73	3327.36	3329.41	3333.98	3336.54	3335.87
7/13/91	3410.0	3411.12	3411.70	3405.33	3407.38	3411.91	3414.47	3413.80
7/14/91	3438.0	3439.12	3439.70	3433.33	3435.38	3439.75	3442.31	3441.64
7/15/91	3466.0	3467.12	3467.70	3461.34	3463.38	3467.66	3470.22	3469.55
7/16/91	3332.0	3333.19	3333.77	3327.41	3329.45	3333.62	3336.18	3335.51
7/17/91	3228.0	3229.10	3229.68	3223.32	3225.36	3229.40	3231.96	3231.29
7/18/91	3228.0	3229.08	3229.66	3223.29	3225.34	3227.22	3229.78	3229.11
7/19/91	3358.0	3359.22	3359.80	3353.44	3355.49	3358.09	3360.65	3359.98
7/20/91	3522.0	3523.16	3523.74	3517.38	3519.42	3521.92	3524.48	3523.81
7/21/91	3662.0	3663.10	3663.68	3657.31	3659.36	3662.54	3665.10	3664.42
7/22/91	3840.0	3841.01	3841.59	3835.23	3837.27	3840.34	3842.90	3842.23
7/23/91	4054.0	4055.20	4055.79	4049.42	4051.47	4054.51	4057.07	4056.40
7/24/91	4342.0	4343.20	4343.79	4337.42	4339.47	4342.93	4345.49	4344.82
7/25/91	4502.0	4503.14	4503.72	4497.35	4499.40	4502.94	4505.50	4504.82
7/26/91	4470.0	4471.14	4471.72	4465.35	4467.40	4470.39	4472.95	4472.28
7/27/91	4406.0	4407.06	4407.64	4401.28	4403.32	4405.97	4408.53	4407.85
7/28/91	4374.0	4375.06	4375.64	4369.28	4371.33	4373.37	4375.93	4375.26
7/29/91	4342.0	4342.97	4343.55	4337.18	4339.23	4341.05	4343.61	4342.94
7/30/91	4342.0	4342.97	4343.55	4337.18	4339.23	4340.97	4343.53	4342.85
7/31/91	4342.0	4343.06	4343.65	4337.28	4338.75	4340.43	4342.99	4342.32
8/1/91	4374.0	4375.18	4375.77	4370.82	4372.47	4374.03	4376.39	4375.72
8/2/91	4406.0	4407.18	4407.77	4402.82	4404.47	4405.96	4408.32	4407.65
8/3/91	4374.0	4375.22	4375.81	4370.85	4372.51	4371.92	4374.28	4373.61
8/4/91	4342.0	4343.22	4343.81	4338.85	4340.51	4340.69	4343.05	4342.37
8/5/91	4470.0	4471.22	4471.81	4466.85	4468.50	4468.68	4471.04	4470.36

8/6/91	4438.0	4439.21	4439.80	4434.84	4436.50	4439.30	4441.66	4440.99
8/7/91	3930.0	3931.12	3931.71	3926.75	3928.40	3932.13	3934.49	3933.82
8/8/91	3840.0	3841.13	3841.72	3836.76	3838.41	3840.58	3842.94	3842.27
8/9/91	3750.0	3751.13	3751.72	3746.76	3748.42	3749.60	3751.96	3751.29
8/10/91	3720.0	3721.13	3721.72	3716.76	3718.42	3719.88	3722.24	3721.56
8/11/91	3690.0	3691.14	3691.73	3686.77	3688.43	3689.76	3692.12	3691.44
8/12/91	3720.0	3721.14	3721.73	3716.77	3718.43	3719.70	3722.06	3721.39
8/13/91	3780.0	3781.14	3781.73	3776.77	3778.43	3779.62	3781.98	3781.31
8/14/91	3810.0	3811.14	3811.73	3806.78	3808.43	3809.54	3811.90	3811.23
8/15/91	3900.0	3901.14	3901.73	3896.78	3898.43	3899.44	3901.80	3901.13
8/16/91	4022.0	4023.24	4023.83	4018.87	4020.32	4021.30	4023.66	4022.98
8/17/91	3960.0	3961.15	3961.74	3956.78	3958.43	3959.45	3961.81	3961.14
8/18/91	3840.0	3841.12	3841.71	3836.76	3837.96	3837.09	3839.45	3838.78
8/19/91	3810.0	3811.29	3811.88	3806.93	3808.13	3807.92	3810.28	3809.60
8/20/91	3810.0	3811.22	3811.81	3806.85	3808.06	3807.79	3810.15	3809.48
8/21/91	3900.0	3901.15	3901.74	3896.78	3897.98	3898.39	3900.75	3900.08
8/22/91	3900.0	3901.05	3901.64	3896.68	3897.88	3898.26	3900.62	3899.95
8/23/91	3870.0	3871.28	3871.87	3866.91	3868.11	3868.47	3870.83	3870.16
8/24/91	3930.0	3931.28	3931.87	3926.91	3928.11	3928.82	3931.18	3930.51
8/25/91	3840.0	3841.20	3841.79	3836.84	3838.04	3838.73	3841.09	3840.41
8/26/91	3780.0	3781.20	3781.79	3776.84	3778.04	3778.36	3780.72	3780.05
8/27/91	2758.0	2759.11	2759.70	2754.74	2755.95	2756.73	2759.09	2758.42
8/28/91	2904.0	2905.11	2905.70	2900.74	2902.39	2903.53	2905.89	2905.22
8/29/91	2810.0	2810.99	2811.58	2806.63	2808.28	2809.72	2812.08	2811.41
8/30/91	2668.0	2668.99	2669.59	2664.63	2666.28	2667.59	2669.95	2669.28
8/31/91	2647.0	2648.11	2648.70	2643.75	2645.29	2646.50	2648.86	2648.19
9/1/91	2603.0	2602.50	2603.13	2599.39	2599.81	2600.80	2602.71	2602.04
9/2/91	2054.0	2053.50	2054.13	2050.39	2050.81	2051.76	2053.67	2053.00
9/3/91	1444.0	1443.54	1444.17	1440.43	1440.85	1440.12	1442.03	1441.36
9/4/91	2798.0	2797.54	2798.17	2794.43	2794.85	2794.76	2796.67	2796.00
9/5/91	2360.0	2359.54	2360.17	2356.43	2356.85	2356.72	2358.63	2357.96
9/6/91	2145.0	2144.54	2145.17	2141.43	2141.85	2142.34	2144.25	2143.58
9/7/91	2021.0	2020.44	2021.07	2017.33	2017.75	2018.24	2020.14	2019.47
9/8/91	1927.0	1926.44	1927.07	1923.33	1923.75	1924.25	1926.16	1925.49
9/9/91	1349.0	1348.44	1349.07	1345.33	1345.75	1346.34	1348.25	1347.58
9/10/91	786.0	785.44	786.07	782.33	782.75	783.59	785.49	784.82
9/11/91	922.0	921.45	922.08	918.34	918.76	919.57	921.48	920.80
9/12/91	774.0	773.45	774.08	770.34	770.76	771.53	773.44	772.77
9/13/91	695.0	694.45	695.08	691.34	691.48	691.98	693.89	693.22
9/14/91	580.0	579.45	580.08	576.34	576.50	577.25	579.16	578.48
9/15/91	610.0	609.45	610.08	606.34	606.61	607.35	609.26	608.59
9/16/91	610.0	609.55	610.18	606.44	603.98	604.67	606.58	605.91
9/17/91	673.0	672.44	673.07	669.33	667.14	667.82	669.73	669.06
9/18/91	684.0	683.73	684.36	680.62	678.44	677.60	679.51	678.84
9/19/91	662.0	661.29	661.92	658.18	655.99	655.73	657.64	656.97
9/20/91	684.0	683.54	684.17	680.43	678.24	677.98	679.88	679.21
9/21/91	728.0	727.45	728.08	724.34	722.15	722.48	724.39	723.72
9/22/91	728.0	727.67	728.30	724.56	722.38	722.72	724.63	723.95
9/23/91	728.0	727.67	728.30	724.56	722.38	722.71	724.62	723.95
9/24/91	717.0	716.22	716.85	713.11	710.93	711.27	713.18	712.50
9/25/91	684.0	683.54	684.18	680.44	678.25	678.89	680.80	680.13
9/26/91	673.0	672.54	673.18	669.44	667.25	667.88	669.79	669.12
9/27/91	673.0	672.46	673.09	669.35	666.89	667.52	669.43	668.76
9/28/91	662.0	661.46	662.09	658.35	655.89	656.53	658.43	657.76
9/29/91	651.0	650.58	651.21	647.47	645.01	645.65	647.56	646.89
9/30/91	620.0	619.58	620.21	616.47	614.01	614.64	616.55	615.88
10/1/91	774.0	773.58	774.26	773.28	771.50	772.11	773.28	772.60
10/2/91	728.0	727.51	728.19	727.21	725.43	726.03	727.20	726.53
10/3/91	695.0	694.51	695.19	694.21	692.43	691.51	692.68	692.01
10/4/91	706.0	705.51	706.19	705.21	703.43	703.13	704.30	703.62
10/5/91	695.0	694.58	695.26	694.27	692.50	692.21	693.37	692.70
10/6/91	684.0	683.58	684.26	683.27	681.50	681.81	682.98	682.31
10/7/91	630.0	629.58	630.26	629.27	627.50	627.82	628.98	628.31

10/8/91	620.0	619.58	620.26	619.27	617.50	617.82	618.99	618.32
10/9/91	610.0	609.52	610.20	609.22	607.44	607.76	608.93	608.26
10/10/91	610.0	609.52	610.20	609.22	607.44	608.05	609.22	608.55
10/11/91	590.0	589.52	590.20	589.22	587.44	588.04	589.21	588.54
10/12/91	662.0	661.52	662.20	661.22	659.44	660.03	661.19	660.52
10/13/91	600.0	599.64	600.32	599.33	597.73	598.31	599.48	598.81
10/14/91	531.0	530.64	531.32	530.33	528.72	529.31	530.47	529.80
10/15/91	600.0	599.64	600.32	599.33	597.73	598.32	599.49	598.82
10/16/91	728.0	727.64	728.28	727.29	727.29	727.82	727.94	727.27
10/17/91	706.0	705.64	706.28	705.29	705.29	705.87	705.99	705.32
10/18/91	706.0	705.64	706.28	705.29	705.29	703.79	703.91	703.24
10/19/91	706.0	705.59	706.23	705.25	705.25	704.35	704.46	703.79
10/20/91	684.0	683.59	684.23	683.25	683.25	682.95	683.06	682.39
10/21/91	590.0	589.59	590.23	589.25	589.25	589.54	589.66	588.99
10/22/91	522.0	521.59	522.23	521.25	521.25	521.60	521.71	521.04
10/23/91	418.0	417.59	418.23	417.25	417.25	417.64	417.75	417.08
10/24/91	370.0	369.59	370.23	369.25	369.25	369.71	369.83	369.16
10/25/91	370.0	369.66	370.29	369.31	369.31	370.20	370.32	369.64
10/26/91	363.0	362.66	363.29	362.31	362.31	363.21	363.33	362.66
10/27/91	370.0	369.66	370.29	369.31	369.31	370.13	370.24	369.57
10/28/91	370.0	369.66	370.29	369.31	369.31	370.10	370.21	369.54
10/29/91	378.0	377.66	378.29	377.31	377.31	378.09	378.21	377.53
10/30/91	378.0	377.66	378.29	377.31	377.31	378.03	378.15	377.48
10/31/91	370.0	369.66	370.29	369.31	369.31	370.10	370.22	369.55
11/1/91	386.0	385.66	386.34	385.67	385.67	385.40	385.51	384.84
11/2/91	418.0	417.66	418.35	417.67	417.67	417.49	417.61	416.94
11/3/91	434.0	433.66	434.35	433.67	433.67	433.49	433.61	432.94
11/4/91	426.0	425.66	426.35	425.67	425.67	425.49	425.61	424.94
11/5/91	426.0	425.66	426.35	425.67	425.67	425.54	425.66	424.98
11/6/91	434.0	433.66	434.35	433.67	433.67	433.54	433.66	432.98
11/7/91	410.0	409.66	410.35	409.67	409.67	409.54	409.66	408.98
11/8/91	386.0	385.66	386.35	385.67	385.67	385.54	385.66	384.98
11/9/91	386.0	385.66	386.35	385.67	385.67	385.57	385.69	385.01
11/10/91	394.0	393.66	394.35	393.67	393.67	393.57	393.69	393.01
11/11/91	418.0	417.72	418.40	417.73	417.73	417.63	417.74	417.07
11/12/91	450.0	449.72	450.40	449.73	449.73	449.63	449.74	449.07
11/13/91	450.0	449.72	450.40	449.73	449.73	449.63	449.74	449.07
11/14/91	434.0	433.72	434.40	433.73	433.73	433.63	433.75	433.07
11/15/91	426.0	425.72	426.40	425.73	425.73	425.63	425.75	425.07
11/16/91	426.0	425.72	426.40	425.73	425.73	425.63	425.75	425.07
11/17/91	426.0	425.72	426.40	425.73	425.73	425.63	425.75	425.07
11/18/91	426.0	425.72	426.40	425.73	425.73	425.63	425.75	425.07
11/19/91	442.0	441.72	442.40	441.73	441.73	441.66	441.78	441.11
11/20/91	600.0	599.72	600.40	599.73	599.73	599.66	599.78	599.11
11/21/91	550.0	549.72	550.40	549.73	549.73	549.66	549.78	549.11
11/22/91	504.0	503.72	504.40	503.73	503.73	503.66	503.78	503.11
11/23/91	486.0	485.71	486.40	485.72	485.72	485.66	485.77	485.10
11/24/91	477.0	476.71	477.40	476.72	476.72	476.66	476.77	476.10
11/25/91	662.0	661.71	662.40	661.72	661.72	661.66	661.77	661.10
11/26/91	640.0	639.71	640.40	639.72	639.72	639.66	639.78	639.10
11/27/91	590.0	589.71	590.40	589.72	589.72	589.66	589.78	589.10
11/28/91	580.0	579.71	580.40	579.72	579.72	579.66	579.78	579.10
11/29/91	600.0	599.71	600.40	599.72	599.72	599.66	599.78	599.10
11/30/91	550.0	549.71	550.40	549.72	549.72	549.66	549.78	549.10
12/1/91	550.0	549.71	550.38	549.69	549.69	549.62	549.74	549.07
12/2/91	600.0	599.71	600.38	599.69	599.69	599.62	599.74	599.07
12/3/91	590.0	589.71	590.38	589.69	589.69	589.65	589.76	589.09
12/4/91	600.0	599.71	600.38	599.69	599.69	599.65	599.76	599.09
12/5/91	774.0	773.71	774.38	773.69	773.69	773.65	773.76	773.09
12/6/91	1014.0	1013.74	1014.42	1013.72	1013.72	1013.68	1013.79	1013.12
12/7/91	1484.0	1483.74	1484.42	1483.72	1483.72	1483.68	1483.79	1483.12
12/8/91	1402.0	1401.74	1402.42	1401.72	1401.72	1401.68	1401.79	1401.12
12/9/91	1434.0	1433.74	1434.42	1433.72	1433.72	1433.68	1433.79	1433.12

12/10/91	1434.0	1433.74	1434.42	1433.72	1433.72	1433.68	1433.79	1433.12
12/11/91	1290.0	1289.74	1290.42	1289.72	1289.72	1289.68	1289.79	1289.12
12/12/91	1501.0	1500.74	1501.42	1500.72	1500.72	1500.68	1500.79	1500.12
12/13/91	1484.0	1483.74	1484.42	1483.72	1483.72	1483.69	1483.80	1483.13
12/14/91	1140.0	1139.74	1140.42	1139.72	1139.72	1139.69	1139.80	1139.13
12/15/91	1005.0	1004.74	1005.41	1004.72	1004.72	1004.69	1004.80	1004.13
12/16/91	918.0	917.74	918.41	917.72	917.72	917.69	917.80	917.13
12/17/91	858.0	857.74	858.41	857.72	857.72	857.69	857.80	857.13
12/18/91	814.0	813.74	814.41	813.72	813.72	813.69	813.80	813.13
12/19/91	782.0	781.74	782.41	781.72	781.72	781.69	781.80	781.13
12/20/91	750.0	749.74	750.41	749.72	749.72	749.69	749.80	749.13
12/21/91	717.0	716.74	717.41	716.72	716.72	716.69	716.80	716.13
12/22/91	684.0	683.78	684.45	683.75	683.75	683.72	683.83	683.16
12/23/91	651.0	650.78	651.45	650.75	650.75	650.72	650.83	650.16
12/24/91	640.0	639.78	640.45	639.75	639.75	639.73	639.84	639.17
12/25/91	620.0	619.78	620.45	619.75	619.75	619.73	619.84	619.17
12/26/91	600.0	599.78	600.45	599.75	599.75	599.73	599.84	599.17
12/27/91	580.0	579.78	580.45	579.75	579.75	579.73	579.84	579.17
12/28/91	570.0	569.78	570.45	569.75	569.75	569.73	569.84	569.17
12/29/91	560.0	559.78	560.45	559.75	559.75	559.73	559.84	559.17
12/30/91	550.0	549.78	550.45	549.75	549.75	549.73	549.84	549.17
12/31/91	531.0	530.78	531.45	530.75	530.75	530.73	530.84	530.17
1/1/92	522.0	521.78	522.43	521.76	521.76	521.74	521.85	521.18
1/2/92	522.0	521.78	522.43	521.76	521.76	521.74	521.85	521.18
1/3/92	513.0	512.78	513.43	512.76	512.76	512.74	512.85	512.18
1/4/92	504.0	503.78	504.43	503.76	503.76	503.74	503.85	503.18
1/5/92	495.0	494.78	495.43	494.76	494.76	494.74	494.85	494.18
1/6/92	486.0	485.78	486.43	485.76	485.76	485.74	485.86	485.19
1/7/92	468.0	467.78	468.43	467.76	467.76	467.74	467.86	467.19
1/8/92	450.0	449.78	450.43	449.76	449.76	449.74	449.86	449.19
1/9/92	442.0	441.78	442.43	441.76	441.76	441.74	441.86	441.19
1/10/92	442.0	441.78	442.43	441.76	441.76	441.74	441.86	441.19
1/11/92	450.0	449.79	450.44	449.78	449.78	449.76	449.87	449.20
1/12/92	418.0	417.79	418.44	417.78	417.78	417.76	417.87	417.20
1/13/92	442.0	441.79	442.44	441.78	441.78	441.76	441.87	441.20
1/14/92	442.0	441.79	442.44	441.78	441.78	441.76	441.87	441.20
1/15/92	434.0	433.79	434.44	433.78	433.78	433.76	433.87	433.20
1/16/92	513.0	512.79	513.44	512.78	512.78	512.76	512.87	512.20
1/17/92	580.0	579.79	580.44	579.78	579.78	579.76	579.87	579.20
1/18/92	531.0	530.79	531.44	530.78	530.78	530.76	530.87	530.20
1/19/92	513.0	512.79	513.44	512.78	512.78	512.76	512.87	512.20
1/20/92	495.0	494.79	495.44	494.78	494.78	494.76	494.87	494.20
1/21/92	495.0	494.79	495.44	494.78	494.78	494.76	494.87	494.20
1/22/92	477.0	476.79	477.44	476.78	476.78	476.76	476.88	476.21
1/23/92	580.0	579.79	580.44	579.78	579.78	579.76	579.88	579.21
1/24/92	1053.0	1052.79	1053.44	1052.78	1052.78	1052.76	1052.88	1052.21
1/25/92	1149.0	1148.79	1149.44	1148.78	1148.78	1148.76	1148.88	1148.21
1/26/92	1132.0	1131.79	1132.44	1131.78	1131.78	1131.76	1131.88	1131.21
1/27/92	1073.0	1072.79	1073.44	1072.78	1072.78	1072.76	1072.88	1072.21
1/28/92	1230.0	1229.79	1230.44	1229.78	1229.78	1229.76	1229.88	1229.21
1/29/92	1583.0	1582.79	1583.44	1582.78	1582.78	1582.76	1582.88	1582.21
1/30/92	1686.0	1685.79	1686.44	1685.78	1685.78	1685.76	1685.88	1685.21
1/31/92	1700.0	1699.79	1700.44	1699.78	1699.78	1699.76	1699.88	1699.21
2/1/92	1607.0	1606.79	1607.50	1606.81	1606.81	1606.79	1606.91	1606.24
2/2/92	1451.0	1450.79	1451.50	1450.81	1450.81	1450.79	1450.91	1450.24
2/3/92	1288.0	1287.82	1288.53	1287.83	1287.83	1287.82	1287.94	1287.26
2/4/92	1079.0	1078.82	1079.53	1078.83	1078.83	1078.82	1078.94	1078.26
2/5/92	954.0	953.82	954.53	953.83	953.83	953.82	953.94	953.26
2/6/92	861.0	860.82	861.53	860.83	860.83	860.82	860.94	860.26
2/7/92	799.0	798.82	799.53	798.83	798.83	798.82	798.94	798.26
2/8/92	738.0	737.82	738.53	737.83	737.83	737.82	737.94	737.26
2/9/92	703.0	702.82	703.53	702.83	702.83	702.82	702.94	702.26
2/10/92	657.0	656.82	657.53	656.83	656.83	656.82	656.94	656.26

2/11/92	709.0	708.82	709.53	708.83	708.83	708.82	708.94	708.27
2/12/92	718.0	717.82	718.53	717.83	717.83	717.82	717.94	717.27
2/13/92	716.0	715.82	716.53	715.83	715.83	715.82	715.94	715.27
2/14/92	703.0	702.82	703.53	702.83	702.83	702.82	702.94	702.27
2/15/92	723.0	722.82	723.53	722.83	722.83	722.82	722.94	722.27
2/16/92	710.0	709.82	710.53	709.83	709.83	709.82	709.94	709.27
2/17/92	686.0	685.82	686.53	685.83	685.83	685.82	685.94	685.27
2/18/92	684.0	683.82	684.53	683.83	683.83	683.82	683.94	683.27
2/19/92	681.0	680.82	681.53	680.83	680.83	680.82	680.94	680.27
2/20/92	657.0	656.82	657.53	656.83	656.83	656.82	656.94	656.27
2/21/92	677.0	676.82	677.53	676.83	676.83	676.82	676.94	676.27
2/22/92	800.0	799.82	800.53	799.83	799.83	799.82	799.94	799.27
2/23/92	858.0	857.82	858.53	857.83	857.83	857.82	857.94	857.27
2/24/92	856.0	855.82	856.53	855.83	855.83	855.82	855.94	855.27
2/25/92	769.0	768.82	769.53	768.83	768.83	768.82	768.94	768.27
2/26/92	767.0	766.82	767.53	766.83	766.83	766.82	766.94	766.27
2/27/92	813.0	812.82	813.53	812.83	812.83	812.82	812.94	812.27
2/28/92	834.0	833.82	834.53	833.83	833.83	833.82	833.94	833.27
2/29/92	820.0	819.82	820.53	819.83	819.83	819.82	819.94	819.27
3/1/92	794.0	793.82	794.46	793.79	793.79	793.78	793.90	793.23
3/2/92	767.0	766.84	767.48	766.82	766.82	766.81	766.92	766.25
3/3/92	753.0	752.84	753.48	752.82	752.82	752.81	752.92	752.25
3/4/92	763.0	762.84	763.48	762.82	762.82	762.81	762.92	762.25
3/5/92	760.0	759.84	760.48	759.82	759.82	759.81	759.92	759.25
3/6/92	758.0	757.84	758.48	757.82	757.82	757.81	757.92	757.25
3/7/92	744.0	743.84	744.48	743.82	743.82	743.81	743.92	743.25
3/8/92	742.0	741.84	742.48	741.82	741.82	741.81	741.92	741.25
3/9/92	729.0	728.84	729.48	728.82	728.82	728.81	728.92	728.25
3/10/92	785.0	784.84	785.48	784.82	784.82	784.81	784.92	784.25
3/11/92	794.0	793.84	794.48	793.82	793.82	793.81	793.92	793.25
3/12/92	804.0	803.84	804.48	803.82	803.82	803.81	803.92	803.25
3/13/92	826.0	825.84	826.48	825.82	825.82	825.81	825.92	825.25
3/14/92	897.0	896.84	897.48	896.82	896.82	896.81	896.92	896.25
3/15/92	999.0	998.84	999.48	998.82	998.82	998.81	998.92	998.25
3/16/92	1038.0	1037.84	1038.48	1037.82	1037.82	1037.81	1037.92	1037.25
3/17/92	903.0	902.84	903.48	902.82	902.82	902.81	902.92	902.25
3/18/92	826.0	825.84	826.48	825.82	825.82	825.81	825.92	825.25
3/19/92	764.0	763.84	764.48	763.82	763.82	763.81	763.92	763.25
3/20/92	797.0	796.84	797.48	796.82	796.82	796.81	796.92	796.25
3/21/92	795.0	794.84	795.48	794.82	794.82	794.81	794.92	794.25
3/22/92	757.0	756.84	757.48	756.82	756.82	756.81	756.92	756.25
3/23/92	732.0	731.84	732.48	731.82	731.82	731.81	731.92	731.25
3/24/92	708.0	707.84	708.48	707.82	707.82	707.81	707.92	707.25
3/25/92	706.0	705.84	706.48	705.82	705.82	705.81	705.92	705.25
3/26/92	704.0	703.84	704.48	703.82	703.82	703.81	703.92	703.25
3/27/92	724.0	723.84	724.48	723.82	723.82	723.81	723.92	723.25
3/28/92	721.0	720.84	721.48	720.82	720.82	720.81	720.92	720.25
3/29/92	686.0	685.84	686.48	685.82	685.82	685.81	685.92	685.25
3/30/92	600.0	599.84	600.48	599.82	599.82	599.81	599.92	599.25
3/31/92	425.0	424.84	425.48	424.82	424.82	424.81	424.92	424.25
4/1/92	367.0	366.84	367.46	366.53	366.53	369.39	370.78	370.21
4/2/92	373.0	372.84	373.46	372.53	372.53	375.25	376.64	376.07
4/3/92	396.0	395.84	396.46	395.53	395.53	397.97	399.36	398.79
4/4/92	560.0	559.84	560.46	559.53	559.53	562.11	563.50	562.93
4/5/92	715.0	714.86	715.47	714.54	714.54	717.12	718.51	717.95
4/6/92	702.0	701.87	702.49	701.56	701.56	704.28	705.67	705.10
4/7/92	1062.0	1061.87	1062.49	1061.56	1061.56	1064.28	1065.67	1065.10
4/8/92	1116.0	1115.87	1116.49	1115.56	1115.56	1118.27	1119.67	1119.10
4/9/92	1419.0	1418.87	1419.49	1418.56	1418.56	1421.27	1422.66	1422.10
4/10/92	1567.0	1566.87	1567.49	1566.56	1566.56	1569.35	1570.74	1570.17
4/11/92	1547.0	1546.87	1547.49	1546.56	1546.56	1549.35	1550.74	1550.17
4/12/92	1509.0	1508.87	1509.49	1508.56	1508.56	1511.34	1512.73	1512.17
4/13/92	1455.0	1454.87	1455.49	1454.56	1454.56	1457.34	1458.73	1458.17

4/14/92	1436.0	1435.87	1436.49	1435.56	1435.56	1438.34	1439.73	1439.17
4/15/92	1798.0	1797.87	1798.49	1797.56	1797.56	1800.34	1801.73	1801.17
4/16/92	1854.0	1853.87	1854.49	1853.56	1853.56	1856.34	1857.73	1857.16
4/17/92	2074.0	2073.87	2074.49	2073.56	2073.56	2076.34	2077.73	2077.16
4/18/92	1987.0	1986.87	1987.49	1986.56	1986.56	1988.94	1990.33	1989.76
4/19/92	1503.0	1502.87	1503.49	1502.56	1502.56	1505.09	1506.48	1505.92
4/20/92	1289.0	1288.87	1289.49	1288.56	1288.56	1291.09	1292.48	1291.91
4/21/92	996.0	995.87	996.49	995.56	995.56	998.25	999.64	999.08
4/22/92	1050.0	1049.87	1050.49	1049.56	1049.56	1052.25	1053.64	1053.07
4/23/92	1644.0	1643.87	1644.49	1643.56	1643.56	1646.25	1647.64	1647.07
4/24/92	1883.0	1882.87	1883.49	1882.56	1882.56	1885.24	1886.63	1886.07
4/25/92	1781.0	1780.87	1781.49	1780.56	1780.56	1783.33	1784.72	1784.15
4/26/92	1796.0	1795.87	1796.49	1795.56	1795.56	1798.33	1799.72	1799.15
4/27/92	1738.0	1737.87	1738.49	1737.56	1737.56	1740.33	1741.72	1741.15
4/28/92	1717.0	1716.87	1717.49	1716.56	1716.56	1719.33	1720.72	1720.15
4/29/92	1572.0	1571.87	1572.49	1571.56	1571.56	1574.32	1575.71	1575.15
4/30/92	1386.0	1385.87	1386.49	1385.56	1385.56	1388.32	1389.71	1389.15
5/1/92	1138.0	1138.99	1139.57	1138.26	1141.82	1147.25	1149.32	1148.75
5/2/92	1108.0	1109.01	1109.58	1108.27	1111.84	1117.27	1119.33	1118.77
5/3/92	1063.0	1064.01	1064.58	1063.27	1066.83	1071.76	1073.83	1073.26
5/4/92	1005.0	1006.00	1006.57	1005.26	1008.82	1013.95	1016.01	1015.45
5/5/92	1003.0	1003.98	1004.56	1003.24	1006.81	1011.92	1013.99	1013.42
5/6/92	1029.0	1029.97	1030.54	1029.23	1032.79	1038.11	1040.18	1039.61
5/7/92	1069.0	1069.97	1070.54	1069.23	1072.80	1078.11	1080.17	1079.61
5/8/92	1136.0	1136.99	1137.56	1136.25	1139.81	1145.12	1147.19	1146.62
5/9/92	1120.0	1121.01	1121.59	1120.27	1123.84	1129.14	1131.20	1130.64
5/10/92	1251.0	1252.14	1252.71	1251.40	1254.96	1260.38	1262.44	1261.88
5/11/92	1733.0	1734.16	1734.73	1733.42	1736.99	1742.40	1744.46	1743.90
5/12/92	2191.0	2192.16	2192.74	2191.42	2194.99	2200.40	2202.46	2201.90
5/13/92	2475.0	2476.17	2476.74	2475.43	2478.99	2484.40	2486.47	2485.90
5/14/92	2895.0	2896.17	2896.74	2895.43	2898.99	2904.40	2906.46	2905.90
5/15/92	3041.0	3042.16	3042.74	3041.42	3044.99	3050.39	3052.46	3051.89
5/16/92	3012.0	3013.11	3013.69	3012.37	3015.94	3021.34	3023.40	3022.83
5/17/92	3033.0	3034.10	3034.67	3033.36	3036.92	3042.32	3044.39	3043.82
5/18/92	3104.0	3105.09	3105.66	3104.35	3107.92	3112.63	3114.70	3114.13
5/19/92	3050.0	3051.19	3051.76	3050.45	3054.01	3058.99	3061.06	3060.49
5/20/92	2993.0	2994.11	2994.69	2993.37	2996.94	3001.91	3003.97	3003.41
5/21/92	2961.0	2962.11	2962.69	2961.37	2964.94	2970.19	2972.25	2971.69
5/22/92	2955.0	2956.10	2956.68	2955.36	2958.93	2964.17	2966.24	2965.67
5/23/92	2948.0	2949.29	2949.86	2948.55	2952.11	2957.35	2959.41	2958.85
5/24/92	2891.0	2892.36	2892.94	2891.62	2895.19	2900.57	2902.63	2902.07
5/25/92	2741.0	2742.36	2742.93	2741.62	2745.18	2750.56	2752.63	2752.06
5/26/92	2639.0	2640.52	2641.10	2639.78	2643.35	2648.57	2650.64	2650.07
5/27/92	2541.0	2542.31	2542.89	2541.57	2545.14	2550.51	2552.58	2552.01
5/28/92	2769.0	2770.39	2770.96	2769.65	2773.22	2778.59	2780.65	2780.09
5/29/92	2859.0	2860.42	2861.00	2859.68	2863.25	2868.67	2870.73	2870.17
5/30/92	2804.0	2805.34	2805.91	2804.60	2808.16	2813.58	2815.65	2815.08
5/31/92	2701.0	2702.48	2703.06	2701.74	2703.12	2708.35	2710.41	2709.85
6/1/92	2719.0	2720.71	2721.34	2717.08	2718.66	2723.90	2726.11	2725.54
6/2/92	3030.0	3031.99	3032.63	3028.37	3029.95	3035.06	3037.27	3036.71
6/3/92	3356.0	3357.71	3358.34	3354.08	3355.67	3359.67	3361.88	3361.31
6/4/92	3245.0	3246.84	3247.47	3243.21	3244.79	3248.96	3251.18	3250.61
6/5/92	3237.0	3238.99	3239.62	3235.36	3236.94	3241.02	3243.23	3242.67
6/6/92	3553.0	3554.68	3555.32	3551.06	3552.64	3556.98	3559.19	3558.62
6/7/92	3685.0	3686.73	3687.36	3683.10	3684.68	3688.96	3691.17	3690.61
6/8/92	3509.0	3510.79	3511.42	3507.16	3508.75	3512.96	3515.17	3514.61
6/9/92	3287.0	3289.15	3289.78	3285.52	3287.10	3291.18	3293.39	3292.83
6/10/92	3332.0	3333.79	3334.43	3330.17	3331.75	3335.90	3338.11	3337.54
6/11/92	3358.0	3359.94	3360.57	3356.31	3357.89	3361.93	3364.15	3363.58
6/12/92	3332.0	3334.12	3334.75	3330.49	3332.08	3336.57	3338.78	3338.22
6/13/92	3125.0	3126.64	3127.19	3122.93	3124.51	3128.99	3131.20	3130.64
6/14/92	3075.0	3076.70	3077.25	3072.99	3074.57	3078.76	3080.97	3080.40
6/15/92	3150.0	3151.75	3152.30	3148.04	3149.62	3153.54	3155.75	3155.18

6/16/92	2950.0	2952.14	2952.69	2948.43	2950.01	2953.88	2956.09	2955.53
6/17/92	2828.0	2829.75	2830.30	2826.04	2827.62	2831.50	2833.71	2833.15
6/18/92	2828.0	2829.88	2830.43	2826.17	2827.76	2830.46	2832.67	2832.10
6/19/92	2975.0	2977.16	2977.71	2973.45	2975.04	2978.08	2980.29	2979.72
6/20/92	3100.0	3101.70	3102.26	3098.00	3099.58	3102.52	3104.73	3104.16
6/21/92	3202.0	3203.70	3204.25	3199.99	3201.57	3204.52	3206.73	3206.16
6/22/92	3384.0	3385.67	3386.23	3381.97	3383.55	3385.91	3388.12	3387.56
6/23/92	3438.0	3439.90	3440.46	3436.20	3437.78	3439.67	3441.88	3441.32
6/24/92	3522.0	3523.75	3524.30	3520.04	3521.62	3523.19	3525.40	3524.83
6/25/92	3662.0	3663.89	3664.44	3660.18	3661.76	3663.50	3665.71	3665.14
6/26/92	3690.0	3692.00	3692.55	3688.29	3689.87	3691.55	3693.76	3693.20
6/27/92	3720.0	3721.66	3722.21	3717.95	3719.53	3721.17	3723.38	3722.82
6/28/92	3662.0	3663.78	3664.33	3660.07	3661.65	3663.28	3665.49	3664.92
6/29/92	3522.0	3523.81	3524.36	3520.10	3521.68	3525.24	3527.46	3526.89
6/30/92	3306.0	3308.14	3308.69	3304.43	3306.01	3308.10	3310.31	3309.75
7/1/92	3254.0	3255.83	3256.42	3250.05	3251.58	3253.28	3255.84	3255.28
7/2/92	3550.0	3551.98	3552.56	3546.19	3547.72	3549.38	3551.94	3551.37
7/3/92	3438.0	3440.15	3440.74	3434.37	3435.90	3436.25	3438.81	3438.24
7/4/92	3254.0	3255.67	3256.25	3249.89	3251.41	3252.76	3255.32	3254.75
7/5/92	3202.0	3203.36	3203.95	3197.58	3199.11	3202.01	3204.57	3204.01
7/6/92	3176.0	3177.47	3178.05	3171.69	3173.21	3175.02	3177.58	3177.01
7/7/92	3125.0	3126.24	3126.82	3120.46	3121.98	3123.47	3126.03	3125.46
7/8/92	3125.0	3126.25	3126.83	3120.47	3121.99	3123.37	3125.93	3125.36
7/9/92	3332.0	3333.26	3333.84	3327.47	3329.00	3330.28	3332.84	3332.27
7/10/92	3466.0	3467.26	3467.85	3461.48	3463.01	3464.56	3467.11	3466.55
7/11/92	3578.0	3579.27	3579.85	3573.48	3575.01	3576.52	3579.08	3578.51
7/12/92	3410.0	3411.27	3411.85	3405.49	3407.01	3408.40	3410.96	3410.39
7/13/92	3228.0	3229.17	3229.76	3223.39	3224.49	3225.79	3228.34	3227.78
7/14/92	3176.0	3177.17	3177.76	3171.39	3172.49	3173.69	3176.25	3175.68
7/15/92	3332.0	3333.17	3333.76	3327.39	3328.49	3329.64	3332.19	3331.63
7/16/92	3438.0	3439.25	3439.83	3433.46	3434.56	3435.61	3438.17	3437.61
7/17/92	3466.0	3467.13	3467.71	3461.35	3462.45	3463.44	3465.99	3465.43
7/18/92	3494.0	3495.10	3495.68	3489.32	3490.42	3489.79	3492.35	3491.78
7/19/92	3438.0	3439.26	3439.84	3433.47	3434.57	3434.53	3437.09	3436.52
7/20/92	3522.0	3523.19	3523.77	3517.40	3518.50	3518.55	3521.10	3520.54
7/21/92	3494.0	3495.12	3495.70	3489.34	3490.43	3491.14	3493.70	3493.14
7/22/92	3438.0	3439.03	3439.61	3433.24	3434.34	3435.22	3437.78	3437.21
7/23/92	3202.0	3203.22	3203.80	3197.43	3198.71	3199.91	3202.47	3201.91
7/24/92	2852.0	2853.22	2853.80	2847.43	2848.96	2850.47	2853.03	2852.46
7/25/92	2876.0	2877.15	2877.73	2871.37	2872.68	2874.02	2876.58	2876.01
7/26/92	3000.0	3001.15	3001.73	2995.37	2996.65	2997.59	3000.15	2999.59
7/27/92	3000.0	3001.07	3001.65	2995.28	2996.38	2997.52	3000.08	2999.51
7/28/92	3125.0	3126.07	3126.65	3120.28	3121.38	3122.44	3125.00	3124.43
7/29/92	3176.0	3176.96	3177.55	3171.18	3172.28	3173.39	3175.95	3175.38
7/30/92	3254.0	3254.97	3255.55	3249.18	3250.28	3251.35	3253.91	3253.34
7/31/92	3332.0	3333.06	3333.64	3327.28	3328.34	3329.34	3331.90	3331.34
8/1/92	3662.0	3663.13	3663.73	3658.77	3659.87	3660.71	3663.07	3662.51
8/2/92	3900.0	3901.13	3901.73	3896.77	3897.87	3898.66	3901.02	3900.45
8/3/92	3840.0	3841.17	3841.77	3836.81	3837.91	3837.15	3839.51	3838.95
8/4/92	3606.0	3607.17	3607.77	3602.81	3603.91	3603.76	3606.12	3605.56
8/5/92	3384.0	3385.16	3385.75	3380.80	3381.90	3381.76	3384.12	3383.56
8/6/92	3438.0	3439.16	3439.75	3434.80	3435.90	3436.41	3438.77	3438.21
8/7/92	3466.0	3467.07	3467.66	3462.70	3463.81	3464.44	3466.80	3466.23
8/8/92	3438.0	3439.07	3439.66	3434.70	3435.81	3436.44	3438.80	3438.24
8/9/92	3306.0	3307.07	3307.66	3302.70	3303.81	3304.37	3306.73	3306.17
8/10/92	3202.0	3203.07	3203.66	3198.71	3199.81	3200.63	3202.99	3202.42
8/11/92	3075.0	3076.08	3076.67	3071.72	3072.19	3072.94	3075.30	3074.73
8/12/92	3100.0	3101.08	3101.67	3096.71	3097.45	3098.16	3100.52	3099.96
8/13/92	3100.0	3100.79	3101.38	3096.42	3097.16	3097.83	3100.19	3099.63
8/14/92	3100.0	3100.46	3101.05	3096.10	3096.84	3097.48	3099.84	3099.28
8/15/92	3100.0	3100.33	3100.92	3095.97	3096.71	3097.34	3099.70	3099.13
8/16/92	3100.0	3100.26	3100.85	3095.89	3096.63	3097.25	3099.61	3099.05
8/17/92	3100.0	3100.01	3100.61	3095.65	3096.39	3097.00	3099.36	3098.79

8/18/92	3075.0	3074.49	3075.08	3070.12	3070.87	3070.02	3072.38	3071.82
8/19/92	3050.0	3049.67	3050.26	3045.30	3046.04	3045.68	3048.04	3047.48
8/20/92	3025.0	3024.59	3025.18	3020.22	3020.96	3020.59	3022.95	3022.38
8/21/92	3025.0	3024.51	3025.10	3020.14	3020.88	3021.09	3023.45	3022.88
8/22/92	3000.0	2999.41	3000.00	2995.04	2995.67	2995.90	2998.26	2997.69
8/23/92	2900.0	2899.65	2900.24	2895.28	2895.76	2896.01	2898.37	2897.80
8/24/92	2756.0	2755.65	2756.24	2751.28	2751.89	2752.44	2754.80	2754.24
8/25/92	2660.0	2659.57	2660.16	2655.20	2655.83	2656.35	2658.71	2658.15
8/26/92	2499.0	2498.57	2499.16	2494.20	2494.94	2495.17	2497.53	2496.96
8/27/92	1980.0	1979.47	1980.06	1975.11	1975.85	1976.32	1978.68	1978.12
8/28/92	1535.0	1534.47	1535.06	1530.10	1530.84	1531.31	1533.67	1533.10
8/29/92	1322.0	1321.35	1321.94	1316.98	1317.73	1318.26	1320.62	1320.05
8/30/92	1402.0	1401.35	1401.94	1396.98	1397.72	1398.26	1400.62	1400.05
8/31/92	1407.0	1406.47	1407.07	1402.11	1402.82	1403.38	1405.74	1405.17
9/1/92	1331.0	1330.47	1331.11	1327.36	1327.03	1327.45	1329.36	1328.80
9/2/92	1320.0	1319.47	1320.11	1316.36	1316.03	1316.46	1318.36	1317.80
9/3/92	1373.0	1372.52	1373.15	1369.41	1369.08	1368.21	1370.12	1369.56
9/4/92	1252.0	1251.52	1252.15	1248.41	1248.08	1247.73	1249.64	1249.07
9/5/92	984.0	983.52	984.15	980.41	980.08	979.79	981.70	981.13
9/6/92	896.0	895.52	896.15	892.41	892.08	892.32	894.23	893.66
9/7/92	826.0	825.41	826.04	822.30	821.97	822.21	824.12	823.56
9/8/92	793.0	792.41	793.04	789.30	789.64	790.14	792.05	791.49
9/9/92	639.0	638.41	639.04	635.30	635.64	636.25	638.16	637.60
9/10/92	380.0	379.41	380.04	376.30	376.80	377.50	379.41	378.84
9/11/92	430.0	429.42	430.05	426.31	426.45	427.08	428.99	428.42
9/12/92	432.0	431.42	432.05	428.31	428.37	428.93	430.84	430.28
9/13/92	435.0	434.42	435.05	431.31	431.37	431.92	433.83	433.26
9/14/92	421.0	420.42	421.05	417.31	417.37	417.98	419.88	419.32
9/15/92	423.0	422.42	423.05	419.31	419.37	419.99	421.90	421.34
9/16/92	425.0	424.53	425.16	421.42	419.67	420.28	422.18	421.62
9/17/92	428.0	427.41	428.04	424.30	422.55	423.12	425.03	424.46
9/18/92	430.0	429.72	430.35	426.61	424.86	424.29	426.20	425.64
9/19/92	448.0	447.25	447.88	444.14	442.39	442.24	444.14	443.58
9/20/92	469.0	468.52	469.15	465.41	463.66	463.48	465.39	464.83
9/21/92	462.0	461.42	462.05	458.31	456.56	456.93	458.84	458.27
9/22/92	439.0	438.66	439.29	435.55	433.80	434.16	436.07	435.51
9/23/92	442.0	441.66	442.29	438.55	436.80	437.14	439.05	438.49
9/24/92	488.0	487.18	487.81	484.07	482.32	483.18	485.09	484.52
9/25/92	527.0	526.52	527.15	523.41	521.66	524.68	526.59	526.02
9/26/92	485.0	484.52	485.15	481.41	479.66	481.30	483.20	482.64
9/27/92	487.0	486.43	487.07	483.32	481.58	482.91	484.82	484.25
9/28/92	490.0	489.43	490.07	486.32	484.58	485.72	487.63	487.06
9/29/92	492.0	491.56	492.19	488.45	486.70	487.74	489.65	489.09
9/30/92	513.0	512.56	513.19	509.45	507.70	508.70	510.61	510.04
10/1/92	504.0	503.56	504.24	503.26	502.15	503.05	504.22	503.65
10/2/92	462.0	461.49	462.17	461.18	460.08	460.95	462.12	461.55
10/3/92	464.0	463.49	464.17	463.18	462.08	461.78	462.95	462.39
10/4/92	467.0	466.49	467.17	466.18	465.08	465.23	466.40	465.83
10/5/92	451.0	450.56	451.24	450.25	449.15	449.29	450.45	449.89
10/6/92	481.0	480.56	481.24	480.25	479.15	479.74	480.91	480.35
10/7/92	483.0	482.56	483.24	482.25	481.14	481.74	482.90	482.34
10/8/92	477.0	476.56	477.24	476.25	474.73	475.32	476.48	475.92
10/9/92	471.0	470.50	471.18	470.19	468.67	469.22	470.39	469.83
10/10/92	491.0	490.50	491.18	490.19	488.81	489.55	490.72	490.15
10/11/92	494.0	493.50	494.18	493.19	492.03	492.75	493.92	493.35
10/12/92	496.0	495.50	496.18	495.19	494.08	494.80	495.97	495.41
10/13/92	490.0	489.62	490.30	489.32	488.21	488.95	490.12	489.55
10/14/92	483.0	482.62	483.30	482.32	481.21	481.93	483.10	482.53
10/15/92	477.0	476.62	477.30	476.32	475.21	475.95	477.12	476.56
10/16/92	246.0	245.62	246.26	245.27	245.27	245.93	246.05	245.48
10/17/92	230.0	229.62	230.26	229.27	229.27	230.00	230.12	229.55
10/18/92	230.0	229.62	230.26	229.27	229.27	228.42	228.54	227.97
10/19/92	220.0	219.57	220.21	219.23	219.23	218.91	219.02	218.45

10/20/92	215.0	214.57	215.21	214.23	214.23	214.42	214.53	213.97
10/21/92	210.0	209.57	210.21	209.23	209.23	209.84	209.96	209.39
10/22/92	220.0	219.57	220.21	219.23	219.23	219.86	219.98	219.41
10/23/92	276.0	275.57	276.21	275.23	275.23	275.84	275.96	275.39
10/24/92	282.0	281.57	282.21	281.23	281.23	281.82	281.93	281.37
10/25/92	288.0	287.64	288.28	287.29	287.29	288.05	288.17	287.60
10/26/92	300.0	299.64	300.28	299.29	299.29	300.03	300.15	299.58
10/27/92	294.0	293.64	294.28	293.29	293.29	294.04	294.15	293.59
10/28/92	294.0	293.64	294.28	293.29	293.29	294.03	294.15	293.58
10/29/92	282.0	281.64	282.28	281.29	281.29	282.13	282.25	281.68
10/30/92	240.0	239.64	240.28	239.29	239.29	240.24	240.35	239.78
10/31/92	225.0	224.64	225.28	224.29	224.29	225.31	225.43	224.86
11/1/92	246.0	245.64	246.32	245.65	245.65	245.44	245.56	244.99
11/2/92	307.0	306.64	307.33	306.65	306.65	306.52	306.63	306.07
11/3/92	335.0	334.64	335.33	334.65	334.65	334.52	334.63	334.07
11/4/92	356.0	355.64	356.33	355.65	355.65	355.52	355.63	355.07
11/5/92	342.0	341.64	342.33	341.65	341.65	341.55	341.67	341.10
11/6/92	335.0	334.64	335.33	334.65	334.65	334.55	334.67	334.10
11/7/92	342.0	341.64	342.33	341.65	341.65	341.55	341.67	341.10
11/8/92	426.0	425.64	426.33	425.65	425.65	425.55	425.67	425.10
11/9/92	459.0	458.64	459.33	458.65	458.65	458.58	458.69	458.13
11/10/92	459.0	458.64	459.33	458.65	458.65	458.58	458.69	458.13
11/11/92	459.0	458.70	459.39	458.71	458.71	458.64	458.75	458.18
11/12/92	513.0	512.70	513.39	512.71	512.71	512.64	512.75	512.18
11/13/92	477.0	476.70	477.39	476.71	476.71	476.64	476.75	476.18
11/14/92	349.0	348.70	349.39	348.71	348.71	348.64	348.75	348.19
11/15/92	402.0	401.70	402.39	401.71	401.71	401.64	401.75	401.19
11/16/92	402.0	401.70	402.39	401.71	401.71	401.64	401.75	401.19
11/17/92	394.0	393.70	394.39	393.71	393.71	393.64	393.75	393.19
11/18/92	410.0	409.70	410.39	409.71	409.71	409.64	409.75	409.19
11/19/92	442.0	441.70	442.39	441.71	441.71	441.66	441.78	441.21
11/20/92	459.0	458.70	459.39	458.71	458.71	458.66	458.78	458.21
11/21/92	477.0	476.70	477.39	476.71	476.71	476.66	476.78	476.21
11/22/92	504.0	503.70	504.39	503.71	503.71	503.66	503.78	503.21
11/23/92	495.0	494.69	495.38	494.71	494.71	494.66	494.77	494.21
11/24/92	342.0	341.69	342.38	341.71	341.71	341.66	341.77	341.21
11/25/92	356.0	355.69	356.38	355.71	355.71	355.66	355.77	355.21
11/26/92	418.0	417.69	418.38	417.71	417.71	417.66	417.77	417.21
11/27/92	394.0	393.69	394.38	393.71	393.71	393.66	393.77	393.21
11/28/92	394.0	393.69	394.38	393.71	393.71	393.66	393.77	393.21
11/29/92	386.0	385.69	386.38	385.71	385.71	385.66	385.77	385.21
11/30/92	426.0	425.69	426.38	425.71	425.71	425.66	425.77	425.21
12/1/92	426.0	425.69	426.37	425.67	425.67	425.62	425.74	425.17
12/2/92	394.0	393.69	394.37	393.67	393.67	393.62	393.74	393.17
12/3/92	370.0	369.69	370.37	369.67	369.67	369.64	369.75	369.19
12/4/92	386.0	385.69	386.37	385.67	385.67	385.64	385.75	385.19
12/5/92	442.0	441.69	442.37	441.67	441.67	441.64	441.75	441.19
12/6/92	378.0	377.73	378.40	377.70	377.70	377.67	377.79	377.22
12/7/92	378.0	377.73	378.40	377.70	377.70	377.67	377.79	377.22
12/8/92	363.0	362.73	363.40	362.70	362.70	362.67	362.79	362.22
12/9/92	356.0	355.73	356.40	355.70	355.70	355.67	355.79	355.22
12/10/92	363.0	362.73	363.40	362.70	362.70	362.67	362.79	362.22
12/11/92	342.0	341.73	342.40	341.70	341.70	341.67	341.79	341.22
12/12/92	335.0	334.73	335.40	334.70	334.70	334.67	334.79	334.22
12/13/92	328.0	327.73	328.40	327.70	327.70	327.68	327.79	327.23
12/14/92	356.0	355.73	356.40	355.70	355.70	355.68	355.79	355.23
12/15/92	477.0	476.73	477.40	476.70	476.70	476.68	476.79	476.23
12/16/92	442.0	441.73	442.40	441.70	441.70	441.68	441.79	441.23
12/17/92	434.0	433.73	434.40	433.70	433.70	433.68	433.79	433.23
12/18/92	410.0	409.73	410.40	409.70	409.70	409.68	409.79	409.23
12/19/92	394.0	393.73	394.40	393.70	393.70	393.68	393.79	393.23
12/20/92	410.0	409.73	410.40	409.70	409.70	409.68	409.79	409.23
12/21/92	426.0	425.73	426.40	425.70	425.70	425.68	425.79	425.23

12/22/92	450.0	449.76	450.44	449.74	449.74	449.71	449.83	449.26
12/23/92	590.0	589.76	590.44	589.74	589.74	589.71	589.83	589.26
12/24/92	620.0	619.76	620.44	619.74	619.74	619.72	619.84	619.27
12/25/92	600.0	599.76	600.44	599.74	599.74	599.72	599.84	599.27
12/26/92	570.0	569.76	570.44	569.74	569.74	569.72	569.84	569.27
12/27/92	560.0	559.76	560.44	559.74	559.74	559.72	559.84	559.27
12/28/92	540.0	539.76	540.44	539.74	539.74	539.72	539.84	539.27
12/29/92	513.0	512.76	513.44	512.74	512.74	512.72	512.84	512.27
12/30/92	495.0	494.76	495.44	494.74	494.74	494.72	494.84	494.27
12/31/92	477.0	476.76	477.44	476.74	476.74	476.72	476.84	476.27
1/1/93	459.0	458.76	459.42	458.75	458.75	458.73	458.85	458.28
1/2/93	459.0	458.76	459.42	458.75	458.75	458.73	458.85	458.28
1/3/93	434.0	433.76	434.42	433.75	433.75	433.73	433.85	433.28
1/4/93	434.0	433.76	434.42	433.75	433.75	433.73	433.85	433.28
1/5/93	434.0	433.76	434.42	433.75	433.75	433.73	433.85	433.28
1/6/93	402.0	401.76	402.42	401.75	401.75	401.74	401.85	401.29
1/7/93	394.0	393.76	394.42	393.75	393.75	393.74	393.85	393.29
1/8/93	459.0	458.76	459.42	458.75	458.75	458.74	458.85	458.29
1/9/93	477.0	476.76	477.42	476.75	476.75	476.74	476.85	476.29
1/10/93	450.0	449.76	450.42	449.75	449.75	449.74	449.85	449.29
1/11/93	426.0	425.78	426.43	425.76	425.76	425.75	425.87	425.30
1/12/93	426.0	425.78	426.43	425.76	425.76	425.75	425.87	425.30
1/13/93	418.0	417.78	418.43	417.76	417.76	417.75	417.87	417.30
1/14/93	370.0	369.78	370.43	369.76	369.76	369.75	369.87	369.30
1/15/93	356.0	355.78	356.43	355.76	355.76	355.75	355.87	355.30
1/16/93	349.0	348.78	349.43	348.76	348.76	348.75	348.87	348.30
1/17/93	342.0	341.78	342.43	341.76	341.76	341.75	341.87	341.30
1/18/93	342.0	341.78	342.43	341.76	341.76	341.75	341.87	341.30
1/19/93	342.0	341.78	342.43	341.76	341.76	341.75	341.87	341.30
1/20/93	342.0	341.78	342.43	341.76	341.76	341.75	341.87	341.30
1/21/93	342.0	341.78	342.43	341.76	341.76	341.75	341.87	341.30
1/22/93	335.0	334.78	335.43	334.76	334.76	334.76	334.87	334.30
1/23/93	328.0	327.78	328.43	327.76	327.76	327.76	327.87	327.30
1/24/93	335.0	334.78	335.43	334.76	334.76	334.76	334.87	334.30
1/25/93	640.0	639.78	640.43	639.76	639.76	639.76	639.87	639.30
1/26/93	1111.0	1110.78	1111.43	1110.76	1110.76	1110.76	1110.87	1110.30
1/27/93	1138.0	1137.78	1138.43	1137.76	1137.76	1137.76	1137.87	1137.30
1/28/93	984.0	983.78	984.43	983.76	983.76	983.76	983.87	983.30
1/29/93	842.0	841.78	842.43	841.76	841.76	841.76	841.87	841.30
1/30/93	757.0	756.78	757.43	756.76	756.76	756.76	756.87	756.30
1/31/93	701.0	700.78	701.43	700.76	700.76	700.76	700.87	700.30
2/1/93	656.0	655.78	656.49	655.79	655.79	655.79	655.90	655.33
2/2/93	624.0	623.78	624.49	623.79	623.79	623.79	623.90	623.33
2/3/93	593.0	592.81	593.52	592.82	592.82	592.81	592.93	592.36
2/4/93	562.0	561.81	562.52	561.82	561.82	561.81	561.93	561.36
2/5/93	542.0	541.81	542.52	541.82	541.82	541.81	541.93	541.36
2/6/93	523.0	522.81	523.52	522.82	522.82	522.81	522.93	522.36
2/7/93	513.0	512.81	513.52	512.82	512.82	512.81	512.93	512.36
2/8/93	503.0	502.81	503.52	502.82	502.82	502.81	502.93	502.36
2/9/93	503.0	502.81	503.52	502.82	502.82	502.81	502.93	502.36
2/10/93	502.0	501.81	502.52	501.82	501.82	501.81	501.93	501.36
2/11/93	501.0	500.81	501.52	500.82	500.82	500.82	500.93	500.37
2/12/93	501.0	500.81	501.52	500.82	500.82	500.82	500.93	500.37
2/13/93	491.0	490.81	491.52	490.82	490.82	490.82	490.93	490.37
2/14/93	490.0	489.81	490.52	489.82	489.82	489.82	489.93	489.37
2/15/93	480.0	479.81	480.52	479.82	479.82	479.82	479.93	479.37
2/16/93	462.0	461.81	462.52	461.82	461.82	461.82	461.93	461.37
2/17/93	436.0	435.81	436.52	435.82	435.82	435.82	435.93	435.37
2/18/93	443.0	442.81	443.52	442.82	442.82	442.82	442.93	442.37
2/19/93	443.0	442.81	443.52	442.82	442.82	442.82	442.93	442.37
2/20/93	434.0	433.81	434.52	433.82	433.82	433.82	433.93	433.37
2/21/93	425.0	424.81	425.52	424.82	424.82	424.82	424.93	424.37
2/22/93	409.0	408.81	409.52	408.82	408.82	408.82	408.93	408.37

2/23/93	384.0	383.81	384.52	383.82	383.82	383.82	383.93	383.37
2/24/93	354.0	353.81	354.52	353.82	353.82	353.82	353.93	353.37
2/25/93	325.0	324.81	325.52	324.82	324.82	324.82	324.93	324.36
2/26/93	318.0	317.81	318.52	317.82	317.82	317.82	317.93	317.36
2/27/93	310.0	309.81	310.52	309.82	309.82	309.82	309.93	309.36
2/28/93	303.0	302.81	303.52	302.82	302.82	302.82	302.93	302.36
3/1/93	296.0	295.81	296.45	295.78	295.78	295.78	295.89	295.32
3/2/93	295.0	294.81	295.45	294.78	294.78	294.78	294.89	294.32
3/3/93	295.0	294.83	295.47	294.81	294.81	294.80	294.92	294.35
3/4/93	301.0	300.83	301.47	300.81	300.81	300.80	300.92	300.35
3/5/93	342.0	341.83	342.47	341.81	341.81	341.80	341.92	341.35
3/6/93	419.0	418.83	419.47	418.81	418.81	418.80	418.92	418.35
3/7/93	452.0	451.83	452.47	451.81	451.81	451.80	451.92	451.35
3/8/93	488.0	487.83	488.47	487.81	487.81	487.80	487.92	487.35
3/9/93	554.0	553.83	554.47	553.81	553.81	553.80	553.92	553.35
3/10/93	575.0	574.83	575.47	574.81	574.81	574.80	574.92	574.35
3/11/93	565.0	564.83	565.47	564.81	564.81	564.80	564.92	564.35
3/12/93	536.0	535.83	536.47	535.81	535.81	535.80	535.92	535.35
3/13/93	511.0	510.83	511.47	510.81	510.81	510.80	510.92	510.35
3/14/93	511.0	510.83	511.47	510.81	510.81	510.80	510.92	510.35
3/15/93	809.0	808.83	809.47	808.81	808.81	808.80	808.92	808.35
3/16/93	961.0	960.83	961.47	960.81	960.81	960.80	960.92	960.35
3/17/93	846.0	845.83	846.47	845.81	845.81	845.80	845.92	845.35
3/18/93	786.0	785.83	786.47	785.81	785.81	785.80	785.92	785.35
3/19/93	774.0	773.83	774.47	773.81	773.81	773.80	773.92	773.35
3/20/93	774.0	773.83	774.47	773.81	773.81	773.80	773.92	773.35
3/21/93	798.0	797.83	798.47	797.81	797.81	797.80	797.92	797.35
3/22/93	846.0	845.83	846.47	845.81	845.81	845.80	845.92	845.35
3/23/93	1155.0	1154.83	1155.47	1154.81	1154.81	1154.80	1154.92	1154.35
3/24/93	1322.0	1321.83	1322.47	1321.81	1321.81	1321.80	1321.92	1321.35
3/25/93	1200.0	1199.83	1200.47	1199.81	1199.81	1199.80	1199.92	1199.35
3/26/93	1084.0	1083.83	1084.47	1083.81	1083.81	1083.80	1083.92	1083.35
3/27/93	1000.0	999.83	1000.47	999.81	999.81	999.80	999.92	999.35
3/28/93	935.0	934.83	935.47	934.81	934.81	934.80	934.92	934.35
3/29/93	786.0	785.83	786.47	785.81	785.81	785.80	785.92	785.35
3/30/93	495.0	494.83	495.47	494.81	494.81	494.80	494.92	494.35
3/31/93	468.0	467.83	468.47	467.81	467.81	467.80	467.92	467.35
4/1/93	450.0	449.83	450.45	449.52	449.52	452.17	453.57	452.99
4/2/93	620.0	619.83	620.45	619.52	619.52	622.04	623.43	622.85
4/3/93	1000.0	999.83	1000.45	999.52	999.52	1001.76	1003.15	1002.57
4/4/93	1056.0	1055.83	1056.45	1055.52	1055.52	1057.90	1059.29	1058.71
4/5/93	1042.0	1041.83	1042.45	1041.52	1041.52	1043.89	1045.28	1044.71
4/6/93	974.0	973.85	974.47	973.54	973.54	976.05	977.44	976.87
4/7/93	935.0	934.86	935.48	934.55	934.55	937.06	938.45	937.88
4/8/93	909.0	908.86	909.48	908.55	908.55	911.06	912.45	911.88
4/9/93	1070.0	1069.86	1070.48	1069.55	1069.55	1072.06	1073.45	1072.88
4/10/93	1126.0	1125.86	1126.48	1125.55	1125.55	1128.13	1129.52	1128.95
4/11/93	1070.0	1069.86	1070.48	1069.55	1069.55	1072.13	1073.52	1072.95
4/12/93	987.0	986.86	987.48	986.55	986.55	989.13	990.52	989.95
4/13/93	909.0	908.86	909.48	908.55	908.55	911.13	912.52	911.95
4/14/93	870.0	869.86	870.48	869.55	869.55	872.13	873.52	872.95
4/15/93	846.0	845.86	846.48	845.55	845.55	848.13	849.52	848.95
4/16/93	858.0	857.86	858.48	857.55	857.55	860.13	861.52	860.94
4/17/93	870.0	869.86	870.48	869.55	869.55	872.13	873.52	872.94
4/18/93	922.0	921.86	922.48	921.55	921.55	923.73	925.12	924.54
4/19/93	935.0	934.86	935.48	934.55	934.55	936.88	938.27	937.70
4/20/93	774.0	773.86	774.48	773.55	773.55	775.88	777.27	776.70
4/21/93	610.0	609.86	610.48	609.55	609.55	612.04	613.43	612.86
4/22/93	550.0	549.86	550.48	549.55	549.55	552.04	553.43	552.85
4/23/93	580.0	579.86	580.48	579.55	579.55	582.04	583.43	582.85
4/24/93	580.0	579.86	580.48	579.55	579.55	582.03	583.42	582.85
4/25/93	620.0	619.86	620.48	619.55	619.55	622.12	623.51	622.93
4/26/93	673.0	672.86	673.48	672.55	672.55	675.12	676.51	675.93

4/27/93	695.0	694.86	695.48	694.55	694.55	697.11	698.51	697.93
4/28/93	630.0	629.86	630.48	629.55	629.55	632.11	633.51	632.93
4/29/93	590.0	589.86	590.48	589.55	589.55	592.11	593.50	592.93
4/30/93	834.0	833.86	834.48	833.55	833.55	836.11	837.50	836.93
5/1/93	1014.0	1014.85	1015.42	1014.11	1017.43	1022.52	1024.58	1024.01
5/2/93	922.0	922.85	923.42	922.11	925.43	930.52	932.58	932.01
5/3/93	834.0	834.85	835.43	834.11	837.44	842.03	844.09	843.52
5/4/93	739.0	739.86	740.44	739.12	742.44	747.23	749.29	748.72
5/5/93	662.0	662.86	663.43	662.12	665.44	670.21	672.28	671.71
5/6/93	662.0	662.82	663.40	662.08	665.41	670.38	672.45	671.87
5/7/93	706.0	706.83	707.40	706.09	709.41	714.38	716.45	715.88
5/8/93	620.0	620.85	621.43	620.11	623.44	628.40	630.47	629.90
5/9/93	550.0	550.87	551.44	550.13	553.45	558.41	560.48	559.90
5/10/93	504.0	504.86	505.43	504.12	507.44	512.51	514.57	514.00
5/11/93	858.0	858.88	859.46	858.14	861.47	866.53	868.60	868.03
5/12/93	1098.0	1099.11	1099.68	1098.37	1101.69	1106.76	1108.82	1108.25
5/13/93	1140.0	1141.11	1141.68	1140.37	1143.69	1148.76	1150.82	1150.25
5/14/93	896.0	896.84	897.41	896.10	899.42	904.48	906.54	905.97
5/15/93	774.0	774.90	775.48	774.16	777.49	782.54	784.61	784.04
5/16/93	706.0	706.84	707.41	706.10	709.42	714.48	716.54	715.97
5/17/93	706.0	706.83	707.41	706.09	709.42	714.47	716.54	715.96
5/18/93	728.0	728.83	729.40	728.09	731.41	735.79	737.86	737.28
5/19/93	728.0	728.90	729.47	728.16	731.48	736.12	738.19	737.61
5/20/93	695.0	695.87	696.44	695.13	698.45	703.08	705.14	704.57
5/21/93	610.0	610.88	611.45	610.14	613.46	618.36	620.43	619.86
5/22/93	580.0	580.87	581.44	580.13	583.45	588.35	590.41	589.84
5/23/93	640.0	640.98	641.56	640.24	643.57	648.46	650.52	649.95
5/24/93	1000.0	1001.01	1001.59	1000.27	1003.60	1008.63	1010.70	1010.13
5/25/93	1230.0	1230.99	1231.57	1230.25	1233.58	1238.61	1240.68	1240.11
5/26/93	1467.0	1468.05	1468.63	1467.31	1470.64	1475.52	1477.58	1477.01
5/27/93	1674.0	1674.96	1675.53	1674.22	1677.54	1682.57	1684.63	1684.06
5/28/93	1535.0	1535.98	1536.56	1535.24	1538.57	1543.60	1545.66	1545.09
5/29/93	1275.0	1275.96	1276.54	1275.22	1278.55	1283.62	1285.69	1285.12
5/30/93	1140.0	1140.94	1141.52	1140.20	1143.52	1148.60	1150.67	1150.09
5/31/93	1170.0	1171.00	1171.58	1170.26	1171.54	1176.62	1178.69	1178.11
6/1/93	1084.0	1084.98	1085.62	1081.36	1082.32	1086.80	1089.01	1088.44
6/2/93	935.0	936.08	936.72	932.46	933.42	937.90	940.11	939.54
6/3/93	948.0	948.99	949.62	945.36	946.32	949.95	952.16	951.58
6/4/93	1056.0	1057.03	1057.67	1053.41	1054.37	1058.32	1060.53	1059.96
6/5/93	1126.0	1127.08	1127.71	1123.45	1124.42	1128.36	1130.57	1130.00
6/6/93	948.0	948.98	949.61	945.35	946.31	950.60	952.82	952.24
6/7/93	1056.0	1056.96	1057.59	1053.33	1054.29	1058.58	1060.79	1060.22
6/8/93	1354.0	1354.99	1355.62	1351.36	1352.32	1356.60	1358.81	1358.24
6/9/93	1603.0	1604.11	1604.74	1600.48	1601.44	1605.72	1607.93	1607.36
6/10/93	1710.0	1710.99	1711.62	1707.36	1708.32	1712.78	1714.99	1714.42
6/11/93	1840.0	1841.03	1841.67	1837.41	1838.37	1842.83	1845.04	1844.46
6/12/93	2147.0	2148.10	2148.73	2144.47	2145.43	2149.89	2152.10	2151.52
6/13/93	2476.0	2476.93	2477.49	2473.23	2474.19	2478.64	2480.85	2480.28
6/14/93	2684.0	2684.95	2685.51	2681.25	2682.21	2686.65	2688.87	2688.29
6/15/93	2900.0	2900.97	2901.52	2897.26	2898.22	2902.67	2904.88	2904.31
6/16/93	2741.0	2742.14	2742.69	2738.43	2739.39	2743.84	2746.05	2745.47
6/17/93	2846.0	2846.98	2847.53	2843.27	2844.23	2848.58	2850.79	2850.22
6/18/93	2807.0	2808.01	2808.57	2804.31	2805.27	2808.45	2810.66	2810.08
6/19/93	2840.0	2841.17	2841.72	2837.46	2838.42	2841.92	2844.13	2843.56
6/20/93	2801.0	2801.98	2802.54	2798.28	2799.24	2802.57	2804.78	2804.21
6/21/93	2858.0	2858.95	2859.51	2855.25	2856.21	2859.89	2862.10	2861.53
6/22/93	2991.0	2991.91	2992.46	2988.20	2989.16	2992.83	2995.04	2994.47
6/23/93	2975.0	2975.94	2976.49	2972.23	2973.19	2977.02	2979.23	2978.65
6/24/93	2780.0	2780.99	2781.54	2777.28	2778.24	2781.80	2784.02	2783.44
6/25/93	2828.0	2829.04	2829.59	2825.33	2826.29	2829.95	2832.16	2831.58
6/26/93	2900.0	2901.03	2901.59	2897.33	2898.29	2901.87	2904.08	2903.51
6/27/93	2950.0	2950.92	2951.47	2947.21	2948.17	2951.70	2953.91	2953.34
6/28/93	2950.0	2950.99	2951.55	2947.29	2948.25	2951.57	2953.78	2953.21

6/29/93	2900.0	2901.01	2901.56	2897.30	2898.26	2901.48	2903.69	2903.12
6/30/93	2876.0	2877.12	2877.67	2873.41	2874.37	2877.58	2879.79	2879.22
7/1/93	3000.0	3001.37	3001.95	2995.58	2997.56	3001.15	3003.71	3003.13
7/2/93	3100.0	3101.42	3102.00	3095.63	3097.61	3101.10	3103.65	3103.08
7/3/93	3125.0	3126.48	3127.06	3120.69	3122.67	3124.65	3127.21	3126.64
7/4/93	3125.0	3126.26	3126.84	3120.48	3122.45	3124.55	3127.11	3126.54
7/5/93	3100.0	3101.16	3101.74	3095.38	3097.35	3099.00	3101.56	3100.98
7/6/93	3202.0	3203.20	3203.78	3197.41	3199.39	3201.21	3203.77	3203.20
7/7/93	3332.0	3333.13	3333.71	3327.35	3329.32	3330.96	3333.52	3332.94
7/8/93	3306.0	3307.14	3307.72	3301.35	3303.33	3304.81	3307.37	3306.79
7/9/93	3280.0	3281.14	3281.72	3275.35	3277.33	3278.77	3281.33	3280.76
7/10/93	3410.0	3411.14	3411.72	3405.36	3407.33	3409.01	3411.57	3410.99
7/11/93	3438.0	3439.14	3439.72	3433.36	3435.33	3436.97	3439.53	3438.96
7/12/93	3410.0	3411.14	3411.72	3405.36	3407.33	3408.96	3411.52	3410.94
7/13/93	3410.0	3411.11	3411.69	3405.32	3407.30	3409.03	3411.59	3411.02
7/14/93	3410.0	3411.11	3411.69	3405.32	3407.30	3409.03	3411.59	3411.01
7/15/93	3358.0	3359.11	3359.69	3353.32	3355.30	3356.91	3359.47	3358.90
7/16/93	3306.0	3307.18	3307.76	3301.39	3303.37	3304.95	3307.51	3306.93
7/17/93	3254.0	3255.09	3255.67	3249.30	3251.27	3253.06	3255.62	3255.04
7/18/93	3176.0	3177.06	3177.64	3171.28	3173.25	3173.38	3175.94	3175.37
7/19/93	3075.0	3076.20	3076.78	3070.42	3072.32	3073.03	3075.59	3075.01
7/20/93	3000.0	3001.14	3001.72	2995.36	2997.33	2998.10	3000.65	3000.08
7/21/93	2900.0	2901.08	2901.66	2895.29	2896.79	2898.13	2900.69	2900.12
7/22/93	2852.0	2852.99	2853.57	2847.21	2848.88	2850.19	2852.75	2852.18
7/23/93	2925.0	2926.18	2926.76	2920.40	2921.89	2923.08	2925.64	2925.06
7/24/93	3000.0	3001.18	3001.76	2995.40	2996.89	2998.26	3000.82	3000.25
7/25/93	3050.0	3051.12	3051.70	3045.33	3047.31	3048.74	3051.29	3050.72
7/26/93	2950.0	2951.12	2951.70	2945.33	2947.23	2948.24	2950.80	2950.22
7/27/93	2876.0	2877.04	2877.62	2871.26	2873.13	2874.37	2876.93	2876.36
7/28/93	2925.0	2926.04	2926.62	2920.26	2922.23	2923.48	2926.04	2925.47
7/29/93	3000.0	3000.95	3001.53	2995.16	2997.14	2998.62	3001.18	3000.60
7/30/93	2925.0	2925.95	2926.53	2920.16	2922.14	2923.62	2926.18	2925.60
7/31/93	2852.0	2853.04	2853.62	2847.26	2848.73	2849.99	2852.55	2851.98
8/1/93	2900.0	2901.14	2901.73	2896.77	2898.31	2899.36	2901.72	2901.15
8/2/93	2950.0	2951.14	2951.73	2946.77	2948.14	2949.14	2951.50	2950.93
8/3/93	3075.0	3076.17	3076.76	3071.81	3072.92	3072.27	3074.63	3074.06
8/4/93	3358.0	3359.17	3359.76	3354.81	3355.92	3355.77	3358.13	3357.55
8/5/93	3494.0	3495.17	3495.76	3490.80	3491.91	3491.74	3494.10	3493.53
8/6/93	3438.0	3439.17	3439.76	3434.80	3435.91	3436.33	3438.69	3438.12
8/7/93	3384.0	3385.09	3385.68	3380.72	3381.83	3382.25	3384.61	3384.04
8/8/93	3358.0	3359.09	3359.68	3354.72	3355.83	3356.27	3358.63	3358.06
8/9/93	3332.0	3333.09	3333.68	3328.72	3329.83	3330.25	3332.61	3332.04
8/10/93	3332.0	3333.09	3333.68	3328.72	3329.83	3330.54	3332.90	3332.33
8/11/93	3306.0	3307.10	3307.69	3302.73	3303.84	3304.57	3306.93	3306.35
8/12/93	3332.0	3333.09	3333.69	3328.73	3329.84	3330.56	3332.92	3332.35
8/13/93	3306.0	3307.09	3307.69	3302.73	3303.84	3304.67	3307.03	3306.46
8/14/93	3306.0	3307.09	3307.69	3302.73	3303.43	3304.40	3306.76	3306.19
8/15/93	3280.0	3281.09	3281.68	3276.73	3277.32	3278.33	3280.69	3280.12
8/16/93	3176.0	3177.19	3177.78	3172.82	3173.93	3174.93	3177.29	3176.72
8/17/93	3125.0	3126.10	3126.69	3121.73	3122.33	3123.30	3125.66	3125.08
8/18/93	3025.0	3026.07	3026.67	3021.71	3022.24	3021.79	3024.15	3023.58
8/19/93	3000.0	3001.24	3001.83	2996.87	2997.36	2997.35	2999.71	2999.14
8/20/93	3050.0	3051.17	3051.76	3046.80	3047.59	3047.54	3049.90	3049.33
8/21/93	2950.0	2951.10	2951.69	2946.73	2947.40	2947.96	2950.33	2949.75
8/22/93	2828.0	2829.00	2829.59	2824.63	2825.42	2825.96	2828.32	2827.75
8/23/93	2828.0	2829.22	2829.81	2824.86	2825.64	2826.18	2828.54	2827.97
8/24/93	2804.0	2805.22	2805.81	2800.86	2801.35	2802.17	2804.54	2803.96
8/25/93	2756.0	2757.15	2757.74	2752.78	2753.32	2754.11	2756.47	2755.90
8/26/93	2828.0	2828.75	2829.34	2824.39	2824.94	2825.36	2827.72	2827.15
8/27/93	2852.0	2852.50	2853.09	2848.14	2848.68	2849.35	2851.71	2851.13
8/28/93	2828.0	2828.60	2829.19	2824.24	2825.35	2826.02	2828.38	2827.81
8/29/93	2804.0	2804.65	2805.24	2800.29	2801.40	2802.18	2804.54	2803.96
8/30/93	2804.0	2804.62	2805.21	2800.26	2801.37	2802.15	2804.51	2803.93

8/31/93	2804.0	2804.74	2805.34	2800.38	2800.82	2801.60	2803.96	2803.39
9/1/93	2732.0	2731.51	2732.14	2728.40	2728.02	2728.62	2730.53	2729.96
9/2/93	2780.0	2779.51	2780.14	2776.40	2776.18	2776.77	2778.67	2778.10
9/3/93	2780.0	2779.55	2780.18	2776.44	2776.22	2775.54	2777.45	2776.88
9/4/93	2732.0	2731.55	2732.18	2728.44	2728.22	2728.03	2729.94	2729.37
9/5/93	2684.0	2683.55	2684.18	2680.44	2680.22	2680.05	2681.96	2681.39
9/6/93	2476.0	2475.55	2476.18	2472.44	2472.22	2472.57	2474.47	2473.90
9/7/93	2147.0	2146.45	2147.09	2143.34	2143.12	2143.47	2145.38	2144.80
9/8/93	1920.0	1919.45	1920.09	1916.34	1916.12	1916.46	1918.37	1917.80
9/9/93	1638.0	1637.45	1638.09	1634.34	1634.12	1634.46	1636.37	1635.79
9/10/93	804.0	803.45	804.09	800.34	800.12	800.70	802.60	802.03
9/11/93	640.0	639.46	640.10	636.36	636.13	636.73	638.64	638.06
9/12/93	585.0	584.46	585.10	581.36	581.60	582.34	584.24	583.67
9/13/93	522.0	521.46	522.10	518.36	518.83	519.56	521.47	520.89
9/14/93	486.0	485.46	486.10	482.36	482.77	483.48	485.39	484.81
9/15/93	495.0	494.46	495.10	491.36	491.60	492.35	494.26	493.68
9/16/93	504.0	503.56	504.19	500.45	498.64	499.34	501.25	500.68
9/17/93	513.0	512.45	513.08	509.34	507.60	508.28	510.18	509.61
9/18/93	504.0	503.74	504.37	500.63	498.88	498.41	500.32	499.75
9/19/93	513.0	512.31	512.94	509.20	507.45	507.42	509.33	508.76
9/20/93	504.0	503.55	504.18	500.44	498.69	498.68	500.59	500.02
9/21/93	486.0	485.46	486.09	482.35	480.61	481.06	482.97	482.39
9/22/93	450.0	449.68	450.31	446.57	444.83	445.28	447.18	446.61
9/23/93	434.0	433.68	434.31	430.57	428.83	429.26	431.17	430.59
9/24/93	468.0	467.24	467.88	464.13	462.39	462.81	464.71	464.14
9/25/93	468.0	467.56	468.19	464.45	462.70	463.35	465.26	464.69
9/26/93	468.0	467.56	468.19	464.45	462.67	463.29	465.20	464.63
9/27/93	468.0	467.48	468.11	464.37	462.24	462.84	464.75	464.17
9/28/93	468.0	467.48	468.11	464.37	462.24	462.75	464.66	464.09
9/29/93	477.0	476.59	477.23	473.48	471.36	471.82	473.73	473.15
9/30/93	477.0	476.59	477.23	473.48	471.74	472.18	474.09	473.51
10/1/93	468.0	467.59	468.27	467.29	466.12	466.55	467.72	467.15
10/2/93	468.0	467.53	468.21	467.22	466.05	466.49	467.66	467.08
10/3/93	477.0	476.53	477.21	476.22	475.05	474.34	475.50	474.93
10/4/93	477.0	476.53	477.21	476.22	475.05	474.80	475.97	475.39
10/5/93	468.0	467.59	468.27	467.29	466.12	465.85	467.02	466.44
10/6/93	459.0	458.59	459.27	458.29	457.12	457.30	458.47	457.90
10/7/93	468.0	467.59	468.27	467.29	466.12	466.35	467.52	466.95
10/8/93	468.0	467.59	468.27	467.29	466.12	466.42	467.58	467.01
10/9/93	459.0	458.54	459.22	458.23	457.06	457.32	458.49	457.92
10/10/93	459.0	458.54	459.22	458.23	457.06	457.54	458.71	458.14
10/11/93	468.0	467.54	468.22	467.23	466.06	466.56	467.73	467.16
10/12/93	477.0	476.54	477.22	476.23	474.77	475.30	476.47	475.89
10/13/93	468.0	467.65	468.33	467.35	465.89	466.53	467.70	467.12
10/14/93	459.0	458.65	459.33	458.35	456.98	457.61	458.78	458.20
10/15/93	450.0	449.65	450.33	449.35	447.88	448.53	449.70	449.12
10/16/93	442.0	441.65	442.29	441.30	441.30	441.91	442.02	441.45
10/17/93	442.0	441.65	442.29	441.30	441.30	441.89	442.00	441.43
10/18/93	270.0	269.65	270.29	269.30	269.30	268.29	268.40	267.83
10/19/93	263.0	262.61	263.24	262.26	262.26	261.69	261.80	261.23
10/20/93	269.0	268.61	269.24	268.26	268.26	268.13	268.25	267.67
10/21/93	268.0	267.61	268.24	267.26	267.26	267.58	267.69	267.12
10/22/93	261.0	260.61	261.24	260.26	260.26	260.57	260.69	260.11
10/23/93	261.0	260.61	261.24	260.26	260.26	260.62	260.74	260.17
10/24/93	260.0	259.61	260.24	259.26	259.26	259.70	259.81	259.24
10/25/93	253.0	252.67	253.30	252.32	252.32	252.94	253.06	252.49
10/26/93	253.0	252.67	253.30	252.32	252.32	252.91	253.03	252.45
10/27/93	252.0	251.67	252.30	251.32	251.32	251.90	252.01	251.44
10/28/93	258.0	257.67	258.30	257.32	257.32	257.89	258.00	257.43
10/29/93	257.0	256.67	257.30	256.32	256.32	256.87	256.99	256.42
10/30/93	256.0	255.67	256.30	255.32	255.32	255.85	255.97	255.39
10/31/93	256.0	255.67	256.30	255.32	255.32	255.86	255.97	255.40
11/1/93	255.0	254.67	255.35	254.68	254.68	254.47	254.59	254.01

11/2/93	248.0	247.67	248.36	247.68	247.68	247.55	247.66	247.09
11/3/93	296.0	295.67	296.36	295.68	295.68	295.55	295.66	295.09
11/4/93	301.0	300.67	301.36	300.68	300.68	300.55	300.66	300.09
11/5/93	294.0	293.67	294.36	293.68	293.68	293.58	293.70	293.12
11/6/93	276.0	275.67	276.36	275.68	275.68	275.58	275.70	275.12
11/7/93	269.0	268.67	269.36	268.68	268.68	268.58	268.70	268.12
11/8/93	256.0	255.67	256.36	255.68	255.68	255.58	255.70	255.12
11/9/93	250.0	249.67	250.36	249.68	249.68	249.60	249.72	249.15
11/10/93	255.0	254.67	255.36	254.68	254.68	254.60	254.72	254.15
11/11/93	254.0	253.72	254.41	253.73	253.73	253.66	253.77	253.20
11/12/93	254.0	253.72	254.41	253.73	253.73	253.66	253.77	253.20
11/13/93	253.0	252.72	253.41	252.73	252.73	252.66	252.77	252.20
11/14/93	252.0	251.72	252.41	251.73	251.73	251.66	251.78	251.20
11/15/93	252.0	251.72	252.41	251.73	251.73	251.66	251.78	251.20
11/16/93	251.0	250.72	251.41	250.73	250.73	250.66	250.78	250.20
11/17/93	251.0	250.72	251.41	250.73	250.73	250.66	250.78	250.20
11/18/93	262.0	261.72	262.41	261.73	261.73	261.66	261.78	261.20
11/19/93	261.0	260.72	261.41	260.73	260.73	260.69	260.80	260.23
11/20/93	255.0	254.72	255.41	254.73	254.73	254.69	254.80	254.23
11/21/93	266.0	265.72	266.41	265.73	265.73	265.69	265.80	265.23
11/22/93	302.0	301.72	302.41	301.73	301.73	301.69	301.80	301.23
11/23/93	289.0	288.72	289.40	288.73	288.73	288.68	288.80	288.22
11/24/93	270.0	269.72	270.40	269.73	269.73	269.68	269.80	269.22
11/25/93	269.0	268.72	269.40	268.73	268.73	268.68	268.80	268.22
11/26/93	269.0	268.72	269.40	268.73	268.73	268.68	268.80	268.23
11/27/93	244.0	243.72	244.40	243.73	243.73	243.68	243.80	243.23
11/28/93	243.0	242.72	243.40	242.73	242.73	242.68	242.80	242.23
11/29/93	243.0	242.72	243.40	242.73	242.73	242.68	242.80	242.23
11/30/93	248.0	247.72	248.40	247.73	247.73	247.68	247.80	247.23
12/1/93	283.0	282.72	283.39	282.69	282.69	282.65	282.76	282.19
12/2/93	371.0	370.72	371.39	370.69	370.69	370.65	370.76	370.19
12/3/93	386.0	385.72	386.39	385.69	385.69	385.66	385.78	385.21
12/4/93	393.0	392.72	393.39	392.69	392.69	392.66	392.78	392.21
12/5/93	392.0	391.72	392.39	391.69	391.69	391.66	391.78	391.21
12/6/93	347.0	346.75	347.42	346.73	346.73	346.70	346.81	346.24
12/7/93	325.0	324.75	325.42	324.73	324.73	324.70	324.81	324.24
12/8/93	310.0	309.75	310.42	309.73	309.73	309.70	309.81	309.24
12/9/93	310.0	309.75	310.42	309.73	309.73	309.70	309.81	309.24
12/10/93	330.0	329.75	330.42	329.73	329.73	329.70	329.81	329.24
12/11/93	395.0	394.75	395.42	394.73	394.73	394.70	394.81	394.24
12/12/93	402.0	401.75	402.42	401.73	401.73	401.70	401.81	401.24
12/13/93	386.0	385.75	386.42	385.73	385.73	385.70	385.82	385.24
12/14/93	362.0	361.75	362.42	361.73	361.73	361.70	361.82	361.24
12/15/93	340.0	339.75	340.42	339.73	339.73	339.70	339.82	339.24
12/16/93	332.0	331.75	332.42	331.73	331.73	331.70	331.82	331.24
12/17/93	318.0	317.75	318.42	317.73	317.73	317.70	317.82	317.24
12/18/93	310.0	309.75	310.42	309.73	309.73	309.70	309.82	309.24
12/19/93	302.0	301.75	302.42	301.73	301.73	301.70	301.82	301.24
12/20/93	277.0	276.75	277.42	276.73	276.73	276.70	276.82	276.24
12/21/93	246.0	245.75	246.42	245.73	245.73	245.70	245.82	245.24
12/22/93	235.0	234.78	235.45	234.76	234.76	234.73	234.85	234.28
12/23/93	229.0	228.78	229.45	228.76	228.76	228.73	228.85	228.28
12/24/93	224.0	223.78	224.45	223.76	223.76	223.74	223.85	223.28
12/25/93	218.0	217.78	218.45	217.76	217.76	217.74	217.85	217.28
12/26/93	218.0	217.78	218.45	217.76	217.76	217.74	217.85	217.28
12/27/93	212.0	211.78	212.45	211.76	211.76	211.74	211.85	211.28
12/28/93	212.0	211.78	212.45	211.76	211.76	211.74	211.85	211.28
12/29/93	211.0	210.78	211.45	210.76	210.76	210.74	210.85	210.28
12/30/93	211.0	210.78	211.45	210.76	210.76	210.74	210.85	210.28
12/31/93	220.0	219.78	220.45	219.76	219.76	219.74	219.85	219.28
1/1/94	251.0	250.78	251.43	250.77	250.77	250.75	250.86	250.29
1/2/94	257.0	256.78	257.43	256.77	256.77	256.75	256.86	256.29
1/3/94	293.0	292.78	293.43	292.77	292.77	292.75	292.86	292.29

1/4/94	340.0	339.78	340.43	339.77	339.77	339.75	339.86	339.29
1/5/94	455.0	454.78	455.43	454.77	454.77	454.75	454.86	454.29
1/6/94	455.0	454.78	455.43	454.77	454.77	454.75	454.87	454.30
1/7/94	389.0	388.78	389.43	388.77	388.77	388.75	388.87	388.30
1/8/94	351.0	350.78	351.43	350.77	350.77	350.75	350.87	350.30
1/9/94	323.0	322.78	323.43	322.77	322.77	322.75	322.87	322.30
1/10/94	364.0	363.78	364.43	363.77	363.77	363.75	363.87	363.30
1/11/94	395.0	394.80	395.45	394.78	394.78	394.77	394.88	394.31
1/12/94	450.0	449.80	450.45	449.78	449.78	449.77	449.88	449.31
1/13/94	610.0	609.80	610.45	609.78	609.78	609.77	609.88	609.31
1/14/94	739.0	738.80	739.45	738.78	738.78	738.77	738.88	738.31
1/15/94	717.0	716.80	717.45	716.78	716.78	716.77	716.88	716.31
1/16/94	706.0	705.80	706.45	705.78	705.78	705.77	705.88	705.31
1/17/94	673.0	672.80	673.45	672.78	672.78	672.77	672.88	672.31
1/18/94	630.0	629.80	630.45	629.78	629.78	629.77	629.88	629.31
1/19/94	570.0	569.80	570.45	569.78	569.78	569.77	569.88	569.31
1/20/94	522.0	521.80	522.45	521.78	521.78	521.77	521.88	521.31
1/21/94	495.0	494.80	495.45	494.78	494.78	494.77	494.88	494.31
1/22/94	468.0	467.80	468.45	467.78	467.78	467.77	467.89	467.31
1/23/94	450.0	449.80	450.45	449.78	449.78	449.77	449.89	449.31
1/24/94	450.0	449.80	450.45	449.78	449.78	449.77	449.89	449.31
1/25/94	468.0	467.80	468.45	467.78	467.78	467.77	467.89	467.31
1/26/94	486.0	485.80	486.45	485.78	485.78	485.77	485.89	485.31
1/27/94	459.0	458.80	459.45	458.78	458.78	458.77	458.89	458.31
1/28/94	426.0	425.80	426.45	425.78	425.78	425.77	425.89	425.31
1/29/94	396.0	395.80	396.45	395.78	395.78	395.77	395.89	395.31
1/30/94	390.0	389.80	390.45	389.78	389.78	389.77	389.89	389.31
1/31/94	385.0	384.80	385.45	384.78	384.78	384.77	384.89	384.31
2/1/94	379.0	378.80	379.51	378.81	378.81	378.80	378.92	378.34
2/2/94	373.0	372.80	373.51	372.81	372.81	372.80	372.92	372.34
2/3/94	367.0	366.82	367.53	366.84	366.84	366.83	366.94	366.37
2/4/94	362.0	361.82	362.53	361.84	361.84	361.83	361.94	361.37
2/5/94	364.0	363.82	364.53	363.84	363.84	363.83	363.94	363.37
2/6/94	366.0	365.82	366.53	365.84	365.84	365.83	365.94	365.37
2/7/94	368.0	367.82	368.53	367.84	367.84	367.83	367.94	367.37
2/8/94	349.0	348.82	349.53	348.84	348.84	348.83	348.94	348.37
2/9/94	363.0	362.82	363.53	362.84	362.84	362.83	362.94	362.37
2/10/94	363.0	362.82	363.53	362.84	362.84	362.83	362.94	362.37
2/11/94	356.0	355.82	356.53	355.84	355.84	355.83	355.95	355.37
2/12/94	342.0	341.82	342.53	341.84	341.84	341.83	341.95	341.37
2/13/94	342.0	341.82	342.53	341.84	341.84	341.83	341.95	341.37
2/14/94	342.0	341.82	342.53	341.84	341.84	341.83	341.95	341.37
2/15/94	328.0	327.82	328.53	327.84	327.84	327.83	327.95	327.37
2/16/94	314.0	313.82	314.53	313.84	313.84	313.83	313.95	313.37
2/17/94	328.0	327.82	328.53	327.84	327.84	327.83	327.95	327.37
2/18/94	342.0	341.82	342.53	341.84	341.84	341.83	341.95	341.37
2/19/94	328.0	327.82	328.53	327.84	327.84	327.83	327.95	327.37
2/20/94	314.0	313.82	314.53	313.84	313.84	313.83	313.95	313.37
2/21/94	307.0	306.82	307.53	306.84	306.84	306.83	306.95	306.37
2/22/94	307.0	306.82	307.53	306.84	306.84	306.83	306.95	306.37
2/23/94	374.0	373.82	374.53	373.84	373.84	373.83	373.95	373.37
2/24/94	363.0	362.82	363.53	362.84	362.84	362.83	362.95	362.37
2/25/94	332.0	331.82	332.53	331.84	331.84	331.83	331.95	331.37
2/26/94	314.0	313.82	314.53	313.84	313.84	313.83	313.95	313.37
2/27/94	304.0	303.82	304.53	303.84	303.84	303.83	303.95	303.37
2/28/94	328.0	327.82	328.53	327.84	327.84	327.83	327.95	327.37
3/1/94	406.0	405.82	406.46	405.80	405.80	405.79	405.91	405.33
3/2/94	335.0	334.82	335.46	334.80	334.80	334.79	334.91	334.33
3/3/94	353.0	352.85	353.49	352.82	352.82	352.81	352.93	352.36
3/4/94	394.0	393.85	394.49	393.82	393.82	393.81	393.93	393.36
3/5/94	406.0	405.85	406.49	405.82	405.82	405.81	405.93	405.36
3/6/94	402.0	401.85	402.49	401.82	401.82	401.82	401.93	401.36
3/7/94	390.0	389.85	390.49	389.82	389.82	389.82	389.93	389.36

3/8/94	513.0	512.85	513.49	512.82	512.82	512.82	512.93	512.36
3/9/94	545.0	544.85	545.49	544.82	544.82	544.82	544.93	544.36
3/10/94	495.0	494.85	495.49	494.82	494.82	494.82	494.93	494.36
3/11/94	527.0	526.85	527.49	526.82	526.82	526.82	526.93	526.36
3/12/94	522.0	521.85	522.49	521.82	521.82	521.82	521.93	521.36
3/13/94	545.0	544.85	545.49	544.82	544.82	544.82	544.93	544.36
3/14/94	640.0	639.85	640.49	639.82	639.82	639.82	639.93	639.36
3/15/94	744.0	743.85	744.49	743.82	743.82	743.82	743.93	743.36
3/16/94	858.0	857.85	858.49	857.82	857.82	857.82	857.93	857.36
3/17/94	870.0	869.85	870.49	869.82	869.82	869.82	869.93	869.36
3/18/94	870.0	869.85	870.49	869.82	869.82	869.82	869.93	869.36
3/19/94	834.0	833.85	834.49	833.82	833.82	833.82	833.93	833.36
3/20/94	750.0	749.85	750.49	749.82	749.82	749.82	749.93	749.36
3/21/94	728.0	727.85	728.49	727.82	727.82	727.82	727.93	727.36
3/22/94	651.0	650.85	651.49	650.82	650.82	650.82	650.93	650.36
3/23/94	610.0	609.85	610.49	609.82	609.82	609.82	609.93	609.36
3/24/94	560.0	559.85	560.49	559.82	559.82	559.82	559.93	559.36
3/25/94	531.0	530.85	531.49	530.82	530.82	530.82	530.93	530.36
3/26/94	504.0	503.85	504.49	503.82	503.82	503.82	503.93	503.36
3/27/94	531.0	530.85	531.49	530.82	530.82	530.82	530.93	530.36
3/28/94	610.0	609.85	610.49	609.82	609.82	609.82	609.93	609.36
3/29/94	762.0	761.85	762.49	761.82	761.82	761.82	761.93	761.36
3/30/94	870.0	869.85	870.49	869.82	869.82	869.82	869.93	869.36
3/31/94	961.0	960.85	961.49	960.82	960.82	960.82	960.93	960.36
4/1/94	1042.0	1041.85	1042.46	1041.53	1041.53	1044.62	1046.02	1045.48
4/2/94	1170.0	1169.85	1170.46	1169.53	1169.53	1172.48	1173.87	1173.34
4/3/94	1185.0	1184.85	1185.46	1184.53	1184.53	1187.20	1188.59	1188.05
4/4/94	1140.0	1139.85	1140.46	1139.53	1139.53	1142.34	1143.73	1143.19
4/5/94	1014.0	1013.85	1014.46	1013.53	1013.53	1016.34	1017.73	1017.19
4/6/94	974.0	973.86	974.48	973.55	973.55	976.50	977.89	977.35
4/7/94	935.0	934.87	935.49	934.56	934.56	937.51	938.90	938.36
4/8/94	883.0	882.87	883.49	882.56	882.56	885.51	886.90	886.36
4/9/94	858.0	857.87	858.49	857.56	857.56	860.51	861.90	861.36
4/10/94	846.0	845.87	846.49	845.56	845.56	848.58	849.97	849.43
4/11/94	846.0	845.87	846.49	845.56	845.56	848.58	849.97	849.43
4/12/94	896.0	895.87	896.49	895.56	895.56	898.58	899.97	899.43
4/13/94	922.0	921.87	922.49	921.56	921.56	924.58	925.97	925.43
4/14/94	870.0	869.87	870.49	869.56	869.56	872.58	873.97	873.43
4/15/94	786.0	785.87	786.49	785.56	785.56	788.58	789.97	789.43
4/16/94	786.0	785.87	786.49	785.56	785.56	788.57	789.96	789.43
4/17/94	896.0	895.87	896.49	895.56	895.56	898.57	899.96	899.43
4/18/94	1185.0	1184.87	1185.49	1184.56	1184.56	1187.17	1188.56	1188.02
4/19/94	1434.0	1433.87	1434.49	1433.56	1433.56	1436.32	1437.71	1437.18
4/20/94	1306.0	1305.87	1306.49	1305.56	1305.56	1308.32	1309.71	1309.17
4/21/94	1215.0	1214.87	1215.49	1214.56	1214.56	1217.48	1218.87	1218.34
4/22/94	1084.0	1083.87	1084.49	1083.56	1083.56	1086.48	1087.87	1087.34
4/23/94	896.0	895.87	896.49	895.56	895.56	898.48	899.87	899.33
4/24/94	728.0	727.87	728.49	727.56	727.56	730.48	731.87	731.33
4/25/94	630.0	629.87	630.49	629.56	629.56	632.56	633.95	633.42
4/26/94	522.0	521.87	522.49	521.56	521.56	524.56	525.95	525.42
4/27/94	459.0	458.87	459.49	458.56	458.56	461.56	462.95	462.41
4/28/94	410.0	409.87	410.49	409.56	409.56	412.56	413.95	413.41
4/29/94	434.0	433.87	434.49	433.56	433.56	436.56	437.95	437.41
4/30/94	450.0	449.87	450.49	449.56	449.56	452.56	453.95	453.41
5/1/94	434.0	434.90	435.48	434.16	437.37	442.25	444.31	443.78
5/2/94	418.0	418.91	419.49	418.17	421.38	426.25	428.32	427.78
5/3/94	450.0	450.91	451.49	450.17	453.38	457.75	459.82	459.28
5/4/94	728.0	728.91	729.48	728.17	731.38	735.94	738.01	737.47
5/5/94	1051.0	1051.90	1052.48	1051.16	1054.37	1058.92	1060.99	1060.45
5/6/94	1715.0	1715.89	1716.47	1715.15	1718.36	1723.12	1725.19	1724.65
5/7/94	1672.0	1672.86	1673.44	1672.12	1675.33	1680.09	1682.15	1681.62
5/8/94	1476.0	1476.83	1477.41	1476.09	1479.30	1484.05	1486.12	1485.58
5/9/94	989.0	989.84	990.41	989.10	992.31	997.05	999.12	998.58

5/10/94	608.0	608.86	609.44	608.12	611.33	616.19	618.25	617.71
5/11/94	525.0	525.98	526.56	525.24	528.45	533.31	535.38	534.84
5/12/94	477.0	478.00	478.58	477.26	480.47	485.33	487.39	486.85
5/13/94	423.0	424.02	424.60	423.28	426.49	431.34	433.41	432.87
5/14/94	452.0	453.04	453.61	452.30	455.51	460.35	462.42	461.88
5/15/94	683.0	684.05	684.62	683.31	686.51	691.36	693.43	692.89
5/16/94	657.0	658.03	658.61	657.29	660.50	665.34	667.41	666.87
5/17/94	675.0	676.03	676.61	675.29	678.50	683.34	685.41	684.87
5/18/94	880.0	881.03	881.61	880.29	883.50	887.65	889.72	889.18
5/19/94	966.0	967.15	967.72	966.41	969.62	974.04	976.10	975.56
5/20/94	786.0	787.05	787.62	786.31	789.52	793.92	795.99	795.45
5/21/94	547.0	548.06	548.63	547.32	550.52	555.21	557.28	556.74
5/22/94	506.0	507.06	507.63	506.32	509.52	514.21	516.27	515.74
5/23/94	485.0	486.29	486.86	485.55	488.75	493.43	495.50	494.96
5/24/94	615.0	616.40	616.98	615.67	618.87	623.70	625.76	625.23
5/25/94	937.0	938.42	938.99	937.68	940.88	945.71	947.77	947.24
5/26/94	919.0	920.67	921.24	919.93	923.13	927.80	929.86	929.33
5/27/94	803.0	804.37	804.95	803.63	806.84	811.66	813.72	813.19
5/28/94	896.0	897.49	898.06	896.75	899.95	904.77	906.84	906.30
5/29/94	1107.0	1108.56	1109.14	1107.82	1111.03	1115.89	1117.96	1117.42
5/30/94	1174.0	1175.44	1176.01	1174.70	1177.91	1182.77	1184.84	1184.30
5/31/94	1244.0	1245.64	1246.21	1244.90	1246.13	1251.00	1253.06	1252.53
6/1/94	1363.0	1364.86	1365.49	1361.23	1362.67	1367.70	1369.91	1369.38
6/2/94	1421.0	1423.28	1423.91	1419.65	1421.09	1426.11	1428.32	1427.79
6/3/94	1447.0	1448.85	1449.49	1445.23	1446.66	1450.85	1453.06	1452.53
6/4/94	1474.0	1476.04	1476.67	1472.41	1473.85	1478.37	1480.58	1480.05
6/5/94	1921.0	1923.26	1923.89	1919.63	1921.07	1925.58	1927.79	1927.26
6/6/94	1686.0	1687.81	1688.44	1684.18	1685.62	1690.45	1692.66	1692.12
6/7/94	1455.0	1456.90	1457.54	1453.28	1454.71	1459.34	1461.55	1461.02
6/8/94	1433.0	1435.00	1435.63	1431.37	1432.81	1437.27	1439.48	1438.94
6/9/94	1527.0	1529.52	1530.15	1525.89	1527.33	1531.70	1533.91	1533.38
6/10/94	1623.0	1625.00	1625.63	1621.37	1622.81	1627.39	1629.60	1629.07
6/11/94	1653.0	1655.22	1655.85	1651.59	1653.03	1657.68	1659.90	1659.36
6/12/94	1628.0	1630.49	1631.13	1626.87	1628.30	1632.95	1635.16	1634.63
6/13/94	1570.0	1571.78	1572.33	1568.07	1569.51	1574.23	1576.44	1575.91
6/14/94	1496.0	1497.86	1498.41	1494.16	1495.59	1500.14	1502.35	1501.82
6/15/94	1455.0	1456.94	1457.49	1453.23	1454.67	1459.00	1461.21	1460.68
6/16/94	1673.0	1675.49	1676.04	1671.78	1673.21	1677.40	1679.61	1679.07
6/17/94	1951.0	1952.94	1953.49	1949.23	1950.67	1954.77	1956.98	1956.44
6/18/94	2172.0	2174.14	2174.69	2170.43	2171.86	2175.28	2177.49	2176.95
6/19/94	1976.0	1978.50	1979.05	1974.80	1976.23	1979.84	1982.05	1981.51
6/20/94	1718.0	1719.85	1720.40	1716.14	1717.58	1721.06	1723.27	1722.73
6/21/94	1747.0	1748.87	1749.42	1745.16	1746.59	1750.46	1752.67	1752.14
6/22/94	2099.0	2100.86	2101.41	2097.15	2098.59	2102.41	2104.62	2104.08
6/23/94	2217.0	2219.24	2219.79	2215.53	2216.96	2220.80	2223.02	2222.48
6/24/94	2041.0	2042.92	2043.48	2039.22	2040.65	2044.33	2046.54	2046.00
6/25/94	2180.0	2182.13	2182.69	2178.43	2179.86	2183.64	2185.85	2185.31
6/26/94	2259.0	2261.32	2261.87	2257.61	2259.05	2262.76	2264.97	2264.43
6/27/94	2250.0	2251.82	2252.37	2248.11	2249.55	2253.15	2255.37	2254.83
6/28/94	2286.0	2287.97	2288.52	2284.26	2285.70	2289.21	2291.42	2290.89
6/29/94	2366.0	2368.03	2368.58	2364.32	2365.76	2369.19	2371.40	2370.87
6/30/94	2492.0	2494.51	2495.07	2490.81	2492.24	2495.62	2497.84	2497.30
7/1/94	2622.0	2624.37	2624.95	2618.58	2620.79	2623.58	2626.14	2625.60
7/2/94	2613.0	2615.58	2616.16	2609.79	2612.00	2615.16	2617.72	2617.18
7/3/94	2536.0	2538.84	2539.42	2533.05	2535.26	2536.38	2538.94	2538.40
7/4/94	2550.0	2552.17	2552.75	2546.39	2548.59	2549.72	2552.27	2551.74
7/5/94	2587.0	2588.72	2589.30	2582.93	2585.14	2588.56	2591.11	2590.58
7/6/94	2396.0	2397.88	2398.46	2392.09	2394.30	2397.36	2399.92	2399.39
7/7/94	2524.0	2525.52	2526.10	2519.73	2521.94	2523.81	2526.37	2525.83
7/8/94	2585.0	2586.53	2587.11	2580.75	2582.96	2584.52	2587.08	2586.55
7/9/94	2668.0	2669.55	2670.13	2663.76	2665.97	2667.45	2670.01	2669.47
7/10/94	2755.0	2756.56	2757.14	2750.77	2752.98	2754.65	2757.21	2756.67
7/11/94	2818.0	2819.56	2820.14	2813.78	2815.98	2817.56	2820.12	2819.59

7/12/94	2931.0	2932.56	2933.15	2926.78	2928.45	2929.89	2932.45	2931.91
7/13/94	3121.0	3122.42	3123.00	3116.64	3118.31	3119.65	3122.21	3121.67
7/14/94	3241.0	3242.42	3243.00	3236.64	3238.31	3239.61	3242.17	3241.63
7/15/94	3257.0	3258.42	3259.00	3252.64	3254.31	3255.59	3258.15	3257.62
7/16/94	3273.0	3274.50	3275.08	3268.71	3270.38	3271.59	3274.14	3273.61
7/17/94	3185.0	3186.36	3186.94	3180.58	3182.25	3183.37	3185.93	3185.40
7/18/94	3176.0	3177.34	3177.92	3171.55	3173.22	3172.72	3175.27	3174.74
7/19/94	3218.0	3219.49	3220.07	3213.71	3215.38	3215.48	3218.04	3217.50
7/20/94	3208.0	3209.42	3210.00	3203.64	3205.31	3205.35	3207.91	3207.37
7/21/94	3277.0	3278.35	3278.94	3272.57	3274.24	3274.86	3277.42	3276.88
7/22/94	3397.0	3398.26	3398.84	3392.48	3394.15	3394.71	3397.27	3396.74
7/23/94	3361.0	3362.45	3363.03	3356.66	3358.33	3358.86	3361.41	3360.88
7/24/94	3403.0	3404.45	3405.03	3398.66	3400.33	3401.14	3403.69	3403.16
7/25/94	3316.0	3317.38	3317.96	3311.59	3313.27	3314.10	3316.66	3316.13
7/26/94	3176.0	3177.38	3177.96	3171.60	3173.27	3173.72	3176.28	3175.74
7/27/94	3202.0	3203.29	3203.87	3197.51	3199.18	3199.91	3202.47	3201.93
7/28/94	3332.0	3332.95	3333.53	3327.16	3328.83	3329.53	3332.08	3331.55
7/29/94	3438.0	3438.72	3439.30	3432.94	3434.61	3435.39	3437.95	3437.42
7/30/94	3438.0	3438.63	3439.21	3432.84	3434.52	3435.29	3437.85	3437.32
7/31/94	3410.0	3410.39	3410.97	3404.61	3405.79	3406.54	3409.10	3408.56
8/1/94	3358.0	3358.24	3358.83	3353.87	3354.81	3355.41	3357.77	3357.24
8/2/94	3358.0	3358.01	3358.61	3353.65	3354.58	3355.17	3357.53	3356.99
8/3/94	3358.0	3358.50	3359.10	3354.14	3355.07	3354.16	3356.52	3355.99
8/4/94	3466.0	3466.91	3467.51	3462.55	3463.48	3463.23	3465.59	3465.06
8/5/94	3466.0	3466.49	3467.09	3462.13	3463.06	3462.78	3465.14	3464.61
8/6/94	3384.0	3384.42	3385.01	3380.05	3380.99	3381.31	3383.67	3383.14
8/7/94	3116.0	3116.65	3117.25	3112.29	3113.22	3113.58	3115.94	3115.41
8/8/94	3006.0	3007.13	3007.72	3002.77	3003.70	3004.14	3006.50	3005.96
8/9/94	2922.0	2923.03	2923.63	2918.67	2919.60	2920.01	2922.37	2921.83
8/10/94	2900.0	2900.34	2900.93	2895.97	2896.29	2896.93	2899.29	2898.75
8/11/94	2879.0	2878.90	2879.49	2874.54	2875.13	2875.73	2878.09	2877.55
8/12/94	2846.0	2845.52	2846.12	2841.16	2841.76	2842.32	2844.68	2844.14
8/13/94	2813.0	2812.52	2813.12	2808.16	2808.76	2809.29	2811.65	2811.11
8/14/94	2900.0	2899.52	2900.12	2895.16	2895.76	2896.26	2898.62	2898.09
8/15/94	2867.0	2866.52	2867.12	2862.16	2862.76	2863.23	2865.59	2865.05
8/16/94	2690.0	2689.63	2690.22	2685.26	2685.86	2686.35	2688.71	2688.17
8/17/94	2681.0	2680.53	2681.12	2676.17	2676.76	2677.26	2679.62	2679.08
8/18/94	2696.0	2695.50	2696.10	2691.14	2691.74	2690.84	2693.20	2692.66
8/19/94	2640.0	2639.67	2640.27	2635.31	2635.91	2635.56	2637.92	2637.39
8/20/94	2608.0	2607.60	2608.19	2603.23	2603.83	2603.48	2605.84	2605.30
8/21/94	2554.0	2553.52	2554.11	2549.15	2549.75	2549.95	2552.31	2551.77
8/22/94	2476.0	2475.42	2476.01	2471.05	2471.65	2471.85	2474.21	2473.68
8/23/94	2467.0	2466.66	2467.25	2462.29	2462.89	2463.12	2465.48	2464.94
8/24/94	2459.0	2458.66	2459.25	2454.29	2454.89	2455.38	2457.74	2457.20
8/25/94	2450.0	2449.58	2450.17	2445.21	2445.81	2446.28	2448.64	2448.11
8/26/94	2375.0	2374.62	2375.21	2370.25	2370.85	2371.18	2373.54	2373.00
8/27/94	2257.0	2256.48	2257.07	2252.12	2252.71	2253.26	2255.62	2255.09
8/28/94	2142.0	2141.48	2142.07	2137.11	2137.71	2138.20	2140.56	2140.02
8/29/94	2008.0	2007.36	2007.95	2002.99	2003.59	2004.15	2006.51	2005.98
8/30/94	1764.0	1763.36	1763.95	1758.99	1759.55	1760.10	1762.47	1761.93
8/31/94	1597.0	1596.48	1597.07	1592.12	1592.83	1593.38	1595.74	1595.20
9/1/94	1522.0	1521.48	1522.11	1518.37	1518.22	1518.64	1520.55	1520.01
9/2/94	1432.0	1431.48	1432.11	1428.37	1428.22	1428.63	1430.54	1430.00
9/3/94	1378.0	1377.52	1378.16	1374.42	1374.26	1373.45	1375.36	1374.82
9/4/94	1324.0	1323.52	1324.16	1320.42	1320.26	1320.15	1322.06	1321.52
9/5/94	1181.0	1180.52	1181.16	1177.42	1177.26	1177.09	1179.00	1178.46
9/6/94	1019.0	1018.52	1019.16	1015.42	1015.26	1015.52	1017.43	1016.89
9/7/94	961.0	960.42	961.05	957.31	957.16	957.37	959.28	958.74
9/8/94	702.0	701.42	702.05	698.31	698.15	698.35	700.26	699.72
9/9/94	573.0	572.42	573.05	569.31	569.53	569.73	571.64	571.10
9/10/94	550.0	549.42	550.05	546.31	546.56	547.09	549.00	548.46
9/11/94	495.0	494.43	495.06	491.32	491.57	492.14	494.05	493.52
9/12/94	459.0	458.43	459.06	455.32	455.57	456.21	458.11	457.58

9/13/94	468.0	467.43	468.06	464.32	464.57	465.12	467.03	466.50
9/14/94	495.0	494.43	495.06	491.32	491.57	492.13	494.04	493.51
9/15/94	522.0	521.43	522.06	518.32	518.57	519.23	521.13	520.60
9/16/94	504.0	503.53	504.17	500.43	498.63	499.19	501.10	500.56
9/17/94	486.0	485.41	486.05	482.30	480.51	481.00	482.91	482.38
9/18/94	477.0	476.72	477.36	473.62	471.82	471.11	473.02	472.49
9/19/94	468.0	467.26	467.89	464.15	462.36	462.09	464.00	463.46
9/20/94	468.0	467.52	468.15	464.41	462.62	462.33	464.24	463.70
9/21/94	459.0	458.42	459.05	455.31	453.52	453.68	455.59	455.05
9/22/94	468.0	467.66	468.29	464.55	462.76	462.90	464.81	464.27
9/23/94	459.0	458.66	459.29	455.55	453.76	453.90	455.81	455.27
9/24/94	459.0	458.19	458.82	455.08	453.29	453.41	455.32	454.79
9/25/94	459.0	458.53	459.16	455.42	453.62	453.97	455.88	455.35
9/26/94	450.0	449.53	450.16	446.42	444.62	444.97	446.88	446.34
9/27/94	442.0	441.44	442.07	438.33	436.54	436.86	438.77	438.23
9/28/94	442.0	441.44	442.07	438.33	436.54	436.89	438.80	438.26
9/29/94	459.0	458.57	459.20	455.46	453.66	454.06	455.97	455.43
9/30/94	450.0	449.57	450.20	446.46	444.66	445.07	446.98	446.45
10/1/94	450.0	449.57	450.25	449.26	448.00	448.29	449.45	448.92
10/2/94	450.0	449.49	450.17	449.19	447.93	448.21	449.38	448.85
10/3/94	450.0	449.49	450.17	449.19	447.93	447.04	448.21	447.68
10/4/94	442.0	441.49	442.17	441.19	439.93	439.51	440.68	440.14
10/5/94	442.0	441.56	442.24	441.26	440.00	439.58	440.75	440.21
10/6/94	442.0	441.56	442.24	441.26	440.00	440.06	441.23	440.69
10/7/94	450.0	449.56	450.24	449.26	448.00	448.10	449.27	448.73
10/8/94	434.0	433.56	434.24	433.26	432.00	432.07	433.23	432.70
10/9/94	442.0	441.50	442.18	441.20	439.94	440.01	441.18	440.64
10/10/94	434.0	433.50	434.18	433.20	431.94	432.23	433.40	432.87
10/11/94	426.0	425.50	426.18	425.20	423.94	424.28	425.45	424.92
10/12/94	434.0	433.50	434.18	433.20	431.94	432.35	433.52	432.98
10/13/94	434.0	433.62	434.31	433.32	432.06	432.54	433.71	433.18
10/14/94	468.0	467.62	468.31	467.32	466.06	466.54	467.71	467.18
10/15/94	434.0	433.62	434.31	433.32	432.06	432.54	433.71	433.18
10/16/94	426.0	425.62	426.26	425.28	425.28	425.51	425.63	425.09
10/17/94	378.0	377.62	378.26	377.28	377.28	377.51	377.63	377.09
10/18/94	211.0	210.62	211.26	210.28	210.28	208.90	209.02	208.48
10/19/94	212.0	211.58	212.22	211.23	211.23	210.32	210.44	209.90
10/20/94	229.0	228.58	229.22	228.23	228.23	227.79	227.90	227.37
10/21/94	264.0	263.58	264.22	263.23	263.23	263.24	263.36	262.82
10/22/94	244.0	243.58	244.22	243.23	243.23	243.25	243.36	242.83
10/23/94	242.0	241.58	242.22	241.23	241.23	241.25	241.37	240.83
10/24/94	241.0	240.58	241.22	240.23	240.23	240.25	240.37	239.83
10/25/94	239.0	238.64	239.28	238.29	238.29	238.54	238.66	238.12
10/26/94	267.0	266.64	267.28	266.29	266.29	266.54	266.66	266.12
10/27/94	380.0	379.64	380.28	379.29	379.29	379.54	379.66	379.12
10/28/94	458.0	457.64	458.28	457.29	457.29	457.54	457.66	457.12
10/29/94	566.0	565.64	566.28	565.29	565.29	565.55	565.66	565.13
10/30/94	507.0	506.64	507.28	506.29	506.29	506.55	506.66	506.13
10/31/94	884.0	883.64	884.28	883.29	883.29	883.55	883.67	883.13
11/1/94	1531.0	1530.64	1531.33	1530.65	1530.65	1530.44	1530.56	1530.02
11/2/94	1063.0	1062.64	1063.33	1062.65	1062.65	1062.52	1062.63	1062.10
11/3/94	848.0	847.64	848.33	847.65	847.65	847.52	847.63	847.10
11/4/94	619.0	618.64	619.33	618.65	618.65	618.52	618.63	618.10
11/5/94	546.0	545.64	546.33	545.65	545.65	545.56	545.67	545.13
11/6/94	453.0	452.64	453.33	452.65	452.65	452.56	452.67	452.13
11/7/94	402.0	401.64	402.33	401.65	401.65	401.56	401.67	401.13
11/8/94	328.0	327.64	328.33	327.65	327.65	327.56	327.67	327.13
11/9/94	342.0	341.64	342.33	341.65	341.65	341.58	341.69	341.16
11/10/94	356.0	355.64	356.33	355.65	355.65	355.58	355.69	355.16
11/11/94	356.0	355.70	356.39	355.71	355.71	355.64	355.75	355.22
11/12/94	356.0	355.70	356.39	355.71	355.71	355.64	355.75	355.22
11/13/94	342.0	341.70	342.39	341.71	341.71	341.64	341.75	341.22
11/14/94	342.0	341.70	342.39	341.71	341.71	341.64	341.76	341.22

11/15/94	335.0	334.70	335.39	334.71	334.71	334.64	334.76	334.22
11/16/94	342.0	341.70	342.39	341.71	341.71	341.64	341.76	341.22
11/17/94	335.0	334.70	335.39	334.71	334.71	334.64	334.76	334.22
11/18/94	307.0	306.70	307.39	306.71	306.71	306.64	306.75	306.22
11/19/94	314.0	313.70	314.39	313.71	313.71	313.66	313.78	313.24
11/20/94	513.0	512.70	513.39	512.71	512.71	512.66	512.78	512.24
11/21/94	477.0	476.70	477.39	476.71	476.71	476.66	476.78	476.24
11/22/94	418.0	417.70	418.39	417.71	417.71	417.66	417.78	417.24
11/23/94	410.0	409.70	410.38	409.71	409.71	409.66	409.77	409.24
11/24/94	386.0	385.70	386.38	385.71	385.71	385.66	385.77	385.24
11/25/94	363.0	362.70	363.38	362.71	362.71	362.66	362.77	362.24
11/26/94	356.0	355.70	356.38	355.71	355.71	355.66	355.78	355.24
11/27/94	356.0	355.70	356.38	355.71	355.71	355.66	355.78	355.24
11/28/94	356.0	355.70	356.38	355.71	355.71	355.66	355.78	355.24
11/29/94	378.0	377.70	378.38	377.71	377.71	377.66	377.78	377.24
11/30/94	1042.0	1041.70	1042.38	1041.71	1041.71	1041.66	1041.78	1041.24
12/1/94	2298.0	2297.70	2298.37	2297.67	2297.67	2297.62	2297.74	2297.20
12/2/94	1569.0	1568.70	1569.37	1568.67	1568.67	1568.62	1568.74	1568.20
12/3/94	1185.0	1184.70	1185.37	1184.67	1184.67	1184.64	1184.76	1184.22
12/4/94	974.0	973.70	974.37	973.67	973.67	973.64	973.76	973.22
12/5/94	717.0	716.70	717.37	716.67	716.67	716.64	716.76	716.22
12/6/94	630.0	629.73	630.40	629.71	629.71	629.68	629.79	629.26
12/7/94	570.0	569.73	570.40	569.71	569.71	569.68	569.79	569.26
12/8/94	531.0	530.73	531.40	530.71	530.71	530.68	530.79	530.26
12/9/94	503.0	502.73	503.40	502.71	502.71	502.68	502.79	502.26
12/10/94	441.0	440.73	441.40	440.71	440.71	440.68	440.79	440.26
12/11/94	417.0	416.73	417.40	416.71	416.71	416.68	416.79	416.26
12/12/94	393.0	392.73	393.40	392.71	392.71	392.68	392.79	392.26
12/13/94	369.0	368.73	369.40	368.71	368.71	368.68	368.80	368.26
12/14/94	355.0	354.73	355.40	354.71	354.71	354.68	354.80	354.26
12/15/94	341.0	340.73	341.40	340.71	340.71	340.68	340.80	340.26
12/16/94	334.0	333.73	334.40	333.71	333.71	333.68	333.80	333.26
12/17/94	368.0	367.73	368.40	367.71	367.71	367.68	367.80	367.26
12/18/94	416.0	415.73	416.40	415.71	415.71	415.68	415.80	415.26
12/19/94	448.0	447.73	448.40	447.71	447.71	447.68	447.80	447.26
12/20/94	502.0	501.73	502.40	501.71	501.71	501.68	501.80	501.26
12/21/94	627.0	626.73	627.40	626.71	626.71	626.68	626.80	626.26
12/22/94	617.0	616.77	617.44	616.74	616.74	616.72	616.83	616.30
12/23/94	567.0	566.77	567.44	566.74	566.74	566.72	566.83	566.30
12/24/94	528.0	527.77	528.44	527.74	527.74	527.72	527.84	527.30
12/25/94	492.0	491.77	492.44	491.74	491.74	491.72	491.84	491.30
12/26/94	519.0	518.77	519.44	518.74	518.74	518.72	518.84	518.30
12/27/94	806.0	805.77	806.44	805.74	805.74	805.72	805.84	805.30
12/28/94	943.0	942.77	943.44	942.74	942.74	942.72	942.84	942.30
12/29/94	853.0	852.77	853.44	852.74	852.74	852.72	852.84	852.30
12/30/94	757.0	756.77	757.44	756.74	756.74	756.72	756.84	756.30
12/31/94	679.0	678.77	679.44	678.74	678.74	678.72	678.84	678.30
1/1/95	626.0	625.77	626.42	625.75	625.75	625.73	625.85	625.31
1/2/95	615.0	614.77	615.42	614.75	614.75	614.73	614.85	614.31
1/3/95	668.0	667.77	668.42	667.75	667.75	667.73	667.85	667.31
1/4/95	646.0	645.77	646.42	645.75	645.75	645.73	645.85	645.31
1/5/95	635.0	634.77	635.42	634.75	634.75	634.73	634.85	634.31
1/6/95	605.0	604.77	605.42	604.75	604.75	604.74	604.85	604.32
1/7/95	414.0	413.77	414.42	413.75	413.75	413.74	413.85	413.32
1/8/95	389.0	388.77	389.42	388.75	388.75	388.74	388.85	388.32
1/9/95	373.0	372.77	373.42	372.75	372.75	372.74	372.85	372.32
1/10/95	381.0	380.77	381.42	380.75	380.75	380.74	380.85	380.32
1/11/95	373.0	372.78	373.43	372.77	372.77	372.75	372.87	372.33
1/12/95	359.0	358.78	359.43	358.77	358.77	358.75	358.87	358.33
1/13/95	358.0	357.78	358.43	357.77	357.77	357.75	357.87	357.33
1/14/95	358.0	357.78	358.43	357.77	357.77	357.75	357.87	357.33
1/15/95	358.0	357.78	358.43	357.77	357.77	357.75	357.87	357.33
1/16/95	344.0	343.78	344.43	343.77	343.77	343.75	343.87	343.33

1/17/95	330.0	329.78	330.43	329.77	329.77	329.75	329.87	329.33
1/18/95	337.0	336.78	337.43	336.77	336.77	336.75	336.87	336.33
1/19/95	316.0	315.78	316.43	315.77	315.77	315.75	315.87	315.33
1/20/95	302.0	301.78	302.43	301.77	301.77	301.75	301.87	301.33
1/21/95	289.0	288.78	289.43	288.77	288.77	288.75	288.87	288.33
1/22/95	277.0	276.78	277.43	276.77	276.77	276.76	276.87	276.34
1/23/95	271.0	270.78	271.43	270.77	270.77	270.76	270.87	270.34
1/24/95	271.0	270.78	271.43	270.77	270.77	270.76	270.87	270.34
1/25/95	265.0	264.78	265.43	264.77	264.77	264.76	264.87	264.34
1/26/95	259.0	258.78	259.43	258.77	258.77	258.76	258.87	258.34
1/27/95	253.0	252.78	253.43	252.77	252.77	252.76	252.87	252.34
1/28/95	253.0	252.78	253.43	252.77	252.77	252.76	252.87	252.34
1/29/95	264.0	263.78	264.43	263.77	263.77	263.76	263.87	263.34
1/30/95	307.0	306.78	307.43	306.77	306.77	306.76	306.87	306.34
1/31/95	620.0	619.78	620.43	619.77	619.77	619.76	619.87	619.34
2/1/95	1403.0	1402.78	1403.49	1402.80	1402.80	1402.79	1402.90	1402.37
2/2/95	1484.0	1483.78	1484.49	1483.80	1483.80	1483.79	1483.90	1483.37
2/3/95	1260.0	1259.81	1260.52	1259.82	1259.82	1259.81	1259.93	1259.39
2/4/95	1070.0	1069.81	1070.52	1069.82	1069.82	1069.81	1069.93	1069.39
2/5/95	974.0	973.81	974.52	973.82	973.82	973.81	973.93	973.39
2/6/95	909.0	908.81	909.52	908.82	908.82	908.81	908.93	908.39
2/7/95	883.0	882.81	883.52	882.82	882.82	882.81	882.93	882.39
2/8/95	883.0	882.81	883.52	882.82	882.82	882.81	882.93	882.39
2/9/95	870.0	869.81	870.52	869.82	869.82	869.81	869.93	869.39
2/10/95	870.0	869.81	870.52	869.82	869.82	869.81	869.93	869.39
2/11/95	870.0	869.81	870.52	869.82	869.82	869.82	869.93	869.40
2/12/95	834.0	833.81	834.52	833.82	833.82	833.82	833.93	833.40
2/13/95	774.0	773.81	774.52	773.82	773.82	773.82	773.93	773.40
2/14/95	706.0	705.81	706.52	705.82	705.82	705.82	705.93	705.40
2/15/95	684.0	683.81	684.52	683.82	683.82	683.82	683.93	683.40
2/16/95	640.0	639.81	640.52	639.82	639.82	639.82	639.93	639.40
2/17/95	640.0	639.81	640.52	639.82	639.82	639.82	639.93	639.40
2/18/95	636.0	635.81	636.52	635.82	635.82	635.82	635.93	635.40
2/19/95	1714.0	1713.81	1714.52	1713.82	1713.82	1713.82	1713.93	1713.40
2/20/95	3628.0	3627.81	3628.52	3627.82	3627.82	3627.82	3627.93	3627.40
2/21/95	2960.0	2959.81	2960.52	2959.82	2959.82	2959.82	2959.93	2959.40
2/22/95	2342.0	2341.81	2342.52	2341.82	2341.82	2341.82	2341.93	2341.40
2/23/95	1734.0	1733.81	1734.52	1733.82	1733.82	1733.82	1733.93	1733.40
2/24/95	1413.0	1412.81	1413.52	1412.82	1412.82	1412.82	1412.93	1412.40
2/25/95	1322.0	1321.81	1322.52	1321.82	1321.82	1321.82	1321.93	1321.40
2/26/95	1311.0	1310.81	1311.52	1310.82	1310.82	1310.82	1310.93	1310.40
2/27/95	1225.0	1224.81	1225.52	1224.82	1224.82	1224.82	1224.93	1224.40
2/28/95	1112.0	1111.81	1112.52	1111.82	1111.82	1111.82	1111.93	1111.40
3/1/95	1033.0	1032.81	1033.45	1032.78	1032.78	1032.78	1032.89	1032.36
3/2/95	957.0	956.81	957.45	956.78	956.78	956.78	956.89	956.36
3/3/95	896.0	895.83	896.47	895.81	895.81	895.80	895.92	895.38
3/4/95	850.0	849.83	850.47	849.81	849.81	849.80	849.92	849.38
3/5/95	806.0	805.83	806.47	805.81	805.81	805.80	805.92	805.38
3/6/95	762.0	761.83	762.47	761.81	761.81	761.80	761.92	761.38
3/7/95	717.0	716.83	717.47	716.81	716.81	716.80	716.92	716.38
3/8/95	684.0	683.83	684.47	683.81	683.81	683.80	683.92	683.38
3/9/95	696.0	695.83	696.47	695.81	695.81	695.80	695.92	695.38
3/10/95	775.0	774.83	775.47	774.81	774.81	774.80	774.92	774.38
3/11/95	847.0	846.83	847.47	846.81	846.81	846.80	846.92	846.38
3/12/95	885.0	884.83	885.47	884.81	884.81	884.80	884.92	884.38
3/13/95	898.0	897.83	898.47	897.81	897.81	897.80	897.92	897.38
3/14/95	937.0	936.83	937.47	936.81	936.81	936.80	936.92	936.38
3/15/95	1059.0	1058.83	1059.47	1058.81	1058.81	1058.80	1058.92	1058.38
3/16/95	1087.0	1086.83	1087.47	1086.81	1086.81	1086.80	1086.92	1086.38
3/17/95	1059.0	1058.83	1059.47	1058.81	1058.81	1058.80	1058.92	1058.38
3/18/95	1059.0	1058.83	1059.47	1058.81	1058.81	1058.80	1058.92	1058.38
3/19/95	1159.0	1158.83	1159.47	1158.81	1158.81	1158.80	1158.92	1158.38
3/20/95	1234.0	1233.83	1234.47	1233.81	1233.81	1233.80	1233.92	1233.38

3/21/95	1234.0	1233.83	1234.47	1233.81	1233.81	1233.80	1233.92	1233.38
3/22/95	1130.0	1129.83	1130.47	1129.81	1129.81	1129.80	1129.92	1129.38
3/23/95	1047.0	1046.83	1047.47	1046.81	1046.81	1046.80	1046.92	1046.38
3/24/95	966.0	965.83	966.47	965.81	965.81	965.80	965.92	965.38
3/25/95	875.0	874.83	875.47	874.81	874.81	874.80	874.92	874.38
3/26/95	815.0	814.83	815.47	814.81	814.81	814.80	814.92	814.38
3/27/95	779.0	778.83	779.47	778.81	778.81	778.80	778.92	778.38
3/28/95	767.0	766.83	767.47	766.81	766.81	766.80	766.92	766.38
3/29/95	756.0	755.83	756.47	755.81	755.81	755.80	755.92	755.38
3/30/95	768.0	767.83	768.47	767.81	767.81	767.80	767.92	767.38
3/31/95	804.0	803.83	804.47	803.81	803.81	803.80	803.92	803.38
4/1/95	840.0	839.83	840.45	839.52	839.52	842.18	843.57	842.98
4/2/95	864.0	863.83	864.45	863.52	863.52	866.01	867.40	866.81
4/3/95	864.0	863.83	864.45	863.52	863.52	865.67	867.06	866.47
4/4/95	943.0	942.83	943.45	942.52	942.52	944.84	946.23	945.64
4/5/95	994.0	993.83	994.45	993.52	993.52	995.84	997.23	996.64
4/6/95	878.0	877.85	878.47	877.54	877.54	880.03	881.42	880.83
4/7/95	647.0	646.86	647.48	646.55	646.55	649.04	650.43	649.84
4/8/95	617.0	616.86	617.48	616.55	616.55	619.04	620.43	619.84
4/9/95	691.0	690.86	691.48	690.55	690.55	693.04	694.43	693.84
4/10/95	892.0	891.86	892.48	891.55	891.55	894.12	895.51	894.92
4/11/95	970.0	969.86	970.48	969.55	969.55	972.12	973.51	972.92
4/12/95	945.0	944.86	945.48	944.55	944.55	947.12	948.51	947.92
4/13/95	1011.0	1010.86	1011.48	1010.55	1010.55	1013.12	1014.51	1013.92
4/14/95	1182.0	1181.86	1182.48	1181.55	1181.55	1184.12	1185.51	1184.92
4/15/95	1335.0	1334.86	1335.48	1334.55	1334.55	1337.12	1338.51	1337.92
4/16/95	1351.0	1350.86	1351.48	1350.55	1350.55	1353.12	1354.51	1353.92
4/17/95	1335.0	1334.86	1335.48	1334.55	1334.55	1337.12	1338.51	1337.92
4/18/95	1320.0	1319.86	1320.48	1319.55	1319.55	1321.63	1323.02	1322.43
4/19/95	1288.0	1287.86	1288.48	1287.55	1287.55	1289.82	1291.21	1290.62
4/20/95	1083.0	1082.86	1083.48	1082.55	1082.55	1084.81	1086.20	1085.61
4/21/95	1041.0	1040.86	1041.48	1040.55	1040.55	1043.01	1044.40	1043.81
4/22/95	1055.0	1054.86	1055.48	1054.55	1054.55	1057.01	1058.40	1057.81
4/23/95	1083.0	1082.86	1083.48	1082.55	1082.55	1085.00	1086.39	1085.80
4/24/95	1140.0	1139.86	1140.48	1139.55	1139.55	1142.00	1143.39	1142.80
4/25/95	1275.0	1274.86	1275.48	1274.55	1274.55	1277.10	1278.49	1277.90
4/26/95	1656.0	1655.86	1656.48	1655.55	1655.55	1658.10	1659.49	1658.90
4/27/95	1710.0	1709.86	1710.48	1709.55	1709.55	1712.10	1713.49	1712.90
4/28/95	1764.0	1763.86	1764.48	1763.55	1763.55	1766.10	1767.49	1766.90
4/29/95	1746.0	1745.86	1746.48	1745.55	1745.55	1748.10	1749.49	1748.90
4/30/95	1692.0	1691.86	1692.48	1691.55	1691.55	1694.10	1695.49	1694.90
5/1/95	1674.0	1674.64	1675.21	1673.90	1676.95	1681.65	1683.72	1683.13
5/2/95	1710.0	1710.63	1711.21	1709.89	1712.95	1717.65	1719.71	1719.12
5/3/95	1820.0	1820.62	1821.20	1819.88	1822.94	1827.03	1829.09	1828.50
5/4/95	1746.0	1746.62	1747.20	1745.88	1748.94	1753.26	1755.33	1754.74
5/5/95	1728.0	1728.63	1729.20	1727.89	1730.94	1735.26	1737.32	1736.73
5/6/95	1692.0	1692.61	1693.18	1691.87	1694.92	1699.48	1701.55	1700.96
5/7/95	1710.0	1710.57	1711.15	1709.83	1712.89	1717.44	1719.51	1718.92
5/8/95	1800.0	1800.56	1801.13	1799.82	1802.87	1807.42	1809.49	1808.90
5/9/95	1402.0	1402.75	1403.33	1402.01	1405.06	1409.61	1411.67	1411.08
5/10/95	1112.0	1112.75	1113.33	1112.01	1115.06	1119.74	1121.81	1121.22
5/11/95	1014.0	1014.87	1015.45	1014.13	1017.19	1021.87	1023.93	1023.34
5/12/95	822.0	822.73	823.31	821.99	825.05	829.72	831.78	831.19
5/13/95	651.0	651.76	652.33	651.02	654.07	658.74	660.81	660.22
5/14/95	610.0	610.75	611.32	610.01	613.06	617.73	619.79	619.20
5/15/95	673.0	673.69	674.27	672.95	676.00	680.67	682.74	682.15
5/16/95	834.0	834.80	835.38	834.06	837.12	841.78	843.84	843.25
5/17/95	870.0	870.78	871.36	870.04	873.09	877.75	879.82	879.23
5/18/95	739.0	739.59	740.16	738.85	741.90	745.74	747.80	747.21
5/19/95	651.0	651.69	652.27	650.95	654.01	658.16	660.22	659.63
5/20/95	651.0	651.67	652.25	650.93	653.98	658.12	660.19	659.60
5/21/95	728.0	728.66	729.23	727.92	730.97	735.45	737.51	736.92
5/22/95	750.0	750.63	751.21	749.90	752.95	757.42	759.48	758.89

5/23/95	834.0	834.73	835.30	833.99	837.04	841.50	843.57	842.98
5/24/95	1746.0	1746.75	1747.32	1746.01	1749.06	1753.70	1755.77	1755.18
5/25/95	3286.0	3286.73	3287.30	3285.99	3289.04	3293.68	3295.74	3295.15
5/26/95	3795.0	3795.77	3796.34	3795.03	3798.08	3802.52	3804.59	3804.00
5/27/95	3833.0	3833.69	3834.27	3832.95	3836.00	3840.63	3842.70	3842.11
5/28/95	3662.0	3662.70	3663.28	3661.96	3665.02	3669.64	3671.71	3671.12
5/29/95	3557.0	3557.66	3558.24	3556.92	3559.97	3564.66	3566.73	3566.14
5/30/95	3825.0	3825.63	3826.21	3824.89	3827.95	3832.63	3834.70	3834.11
5/31/95	4494.0	4494.70	4495.28	4493.96	4495.14	4499.83	4501.89	4501.30
6/1/95	4374.0	4375.06	4375.69	4371.43	4373.25	4378.74	4380.95	4380.36
6/2/95	4046.0	4047.14	4047.77	4043.51	4045.33	4050.83	4053.04	4052.45
6/3/95	3536.0	3537.08	3537.71	3533.45	3535.27	3539.71	3541.92	3541.33
6/4/95	3339.0	3340.12	3340.75	3336.49	3338.31	3343.16	3345.37	3344.78
6/5/95	2232.0	2233.17	2233.80	2229.54	2231.36	2236.20	2238.41	2237.82
6/6/95	1446.0	1447.11	1447.74	1443.48	1445.30	1450.56	1452.77	1452.18
6/7/95	1378.0	1379.09	1379.72	1375.46	1377.29	1382.54	1384.75	1384.16
6/8/95	1144.0	1145.11	1145.74	1141.48	1143.31	1148.55	1150.77	1150.18
6/9/95	1170.0	1171.20	1171.84	1167.58	1169.40	1174.64	1176.85	1176.26
6/10/95	1185.0	1186.11	1186.74	1182.49	1184.31	1189.77	1191.98	1191.39
6/11/95	1215.0	1216.13	1216.76	1212.50	1214.32	1219.79	1222.00	1221.41
6/12/95	1306.0	1307.19	1307.82	1303.56	1305.38	1310.84	1313.05	1312.46
6/13/95	1185.0	1186.07	1186.62	1182.36	1184.18	1189.64	1191.85	1191.26
6/14/95	1306.0	1307.09	1307.64	1303.38	1305.20	1310.65	1312.86	1312.27
6/15/95	1501.0	1502.10	1502.66	1498.40	1500.22	1505.67	1507.88	1507.29
6/16/95	1467.0	1468.24	1468.79	1464.53	1466.35	1471.80	1474.01	1473.42
6/17/95	1450.0	1451.11	1451.66	1447.40	1449.22	1454.66	1456.87	1456.28
6/18/95	1535.0	1536.13	1536.68	1532.42	1534.25	1538.39	1540.60	1540.01
6/19/95	1603.0	1604.26	1604.82	1600.56	1602.38	1607.03	1609.24	1608.65
6/20/95	1603.0	1604.12	1604.67	1600.41	1602.24	1606.72	1608.93	1608.34
6/21/95	1552.0	1553.09	1553.64	1549.38	1551.21	1556.19	1558.40	1557.81
6/22/95	1484.0	1485.05	1485.60	1481.34	1483.16	1488.32	1490.53	1489.94
6/23/95	1434.0	1435.06	1435.61	1431.35	1433.17	1438.32	1440.53	1439.94
6/24/95	1484.0	1485.12	1485.67	1481.41	1483.23	1488.37	1490.58	1489.99
6/25/95	1603.0	1604.15	1604.71	1600.45	1602.27	1607.66	1609.87	1609.28
6/26/95	1764.0	1765.15	1765.70	1761.44	1763.26	1768.43	1770.64	1770.05
6/27/95	1960.0	1961.06	1961.61	1957.35	1959.17	1964.11	1966.32	1965.73
6/28/95	1980.0	1981.13	1981.68	1977.42	1979.24	1983.96	1986.17	1985.58
6/29/95	1960.0	1961.14	1961.69	1957.43	1959.25	1963.85	1966.07	1965.47
6/30/95	1900.0	1901.22	1901.77	1897.52	1899.34	1903.90	1906.11	1905.52
7/1/95	1920.0	1921.45	1922.04	1915.67	1917.63	1922.34	1924.89	1924.30
7/2/95	1960.0	1961.49	1962.07	1955.71	1957.67	1962.35	1964.91	1964.32
7/3/95	1940.0	1941.54	1942.12	1935.75	1937.72	1940.75	1943.31	1942.72
7/4/95	2000.0	2001.36	2001.95	1995.58	1997.54	2001.18	2003.74	2003.15
7/5/95	2320.0	2321.29	2321.87	2315.50	2317.46	2321.01	2323.57	2322.98
7/6/95	2756.0	2757.32	2757.90	2751.53	2753.49	2757.58	2760.14	2759.55
7/7/95	3112.0	3113.27	3113.85	3107.49	3109.45	3113.49	3116.04	3115.45
7/8/95	3174.0	3175.27	3175.86	3169.49	3171.45	3175.48	3178.04	3177.45
7/9/95	3160.0	3161.27	3161.85	3155.48	3157.45	3161.96	3164.52	3163.93
7/10/95	2873.0	2874.27	2874.85	2868.49	2870.45	2875.09	2877.65	2877.06
7/11/95	2622.0	2623.28	2623.86	2617.49	2619.46	2623.73	2626.29	2625.70
7/12/95	2609.0	2610.28	2610.86	2604.50	2606.46	2610.56	2613.12	2612.53
7/13/95	2666.0	2667.26	2667.84	2661.47	2663.44	2667.43	2669.98	2669.39
7/14/95	2846.0	2847.26	2847.84	2841.47	2843.44	2847.34	2849.90	2849.31
7/15/95	3030.0	3031.26	3031.84	3025.48	3027.44	3031.26	3033.82	3033.23
7/16/95	3245.0	3246.32	3246.90	3240.54	3242.50	3246.23	3248.79	3248.20
7/17/95	3470.0	3471.24	3471.82	3465.46	3467.42	3470.52	3473.08	3472.49
7/18/95	3768.0	3769.22	3769.80	3763.44	3765.40	3766.07	3768.63	3768.04
7/19/95	3902.0	3903.35	3903.93	3897.57	3899.53	3900.51	3903.06	3902.47
7/20/95	4039.0	4040.30	4040.88	4034.51	4036.46	4037.06	4039.61	4039.02
7/21/95	4182.0	4183.24	4183.82	4177.45	4178.91	4180.22	4182.78	4182.19
7/22/95	4182.0	4183.16	4183.74	4177.38	4178.84	4180.11	4182.67	4182.08
7/23/95	4182.0	4183.33	4183.91	4177.55	4179.51	4180.78	4183.33	4182.74
7/24/95	4182.0	4183.33	4183.92	4177.55	4179.51	4181.13	4183.69	4183.10

7/25/95	4246.0	4247.28	4247.86	4241.49	4243.45	4245.01	4247.57	4246.97
7/26/95	4278.0	4279.28	4279.86	4273.49	4275.45	4276.67	4279.23	4278.64
7/27/95	4214.0	4215.21	4215.79	4209.42	4211.38	4212.98	4215.54	4214.95
7/28/95	4214.0	4215.21	4215.79	4209.42	4211.38	4212.80	4215.36	4214.77
7/29/95	4182.0	4183.12	4183.70	4177.34	4179.30	4180.71	4183.26	4182.67
7/30/95	4278.0	4279.12	4279.70	4273.34	4275.30	4276.67	4279.23	4278.64
7/31/95	4214.0	4215.21	4215.79	4209.43	4211.06	4212.33	4214.88	4214.29
8/1/95	4246.0	4247.01	4247.60	4242.65	4243.60	4244.66	4247.02	4246.43
8/2/95	4342.0	4343.01	4343.61	4338.65	4339.60	4340.61	4342.97	4342.38
8/3/95	4278.0	4279.05	4279.64	4274.68	4275.63	4274.76	4277.12	4276.53
8/4/95	4214.0	4215.05	4215.64	4210.68	4211.63	4211.44	4213.80	4213.21
8/5/95	4406.0	4407.04	4407.64	4402.68	4403.63	4403.38	4405.74	4405.15
8/6/95	4162.0	4163.04	4163.63	4158.68	4159.63	4160.15	4162.51	4161.92
8/7/95	3952.0	3952.97	3953.56	3948.60	3949.55	3950.32	3952.68	3952.09
8/8/95	3932.0	3932.97	3933.56	3928.60	3929.55	3930.42	3932.78	3932.19
8/9/95	3823.0	3823.97	3824.56	3819.60	3820.55	3821.26	3823.62	3823.03
8/10/95	3744.0	3744.97	3745.56	3740.60	3741.55	3742.54	3744.90	3744.31
8/11/95	3725.0	3725.98	3726.57	3721.61	3722.56	3723.53	3725.89	3725.30
8/12/95	3565.0	3565.98	3566.57	3561.61	3562.56	3563.44	3565.80	3565.21
8/13/95	3519.0	3519.98	3520.57	3515.61	3516.56	3517.42	3519.78	3519.19
8/14/95	3501.0	3501.98	3502.57	3497.61	3498.30	3499.13	3501.49	3500.90
8/15/95	3374.0	3374.98	3375.57	3370.61	3371.55	3372.41	3374.77	3374.18
8/16/95	3305.0	3306.06	3306.65	3301.70	3302.31	3303.10	3305.46	3304.87
8/17/95	3288.0	3288.98	3289.57	3284.61	3285.57	3286.84	3289.20	3288.61
8/18/95	3168.0	3168.96	3169.55	3164.59	3165.54	3165.11	3167.47	3166.88
8/19/95	3126.0	3127.11	3127.70	3122.74	3123.70	3123.71	3126.07	3125.48
8/20/95	3160.0	3161.04	3161.64	3156.68	3157.53	3157.44	3159.80	3159.21
8/21/95	3222.0	3222.98	3223.57	3218.61	3218.91	3219.39	3221.75	3221.16
8/22/95	3309.0	3309.89	3310.48	3305.53	3305.52	3305.94	3308.30	3307.71
8/23/95	3318.0	3319.09	3319.69	3314.73	3314.76	3315.16	3317.52	3316.93
8/24/95	3302.0	3303.09	3303.69	3298.73	3298.79	3299.48	3301.84	3301.25
8/25/95	3311.0	3312.03	3312.62	3307.66	3308.27	3308.96	3311.32	3310.73
8/26/95	3217.0	3218.03	3218.62	3213.66	3214.27	3214.62	3216.98	3216.39
8/27/95	3278.0	3278.95	3279.54	3274.58	3275.19	3275.86	3278.22	3277.63
8/28/95	3287.0	3287.95	3288.54	3283.58	3283.84	3284.50	3286.86	3286.27
8/29/95	3219.0	3219.85	3220.44	3215.48	3216.03	3216.95	3219.31	3218.72
8/30/95	3176.0	3176.85	3177.44	3172.48	3173.26	3174.27	3176.63	3176.04
8/31/95	3157.0	3157.95	3158.54	3153.58	3154.56	3155.49	3157.85	3157.26
9/1/95	3039.0	3038.55	3039.19	3035.45	3035.17	3035.87	3037.78	3037.19
9/2/95	2896.0	2895.55	2896.19	2892.45	2892.17	2892.83	2894.74	2894.15
9/3/95	2855.0	2854.59	2855.22	2851.48	2851.21	2850.30	2852.21	2851.62
9/4/95	2814.0	2813.59	2814.22	2810.48	2810.21	2809.94	2811.85	2811.26
9/5/95	2725.0	2724.59	2725.22	2721.48	2721.21	2720.97	2722.88	2722.29
9/6/95	2408.0	2407.59	2408.22	2404.48	2404.21	2404.59	2406.50	2405.91
9/7/95	1967.0	1966.50	1967.14	1963.39	1963.12	1963.96	1965.87	1965.28
9/8/95	1023.0	1022.50	1023.13	1019.39	1019.12	1019.88	1021.79	1021.20
9/9/95	477.0	476.50	477.13	473.39	473.12	473.73	475.64	475.05
9/10/95	570.0	569.50	570.13	566.39	566.12	566.92	568.83	568.24
9/11/95	540.0	539.51	540.14	536.40	536.13	536.86	538.77	538.18
9/12/95	522.0	521.51	522.14	518.40	518.13	518.81	520.72	520.13
9/13/95	522.0	521.51	522.14	518.40	518.29	518.95	520.85	520.26
9/14/95	513.0	512.51	513.14	509.40	509.14	509.77	511.68	511.09
9/15/95	504.0	503.51	504.14	500.40	500.34	500.95	502.85	502.26
9/16/95	495.0	494.60	495.23	491.49	489.30	489.88	491.79	491.20
9/17/95	495.0	494.50	495.13	491.39	489.20	489.77	491.68	491.09
9/18/95	513.0	512.76	513.39	509.65	507.46	506.65	508.56	507.97
9/19/95	504.0	503.37	504.00	500.26	498.32	498.06	499.97	499.38
9/20/95	495.0	494.59	495.22	491.48	489.89	489.63	491.53	490.94
9/21/95	495.0	494.51	495.14	491.40	489.81	490.08	491.99	491.40
9/22/95	495.0	494.71	495.34	491.60	489.98	490.24	492.15	491.56
9/23/95	486.0	485.71	486.34	482.60	480.96	481.23	483.14	482.55
9/24/95	495.0	494.31	494.94	491.20	489.23	489.48	491.39	490.80
9/25/95	495.0	494.60	495.23	491.49	489.51	490.03	491.94	491.35

9/26/95	504.0	503.60	504.23	500.49	498.51	499.06	500.97	500.38
9/27/95	504.0	503.52	504.16	500.42	498.65	499.26	501.16	500.57
9/28/95	504.0	503.52	504.16	500.42	498.47	499.18	501.09	500.50
9/29/95	495.0	494.63	495.26	491.52	489.44	490.13	492.04	491.45
9/30/95	504.0	503.63	504.26	500.52	498.57	499.30	501.21	500.62
10/1/00	890.0	889.62	890.30	889.31	888.14	889.87	891.04	890.45
10/2/00	826.0	825.56	826.24	825.25	824.07	825.80	826.97	826.39
10/3/00	728.0	727.56	728.24	727.25	726.07	726.63	727.80	727.21
10/4/00	652.0	651.56	652.24	651.25	650.07	651.08	652.25	651.66
10/5/00	631.0	630.62	631.30	630.31	629.13	630.06	631.23	630.65
10/6/00	606.0	605.62	606.30	605.31	604.13	605.25	606.42	605.83
10/7/00	606.0	605.62	606.30	605.31	604.13	605.05	606.22	605.63
10/8/00	597.0	596.62	597.30	596.31	595.13	595.95	597.12	596.53
10/9/00	589.0	588.56	589.24	588.26	587.08	587.83	589.00	588.42
10/10/00	589.0	588.56	589.24	588.26	587.08	588.08	589.25	588.66
10/11/00	589.0	588.56	589.24	588.26	587.08	588.07	589.24	588.65
10/12/00	572.0	571.56	572.24	571.26	570.08	571.03	572.20	571.61
10/13/00	572.0	571.67	572.35	571.37	570.19	571.12	572.29	571.70
10/14/00	556.0	555.67	556.35	555.37	554.19	555.11	556.28	555.69
10/15/00	548.0	547.67	548.35	547.37	546.19	547.11	548.28	547.69
10/16/00	548.0	547.67	548.31	547.32	547.32	548.18	548.29	547.70
10/17/00	564.0	563.67	564.31	563.32	563.32	564.45	564.56	563.98
10/18/00	606.0	605.67	606.31	605.32	605.32	604.76	604.87	604.28
10/19/00	674.0	673.63	674.27	673.28	673.28	673.14	673.26	672.67
10/20/00	841.0	840.63	841.27	840.28	840.28	840.71	840.83	840.24
10/21/00	731.0	730.63	731.27	730.28	730.28	731.18	731.30	730.71
10/22/00	670.0	669.63	670.27	669.28	669.28	670.19	670.30	669.71
10/23/00	579.0	578.63	579.27	578.28	578.28	579.19	579.31	578.72
10/24/00	566.0	565.63	566.27	565.28	565.28	566.19	566.31	565.72
10/25/00	568.0	567.69	568.32	567.34	567.34	568.44	568.56	567.97
10/26/00	554.0	553.69	554.32	553.34	553.34	554.41	554.52	553.93
10/27/00	541.0	540.69	541.32	540.34	540.34	541.39	541.50	540.91
10/28/00	551.0	550.69	551.32	550.34	550.34	551.48	551.59	551.01
10/29/00	546.0	545.69	546.32	545.34	545.34	546.48	546.60	546.01
10/30/00	516.0	515.69	516.32	515.34	515.34	516.48	516.60	516.01
10/31/00	516.0	515.69	516.32	515.34	515.34	516.48	516.60	516.01
11/1/00								
11/2/00								
11/3/00								
11/4/00								
11/5/00								
11/6/00								
11/7/00								
11/8/00								
11/9/00								
11/10/00								
11/11/00								
11/12/00								
11/13/00								
11/14/00								
11/15/00								
11/16/00								
11/17/00								
11/18/00								
11/19/00								
11/20/00								
11/21/00								
11/22/00								
11/23/00								
11/24/00								
11/25/00								
11/26/00								
11/27/00								

11/28/00
11/29/00
11/30/00
12/1/00
12/2/00
12/3/00
12/4/00
12/5/00
12/6/00
12/7/00
12/8/00
12/9/00
12/10/00
12/11/00
12/12/00
12/13/00
12/14/00
12/15/00
12/16/00
12/17/00
12/18/00
12/19/00
12/20/00
12/21/00
12/22/00
12/23/00
12/24/00
12/25/00
12/26/00
12/27/00
12/28/00
12/29/00
12/30/00
12/31/00
1/1/01
1/2/01
1/3/01
1/4/01
1/5/01
1/6/01
1/7/01
1/8/01
1/9/01
1/10/01
1/11/01
1/12/01
1/13/01
1/14/01
1/15/01
1/16/01
1/17/01
1/18/01
1/19/01
1/20/01
1/21/01
1/22/01
1/23/01
1/24/01
1/25/01
1/26/01
1/27/01
1/28/01
1/29/01

1/30/01
1/31/01
2/1/01
2/2/01
2/3/01
2/4/01
2/5/01
2/6/01
2/7/01
2/8/01
2/9/01
2/10/01
2/11/01
2/12/01
2/13/01
2/14/01
2/15/01
2/16/01
2/17/01
2/18/01
2/19/01
2/20/01
2/21/01
2/22/01
2/23/01
2/24/01
2/25/01
2/26/01
2/27/01
2/28/01
3/1/01
3/2/01
3/3/01
3/4/01
3/5/01
3/6/01
3/7/01
3/8/01
3/9/01
3/10/01
3/11/01
3/12/01
3/13/01
3/14/01
3/15/01
3/16/01
3/17/01
3/18/01
3/19/01
3/20/01
3/21/01
3/22/01
3/23/01
3/24/01
3/25/01
3/26/01
3/27/01
3/28/01
3/29/01
3/30/01
3/31/01
4/1/01
4/2/01

4/3/01								
4/4/01								
4/5/01								
4/6/01								
4/7/01								
4/8/01								
4/9/01								
4/10/01								
4/11/01								
4/12/01								
4/13/01								
4/14/01								
4/15/01								
4/16/01								
4/17/01								
4/18/01								
4/19/01								
4/20/01								
4/21/01								
4/22/01								
4/23/01								
4/24/01								
4/25/01								
4/26/01								
4/27/01								
4/28/01								
4/29/01								
4/30/01								
5/1/01	1185.0	1185.03	1185.61	1184.29	1185.74	1188.13	1190.19	1189.61
5/2/01	978.0	978.03	978.61	977.29	978.74	981.13	983.20	982.61
5/3/01	940.0	940.03	940.61	939.29	940.74	942.85	944.92	944.33
5/4/01	1150.0	1150.03	1150.61	1149.29	1150.74	1152.96	1155.02	1154.44
5/5/01	1230.0	1230.03	1230.61	1229.29	1230.74	1232.95	1235.02	1234.43
5/6/01	1216.0	1216.03	1216.61	1215.29	1216.74	1219.07	1221.13	1220.55
5/7/01	1152.0	1152.03	1152.61	1151.29	1152.74	1155.07	1157.13	1156.55
5/8/01	1028.0	1028.03	1028.61	1027.29	1028.74	1031.06	1033.13	1032.54
5/9/01	965.0	965.03	965.61	964.29	965.74	968.06	970.12	969.54
5/10/01	901.0	901.03	901.61	900.29	901.74	904.12	906.19	905.60
5/11/01	917.0	917.14	917.71	916.40	917.85	920.23	922.29	921.70
5/12/01	903.0	903.14	903.72	902.40	903.85	906.23	908.30	907.71
5/13/01	999.0	999.14	999.71	998.40	999.85	1002.22	1004.29	1003.70
5/14/01	1025.0	1025.14	1025.72	1024.40	1025.85	1028.23	1030.29	1029.70
5/15/01	952.0	952.15	952.72	951.41	952.86	955.23	957.29	956.71
5/16/01	928.0	928.09	928.67	927.35	928.80	931.17	933.24	932.65
5/17/01	844.0	844.08	844.66	843.34	844.79	847.16	849.23	848.64
5/18/01	822.0	822.08	822.65	821.34	822.79	824.78	826.84	826.25
5/19/01	970.0	970.11	970.69	969.37	970.82	972.96	975.02	974.44
5/20/01	1080.0	1080.09	1080.67	1079.35	1080.80	1082.93	1085.00	1084.41
5/21/01	1040.0	1040.09	1040.66	1039.35	1040.80	1043.08	1045.15	1044.56
5/22/01	970.0	970.07	970.64	969.33	970.78	973.06	975.12	974.54
5/23/01	1080.0	1080.11	1080.69	1079.37	1080.82	1083.10	1085.16	1084.58
5/24/01	1050.0	1050.12	1050.69	1049.38	1050.83	1053.19	1055.25	1054.66
5/25/01	841.0	841.11	841.68	840.37	841.82	844.18	846.24	845.66
5/26/01	755.0	755.13	755.71	754.39	755.84	758.11	760.18	759.59
5/27/01	710.0	710.09	710.67	709.35	710.80	713.16	715.22	714.63
5/28/01	710.0	710.10	710.68	709.36	710.81	713.17	715.23	714.64
5/29/01	780.0	780.08	780.66	779.34	780.79	783.18	785.24	784.66
5/30/01	883.0	883.08	883.65	882.34	883.79	886.17	888.23	887.65
5/31/01	1240.0	1240.11	1240.68	1239.37	1239.92	1242.31	1244.37	1243.78
6/1/01	1414.0	1414.42	1415.05	1410.79	1411.82	1414.78	1416.99	1416.41
6/2/01	1509.0	1509.45	1510.08	1505.82	1506.85	1509.82	1512.03	1511.44
6/3/01	1543.0	1543.42	1544.06	1539.80	1540.83	1543.30	1545.51	1544.93
6/4/01	1587.0	1587.44	1588.07	1583.81	1584.84	1587.51	1589.72	1589.13

6/5/01	1731.0	1731.46	1732.09	1727.83	1728.86	1731.52	1733.73	1733.14
6/6/01	1826.0	1826.42	1827.05	1822.80	1823.83	1826.68	1828.89	1828.31
6/7/01	1880.0	1880.40	1881.04	1876.78	1877.81	1880.66	1882.87	1882.29
6/8/01	1830.0	1830.41	1831.04	1826.78	1827.82	1830.67	1832.88	1832.29
6/9/01	1780.0	1780.45	1781.08	1776.83	1777.86	1780.70	1782.91	1782.33
6/10/01	1710.0	1710.41	1711.05	1706.79	1707.82	1710.77	1712.98	1712.39
6/11/01	1680.0	1680.42	1681.06	1676.80	1677.83	1680.78	1682.99	1682.40
6/12/01	1670.0	1670.45	1671.08	1666.82	1667.85	1670.80	1673.01	1672.42
6/13/01	1570.0	1570.39	1570.94	1566.68	1567.72	1570.66	1572.87	1572.29
6/14/01	1617.0	1617.40	1617.95	1613.69	1614.72	1617.67	1619.88	1619.29
6/15/01	1725.0	1725.40	1725.96	1721.70	1722.73	1725.67	1727.88	1727.30
6/16/01	1782.0	1782.47	1783.03	1778.77	1779.80	1782.72	1784.93	1784.34
6/17/01	1869.0	1869.41	1869.96	1865.70	1866.73	1869.55	1871.76	1871.17
6/18/01	1956.0	1956.42	1956.97	1952.71	1953.74	1955.84	1958.05	1957.46
6/19/01	2034.0	2034.49	2035.04	2030.78	2031.81	2034.05	2036.26	2035.67
6/20/01	2128.0	2128.42	2128.97	2124.71	2125.74	2127.93	2130.14	2129.55
6/21/01	2206.0	2206.40	2206.95	2202.69	2203.72	2206.12	2208.34	2207.75
6/22/01	2251.0	2251.37	2251.92	2247.66	2248.69	2251.05	2253.27	2252.68
6/23/01	2323.0	2323.36	2323.92	2319.66	2320.69	2322.94	2325.15	2324.57
6/24/01	2384.0	2384.41	2384.97	2380.71	2381.74	2383.75	2385.96	2385.37
6/25/01	2332.0	2332.43	2332.98	2328.72	2329.75	2332.12	2334.33	2333.75
6/26/01	2280.0	2280.42	2280.97	2276.71	2277.74	2279.40	2281.61	2281.03
6/27/01	2232.0	2232.38	2232.93	2228.67	2229.70	2232.37	2234.58	2233.99
6/28/01	2149.0	2149.41	2149.96	2145.70	2146.73	2149.64	2151.85	2151.26
6/29/01	2061.0	2061.42	2061.97	2057.71	2058.74	2061.17	2063.39	2062.80
6/30/01	2000.0	2000.45	2001.01	1996.75	1997.78	1999.68	2001.89	2001.30
7/1/01	1980.0	1980.95	1981.53	1975.17	1976.95	1978.42	1980.98	1980.39
7/2/01	2121.0	2121.97	2122.55	2116.18	2117.97	2119.25	2121.81	2121.22
7/3/01	2358.0	2358.99	2359.57	2353.21	2354.99	2355.43	2357.99	2357.40
7/4/01	2662.0	2662.90	2663.48	2657.12	2658.90	2659.52	2662.08	2661.49
7/5/01	2911.0	2911.87	2912.45	2906.08	2907.47	2908.00	2910.56	2909.97
7/6/01	2911.0	2911.88	2912.46	2906.09	2907.48	2908.24	2910.80	2910.21
7/7/01	2928.0	2928.86	2929.44	2923.08	2924.46	2925.15	2927.71	2927.12
7/8/01	2996.0	2996.86	2997.44	2991.08	2992.86	2994.33	2996.88	2996.30
7/9/01	3048.0	3048.86	3049.44	3043.08	3044.86	3046.83	3049.39	3048.81
7/10/01	3102.0	3102.86	3103.44	3097.08	3098.86	3101.46	3104.02	3103.43
7/11/01	3210.0	3210.86	3211.44	3205.08	3206.86	3209.99	3212.55	3211.96
7/12/01	3267.0	3267.86	3268.44	3262.08	3263.86	3266.97	3269.52	3268.94
7/13/01	3216.0	3216.85	3217.43	3211.06	3212.85	3215.93	3218.49	3217.90
7/14/01	3149.0	3149.85	3150.43	3144.07	3145.85	3148.80	3151.36	3150.77
7/15/01	3190.0	3190.85	3191.43	3185.07	3186.85	3189.72	3192.28	3191.69
7/16/01	3178.0	3178.89	3179.47	3173.10	3174.89	3177.83	3180.38	3179.80
7/17/01	3111.0	3111.84	3112.42	3106.06	3107.84	3110.71	3113.27	3112.68
7/18/01	3080.0	3080.83	3081.41	3075.04	3076.82	3078.61	3081.17	3080.59
7/19/01	3032.0	3032.90	3033.49	3027.12	3028.90	3030.84	3033.40	3032.81
7/20/01	3037.0	3037.87	3038.45	3032.09	3033.87	3035.65	3038.21	3037.62
7/21/01	2991.0	2991.84	2992.42	2986.05	2987.83	2989.95	2992.51	2991.92
7/22/01	2945.0	2945.79	2946.37	2940.00	2941.79	2943.65	2946.21	2945.62
7/23/01	2941.0	2941.89	2942.48	2936.11	2937.89	2939.50	2942.06	2941.47
7/24/01	2971.0	2971.89	2972.48	2966.11	2967.89	2969.50	2972.06	2971.47
7/25/01	3071.0	3071.86	3072.44	3066.08	3067.86	3069.43	3071.99	3071.40
7/26/01	3156.0	3156.86	3157.44	3151.08	3152.86	3154.25	3156.81	3156.23
7/27/01	3174.0	3174.82	3175.40	3169.03	3170.82	3172.42	3174.97	3174.39
7/28/01	3210.0	3210.82	3211.40	3205.03	3206.82	3208.40	3210.96	3210.38
7/29/01	3210.0	3210.77	3211.35	3204.98	3206.76	3208.45	3211.01	3210.42
7/30/01	3156.0	3156.77	3157.35	3150.98	3152.76	3154.44	3156.99	3156.41
7/31/01	3009.0	3009.82	3010.40	3004.03	3005.18	3006.82	3009.38	3008.79
8/1/01	2868.0	2868.96	2869.55	2864.59	2865.84	2867.39	2869.76	2869.17
8/2/01	2752.0	2752.96	2753.55	2748.59	2749.84	2751.10	2753.46	2752.88
8/3/01	2655.0	2655.98	2656.57	2651.61	2652.37	2652.46	2654.82	2654.23
8/4/01	2716.0	2716.98	2717.57	2712.61	2713.67	2714.11	2716.47	2715.88
8/5/01	2780.0	2780.98	2781.57	2776.61	2777.27	2777.67	2780.03	2779.45
8/6/01	2796.0	2796.98	2797.57	2792.61	2793.27	2793.97	2796.33	2795.75

8/7/01	2812.0	2812.93	2813.52	2808.57	2809.47	2810.15	2812.51	2811.92
8/8/01	2844.0	2844.93	2845.52	2840.57	2841.47	2842.14	2844.50	2843.91
8/9/01	2877.0	2877.93	2878.52	2873.57	2874.47	2875.11	2877.47	2876.88
8/10/01	2911.0	2911.93	2912.52	2907.57	2908.47	2909.23	2911.59	2911.00
8/11/01	2911.0	2911.94	2912.53	2907.57	2908.48	2909.21	2911.57	2910.98
8/12/01	2894.0	2894.94	2895.53	2890.57	2891.48	2892.20	2894.56	2893.97
8/13/01	2894.0	2894.94	2895.53	2890.57	2891.48	2892.18	2894.54	2893.95
8/14/01	2911.0	2911.94	2912.53	2907.57	2908.48	2909.18	2911.54	2910.95
8/15/01	2911.0	2911.94	2912.53	2907.57	2908.48	2909.23	2911.59	2911.00
8/16/01	2928.0	2928.99	2929.58	2924.63	2925.53	2926.21	2928.57	2927.98
8/17/01	2945.0	2945.94	2946.53	2941.58	2942.48	2943.18	2945.54	2944.96
8/18/01	2945.0	2945.93	2946.52	2941.56	2942.46	2942.44	2944.80	2944.21
8/19/01	2911.0	2912.02	2912.61	2907.65	2908.56	2908.85	2911.21	2910.63
8/20/01	2860.0	2860.98	2861.57	2856.61	2857.52	2857.81	2860.17	2859.58
8/21/01	2788.0	2788.94	2789.53	2784.57	2785.48	2786.10	2788.46	2787.87
8/22/01	2748.0	2748.88	2749.48	2744.52	2745.77	2746.77	2749.13	2748.54
8/23/01	2602.0	2603.00	2603.60	2598.64	2599.89	2601.44	2603.80	2603.22
8/24/01	2455.0	2456.01	2456.60	2451.64	2452.89	2454.45	2456.81	2456.22
8/25/01	2391.0	2391.97	2392.56	2387.60	2388.85	2390.12	2392.48	2391.89
8/26/01	2371.0	2371.97	2372.56	2367.60	2368.85	2369.80	2372.16	2371.57
8/27/01	2299.0	2299.92	2300.51	2295.55	2296.80	2297.79	2300.15	2299.56
8/28/01	2220.0	2220.92	2221.51	2216.55	2217.47	2218.40	2220.76	2220.18
8/29/01	2178.0	2178.86	2179.45	2174.49	2175.40	2176.35	2178.71	2178.12
8/30/01	2127.0	2127.86	2128.45	2123.49	2124.40	2125.32	2127.68	2127.09
8/31/01	2077.0	2077.92	2078.51	2073.56	2074.40	2075.29	2077.65	2077.06
9/1/01	2010.0	2009.73	2010.36	2006.62	2007.02	2007.81	2009.72	2009.13
9/2/01	1950.0	1949.73	1950.36	1946.62	1947.33	1948.17	1950.07	1949.49
9/3/01	1880.0	1879.75	1880.38	1876.64	1877.31	1877.41	1879.31	1878.73
9/4/01	1710.0	1709.75	1710.38	1706.64	1707.35	1707.69	1709.60	1709.01
9/5/01	1490.0	1489.75	1490.38	1486.64	1487.23	1487.55	1489.46	1488.87
9/6/01	1240.0	1239.75	1240.38	1236.64	1236.94	1237.54	1239.45	1238.86
9/7/01	1037.0	1036.70	1037.33	1033.59	1033.84	1034.44	1036.34	1035.76
9/8/01	826.0	825.70	826.33	822.59	822.72	823.30	825.21	824.62
9/9/01	633.0	632.70	633.33	629.59	629.58	630.14	632.04	631.46
9/10/01	500.0	499.70	500.33	496.59	496.58	497.23	499.14	498.56
9/11/01	451.0	450.70	451.34	447.60	447.59	448.22	450.13	449.54
9/12/01	451.0	450.70	451.34	447.60	447.59	448.21	450.12	449.53
9/13/01	437.0	436.70	437.34	433.60	433.59	434.19	436.10	435.51
9/14/01	437.0	436.70	437.34	433.60	433.59	434.17	436.08	435.49
9/15/01	437.0	436.70	437.34	433.60	433.59	434.16	436.07	435.48
9/16/01	437.0	436.76	437.39	433.65	431.97	432.52	434.42	433.84
9/17/01	451.0	450.70	451.33	447.59	445.91	446.45	448.36	447.77
9/18/01	451.0	450.86	451.49	447.75	446.07	445.86	447.77	447.18
9/19/01	451.0	450.62	451.25	447.51	445.83	445.90	447.81	447.22
9/20/01	451.0	450.75	451.38	447.64	445.97	446.05	447.96	447.37
9/21/01	458.0	457.70	458.34	454.59	452.71	453.04	454.95	454.36
9/22/01	472.0	471.82	472.46	468.72	466.83	467.17	469.08	468.49
9/23/01	465.0	464.82	465.46	461.72	459.83	460.16	462.07	461.49
9/24/01	465.0	464.58	465.22	461.47	459.59	459.91	461.82	461.24
9/25/01	493.0	492.76	493.39	489.65	487.76	488.20	490.11	489.52
9/26/01	417.0	416.76	417.39	413.65	411.76	412.27	414.18	413.59
9/27/01	414.0	413.71	414.34	410.60	408.92	409.62	411.52	410.94
9/28/01	411.0	410.71	411.34	407.60	405.93	406.62	408.53	407.94
9/29/01	407.0	406.78	407.41	403.67	401.99	402.61	404.52	403.94
9/30/01	410.0	409.78	410.41	406.67	404.99	405.56	407.47	406.88

Appendix B

Survey Data

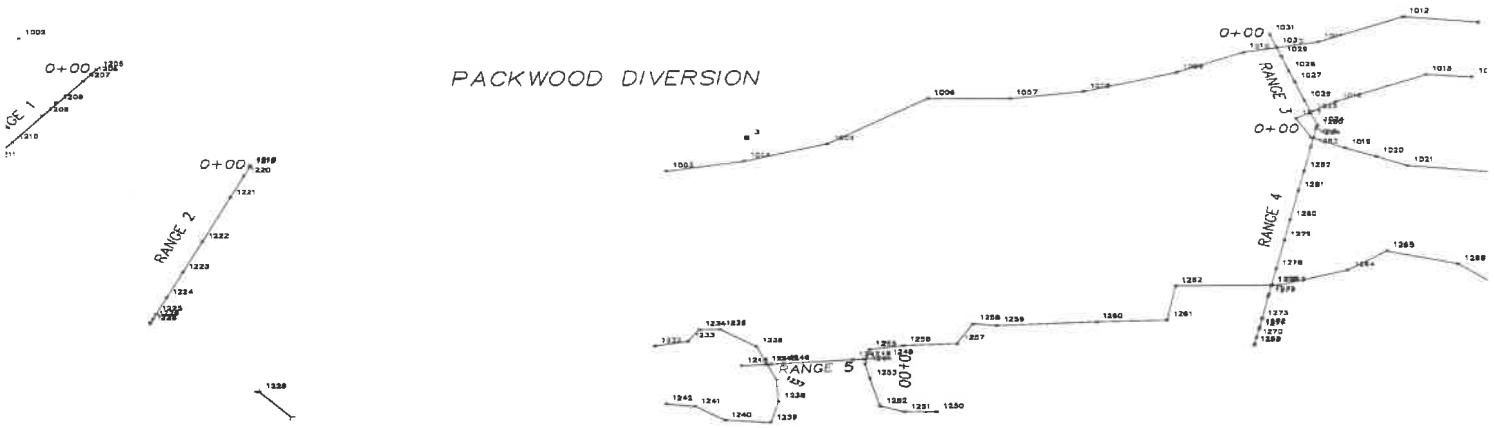
APPENDIX B

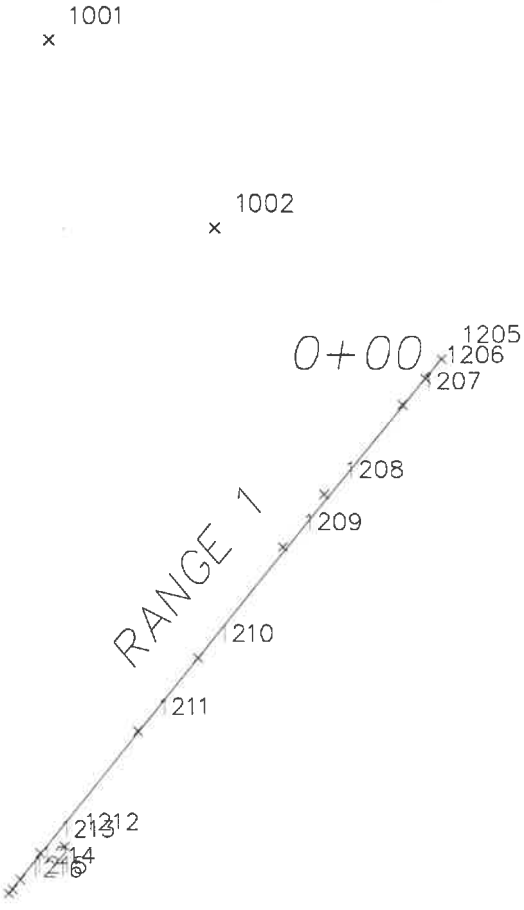
YAKIMA RIVER CROSS SECTIONS
WATER DIVERSION HYDRAULIC STUDY
APRIL 3RD, 2000

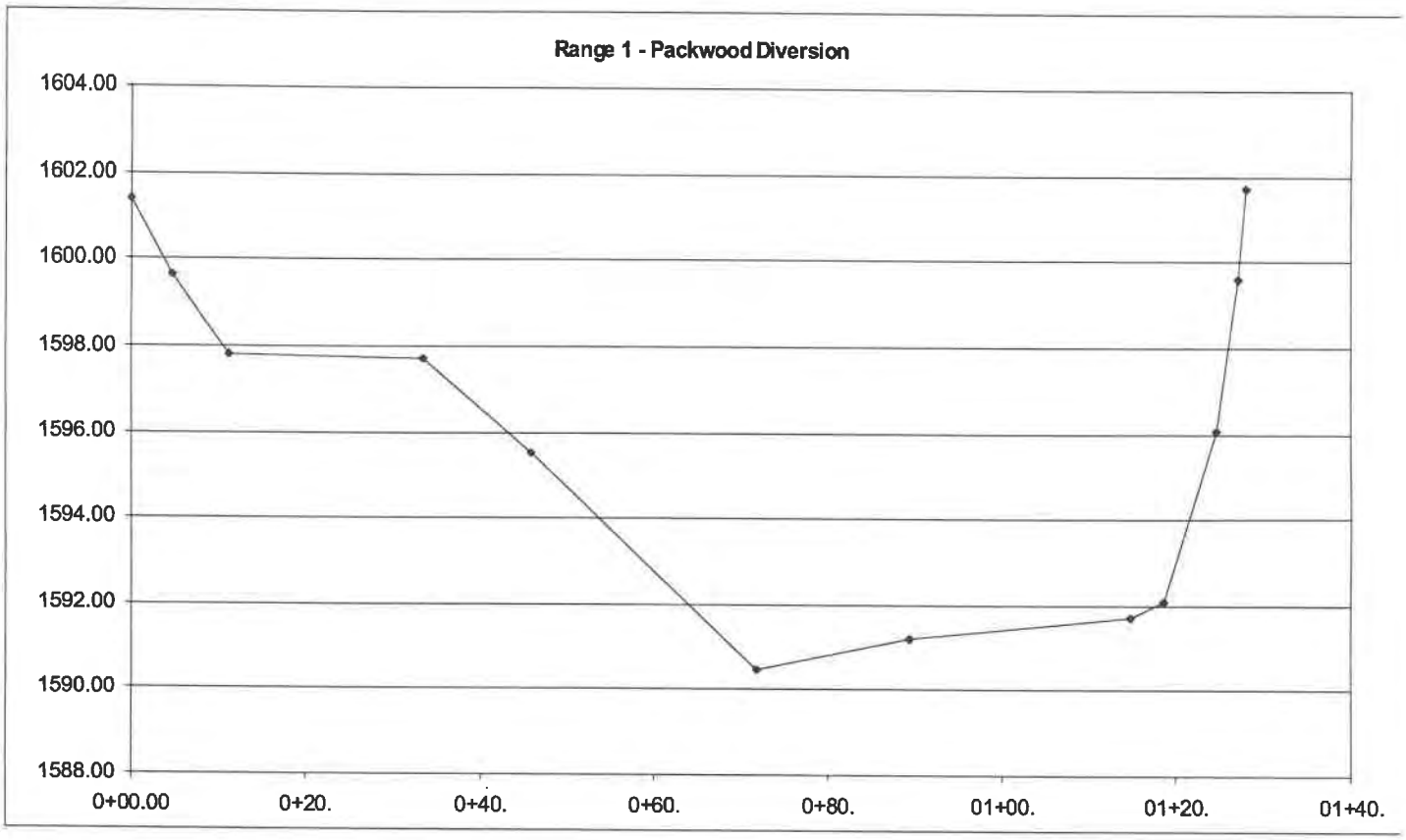
PROJECT NARRATIVE:

W&H Pacific surveyed 18 cross sections (ranges) near five diversion structures on theYakima River between March 29th and March 31st. The diversions included the Packwood Diversion, the Cascade Diversion, the West Side Diversion, the Thorp Diversion, and the Younger Ditch Diversion. A Wild TC1010 Total Station Instrument and a Husky FS/2 Data Collector with TDS software was used to collect the data. The horizontal datum was assumed and all cross sections within each Diversion are relative to each other. Vertically, Ranges 1-5 of the Packwood Diversion and Ranges 6-8 of the Cascade Diversion were based on a found 3" brass disk in the concrete headwall of the Cascade Diversion structure stamped "1603.53". For the West Side Diversion, Ranges 9-12, an elevation of 100.00' was assumed on W&H Pacific (WHP) control point #6. An assumed elevation of 100.00' was held on WHP control point #4 for Thorp Diversion Ranges 13&14 and an assumed elevation of 100.00' was held on WHP control point #8 for Younger Ditch Diversion Ranges 15-18. The data was downloaded into Autocad Version 14 and the Ranges were put into an Excel spreadsheet. The following pages show each Range as it is listed in the Excel Spreadsheet along with a sketch of the Diversion imported from Autocad.

PACKWOOD DIVERSION OVERALL SKETCH



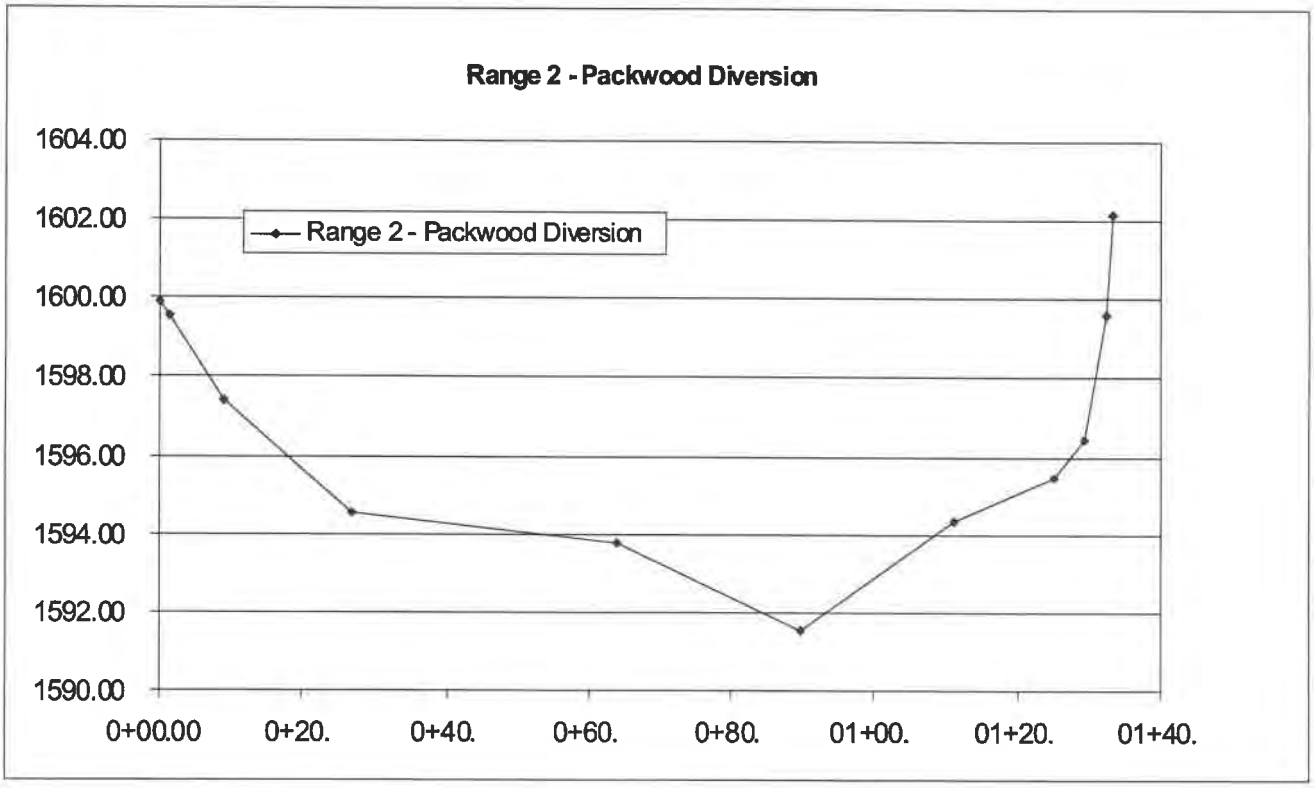




RANGE 1

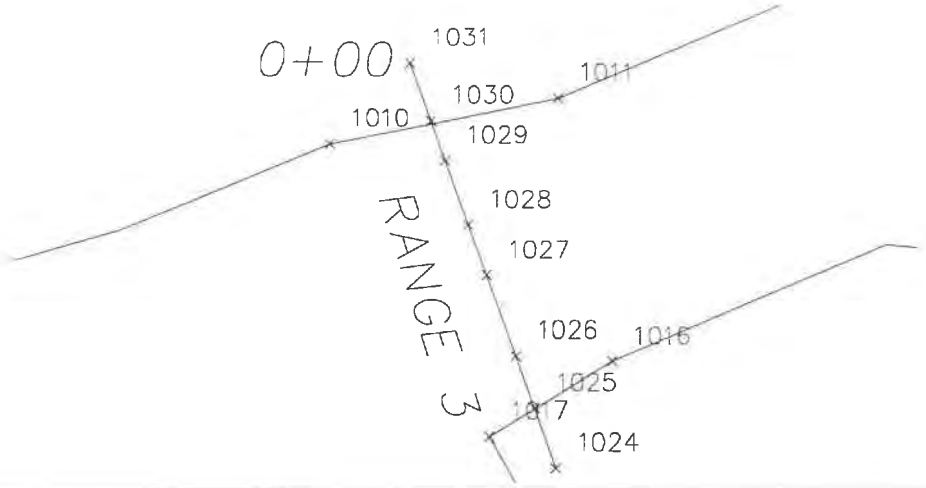
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1601.38	GROUND TOP	1205
0+04.77	1599.64	WATER SURFACE EDGE@5:35PM 3/30	1206
0+11.30	1597.79	GROUND TOE	1207
0+33.42	1597.73	GROUND BREAK	1208
0+45.87	1595.50	GROUND	1209
0+71.80	1590.47	GROUND	1210
0+89.51	1591.20	GROUND	1211
1+14.76	1591.72	GROUND	1212
1+18.63	1592.10	GROUND BREAK	1213
1+24.78	1596.09	GROUND TOE	1214
1+27.11	1599.60	WATER SURFACE EDGE@6:11PM 3/30	1215
1+28.14	1601.72	GROUND TOP	1216

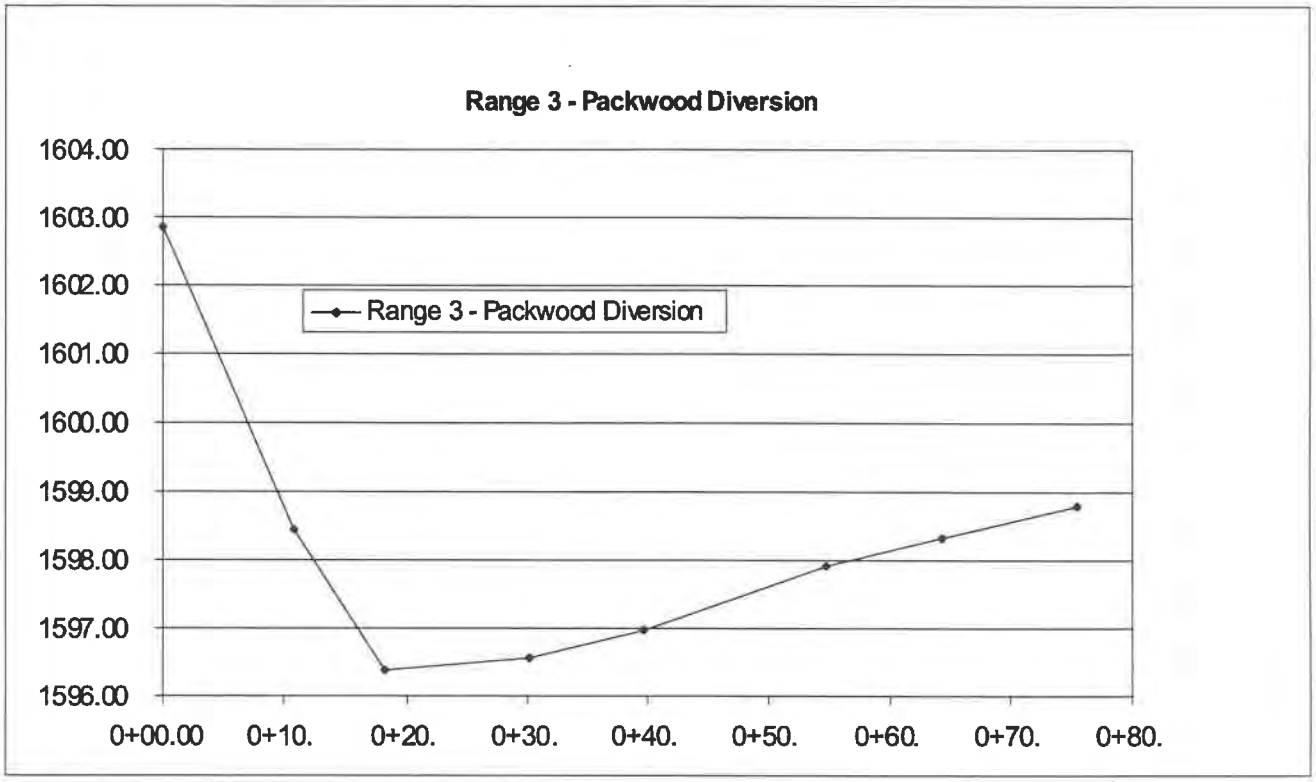

0+00
1218
1219
1220
1221
RANGE 2
1222
1223
1224
1225
1226
1228


Range 2 - Packwood Diversion
1604.00
1602.00
1600.00
1598.00
1596.00
1594.00
1592.00
1590.00
Range 2 - Packwood Diversion
0+00.00
0+20.
0+40.
0+60.
0+80.
01+00.
01+20.
01+40.

RANGE 2

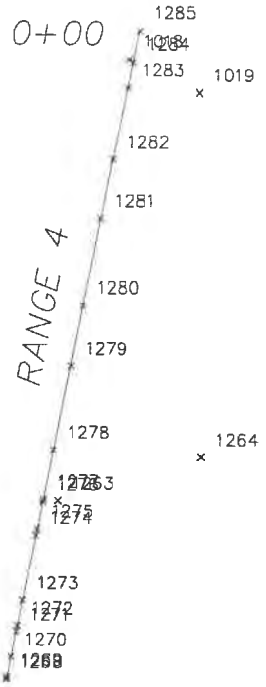
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1599.91	GROUND TOP	1218
0+01.31	1599.54	WATER SURFACE EDGE@6:22PM 3/30	1219
0+08.92	1597.40	GROUND TOE	1220
0+27.07	1594.57	GROUND	1221
0+64.03	1593.76	GROUND	1222
0+89.77	1591.54	GROUND	1223
1+11.13	1594.33	GROUND	1224
1+25.26	1595.49	GROUND	1225
1+29.27	1596.46	GROUND TOE	1226
1+32.42	1599.61	WATER SURFACE EDGE@6:26PM 3/30	1227
1+33.19	1602.18	GROUND TOP	1228

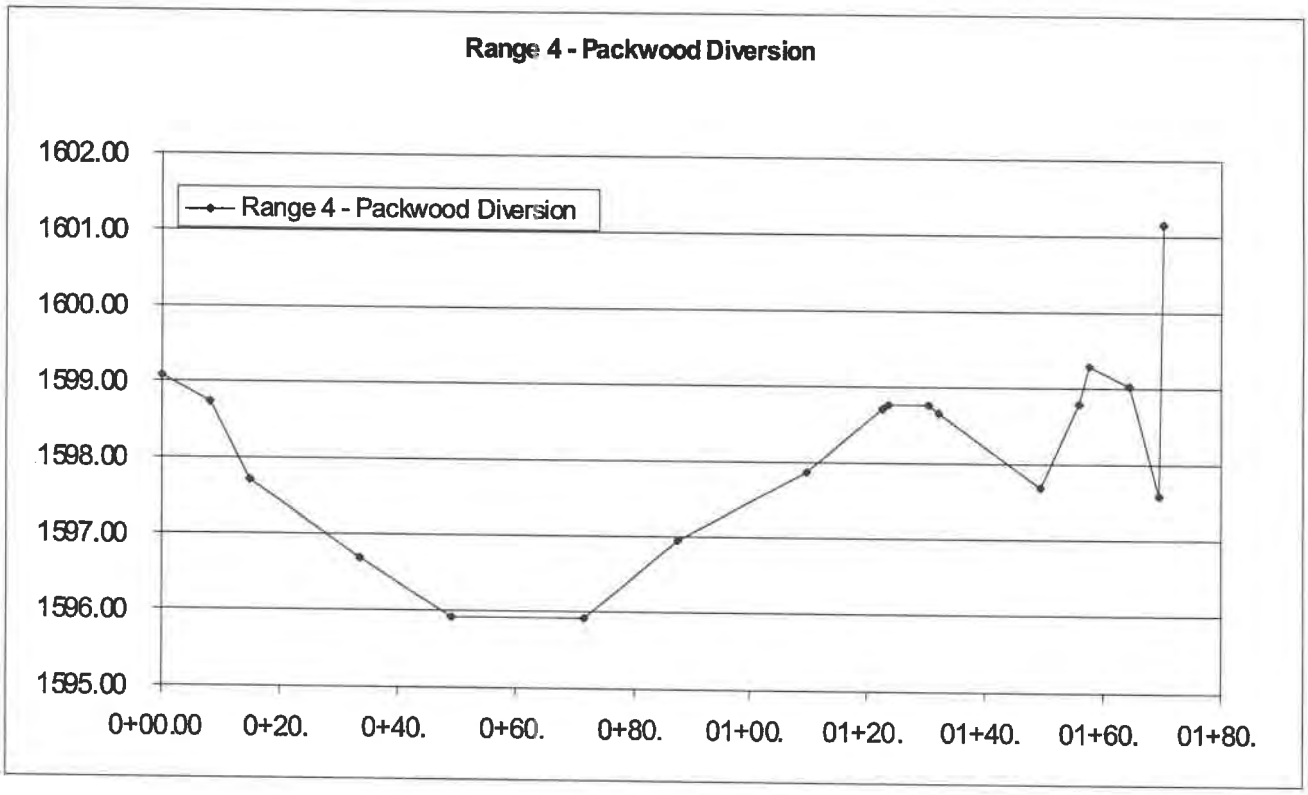




RANGE 3

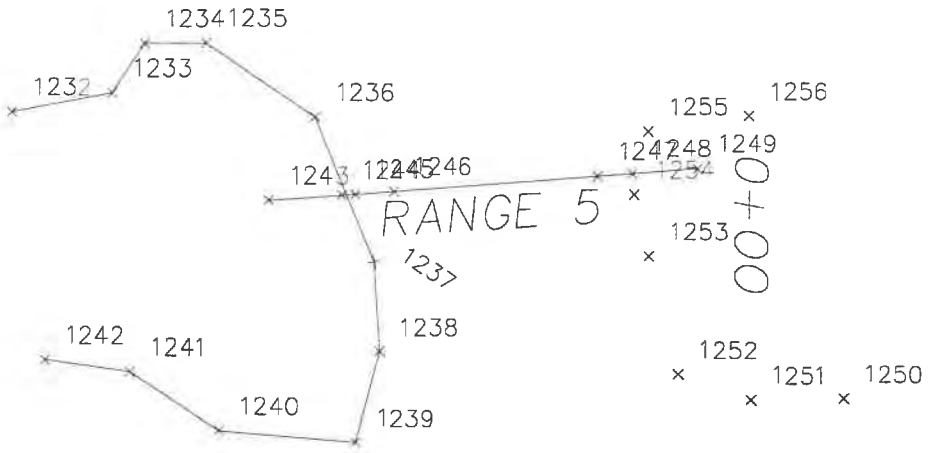
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1602.86	GROUND TOP	1031
0+10.79	1598.43	WATER SURFACE EDGE@11:50AM 3/31	1030
0+18.20	1596.38	GROUND BREAK	1029
0+30.22	1596.56	GROUND	1028
0+39.62	1596.97	GROUND	1027
0+54.73	1597.90	GROUND BREAK	1026
0+64.44	1598.33	WATER SURFACE EDGE@11:50AM 3/31	1025
0+75.54	1598.80	GROUND	1024

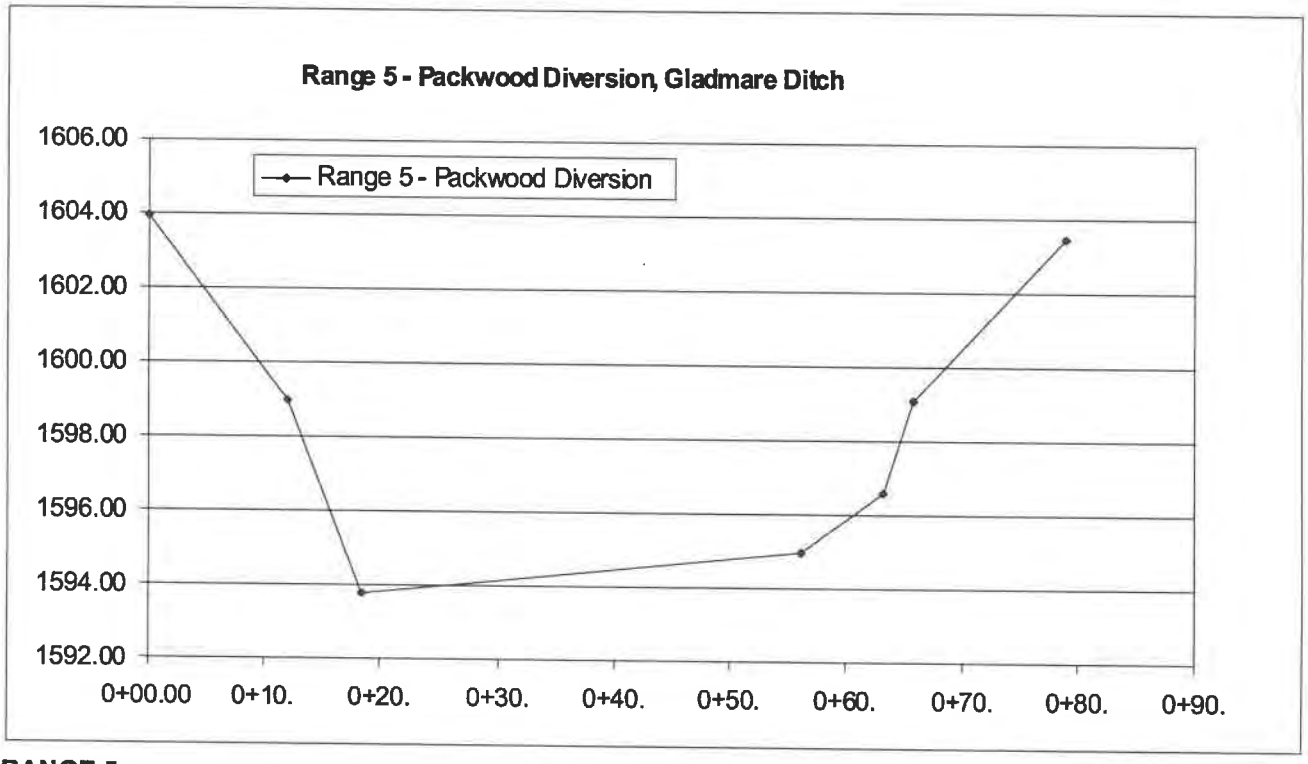

0+00
RANGE 4
1285
1283
1019
1282
1281
1280
1279
1278
1264
1273
1270


Range 4 - Packwood Diversion
Range 4 - Packwood Diversion
1602.00
1601.00
1600.00
1599.00
1598.00
1597.00
1596.00
1595.00
0+00.00
0+20.
0+40.
0+60.
0+80.
01+00.
01+20.
01+40.
01+60.
01+80.

RANGE 4

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1599.09	GROUND TOP	1285
0+08.14	1598.75	WATER SURFACE EDGE@10:11AM 3/31	1284
0+14.89	1597.72	GROUND	1283
0+33.71	1596.68	GROUND	1282
0+49.23	1595.91	GROUND	1281
0+71.83	1595.92	GROUND	1280
0+87.75	1596.94	GROUND	1279
1+09.83	1597.87	GROUND BREAK	1278
1+22.71	1598.70	WATER SURFACE EDGE@9:53AM 3/31	1277
1+23.47	1598.76	GROUND TOP@ GRAVEL BAR	1276
1+30.50	1598.76	GROUND TOP@ GRAVEL BAR	1275
1+32.22	1598.66	WATER SURFACE EDGE@SIDE CHANNEL 9:47AM 3/31	1274
1+49.34	1597.69	GROUND BREAK	1273
1+55.96	1598.79	WATER SURFACE EDGE@SIDE CHANNEL 9:47AM 3/31	1272
1+57.56	1599.29	GROUND BREAK	1271
1+64.25	1599.02	GROUND BREAK	1270
1+69.53	1597.59	GROUND TOE	1269
1+70.16	1601.16	GROUND TOP	1268





RANGE 5

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1603.93	GROUND TOP	1249
0+12.07	1599.00	WATER SURFACE EDGE@CTR LOG JAM 9:24AM 3/31	1248
0+18.41	1593.76	GROUND TOE@ CENTER LOG JAM	1247
0+56.24	1594.95	GROUND	1246
0+63.28	1596.57	GROUND BREAK	1245
0+65.81	1599.06	WATER SURFACE EDGE@8:51AM 3/31	1244
0+79.08	1603.47	GROUND TOP	1243

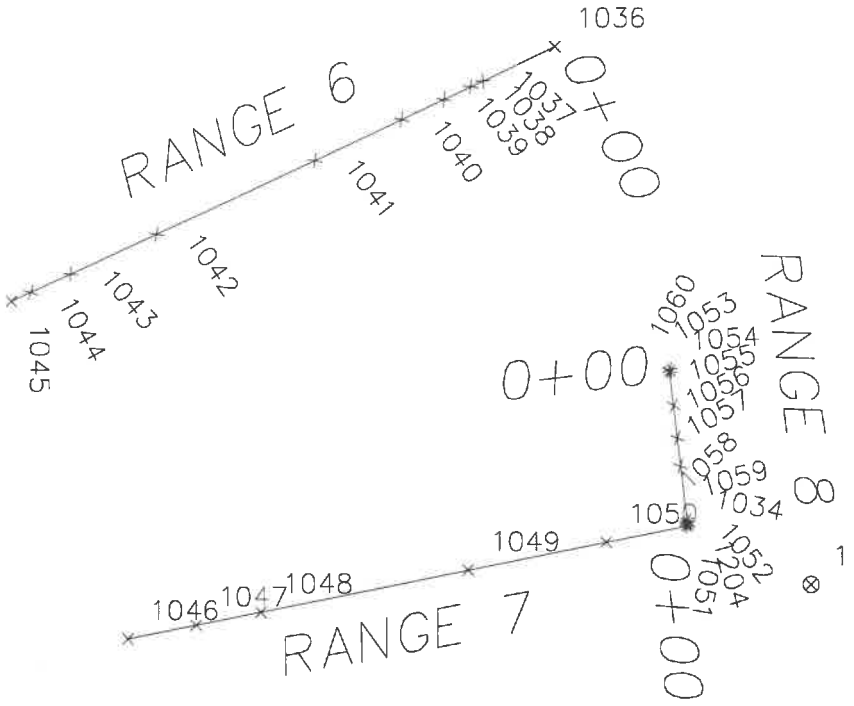
ADDITIONAL TOPO PACKWOOD DIVERSION

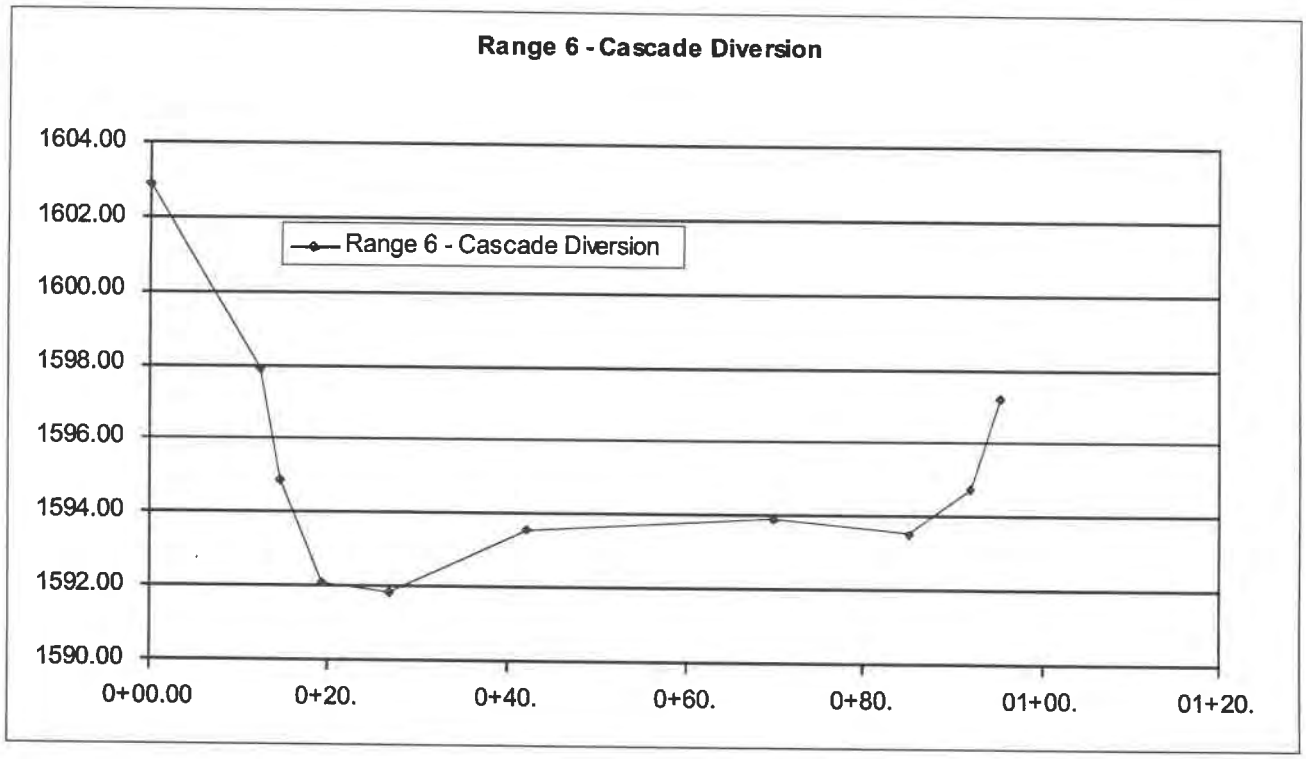
POINT NUMBER	ELEVATION	POINT DESCRIPTION
1001	1599.62	Water Surface Edge
1002	1599.61	Water Surface Edge
1003	1599.10	Water Surface Edge
1004	1599.14	Water Surface Edge
1005	1599.14	Water Surface Edge
1006	1599.05	Water Surface Edge
1007	1599.03	Water Surface Edge
1008	1598.99	Water Surface Edge
1009	1598.90	Water Surface Edge
1010	1598.62	Water Surface Edge
1011	1598.03	Water Surface Edge
1012	1597.94	Water Surface Edge
1013	1597.58	Water Surface Edge
1014	1597.44	Water Surface Edge
1015	1597.44	Water Surface Edge
1016	1598.14	Water Surface Edge
1017	1598.61	Water Surface Edge
1018	1598.78	Water Surface Edge
1019	1598.54	Water Surface Edge
1020	1597.62	Water Surface Edge
1021	1597.55	Water Surface Edge
1022	1597.59	Water Surface Edge
1023	1597.46	Water Surface Edge
1229	1596.36	Culvert In
1232	1599.44	Water Surface Edge
1233	1599.41	Water Surface Edge
1234	1599.28	Water Surface Edge
1235	1599.14	Water Surface Edge
1236	1599.07	Water Surface Edge
1237	1598.92	Water Surface Edge
1238	1598.85	Water Surface Edge
1239	1598.78	Water Surface Edge
1240	1598.63	Water Surface Edge
1241	1598.45	Water Surface Edge
1242	1598.50	Water Surface Edge
1250	1598.70	Water Surface Edge
1251	1598.77	Water Surface Edge
1252	1598.84	Water Surface Edge
1253	1598.97	Water Surface Edge
1254	1598.98	Water Surface Edge
1255	1599.60	Water Surface Edge
1256	1599.48	Water Surface Edge
1257	1599.46	Water Surface Edge
1258	1599.27	Water Surface Edge
1259	1599.19	Water Surface Edge
1260	1599.17	Water Surface Edge
1261	1599.03	Water Surface Edge

1262	1598.90	Water Surface Edge
1263	1598.60	Water Surface Edge
1264	1598.28	Water Surface Edge
1265	1597.43	Water Surface Edge
1266	1597.34	Water Surface Edge
1267	1597.44	Water Surface Edge

H-01

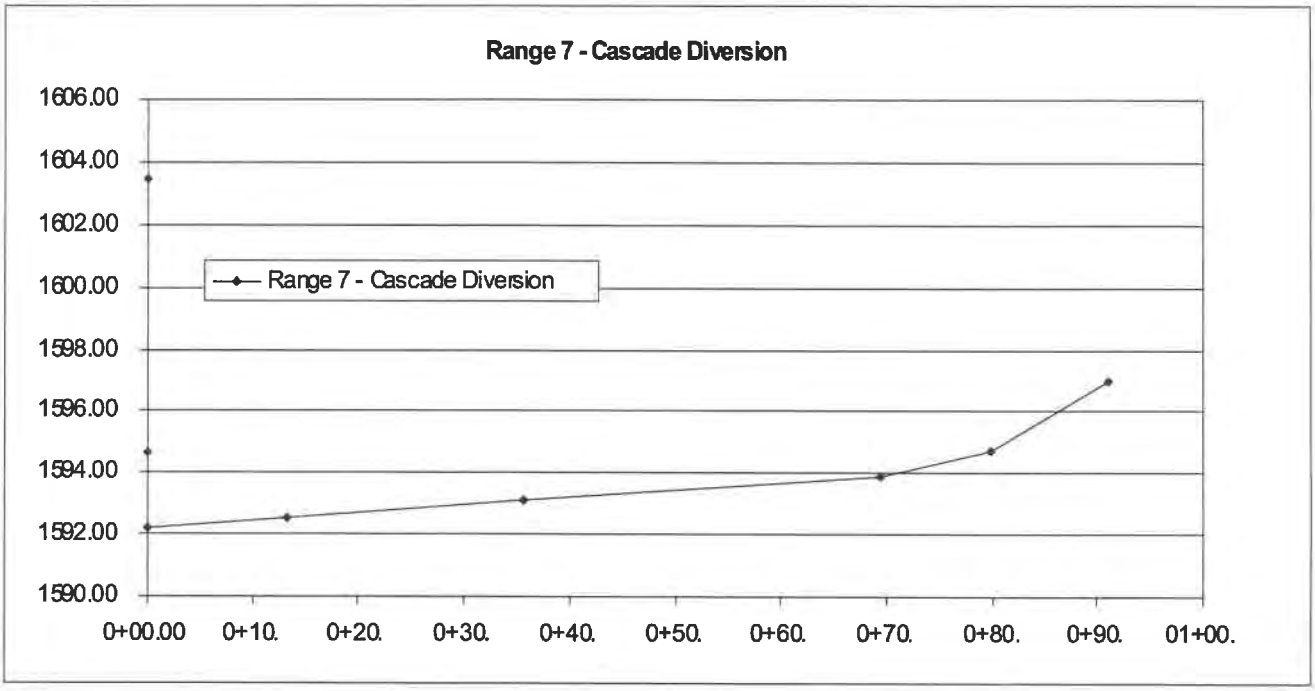
CASCADE DIVERSION





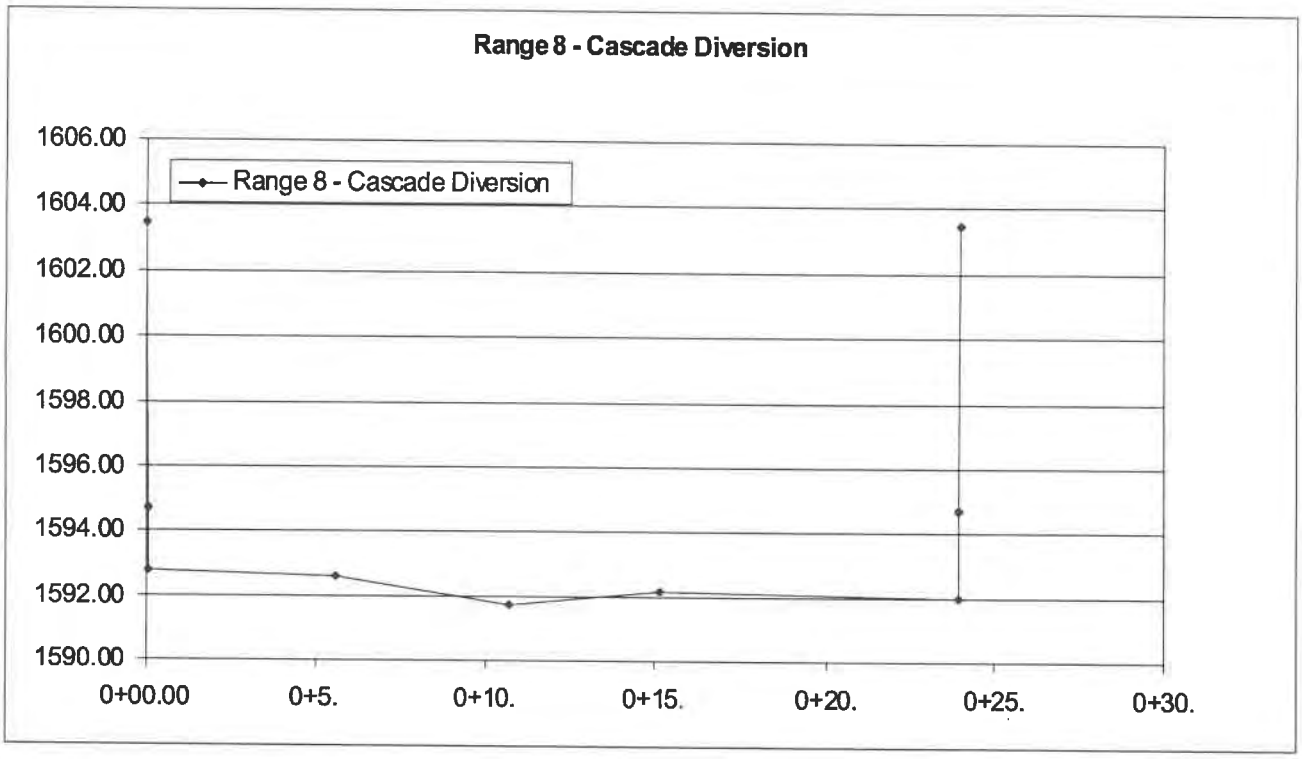
RANGE 6

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1602.86	GROUND TOP	1036
0+12.58	1597.88	GROUND BREAK	1037
0+14.76	1594.88	WATER SURFACE EDGE@1:10PM 3/29	1038
0+19.46	1592.13	GROUND TOE	1039
0+27.00	1591.82	GROUND BREAK	1040
0+42.28	1593.56	GROUND BREAK	1041
0+70.00	1593.88	GROUND	1042
0+85.05	1593.50	GROUND BREAK	1043
0+92.12	1594.75	WATER SURFACE EDGE@1:10PM 3/29	1044
0+95.47	1597.20	GROUND TOP	1045



RANGE 7

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1603.47	RETAINING WALL TOP	1052
0+00.02	1594.67	WATER SURFACE EDGE@4:43PM 3/30	1204
0+00.04	1592.18	RETAINING WALL TOE	1051
0+13.23	1592.54	GROUND	1050
0+35.71	1593.14	GROUND	1049
0+69.48	1593.89	GROUND BREAK	1048
0+79.97	1594.70	WATER SURFACE EDGE@1:20PM 3/29	1047
0+90.99	1596.99	GROUND TOP	1046



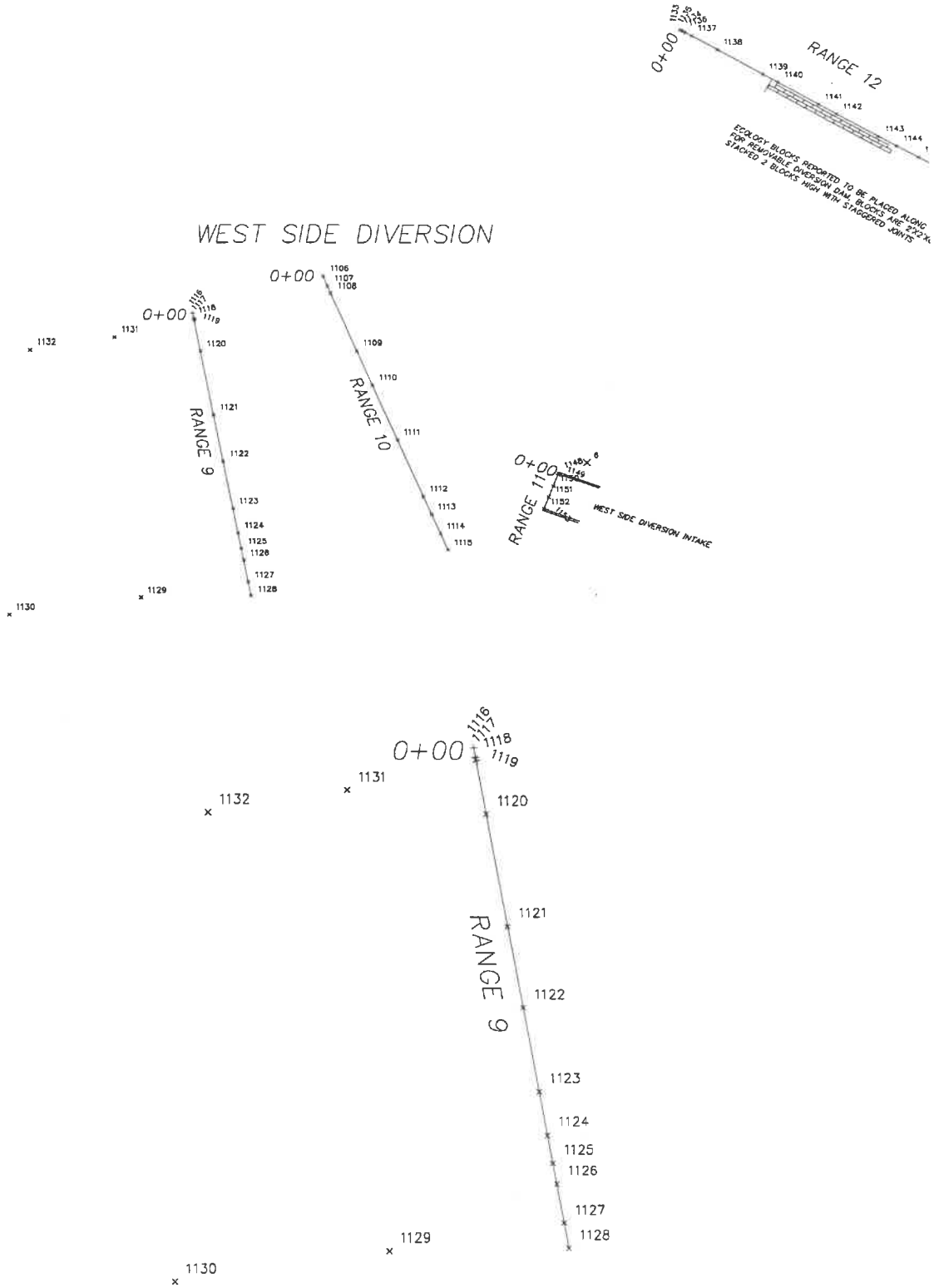
RANGE 8

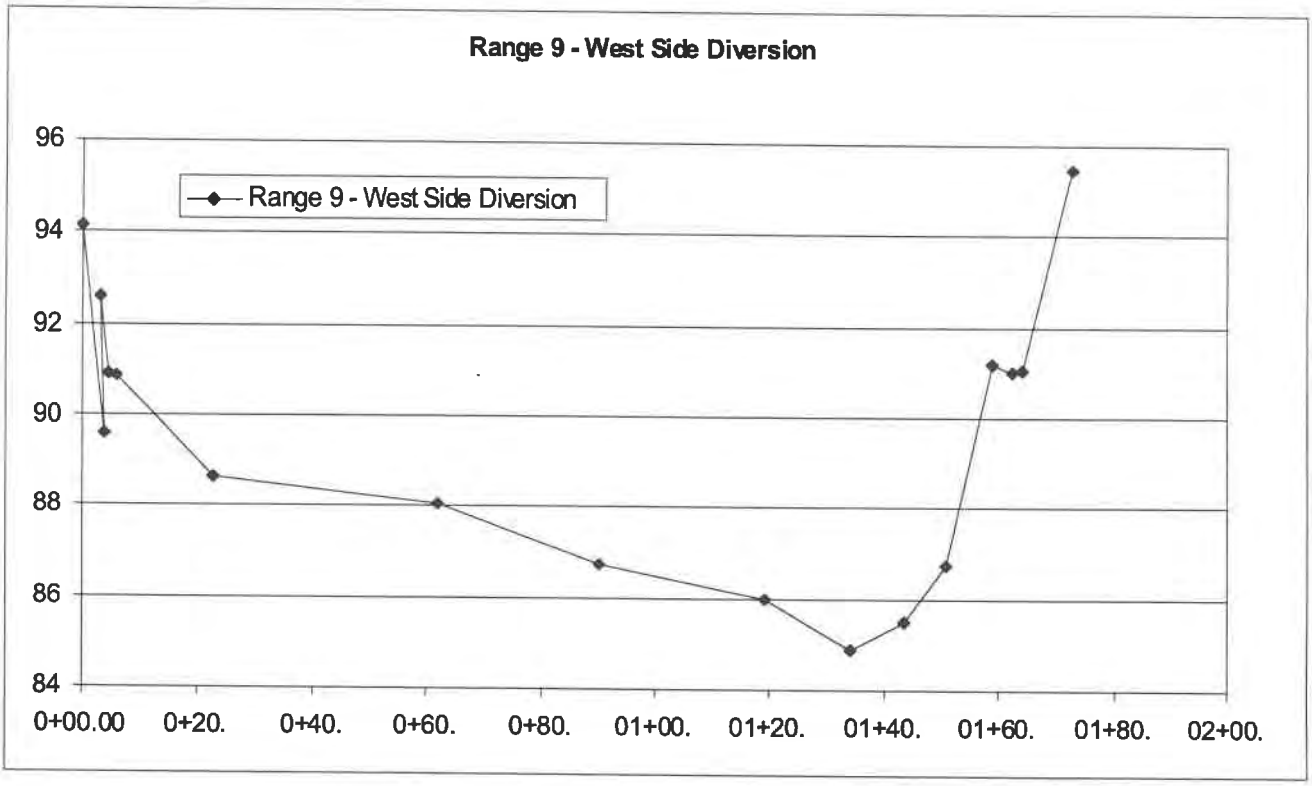
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	1603.48	RETAINING WALL TOP	1060
0+00.04	1594.69	WATER SURFACE EDGE@1:35PM 3/29	1053
0+00.07	1592.81	RETAINING WALL TOE	1054
0+05.55	1592.57	GROUND BREAK	1055
0+10.68	1591.75	GROUND BREAK	1056
0+15.13	1592.14	GROUND BREAK	1057
0+23.97	1592.00	RETAINING WALL TOE	1058
0+23.98	1594.70	WATER SURFACE EDGE@1:35PM 3/29	1059
0+24.00	1603.47	RETAINING WALL TOP	1034

ADDITIONAL TOPO CASCADE DIVERSION

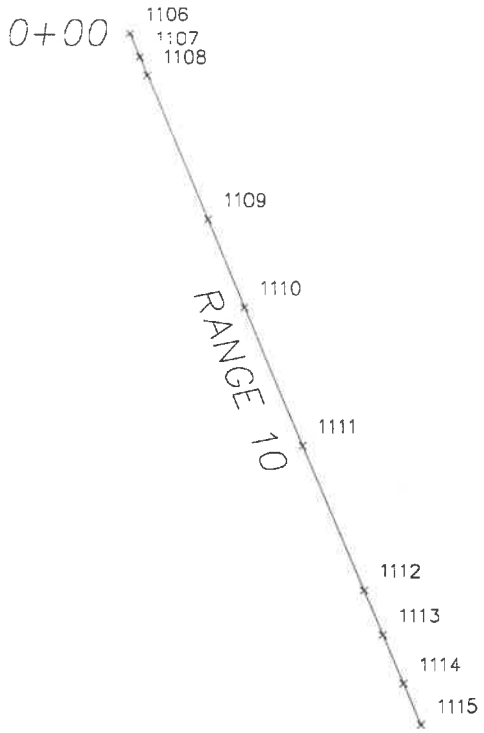
POINT NUMBER	ELEVATION	POINT DESCRIPTION
1035	1594.57	Water Surface Edge

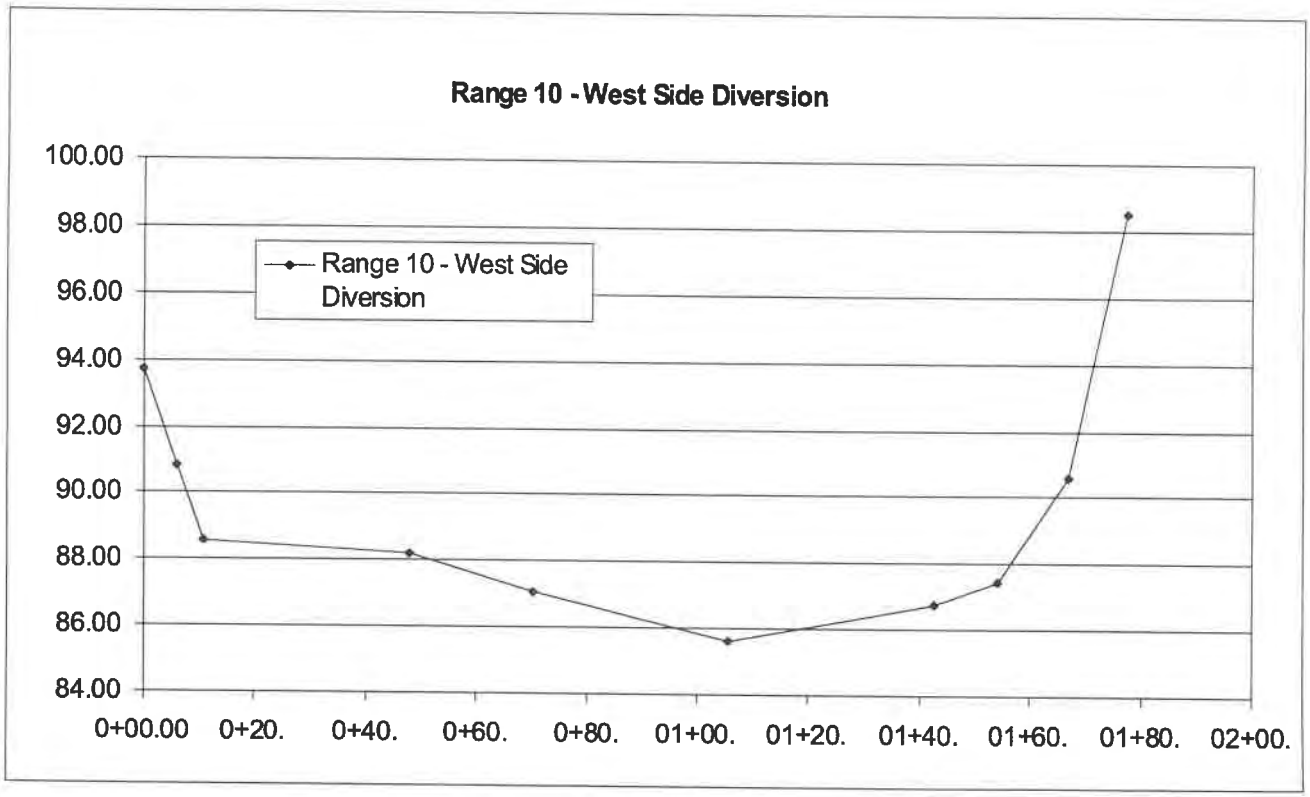
WEST SIDE DIVERSION





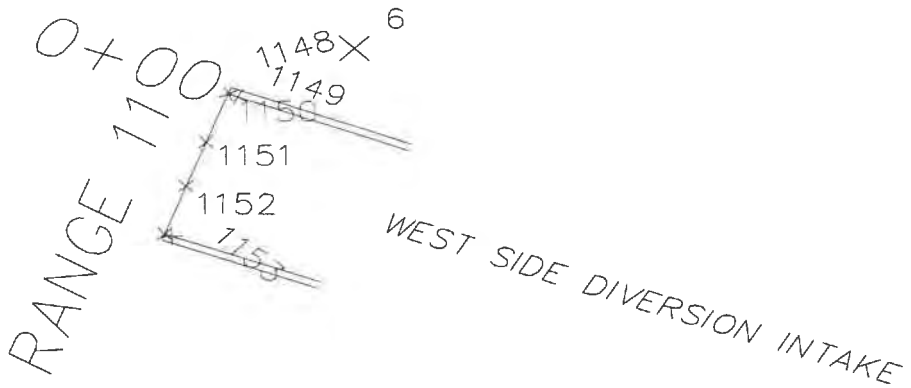
RANGE 9 STATION	ELEVATION	POINT DESCRIPTION	POINT #	OFFSET UPSTREAM
0+00.00	94.13	GROUND TOP	1116	
0+03.83	89.61	GROUND TOE	1118	
0+03.25	92.59	GROUND BREAK	1117	
0+04.46	90.92	WATER SURFACE EDGE@10:15AM 3/30	1119	
0+04.69	90.94	WATER SURFACE EDGE@10:15AM 3/30	1132	92.71
0+05.95	90.90	WATER SURFACE EDGE@10:15AM 3/30	1131	44.81
0+22.82	88.65	GROUND BREAK	1120	
0+61.92	88.05	GROUND	1121	
0+90.13	86.74	GROUND	1122	
1+19.13	85.97	GROUND BREAK	1123	
1+34.08	84.88	GROUND	1124	
1+43.60	85.49	GROUND	1125	
1+50.77	86.73	GROUND BREAK	1126	
1+59.00	91.18	WATER SURFACE EDGE@10:15AM 3/30	1130	133.86
1+62.45	91.02	WATER SURFACE EDGE@10:15AM 3/30	1129	60.22
1+64.14	91.08	WATER SURFACE EDGE@10:15AM 3/30	1127	
1+72.69	95.45	GROUND TOP	1128	

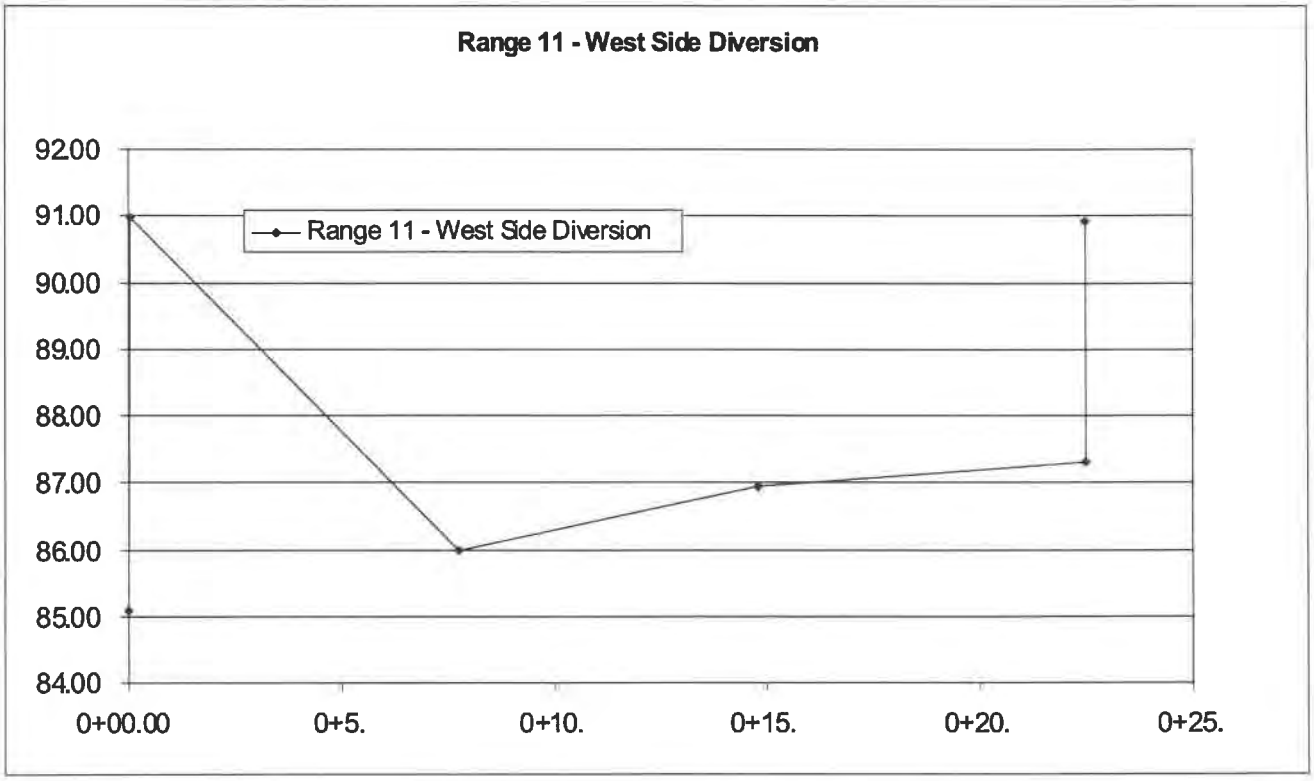

0+00
1106
1107
1108
1109
1110
RANGE 10
1111
1112
1113
1114
1115



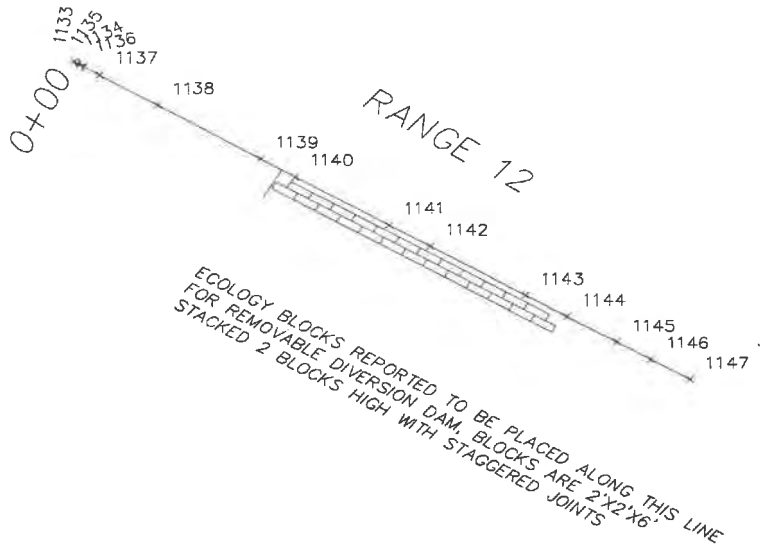
RANGE10

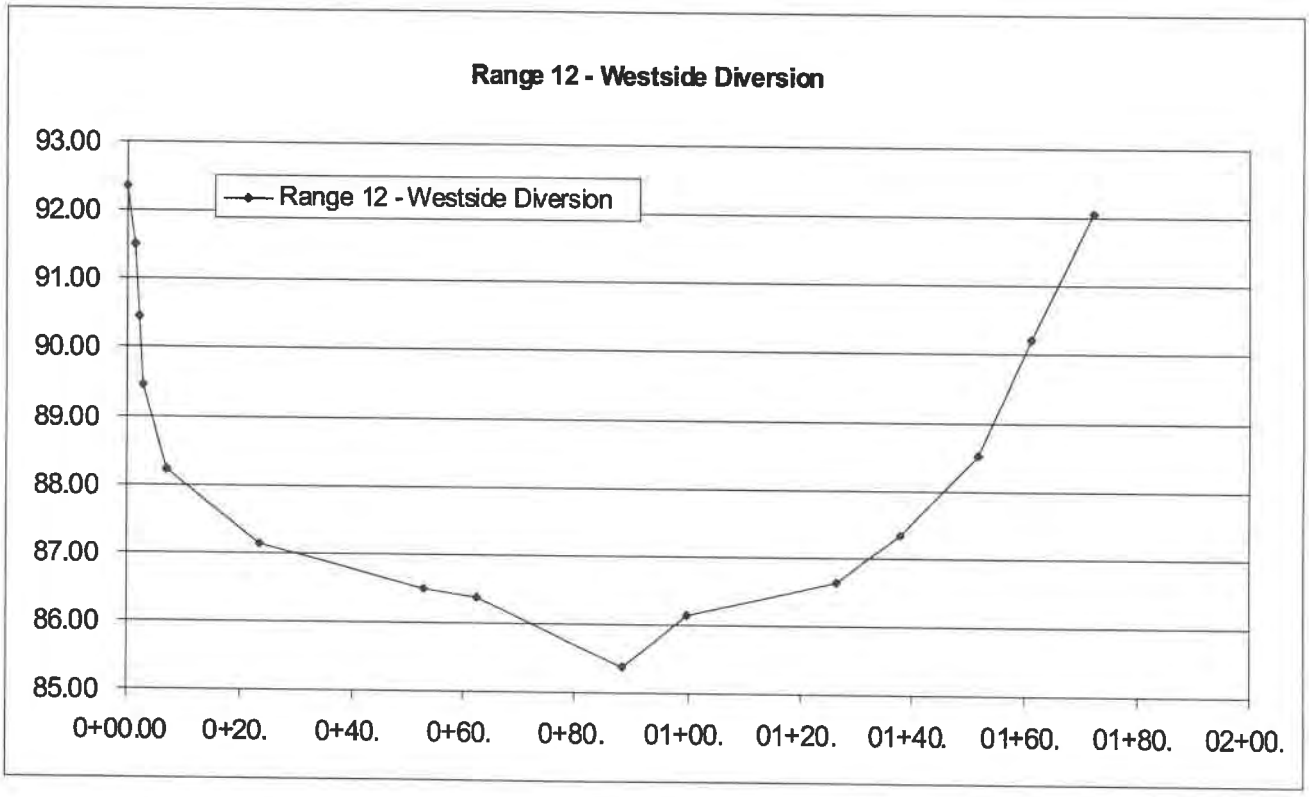
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	93.74	GROUND TOP	1106
0+06.16	90.84	WATER SURFACE EDGE@9:40AM 3/30	1107
0+10.86	88.57	GROUND TOE	1108
0+48.00	88.19	GROUND	1109
0+70.33	87.07	GROUND	1110
1+05.62	85.63	GROUND	1111
1+42.77	86.74	GROUND	1112
1+54.35	87.47	GROUND BREAK	1113
1+66.89	90.60	WATER SURFACE EDGE@9:40AM 3/30	1114
1+77.48	98.52	GROUND TOP	1115





RANGE11 STATION	ELEVATION	POINT DESCRIPTION	POINT #	OFFSET DOWNSTREAM
0+00.00	85.09	RETAINING WALL TOE	1149	
0+00.03	90.97	WATER SURFACE EDGE/ WING WALL@ 11:55AM 3/30	1148	-1.35
0+07.73	86.00	GROUND BREAK	1150	
0+14.79	86.96	GROUND BREAK	1151	
0+22.50	87.30	RETAINING WALL TOE	1152	
0+22.50	90.93	WATER SURFACE EDGE/ WING WALL@ 11:55AM 3/30	1153	-1.03


0+00
1133
1135
1134
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
RANGE 12
ECOLOGY BLOCKS REPORTED TO BE PLACED ALONG THIS LINE FOR REMOVABLE DIVERSION DAM, BLOCKS ARE 2'X2'X6', STACKED 2 BLOCKS HIGH WITH STAGGERED JOINTS


Range 12 - Westside Diversion
Range 12 - Westside Diversion
93.00
92.00
91.00
90.00
89.00
88.00
87.00
86.00
85.00
0+00.00
0+20.
0+40.
0+60.
0+80.
01+00.
01+20.
01+40.
01+60.
01+80.
02+00.

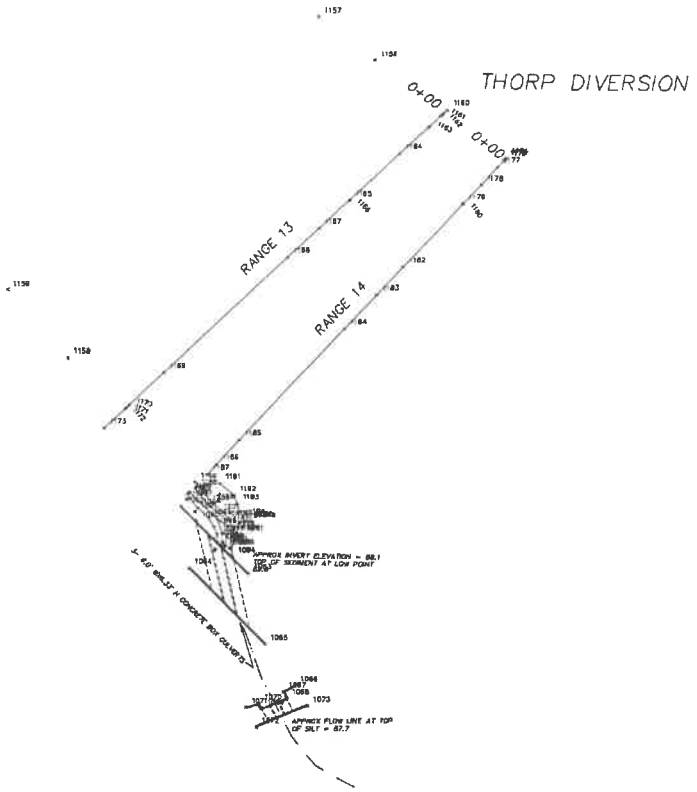
RANGE12

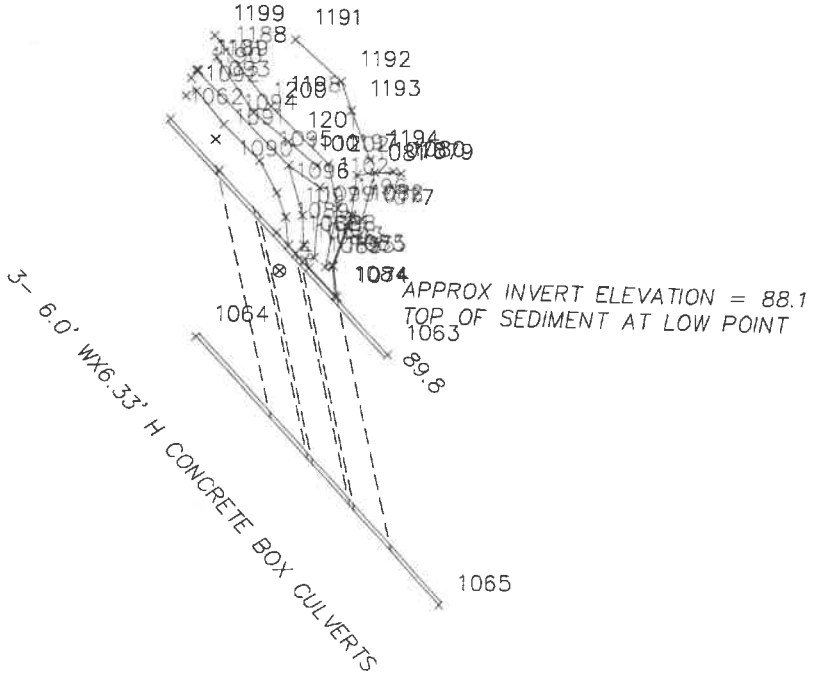
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	92.35	GROUND TOP	1133
0+01.27	91.50	GROUND BREAK	1134
0+02.01	90.46	WATER SURFACE EDGE@11:25AM 3/30	1135
0+03.03	89.46	GROUND TOE	1136
0+07.24	88.22	GROUND BREAK	1137
0+23.57	87.14	GROUND BREAK	1138
0+52.59	86.48	GROUND	1139
0+62.22	86.39	GROUND	1140
0+88.24	85.39	GROUND	1141
0+99.78	86.14	GROUND	1142
1+26.42	86.63	GROUND BREAK	1143
1+37.99	87.34	GROUND BREAK	1144
1+51.80	88.53	GROUND BREAK	1145
1+61.22	90.21	WATER SURFACE EDGE@11:25AM 3/30	1146
1+72.09	92.07	GROUND TOP	1147

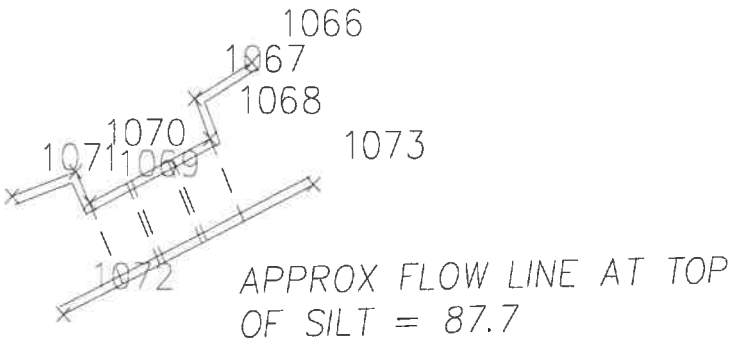
ADDITIONAL TOPO WEST SIDE DIVERSION

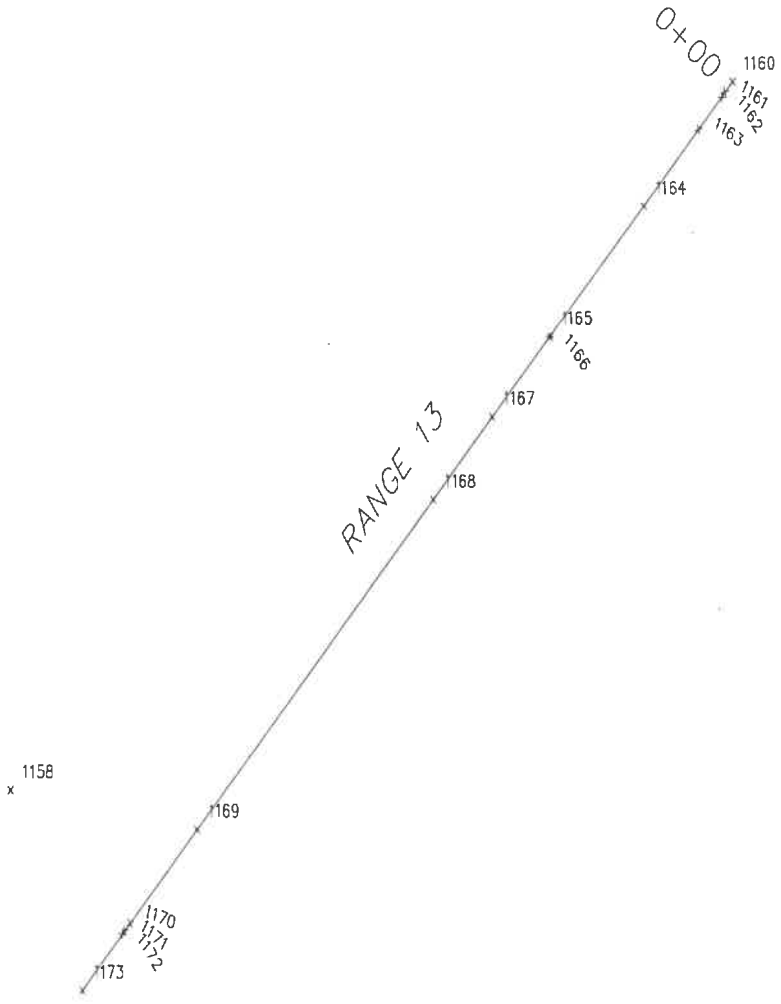
POINT NUMBER	ELEVATION	POINT DESCRIPTION
6	100.00	Set Cross
1129	91.02	Water Surface Edge
1130	91.18	Water Surface Edge
1131	90.91	Water Surface Edge
1132	90.94	Water Surface Edge

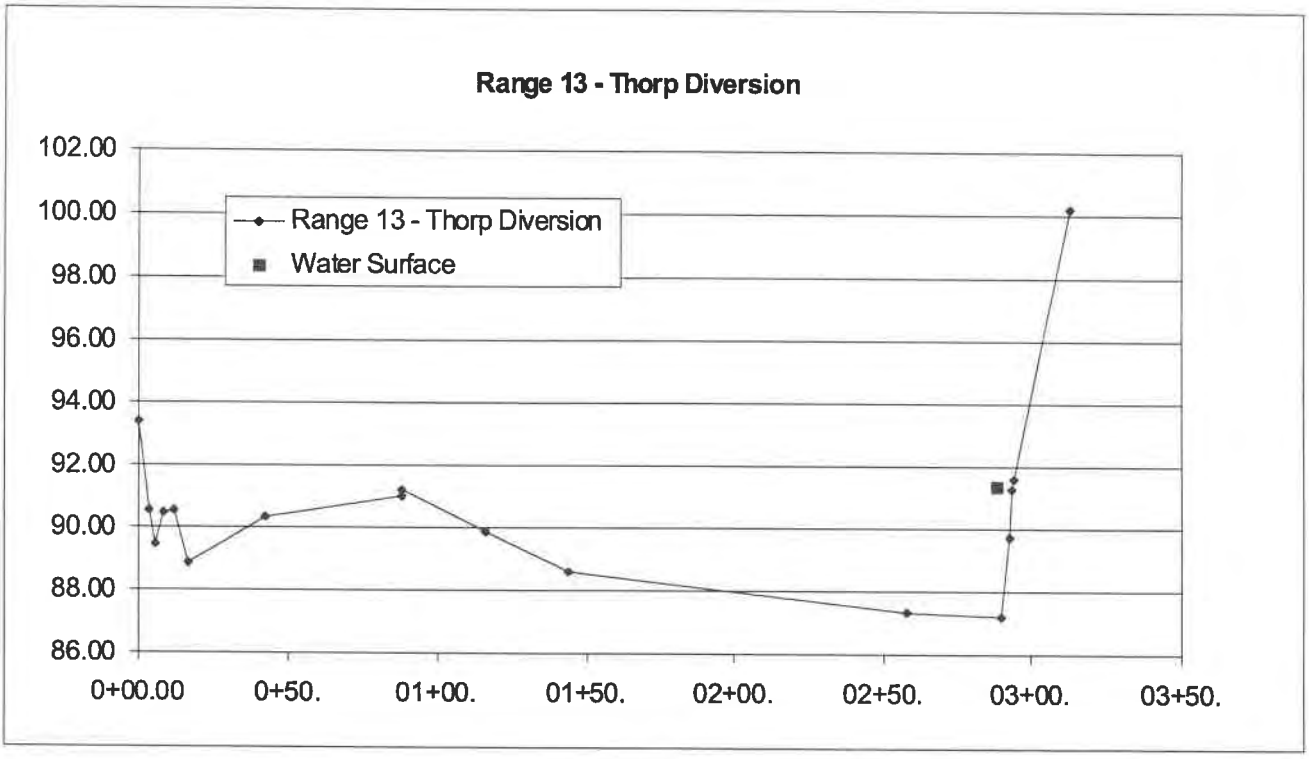
THORP DIVERSION





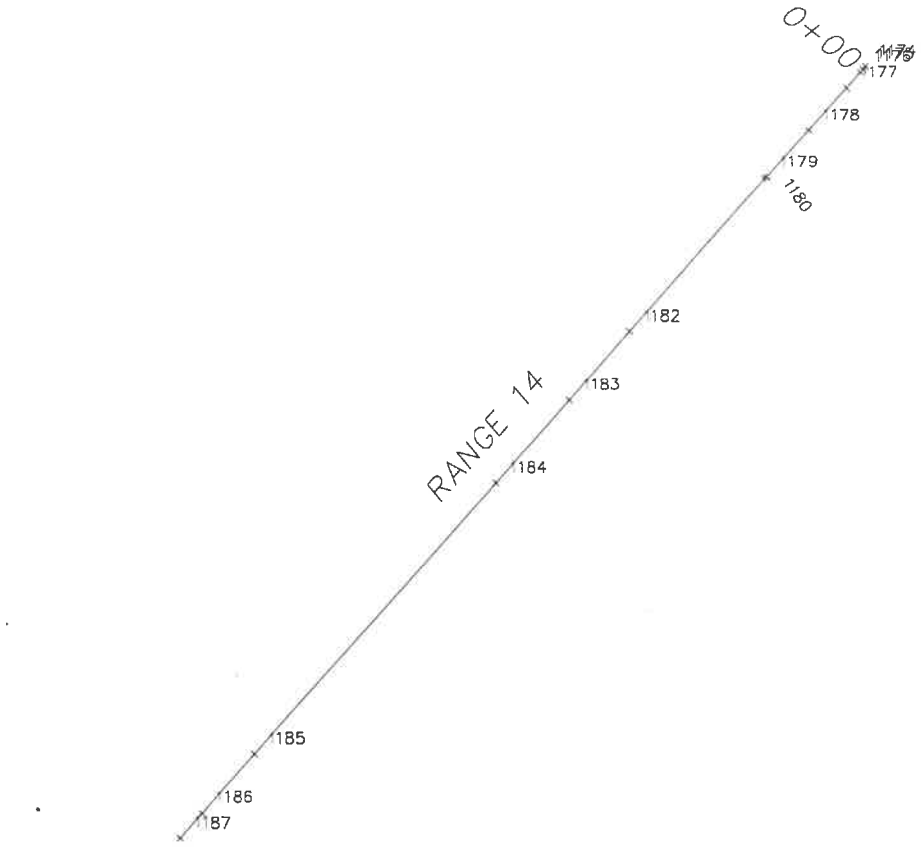

1066
1067
1068
1070
1071
1069
1073
1072
APPROX FLOW LINE AT TOP
OF SILT = 87.7

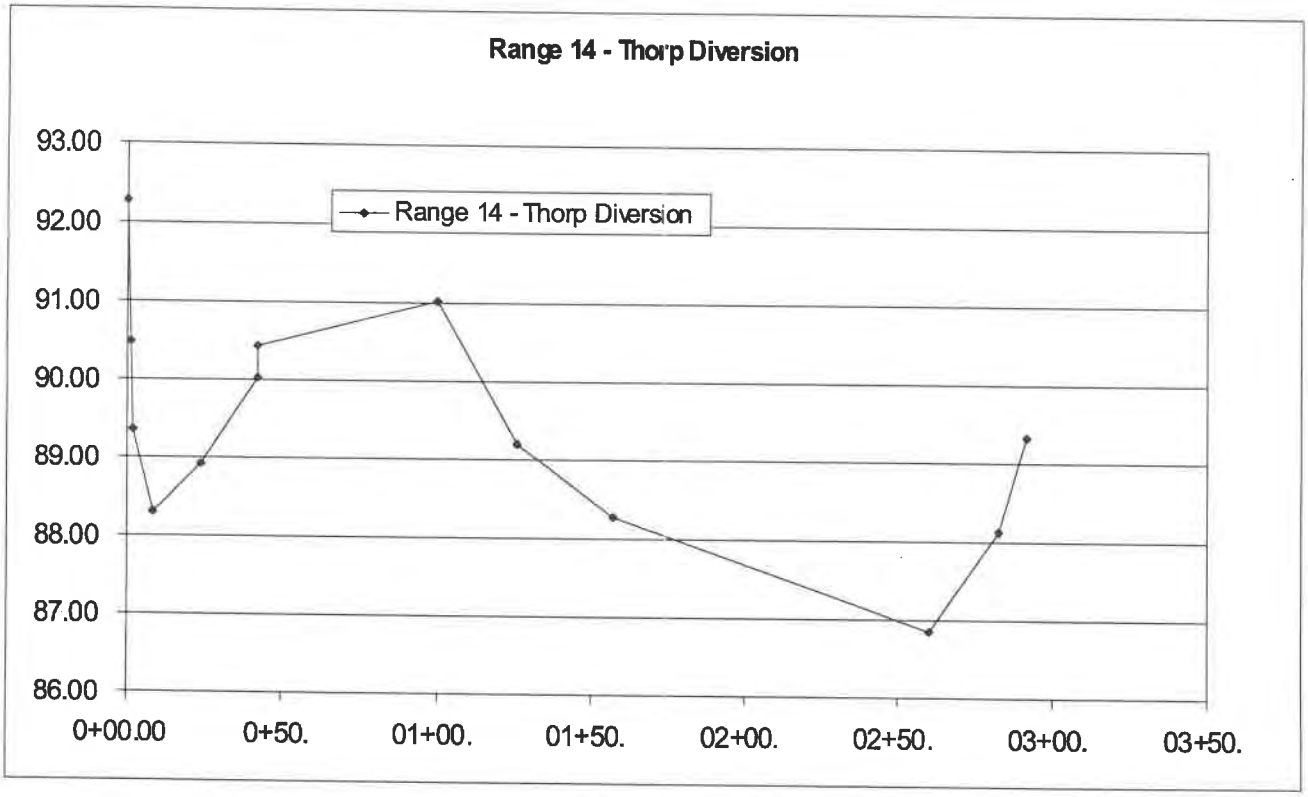

0+00
1160
1161
1162
1163
1164
1165
1166
1167
1168
RANGE 13
1158
1169
1170
1171
1172
1173



RANGE13

STATION	ELEVATION	POINT DESCRIPTION	POINT #	OFFSET UPSTREAM
0+00.00	93.41	GROUND TOP	1160	
0+03.58	90.53	WATER SURFACE EDGE@1:59PM 3/30	1161	
0+05.29	89.50	GROUND TOE	1162	
0+08.39	90.46	WATER SURFACE EDGE@11:55AM 3/30	1156	56.75
0+12.06	90.52	WATER SURFACE EDGE@11:55AM 3/30	1157	103.70
0+16.42	88.85	GROUND BREAK@ EDGE GRAVEL BAR	1163	
0+42.88	90.31	GROUND BREAK	1164	
0+87.95	91.00	GROUND BREAK	1165	
0+88.10	91.17	WATER SURFACE EDGE@ 1:59PM 3/30	1166	
1+15.65	89.89	GROUND	1167	
1+43.95	88.63	GROUND BREAK	1168	
2+57.91	87.32	GROUND	1169	
2+88.35	91.34	WATER SURFACE EDGE@11:55AM 3/30	1159	111.37
2+89.94	87.23	GROUND TOE	1170	
2+92.42	89.73	GROUND TOP@ TOP RIP RAP	1171	
2+93.67	91.30	WATER SURFACE EDGE@2:11PM 3/30	1172	
2+94.40	91.62	WATER SURFACE EDGE@11:55AM 3/30	1158	51.02
3+12.79	100.22	GROUND TOP	1173	


0+00
177
178
179
180
182
183
184
185
186
187
RANGE 14



RANGE14

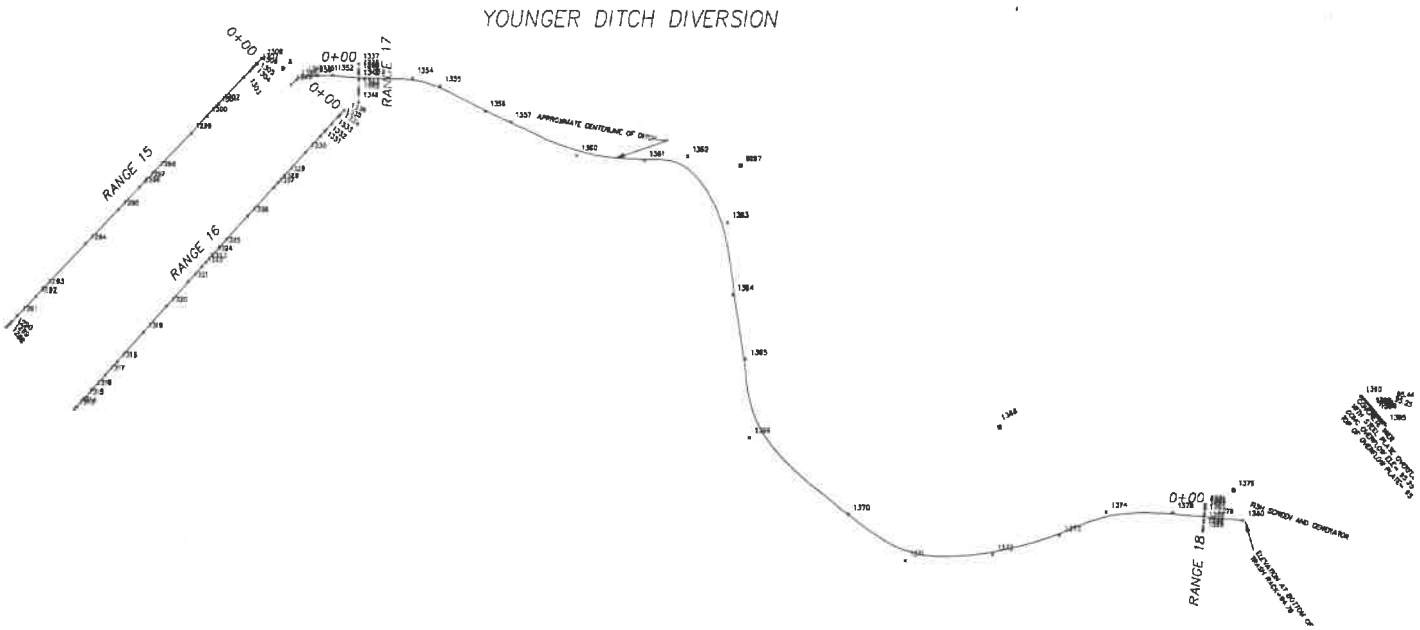
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	92.27	GROUND TOP	1174
0+01.10	90.49	WATER SURFACE EDGE@2:15PM 3/30	1175
0+02.11	89.36	GROUND TOE	1176
0+08.10	88.32	GROUND BREAK	1177
0+24.13	88.92	GROUND BREAK	1178
0+41.97	90.03	GROUND BREAK@ EDGE GRAVEL BAR	1179
0+42.12	90.43	WATER SURFACE EDGE@GRAVEL BAR 2:23PM 3/30	1180
1+00.11	91.02	WATER SURFACE EDGE@GRAVEL BAR 2:25PM 3/30	1182
1+25.96	89.20	GROUND	1183
1+57.31	88.29	GROUND	1184
2+60.33	86.85	GROUND	1185
2+82.64	88.13	GROUND BREAK	1186
2+92.09	89.33	GROUND BREAK	1187

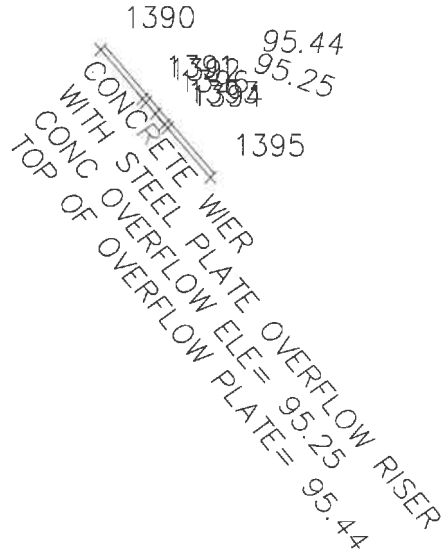
ADDITIONAL TOPO THORP DIVERSION

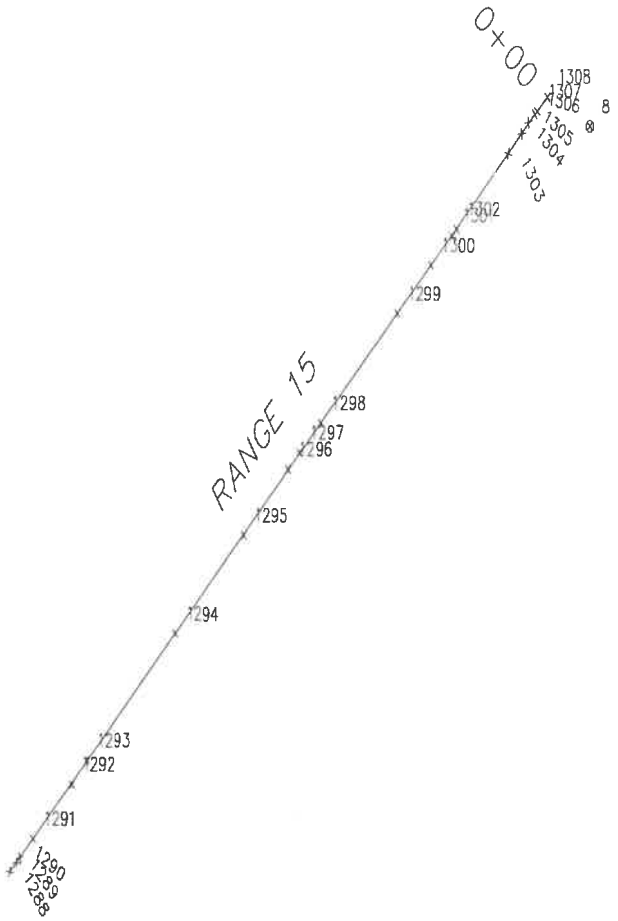
POINT NUMBER	ELEVATION	POINT DESCRIPTION
4	100.00	Set Rebar Control
1156	90.46	Water Surface Edge
1157	90.52	Water Surface Edge
1158	91.62	Water Surface Edge
1159	91.34	Water Surface Edge
1062	100.57	Retaining Wall Top
1063	100.18	Retaining Wall Top
1064	100.46	Retaining Wall Top
1065	100.30	Retaining Wall Top
1066	99.40	Retaining Wall Top
1067	99.78	Retaining Wall Top
1068	99.84	Retaining Wall Top
1069	99.78	Retaining Wall Top
1070	99.70	Retaining Wall Top
1071	100.00	Retaining Wall Top
1072	99.90	Retaining Wall Top
1073	99.67	Retaining Wall Top
1074	98.26	Retaining Wall Top
1075	93.80	Retaining Wall Top
1076	93.06	Retaining Wall Top
1077	93.57	Ground Top
1078	93.27	Ground Top
1079	92.51	Ground Top
1080	90.81	Ground Toe
1081	91.19	Ground Toe
1082	91.25	Ground Toe
1083	89.74	Ground Toe
1084	89.58	Ground Toe
1085	90.35	Ground Break
1086	91.12	Water Surface Edge
1087	91.53	Ground Break
1088	93.29	Ground Top
1089	94.84	Ground Break
1090	94.62	Ground Shot
1091	94.95	Ground Shot
1092	95.99	Ground Shot
1093	93.57	Ground Top
1094	94.45	Ground Top
1095	95.31	Ground Top
1096	95.37	Ground Top
1097	94.70	Ground Top
1098	92.20	Ground Toe
1099	92.16	Ground Toe
1100	91.71	Ground Toe
1101	91.06	Ground Toe
1102	91.24	Ground Break
1103	91.46	Ground Break

1188	88.78	Ground Break
1189	91.18	Water Surface Edge
1190	93.54	Ground Top
1191	90.32	Ground Break
1192	91.13	Ground Break
1193	90.85	Ground Break
1194	92.03	Ground Break
1195	89.83	Ground Break
1196	90.32	Ground Break
1197	89.93	Ground Break
1198	88.98	Ground Break
1199	88.87	Ground Break
1200	89.15	Ground Break
1201	89.13	Ground Break
1202	90.04	Ground Break

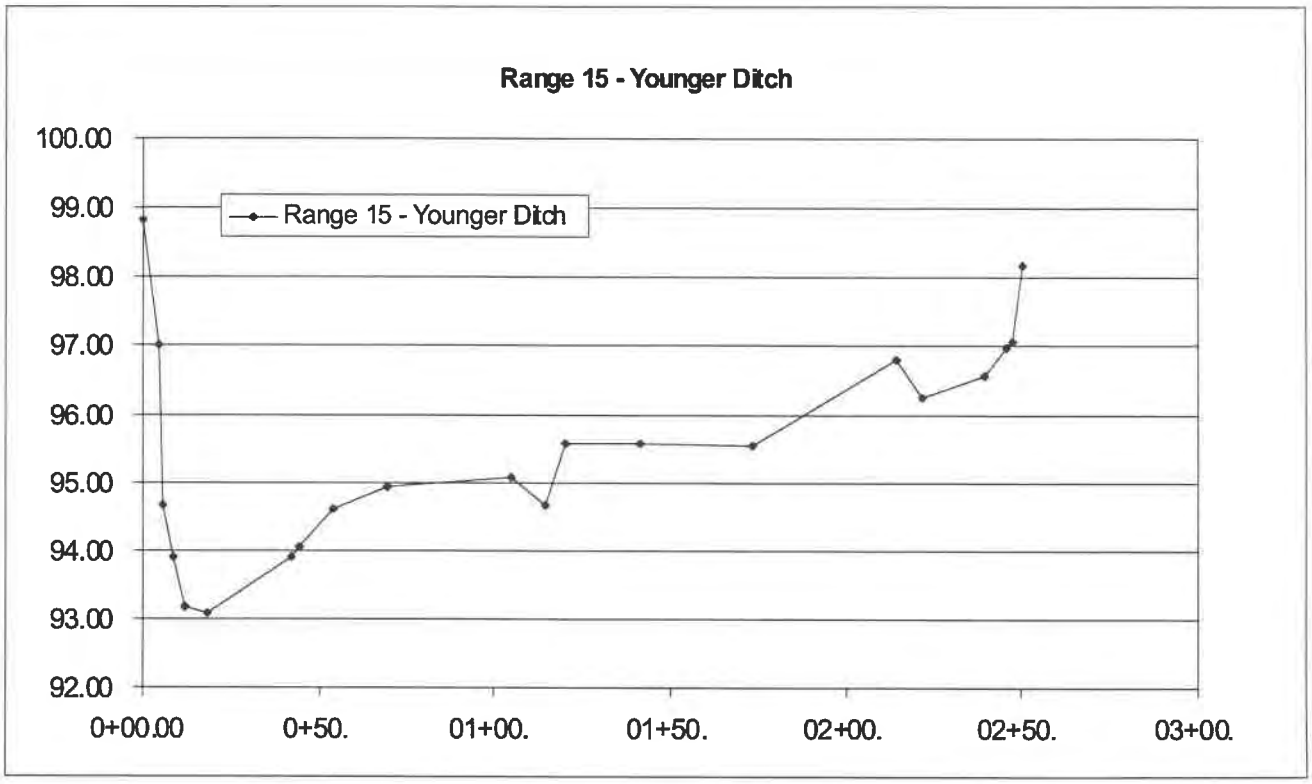
YOUNGER DITCH DIVERSION





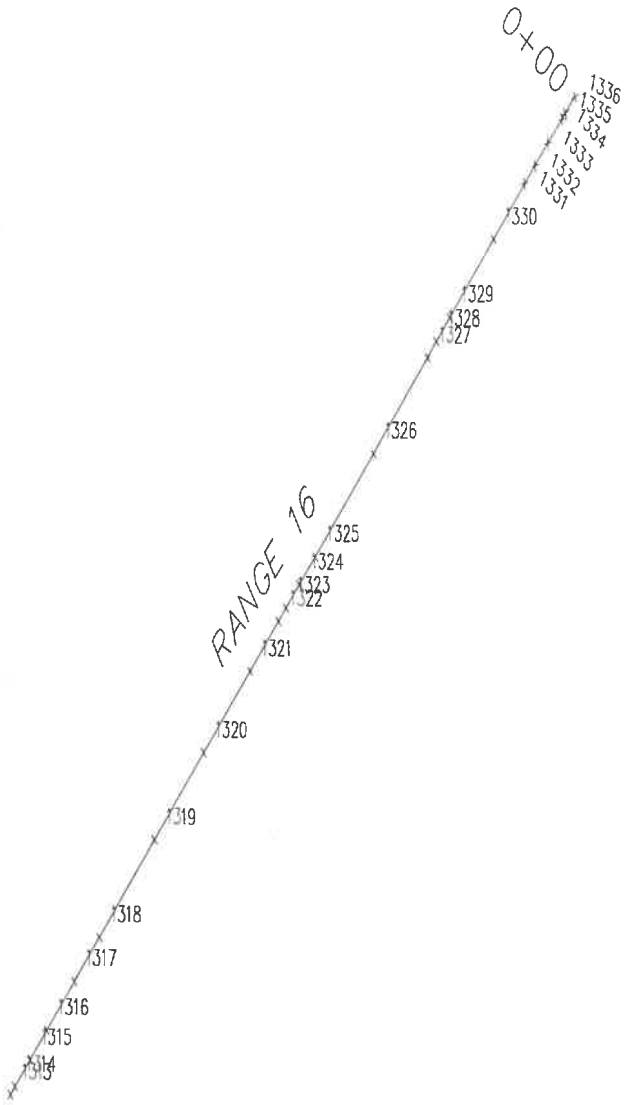

0+00
1308
1307
1306
1305
1304
1303
1302
1300
1299
RANGE 15
1298
1297
1296
1295
1294
1293
1292
1291
1290
1289
1288

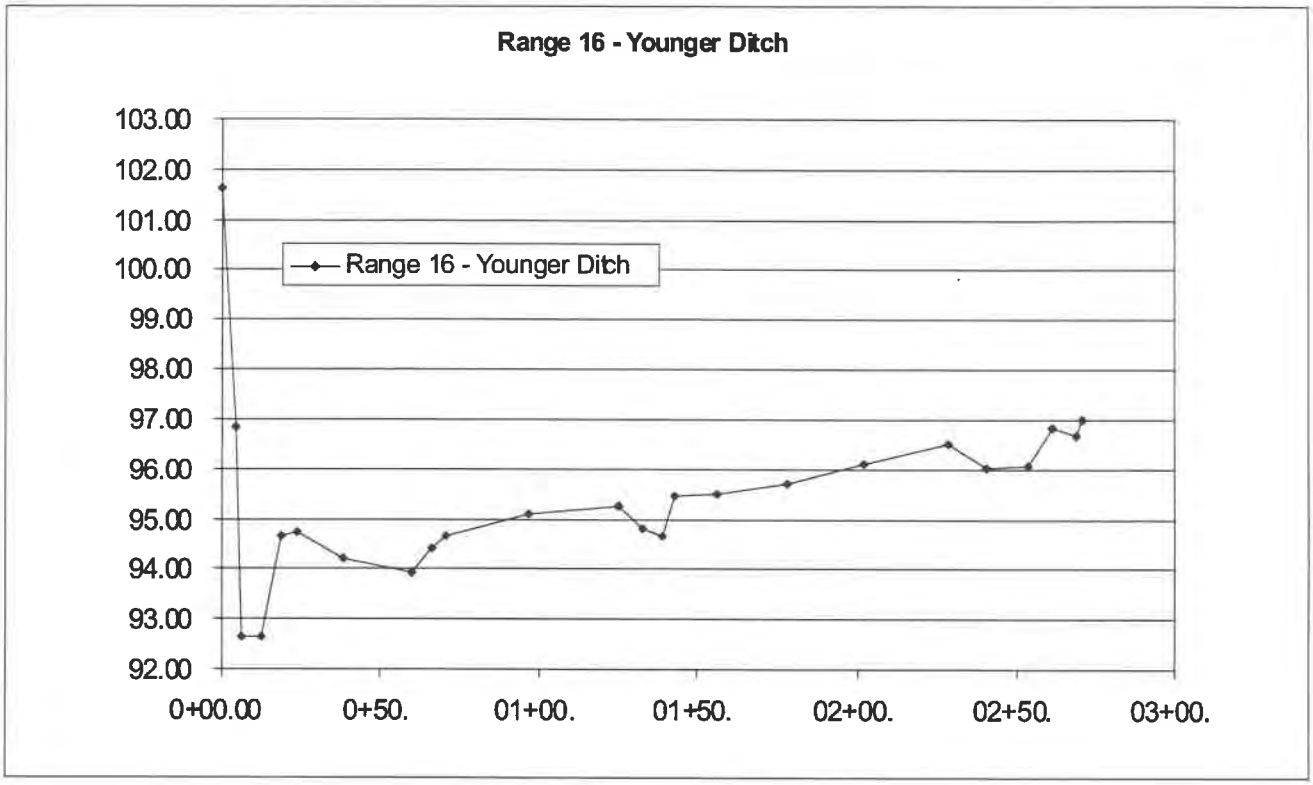
H-01



RANGE15

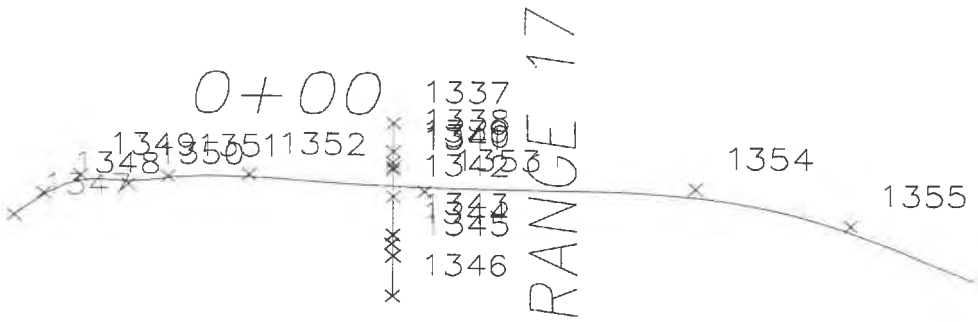
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	98.82	GROUND TOP	1308
0+04.60	97.02	WATER SURFACE EDGE@ 3:15PM 3/31	1307
0+05.69	94.66	GROUND BREAK	1306
0+08.44	93.90	GROUND TOE	1305
0+11.78	93.17	GROUND BREAK	1304
0+18.18	93.08	GROUND BREAK	1303
0+42.27	93.90	GROUND BREAK	1302
0+44.39	94.06	GROUND BREAK	1301
0+53.97	94.61	GROUND BREAK	1300
0+69.71	94.94	GROUND	1299
1+05.18	95.09	GROUND BREAK	1298
1+14.91	94.66	GROUND BREAK	1297
1+20.29	95.57	GROUND BREAK	1296
1+41.34	95.57	GROUND BREAK	1295
1+73.24	95.56	GROUND	1294
2+14.67	96.81	GROUND TOP@ GRAVEL BAR	1293
2+21.97	96.26	GROUND BREAK	1292
2+39.73	96.57	GROUND BREAK	1291
2+45.97	96.97	WATER SURFACE EDGE@1:49PM 3/31	1290
2+47.65	97.07	GROUND TOE	1289
2+50.61	98.17	GROUND TOP	1288

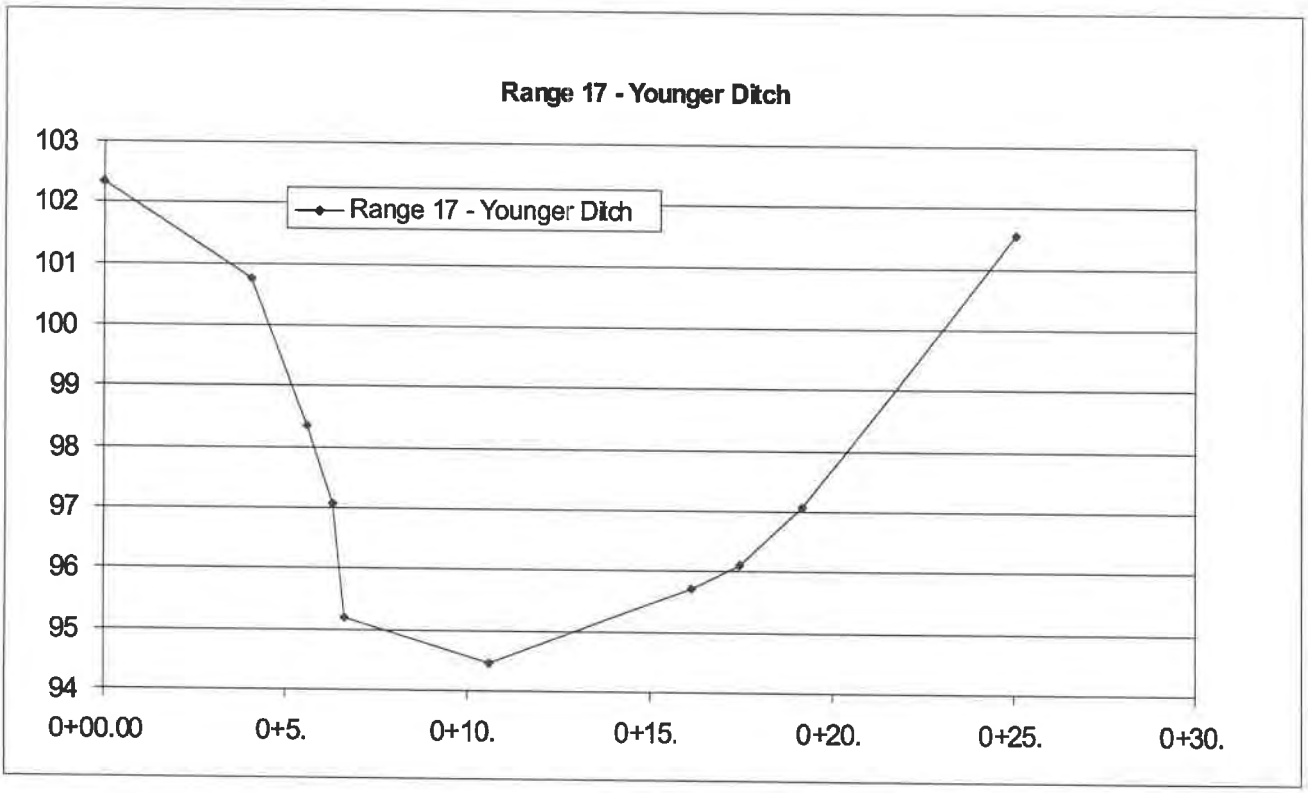

0+00
1336
1335
1334
1333
1332
1331
330
329
328
327
326
RANGE 16
325
324
323
322
321
320
319
318
317
316
315
314
313



RANGE16

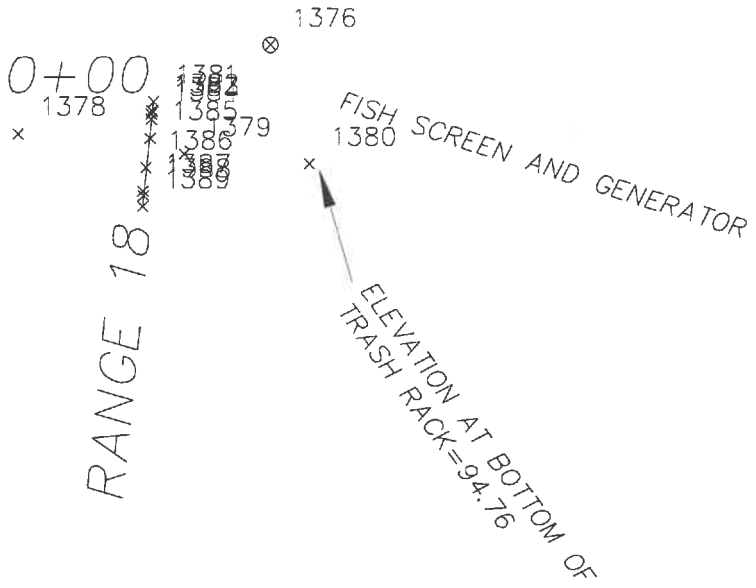
STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	101.65	GROUND TOP	1336
0+04.53	96.85	WATER SURFACE EDGE@ 2:23PM 3/31	1335
0+06.21	92.66	GROUND TOE	1334
0+12.79	92.63	GROUND BREAK	1333
0+18.83	94.65	GROUND BREAK	1332
0+23.80	94.73	GROUND	1331
0+38.76	94.20	GROUND	1330
0+59.84	93.93	GROUND BREAK	1329
0+66.32	94.43	GROUND BREAK	1328
0+70.68	94.66	GROUND	1327
0+96.86	95.10	GROUND	1326
1+24.85	95.28	GROUND BREAK	1325
1+32.47	94.82	GROUND BREAK	1324
1+38.88	94.64	GROUND BREAK	1323
1+42.52	95.45	GROUND BREAK	1322
1+56.12	95.51	GROUND	1321
1+78.24	95.71	GROUND	1320
2+01.87	96.09	GROUND	1319
2+28.36	96.53	GROUND BREAK	1318
2+40.35	96.03	GROUND BREAK	1317
2+53.68	96.05	GROUND BREAK	1316
2+61.74	96.83	WATER SURFACE EDGE@2:35PM 3/31	1315
2+69.08	96.66	GROUND TOE	1314
2+71.24	97.00	GROUND TOP	1313

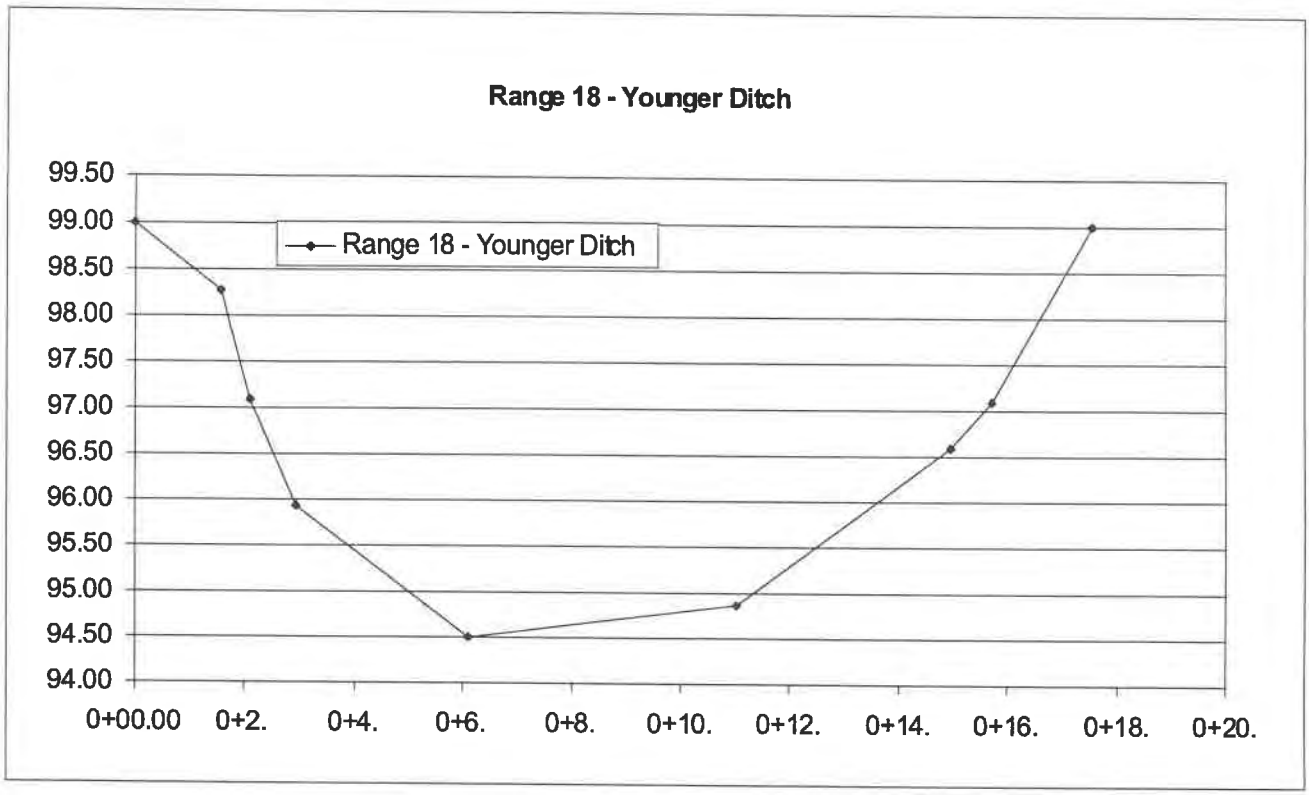




RANGE17

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	102.35	GROUND TOP	1337
0+04.06	100.77	GROUND BREAK	1338
0+05.62	98.36	GROUND BREAK	1339
0+06.29	97.06	WATER SURFACE EDGE@3:21PM 3/31	1340
0+06.65	95.19	GROUND BREAK	1341
0+10.56	94.45	DITCH CENTERLINE	1342
0+16.17	95.72	GROUND BREAK	1343
0+17.48	96.11	GROUND TOE	1344
0+19.21	97.05	WATER SURFACE EDGE@3:26PM 3/31	1345
0+25.07	101.54	GROUND TOP	1346


1376
0+00
1378
1379
1380
FISH SCREEN AND GENERATOR
RANGE 18
ELEVATION AT BOTTOM OF TRASH RACK=94.76



RANGE18

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	99.00	DITCH TOP	1381
0+01.57	98.27	GROUND BREAK	1382
0+02.93	95.94	GROUND TOE	1384
0+02.11	97.10	WATER SURFACE EDGE@4:59PM 3/31	1383
0+06.12	94.51	GROUND BREAK	1385
0+11.03	94.87	GROUND BREAK	1386
0+14.97	96.58	GROUND TOE	1387
0+15.74	97.10	WATER SURFACE EDGE@5:04PM 3/31	1388
0+17.57	99.01	GROUND TOP	1389

ADDITIONAL TOPO YOUNGER DIVERSION

POINT NUMBER	ELEVATION	POINT DESCRIPTION
8	100.00	Set Rebar Control
9	99.74	Set Rebar Control
1287	99.73	Check Shot
1347	94.12	Ditch Center Line
1348	95.43	Ditch Center Line
1349	95.18	Ditch Center Line
1350	95.86	Ditch Center Line
1351	96.10	Ditch Center Line
1352	94.30	Ditch Center Line
1353	94.37	Ditch Center Line
1354	93.82	Ditch Center Line
1355	94.32	Ditch Center Line
1356	94.27	Ditch Center Line
1357	95.72	Ditch Center Line
1360	95.35	Ditch Center Line
1361	94.97	Ditch Center Line
1362	95.05	Ditch Center Line
1363	95.08	Ditch Center Line
1364	94.75	Ditch Center Line
1365	94.99	Ditch Center Line
1366	94.87	Ditch Center Line
1368	99.87	Set Spike
1370	94.74	Ditch Center Line
1371	95.47	Ditch Center Line
1372	95.03	Ditch Center Line
1373	95.23	Ditch Center Line
1374	94.57	Ditch Center Line
1376	99.23	Set Spike
1378	94.65	Ditch Center Line
1379	93.95	Ditch Center Line
1380	94.76	SEE NOTES
1390	97.80	Retaining Wall Top
1391	97.79	Retaining Wall Top
1392	95.26	Retaining Wall Toe
1393	95.27	Retaining Wall Toe
1394	97.79	Retaining Wall Top
1395	97.78	Retaining Wall Top
1396	95.44	Retaining Wall Top
1287	99.73	Check Shot

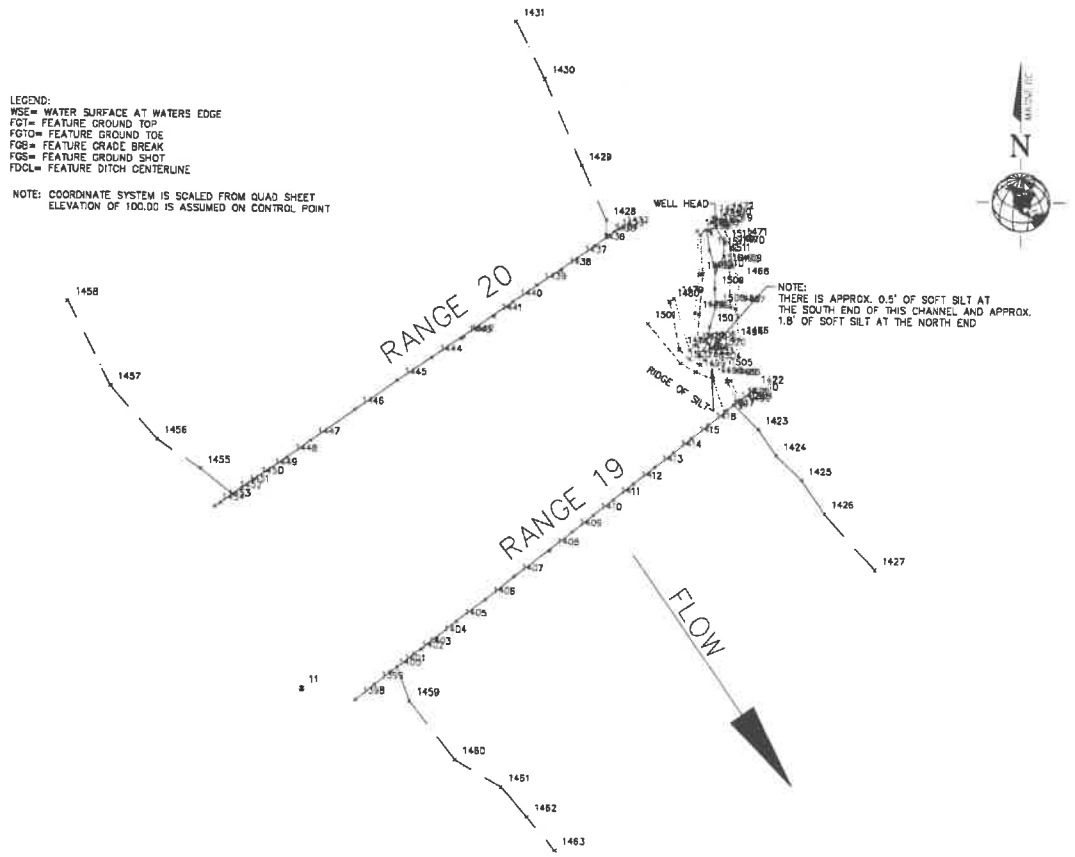
SUPPLEMENTAL APPENDIX B

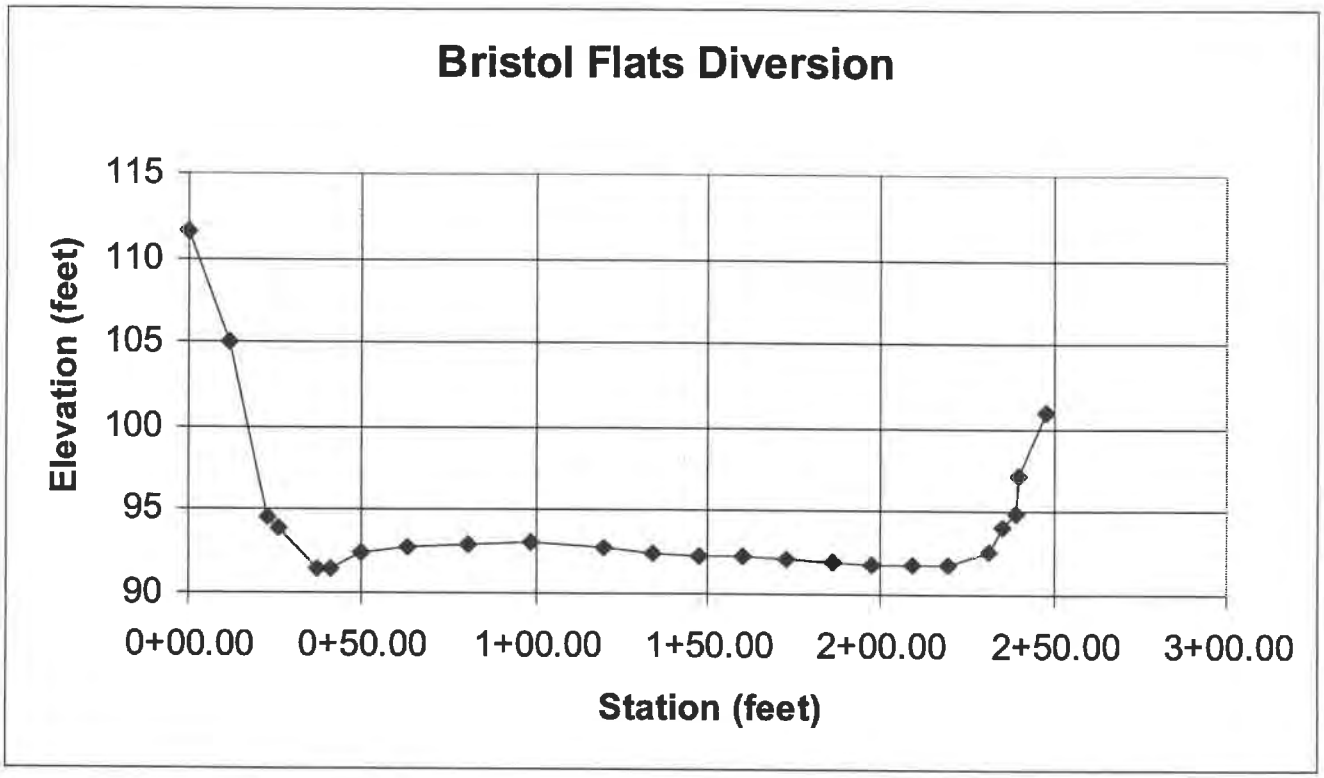
ADDITIONAL YAKIMA RIVER CROSS SECTIONS
WATER DIVERSION HYDRAULIC STUDY
July 23rd, 2001

PROJECT NARRATIVE:

W&H Pacific surveyed 2 additional cross sections (ranges) near the Bristol Flats (Wallace Ranch) diversion on the Yakima River on March 15th 2001. A Wild TC1010 Total Station Instrument and a Husky FS/2 Data Collector with TDS software was used to collect the data. The horizontal and vertical datums were assumed, however both cross sections were based on the same reference datums. An assumed elevation of 100.00' was held on WHP control point #10 for Bristol Flats Diversion Ranges 19&20. The data was downloaded into Autocad Version 14 and the Ranges were put into an Excel spreadsheet. A sketch of the diversion site imported from AutoCAD and cross section 19, as used in the hydraulic analysis, is provided below.

BRISTOL FLATS DIVERSION OVERALL SKETCH





RANGE 19

STATION	ELEVATION	POINT DESCRIPTION	POINT #
0+00.00	111.58	FGT	1398
0+11.77	105.03	FGB	1399
0+22.60	94.54	FGTO	1400
0+26.00	93.98	WSE	1401
0+36.72	91.42	FGB	1402
0+40.99	91.52	FGB	1403
0+50.11	92.51	FGB	1404
0+62.86	92.79	FGB	1405
0+80.65	92.98	FGS	1406
0+98.39	93.12	FGS	1407
1+20.04	92.78	FGB	1408
1+34.55	92.52	FGS	1409
1+47.70	92.32	FGS	1410
1+60.00	92.31	FGS	1411
1+72.80	92.06	FGS	1412
1+85.97	91.88	FGS	1413
1+97.68	91.82	FGS	1414
2+08.99	91.76	FGS	1415
2+19.47	91.82	FGB	1416
2+30.93	92.65	FGB	1417
2+35.53	94.09	WSE	1418
2+39.00	94.93	FGTO	1419
2+39.65	97.23	FGT	1420
2+48.22	100.97	FGS	1422

Appendix C

Yakima River
Water Rights Data

THIRDPARTY DIVERSIONS FROM BYPASSED REACH
April 7, 2000

	NAME	LOCATION (to nearest ¼ section)	SUBBASIN	CLAIM	PRIORITY DATE	REFEREE RECOMMENDED (QA) / (QI)	IRRIGATED ACREAGE	STOCK WATER	ENTITLEMENT SUMMARY (ES) / 1945 CONSENT DECREE & LIMITING AGREEMENTS (CD)
	CLE ELUM RIVER TO TEANAWAY RIVER								
(0) CITY OF CLE ELUM		(Legal Description)							
(I) YOUNGER DITCH		SE ¼ NW ¼ NE ¼ Sec. 35 T20N R15E	No. 5 (Elk Heights)						(ES) 3,010 AF (NP)
	Baker/Morgan			01688	06/05/1886	49 AF / 0.86 CFS	7.5	1.0 AF	
	Bator			02230	06/05/1886	116 AF / 1.91 CFS	9.5	0.5 AF	
	Bronkema			01268 02225	06/05/1886	36 AF / 0.18 CFS	6		
	Carveth			01678	06/05/1886	60 AF / 0.455 CFS	10	0.50 AF	
	Fudacz			02224	06/05/1886	66 AF / 0.67 CFS	11	1.0 AF	
	Garrett			01279	06/05/1886	45 AF / 0.32 CFS	11	1.0 AF	
	Haas			01279	06/05/1886	12 AF / 0.09 CFS	2	0.25 AF	
	Hankins			01279	06/05/1886	21 AF / 0.166 CFS	3.5	0.5 AF	
	Henshaw			00365	06/05/1886	450 AF / 1.82 CFS	75	3.0 AF	
	Merritt			01279	06/05/1886	24 AF / 0.19 CFS	4	0.10 AF	
	Telenico			05671	06/05/1886	21 AF / 0.24 CFS	4	0.5 AF	
	Telenico			01279	06/05/1886	12 AF / 0.235 CFS	3.5		
	Winslow			01279	06/05/1886	12 AF / .085 CFS	2	0.25 AF	
	Frederick, Richey, Newton & Fredericksen.			02222 01676	06/30/1900	1,585 AF / 5.8 CFS	270	4 AF	
	TEANAWAY RIVER TO SWAUK CREEK								
(2) WALLACE RANCH									
	Wallace Ranch	SW ¼ SW ¼ Sec. 2 T19N, R16E.	No. 4 (Swauk)	02267	05/24/1884	673.06 AF / 3.35 CFS (w/ 1884 right)	92.2		
	Wallace Ranch	NW ¼ NE ¼ Sec. 14 T19N, R16E.	No. 4 (Swauk)	02267	09/25/1894	279.6 AF / 3.35 CFS	38.2		
	SWAUK CREEK TO TANEUM CREEK								
(3) CASCADE IRRIGATION DISTRICT*		NW ¼ NW ¼ Sec. 28 T19N. R17E. (Original Site)	Major Claimant						
(4) CLARK		SW ¼ NE ¼ Sec. 28 T19 N. R17 E.	No. 4 (Swauk)						

794 Dudley Rd
Thorp

THIRDPARTY DIVERSIONS FROM BYPASSED REACH
April 7, 2000

	Clark			01087	07/27/1889	250 AF / 1.0 CFS	50		
(5) WESTSIDE IRRIGATION CO.		SE ¼ SE ¼ Sec. 33 T19 N. R17 E.	No. 6 (Taneum)						
	Knoke		No. 6 (Taneum)	01628	05/0/1883	1,967.885 AF / 13.826 CFS	113.75	0.5 AF	(ES) 1,600 AF (NP)
	Hagemeyer		No. 6 (Taneum)	01628	05/0/1883	90.83 AF / 0.537 CFS	5.25		
	West Side Irr. Co.		Major Claimant		06/06/1889	17,530 AF / 80 CFS	5,373		(ES) 31,128 AF (NP) / 8,200 AF (P) (CD) 80 CFS (Apr.-Sept.) & 34 CFS (Oct.) / Storage Contract: 25 CFS & 8,200 AF 4/20-8/20
	West Side Irr. Co.		Major Claimant		05/10/1905	8,200 AF / 25 CFS	5,373		
	TANEUM CREEK TO REECER CREEK								
(6) CASCADE IRRIGATION DISTRICT*		SE ¼ SE ¼ Sec. 34, T19N, R17E (Clark Flats)							
(7) THORP		NE ¼ SE ¼ NE ¼ Sec. 3 T18N, R17E	No. 8 (Thorp)						
	Hutchison			00877	12/03/1879	240 AF / 2 CFS	14	10AF	
	Fields			02372	12/03/1879	9.25 AF / 0.06 CFS	2.5	1 AF	
	Fields			02372	12/03/1879	9.25 AF / 0.06 CFS	2.5	1 AF	
	Lindsey			01189	12/03/1879	11 AF / 0.06 CFS	3		
	Wilson			00718	12/03/1879	18.25 AF / 0.08 CFS	3.5	1 AF	
	Chamberlain			02316	01/01/1881	36 AF / 0.15 CFS	6	1 AF	
	Chamberlain			02316	06/09/1881	270 AF / 1.125 CFS	45		
	Chamberlain			02316	01/29/1887	78 AF / 0.325 CFS	13		
	Loucks			02046	12/28/1888	300 AF / 1.80 CFS	15	0.50 AF	
	Loucks			02046	03/01/1890	540 AF / 3.2 CFS	27	1.5 AF	
	Thorp Town Ditch			00725	06/30/1893	80.6 AF / 0.33 CFS	15.5	2 AF	
	Chamberlain			02316	03/03/1900	96 AF / 0.40 CFS	16		
(8) ELLENSBURG WATER COMPANY									
	Ellensburg Water	NE ¼ NW ¼ SE ¼ Sec. 12 T18 N. R17 E.	Major Claimant		04/25 1885	43,840 AF / 125 CFS	9,749.33		(ES) 47,758 AF (NP) (CD) 125 CFS (Apr.-Aug), 100 CFS (Sept.), 63 CFS (Oct.)
(8) OLSON DITCH		NE ¼ NW ¼ SE¼ Sec. 12 T18 N. R17 E.	No. 7 (Reecer)						(ES) 12,973 AF (NP) (CD) 24 CFS (Apr.-Aug), 16 CFS (Sept.), 8 CFS (Oct.)

THIRDPARTY DIVERSIONS FROM BYPASSED REACH
April 7, 2000

	Olson Ditch			00169	02/21/1876	2,444.20 AF 168 (Nov) / 17.36 CFS	121.5	72.3 AF (12/1-3/31)	
	Olson Ditch			00169	02/21/1876	2,200.5 AF 240 (Nov) / 10.6 CFS	174	72.3 AF	
	Olson Ditch			00169	07/30/1885	633.5 AF / 2.3 FS	70		
	Olson Ditch			00169	07/01/1889	86.34 AF / 0.485 CFS	8	10.4 AF (Nov) 3.25 AF 12/1-3/31	
	Olson Ditch			00169	04/07/1891	8,179 AF / 41.537 CFS (w/ time limitations)	183.4	392 AF (Nov); 118 AF 12/1-3/31	
	Bain			01207	12/21/1882	867.58 AF / 5.5 AF	39.7	5 AF 10/16-3/31)	
	Fitterer			05175	12/21/1882	342.7 AF / 2.37 CFS	23	5 AF	
	Klocke			01696	12/21/1882	7.5 AF / 0.07 CFS	1.5	1 AF	
	Fitterer			05175	05/24/1884	4 AF / 0.06 CFS	2	1 AF	
	Holmes			00487	05/24/1884	675 AF / 3.31 CFS	26.8	2 AF	
	McManamy, Suebert			00521	07/30/1885	585.4 AF / 4.29 CFS	38.2		
	Merten			00750	07/30/1885	124.7 AF / 0.30 CFS	10.5		
	Clapper			01565	04/07/1891	100 AF / 1 CFS			
	Bain, Donovan			01207	04/25/1891	445.26 AF / 4 CFS	20.4	5 AF	
(9) PACKWOOD CANAL		NW ¼ SE ¼ NE ¼ Sec. 13, T18N, R17E.							
	Packwood Canal		No. 8 (Thorp) See: Memo Op. 1/28/20000	00785 A04801	06/30/1903	7,971.2 AF / 23.5 CFS (4/1-7/10); 21 CFS (7/11-10/1); 7 CFS (10/2-10/31)	424		
	Lapen		No. 8 (Thorp)	01446	06/30/1885	11 AF / 0.0313 CFS	1.25		
(10) CASCADE IRRIGATION DISTRICT									
	Cascade Irrigation	SW ¼ NW ¼ Sec. 18 T18N., R18E. (CID Pumping Station)	Major Claimant		02/28/1903	35,612 AF / 120 CFS	12,446.3		(ES) 49,525 AF (NP) (CD) 150 CFS (3/15-7/20), 30 CFS (stock 10/15-3/15) / Contract: 16,800 AF @ 150 CFS (7/20-10/15)

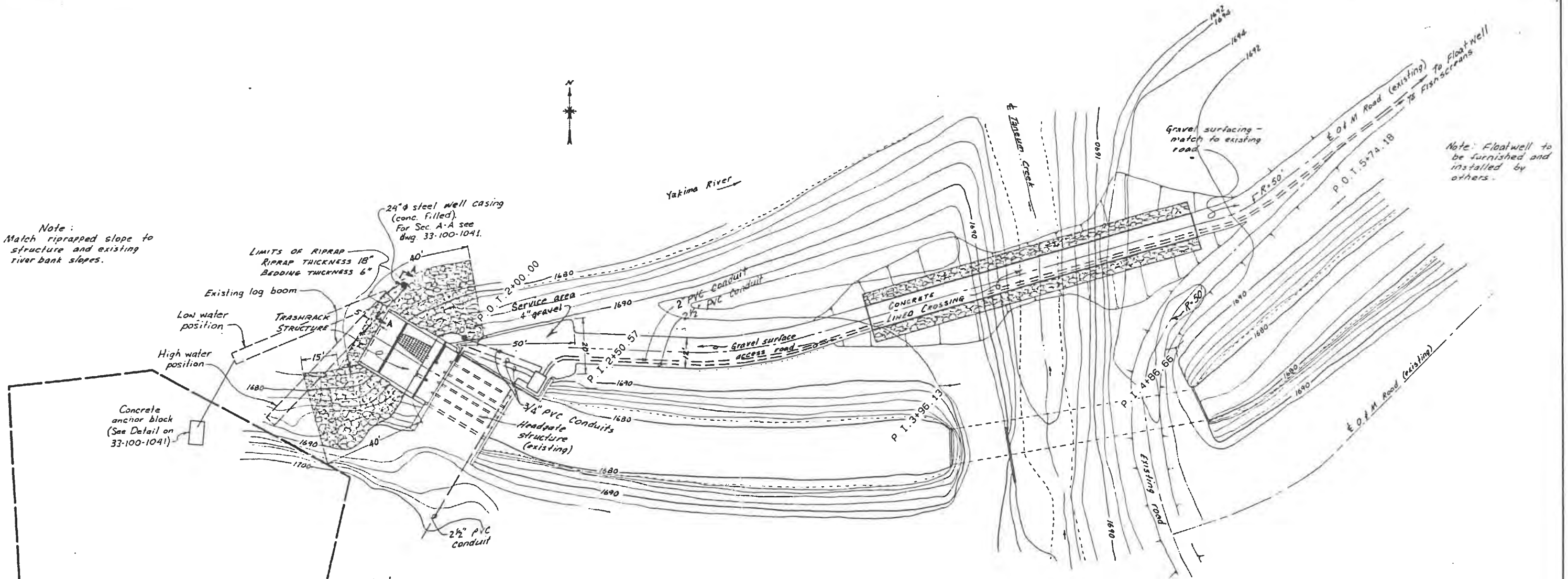
THIRDPARTY DIVERSIONS FROM BYPASSED REACH
April 7, 2000

(11) MILL DITCH		SE ¼ SW ¼ NE ¼ Sec. 29 T18 N. R18 E.	No. 7 (Reecer)						(ES) 7,530 AF (NP) (Mills & Son)
	Anderson			00296	05/20/1885	744 AF / 1.56 CFS	60		
	Anderson			00637	05/20/1885	111.6 AF / 0.225 CFS	9		
	Anderson			00626	05/20/1885	500 AF / 1.0 CFS	40		
	Anderson			00636	05/20/1885	155 AF / 0.324 CFS	12.5		
	Barton			00910 01719	05/20/1885	316.2 AF / 0.662 CFS	25.5		
	Lamb			00908	05/20/1885	620 AF / 4.0 CFS	50		
	Mill Ditch Co.			00626	05/20/1885	105.4 AF / 0.2125 CFS	8.5		
	Mill Ditch Co.			00626	05/20/1885	/ 1.14 CFS		375 AF	
	Pautzke Bait Co.			01724	05/06/1893	1,825 AF / 12.9 CFS	146	375 AF	
	Calaway Pacific			01720	05/06/1893	96 AF / 1.3 CFS	16		
	Guy			01983	05/06/1893	3 AF / 0.067 CFS	1.5		
	Jewett			00140 02098 02105	05/06/1893	30 AF / 0.50 CFS	2		
	Lentz			00637	05/06/1893	483.6 AF / 1.0 CFS	40		
(12) PAUTZKE BAIT CO II.		NW ¼ SW ¼ NW ¼ Sec. 3 T17 N. R 18 E.	No. 7 (Reecer)						
	Pautzke Bait Co.			01724	10/30/1884	2,808 AF / 12 CFS	117 (50 acres Par 5)	12 AF	
	Pautzke Bait Co.			01724	10/30/1884	967.2 AF / 3.9 CFS	78		
	Wyatt			01558	10/30/1884	2.76 AF / 0.02 CFS	0.50		
	Bull Ditch	Sec. 10 T17N R18E	No. 9 (Wilson-Nameum)						

04/07/2000 12:43 PM

Appendix D

Westside Irrigation District Facility Plans



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
YAKIMA PROJECT - WASHINGTON
FISH PASSAGE AND PROTECTIVE FACILITIES

WEST SIDE CANAL
FISH SCREEN STRUCTURE
HEADWORKS STRUCTURE - SITE PLAN

DESIGNED		SUBMITTED	John J. Bowcutt
DRAWN	Guy F. Grooms	RECOMMENDED	
CHECKED	JWS	APPROVED	Harold D. Davis, REGIONAL ENGINEER
BOISE, IDAHO	APRIL 1987		33-100-1013

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

YAKIMA PROJECT - WASHINGTON
FISH PASSAGE & PROTECTIVE FACILITIES

WEST SIDE CANAL

FISH SCREEN STRUCTURE

SITE PLAN

DESIGNED John Brozovich	SUBMITTED		
DRAWN Guy F. Groomes	RECOMMENDED		
CHECKED [illegible]	APPROVED	REGIONAL ENGINEER	
BOISE, IDAHO JULY 1987			33-100-1021

0 20 40 60 Feet

1690

1680

Wasteway

Canal

Route Dyer

Wasteway

Reshape Canal to Match Structure

Fence Overhang, See Detail (3) (1025)

High Chain Link Fence w/3 Strand Barbed Wire Guard

6' Canal

Reshape Canal to Match Structure

2"PVC Conduit

2 1/2 PVC Conduit

N 24° 41' 54" E

To Headworks

P1 15+37

Pull Depth Sloping Slope

Floor Wall (By Others)

Wasteway

P1 18+45

4'-0" Single Gate

4'-0" Single Gate

Pump Area

18' Slot

12" x 12"

Storage Bldg.

14' Double Gate Concrete Slab for Screen Mount 15'x20'

N 50° 11' 01" E

℄ O & M Road

P1 2+03.23

P1 9+65.33

P1 1+72.80

N 42° 13' 53" W

80'±

256'±

10'

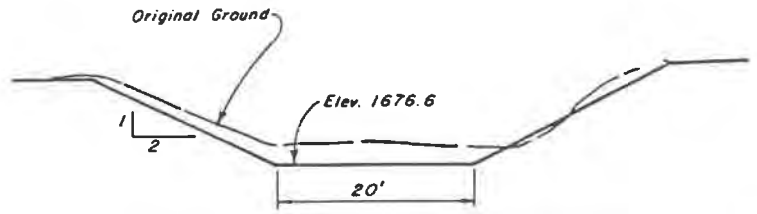
15'

20'

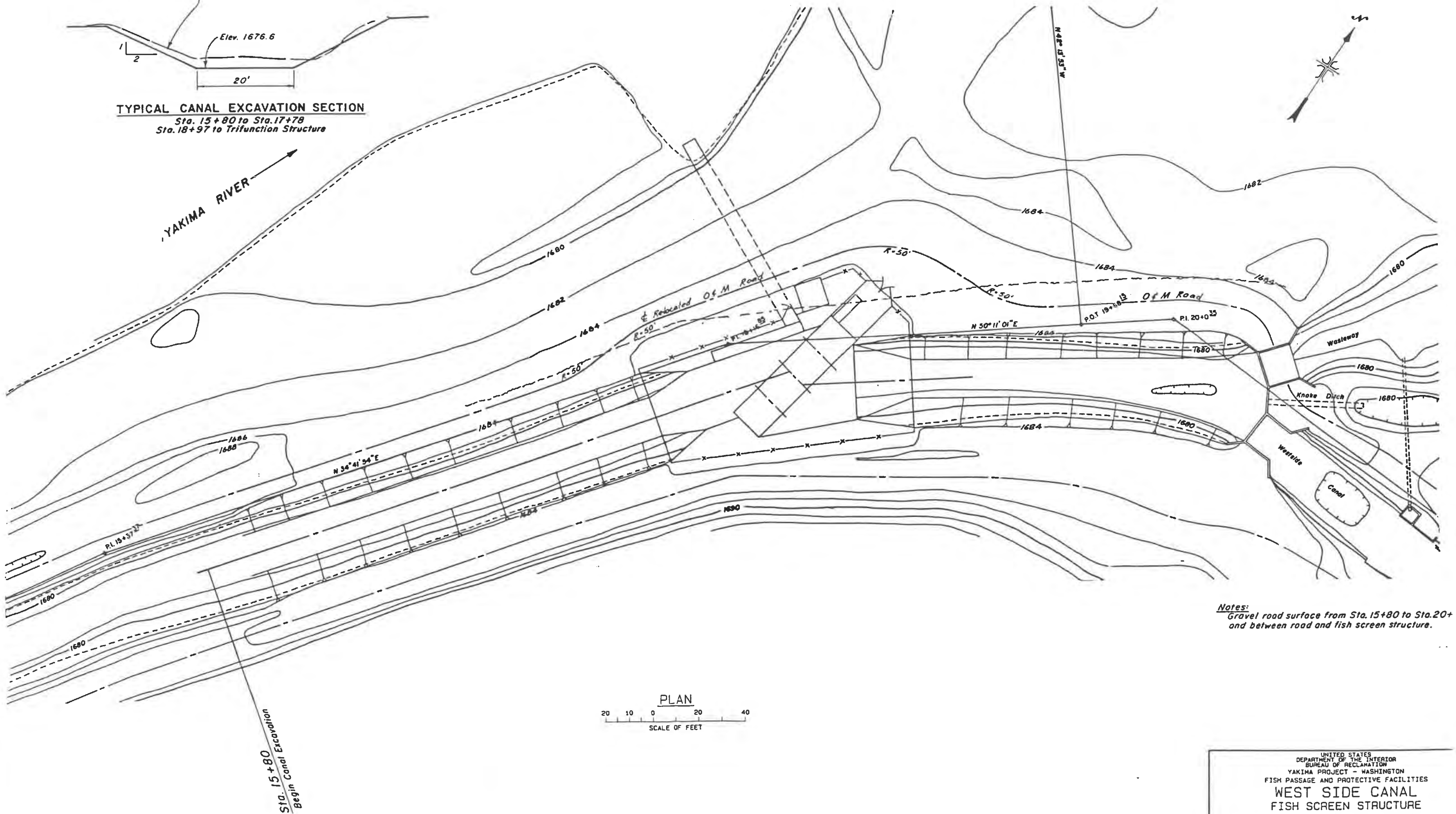
YAKIMA RIVER

N

H-01



TYPICAL CANAL EXCAVATION SECTION
Sta. 15+80 to Sta. 17+78
Sta. 18+97 to Trifunction Structure



PLAN
20 10 0 20 40
SCALE OF FEET

Notes:
Gravel road surface from Sta. 15+80 to Sta. 20+ and between road and fish screen structure.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
YAKIMA PROJECT - WASHINGTON
FISH PASSAGE AND PROTECTIVE FACILITIES

WEST SIDE CANAL
FISH SCREEN STRUCTURE
GRADING PLAN

DESIGNED	SUBMITTED	
DRAWN Guy F. Grooms	RECOMMENDED	
CHECKED JB	APPROVED	REGIONAL ENGINEER
BOISE, IDAHO	APRIL 1987	33-100-10

DEPARTMENT OF THE INTERIOR
UNITED STATES
BUREAU OF RECLAMATION

YAKIMA PROJECT, WASHINGTON
FISH PASSAGE & PROTECTIVE FACILITIES
WEST SIDE CANAL
FISH SCREEN STRUCTURE
GENERAL PLAN

DESIGNED John Arroyovich	SUBMITTED		
DRAWN Roy Mccleskey	RECOMMENDED		
CHECKED	APPROVED		
		REGIONAL ENGINEER	

BOISE, IDAHO MAR 1987 33-100-1022

PLAN
2 0 2 4 6 8 10

Notes:
Drum screens to be furnished and installed by others.
Outlet structure at end of fish bypass pipeline extends approximately 80 feet into river from normal high water line.

B (1027) — B' — 11'-1" — 1½:1 — 5'-0" — 8'-0" — 16'-0" — 24'-0" — ℄ Outlet — N 5038.60 E 5073.55 — 18.1' Offset from Sta. 18+98.06 of Base Line

Outlet Structure (1025) See Detail 1 — 400' Dist. Determine in field — 24" Dia. PVC By pass pipe

Area Lighting Support — 15'-0" — 6'-4" — 20'-0"

Storage Bldg. 12' x 12' — I (1036) — I

Detail 8 (1024) — Detail 7 (1024) — Detail 2 (1036) — Detail 1 (1036) — ℄ U (1027) — ℄ U (1036) — 8'-0"

Screen Support (1023) — See Det. 4 — Screen Support (1024) — See Det. 3

℄ Drum Screen — N (990) — Premolded Joint filler ASTM D175 — 14'-10" — 4'-2½" — Pier #2 See Sec. J-J

Pier #1 See Sec. J-J — 7½" — 2'-3" — 2'x32"x½" neoprene pad — N

T (990) — T w/6" weatherstrip — Construction Joint

Pier #3 See Sec. J-J — 3'-9½" — 3'-11" — 14'-10" — 40°27'52" — 49.47' — Pier #4 See Sec. J-J — 14'-2½" — 16'-0"

Pier #5 See Sec. J-J — 14'-10" — 2'x36"x½" neoprene pad — 2"x12"x½" Polyurethane Joint filler ASTM D175 (By others) — 2½" Stoplog Slots 4'-0" Wide (By others) — 4'-0" (1027)

Pier #6 See Sec. G-G (991) — B

N 5006.92 E 5035.55 — N 5008.26 E 5027.73 — H (990) — Spacing 7.5@8.0" — Post — Handrail — 2'-6" — 2'-5" — 37'-0" — See Detail 2 (1036) — Stoplog Slots

D (1036) — D — 4'-0" — E — E (1036) — E — 80" x 44" x 88" Culvert — P.I 18+16.85

N 5000.00 E 5000.00 — N 50°11'01"E — 22'-0" — 13'-0" — 6" — Base Line N 34°21'54"E — 6" — 3'-0" — 8" — A (1027)

℄ Exist. Canal 18' Offset from Sta. 17+78 ℄ Entire Line — 11'-1" — 1½:1 — 3'-0" — 16'-0" — C (1027) — C — ℄ Inlet — N 4957.76 E 4992.77

(990) — 12'-0" — Construction Joint w/6" weatherstrip — 12'-0" — 11'-1" — 1½:1 — 3'-0"

¾" x 3½" Grating (Prime Type IW4 or 94) Typ.

12

H-01

Appendix C

Employment-Induced Water Demand Analysis



Employment-Induced Water Demand Analysis MountainStar MPR and Cle Elum UGA

Trendwest Properties: Cle Elum UGA Final EIS

Prepared by:

Shapiro and Associates, Inc.
Brown & Caldwell
Johnson-Gardner, LLC
Mentor Law Group, PLLC

March 18, 2002

Introduction

The primary purpose of this report is to evaluate potential impacts on groundwater quantity resulting from direct and indirect employment impacts associated with development of the MountainStar Master Planned Resort (MPR) and the Cle Elum Urban Growth Area (UGA). The report also identifies potential water supply impacts to incorporated areas. The scope of this technical report includes Trendwest induced employment as well as employment generated by development of the City of Cle Elum Business Park. The analysis does the following:

- Estimates direct and indirect employment in-migration and households associated with Trendwest development in the MPR and Cle Elum UGA;
- Describes the method used for distributing in-migrant households within incorporated and unincorporated Kittitas County;
- Distributes in-migrant households in unincorporated Kittitas County within subbasins of the Yakima River;
- Estimates the quantity of consumptive groundwater use associated with in-migrant households in unincorporated areas on an average annual and seasonal basis;
- Estimates the water demand associated with in-migrant households in incorporated areas;
- Compares the estimated per basin consumption from in-migrant households in unincorporated areas with average annual baseflows of those basins to evaluate the potential impact on stream baseflows; and
- Compares water demand estimates for incorporated jurisdictions to the jurisdiction's available water rights and current water demand.

Direct, Indirect, and Induced Employment

Construction and operation of the UGA and MPR would generate direct impacts from local and non-local (outside Kittitas County) employment demand. The increased economic activity associated with Trendwest would produce a ripple effect through the Kittitas County economy in the form of indirect impacts and induced impacts. Depending on their locations, the new households would increase water demand from municipal systems or from exempt groundwater wells.

In-migrant households were calculated as the quotient of employment impacts (Table 3.18-32 from the Cle Elum UGA Draft EIS) and the Washington household workforce participation rate of 1.34 workers per household. Methods and assumptions used to calculate employment impacts are the same as those used in the Draft EIS and are summarized as follows:

- Employment impacts represent the sum of non-local direct employment and total indirect/induced employment.
- Non-local, direct employment includes those jobs that will not be able to be filled by the existing Kittitas County labor force. Based on the labor supply analysis performed for the Draft EIS, approximately 33% (or one-third) of the available Kittitas County labor force could be obtained for direct employment on an annual basis. A natural annual labor force growth rate of 3% was assumed[1]

1 Washington Employment Security Department 2000.

- Total indirect/induced employment is the product of the total direct employment and the employment multiplier. The source of the multiplier is the state of Washington's input-output model, which is used to estimate activity in an economy based on the interactions between industries in that economy.
- For purposes of estimating a worst-case scenario, it was assumed that all indirect/induced population represented in-migrant population. In reality, local residents would fill a portion of the indirect/induced jobs.
- The workforce participation rate is the ratio of Washington's 2000 labor force of 3,045,200[2] and Washington's household count in 2000 of 2,271,398.[3]

Alternative 5 represents a site plan variation of the alternatives analyzed in the Draft EIS. A master site plan application for Alternative 5 was submitted to the City of Cle Elum in August 2001, following publication of the Draft EIS. Alternative 5 is the designated Preferred Alternative for development of the UGA and is evaluated in the Final EIS (refer to Chapter 1, Summary and Chapter 2, Description of Alternatives). Alternative 5 differs from the development alternatives analyzed in the Draft EIS in that the proposal does not include any significant Trendwest-associated employment generators (e.g. lodge, golf course). Trendwest-generated operational employment under Alternative 5 is assumed at zero.

Following publication of the Cle Elum UGA Draft EIS, Trendwest reduced the total number of units that would be constructed in the MPR from 4,650 to 3,785. This represents an overall decrease of 865 units and would result in a lower demand for construction employment than was identified in the Draft EIS. Table 1 shows projected cumulative in-migrant households from construction and operation of the MPR Reduced Density and UGA Alternative 5.

Table 1: In-Migration from Trendwest Employment, MPR Reduced Density and UGA Alternative 5

Employment Category	Year 1	Year 3	Year 5	Year 10	Year 20	Year 30
Construction						
Non-Local Direct Employment	227	444	243	173	113	100
+ Indirect/Induced Employment	200	390	210	145	91	80
= *Total Possible Job In-Migration*	*427*	*834*	*453*	*318*	*204*	*180*
÷ Labor Force Participants per Household	1.34	1.34	1.34	1.34	1.34	1.34
= Total In-Migrant Households	319	622	338	237	152	134
Operation						
Non-Local Direct Employment	56	630	907	1,000	1,036	944
+ Indirect/Induced Employment	17	136	189	243	265	265
= *Total Possible Job In-Migration*	*73*	*766*	*1,096*	*1,243*	*1,301*	*1,209*
÷ Labor Force Participants per Household	1.34	1.34	1.34	1.34	1.34	1.34
= Total In-Migrant Households	54	572	818	928	971	902
Combined In-Migrant Households	373	1,194	1,156	1,165	1,123	1,036

Source: Cle Elum UGA Draft EIS 2001; Johnson-Gardner 2001.

2 Washington Employment Security Department 2001.
3 Office of Financial Management 2001.

Table 1 shows that the number of in-migrant jobs associated with construction would peak in Project Year 3. In-migration related to operational employment would increase steadily through Project Year 10, at which point it is projected to stabilize. Project Year 10 is the year used to calculate projected water demand from direct and indirect/induced employment.

The total direct operational employment demand for Year 20 and Year 30 is identical, as are the indirect/induced jobs they create. However, as a result of Kittitas County's inherent labor force growth rate of 3% a year, more locals will be available by Year 30 to fill the direct operation jobs. As a result, the amount of potential non-local in-migration in Year 30 would be less than in Year 20 (shown in Table 1).

Business Park

As in Alternative 2 (Draft EIS), Alternative 5 includes development by the City of Cle Elum of a 950,000 square foot Business Park. To date, no market studies have been completed. As such, the UGA Draft EIS analysis of employment demand reflects an even incremental buildout over a 30-year period. Table 2 identifies projected in-migrant households from operation of the Business Park. Construction employment for the Business Park is accounted for in demand estimates for Trendwest facilities included in Table 1. Project Year 30 represents full buildout conditions and is the year used to calculate projected water demand from direct and indirect/induced employment.

Table 2: In-Migration from Cle Elum UGA Business Park, Alternative 5

Employment Category	Year 5	Year 10	Year 20	Year 30
Operation[1]				
Non-Local Direct Employment	35	124	302	479
+ Indirect/Induced Employment	44	154	373	593
= *Total Possible Job In-Migration*	*79*	*278*	*675*	*1,072*
÷ Labor Force Participants per Household	1.34	1.34	1.34	1.34
= Total In-Migrant Households	59	207	504	800

Source: Cle Elum UGA Draft EIS 2001; Johnson-Gardner 2001.

1 Construction employment for the Business Park is accounted for in demand estimates for Trendwest facilities included in Table 1.

Household Distribution

Total water consumption would be influenced by the distribution of households between incorporated and unincorporated areas across Kittitas County. Consumptive use varies throughout the County based on factors including different domestic water consumption rates among utility districts and climate variations that affect irrigation demands for crops and lawns. This section describes how projected employment-induced households are distributed across the County.

The projected distribution of households across Kittitas County is based on the Kittitas County Council of Governments (KCCOG) 20-year population allocations (Kittitas Countywide

Planning Policies, as amended, 1999) for unincorporated and incorporated areas. Countywide Planning Policies (CWPP) population allocations are shown in Table 3.

Table 3: Kittitas County Population Allocations - 2020

Jurisdiction	Allocation Percentage (1999 CWPP)
Cle Elum/UGA	19.0%
South Cle Elum/UGA	1.5%
Roslyn/UGA	1.0%
Ellensburg/UGA	35.0%
Kittitas/UGA	2.5%
Unincorporated Kittitas County	26.0%
Urban Growth Nodes[1]	15.0%

Source: Kittitas County CWPP 1999.

1 Urban Growth Nodes include Snoqualmie Pass, Easton, and Ronald in the upper county and Vantage and Thorp in the lower county.

Table 4 shows projected in-migrant households associated with Trendwest-related employment by jurisdiction for the MPR Reduced Density/UGA Alternative 5 development scenario and, separately, for the City of Cle Elum Business Park, based on the KCCOG population allocations.

Table 4: Distribution of In-Migrant Households within Kittitas County Jurisdictions

Jurisdiction	Allocation Percentage (1999 CWPP)	Number of In-Migrant Households (MPR Reduced Density and UGA Alternative 5)	Number of In-Migrant Households (Business Park)
Cle Elum/UGA	19.0%	221.4	152.0
South Cle Elum/UGA	1.5%	17.5	12.0
Roslyn/UGA	1.0%	11.7	8.0
Ellensburg/UGA	35.0%	407.8	280.0
Kittitas/UGA	2.5%	29.1	20.0
Unincorporated County	26.0%	302.9	208.0
Urban Growth Nodes	15.0%	174.8	120.0
Total	100%	1,165.0	800.0

Source: Kittitas County CWPP 1999; Mentor Law Group, PLLC 2001.

To be conservative, this analysis reflects a study area determined most likely to accommodate future population based on existing growth patterns and the location of the MPR and UGA. The study area extends from Snoqualmie Pass to Ellensburg. Households are not distributed to the area east of Ellensburg, including Kittitas and its UGA. The identified in-migrant households allocated to Kittitas and its UGA in Table 4 were proportionally reallocated to the four other incorporated jurisdictions and UGAs. The revised distribution of projected in-migrant households is shown in Table 5.

Table 5: Distribution of In-Migrant Households within Kittitas County Jurisdictions excluding Kittitas/UGA

Jurisdiction	Allocation Percentage (1999 CWPP percentages after redistribution of Kittitas/UGA)	Number of In-Migrant Households[1] (MPR and UGA Alternative 2)	Number of In-Migrant Households[1] (MPR Reduced Density and UGA Alternative 5)	Number of In-Migrant Households (Business Park)
Cle Elum/UGA	19.84%	285.3	231.1	158.7
South Cle Elum/UGA	1.57%	22.6	18.3	12.5
Roslyn/UGA	1.04%	15.0	12.1	8.4
Ellensburg/UGA	36.55%	525.6	425.8	292.4
Kittitas/UGA	0.0%	0	0	0
Unincorporated County	26.0%	373.9	302.9	208.0
Urban Growth Nodes	15.0%	215.7	174.8	120.0
Total	100.0%	1,438.1	1,165.0	800.0

Source: Kittitas County CWPP 1999; Mentor Law Group, PLLC 2001.
1 Households identified are associated with Trendwest-related employment.

Distribution by Subbasin

The projected distribution of households across unincorporated Kittitas County was further broken down within the Yakima River subbasins. Distribution of projected households within Yakima River subbasins was performed based on percentages derived from estimates of the current distribution of population within these subbasins. The following resources were used to estimate the current population distribution across the individual subbasins:

- ArcView 3.2 GIS software;
- Department of Ecology's GIS layer of Yakima Adjudication subbasins;
- Kittitas County's boundary data (including the location of incorporated areas within the county);
- Washington State Department of Transportation data on the location of Urban Growth Nodes (UGNs) within the county;
- 2000 Census tract data available from the Washington Redistricting Commission; and
- Washington Department of Natural Resources public lands data.

Figure 1 depicts the location of the census tracts and subbasins in Kittitas County.

Unincorporated Population by Census Tract

According to the 2000 Census, the total population of Kittitas County is 33,362. The 2000 Census provides information on the population of incorporated areas within Kittitas County and the UGNs. Incorporated areas are: Ellensburg, Cle Elum, South Cle Elum, Kittitas, and Roslyn. The total population within incorporated areas is 19,748 people. Therefore, the total population of the unincorporated areas (including UGAs and UGNs) is 13,614 people.

Urban Growth Nodes include Easton, Ronald, Snoqualmie Pass, Vantage, and Thorp. Because population information is available for these areas from the 2000 Census, they are evaluated

separately, which allows for increased refinement in projecting location choices for in-migrant households. The current population of the UGNs is 1,192 people. For purposes of this analysis, the unincorporated population will not include the UGN population, which is shown as a separate category. The remaining population within the unincorporated areas of Kittitas County is 12,422 people (13,614 minus 1,192).

To determine the unincorporated population by census tract, the population of the incorporated areas and UGNs was subtracted from the total population of that tract. For Ellensburg, where the incorporated area is located in three census tracts, the total incorporated population of Ellensburg was subtracted from the total population of the three census tracts combined. The remaining unincorporated population within the combined census tracts was then distributed back to each tract according to the calculated area of each. The unincorporated population of each census tract was then distributed among the subbasins as described below.

Unincorporated Population by Subbasin

Subbasins 1 through 9 and 12, which encompass the I-90 corridor from Snoqualmie Pass to Ellensburg, were selected as the study area. The study area represents the basins determined most likely to accommodate future population based on existing growth patterns and the location of the MPR and UGA.

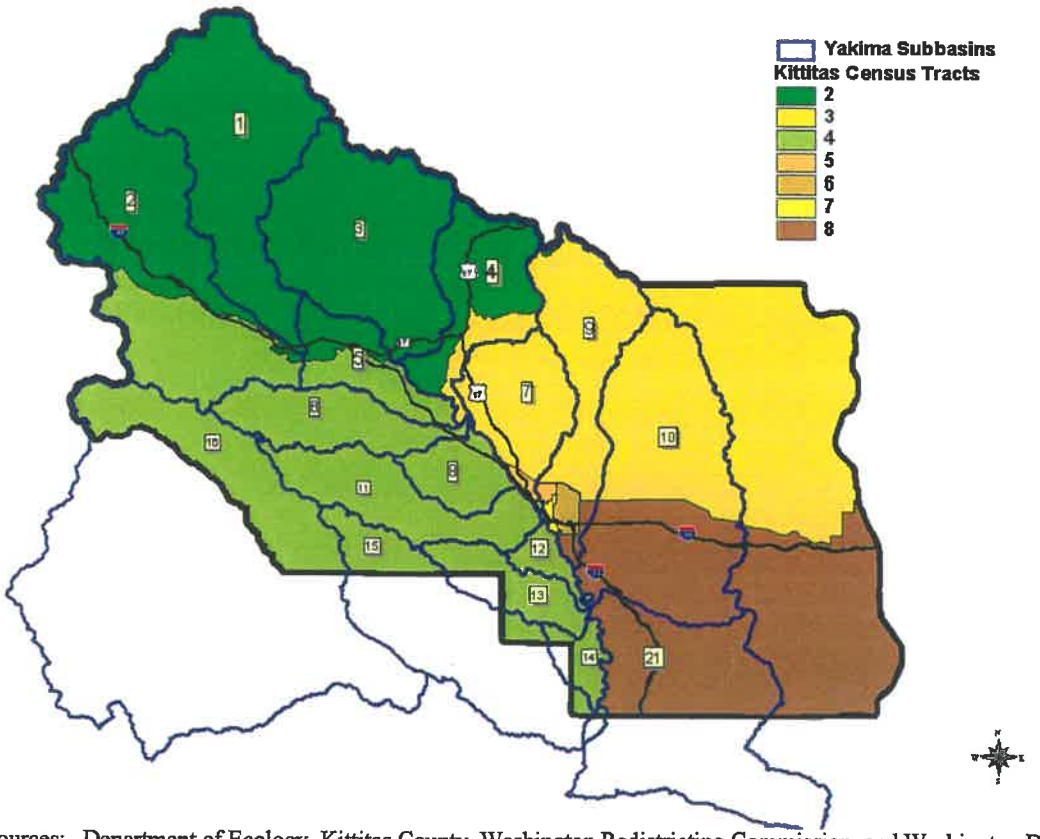
In-migrant households were allocated to subbasins within the study area by: calculating the area of each subbasin available for development; calculating existing population density by subbasin based on the proportion of developable area; calculating the representative percentages of population by subbasin; and distributing in-migrant households to subbasins based on those respective percentages. This provides a possible distribution scheme for future in-migrant households within unincorporated areas.

It is assumed that future population in unincorporated areas could not locate in areas designated as public land. Therefore, the area of each subbasin less the area of public land within that subbasin was assumed to be the area within the subbasin available for development. To calculate the developable area within each subbasin, subbasin boundary data from the Washington Department of Ecology and public lands data from the Washington State Department of Natural Resources were used to identify the location and amount of public land in each subbasin. Figure 2 shows the subbasin boundaries relative to the areas of public lands in Kittitas County.

The calculation of existing unincorporated population densities within each subbasin is based on the percentage of the census tract contained within the developable area of each subbasin. Where a subbasin includes developable area in more than one census tract, the percentage of the area of each census tract located within the developable area of the subbasin was estimated, applied to the unincorporated population of the respective census tracts, and summed to provide a total estimate of unincorporated population for the respective subbasin.

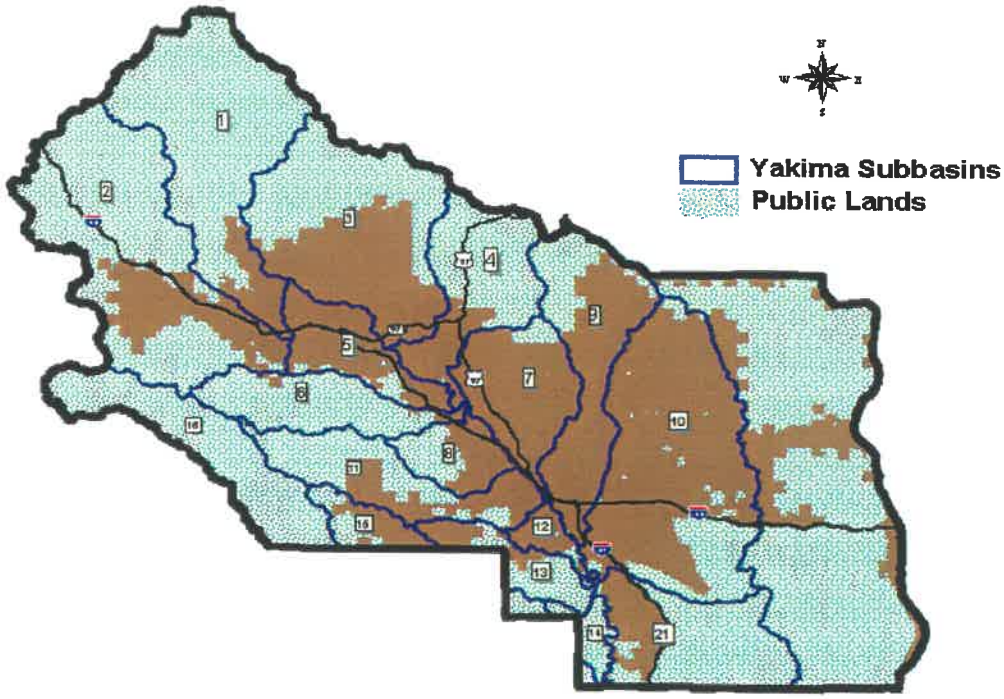
Projected households are distributed to subbasins based on percentages of total existing population applied, proportionately, to the 26% KCCOG projection for unincorporated Kittitas County. These subbasin percentages are inherently conservative as the study area does not

Figure 1: Acquavella Subbasins and Census Tracks in Kittitas County



Sources: Department of Ecology, Kittitas County, Washington Redistricting Commission, and Washington Department of Transportation.

Figure 2: Acquavella Subbasins and Public Lands in Kittitas County



Sources: Department of Ecology, Kittitas County, Washington Department of Natural Resources, and Washington Department of Transportation.

include all of the unincorporated area of Kittitas County. Table 6 shows Trendwest related in-migrant households in unincorporated areas (not including UGNs) distributed by basin for the MPR Reduced Density/UGA Alternative 5 development scenario, and households associated with the Business Park.

Table 6: Distribution of In-Migrant Households in Unincorporated Kittitas County by Subbasin

Subbasin Number	Percentage of Total Population	Number of In-Migrant Households (MPR Reduced Density and UGA Alternative 5)	Number of In-Migrant Households (Business Park)
Subbasin No. 1 (Cle Elum)	1.1 %	13.3	9.2
Subbasin No. 2 (Easton)	3.7 %	43.3	29.7
Subbasin No. 3 (Teanaway)	3.1 %	36.0	24.8
Subbasin No. 4 (Swauk)	1.0 %	12.1	8.3
Subbasin No. 5 (Elk Heights)	1.8 %	20.9	14.4
Subbasin No. 6 (Taneum)	0.9 %	10.0	6.9
Subbasin No. 7 (Reecer)	3.5 %	40.3	27.7
Subbasin No. 8 (Thorp)	1.8 %	21.5	14.8
Subbasin No. 9 (Wilson-Naneum)	8.6 %	100.3	68.8
Subbasin No. 12 (Shushuskin)	0.5 %	6.4	4.4
Total	26 %	302.9	208.8

Source: Mentor Law Group, PLLC 2001.

Urban Growth Nodes. Projected households are distributed to UGN's based on percentages of total existing population applied, proportionately, to the 15% KCCOG projection. Households were allocated to Easton, Ronald, Snoqualmie Pass, and Thorp. Vantage is located in far-eastern Kittitas County and is outside the study area; as such, it was not determined a reasonable location for in-migrant households. Population for Vantage and projected in-migrant households were proportionally reallocated to the four other UGNs. Table 7 shows these percentages and the corresponding household distributions.

Table 7: Distribution of In-Migrant Households within Urban Growth Nodes

Urban Growth Node (Subbasin)	Percentage of Total Population	Number of In-Migrant Households (MPR Reduced Density and UGA Alternative 5)	Number of In-Migrant Households (Business Park)
Ronald (Subbasin No. 1 - Cle Elum)	3.5 %	41.2	28.3
Easton & Snoqualmie Pass (Subbasin No. 2 - Easton)	7.8 %	90.9	62.4
Thorp (Subbasin No. 8 - Thorp)	3.6 %	42.5	28.7
Total	15 %	174.8	119.4

Source: Mentor Law Group, PLLC 2001.

Water Demand Associated with In-Migrant Population

Unincorporated Areas by Subbasin

Water demand for unincorporated in-migrant households was estimated by applying the same method for "per household" demands as was used for the Cle Elum UGA Draft EIS, Water Supply Technical Report (Volume 1 of the appendices). Water demand for unincorporated Kittitas County was calculated based on the average household domestic water use less domestic return flows plus irrigation of one-half acre of lawn. This analysis assumes a domestic diversion of 240 gallons per household (100 gallons per person per day x 2.4 persons per household), less 80% return flows. Irrigation demands were calculated using the *Washington Irrigation Guide* in Cle Elum for subbasins in the upper county (18.11 inches per acre per year) and in Ellensburg for subbasins in the lower county (31.46 inches per acre per year) to determine total average annual consumption. Average seasonal consumption was determined by combining the total irrigation consumption with five months of domestic consumption. Table 8 shows cumulative water demand estimates from Trendwest related households in unincorporated subbasin areas. Table 9 shows water demand estimates from Business Park households in unincorporated subbasin areas.

Incorporated Areas by Jurisdiction

Water demand for in-migrant households in incorporated areas was determined based on estimates of "per household" water use from each jurisdiction's latest Water System Plan. In many cases, data for these water systems are based on demand estimates from the early to mid-1990s.[4] Where data were available for per capita, per day consumption, a factor of 2.4 was applied to reach a per household number. Table 8 shows cumulative water demand estimates from Trendwest related households in incorporated areas. Table 9 shows water demand estimates from Business Park households in incorporated areas.

Groundwater Consumptive Use and Base Flow Comparison

Water demands associated with in-migrant households in unincorporated areas are compared with the estimated mean annual subbasin base flows in Table 10 (MPR Reduced Density and UGA Alternative 5). In-migrant households associated with the Business Park are included in consumptive use estimates for each development scenario.

---

4 City of Roslyn: Average annual per day water use 266 gallons per capita per day based on 1994-1995 data. Source: City of Roslyn Comprehensive Water System Plan (Gray & Osborne, Inc. June 1996), p.2-6.

City of Cle Elum: Consumption per Service 508 gallons per day based on 1995 data. Source: City of Cle Elum Town of South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc., Oct. 1997), p. 32.

Town of South Cle Elum: Consumption per Service 733 gallons per day based on 1981-1984 data. Source: City of Cle Elum Town of South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc. Oct. 1997), p. 32.

Ellensburg: Average day demand 246 gallons per capita per day based on 1998 data. Source: Draft City of Ellensburg Water System Plan Update (HDR, Inc. 1999), p. 2-9.

Table 8: Water Demand, In-migrant Households Associated with Trendwest Employment, MPR Reduced Density and UGA Alternative 5

1,165 Households	MPR (Reduced Density) & UGA Alternative 5 Induced In-Migration Percent	Percent	Domestic Diversion Per ERU gpd	Domestic Return Percent	Domestic CU Per ERU gpd	Domestic CU gpd	Domestic CU acft/yr	Total Diversion acft/yr		Total CU acft/yr
687	59%	Incorporated Areas								
231.1	19.84	Cle Elum / UGA	508	80	102	23483	26.3	132		26.30
18.3	1.57	South Cle Elum / UGA	733	80	147	2681	3.00	15.0		3.00
425.8	36.55	Ellensburg / UGA	590	80	118	50245	56.3	281		56.30
		Kittitas / UGA[1]								
12.1	1.04	Roslyn / UGA	638	80	128	1546	1.73	8.66		1.73
41.2		Ronald UGN[2]	257	80	51	2118	2.37	11.86		2.37
		Total Incorporated Areas								89.69

			Domestic Diversion Per ERU gpd	Domestic Return Percent	Domestic CU Per ERU gpd	Domestic CU gpd	Domestic CU acft/yr	Irrigation CU / unit acft/yr	Irrigation CU Total acft/yr	Total CU acft/yr	Total CU Irrigation Season
302.9	26%	Unincorporated Areas									
13.3	1.1	Subbasin No. 1 (Cle Elum)	240	80	48	640	0.717	0.755	10.1	10.7	10.4
43.3	3.7	Subbasin No. 2 (Easton)	240	80	48	2079	2.33	0.755	32.7	35.0	33.7
36.0	3.1	Subbasin No. 3 (Teanaway)	240	80	48	1730	1.94	0.755	27.2	29.1	28.0
12.1	1.0	Subbasin No. 4 (Swauk)	240	80	48	582	0.651	0.755	9.14	9.79	9.4
20.9	1.8	Subbasin No. 5 (Elk Heights)	240	80	48	1003	1.12	0.755	15.8	16.9	16.3
10.0	0.9	Subbasin No. 6 (Taneum)	240	80	48	480	0.537	1.31	13.1	13.6	13.3
40.3	3.5	Subbasin No. 7 (Reecer)	240	80	48	1934	2.17	1.31	52.8	55.0	53.7
21.5	1.8	Subbasin No. 8 (Thorp)	240	80	48	1032	1.16	1.31	28.2	29.3	28.7
100.3	8.6	Subbasin No. 9 (Wilson-Naneum)	240	80	48	4812	5.39	1.31	131	137	133.2
6.4	0.5	Subbasin No. 12 (Shushuskin)	240	80	48	305	0.342	1.31	8.34	8.68	8.5
										345	335.2
174.8	15%	Growth Nodes									
41.2	3.5	Subbasin No. 1 (Cle Elum) (Ronald)[2]	240	80	48						
90.9	7.8	Subbasin No. 2 (Easton)	240	80	48	4362	4.89	0.755	68.6	73.5	70.6
		(Snoqualmie Pass & Easton)									
42.5	3.6	Subbasin No. 8 (Thorp) (Thorp)	240	80	48	2038	2.28	1.31	55.7	57.9	56.7
										131	127.3
		Total Unincorporated Areas								476	466.2

1 The households allocated to the Kittitas UGA by the CWPP were reallocated across the other UGAs because Kittitas was not a likely location for the in-migrant households.

2 Water demands from the Ronald Urban Growth Node are calculated as incorporated demands because Ronald receives water from Kittitas County Water District #2, which is a wholesale customer of the City of Roslyn. Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

Table 9: Water Demand, In-migrant Households Associated with the Cle Elum UGA Business Park

800 Households	UGA Business Park, Alternatives 2 & 5 Induced In-Migration Percent	Percent	Domestic Diversion Per ERU gpd	Domestic Return Percent	Domestic CU Per ERU gpd	Domestic CU gpd	Domestic CU acft/yr	Total Diversion acft/yr		Total CU acft/yr
472.0	59%	Incorporated Areas								
158.7	19.84	Cle Elum / UGA	508	80	102	16124	18.060	90.3		18.060
12.5	1.57	South Cle Elum / UGA	733	80	147	1833	2.053	10.3		2.053
292.4	36.55	Ellensburg / UGA	590	80	118	34503	38.646	193		38.646
	0	Kittitas / UGA[1]								
8.4	1.04	Roslyn / UGA	638	80	128	1072	1.201	6.01		1.201
28.3		Ronald UGN[2]	257	80	51	1455	1.629	8.15		1.629
		Total Incorporated Areas								61.589

			Domestic Diversion Per ERU gpd	Domestic Return Percent	Domestic CU Per ERU gpd	Domestic CU gpd	Domestic CU acft/yr	Irrigation CU / unit acft/yr	Irrigation CU Total acft/yr	Total CU acft/yr	Total CU Irrigation Season
208.0	26%	Unincorporated Areas									
9.2	1.1	Subbasin No. 1 (Cle Elum)	240	80	48	439	0.492	0.755	6.906	7.398	7.1
29.7	3.7	Subbasin No. 2 (Easton)	240	80	48	1428	1.599	0.755	22.444	24.043	23.1
24.8	3.1	Subbasin No. 3 (Teanaway)	240	80	48	1188	1.331	0.755	18.677	20.008	19.2
8.3	1.0	Subbasin No. 4 (Swauk)	240	80	48	399	0.447	0.755	6.278	6.725	6.5
14.4	1.8	Subbasin No. 5 (Elk Heights)	240	80	48	689	0.772	0.755	10.830	11.601	11.2
6.9	0.9	Subbasin No. 6 (Taneum)	240	80	48	329	0.369	1.311	8.998	9.367	9.2
27.7	3.5	Subbasin No. 7 (Reecer)	240	80	48	1328	1.487	1.311	36.263	37.750	36.9
14.8	1.8	Subbasin No. 8 (Thorp)	240	80	48	709	0.794	1.311	19.358	20.152	19.7
68.8	8.6	Subbasin No. 9 (Wilson-Naneum)	240	80	48	3305	3.702	1.311	90.248	93.950	91.8
4.4	0.5	Subbasin No. 12 (Shushuskin)	240	80	48	210	0.235	1.311	5.726	5.961	5.8
										236.956	
120.0	15%	Growth Nodes									
28.3	3.5	Subbasin No. 1 (Cle Elum) (Ronald)[2]									
62.4	7.8	Subbasin No. 2 (Easton) (Snoqualmie Pass & Easton)	240	80	48	2995	3.355	0.755	47.086	50.441	48.5
29.2	3.6	Subbasin No. 8 (Thorp) (Thorp)	240	80	48	1400	1.568	1.311	38.224	39.792	38.9
										91.232	87.4
		Total Unincorporated Areas								327.188	321.6

1 The households allocated to the Kittitas UGA by the CWPP were reallocated across the other UGAs because Kittitas was not a likely location for the in-migrant households.

2 Water demands from the Ronald Urban Growth Node are calculated as incorporated demands because Ronald receives water from Kittitas County Water District #2, which is a wholesale customer of the City of Roslyn. Source: Mentor Law Group, PLLC 2001; Brown & Caldwell 2001.

Table 10: Subbasin Groundwater Demand and Base Flow Comparison, MPR Reduced Density and UGA Alternative 5 including Business Park

Subbasin Number	Total Consumptive Use from In-Migrant Households acft/yr[1]	Mean Annual Base Flow acft/yr	Total Consumptive Use as a Percentage of Base Flow
Subbasin No. 1 (Cle Elum)[2]	18.2	115,076	0.02%
Subbasin No. 2 (Easton)[2]	183	143,986	0.13%
Subbasin No. 3 (Teanaway)	49.1	66,687	0.07%
Subbasin No. 4 (Swauk)	16.5	23,624	0.07%
Subbasin No. 5 (Elk Heights)	28.5	13,116	0.22%
Subbasin No. 6 (Taneum)	23.0	29,542	0.08%
Subbasin No. 7 (Reecer)	92.7	13,248	0.70%
Subbasin No. 8 (Thorp)[2]	147	7,099	2.07%
Subbasin No. 9 (Wilson-Naneum)	231	22,144	1.04%
Subbasin No. 12 (Shushuskin)	14.6	2,033	0.72%
Total	804	436,555	0.18% Avg. Annual[3]

Source: Brown & Caldwell 2001.

1 Consumptive use calculated for in-migrant households includes those associated with the Business Park.

2 Consumptive use calculations for Subbasin Nos. 2 and 8 reflect water use from both unincorporated and urban growth node households. UGN households for Subbasin 1 (Ronald) are reflected in incorporated water demands because Ronald receives apart of its water from the City of Roslyn.

3 Average annual percentage was calculated by summing the total consumptive use for all of the subbasins and dividing this by the mean annual basin flow for all the subbasins.

Mean annual subbasin baseflow was estimated at 13% of the mean annual precipitation in the subbasin times the total area of the subbasin. The 13% estimate is consistent with information contained in Ecology's Water Supply Bulletin 60 - Estimated Baseflow Characteristics of Selected Washington Rivers and Streams (Ecology 1999).

In Ecology's Water Supply Bulletin 60 - groundwater baseflow is estimated by analyzing streamflow hydrographs. Mean monthly groundwater baseflow (except during snowmelt season) discharge to the Teanaway River is calculated based on the streamflow record of the Reclamation gauge below Forks. In order to estimate the mean annual groundwater baseflow for the Teanaway subbasin, the baseflow for the months of March through July were assumed to equal the average baseflow of the other months of the year. The resulting mean annual baseflow estimate was 13% of the mean annual precipitation in the subbasin.

The percentage of base flow that would be consumed by demand from in-migrant households in unincorporated areas ranges from 0.02% to 2.07% for the MPR Reduced Density and UGA Alternative 5 development scenario (including the Business Park). These low percentages indicate that water demands associated with in-migrant households in unincorporated Kittitas County would result in a minor impact on water availability in the upper Yakima River Basin.

The potential impact on tributary streamflow is dependent on many factors such as the amount of base flow that discharges to an individual tributary, whether or not hydraulic continuity exists between the groundwater and the tributary, and the specific number, location, depth, and screened interval of future exempt wells within a basin. Where hydraulic continuity exists, the

magnitude of this impact would depend on the percentage of groundwater base flow that would be pumped and consumed. Due to the complexity and uncertainty related to any analysis that would attempt to quantify all these variables, average annual values of consumptive groundwater use and tributary baseflow were used to provide a basis for assessing potential magnitude of impact to tributary streamflows for all the basins.

The analysis compares annual subbasin water demand to mean annual base flow. The analysis shows that groundwater consumptive use represents a small percentage of mean annual base flows in individual subbasins and an average annual percentage of approximately 0.18% (MPR and UGA Alternative 5, including the Business Park) for the basins combined. These percentages are small and support a reasonable conclusion of no significant adverse impact. It is not likely that this conclusion would be affected by the uncertain placement of future exempt wells and their hydraulic continuity to the streams draining each basin.

However, this report recognizes that: (1) some portion of the total groundwater base flow within each subbasin would discharge into tributaries where hydraulic continuity exists; and, (2) that some portion of the wells associated with indirect/induced households within unincorporated Kittitas County could withdraw groundwater that is in hydraulic continuity with tributaries.

Potential impacts on tributary streamflow would likely be lower during the high flow season and would be greater during the later summer months, when streamflows are more dependant on baseflows and instantaneous rates of baseflow are lower than the average annual baseflow. Summer lowflows measured in the Teanaway River from 1999 to 2001 at the Forks gage ranged from 8 to 16 cfs, which is about 9% to 17% of the annual average baseflow of 92 cfs (66,687 ac-ft/yr, Table 10). Summer baseflow can be substantially lower than average annual baseflow; as such, the relative impact of reduced groundwater availability can be greater during the summer low-flow season.

On the Teanaway River, where the lower Teanaway is known to be in hydraulic continuity with groundwater, a worst case scenario was assumed for the purposes of evaluating potential magnitude of impact during the summer low flow season. In the absence of well data, all of the in-migrant wells were assumed to be shallow and located next to the lower reach of the river. Based on information contained in Ecology's Water Supply Bulletin No. 60, October 1999, Brown and Caldwell calculated the consumptive use as a percentage of base flow during the summer low-flow season as approximately 0.57% (as compared to the annual 0.07%, Table 10). This more specific "worst case" seasonal analysis shows a higher consumptive use impact during the low flow season due to seasonally high consumptive water use for irrigation of lawns and gardens.

Incorporated Areas' Existing Water Supplies

City of Roslyn Water Supply

The City of Roslyn relies exclusively on Domerie Creek, a tributary to the Cle Elum River, as its municipal water supply. Roslyn owns a surface water right from Domerie Creek that entitles the City to withdraw 3.14 cubic feet of water per second (cfs), not to exceed 446.7 acre-feet (AF) of

water each year. Roslyn's Domerie Creek water right has a priority date of September 2, 1908.[5] Roslyn also provides water for the community of Ronald. As of 1996, based on a combined population estimated at 1,026, the City of Roslyn used approximately 328.6 AF of water each year,[6] leaving approximately 118.1 AF available for future growth. Roslyn estimated its water demands in 2015 to be approximately 430,920 gpd, or 482.9 AF each year.[7]

City of Cle Elum / Town of South Cle Elum Water Supply

The City of Cle Elum owns a water right for 3 cfs, not to exceed 1,100 AF annually from the Cle Elum River. Cle Elum's water right has a priority date of June 30, 1896.[8] In addition, in 1932 Cle Elum entered into a Water Rental Agreement with the Bureau of Reclamation. The Water Rental Agreement was extended in 1940, and the City currently is negotiating with Reclamation to extend the Water Rental Agreement. Under the agreement, Cle Elum is entitled to divert water from the Cle Elum and Yakima rivers at a rate of 3 cfs, not to exceed 2,170 AF of water annually. The water right used by Reclamation to serve Cle Elum under the Water Rental Agreement has a priority date of May 10, 1905. In 1995, Cle Elum's annual water demand was 356.9 million gallons (MG), or 1,095.3 AF. Cle Elum's projected water demand in 2016 is 357.1 MG, or 1,095.9 AF.[9]

The Town of South Cle Elum has a water right certificate entitling it to withdraw 500 gallons per minute (gpm), not to exceed 101 AF each year from two groundwater wells. The City's groundwater right has a priority date of July 13, 1983. South Cle Elum also has a surface water right to withdraw 1 cfs, not to exceed 168 AF each year. The City's surface water right has a priority date of June 12, 1957.[10] In 1995, South Cle Elum estimated its annual water demand was 62.9 MG or 193.0 AF. South Cle Elum's projected water demand in 2016 is 93.3 MG, or 286.3 AF.[11]

In 1998, both the City of Cle Elum and Town of South Cle Elum filed change applications with the Department of Ecology to change to a common point of diversion and to consolidate the place of use to the area served by a regional water supply system. This regional water system will serve both the City of Elum and the Town of South Cle Elum. Ecology issued change orders with conditions on these applications in April 2001 which Cle Elum and South Cle Elum Appealed. On October 9, 2001, Cle Elum, South Cle Elum and Ecology entered a Stipulation and Agreed Order of Dismissal approving the combined place of use.

---

5 *Report of Referee for Subbasin No. 1 (Lake Cle Elum)*, Washington v. Acquavella (Yakima Co. Sup. Ct Cause No. 77-2-01484-5) (June 15, 1998) pp. 17-18.

6 City of Roslyn Comprehensive Water System Plan (Gray & Osborne, Inc. June 1996), p.2-7.

7 City of Roslyn Comprehensive Water System Plan (Gray & Osborne, Inc. June 1996), p.2-9.

8 *See Conditional Final Order – Subbasin 1*, Washington v. Acquavella (Yakima Co. Sup. Ct Cause No. 77-2-01484-5) (June 9, 1989) and *Report of Referee Re: Subbasin No. 1*, Washington v. Acquavella (Yakima Co. Sup. Ct Cause No. 77-2-01484-5) (June 15, 1988) p. 17.

9 Cle Elum-South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc. 1997), p. 35. Cle Elum expects to meet its future growth needs in large part through installation of water meters and implementation of system improvements and water conservation measures.

10 *Supplemental Report of Referee for Subbasin No. 5 (Elk Heights)*, Washington v. Acquavella (Yakima Co. Sup. Ct. Cause No. 77-2-01484-5) (May 10, 1999) p. 94.

11 Cle Elum-South Cle Elum Comprehensive Water Plan, p. 72,74.

City of Ellensburg Water Supply

The City of Ellensburg owns a combination of surface water and groundwater rights. Ellensburg currently is using several wells with an estimated production capacity of 10,431 gpm. In addition, Ellensburg has surface water rights from the Yakima River under shares the City owns in the Ellensburg (Town Ditch) Water Company and under a 1971 contract assignment between Ellensburg, the Kittitas Reclamation District (KRD), and the Bureau of Reclamation. The 1971 KRD contract and the City's shares in the Ellensburg Water Company represent a capacity from surface water resources totaling about 12,713 gpm, not to exceed about 7,761.6 AF each year.[12] In its July 1997 Ellensburg Water Supply Source Evaluation, HDR Engineering projected the City's population growth over a 25-year period at approximately 1% each year. According to Ellensburg's 1999 Draft Water System Comprehensive Plan, the City's projected average day demand in 2020 is 6.29 million gallons per day, or 7,045.7 AF each year.[13]

Water Demand Compared to Water Use and Available Water Rights

Table 11 compares water demands for in-migrant households associated with Trendwest employment within each jurisdiction to the jurisdictions' available water rights and current water use. For all jurisdictions, the water demand associated with potential in-migrant households falls within the difference between the amount of water available under the current water rights and the jurisdiction's projected future water demand. For all jurisdictions except the City of Roslyn, the water demand associated with potential in-migrant households added to the jurisdiction's projected future water demands still falls within the amount of water available under the current water rights. The City of Roslyn was projecting a water right deficit in meeting its projected future water demand without the Trendwest projects. As part of a settlement agreement entered with RIDGE, Trendwest has agreed to mitigate for increased water demands on Roslyn resulting from induced offsite development within Roslyn.[14]

Table 11: Comparison of Current Water Use as Reported by Jurisdiction with Water Demands from In-Migrant Households

Jurisdiction	Water Available under Water Rights*	Current Water Use[15]	Water Demand by Jurisdiction (MPR Reduced Density and UGA Alternative 5)	Projected Future Water Demand
Roslyn/UGA Ronald UGN	446.7 AF	328.6 AF[16]	20.5 AF	482.9 AF
Cle Elum/UGA South Cle Elum/UGA	3,539 AF	1,288.3 AF[17]	147 AF	1,382.2 AF
Ellensburg/UGA	18,312.6 AF	2,708 AF[18]	281 AF	7,045.7 AF

* Available water rights represent those as stated in the jurisdiction's respective water supply plans.
Source: Mentor Law Group 2001.

12 Ellensburg Water Supply Source Evaluation (HDR Engineering, Inc. 1997), p. III-7.
13 City of Ellensburg Comprehensive Water Plan Update (HDR Engineering, Inc. 1999), p. 2-10.
14 *Settlement Agreement Regarding MountainStar Master Planned Resort, Cle Elum Urban Growth Area and Supporting Infrastructure and Services* (Sept. 19, 2001).
15 Current water use based on information from the most recent WDOH Approved Water System Plan available.
16 City of Roslyn Comprehensive Water System Plan (Gray & Osborne, Inc. 1996), p. 2-7.
17 City of Cle Elum Town of South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc. 1997), p. 32.
18 Draft City of Ellensburg Comprehensive Water Plan Update (HDR Engineering, Inc. 1999), p. 2-11.

Table 12 compares water demands for in-migrant households associated with both Trendwest employment and Business Park employment within each jurisdiction to the jurisdictions' available water rights and current water use. Water demand estimates that reflect the Business Park also falls within the difference between the amount of water available under the current water rights and the jurisdiction's projected future water demand

Table 12: Comparison of Current Water Use as Reported by Jurisdiction with Water Demands from In-Migrant Households, Including the Business Park

Jurisdiction	Water Available under Water Rights*	Current Water Use[19]	Water Demand by Jurisdiction (MPR Reduced Density and UGA Alternative 5)	Projected Future Water Demand
Roslyn/UGA Ronald UGN	446.7 AF	328.6 AF[20]	34.7 AF	482.9 AF
Cle Elum/UGA South Cle Elum/UGA	3,539 AF	1,288.3 AF[21]	247 AF	1,382.2 AF
Ellensburg/UGA	18,312.6 AF	2,708 AF[22]	475 AF	7,045.7 AF

* Available water rights represent those as stated in the jurisdiction's respective water supply plans.
Source: Mentor Law Group 2001.

19 Current water use based on information from the most recent WDOH Approved Water System Plan available.
20 City of Roslyn Comprehensive Water System Plan (Gray & Osborne, Inc. 1996), p. 2-7.
21 City of Cle Elum Town of South Cle Elum Comprehensive Water Plan (Huibregtse, Louman Assoc., Inc. 1997), p. 32.
22 Draft City of Ellensburg Comprehensive Water Plan Update (HDR Engineering, Inc. 1999), p. 2-11.

Trendwest Properties: Cle Elum UGA Final EIS

Appendix - Volume 2



March 18, 2002

City of Cle Elum

TABLE OF CONTENTS

Volume 1:

Appendix A - Water Quality Technical Report

Appendix B - Water Supply Technical Report Supplement

Appendix C - Employment-Induced Water Demand Analysis

Volume 2:

Appendix D - Fiscal Impact Analysis

Appendix E - Site Engineering Technical Report

Appendix F - Transportation

Appendix G - Agency Correspondence

Appendix D

Fiscal Impact Analysis



I. PURPOSE AND SCOPE OF ANALYSIS 1
A. *Analysis* 1
II. EXISTING REVENUES AND EXPENDITURES 5
III. UGA CONSTRUCTION AND OPERATION 6
A. *Residential Development* 6
B. *Commercial/Non-Residential Development* 7
C. *Geographic Distribution of Construction Costs* 8
D. *UGA Demographics* 9
IV. ESTIMATED UGA REVENUES 10
A. *State of Washington* 11
B. *Kittitas County* 15
C. *City of Cle Elum* 19
D. *City of Roslyn* 25
E. *Town of South Cle Elum* 26
F. *City of Ellensburg* 26
G. *Cle Elum/Roslyn School District No. 404* 27
H. *Kittitas County Hospital District No. 2* 28
I. *Kittitas County Communications (KITTCOM)* 29
V. UGA SERVICE DEMANDS AND ESTIMATED COSTS 30
A. *State of Washington* 30
B. *Kittitas County* 31
C. *City of Cle Elum* 34
D. *City of Roslyn* 39
E. *Town of South Cle Elum* 40
F. *City of Ellensburg* 40
G. *Cle Elum/Roslyn School District No. 404* 40
H. *Kittitas County Fire District No. 7* 47
I. *Kittitas County Hospital District No. 2* 48
J. *Kittitas County Communications (KITTCOM)* 49
VI. NET FISCAL IMPACTS 50
A. *State of Washington* 50
B. *Kittitas County* 51
C. *City of Cle Elum* 52
D. *City of Roslyn* 55
E. *Town of South Cle Elum* 55
F. *City of Ellensburg* 56
G. *Cle Elum/Roslyn School District No. 404* 56
H. *Kittitas County Fire District No. 7* 59
I. *Kittitas County Hospital District No. 2* 60
J. *Kittitas County Communications (KITTCOM)* 61
VII. CUMULATIVE IMPACTS OF THE PROPOSED ACTION 62
A. *State of Washington* 62
B. *Kittitas County* 63
C. *City of Cle Elum* 64
D. *Cle Elum/Roslyn School District No. 404* 66
E. *Kittitas County Hospital District No. 2* 74
F. *Kittitas County Communications (KITTCOM)* 76
G. *Nearby Jurisdictions* 76
BIBLIOGRAPHY 78

H-01

I. PURPOSE AND SCOPE OF ANALYSIS

Trendwest Properties, Incorporated (Trendwest) has proposed the development of a master plan community located within the Cle Elum Urban Growth Area (UGA). The approximately 1,100-acre development is located adjacent and west of the City of Cle Elum, in Kittitas County, Washington. This technical appendix to the Final Environmental Impact Statement (FEIS) provides analysis of a fifth development alternative proposed since the publication of the Draft EIS (DEIS).

The primary differences between Alternative 5 (Preferred Alternative) and Alternatives 2, 3, and 4 relate primarily to housing mix and recreational facilities. Under Alternative 5, visitor/tourist facilities (i.e. timeshare condominiums, lodge, RV Park, and the golf course) have been eliminated. Construction of the Washington State Horse Park is also not included in this alternative. Residential development is composed of single family homes and multi-family condominium and apartment units at a similar scale as analyzed under Alternative 3 (Expanded Residential). With the elimination of visitor/tourist facilities, analysis of Alternative 5 assumes that all residential development is occupied by permanent residents. Alternative 5 includes development of a 950,000 square foot Business Park, which was analyzed as part of Alternative 2 in the Draft EIS.

This report analyzes anticipated fiscal impacts associated with development of Alternative 5 as a supplement to Appendix H of the DEIS, *Fiscal and Economic Impact Analysis for Proposed Development of the Cle Elum UGA in Kittitas County, Washington* (Johnson Gardner 2001). As in that document, a detailed analysis of anticipated fiscal impacts resulting from the proposed development of the area are introduced, estimated and interpreted here for Alternative 5. Emphasis is placed on the manner in which specific impacts may affect local communities, the City of Cle Elum and Kittitas County.

A. ANALYSIS

The purpose of the fiscal impact analysis is to measure the direct incremental revenues and costs for each of the various jurisdictions and service providers serving the City of Cle Elum Urban Growth Area (UGA). Direct incremental revenues and costs are defined as primary public service costs incurred and immediate public service revenues generated by a proposed development (Burchell, et al, 1985).

The analysis is conducted from the perspective of existing conditions within the City of Cle Elum, Upper Kittitas County and its existing residents. All revenue and cost estimates are presented in 2000 constant dollars to provide a consistent index of comparison over the thirty-year analysis period. Inflation-adjusted values measure growth in real activity eliminating the effects of changing price levels. This perspective is particularly true of impact analysis conducted for property tax revenues in each affected jurisdiction. Assumptions have been made in this analysis that help to illustrate future impacts in terms of existing conditions, existing fiscal capacity and future fiscal capacity. However, conditions may change, timelines may change and a host of many other variables may be different in the future. Due to that uncertainty and variability, this analysis is not intended to be used for definitive fiscal planning by any affected jurisdiction, but rather as a reference document to assist in community planning for actual future impacts yet to be realized.

H-01

JOHNSON
GARDNER

FISCAL AND ECONOMIC IMPACT ANALYSIS FOR CLE ELUM UGA ALTERNATIVE 5

APPENDIX D

Prepared For:
TRENDWEST PROPERTIES, INC.

March 18, 2002

Alternative 5 would pose identical categories of service costs and sources of tax revenues as those discussed for Alternatives 2, 3 and 4 in the DEIS. Table I-2 summarizes the impacted jurisdictions and the pertinent public revenue and cost categories impacted by proposed development of Alternative 5 for each jurisdiction.

TABLE I-2: PUBLIC SERVICE JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA

Government Jurisdiction	
Source of Revenue	Source of Cost
State of Washington	
Permit Fee Revenue	Law Enforcement
Sales Tax	General Government
Real Estate Excise Tax	Transportation
Property Tax	
Timber Excise Tax	
Business and Occupation Tax	
Kittitas County	
Permit Fee Revenue	Development Permit & Review
Sales Tax	Law Enforcement
Real Estate Excise Tax	General Government
Timber Excise Tax	
Property Tax	
Developer Contributions	
City of Cle Elum	
Permit Fee Revenue	Law Enforcement
Retail Sales Tax	Fire Protection
Real Estate Excise Tax	Emergency Medical Service (Mutual Aid)
Property Tax	General Services
Water Treatment Fees	Water Treatment Service Costs
Wastewater Treatment Fees	Wastewater Treatment Service Costs
Utility Tax	
City of Roslyn (Indirect)	
Sales Tax	Public Works
	Law Enforcement (Mutual Aid)
	Fire Protection (Mutual Aid)
	General Government
City of South Cle Elum (Indirect)	
Sales Tax	Public Works
City of Ellensburg (Indirect)	
Sales Tax	Law Enforcement (Mutual Aid)
	Fire Protection (Mutual Aid)
Cle Elum/Roslyn School District No. 404	
Property Taxes	Educational Services (K-12)
Timber Excise Tax	
Kittitas County Hospital District No. 2	
Property Taxes	Emergency Medical Service
Patient Fees	
Timber Excise Tax	
Kittitas County Communications	
Service Provider User Fees	Emergency Service Call Dispatch
Telephone Taxes	

The development design changes under Alternative 5 affect the following primary fiscal areas:

- *Tourist Spending:* Elimination of tourist facilities and consequently tourist spending under Alternative 5 greatly reduces the potential for retail sales tax revenues as a result of UGA development. Permanent residents spend significantly less per day than do tourists, who tend to eat at restaurants for every meal, buy gifts and souvenirs, and spend a greater daily amount

H-01

on recreation and entertainment. In addition, there will be no hotel/motel tax generated by Alternative 5.

- *Property Tax Revenue:* The combination of the highest residential development (similar to Alternative 3) with the same sized Business Park as Alternative 2 would increase property tax revenues for affected jurisdictions.
- *Real Estate Excise Tax and Shared Revenues:* Residential development proposed under Alternative 5 will generate greater real estate excise tax revenues due to sale transactions, as well as greater shared revenues due to higher permanent population growth.
- *Public Service Costs:* The higher permanent population associated with residential development could result in an increase in emergency service needs and would generate higher general government service costs.
- *School Service Requirements:* Residential development under Alternative 5 will increase potential public school enrollment relative to the other development alternatives.

Public Service Jurisdictions

Like previous analysis, this study assumes that the Cle Elum UGA will be annexed by the City before construction starts. The change in jurisdiction, from Kittitas County to the City of Cle Elum, would shift primary public service responsibility to the City in addition to shifting various tax revenue flows. Beginning in Project Year 1 (Year 1), Cle Elum would assume primary service responsibility and taxing jurisdiction for the UGA. Table I-3 provides a summary of public service categories inherited by the City of Cle Elum with incorporation. The table also lists service providers with primary jurisdiction before annexation occurs.

TABLE I-3: SUMMARY OF CLE ELUM UGA JURISDICTION ALTERED BY CITY ANNEXATION

Service Costs	*Primary Jurisdiction Before Annexation*
Development Review	Kittitas County
Law Enforcement	Kittitas County
General Services/Administration	Kittitas County
Emergency Fire Service	Fire District No. 7
Road Maintenance	Kittitas County

Discussion of likely effects upon revenue and cost flows with changes in annexation is provided in Sections IV, V, VI and VII for revenues, costs, net impacts and cumulative impacts, respectively. Further discussion of each revenue and cost category is reserved for Section IV and Section V, respectively.

Chronology of Analysis

As in the Draft EIS, this study considers full build-out of the UGA along a thirty-year time period. Specific calendar years, i.e. 2000, 2001, etc. are not utilized in this study. Rather, the analysis reports results with non-specific annual labels, i.e. Year 1, Year 2, Year 20, etc. Year 1 marks the initiation of UGA construction. Revenue and cost estimates are generally reported in text for Years 1, 5, 10, 20 and 30. Detailed, annual tables of estimated revenues and costs for each jurisdiction are found in

H-01

EXHIBITS 2.01-2.07 and 3.01-3.07. During the proposed build-out period, it is assumed that the proposed MountainStar Master Planned Resort (MPR) would be constructed concurrently and that MPR construction would begin in Year 1 of UGA build-out.

Assumptions and Data

Assumptions for estimation of fiscal impacts due to UGA development include:

- Residential and commercial development timing;
- Residential sales and unit prices;
- Resident characteristics (household size, etc.);
- Accommodation characteristics (unit types, vacancy rates, etc.); and
- Categories and geographic distributions of visitor spending.

Assumptions are based on data provided primarily by the applicant, Trendwest Properties, and by pertinent public agencies. Additional data and information was acquired from the State of Washington, sections of the UGA Draft and Final EIS, and secondary sources such as industry studies and publications. Section III of this analysis provides an updated discussion of development assumptions for Alternative 5.

Measure of Impacts

All revenue and cost estimates are presented in 2000 constant dollars to provide a consistent index of comparison over the thirty-year analysis period. Inflation-adjusted values measure growth in real activity eliminating the effects of changing price levels.

H-01

II. EXISTING REVENUES AND EXPENDITURES

Table II-1 provides a summary of recent revenues and expenditures for the jurisdictions providing direct services to the proposed UGA.

TABLE II-1: BUDGET SUMMARIES FOR PUBLIC SERVICE PROVIDERS TO THE UGA

Jurisdiction	Fiscal Year	Total Revenues/ Largest Sources	Total (millions)[1]	Total Expenditures/ Largest Categories	Total (millions)[1]
State of Washington	*1998*	*All Funds*	*$19,737*	*All Funds*	*$19,512*
		Retail Sales/Use Tax	$4,983	Human Services	$7,643
		Federal Grants-In-Aid	$4,975	Education	$7,496
Kittitas County	*1999*	*All Funds*	*$28.6*	*All Funds*	*$32.4*
		Intergovernmental Rev. (State of Washington)	$10.9	Operations General Fund	$28.2 $12.5
		Total Tax Revenues	$8.1	Services	$15.4
City of Cle Elum	*1999*	*All Funds*[2]	$4.0	*All Funds*	*$4.0*
		Local Retail &Sales Tax	$0.3	Water Sewer Reserve	$1.0
		Property Tax	$0.3	Police Department	$0.5
School District 404	*1998-9*	*All Funds*	*$4.8*	*All Funds*	*$4.8*
		Intergovernmental Rev. (State of Washington)	$4.2	Regular Instruction	$2.4
		Local Tax/Non-Tax Revenue	$0.3	Support Services	$2.0
Hospital District No. 2	*1999*	*All Funds*	*$0.8*	*All Funds*	*$0.8*
		Patient Revenue	$0.4	Service Fees	$0.5
		Property Tax	$0.3	Personnel	$0.3
Kittitas County Communications Center (KITTCOM)	*1999*	*All Funds*[3]	*$4*	*All Funds*[3]	*$4*
		Subscriber Fees	$0.5	Capital Projects	$0.5
		Telephone Tax	$0.2	Personnel	$0.3

1 Numbers are rounded to the nearest $100,000.
2 Excludes $3,311,196 grant for Water Rehabilitation Fund.
3 Includes Enhanced "911" intergovernmental revenues and program expenditures ($2.8 million).
Source: Kittitas County, City of Cle Elum, 1999; Cle Elum-Roslyn School District No. 404, Kittitas County Hospital District No. 2, KITTCOM, 1998.

Further discussion of revenue sources and service expenditures is found in Sections IV and V, respectively.

H-01

III. UGA CONSTRUCTION AND OPERATION

Section III provides a detailed description of construction and operations assumptions made for this analysis.

A. RESIDENTIAL DEVELOPMENT

The following information was provided by the applicant, Trendwest Properties, Incorporated. All assumptions discussed below assume a build-out period of 30 years.

Development Schedule

An annual schedule of construction for all planned development under Alternative 5 is found in EXHIBIT 1.01.

Building Characteristics

Table III-1 summarizes the quantity, type, size, and density of residential product being proposed for the Cle Elum UGA. Unit quantity and density vary depending upon the development alternative considered.

TABLE III-1: CLE ELUM UGA ALTERNATIVE 5 RESIDENTIAL UNIT CHARACTERISTICS

Unit Type	Units	Size Range (SF)	Average Size (SF)	Density Units/Acre
Single Family	47	1,500-2,500	2,000	3.0-7.0, 2.0-5.0
Lakefront Units				
5,000-6,000 sq. ft. Residential	357	1,500-2,500	2,000	
7,000+ sq. ft. Residential	406	2,500-3,500	3,000	
Multifamily	340	650-2,000	1,325	8.0-15.0
Condominiums				
Apartments	184	650-1,000	800	

Source: Trendwest 2001

- *Detached Units:* Initially sold as undeveloped lots.
- *Wholly Owned Condominiums:* Sold as one unit.
- *Apartments:* Rental apartments with four to six units per building.

Costs of Construction and Development

Table III-2 summarizes the following assumptions used to calculate various tax revenues generated from the residential portion of the proposed UGA. Specific taxes are discussed in Section IV.

- The applicant provided estimated average sales prices for units and construction costs for multi-family residential units.
- Market sales prices for units were calculated based on assessed property value. Historically, assessed property value has been roughly 90.5% of fair market sales price (State of Washington Tax Reference Manual, 1996).
- It was assumed that after initial sale, lots would not be resold before a house is constructed.

H-01

- It was assumed that the assessed value of improved property, i.e. condominiums and constructed houses, would increase annually by 5.4% in 2000 dollars. The growth rate is the average appreciation rate for property in Kittitas County between 1992 and 1999 (Kittitas County Assessor's Report, 1999). Note: See Section IV, Estimated UGA Revenues for a discussion of the implications of Initiative 747 (I-747), passed in the November 2001 election, to this report.
- It was assumed that residential lots would not appreciate in value until they were improved with a house.

TABLE III-2: CLE ELUM UGA RESIDENTIAL SALES PRICES, CONSTRUCTION COSTS AND ASSESSED VALUE CHARACTERISTICS

Type	Initial Sale: Lot or Finished Unit	Estimated Avg. Lot Sales Price	Estimated Cost of Construction	Estimated Average Market Sales Price	Average Assessed Value
Lakefront Units	Lot	$32,000	$132,000	$213,000	$192,765
5-6,000 sq. ft. Residential	Lot	$40,000	$182,000	$275,000	$248,875
7,000+ sq. ft. Residential	Lot	$65,500	$231,000	$360,000	$325,800
Condominiums	Finished	--- ---	$119,250	$150,000	$136,000
Apartments			$60,000		

Source: Trendwest 2000, 2001

Construction costs for Lakefront units, 5,000-6,000 sq. ft. residential units, and 7,000+ sq. ft. residential units were estimated using average square foot costs from RS Means' *Square Foot Costs 1998* (RS Means, 1997). Cost derivation is summarized below. All square foot costs are quoted at national averages, but are adjusted assuming the Yakima, Washington location factor of 1.02.

TABLE III-3: RESIDENTIAL CONSTRUCTION COST CALCULATIONS FOR ALTERNATIVE 5

	Average Cost per square foot		Location Factor		Adjusted Average per sf		Square Footage		Total Cost
Lakefront Units	$64.85	×	1.02	≈	$66.00	×	2,000	=	$132,000
5-6,000 sq. ft. Residential	$89.05	×	1.02	≈	$91.00	×	2,000	=	$182,000
7,000+ sq. ft. Residential	$75.90	×	1.02	≈	$77.00	×	3,000	=	$231,000

- *Lakefront Units:* Units were assumed to be average construction with wood-siding, wood-frame and comprised of two stories.
- *5,000-6,000 and 7,000+ sq. ft. Residential:* Units were assumed to be custom construction. An average cost was estimated assuming units would be either wood-frame, wood-siding or wood-frame with stone-siding. Units were assumed to be two-story construction.

B. COMMERCIAL/NON-RESIDENTIAL DEVELOPMENT

Structures

Trendwest Properties supplied construction cost information for all planned non-residential construction, except for the Community Recreation Center and the Business Park. Construction cost derivations for each of the three project components are summarized below.

H-01

Community Recreation Center

Trendwest plans to dedicate a parcel of land for the development and operation of a Community Recreation Center. Specific plans have not yet been finalized, including specific dimensions and construction costs for potential building structures. Facilities could include an indoor swimming pool, a sports court, and ballfields. The facility would be operated by the Upper Kittitas County Community Center, a non-profit organization. Because specific plans have not yet been determined, the proposed Community Recreation Center has been excluded from the quantitative results of this study.

Business Park

The Business Park proposed under Alternative 5 is 950,000 square feet, the same as analyzed under Alternative 2. Assuming an average of 20,000 square feet per two-story office building, this would result in approximately 47 two-story office buildings.

Trendwest Properties, Inc. has speculated that Business Park space would likely be wood frame, two-story buildings. Accordingly, an average cost per square foot of roughly $57 was obtained. After adjusting for the location factor, the above specifications result in a total estimated cost per building of $1,160,000. Table III-4 summarizes potential construction costs of the Business Park under Alternative 5.

TABLE III-4: CLE ELUM UGA CONSTRUCTION COST CALCULATIONS FOR THE BUSINESS PARK UNDER ALTERNATIVE 5

	Average Cost per square foot		Location factor		Total Square Footage		Total Cost
Alternative 5	$57	×	1.02	×	950,000	=	$54,520,000

Assessed Value of Commercial/Non-Residential Development

The initial assessed value of non-residential development at the UGA is assumed to equal the construction cost of the item in year of completion. Each year thereafter, assessed values for tax purposes are assumed to increase at a rate of 5.4% annually in 2000 dollars. Detailed annual non-residential construction costs are found in EXHIBIT 1.01.

C. GEOGRAPHIC DISTRIBUTION OF CONSTRUCTION COSTS

All construction costs for UGA development are assumed to be incurred at the worksite by various contractors on a non-speculative basis.[1] Sales tax revenues on construction costs accrue to the jurisdiction with primary taxing authority in any particular year. Accordingly, the City of Cle Elum would receive sales tax on those transactions, less the standard 15% redistribution of sales tax receipts to the County.

[1] To the extent that construction is speculative, Cle Elum sales tax receipts from construction costs would be overstated.

H-01

D. UGA DEMOGRAPHICS

The UGA Demographics section outlines the assumptions made for modeling the quantity of occupants within the UGA, including household sizes, occupancy rates, and personal expenditures.

Residency

The following residence classifications and unit-specific assumptions are adopted from Hobson Johnson & Associates' Cle Elum UGA Occupant Analysis (Hobson Johnson & Associates, 1999b).

The analysis of Alternatives 2, 3 and 4 included two classifications of residences:

- *Primary Residence:* Property occupied year-round by full-time residents.
- *Non-Primary Residence:* Property occupied on an occasional basis (i.e. weekends and vacations) including tourists and owners of second homes.

Table III-5 shows the residency classification for Alternative 5.

TABLE III-5: RESIDENCY CLASSIFICATION OF CLE ELUM UGA RESIDENTIAL DEVELOPMENT, ALTERNATIVE 5

Type	Percent Non-Primary	Percent Primary
Lakefront Units	0%	100%
5-6,000 sq. ft. Unit Residential	0%	100%
7,000+ sq. ft. Unit Residential	0%	100%
Whole-Ownership Condos	0%	100%

Occupant Household Size

Table III-6 outlines the average household size for each dwelling type proposed under Alternative 5.

TABLE III-6: OCCUPANT HOUSEHOLD SIZES FOR RESIDENCES AT CLE ELUM UGA, ALTERNATIVE 5

Type	Household Size
Lakefront Units	2.4
5-6,000 sq. ft. Unit Residential	2.4
7,000+ sq. ft. Unit Residential	2.4
Whole-Ownership Condos	2.4

- *Day-Only Visitors:* This study assumes that annual day-only visitors will number approximately 5% of total residents. The figure is based on averages at master planned communities within JELD-WEN developments in 1997 (Trendwest Properties, 1998).

Occupant Expenditures

Assumptions made for estimating permanent occupant expenditures under Alternative 5 are identical to those found in the DEIS fiscal impact analysis, Appendix H. Annual expenditures by permanent

H-01

residents are assumed to follow patterns exhibited within Washington State. Because Alternative 5 does not include the lodge, golf course, timeshare condominiums, Washington State Horse Park or recreational RV park, temporary occupant expenditure assumptions for each of these excluded components are not utilized for this analysis.

IV. ESTIMATED UGA REVENUES

The following sections outline revenue sources for jurisdictions affected by the development of the Cle Elum UGA. As discussed previously, revenue estimates are in constant 2000 dollars to facilitate revenue comparisons between years. The following table provides a quick summary of average annual revenue estimates for each jurisdiction.

REVENUE SUMMARY FROM CLE ELUM UGA DEVELOPMENT ALTERNATIVE 5
(Average Annual 000's of Constant 2000 dollars)

Public Service	Alternative 5
State of Washington	$3.5-$4 million
Kittitas County	$600,000-$700,000
City of Cle Elum	$1-$1.5 million
City of Roslyn	$1,000 - $5,000
Town of South Cle Elum	<$1
City of Ellensburg	$40,000 - $50,000
School District No. 404	$900,000 - $950,000
Hospital District No. 2	$250,000 - $300,000

1/ Annual average reflects only those years where the agency holds service jurisdiction. See below for further discussion.
Source: Johnson Gardner 2001

Revenue Projections and Property Tax Initiatives

For most jurisdictions affected by development of the Cle Elum UGA, property tax is an important revenue source. Initiative 747 (I-747) passed in the November 2001 election limits general property tax revenues to 1% growth annually without voter approval.

The long-term effect of the passage of I-747 is uncertain at this time. The measure only applies to general levies[2] and only allows for property tax revenue growth exceeding 1% with voter approval. If public services suffer noticeably due to I-747, voters may decide to increase tax revenue at the local level. Voters could also vote to repeal or reform I-747 at a later date. Essentially, the real, long-term impact of I-747 is greatly speculative so soon after its approval.

Due to the uncertainty of I-747, property tax revenue analysis and detailed revenue estimates in this document do not reflect the potential effects of I-747. However, as the primary service provider to the Cle Elum UGA after annexation, the City of Cle Elum is particularly affected by fluctuations in

[2] Distinction between general levies and special levies is discussed later in this section. Simply, general levies are those property taxes that jurisdictions need not put before voters for approval.

H-01

property tax revenue collection. To give some perspective to future Cle Elum fiscal impacts if I-747 is binding, discussion of the potential impacts of I-747 to City of Cle Elum is found in this Revenues section, Net Impacts (Section VI) and Cumulative Impacts (Section VII).

A. STATE OF WASHINGTON

Summary for State of Washington

Table IV-1 summarizes potential State of Washington revenues under Alternative 5. Figures provided are for selected years of build-out. Figures under the last column, All Years, are the sum for each respective revenue source. EXHIBITS 2.01-2.07 provide detailed, annual revenue figures for each of the years of build-out. All revenue figures are estimates resulting from assumptions as outlined previously. The projections are not precise point estimates, but rather approximations. Further details of revenue flow differences are provided in discussions of specific revenue sources later in this section.

The State of Washington may receive average tax revenues ranging between $3.0 million and $3.5 million annually for all thirty years of build-out. Average, annual one-time revenues, largely due to construction incidence, may reach a range of between $900,000 and $1.0 million through the entire study period. Annual average recurring revenues, comprised largely of retail sales tax and property tax receipts, may range between $2.0 million and $2.5 million.

TABLE IV-1: STATE OF WASHINGTON REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Development Permit & Review Fees	<$1	<$1	<$1	<$1	<$1	$4
Sales Tax	$1,938	$2,091	$1,508	$1,861	$1,786	$56,473
B&O Tax	$128	$167	$129	$160	$157	$4,689
Real Estate Excise Tax	$146	$294	$202	$259	$304	$7,467
Property Tax	$0	$328	$581	$772	$935	$18,627
Motor Vehicle Fuel Tax	$30	$221	$271	$345	$381	$8,787
Timber Excise Tax	$2	$0	$0	$0	$0	$5
Total Revenues	*$2,243*	*$3,102*	*$2,691*	*$3,397*	*$3,563*	*$96,051*
One-Time Revenues	$2,079	$1,533	$614	$721	$524	$28,899
Recurring Revenues	$164	$1,549	$2,076	$2,676	$3,039	$67,152

Note: totals may not sum due to rounding
Source: Johnson Gardner 2001

Projected State revenues would likely not impact current State totals significantly. Assuming all inflow would contribute to the General Fund, Year 1 total revenues for would amount to less than one-tenth of one-percent of the $14.1 billion General Fund total in 1998 (State of Washington Office of Financial Management, 1999). Through the build-out period, annual average revenues would still amount to roughly less than one-tenth of one-percent of the 1998 General Fund total. Impacts of specific revenue sources would be roughly similar in scale.

H-01

Revenue Sources

Detailed information about each revenue source for the State of Washington is found below. Annual calculations for each revenue source may be found in EXHIBITS 2.01-2.07. Technical explanation of each revenue source and its mechanism are found in Appendix H of the Draft EIS. If a tax, fee or other revenue source has been altered by legislation or local policy since the publication of the Draft EIS, appropriate explanation is provided below.

Development Review Fees

Building code fee revenues would likely never exceed $1,000 in any particular year for all development alternatives. Fee revenue under Alternative 5 may likely be the greatest among all development alternatives, given the greater number of individual structures planned, primarily single family residential. EXHIBIT 2.02 provides detailed, annual permit fee revenues for Alternative 5.

Retail Sales Tax

Table IV-2 below provides a summary of State sales tax revenue due to both construction and occupant expenditure activities.

TABLE IV-2: STATE OF WASHINGTON RETAIL SALES TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Construction	$1,814	$1,174	$385	$431	$205	$20,011
Resident Spending	$124	$917	$1,124	$1,431	$1,581	$36,462
Total Revenues	*$1,938*	*$2,091*	*$1,509*	*$1,862*	*$1,786*	*$56,473*

Note: Totals may not sum due to rounding
Source: Johnson Gardner 2001

Average annual revenues under Alternative 5 are projected to range between $1.5 to $2 million. As Table IV-2 demonstrates, average annual sales tax revenue from construction would likely range from $600,000 to $700,000. Growing from roughly $125,000 to the neighborhood of $1.5 million, tax revenues from resident spending are projected to average $1.0 million to $1.5 million annually.

Business & Occupation Tax (B&O)

Table IV-3 below provides a summary of potential business and occupation tax revenues for various years of the analysis due to the development of the UGA. Detailed, annual tables of estimates are found in EXHIBIT 2.04. Engineering and consulting fees, included as part of pre-development costs, are subject to the Select Business Services B&O tax rate and are reported separately in Table IV-3. Annual average revenues are projected to reach the range of $150,000 to $200,000 for the study period, growing from $128,000 in Year 1 to over $150,000 by Year 30.

H-01

TABLE IV-3: STATE OF WASHINGTON BUSINESS & OCCUPATION TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Tax on Retail Services	$126	$167	$129	$160	$157	$4,675
Tax on Select Business Services[1]	$2	$0	$0	$0	$0	$14
Total B&O Tax Revenues	*$128*	*$167*	*$129*	*$160*	*$157*	*$4,689*

1 Tax on Select Business Services would occur between Project Years 1 and 5 and would total an estimated $14,000.
Source: Johnson Gardner 2001

Real Estate Excise Tax

Table IV-4 below summarizes total estimated real estate excise tax revenue over the course of the first thirty years of the UGA under Alternative 5. Detailed annual estimates for REET revenue are found in EXHIBIT 2.05.

TABLE IV-4: STATE OF WASHINGTON REVENUES FROM THE REAL ESTATE EXCISE TAX DUE TO THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Residential Property Sale Value	$11,532	$21,622	$15,937	$20,447	$23,970	$581,226
Business Park Property Sale Value[1]	$0	$1,600	$0	$0	$0	$8,000
Total Revenues from Excise Tax	*$146*	*$294*	*$202*	*$259*	*$304*	*$7,467*

1 For the purpose of this fiscal analysis, timing of Business Park land sales was assumed to occur in even increments between Years 2 and 6.
Source: Johnson Gardner 2001

The scope of single-family residential development under Alternative 5 would likely result in State REET revenues in the range of $200,000 to $250,000 annually on average throughout the thirty-year build-out.

Property Tax

With annual tax assessment occurring after August 1 of each year, only new construction finished before that date is added to the current year tax base. Therefore, only a portion of new construction in any year is actually added to the year's tax base, thus delaying revenues from new construction for affected jurisdictions. Based on an assessment of likely annual construction scheduling by (Trendwest Properties, 2001), it was assumed that 55% of annual new construction would occur before August 1. Therefore, 45% of finished construction in any year is delayed one year for assessment and taxation.

Table IV-5 below provides a summary of State property tax revenue for selected years under Alternative 5. Annual total assessed values for construction, levy rates, and property tax revenue estimates are found in EXHIBIT 2.06.

H-01

Under Alternative 5, the State could expect to receive annual average property tax revenues of between $600,000 and $700,000. Alternative 5 poses the greatest scale of residential development, and thus greatest potential tax revenue from residential assessment.

TABLE IV-5: STATE OF WASHINGTON PROPERTY TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Property Tax Revenues	*$0*	*$328*	*$581*	*$772*	*$935*	*$18,627*

Source: Johnson Gardner 2001

Based on historical trends, the State levy rate in Kittitas County would decrease from roughly $3.21 per $1,000 of assessed value to approximately $0.94 per $1,000 of assessed value. Across the thirty-year build-out, the average annual levy rate may register at nearly $1.42 per $1,000 of assessed property value. The decrease in the State levy rate is based on the first reduction in the rate since Referendum 47.

Because there have been few observed changes in the levy since the new law, it is difficult to reliably project the probable levy rate trend through UGA build-out. Furthermore, annual, real changes may be slightly greater than the 4.1% assumed for this analysis due to the passage of I-747 in November of 2001. As described previously, due to the uncertainty of I-747 and its effects at the present time, a detailed analysis of the effects of I-747 on the entire State of Washington property tax revenue system is beyond the scope of this analysis.

Timber Excise Tax

Due to the greater dedication of open space, timber excise tax revenues are anticipated to be somewhat lower under Alternative 5 than under Alternatives 2, 3 and 4 and would total $5,000.

Motor Vehicle Fuel Tax

Table IV-6 below provides estimated potential motor vehicle fuel tax revenues for the State of Washington over the projected thirty-year build-out period of Cle Elum UGA under Alternative 5.

TABLE IV-6: STATE OF WASHINGTON MOTOR VEHICLE FUEL TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Fuel Expenditures	$129	$961	$1,177	$1,499	$1,656	$38,202
Total Revenues ($.023/gallon)	$30	$221	$271	$345	$381	$8,787

Source: Johnson Gardner 2001

Annual revenues are projected to average between $250,000 and $300,000. Average annual fuel expenditures under Alternative 5 are expected to be lower than other alternatives given the exclusion of tourist/commercial components. Spending on fuel is expected to average $1 million to $1.5 million annually.

H-01

B. KITTITAS COUNTY

Table IV-7 summarizes the major sources of incremental tax revenue for Kittitas County due to UGA build-out and operations. Designation of revenue sources as one-time or recurring is also summarized.

TABLE IV-7: KITTITAS COUNTY REVENUE SOURCES FROM DEVELOPMENT OF CLE ELUM UGA

Revenue Source	One-Time or Recurring
Development Permit & Review Fees[3]	One-Time
Retail Sales Tax	Recurring
Real Estate Excise Tax (REET) Fees	One-Time
Property Tax	Recurring
Shared Revenues	Recurring

Below is a summary of County revenue projections for the sources listed above. Following are separate discussions of each County tax revenue source and projected inflows for Alternative 5.

Summary for Kittitas County

Table IV-8 summarizes potential Kittitas County revenues under development Alternative 5. EXHIBITS 2.01-2.07 provide detailed, annual revenue figures for each of the years of build-out.

TABLE IV-8: KITTITAS COUNTY REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Development Permit & Review Fees	$263	$121	$48	$52	$32	$2,383
Retail Sales Tax	$48	$71	$95	$120	$126	$3,182
Real Estate Excise Tax	$2	$4	$2	$3	$4	$90
Property Tax	$0	$158	$303	$466	$652	$11,123
Shared Revenues	$0	$65	$108	$138	$158	$3,346
Timber Excise Tax	$5	$0	$0	$0	$0	$14
Total Revenues	*$499*	*$419*	*$557*	*$779*	*$972*	*$20,138*
One-Time Revenues	$492	$151	$59	$65	$40	$2,949
Recurring Revenues	$7	$267	$498	$714	$931	$17,189

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

[3] The City of Cle Elum has discussed establishing a new building department responsible for permitting construction within the city. In that event, Kittitas County revenues would be decreased by the value of development permit and review fee projections, which would shift to the City of Cle Elum.

H-01

Kittitas County is projected to receive annual average tax revenues from between $600,000 and $700,000. Annual average one-time revenues, largely due to construction incidence, are projected to range from between $90,000 and $100,000. Because construction incurs the greatest share of one-time revenues, the County could expect the most of this inflow to occur by Year 10. Recurring revenues, comprised largely of property tax and retail sales tax receipts, are projected to average between $500,000 and $600,000 annually.

Alternative 5 is not expected to generate as much tax revenue for the County as other alternatives with tourist facilities. Non-primary occupants, i.e. tourists, generally spend a greater amount per day than regular, full-time residents. The result is lower taxable economic activity, even though Alternative 5 poses significant residential development.

However, projected revenues would measurably impact current County totals. Average annual revenue estimates under Alternative 5 would amount to a two percent increase in the $28.6 million County total for 1999 (Kittitas County, 1999).

Kittitas County Revenue Sources

Below are detailed analyses of each revenue source and potential revenue flow from each as the UGA, as developed over the thirty-year study period. Tax sources affected by development of Alternative 5 do not differ from those explained in the DEIS fiscal impact analysis, Appendix H. Unless noted, tax mechanisms and related assumptions for this analysis are identical to those found in the DEIS. Full schedules of annual revenue levels from each source are found in EXHIBITS 2.01-2.07.

Development Permits and Review Fees

UGA development will require numerous permit reviews and inspections from the City of Cle Elum, which currently contracts with Kittitas County for these services. The City of Cle Elum would collect twenty percent of fee revenues, while the County would retain the remaining eighty percent (Telephone interview with Delilah Bannister, 1999). As noted earlier, the City of Cle Elum may establish a new building department. If this occurs, permit and fee revenues discussed below would be retained the City of Cle Elum rather than distributed to Kittitas County as discussed below. However, because the department has not yet been established, this study assumes the continuation of the present arrangement.

All development permit and review fee details and assumptions for this analysis are identical to those found in the DEIS fiscal impact analysis, Appendix H. In the specific case of Alternative 5, building permit fees for residential units are identical to those found in the previous analysis. Business Park building permit fees for Alternative 5 would be identical to those for Alternative 2, which proposes the same sized park at 950,000 square feet.

Permit and Review Fee Revenue Estimates

Table IV-9 below summarizes potential development fee revenues for Alternative 5 assuming Kittitas County retains permit and review duties. Detailed annual development and review fee revenues to the County under this scenario are found in EXHIBIT 2.02.

H-01

TABLE IV-9 KITTITAS COUNTY REVENUES FROM DEVELOPMENT REVIEW AND INSPECTION FEES GENERATED BY BUILD-OUT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Permit Issuance Fee	<$1	<$1	<$1	<$1	<$1	$17
Dwelling Unit Fee	<$1	<$1	$0	$0	$0	$1
Basic Building Permit	$44	$51	$14	$16	$4	$850
Plan Review	$26	$29	$7	$8	$2	$466
Mechanical Permit	$4	$4	$1	$1	$0	$54
Fire & Life Safety Plan Review	$1	$1	$0	$0	$0	$10
Sprinkler Permit and Review	$3	$2	$0	$0	$0	$22
Permits & Fees for Other Development	$185	$33	$26	$26	$26	$1238
Total Revenues	*$263*	*$121*	*$48*	*$52*	*$32*	*$2,658*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Retail Sales Tax

Table IV-10 below summarizes retail sales tax revenue from the construction and commerce of the UGA over the thirty-year study period for Alternative 5. Unlike Alternatives 2, 3 and 4, Alternative 5 does not include a lodge or other hotel/motel tax-generating development. As such, the following analysis only considers County retail sales tax projections. Detailed annual estimates of sales tax revenue for Kittitas County are found in EXHIBIT 2.03.

TABLE IV-10: KITTITAS COUNTY RETAIL SALES TAX CONSTRUCTION AND COMMERCE OF CLE ELUM UGA: ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Construction	$42	$27	$9	$10	$5	$462
Spending	$6	$44	$86	$110	$122	$2,720
Total Sales Tax Revenues:	*$48*	*$71*	*$95*	*$120*	*$127*	*$3,182*

Source: Johnson Gardner 2001

Alternative 5 would generate lower retail sales tax revenues created by Alternatives 2, 3 and 4. Total sales tax revenues would average approximately $100,000 annually, compared to the other development alternatives. Approximately $90,000 to $100,000 of the annual total would be due to UGA resident spending. Sales tax revenues would be significant for the current Kittitas County tax base. Average annual revenues under Alternative 5 would make roughly a 5%-10% contribution to the projected, 1999 County retail sales tax inflow of $1.8 million (Kittitas County, 1999).

Real Estate Excise Taxes

Table IV-11 below summarizes total estimated real estate excise tax revenue to the County over the course of the thirty-year study period under Alternative 5. Detailed annual estimates for REET revenue are found in EXHIBIT 2.05.

H-01

TABLE IV-11: KITTITAS COUNTY REVENUES FROM REAL ESTATE EXCISE TAX FEES DUE TO THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Residential Property Sale Value	$11,532	$21,622	$15,937	$20,447	$29,970	$561,226
Business Park Property Sale Value[1]	$0	$1,600	$0	$0	$0	$8,000
Total Revenues from Excise Tax	*$2*	*$4*	*$2*	*$3*	*$4*	*$90*

1 For the purpose of this fiscal analysis, timing of Business Park land sale was assumed to occur in even increments between Years 2 and 6.
Source: Johnson Gardner 2001

Given its scope of residential development, Alternative 5 unsurprisingly poses substantial real estate sales annually. Accordingly, the County may receive as much as $2,000 to $4,000 annually from real estate excise tax fees. Average revenues under Alternative 5 would make roughly a 5% to 10% contribution to the projected, 1999 County REET inflow of $30,725 (Kittitas County, 1999).

Property Taxes

As with State property tax revenue projections discussed above, County property tax revenue projections also reflect the new assumption that 55% of annual new construction will occur before August 1, thus delaying 45% of tax revenues from new construction each year to the following tax year.

Table IV-12 below provides estimated property tax revenues for Kittitas County for selected years under Alternative 5. Detailed annual estimates for Kittitas County property tax revenues are found in EXHIBIT 2.06.

TABLE IV-12: KITTITAS COUNTY PROPERTY TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Alternative 5 Revenue Source	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
General Levy						
Total Revenues	$0	$158	$303	$466	$652	$11,123

1/ Tax per $1,000 of assessed property value.
Source: Johnson Gardner 2001

Revenues from the general levy would likely be substantial under Alternative 5, which would feature the greatest scale of single-family residential construction. Annual average revenues are projected between $350,000 and 400,000. Across the study period, roughly 4% of all property tax revenues would come new annual construction annually and the remaining from existing UGA property.

Property tax revenues from the UGA would be significant for the current Kittitas County tax base. Average annual revenues under Alternative 5 would make roughly a 10%-15% contribution to the projected, 1999 County current expense property tax inflow of $2.9 million (Kittitas County Assessor's Report, 1999).

H-01

As a result of assumptions for property tax analysis, the County general levy rate is projected to decrease from roughly $1.44 per $1,000 of assessed value to approximately $0.65 per $1,000 of assessed value in all three development alternatives. The thirty-year decline would amount to roughly a 44% decrease from the 1998 levy of $1.48 per $1,000 of assessed value. Over time, decreases in levy rates would likely be more accelerated if voters do not approve property tax revenue increases greater than provided for in Initiative 747. However, due to the uncertainty of I-747, detailed, specific projections of the effects on the Kittitas County property tax system are beyond the scope of this analysis. The following summarizes possible outcomes and their effects on levy rates.

- *Increased County Spending:* Slower reductions in levy rates, as more revenue is needed. As previously noted, special circumstances and a resulting supermajority vote can in fact increase budgets by more than the rate of inflation.
- *Higher Growth in Property Values/New Construction:* Further reductions in levy rates given a larger relative tax base value.
- *Lower Growth in Property Value/New Construction:* Slower reductions in levy rates due to slower increases in the tax base.

Shared Revenues

Table IV-13 provides County revenue estimates for selected years of build-out under Alternative 5, assuming the master planned community is fully developed by Year 30. Detailed, annual estimates for shared revenues for Kittitas County are found in EXHIBIT 2.07.

TABLE IV-13: KITTITAS COUNTY SHARED REVENUES FROM THE DEVELOPMENT OF THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Motor Vehicle Fuel Tax ($50/capita)	$0	$65	$108	$137	$157	$2,827
Liquor Excise Tax:	$0	<$1	<$1	<$1	<$1	$12
Share from Cle Elum (2%)						
Total Shared Revenues	*$0*	*$65*	*$108*	*$108*	*$158*	*$3,346*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Kittitas County would likely receive greater shared revenues under Alternative 5 than under any other development plan. Average annual shared revenues are projected between $100,000 and $150,000. The vast majority would be from distributions of the motor vehicle fuel tax, at $90,000 to $100,000 annually.

Average annual revenues under Alternative 5 would amount roughly to a 25%-30% increase in the projected 1999 County shared revenue inflow of $391,000 (Kittitas County, 1998).

C. CITY OF CLE ELUM

Under Alternative 5, the City of Cle Elum would receive tax revenues from identical sources identified for Alternatives 2, 3 and 4 as discussed in the DEIS fiscal impact analysis, Appendix H. The only exception is the exclusion of the City hotel/motel tax due to the omission of the lodge in Alternative 5. Detailed discussion of each tax source may be found in Appendix H of the Draft EIS.

H-01

Summary for City of Cle Elum

Table IV-14 summarizes potential City revenues under each of development Alternative 5. EXHIBITS 2.01-2.07 provide detailed, annual revenue figures for each of the years of build-out.

TABLE IV-14: CITY OF CLE ELUM REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Development Permit & Review Fees	$66	$30	$12	$13	$8	$596
Retail Sales Tax	$241	$183	$74	$87	$61	$3,425
Real Estate Excise Tax	$29	$57	$39	$51	$59	$1,458
Property Tax	$0	$279	$586	$1,072	$1,785	$25,666
Shared Revenues	$0	$42	$69	$88	$101	$2,143
Total Revenues	*$336*	*$591*	*$781*	*$1,311*	$2,014	$33,289
One-Time Revenues	$332	$241	$102	$120	$94	$4,671
Recurring Revenues	$4	$350	$679	$1,191	$1,919	$28,618

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Average annual tax revenues are projected between $1 million and $1.5 million under Alternative 5. Annual one-time revenues, largely due to construction incidence, may average between $150,000 and $200,000 through the entire study period. Recurring revenues may average between $900,000 and $1 million annually.

After a two-year property tax lag, the City of Cle Elum would likely experience the greatest tax revenue impact from development under Alternative 5. Average revenues under Alternative 5 would likely exceed estimates for Alternative 3, the most similar of the other alternatives, though not by a great amount. Reasons for the revenue difference are summarized as follows:

- *Residential Impact:* Planned development under Alternative 5 poses the greatest residential scope among the alternatives. Accordingly, property tax revenues, real estate excise taxes and development fee revenues are greatest under the fifth alternative.
- *Permanent Population Impact:* Alternative 5 comprises the greatest primary resident population impacts among the alternatives. Accordingly, shared revenues will likely be greatest under Alternative 5.

Projected tax revenues would measurably impact current City totals. Average annual tax revenues under Alternative 5 would amount to a 200%-250% increase in the $451,890 total tax-based revenues[4] for 1999 (City of Cle Elum, 1999).

[4] Excludes intergovernmental grants, non-building licenses and permits, fines, forfeitures, donations, and other non-tax-based revenues.

H-01

City of Cle Elum Revenue Sources

The following subsections provide detailed discussions of estimated revenues from each potential tax and fee source mentioned above for the City of Cle Elum. Assumptions required for City revenue analysis from each source are identical to those discussed in the DEIS fiscal impact analysis, Appendix H, unless specifically noted. Full schedules of annual revenue levels from each source are found in EXHIBITS 2.01 - 2.07.

Development Permits and Review Fees

Permit and Review Fee Revenue Estimates

As described previously, the City of Cle Elum has discussed establishing a new building department responsible for permitting construction within the city. In that event, City of Cle Elum revenues would be increased by the value of development permit and review fee projections currently assigned to the County. This analysis assumes the current arrangement between the City and the County.

The following summarizes potential development fee revenues for Alternative 5. Detailed annual development and review fee revenue for Cle Elum is found in EXHIBIT 2.02.

Under Alternative 5, annual average permit fee revenues were estimated at between $10,000 and $15,000. Annual average permit revenues for basic building permits and plan review fees were estimated between $1,000 to $5,000 each. Revenue estimates for Alternative 5 are summarized in Table IV-15 below.

TABLE IV-15: CITY OF CLE ELUM REVENUES FROM DEVELOPMENT REVIEW AND INSPECTION FEES GENERATED BY BUILD-OUT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Permit Issuance Fee	<$1	<$1	<$1	<$1	<$1	$2
Dwelling Unit Fee	<$1	<$1	$0	$0	$0	<$1
Basic Building Permit	$11	$13	$3	$4	$1	$95
Plan Review	$6	$7	$2	$2	<$1	$50
Mechanical Permit	$1	<$1	<$1	<$1	<$1	$5
Fire & Life Safety Plan Review	<$1	<$1	$0	$0	$0	<$1
Sprinkler Permit and Review	$1	<$1	$0	$0	$0	<$1
Permits & Fees for Other Development	$46	$8	$7	$7	$7	$168
Total Revenues	*$66*	*$30*	*$12*	*$13*	*$8*	*$320*

Notes: Figures may not sum due to rounding. Revenue projections assume the existing split of development review and inspection duties between the City and the County.
Source: Johnson Gardner 2001

UGA development would contribute significantly to the current permit-fee revenue base. The City of Cle Elum projected $26,000 in building permit revenues for 1999 (City of Cle Elum, 1999).

H-01

Average annual revenues under Alternative 5 would amount to a 40% to 50% increase in 1999 projected City fee inflow (under existing development review conditions).

Retail Sales Tax

Table IV-16 below summarizes retail sales tax revenue from the construction and commerce of the UGA over the thirty-year study period for Alternative 5. Detailed annual estimates of sales tax revenue for Cle Elum are found in EXHIBIT 2.03.

Average annual sales tax revenues under Alternative 5 are projected between $100,000 to $150,000. Sales tax revenue potential would be lowest under Alternative 5, compared to the other development alternatives.

TABLE IV-16: CITY OF CLE ELUM RETAIL SALES TAX REVENUE IMPACTS FROM CONSTRUCTION AND COMMERCE OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Construction	$237	$153	$50	$56	$27	$2,617
Spending	$4	$30	$24	$30	$34	$808
Total Sales Tax Revenues:	*$241*	*$183*	*$74*	*$86*	*$61*	*$3,425*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Although sales tax revenues would be lower under Alternative 5 than under the other development alternatives, they would still represent a significant contribution to the current Cle Elum tax base. Average annual revenues under Alternative 5 would make roughly a 30%-40% contribution to the projected 1999 City retail sales tax inflow of $300,000 (City of Cle Elum, 1998).

Real Estate Excise Taxes

Table IV-17 below summarizes total estimated real estate excise tax revenue to the City over the course of the first thirty years of the UGA under Alternative 5. Detailed annual estimates for REET revenue are found in EXHIBIT 2.05. As utilized in the UGA DEIS, the City REET is $0.0025 per $1 of property value transacted. This applies to new residential land sales, residential property and land re-sales, as well as Business Park land sales. Residential land sales assumptions are identical to those in the UGA DEIS.

TABLE IV-17: CITY OF CLE ELUM REVENUES FROM THE REAL ESTATE EXCISE TAX DUE TO THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Residential Property Sale Value	$11,532	$21,622	$15,937	$20,447	$29,970	$561,226
Business Park Property Sale Value[1]	$0	$1,600	$0	$0	$0	$8,000
Total Revenues from Excise Tax	*$29*	*$57*	*$39*	*$51*	*$59*	*$1,458*

1 For the purpose of this fiscal analysis, timing of Business Park land sale was assumed to occur in even increments between Years 2 and 6.
Source: Johnson Gardner 2001

H-01

Given its scope of residential development and comprising the planned 950,000 square foot Business Park, Alternative 5 poses the greatest potential REET revenues for the City among the alternatives. Average annual REET revenues under Alternative 5 are projected between $40,000 to $50,000.

REET revenues would be significant for the current City tax base. Average annual revenues under Alternative 5 would make roughly a 300% to 350% contribution to the projected, 1999 Cle Elum REET inflow of $13,800 (City of Cle Elum, 1998).

Property Taxes

As with State and County property tax revenue estimates, this analysis assumes that 55% of all new construction annually will occur before August 1. As a result, 45% of all new construction in a given year will not be assessed for the current tax year, but rather the following year.

Table IV-18 below provides estimated property tax revenues for the City of Cle Elum for selected years. Detailed annual estimates for Cle Elum property tax revenues are found in EXHIBIT 2.06 for Alternative 5.

Under Alternative 5, average annual property tax revenue are projected between $800,000 and $900,000. Roughly 97% of property tax revenues would be recurring from existing UGA property after it is constructed; the City could receive $20,000 to $30,000 annually from new construction assessment, assuming the thirty year build-out schedule.

TABLE IV-18: CITY OF CLE ELUM PROPERTY TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Property Tax Revenues	$0	$279	$586	$1,072	$1,785	$25,666

Source: Johnson Gardner 2001

Property tax revenues would be significant for the current Cle Elum revenue flow. Average annual projected revenues under Alternative 5 would make roughly a 350%-400% contribution to the projected 1999 City property tax inflow of $240,285 (Kittitas County Assessor's Report, 1999).

I-747 Effects

The practical effect of I-747 would be smaller increases in annual City property tax revenues coinciding with a growing City tax base due to new development, including the Cle Elum UGA, and inherent real estate value growth. The result is accelerated downward pressure on the City levy rate. As stated earlier, property tax revenue estimates summarized in Table IV-19 assumes an annual, real levy rate decline of 1% based on the City's tax history. Under I-747, the levy rate would undoubtedly drop at a faster rate.

Because the levy rate is ultimately determined by the total City assessed value and the City's annual property tax levy amount, projections of future City levy rates is difficult considering voters may approve property tax revenues in excess of the natural cap dictated by I-747. However, City of Cle

H-01

Elum fiscal consultant (Microflex, Inc., 2001) has modeled the potential impacts of I-747 on City property tax revenues, which are summarized in the following table.

TABLE IV-19. CITY OF CLE ELUM PROPERTY TAX REVENUES GENERATED BY THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5: INITIATIVE 747
(000's of Constant 2000 dollars)

Source of Revenue	Year 2	Year 4	Year 6	Year 8	Year 10
Alternative 5 without I-747					
Property Tax Levy Rate	$2.3654	$2.3183	$2.2722	$2.2270	$2.1827
Alternative 5 with I-747					
Property Tax Levy Rate	- - -	$2.3150	$2.1928	$2.0519	$1.9054
Levy Rate Decrease due to I-747	*$0*	*$0.0033*	*$0.0794*	*$0.1751*	*$0.2773*
Percentage Decrease (%)	0%	<1%	3.5%	7.9%	12.7%

Source: Microflex, Inc. 2001

I-747-induced decreases in property tax revenues from the Cle Elum UGA, resulting from accelerated drops in levy rate, would be of most concern in the first ten years of development given lags in the receipt of property taxes. If Cle Elum voters do not approve tax increases above 1%, voter-approved Initiative 747 would have measurable impacts upon property tax revenues generated by Cle Elum UGA development. The effective City levy rate is projected to decline faster under I-747 than without the tax measure by an average of 1.3% annually. After one decade, the City levy rate could be as much as an estimated 12.7% lower under I-747 than it would otherwise, and by extension, would City property tax revenues.

Shared Revenues

Table IV-20 provides City revenue estimates for selected years for Alternative 5, assuming the master planned community is fully developed by Year 30. Detailed, annual estimates for shared revenues for Kittitas County is found in EXHIBIT 2.07 for Alternative 5.

TABLE IV-20: CITY OF CLE ELUM SHARED REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Alternative 5 Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Primary Occupant Population	243	1,808	2,215	2,819	3,115	71,858
Motor Vehicle Fuel Tax ($23 per capita)	$0	$30	$50	$64	$73	$1,548
Liquor Sales Tax ($9 per capita)	$0	$12	$20	$25	$29	$607
Less: 2% Distribution to County	$0	<$1	<$1	$1	$1	$12
Net Liquor Sales Tax	$0	$12	$20	$24	$28	$595
Total Shared Revenues	*$0*	*$42*	*$69*	*$88*	*$101*	*$2,143*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

H-01

The City of Cle Elum would likely receive greater shared revenues under Alternative 5 than the other development plans. Under Alternative 5, annual average revenues are projected to range from $70,000 to $80,000. Permanent population would be greatest under Alternative 5, driving the higher shared revenues.

Average annual revenues under Alternative 5 would amount roughly to a 110%-120% increase in the projected 1999 City motor vehicle fuel tax and liquor sales tax revenue inflow of $57,654 (City of Cle Elum, 1998).

Utility Service Revenues

City of Cle Elum is developing a regional water supply system and a planning a regional wastewater treatment plant to serve the City, the UGA, the Town of South Cle Elum, and the MPR (refer to Section 3.16, Utilities, of the Final EIS for additional information). Trendwest Properties would contribute to funding for construction costs of the water and wastewater treatment facilities, in addition to providing a site on its property within the UGA for the water treatment facility. The City and Trendwest entered into a Water Supply System Project Development Agreement on June 2001. The agreement on the regional wastewater project is not yet finalized; construction costs would be prorated among parties in a yet undetermined manner (Telephone interview with Mike Moyer, 1999). Specific revenue estimates resulting from the utility agreements have not been estimated.

Indirect Revenues

Potential indirect revenue impacts to the City of Cle Elum would be generated by employment population and induced growth. Refer to the DEIS fiscal impact analysis, Appendix H for additional detail on types of revenue impacts.

D. CITY OF ROSLYN

The City of Roslyn will not hold direct jurisdiction at the UGA. As a result, direct revenue impact on Roslyn will likely be limited to sales tax on off-site expenditures by UGA occupants.

Retail Sales Tax

Table IV-21 below summarizes retail sales tax revenue from commerce of the UGA over the thirty-year study period for Alternative 5. Detailed annual estimates of sales tax revenue for Roslyn are found in EXHIBIT 2.03.

TABLE IV-21: CITY OF ROSLYN RETAIL SALES TAX REVENUE IMPACTS FROM OPERATION OF THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5 Spending	$1	$6	$4	$5	$5	$129

Source: Johnson Gardner 2001

Alternative 5 would likely generate the lowest retail sales tax revenue for the City of Roslyn compared to the other development alternatives. Again, Alternative 5 excludes tourist facilities, thus

H-01

retail spending will be lower per capita under Alternative 5 compared to the other development alternatives, Average annual revenues under Alternative 5 are projected to range from $1,000 to $5,000. Revenue flow would be restricted to spending by permanent occupants of the UGA and some construction expenditures.

Sales tax revenues would not be insignificant for the Roslyn tax base. Average annual revenues under Alternative 5 would make roughly a 10% contribution to projected, 1999 City retail sales tax inflow of $42,000 (City of Roslyn, 1998).

Indirect Revenues

Alternative 5 will pose identical types of indirect revenues to the City of Roslyn, with the exception of lower numbers of visits from tourists as a result of the exclusion of tourist facilities from Alternative 5. Further details of potential indirect impacts may be found in Appendix H of the DEIS.

E. TOWN OF SOUTH CLE ELUM

Revenue impacts to the Town of South Cle Elum will be identical to those identified in the DEIS fiscal impact analysis, Appendix H, with the exception of tourist-related revenues. Additional discussion of South Cle Elum impacts may be found in that document.

F. CITY OF ELLENSBURG

Similar to analysis in the DEIS fiscal impact analysis, Appendix H, the City of Ellensburg will receive off-site visits by UGA occupants and associated retail sales tax revenues.

Retail Sales Tax

Table IV-22 below summarizes retail sales tax revenue from development of the UGA over the thirty-year build-out period. Detailed annual estimates of sales tax revenue for the City of Ellensburg are found in EXHIBIT 2.03.

Average annual revenues under Alternative 5 are projected to range from $40,000 to $50,000.

TABLE IV-22: CITY OF ELLENSBURG RETAIL SALES TAX REVENUE IMPACTS FROM DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Sales Tax Revenues:	*$6*	*$41*	*$36*	*$46*	*$51*	*$1,218*

Source: Johnson Gardner 2001

Indirect Revenue

Potential indirect impacts to Ellensburg under Alternative 5 are nearly identical to those identified in the DEIS fiscal impact analysis, Appendix H.

H-01

G. CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404

Like analysis for Alternatives 2, 3 and 4, School District No. 404 revenues are projected from both a bond fund property tax levy and a maintenance and operations (M&O) property tax levy. Both sources are discussed in detail, including required assumptions and tax mechanisms, in Appendix H of the DEIS. Because revenue analysis differs only slightly, as explained below, details of district revenue methodology may be found in the DEIS fiscal impact analysis, Appendix H. This analysis assumes the District will continue to fund revenue needs through both types of levies. However, voters may reject proposed levies. Levy uncertainty is discussed further, below.

Revenue methodology has been changed to reflect the assumption that only 55% of new construction annually would occur before August 1, thus 45% is assessed for the following tax year rather than the current year, i.e. a one-year lag.

Revenue Estimates

Table IV-23 below provides estimated property tax revenues for School District No. 404 for selected years under Alternative 5. Detailed annual estimates for school district property tax revenues are found in EXHIBIT 2.06 for Alternative 5. As described above, revenue projections are not automatic and are contingent upon the assumption that voters approve future M&O and bond levies.

In Years 1 through 12, Alternative 5 is projected to contribute a significant share of bond repayment (18 percent) compared to the existing level of school district assessed value. Under Alternative 5, the bond levy rate is estimated to decline from the 2000 rate of $1.1836 per $1,000 assessed value to $0.8003 per $1,000 assessed value. It is important to note that the above levy rate decreases assume that the existing District 404 assessed value will remain constant through Year 30. To the extent that the present District tax base grows in value rather than remaining constant, levy rates would decrease faster than expressed in Table IV-22 and EXHIBIT 2.06.

TABLE IV-23: CLE ELUM/ROSLYN SCHOOL DISTRICT PROPERTY TAX REVENUES GENERATED BY DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Alternative 5 Revenue Source	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Bond Levy						
Total Revenues (All Property)	$778	$778	$780	$972	$1,338	$28,006
Levy Rate	1.1577	0.9820	0.8295	0.8003	0.8003	---
Revenue from UGA Development	$0	$119	$223	$435	$800	$10,622
M&O Levy						
Total Revenues	$0	$154	$341	$691	$1,272	$16,679
Existing UGA Property	$0	$88	$328	$680	$1,266	$16,195
New Property	$0	$66	$14	$11	$5	$484
TOTAL REVENUE CAPACITY	*$0*	*$273*	*$564*	*$1,126*	*$2,072*	*$27,301*

1/ Expressed as tax per $1,000 of assessed property value.
Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

H-01

After Year 12, the District would no longer face the existing bond obligation. At that time, the District may or may not need another bond issue. Though this analysis does not assume that the District will need another issue, bond levy revenue capacity was projected through Year 30 to illustrate the potential contribution of UGA development to such a bond measure. Similarly to above, Alternative 5 poses significant bond revenue capacity for the District. UGA-generated revenue capacity under Alternative 5 could climb from approximately $267,000 in Year 13 up to approximately $800,000 by Year 30.

M&O levy revenue capacity would also likely be substantial under Alternative 5 due to significant assessed value growth. Revenue potential is projected to climb from between $20,000 and $30,000 in Year 3 to over $1.2 million by Year 30. The School District could then anticipate recurring revenues in the neighborhood of $1.3 million annually after full build-out.

Rather than holding constant, M&O levy rates could change significantly over the next thirty years, depending upon District revenue needs and local voter preferences. The following summarizes possible outcomes and their effects on levy rates.

- *Increased District Revenue Needs:* Slower reductions in levy rates as more revenue is needed.
- *Decreased District Revenue Needs:* Further reductions in levy rates due to lower revenue needs.
- *Higher Growth in Property Values/New Construction:* Further reductions in levy rates given a larger relative tax base value.
- *Lower Growth in Property Value/New Construction:* Slower reductions in levy rates due to slower increases in the tax base.
- *Rejection of M&O Levy:* As in 1997-98, local voters could reject a new M&O levy, setting the district back at least two years for maintenance and operations revenues.

UGA development poses significant impacts to the Cle Elum/Roslyn School District tax base. Average annual revenue capacity under Alternative 5 would make roughly a 130% to 140% contribution to 1998-1999 district property tax inflow of $650,000, including both levies (Kittitas County Assessor's Report, 1999).

H. KITTITAS COUNTY HOSPITAL DISTRICT NO. 2

Hospital District No. 2 currently has primary emergency medical service (EMS) jurisdiction for the UGA. This study assumes that Hospital District No. 2 will continue to hold taxing jurisdiction through the entire study period. Analysis of Alternative 5 assumes identical tax and patient fee information and assumptions discussed in the DEIS fiscal impact analysis, Appendix H.

Table IV-24 below provides estimated property tax revenues for Hospital District No. 2 for selected years. Detailed annual estimates for hospital district property tax revenues are found in EXHIBIT 2.06 for Alternative 5.

Average annual regular levy revenues the Hospital District could receive may range from $100,000 to $150,000. In addition, revenues from the EMS levy could range from $100,000 to $110,000. Unsurprisingly, patient fees would likely be substantial under Alternative 5, which poses considerable population gain among the development alternatives. Annual fees are projected to grow

H-01

from between $1,000 and $5,000 in Year 1 to the neighborhood of $30,000 and $40,000 by Year 30.

TABLE IV-24: HOSPITAL DISTRICT NO. 2 PROPERTY TAX REVENUES GENERATED BY DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

Alternative 5 Revenue Source	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Regular Levy						
Total Revenues	$0	$34	$76	$155	$285	$3,731
UGA Development	$0	$35	$76	$154	$284	$3,731
EMS Levy						
Total Revenues	$0	$30	$67	$136	$250	$3,278
UGA Development	$0	$30	$66	$136	$250	$3,278
Patient Fees ($550 per EMS call)	$3	$21	$26	$33	$36	$833
TOTAL DISTRICT REVENUES	*$3*	*$86*	*$169*	*$323*	*$570*	*$7,842*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

UGA development poses significant impacts to the Hospital District tax base. Average annual revenues under Alternative 5 would make roughly a 70%-80% contribution to projected 1999 district tax inflow of $343,000, including both levies (Kittitas County Assessor's Report, 1999).

Revenues received by the Hospital District could be affected by additional property tax issues associated with District spending or growth in property values. See the DEIS fiscal impact analysis, Appendix H for additional detail.

I. KITTITAS COUNTY COMMUNICATIONS (KITTCOM)

Kittitas County Communications (KITTCOM) is the sole operator of "911" emergency telephone services and dispatch for all of Kittitas County including the UGA. This study assumes that KITTCOM will continue to be the sole provider of the service through the course of the thirty-year study period.

KITTCOM revenues fall into two recurring categories: fees billed to emergency service jurisdictions (subscribers) on a per-call basis and monthly excise taxes on all telephone lines in the County. Revenues from subscriber fees are dedicated solely to KITTCOM operations expenditures, including personnel. Revenues from telephone tax are applied toward capital equipment expenditures. KITTCOM also receives grants from various sources to fund operations or equipment upgrades as necessary. The grant process is independent of normal revenue mechanisms (it is not generated by growth within the county).

Since publication of the UGA DEIS, the City of Cle Elum and KITTCOM have come to a new billing agreement whereby Cle Elum would pay higher subscriber fees than at present, though new rates have yet to be set (Telephone interview with Mike Cecka, 2001). New fees would be set to prevent possible shortfalls.

H-01

V. UGA SERVICE DEMANDS AND ESTIMATED COSTS

Development of the UGA under Alternative 5 would require service demands and associated costs for the following jurisdictions:

- State of Washington;
- Kittitas County;
- City of Cle Elum;
- Cle Elum/Roslyn School District No. 404;
- Hospital District No. 2; and
- Kittitas County Communications (KITTCOM).
- Cities of Roslyn and Ellensburg and Town of South Cle Elum (Indirect)

Unless specifically noted, identical methodologies to those employed in the DEIS fiscal impact analysis, Appendix H were utilized to project public service costs for the affected jurisdictions. Details of general methodological issues, including a discussion of average cost and marginal cost analysis, can be found in Appendix H of the DEIS.

A. STATE OF WASHINGTON

Summary for State of Washington

Table V-1 below summarizes the estimated costs to the State of Washington departments under Alternative 5. Annual incremental cost estimates across the thirty-year build-out period are found in EXHIBIT 3.02 for Alternative 5.

Sources of State agency cost are identical to Alternative 5 as were discussed for Alternatives 2, 3 and 4 in the DEIS fiscal impact analysis, Appendix H. Further details of cost categories identified are found in that document. Alternative 5 does pose different population trends than the other development alternatives, therefore cost timing will be different for Alternative 5.

State service costs could be the highest under Alternative 5, with identifiable service costs projected to range from $2 million to $2.5 million annually on average. Alternative 5 poses the greatest residential population impact to the area, thus requiring greater school fund distributions. Distributions to School District 4 due to additional enrollment could reach the range of $2 million to $2.5 million annually.

Cost projections as described above and as outlined in Table V-1 do not represent comprehensive costs for the State, but rather identifiable costs. There will, more than likely, be other costs to the State of Washington due to UGA development, although these costs are unidentifiable at this time due to their incidental nature. In addition, service cost estimates do not reflect net new costs to the State. The vast majority of UGA development will likely be occupied by residents from elsewhere in Washington. Therefore, most costs expressed here represent a geographical shift in State costs rather than new costs generated.

H-01

TABLE V-1: ESTIMATED COSTS FOR THE STATE OF WASHINGTON AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Department of Natural Resources	$2	$2	$0	$0	$0	$10
Department of Transportation	$0	$0	$0	$32	$32	$608
State Patrol	$0	$0	$0	$83	$83	$1,583
Department of Ecology	$6	$6	$6	$6	$6	$180
Departmental Costs	*$8*	*$8*	*$6*	*$121*	*$121*	*$2,381*
Distributions to School District No.404	$233	$1,767	$2,170	$2,769	$3,062	$70,487
Total Annual Costs	$241	$1,775	$2,176	$2,890	$3,184	$72,868
One-Time Costs	$2	$2	$0	$0	$0	$79
Recurring Costs	$239	$1,773	$2,176	$2,890	$3,184	$72,789

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

B. KITTITAS COUNTY

Kittitas County would provide services to the UGA through build-out and thereafter. Costs for the County include development review and inspection (one-time) as contracted by the City of Cle Elum, and recurring costs from general services (e.g., courts, property assessment, general administration) and law enforcement. As described above, if the City of Cle Elum assumes responsibility for these activities, revenues and costs would shift to the City. Detailed discussion of cost sources and methodology may be found in Appendix H of the Draft EIS.

Table V-2 below summarizes estimated county service costs under Alternative 5, for selected years, assuming all planned development at the UGA is fully constructed by year 30. EXHIBIT 3.03 provides detailed, annual estimates of County service costs by category for Alternative 5.

TABLE V-2: KITTITAS COUNTY SERVICE COSTS DUE TO THE DEVELOPMENT OF THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Development Review & Inspection	$263	$121	$48	$52	$32	$2,383
Law Enforcement	$13	$63	$110	$111	$112	$3,074
General Services	$102	$377	$478	$645	$780	$16,481
Total Costs	*$379*	*$561*	*$635*	*$808*	*$924*	*$21,897*
One-Time Costs	$263	$121	$48	$52	$32	$2,383
Recurring Costs	$116	$440	$588	$756	$892	$19,515

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

H-01

UGA development would pose relatively small impacts to existing County operating expenses. Average annual costs under Alternative 2 would amount to a 1%-5% increase in the projected $28.2 million total County operating expense for 1999 (Kittitas County, 1999).

Kittitas County Service Categories

The following subsections provide discussions of projected costs by category for Kittitas County. Unless specifically noted, details of County tax mechanisms and assumptions required for analysis are identical for Alternative 5 as found in the DEIS Appendix H. Annual calculations for specific costs are found in EXHIBIT 3.03.

Solid waste disposal fees, and associated costs for solid waste disposal, were not separately treated in the FEIS. It was assumed that service fees would be set to fully compensate for service costs. Trendwest is participating with the City of Cle Elum and the County in revising the Kittitas County Solid Waste Management Plan (SWMP) to address the projected waste streams from the UGA development. This effort is coordinated with efforts to revise the SWMP to address waste streams and programs for the MPR development. Trendwest would contribute pro-rata share of the costs to construct a new or expanded transfer station, as necessary, to handle projected waste streams.

Development Review and Inspection

Because development fees and permits are designed to at least cover the cost of their respective review and inspection processes, this study assumes that those costs would be equal to revenue generated by their acquisition. For specific details of each permit included in this study, see Section IV and EXHIBIT 2.02 for Alternative 5.

Law Enforcement Cost Estimates

Table V-3 below provides a summary of service cost estimates for the Kittitas County Sheriff's Department under Alternative 5 for selected years. Annual incremental cost estimates for law enforcement at the UGA are found in EXHIBIT 3.03 for Alternative 5. Law enforcement costs are based on the same assumptions as used in the Draft EIS. Fiscal costs are projected for all years as Sheriff deputies are hired on a County population basis, including incorporated areas.

TABLE V-3: KITTITAS COUNTY SHERIFF'S DEPARTMENT SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Personnel Expenditures	$1	$42	$81	$82	$82	$2,213
O&M Expenditures	<$1	$7	$14	$14	$14	$368
Capital Expenditures	$13	$14	$15	$15	$15	$453
Total Costs	*$13*	*$63*	*$110*	*$111*	*$112*	*$3,034*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Law enforcement needs at the UGA would not likely pose significant cost impacts relative to current law enforcement expenses for Kittitas County. Average annual costs under Alternative 5 would

H-01

amount to only a 1%-5% increase in the projected $3.3 million total Sheriff's Department operating expense for 1999 (Kittitas County, 1999).

Although the County will not have primary jurisdiction, the County is typically relied on for aspects of law enforcement beyond basic patrol. This includes detective work, homicide, tactical enforcement, etc. Over time, as Cle Elum's police department expands and experience is gained, these capabilities could shift to the City of Cle Elum. Trendwest has committed to funding of additional police officers for the City of Cle Elum to serve its UGA after annexation.

General County Services

Table V-4 below provides general service costs for Kittitas County in selected years assuming all development is complete by Year 30. Annual cost estimates for each of the first thirty years of development are found in EXHIBIT 3.03 for Alternative 5. Derivation of general service costs for UGA development are identical to that discussed in Appendix H of the DEIS. The fiscal analysis assumes a constant average general service cost rate during the project buildout. Calculation of rates is based on population (for residential property) and on assessed value (for future commercial development). Table V-4 identifies general service cost share for commercial and residential property.

General service costs from development of the UGA would likely not pose significant cost impacts relative to current general service expenses for Kittitas County. Average annual costs under Alternative 2 would amount to only a 1%-5% increase in the projected $24.5 million County operating expense for 1999 less costs for the Sheriff's Department and the Building & Fire Safety Department (Kittitas County, 1999).

TABLE V-4: KITTITAS COUNTY GENERAL SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Commercial Property Cost Share	$74	$182	$241	$345	$450	$8,820
Residential Property Cost Share	$28	$195	$237	$299	$330	$7,661
Total Costs	*$102*	*$377*	*$478*	*$645*	*$780*	*$16,481*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

The higher concentration of permanent residential development under Alternative 5 will require greater expenditures for functions such as Treasury, Auditing, Clerk, Assessor, auxiliary planning and other general administrative functions supporting these and other departments. Projections of general service costs do not factor in cost economies of scale, which may significantly reduce general service cost provision over time. As Kittitas County grows, general service costs would be distributed across an increasing scale of development within the County, thus lowering the average general services cost for future development. The County's general service cost burden would also decrease as incorporated communities grow and annex previously unincorporated areas (e.g. the Cle Elum UGA). These factors would reduce impacts to the County identified in Table V-4.

H-01

C. CITY OF CLE ELUM

The City of Cle Elum would provide many services to the population and associated master plan community development at the UGA through build-out and thereafter. Sources of costs under Alternative 5 would be identical to those identified in Appendix H of the DEIS. Unless specifically noted, methodology and assumptions utilized for analyzing Alternative 5 are identical to those identified in Appendix H of the DEIS.

Summary for City of Cle Elum

Table V-5 below summarizes estimated City service costs under Alternative 5, for selected years, assuming all planned development at the UGA is fully constructed by Year 30. EXHIBIT 3.04 provides detailed, annual estimates of City service costs by category for Alternative 5.

Alternative 5 would likely generate the greatest annual costs to the City of Cle Elum, compared to the other development alternatives. It encompasses the greatest scale of residential development along with the 950,000 square foot Business Park. Over the 30-year build-out period, this alternative may generate and average annual cost in the range of $800,000 and $900,000. Law enforcement will likely be the greatest source of costs, averaging in the neighborhood of $200,000 to $300,000 annually.

TABLE V-5: CLE ELUM SERVICE COSTS DUE TO THE DEVELOPMENT OF THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Development Review & Inspection[1]	$66	$30	$12	$13	$8	$596
Law Enforcement	$83	$225	$282	$337	$348	$8,334
Emergency Fire Services	$107	$146	$176	$183	$184	$5,091
Road Maintenance	$70	$136	$150	$195	$206	$5,086
General Services	$41	$163	$206	$275	$329	$7,034
Total Costs	*$368*	*$702*	*$826*	*$1,003*	*$1,075*	*$26,139*
One-Time Costs	$66	$30	$12	$13	$8	$596
Recurring Costs	$302	$671	$814	$990	$1,067	$25,544

1 Figures in this category do not include a City Planner, which Trendwest has agreed to fund.
Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

City of Cle Elum Service Categories

The following subsections provide detailed discussions of each specific cost category for Cle Elum. Detailed treatment of assumptions and cost derivation, unless specifically noted, may be found in Appendix H of the DEIS. Annual calculations for specific costs are found in EXHIBIT 3.04 for Alternative 5.

As described above in Section IV, the City of Cle Elum and KITTCOM have agreed to a new billing agreement whereby Cle Elum would pay higher per-call subscriber fees. New fees would be

H-01

set to prevent possible shortfalls. Subscriber fees paid by the City and attributable to UGA-related emergency service calls will be tracked by the UGA fiscal cost monitoring system set forth by the mitigation agreement between Trendwest and the City. To the extent that subscriber fees related to UGA development cause fiscal shortfalls, Trendwest will make mitigation payments. It should be noted that KITTCOM fees reflected in Tables V-7 and V-9 below do not reflect the new fees, which are unknown at this time.

Development Review and Inspection

Because development fees and permits are designed to at least cover the cost of their respective review and inspection processes, this study assumes that those costs would be equal to revenue generated by their acquisition[5]. For specific details of each permit included in this study, see Section IV, Appendix H in the DEIS and EXHIBIT 2.02 for Alternative 5. Since this analysis was performed, Trendwest has agreed to fund a City Planner.

Law Enforcement Cost Estimates

Police department costs under Alternative 5 were derived in similar manner for Alternatives 2, 3 and 4 discussed in Appendix H of the DEIS. The ratio of two officers per 1,000 UGA residents is consistent with a 1997 survey of Washington city police department staffing levels with populations ranging from 2.500 to 10,000. Because population growth is different under Alternative 5, trigger-points for additional officers are different through build-out. Table V-6 below displays the number of officers needed during selected years of UGA development under Alternative 5.

TABLE V-6: CLE ELUM POLICE DEPARTMENT PROJECTED STAFF LEVELS FOR COVERAGE OF THE CLE ELUM UGA ALTERNATIVE 5

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30
Alternative 5					
Officers (1:500 occupants)	1	3	4	5	5

Notes: Figures reflect cumulative number of police officers.
Source: Johnson Gardner 2001

Capital Outlays

Capital expense timing will be different under Alternative 5 due to different hiring trigger points for officers. However, item costs will not differ from that discussed in Appendix H of the DEIS. However, subject to comments by the City of Cle Elum fiscal consultant (Michael Mulcahy, 2001), capital expenses in all City departments are assumed to be leased during their lifetime rather than purchased through annual contributions to a capital fund prior to item purchase.

Table V-7 below provides a summary of service cost estimates for the City of Cle Elum Police Department under Alternative 5 for selected years. Annual incremental cost estimates for law enforcement at the UGA are found in EXHIBIT 3.04 for Alternative 5. Because KITTCOM fees reflected in Table V-5 and EXHIBIT 3.04 do not reflect the new billing agreement between the City of Cle Elum and KITTCOM discussed in Section IV, future KITTCOM fees will be higher than currently expressed.

[5] In the event that Cle Elum does establish its own building department, the City would receive 100 percent of permit revenues and inspection fees rather than sharing 80 percent with Kittitas County. Concurrently, the City would incur 100 percent of costs associated with permit/inspection responsibility.

H-01

TABLE V-7: CITY OF CLE ELUM POLICE DEPARTMENT SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Personnel Expenditures	$39	$140	$183	$230	$236	$5,540
O&M Expenditures	$7	$22	$29	$36	$36	$853
Capital Expenditures	$33	$34	$34	$26	$26	$789
KITTCOM Fees	$4	$29	$35	$45	$50	$1,152
Total Costs	*$83*	*$225*	*$282*	*$337*	*$348*	*$8,334*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Annual average cost to the City of Cle Elum's Police Department is estimated to lie within the range of $250,00 to $300,000. Personnel expenditures would make up the majority of department costs, averaging between $150,000 and $200,000 annually.

Law enforcement expenses at the UGA would likely generate significant cost impacts relative to current law enforcement expenses for Cle Elum. Average annual costs under Alternative 5 would amount to a 50% to 60% increase in the projected $539,000 total Police Department operating expense for 1999 (City of Cle Elum, 1999).

Fire Service Costs Estimates

The City of Cle Elum Fire Department will provide similar services to the UGA under Alternative 5 as identified for Alternatives 2, 3 and 4 in Appendix H of the DEIS. Fire service costs outlined below reflect new information gathered in preparation of a separate City Municipal Facilities and Services Expansion Plan (MFSEP).

- *Firefighter Training:* $500 in training expense when a new firefighter is hired.
- *Firefighters:* The City will require greater assurance of weekday fire fighter response when construction begins. This could be accomplished either through additional trained volunteers or from funding one trained full-time firefighter. This is projected to increase to 3 paid full-time firefighters in Year 5 with additional support of 15 volunteers by Year 30.
- *Fire Station Construction:* A new fire station will be needed in Year 2 rather than Year 6.
- *Capital Equipment Lease:* Rather than making annual contributions prior to the purchase of new capital equipment, this analysis assumes vehicles will be leased across their useful lifetime. This analysis assumes a rate of 4% on vehicle leases consistent with rates offered by the State of Washington LOCAL lease program for rural jurisdictions.

Table V-8 provides a summary of fire department personnel needs for selected years.

H-01

TABLE V-8: CITY OF CLE ELUM PROJECTED FIREFIGHTER STAFF LEVELS UNDER ALTERNATIVE 5

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30
All Alternatives					
Paid FTE Firefighters	1	3	3	3	3
Volunteer Firefighters	10	10	10	13	15

Source: Johnson Gardner 2001

Table V-9 below provides a summary of City fire service cost estimates for selected years, assuming the UGA is fully developed by Year 30. Annual estimates of costs for all years of UGA build-out are found in EXHIBIT 3.04. Because KITTCOM fees reflected in Table V-11 and EXHIBIT 3.04 do not reflect the new billing agreement between the City of Cle Elum and KITTCOM, future fees will be higher than currently expressed.

Average annual costs under Alternative 5 may reach the range of $150,000 to $200,000. Personnel expenditures promise to be the greatest expense. Annually, the City may average $100,000 to $150,000 in personnel-related costs. Discussion of bond capacity for a new fire station is reserved for Section VI, Net Fiscal Impacts.

TABLE V-9: CITY OF CLE ELUM FIRE DEPARTMENT SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Personnel Expenditures	$53	$113	$113	$113	$113	$3,198
O&M Expenditures	$8	$10	$9	$11	$13	$315
Capital Expenditures	$46	$22	$52	$56	$56	$1,507
KITTCOM Fees	<$1	$2	$2	$3	$3	$72
Total Costs	$107	$146	$176	$183	$84	$5,091

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Cost projections to the fire department do not include the possible purchase of a fire tender. The DEIS determined that the fire tender provided to Fire District No. 7 for MPR coverage would be adequate for coverage at the UGA as well. The City of Cle Elum Fire Department would either enter an arrangement to share use of the fire tender provided to District 7 as part of the MPR mitigation, or the City would have to acquire a fire tender when construction commences in the UGA. Vehicles would be leased during the useful lifetime.

City Streets/Maintenance

Cost assumptions for city streets and maintenance are consistent with those identified in Appendix H of the DEIS with only a few exceptions subject to the Alternative 5 design and requirements of the new capital facilities plan. These changes are:

- *Different Road Plans:* Alternative 5 will comprise 3.4 miles of arterial roads, 5.5 miles of residential single-family roads, 1.8 miles of alleyways and 1.3 miles of multifamily roads. All roads, except for the multifamily access roads, will be city maintained.

H-01

- *Personnel:* Per the service expansion plan, an additional FTE maintenance worker will be required in the first year of road maintenance responsibilities at a cost of $28,000 plus benefits annually. That person will be shared between parks and road maintenance.
- *Capital Equipment Acquisition:* A snowplow, front-end loader and dump truck/sander will be required prior to the first snowfall in the year the City assumes responsibility for UGA road maintenance.
- *Capital Equipment Lease:* Capital equipment/vehicles are assumed to be leased for the identified lifetime of each. A rate of 4% was assumed based on the State of Washington LOCAL capital equipment-leasing program.
- *Park/Lawn Maintenance:* A $35,000 mower will be required in the season when the City assumes responsibility for UGA park/lawn maintenance.
- *Equipment Storage:* A four bay lean-to facility for protected storage of new equipment would be needed at a cost of $75,000. The City capital facilities plan identifies the water treatment plant site as an ideal, secured location.

Table V-10 summarizes Cle Elum road maintenance cost estimates for selected years for Alternative 5. Annual cost estimates may be found in EXHIBIT 3.04 for Alternative 5.

TABLE V-10: CITY OF CLE ELUM ROAD MAINTENANCE COST IMPACTS FROM DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Revenue	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Miles of Completed Roads	1.3	7.0	8.1	10.3	11.5	---
Personnel Costs	$30	$30	$30	$30	$30	$900
Operating Costs ($9,500/mile)	$12	$66	$77	$98	$109	$2,526
Capital Equipment Costs	$28	$40	$43	$67	$67	$1,659
Total Annual Costs:	*$70*	*$136*	*$150*	*$195*	*$206*	*$5,086*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

The City of Cle Elum may incur average annual road maintenance costs in the neighborhood of $150,000 to $200,000 annually. Costs are projected to climb gradually as additional roads are completed each year.

Estimated road maintenance costs would be significant compared to current budgeted City expenditures. Average annual costs would amount to a roughly 60%-70% increase in the 1999 budget for road maintenance expenditures of $245,394 (City of Cle Elum, 1999).

City Parks

The Upper Kittitas County Community Center non-profit organization would be responsible for operational costs of that facility and associated recreational facilities. Private park and recreation facility maintenance costs within the UGA could be funded by UGA homeowner association fees. Park and recreation facilities dedicated to the City would be operated and maintained by the City of Cle Elum.

H-01

General City Services

General city services under Alternative 5 will have identical scope, and thus follow identical methodology as identified for Alternatives 2, 3 and 4 in Appendix H of the DEIS. Further details may be found in that document.

Table V-11 below provides general services cost projections for Cle Elum in selected years; assuming all development is complete by Year 30. Annual cost estimates for each of the first thirty years of development for Alternative 5 are found in EXHIBIT 3.04.

General costs are projected to greater under Alternative 5 than under other development alternatives, given the greater scale of residential development planned in Alternative 5. Annual average costs may range from $200,000 to $250,000. Services to residential development will comprise the majority of general city costs.

General service needs at the UGA would likely pose considerable cost impacts relative to current general service expenses for Cle Elum. Annual averages under Alternative 5 would amount to a 50% to 60% increase in the projected $451,523 tax-supported general services operating expense for 1999 (City of Cle Elum, 1999).

TABLE V-11: CITY OF CLE ELUM GENERAL SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Commercial Property Cost Share	$28	$68	$90	$129	$168	$3,297
Residential Property Cost Share	$14	$95	$116	$146	$161	$3,737
Total Costs	*$41*	*$163*	*$206*	*$275*	*$329*	*$7,034*

Note: Figures may not sum due to rounding. The costs expressed above do not include the new position of City Administrator, which Trendwest has agreed to fund.
Source: Johnson Gardner 2001

Utilities

City-provided utilities, i.e. water and sewer, would be subject to the same agreement binding for Alternatives 2, 3 and 4 as outlined in the DEIS. As explained in the Pre-Annexation Agreement (City of Cle Elum, 2000), utility capital and operations costs are to be proportioned based on use by existing residents and future UGA residents. The agreement dictates that existing residents will not be financially penalized for UGA utility needs.

D. CITY OF ROSLYN

Because Roslyn will not have direct jurisdiction at the UGA at any time of its development, the City will not incur direct service costs as a result of planned development. However, the City of Roslyn could see indirect fiscal costs from the development of the UGA. Possible indirect costs are summarized as follows:

- *Public Works:* Road maintenance, sanitation, and other services associated with city traffic from UGA construction employees and off-site visits by UGA occupants;

H-01

- *General/Administrative Services:* Services would primarily be driven by housing and commercial building construction associated with Roslyn employees and businesses catering to off-site visits and construction personnel.

As part of a settlement with RIDGE (RIDGE Settlement Agreement, 2001), Trendwest Properties has agreed to mitigation measures for the City of Roslyn regarding specific impacts to the community as a result of MountainStar MPR and UGA development. Those mitigation measures are discussed further in Section VII, Cumulative Impacts.

E. TOWN OF SOUTH CLE ELUM

Costs to the Town of South Cle Elum from Alternative 5 will be identical in scope as those identified from Alternatives 2, 3 and 4 in Appendix H of the DEIS. Further discussion of potential impacts to the community may be found in that document.

F. CITY OF ELLENSBURG

Costs to the City of Ellensburg from Alternative 5 will be identical in scope as those identified from Alternatives 2, 3 and 4 in Appendix H of the DEIS. Further discussion of potential impacts to the community may be found in that document.

G. CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404

The Cle Elum/Roslyn School District will be the primary jurisdiction for public educational needs of full-time resident families at the UGA. The School District would likely face cost impacts as a result of potentially increased enrollment. Enrollment impacts and service demands to accommodate potential enrollment are discussed below.

Enrollment Impacts

Future enrollment at School District No. 404 induced by UGA development under Alternative 5, consistent with the thirty-year build-out scenario analyzed in the DEIS and the FEIS, was projected in an identical manner as described in Appendix H of the DEIS. Specifically, methodology is based on statistics on school-aged children per household as determined by the 1999 Washington State Population Survey (Office of Financial Management, 1999):

- *Enrollment from For-Sale Residences:* It was assumed that the minimum income required for house ownership within the UGA was $60,000 annually[6]. Washington families earning greater than $60,000 annually have an average of 0.71 school aged children each.
- *Enrollment from Rental Apartments:* It was assumed that families earning less than $60,000 annually, and choosing to reside within the Cle Elum UGA, would choose a rental apartment unit. Washington families earning less than $60,000 annually have an average of 0.53 school-aged children each.

[6] Ownership eligibility based on the least expensive residential unit, a wholly-owned condominium at $150,000. Eligibility based on a 30-year loan at 8% interest with 10% property tax and $100 monthly homeowner association dues.

H-01

Table V-12 provides estimates for projected enrollment at District schools for selected years due to population increases within the UGA. Derivation and annual estimates of enrollment are found in EXHIBIT 3.05 for Alternative 5, respectively

Given its scope of residential development among the alternatives, enrollment will likely be greatest under Alternative 5. Over all years, Alternative 5 is estimated to enroll an average of over 700 students per year. The vast majority of pupils from UGA development will be from detached single-family homes, growing from 54 percent of all UGA students in Year 1 to roughly 89 percent of all UGA students by Year 30.

TABLE V-12: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 ESTIMATED ENROLLMENT UNDER ALTERNATIVE 5 FROM DEVELOPMENT WITHIN THE CLE ELUM UGA

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30
Alternative 5 Projected UGA Enrollment	70	527	647	826	914

Source: Johnson Gardner 2001

Additional enrollment would result from employment-induced growth (jobs created from construction of the UGA and due to increased economic activity). As described in the Draft EIS (Appendix H), the location of students representing direct and indirect employment growth is uncertain. Precise enrollment impacts on School District #404 cannot be predicted with certainty and have not been quantified in this analysis. School District estimates of enrollment growth for estimating potential classroom costs (discussed below) assume an annual growth rate for natural enrollment of 1.05%. Refer to Section 3.15, Public Services, for a discussion of projected employment-related enrollment for the County overall.

Service Costs

Since the publication of the DEIS, School District 404 has completed a new Capital Facilities Expansion Plan which reflects endogenous enrollment growth within the district, as well as considerations for future growth due to UGA and MountainStar MPR development. Therefore, capital facilities cost analysis for Alternative 5 reflects new assumptions and service standards indicated by the new Capital Facilities Plan, summarized below. New methodology and assumptions utilized, primarily for capital facilities needs, will be noted accordingly. Alternatively, methodology and assumptions employed for projecting personnel, operations and maintenance (O&M), and miscellaneous capital equipment costs remain identical to that found in the DEIS fiscal impact analysis, Appendix H. Details of unchanged personnel, O&M, and miscellaneous capital equipment methodology may be found in that document.

The following discussions first summarize school district service costs, excluding classroom and vehicle costs, induced by projected enrollment under Alternative 5. Following the summary are detailed discussions of future classroom and transportation costs, as indicated in the district's new capital facilities and expansion plan, as a result of future enrollment under Alternative 5.

H-01

Service Cost Estimate Summary

Table V-13 below summarizes estimated costs to the Cle Elum/Roslyn School District under Alternative 5. Total costs, State-funded costs, and locally funded costs are reported separately. Annual estimates are found in EXHIBIT 3.06 for Alternative 5.

TABLE V-13: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total District Costs (Local and State-Funded)	$274	$2,078	$2,552	$3,257	$3,603	$82,926
State-Funded Costs	$233	$1,767	$2,170	$2,769	$3,062	$70,487
Locally Funded Costs						
Personnel (Certified & Classified)	$33	$249	$305	$390	$431	$9,923
O&M Expenditures ($700/student)	$8	$60	$74	$94	$104	$2,400
Capital Outlays ($40/student)	<$1	$3	$4	$5	$5	$116
Total Local Costs	$41	$312	$383	$489	$540	$12,439

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan

Given its scope of residential development, and the inevitably highest number of enrollment, Alternative 5 will most likely pose the greatest potential costs to the Cle Elum/Roslyn School District No. 404. Average annual local costs are estimated to range between $400,000 and $450,000 for the fifth development alternative. Unsurprisingly, personnel costs would comprise the greatest share of non-capital facility costs for the district at roughly 80 percent of the thirty-year local total.

Public education service demand from the UGA would likely pose significant cost impacts relative to current School District expenses. Average annual costs under Alternative 5 would amount to a 50% to 60% increase in the projected $726,000 local share of School District operating expenses for 1999 (Cle Elum/Roslyn School District No. 404, 1999).

School Bus Costs

UGA-induced enrollment will require the purchase of new school buses for the transportation of children to schools along SR 903. However, the need for new school buses will likely constrained by the proximity of the UGA to district schools. In fact, all planned residential development is within one-half mile of existing schools. Table V-14 provides an outline of school bus costs for UGA Alternative 5.[7]

Individual buses cost $95,000, which includes upgrades for snow conditions as well as State of Washington retail sales tax. It is District policy to bus all students if weather is such that student safety is threatened, no matter what grade level. Though unpredictable at this point, school bus costs could rise accordingly.

[7] Like analysis by Moyer & Associates, this study assumes that buses will pick up and drop off children in two shifts at 80 percent capacity. With school buses capacity at 76 to 78 children, a single bus can transport 122 children daily.

H-01

TABLE V-14: POTENTIAL NEW BUS COSTS DUE TO UGA DEVELOPMENT ALTERNATIVE 5

Alternative	UGA Elementary Enrollment	New Buses Needed	Total Cost 1/
Alternative 5	394	4	*$380,000*

1/ Cost for each new bus is projected at $95,000.
Note: Reflects projected UGA enrollment by Year 30.
Source: Johnson Gardner 2001; Cle Elum-Roslyn School District #404

Alternative 5 would likely require the greatest new school bus acquisition among the UGA alternatives. As a result of UGA enrollment at full build-out, the District may need as many as four new buses at a total cost of $380,000. As stated earlier, trigger points for such purchases would largely depend upon when enrollment is actually realized in addition to endogenous school district growth.

Future, natural enrollment growth from existing local population will accelerate the need for not only new buses, but also new classroom space. The District capital facilities plan provides a forecast for natural enrollment growth whether or not the UGA is developed. Table V-15 below provides a comparison of natural and UGA-induced enrollment growth for Alternatives 2, 3, 4 and 5 assuming the planned thirty-year build-out.[8] Detail is provided for elementary, middle school and high school segments assuming the average distribution exhibited in the District capital facilities plan.

Alternative 5 poses the greatest enrollment impacts alone and paired with natural projected growth in the district. Ultimate timing of bus purchases will depend on cumulative enrollment caused by natural growth, UGA development and MountainStar MPR development. While the quantity of buses needed as a result of UGA Alternative 5 is identified here, timing of purchases is taken up in Section VII, Cumulative Impacts.

[8] The District's Capital Facilities Plan forecasts enrollment for twenty years rather than a across a thirty-year horizon. For the purposes of a thirty-year comparison, this analysis assumes that between Year 21 and Year 30, natural enrollment will grow by the average annual rate for natural enrollment exhibited in Years 11 through 20 in the capital facilities plan (1.05%).

H-01

TABLE V-15: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 ESTIMATED NATURAL AND UGA-INDUCED ENROLLMENT UNDER ALTERNATIVES 2, 3, 4, AND 5

Enrollment Source	Year 1	Year 5	Year 10	Year 20	Year 30
Natural Growth					
Elementary	0	12	31	79	135
Middle School	20	30	41	70	103
High School	0	5	19	54	94
Total	20	47	91	203	332
Alternative 2 & Natural Growth					
Elementary	34	169	232	310	384
Middle School	40	124	162	209	253
High School	24	119	164	220	274
Total	98	412	558	739	911
Alternative 3 & Natural Growth					
Elementary	37	187	272	384	477
Middle School	42	135	186	253	309
High School	27	131	193	274	340
Total	106	453	651	911	1,126
Alternative 4 & Natural Growth					
Elementary	37	129	170	257	336
Middle School	42	100	125	177	224
High School	27	90	119	182	239
Total	106	319	414	616	799
Alternative 5 & Natural Growth					
Elementary	30	239	310	435	529
Middle School	38	166	209	284	340
High School	22	169	220	310	378
Total	90	574	739	1,029	1,247

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan

Capital Facilities Costs

As expressed in Table V-12 and V-15 above, UGA development poses significant enrollment increases for District 404 through the thirty-year build-out period. As such, new school space will likely be required to house UGA-induced enrollment. New school construction will be guided by two factors: unused space in existing schools and future enrollment. The District Capital Facilities Plan indicates that there currently exists no excess capacity for additional students in any grade level. As such, all identified future enrollment summarized in Tables V-12 and V-15 will require new school space.

Though guided by enrollment forecasts, actual construction of new schools will depend upon District capital needs plans and actual enrollment as it occurs annually. New schools will likely be built in response to existing excess enrollment rather than in anticipation of future enrollment. To grapple with this reality, the District facility plan considers both a short-term student plan utilizing portable classroom purchases and a long-term plan with new classroom space construction the ultimate goal for longer-term, permanent student housing. In the document, short-term is defined as

H-01

the next seven years and long-term defined as all years thereafter. This analysis addresses each phase in turn.

Short-Term Capital Facility Needs

Portable classroom space will be essential for housing students in the short-term before the district property tax base may be able to support substantial new school construction costs. The District Capital Facilities Plan identifies "double-wide" portables to be the most cost effective at $122,271 for two classroom spaces. However, prior to Year 7, enrollment growth may necessitate the purchase of standard portables for different grade levels at $77,952 for one classroom space. Including space for special programs, classroom size needs to abide by the following Capital Facilities Plan standards:

- *Elementary:* 17 pupils per classroom;
- *Middle School:* 21 pupils per classroom; and
- *High School:* 22 pupils per classroom.

Actual portable purchase will depend upon combination of three factors: natural enrollment growth, UGA-induced enrollment and MPR-induced enrollment. Given the cumulative nature of portable purchases, detailed timing and cost analysis is reserved for Cumulative Impacts, Section VII of this document. However, preliminary estimates of portable costs due solely to UGA-induced enrollment can be estimated. Based on the above standards and assuming the District maximizes the use of double-wide portables before Year 7, maximum total portable classroom costs to the District are as summarized in Table V-16 below.

With the greatest scope of residential development, Alternative 5 is projected to require the greatest need for portables prior to Year 7, compared to the other development alternatives and according to the short-term housing plan guidelines.

H-01

TABLE V-16: POTENTIAL NEW PORTABLE COSTS DUE TO UGA DEVELOPMENT
ALTERNATIVES 2, 3, 4 & 5

Alternative	Year 7 Enrollment	Portables Needed	Total Cost
Alternative 2			
Elementary	184	5 double	*$611,355*
		1 single	*$77,952*
Middle School	110	2 double	*$244,542*
		1 single	*$77,952*
High School	132	3 double	*$366,813*
Total			*$1,378,614*
Alternative 3			
Elementary	217	6 double	*$733,626*
		1 single	*$77,952*
Middle School	130	3 double	*$366,813*
High School	156	2 double	*$244,542*
Total			*$1,422,933*
Alternative 4			
Elementary	129	4 double	*$489,084*
Middle School	78	2 double	*$244,542*
High School	93	2 double	*$244,542*
Total			*$978,168*
Alternative 5			
Elementary	260	7 double	*$855,897*
		1 single	*$77,952*
Middle School	156	3 double	*$366,813*
		1 single	*$77,952*
High School	187	3 double	*$366,813*
Total			*$1,745,427*

Note: Estimates reflect UGA-induced costs only.
Source: Johnson Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan

Long-Term Capital Facility Needs

The District Capital Facilities Plan indicates that new classroom construction is the only adequate solution for long-term housing needs for pupils. As such, classroom space will vary greatly between UGA development alternatives. To calculate both State and local construction costs for new classroom space, the following assumptions and District standards were utilized:

- *Square Feet per Student:* The District Capital Facilities Plan calls for 110 square feet per elementary student, 135 square feet per middle school student, and 145 square feet per high school student.
- *State Construction Cost Share:* The District Capital Facilities Plan indicates that the State of Washington will pay $26 per square foot for elementary space, $29 per square foot for middle school space and $29 per square foot for high school space. These figures are based on State of Washington per-pupil space allotments that are smaller than practical space needs required by the District, as expressed immediately above. The result is an effectively lower State cost share under these assumptions than under base assumptions utilized by the State.

H-01

- *Local Construction Cost Share:* The District Capital Facilities Plan calculates local share of construction costs at roughly $157 per square foot for elementary space, $186 per square foot for middle school space and $217 per square foot for high school space.

Based on the above space and cost requirements, construction costs for UGA-induced enrollment were calculated and are summarized in Table V-17 below.

Alternative 5 poses the greatest costs for long-term classroom construction, followed by Alternatives 3, 2 and 4 in descending order. Because classroom construction is treated more generally as a long-term plan, timing of construction would depend on many factors, including actualized enrollment, property tax base, voter sentiment and other issues.

Actual construction would also depend on natural enrollment growth in the District, which would occur whether or not the UGA is developed, and enrollment induced by the MPR. This cumulative aspect of enrollment growth and space needs is further addressed in Cumulative Impacts, Section VII of this document.

TABLE V-17: POTENTIAL NEW CLASSROOM CONSTRUCTION COSTS DUE TO UGA DEVELOPMENT ALTERNATIVES 2, 3, 4 & 5

Alternative	Year 30 Enrollment	Sq. Ft. per Pupil	State Cost per Sq. Ft.	Local Cost per Sq. Ft.	State Cost	Local Cost
Alternative 2						
Elementary	250	110	$26	$157	$712,219	$4,299,368
Middle School	150	135	$29	$186	$588,787	$3,755,734
High School	180	145	$29	$217	$766,190	$5,664,043
Total					*$2,067,196*	*$13,719,144*
Alternative 3						
Elementary	342	110	$26	$157	$976,687	$5,895,851
Middle School	205	135	$29	$186	$807,421	$5,150,350
High School	247	145	$29	$217	$1,050,700	$7,767,271
Total					*$2,834,808*	*$18,813,473*
Alternative 4						
Elementary	202	110	$26	$157	$575,680	$3,475,137
Middle School	121	135	$29	$186	$475,911	$3,035,723
High School	145	145	$29	$217	$619,304	$4,578,190
Total					*$1,670,894*	*$11,089,049*
Alternative 5						
Elementary	394	110	$26	$157	$1,124,228	$6,786,494
Middle School	236	135	$29	$186	$929,392	$5,928,375
High School	284	145	$29	$217	$1,209,421	$8,940,615
Total					*$3,263,041*	*$21,655,484*

Source: Johnson Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan

H. KITTITAS COUNTY FIRE DISTRICT NO. 7

Fire District No. 7 would not hold primary fire service jurisdiction at the UGA once it is annexed by the City of Cle Elum, i.e. Year 1. Therefore, the Fire District would not incur direct service costs for fire calls to the UGA in any of the development alternatives.

H-01

However, the Fire District may in fact incur indirect costs from mutual aid calls subject to the Upper County mutual aid agreement. Such calls may include support to medical calls, fire calls and other such incidences. While costs may be incurred, the Fire District may retrieve fees for such costs through the said mutual aid agreement..

I. KITTITAS COUNTY HOSPITAL DISTRICT NO. 2

Hospital District No. 2 would experience the same scope and type of service costs identified for Alternatives 2, 3 and 4 in Appendix H of the DEIS. Although costs will vary with different population counts under Alternative 5, assumptions and cost mechanisms are identical. Further details of those aspects may be found in Appendix H of the DEIS.

Table V-18 provides a summary of the personnel needs at select years as a result of expected population under Alternative 5.

TABLE V-18: KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 PROJECTED STAFF LEVELS FOR MEDICAL COVERAGE OF CLE ELUM UGA ALTERNATIVE 5

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30
Alternative 5					
Total Paramedics	0	2	2	2	3
Total EMTs	0	1	2	2	2

Note: Figures reflect cumulative number of hospital staff.
Source: Johnson Gardner 2001

Table V-19 below provides a summary of projected Hospital District costs for selected years, assuming full development of the UGA by Year 30. Annual cost estimates for each year of build-out are found in EXHIBIT 3.07 for Alternative 5.

TABLE V-19: KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 SERVICE COSTS DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Personnel Expenditures (Paramedics and Clerks)	$13	$117	$161	$193	$208	$4,961
O&M Expenditures ($147/service call, $9/call)	$1	$6	$7	$9	$10	$241
Capital Expenditures (Ambulance)	$50	$25	$0	$0	$0	$200
Total Costs	*$64*	*$148*	*$169*	*$202*	*$218*	*$5,402*

Source: Johnson Gardner 2001

Service costs may be greatest under Alternative 5, which poses the greatest permanent population impacts among the alternatives. Personnel expenditures would comprise the vast majority of costs, at roughly 91% of the thirty-year projected total.

H-01

Emergency medical service calls to Hospital District No. 2 attributable to UGA development, routed by KITTCOM would be monitored as UGA-induced costs under the criteria for the mitigation agreement between Trendwest and the Hospital District.

Emergency medical service demand from the UGA would likely pose significant cost impacts relative to current District expenses. Average annual costs under Alternative 5 would amount to a 20% to 30% increase in the 1999 projected $833,000 in budget expenditures (Kittitas County Hospital District No. 2, 1998).

J. KITTITAS COUNTY COMMUNICATIONS (KITTCOM)

Under Alternative 5, KITTCOM would experience service requirements in similar scope and from identical sources identified for Alternatives 2, 3 and 4 in Appendix H of the DEIS. Incurred costs would include personnel and O&M. The Draft EIS discussed KITTCOM as a separate public service agency and projected deficits throughout the 30 year buildout period. In reality, costs to KITTCOM would be mitigated through the structure of its revenue acquisition. It is anticipated that the subscriber fees will be set to cover costs not covered through the telephone surcharge or grant monies. Subscriber fees (per-call basis) will be billed to affected public service providers (City of Cle Elum and Hospital District #2). Charges attributable to UGA development will be included in the shortfall monitoring and shortfall payment agreements between Trendwest and the City of Cle Elum and Trendwest and Hospital District #2.

H-01

VI. NET FISCAL IMPACTS

The net fiscal impact section of this study summarizes the projected balance of estimated, direct incremental revenues and direct incremental costs accruing to the various affected jurisdictions as a result of planned development of the Cle Elum UGA. Net fiscal impacts are calculated as the difference between estimated revenues and estimated service costs, as outlined in Sections IV and V, respectively.

Annual net impact estimates for all years of build-out are found in EXHIBITS 4.01-4.05 for Alternative 5. Potential net fiscal impacts for the Kittitas County, KITTCOM, Roslyn, South Cle Elum, and Ellensburg were not summarized quantitatively. However, potential net impacts are discussed qualitatively in the appropriately titled subsections below.

The following table provides a quick summary of estimated, average annual net fiscal impacts for all jurisdictions affected by UGA development. Results are reported for Alternative 5 for each jurisdiction given the revenue and cost categories considered.

VI-1: NET FISCAL IMPACT SUMMARY FROM ALL CLE ELUM UGA DEVELOPMENT ALTERNATIVES
(Average Annual 000's of Constant 2000 dollars)

Public Service		Alternative 5
State of Washington		$700,000 - $800,000
Kittitas County	1/	($50,000) – ($60,000)
City of Cle Elum	2/	($50,000) – ($60,000)
	3/	$400,000 - $500,000
School District No. 404	4/	($80,000) – ($90,000)
	5/	$400,000 - $500,000
Hospital District No. 2	6/	($50,000) - ($60,000)
	7/	$100,000 - $150,000

NOTE: Net deficits reported in Table VI-1 illustrate potential impacts if there were no mitigation agreements between Trendwest and public service providers.
1/ Figures represent net deficits resulting from the assumption of constant average general services costs during the lifetime of UGA build-out. Figures do not reflect strong potential cost economies of scale, where growth throughout the County could significantly reduce per-household general service costs.
2/ Figures represent net deficits in Years 1-11 under Alternative 5.
3/ Figures represent positive net revenues in all non-deficit years.
4/ Figures represent net deficits in Years 1-6 for Alternative 5, assuming the District modifies the M&O levy to capture excess bond levy capacity. Further discussion is given below.
5/ Figures represent positive net revenues excluding bond levy revenue and potential capital facilities costs.
6/ Figures represent net deficits in Years 1-9 for Alternative 5.
7/ Represents average annual surplus in non-deficit years for each alternative.
Source: Johnson Gardner 2001

A. STATE OF WASHINGTON

Cost estimates for State services are not expected to be substantial, as summarized in Section V. Paired with significant potential revenues from UGA development, the State of Washington may likely experience significant revenue impacts relative to likely identifiable costs.

H-01

Net Fiscal Impacts

Table VI-2 below provides a summary of projected State of Washington revenues and costs for selected years of the thirty-year UGA build-out period. Detailed, annual estimates of revenues, costs, and net impacts for the State are found in EXHIBIT 4.01 for Alternative 5. Specific details of individual revenue sources and cost categories are discussed in Section IV and Section V, respectively.

TABLE VI-2: STATE OF WASHINGTON REVENUE AND COST SUMMARY DUE TO THE DEVELOPMENT OF THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$2,243	$3,082	$2,691	$3,397	$3,563	$95,950
One-Time Revenues	$2,079	$1,533	$614	$721	$524	$28,797
Recurring Revenues	$164	$1,549	$2,076	$2,676	$3,039	$67,152
Total Costs	$241	$1,775	$2,176	$2,890	$3,184	$72,868
One-Time Costs	$2	$2	$0	$0	$0	$79
Recurring Costs	$239	$1,773	$2,176	$2,890	$3,184	$72,789
Net Fiscal Impact	*$2,002*	*$1,307*	*$515*	*$507*	*$379*	$23,082
Recurring Net Revenues	($75)	($224)	($99)	($214)	($145)	($5,637)

Note: Figures may not sum due to rounding
Source: Johnson Gardner 2001

Alternative 5 is likely to generate the lowest positive net impact for the State of Washington, in the range from $750,000 to $800,000 annually. Department costs are not likely to be dramatically greater among the three alternatives as identified in this analysis. However, the greater scale of residential development in Alternative 5 will induce the greatest enrollment impacts for School District No. 404. Accordingly, distributions to School District 404 are likely to be greatest under Alternative 5. Further details of net impacts to School District No. 404 are found later in this section.

B. KITTITAS COUNTY

Net Fiscal Impacts

Table VI-3 below provides a summary of estimated fiscal revenues, costs, and net fiscal impact for selected years for Kittitas County. Annual estimates of net fiscal impacts for all years of build-out are found in EXHIBIT 4.02 for Alternative 5.

Though net shortfalls are projected for most years of build-out, actualization of shortfalls will likely be reduced by the cost economies of scale. General service costs grow at a slower rate than does population or commercial development growth. For example, no matter how much growth occurs, Kittitas County will only require one Auditor, one Assessor, etc. and marginally more personnel in each of the said departments to handle the additional workload. Therefore, growing general service costs get spread across a faster growing quantity of population and commercial development over

H-01

time. The result is cost economies of scale, or decreasing average general service costs for residential and commercial development.

TABLE VI-3 – KITTITAS COUNTY REVENUE AND COST SUMMARY DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$318	$419	$557	$779	$972	$20,136
One-Time Revenues	$312	$151	$59	$65	$40	$2,947
Recurring Revenues	$6	$267	$498	$714	$931	$17,189
Total Costs	$379	$561	$635	$808	$924	$21,897
One-Time Costs	$263	$121	$48	$52	$32	$2,383
Recurring Costs	$116	$440	$588	$756	$892	$19,515
Net Fiscal Impact	*($61)*	*($142)*	*($78)*	*($30)*	*$47*	($1,761)
Recurring Net Revenues	($110)	($173)	($90)	($43)	$39	($2,326)

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

As discussed in Section V, general service costs are assumed to be constant over the build-out of the Cle Elum UGA. Cost economies of scale are not modeled in this analysis due to the complexity and uncertainty of such an undertaking. However, cost economies of scale could pose substantial general service cost reductions through the 30-year build-out, thus reducing or potentially eliminating projected net shortfalls summarized in Table VI-3.

C. CITY OF CLE ELUM

Table VI-4 below provides a summary of estimated fiscal revenues, costs, and net fiscal impact for selected years for Cle Elum. Annual estimates of net fiscal impacts for all years of build-out are found in EXHIBIT 4.03 for Alternative 5. As with cost estimates in Section V, the following net impact figures do not reflect higher subscriber fees under the new billing agreement with KITTCOM.

Across the thirty-year build-out period, Alternative 5 has projected average annual net revenues in the neighborhood of $200,000 to $300,000. However, Cle Elum is not projected to experience positive net revenues until Year 11 under Alternative 5. Thereafter, positive net inflow is estimated to improve to over $900,000 annually, largely due to the expanded property tax base. Until Year 11, annual shortfalls are projected to be in the neighborhood of $50,000 to $60,000 under the assumptions of this analysis.

To the extent that KITTCOM fees increase under the recent agreement with the City of Cle Elum, net shortfalls projected in early years would likely be greater and net surpluses would be reduced in later years. Subscriber fees would be tracked by the fiscal monitoring system established by mitigation agreement between Trendwest and the City. To the extent that higher KITTCOM subscriber fees attributable to the UGA caused shortfalls, Trendwest would make mitigation payments.

H-01

TABLE VI-4 – CLE ELUM REVENUE AND COST SUMMARY DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$336	$591	$781	$1,311	$2,014	$33,289
One-Time Revenues	$332	$241	$102	$120	$94	$4,671
Recurring Revenues	$4	$350	$679	$1,191	$1,919	$28,618
Total Costs	$368	$702	$826	$1,003	$1,075	$26,139
One-Time Costs	$66	$30	$12	$13	$8	$596
Recurring Costs	$302	$671	$814	$990	$1,067	$25,544
Net Fiscal Impact	*($32)*	*($110)*	*($45)*	*$307*	*$939*	$7,149
Recurring Net Revenues	($298)	($321)	($135)	$200	$853	$3,094

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001

Shortfall incidence would be greatly attributable to new service expenses before significant tax revenues are received, most notably property taxes. However, the City and Trendwest have agreed to a fiscal cost monitoring system, which will likely serve to significantly reduce fiscal shortfall potential. Under the agreement, new service burden, such as personnel and capital costs, will be acquired as new services are actually required rather according to a forecast schedule. Resulting net fiscal impacts may be lower than those projected under the assumptions of this analysis.

Initiative 747 and Net Fiscal Impacts

Net fiscal impacts to the City of Cle Elum would likely look differently if Cle Elum voters do not approve property tax revenue increases in excess of 1% annually as provided for in Initiative 747. In Section IV, it was found that by Year 10, property tax revenues generated by UGA development would be 13% lower with Initiative 747 when compared to the City levy rate decreasing at its historical rate of 1% in constant dollars. As such, net fiscal impacts to the City would likely be smaller than expressed above. In particular, net deficits in early years would likely increase and extend further into the lifetime of UGA development.

For the following reasons, quantification of net impacts to the City would at this point be speculative at best:

- *Legal Future for I-747:* As expressed earlier, the long-term legal status of I-747 is not definite as legal challenges may ultimately be successful as with past property tax cap measures.
- *Local Voter Approval:* I-747 does allow for property tax growth to exceed 1% if voters approve. As such, the City levy may act very much like a special levy in the future. Future voter sentiment would then be a significant revenue determinant and is impossible to predict at this point.
- *Altered Fiscal Cost Landscape:* If I-747 is binding and Cle Elum voters do not approve of higher property tax growth, current city service budgeting would likely be altered significantly to meet required service standards within acceptable budget. This will be particularly true for new residents at the UGA, who will require at a minimum the same

H-01

service standards guaranteed to existing City residents. Resulting changes in the City cost structure would be impossible to model at this time.

- *Altered Fiscal Revenue Landscape:* With constant service levels to uphold and revenues not keeping pace with inflation, the City may have to look for new or altered revenue sources to afford future service costs. Resulting changes would be impossible to model at this time.
- *Long-Term Prospects of I-747:* If I-747 causes noticeable, undesirable impacts to City finances and service provision, Washington voters may in fact repeal or reform I-747 to allow for greater revenue capacity. In the meantime, local voters may disregard the automatic cap and approve higher levy increases than 1% as indicated above.

Although I-747 would alter the existing and future fiscal situation for the City of Cle Elum, the City has negotiated mitigation agreements with the applicant in order to monitor annual, actualized costs and revenue flow due to Trendwest development. With or without I-747, the monitoring agreement between the City and Trendwest is designed to trigger any appropriate mitigation requirement as it may actually occur.

Initiative 747 would also affect the net fiscal impact to the City of Cle Elum from combined UGA and MPR development. Accordingly, discussion of the issue in terms of cumulative Trendwest development may be found in Section VII below.

Fire Station in Project Year 2

The City's Municipal Facilities and Services Expansion Plan indicates that by Year 2, the Cle Elum Fire Department will need a three-bay fire station to house new vehicles required by UGA service demand. Projected cost is between $550,000 and $650,000 for the purpose of this analysis. Under all of the development alternatives, the City is not projected to have enough new UGA property value to support a bond issue for a three-bay fire station. By Year 2, as a result, funding will likely require a combination of grants, bonds, and possible shortfall contributions if the UGA share of revenues is not sufficient to cover the UGA share of costs.

Property tax revenue projections have to this point assumed that the real City tax rate will decrease by roughly 1 percent annually consistent with historical trends. As the levy rate declines annually, the difference between the original real rate before construction and the lower rate each year of development can be viewed as potential room for new bond revenue assuming levy rates continue to hold below their levels in 2000. Table VI-5 below illustrates new City bond capacity through Year 6.

TABLE VI-5: CITY OF CLE ELUM BOND REVENUE CAPACITY FROM DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Alternative 5						
Maximum Capacity (000s)	$240	$240	$296	$407	$533	$640
- Projected Actual Revenue (000s)	$238	$236	$287	$391	$507	$603
= New Bond Capacity (000s)	$2	$5	$9	$16	$26	$37

Source: Johnson Gardner 2001

H-01

Possible new bond revenue in Table VI-5 is the total possible property tax revenue the City of Cle Elum may generate in a year if the City levy rate is held constant at its 1999 level of $2.4134 per $1,000 assessed. New possible revenue is the product of the constant levy rate and combined City and UGA assessed value. Combined assessed value is the sum of existing City assessed value of $99.6 million (Kittitas County Assessor's Report, 1999) and assessed UGA value as calculated in EXHIBIT 2.06.

Projected Actual Revenue is the total property tax revenue the City will generate if the property tax levy decreases 1 percent annually, as projected in this analysis. Actual revenue is the product of the projected levy rate from EXHIBIT 2.06 and the combined assessed value of the City as described in the paragraph above.

D. CITY OF ROSLYN

The scope of direct revenue and cost effects would be largely comprised of off-site visitor expenditures and public works and emergency service costs, respectively. Net fiscal impacts are discussed below.

Net Fiscal Impacts

Under Alternative 5, The City of Roslyn would likely experience more significant service costs due to occasional trips into Roslyn by UGA residents. Estimates are not quantified given that incidental general service (i.e. public works) and emergency service costs cannot be estimated. Paired with the said higher traffic and service costs would be lower sales tax revenues under Alternative 5. The City of Roslyn may likely see in excess of $4,000 in annual average sales tax revenues, as described in Section IV above. The result under Alternative 5 will likely be the least positive net fiscal impacts among the alternatives during the UGA development period.

Given these facts, it is not likely Roslyn will experience negative fiscal impacts from UGA development. Roslyn will capture a far lower share of UGA resident traffic than will the City of Cle Elum due to the limited number of services available in the community relative to Cle Elum. In light of such potential revenues and the minor increases in visitor traffic described in Section V, the City of Roslyn should realize no negative net fiscal effects, at a minimum.

E. TOWN OF SOUTH CLE ELUM

The Town of South Cle Elum may likely experience positive, net fiscal impacts during the UGA development period under Alternative 5. Estimates are not quantified given that incidental general service (i.e. public works) and emergency service costs cannot be estimated. While this analysis does not project identifiable revenues for South Cle Elum, it is also highly probable that traffic through the Town will be very limited give its proximity to Cle Elum. Accordingly, the Town should at a minimum experience no net, negative fiscal impacts.

H-01

F. CITY OF ELLENSBURG

The scope of direct revenue and cost effects should be largely comprised of off-site visitor expenditures paired with construction purchases and incidental public works and emergency service costs, respectively. Net fiscal impacts are discussed below.

Net Fiscal Impacts

The City of Ellensburg may likely experience positive, net fiscal impacts during the UGA development period. Estimates are not quantified given that incidental general service (i.e. public works) and law enforcement service costs cannot be estimated.

However, the City of Ellensburg may see as much as $40,000 to $50,000 in annual average sales tax revenues from Alternative 5 as described in Section IV above. The result is a likely net positive revenue effect for Ellensburg for all years of UGA development.

G. CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404

Net impacts to District 404 fall into two separate, but related categories: reconciliation of M&O revenues to recurring operating costs; and reconciliation of bond levy revenues to capital facility/equipment expenses. Though serving very different purposes, the M&O and bond fund levy rates combined effectively measure the total tax rate faced by citizens within District 404. This analysis of net fiscal impacts to the District assumes that current taxpayers are never to pay a higher real property tax rate to District 404 than the 2000 level of $2.4556 per $1,000 of assessed property value (sum of $1.1836 bond levy rate and $1.2720 M&O levy rate).

Net Operating Impacts

Table VI-6 summarizes estimated fiscal revenues, non-capital facility costs, and net fiscal impacts for the Cle Elum/Roslyn School District. Here net impacts are defined as M&O levy revenues less total local, non-capital facility costs.[9] Annual estimates of net fiscal impacts for all years of build-out are found in EXHIBIT 4.04 for Alternative 5.

[9] Bond levy revenues are excluded as they are to be reserved for likely capital equipment costs. For Years 1 through 12, bond levy revenues will be devoted to current bond obligation not affected by future UGA development. Thereafter, bonds may be issued for capital facilities and levy revenue would be restricted to payment on that future obligation.

H-01

TABLE VI-6: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 FISCAL IMPACTS SUMMARY DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Local Revenues	$19	$364	$807	$1,402	$2,349	$33,967
Total Local Costs (15%)	$41	$312	$383	$489	$540	$12,439
One-Time Costs	$0	$0	$0	$0	$0	$0
Recurring Costs	$41	$312	$383	$489	$540	$12,439
Net Fiscal Impact	*($24)*	*($67)*	*$202*	*$479*	*$1,008*	*$10,902*

Note: Figures may not sum due to rounding.
Source: Johnson Gardner 2001 and Cle Elum-Roslyn School District #404 Capital Facilities Plan

Maintenance and operations levy revenues are projected to fall short of recurring costs in early years. Lags between construction and property taxes received on that construction will greatly contribute to potential fiscal shortfalls. As a result, M&O levy revenue may not be expected to catch up with local operating costs until as late as Year 6 under Alternative 5. Accordingly, early deficits will likely be greatest from high enrollment impacts under Alternative 5, with shortfalls projected through Year 6 averaging over $150,000 annually. After M&O levy revenues catch up with annual operations expenses, Alternative 5 poses substantial positive net fiscal impacts through Year 30, ranging between $450,000 and $500,000 annually if levy rates are held constant after Year 12.

The projected positive net revenues for the School District are contingent upon the assumption of constant proportional increases in expenditure annually and constant M&O levy rates. In reality, school funding also depends upon voter approval as much as it does growth in assessed value and necessary costs. The following represent possible fiscal outcomes.

- *Expenditure-Matching Revenues:* Because revenue needs will be set to match additional UGA induced costs, levy rates likely will go down as assessed value increases.
- *Deficiency Recovery:* Net revenues may be dedicated to any existing service or capital deficiencies in the district, particularly after the failed M&O levy in 1998.
- *Capital Contributions:* A new fund may be established as a resource for capital equipment to minimize future need for bonds.
- *Additional Levy Constraint:* Significant positive net revenues may affect the passage of levies.

Three additional issues will have bearing on the incidence of short-term fiscal shortfalls and future levy rate behavior as summarized below.

- *Growth in Assessed Values:* For conservative estimates, this analysis assumed that existing development within District 404 will remain constant for thirty years. In actuality, non-UGA construction and inherent value growth will certainly occur thus increasing revenue potential for the District independent of the UGA.
- *Economies of Scale:* This analysis does not factor in economies of scale for the District as growth occurs. Although enrollment will increase, many personnel and operating costs will not increase by the same proportion, i.e. Administration positions, thus curbing future cost potential.

H-01

- *Levy Decline After Year 12:* After the current bond obligation is repaid by Year 12, the District will automatically increase its levy capacity by the value of the old bond levy rate. With substantial operating surpluses forecast by Year 12, both bond levy and M&O levy rates will have room to actually decline through Year 30 rather than hold constant.

Even with District changes to the M&O levy rate, the District is projected to face possible shortfalls through Year 5 of UGA development assuming MountainStar MPR is not developed. MPR development poses significant increases in District revenue capacity with very different net fiscal impacts. Net impacts to the District from UGA and MPR development are addressed in Section VII below.

Capital Costs and New Levy Capacity

Analysis in Section IV above determined that the levy rate for current bond obligation will decline through Year 12 as the UGA is developed. Concurrently, the M&O levy rate was assumed constant as a measure of District tax capacity with the rate capped at present levels over the next thirty years. As a result, the combined levy rate is projected to decline through Year 12, thereafter holding constant as a measure of future tax capacity after the current bond obligation is repaid. The twelve-year levy rate decline suggests the District will have new levy capacity for either new bond issues or additional maintenance and operation needs without exceeding the current, combined District tax rate.

As stated in Section V, District 404 will require new portables in the short-term, new space over the long-term, and school buses intermittently in future years as UGA enrollment increases. An analysis of maximum new bond revenue capacity, before and after the existing bond obligation is retired, was conducted to determine the ability of new UGA assessed value under Alternative 5 to pay for needed school space and transportation. Results of the analysis are presented in Table VI-7 below.

TABLE VI-7: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 MAXIMUM BOND REVENUE CAPACITY FROM DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 5	Year 10	Year 15	Year 20	Year 30
Alternative 5					
Excess Bond Rate Capacity 1/	0.2016	0.3541	1.1836	1.1836	1.1836
x Annual Assessed Value (000s) 2/	$792,636	$940,072	$1,081,762	$1,246,932	$1,671,333
= Excess Bond Revenue Capacity	$160	$333	$866	$998	$1,338
+ Excess M&O Revenue Capacity	$0	$202	$326	$479	$1,008
= Maximum Bond Capacity (000s)	$160	$535	$1,192	$1,477	$2,346

1/ Defined as the current, 2000 levy rate of $1.1836 less the projected levy rate in the respective year of UGA development.
2/ The sum of existing District assessed value and annual assessed value of UGA development.
Source: Johnson Gardner 2001

Assuming that the 2000 combined bond levy and M&O levy rate is the effective levy rate cap for existing residents within District 404, the District faces growing capacity for additional bond levies. In Years 1 through 12, excess bond rate capacity is defined as the difference between the 2000 bond levy rate and projected levy rates. After the current debt obligation is retired in Year 12, the District could seek new bond levies not exceeding a millage rate of $1,1836 per $1,000 of assessed value.

H-01

Excess M&O revenue capacity are those revenues generated by the assumed constant M&O levy in excess of operating cost projections summarized in Section V above, i.e. net operating surpluses.

Under Alternative 5, excess bond rate capacity begins at $0.0221 per $1,000 assessed value and climbs to the range of $0.35 to $0.40 per $1,000 assessed value by Year 12. As Table VI-6 indicates, the total assessed value of District 404 is expected to climb from the 2000 level of $672 million to as high as $978 million under Alternative 5. Growing assessed value, paired with growing additional levy rate capacity, points to significant resources for funding additional school space and bus expenditures as enrollment increases.

After adding excess M&O levy revenues, Alternative 5 will likely pose the greatest potential capacity for new bond issues before Year 12, with additional revenue growing from between $10,000 and $20,000 in Year 2 to as much as $600,000 to $650,000 by Year 12. After the existing bond obligation is retired, new bond capacity could grow from roughly $1.1 million in Year 13 to the neighborhood of $2.3 million annually by Year 30.

However, based on guidelines in the District Capital Facilities Expansion Plan, new UGA-induced bond levy capacity may not satisfy UGA-induced demand for portables and buses in very early years of development. As previously stated, buses and portable space serving UGA enrollment will likely be needed within the first five years. While the District does not specifically target a precise year for requirement of school construction, Year 7 is likely given the District's plan to satisfy enrollment growth for seven years through portable classroom purchase.

Assuming the District continues upkeep of all portables purchased, and assuming new bond issue would require twenty-year repayment at 5 percent annual interest, school construction could in fact be financed in a gradual manner continually supplemented with portable use. The following summarizes the earliest possible timing of new bond issues for all thirty-year needed bus expense and one-half of total, thirty-year school construction costs under Alternative 5.

- *Alternative 5:* Four buses ($324,000) and $11.2 million in local-share space costs could be funded by Year 12, with constant repayments at $895,000 annually.

Bond issues, posing no extra cost to existing residents, will likely be possible earlier as bus purchase will be more gradual than assumed. Furthermore, the District with public input will ultimately determine timing of school construction. While the figures above do describe UGA-specific impacts, the figures and timing expressed above do not account for MountainStar MPR-induced enrollment. The issue, which has particularly important tax base ramifications, is given further discussion below in Section VII, Cumulative Impacts.

H. KITTITAS COUNTY FIRE DISTRICT NO. 7

As stated previously, Fire District No. 7 would not hold direct jurisdiction over the UGA site in this analysis. Net fiscal impacts to the Fire District due to UGA development would be limited to indirect impacts with incidental back-up or mutual aid fire response calls. Such calls would incur District costs, however, fees for such services can be retrieved through the Upper County mutual aid agreement. Therefore, net fiscal impacts to the District are anticipated to be negligible.

H-01

I. KITTITAS COUNTY HOSPITAL DISTRICT NO. 2

Table VI-8 summarizes estimated fiscal revenues, costs, and net fiscal impacts for Hospital District No. 2. Annual estimates of net fiscal impacts for all years of build-out are found in EXHIBIT 4.05 for Alternative 5.

Results of the analysis suggest that Hospital District 2 cost estimates may likely exceed UGA-induced revenues in early years of development. Service costs under Alternative 5 may exceed tax revenues by as much as $50,000 to $60,000 annually on average through Year 9.

TABLE VI-8: KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 FISCAL IMPACTS SUMMARY DUE TO THE DEVELOPMENT OF CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$3	$86	$169	$323	$570	$7,842
Total Costs	$64	$148	$169	$202	$218	$5,422
One-Time Costs	$0	$0	$0	$0	$0	$0
Recurring Costs	$64	$148	$169	$202	$218	$5,422
Net Fiscal Impact	($61)	($62)	$0	$121	$352	$2,420
Recurring Net Revenues	($61)	($62)	$0	$121	$352	$2,420

Note: Figures may not sum due to rounding.

Thereafter, net impacts to the Hospital District are projected to be positive after assessed property value has caught up with costs. Positive net revenues from Year 10 through Year 30 are projected to average $100,000 to $150,000 annually. For all years, net impacts are estimated at $80,000 to $90,000 annually.

The following issues may affect the actualization of net fiscal impacts as the UGA is built out under Alternative 5 or Alternatives 2, 3, or 4.

- *Fire/EMS Coordination:* No assumptions were made regarding paramedic training of firefighters. As such, the above cost projections may represent double-counted personnel needs if the Cle Elum Fire Department and Hospital District No. 2 jointly train and employ paramedics serving the UGA. The above cost estimates would be reduced proportionately.
- *Overlap in BLS Ambulance Service:* The above cost estimates assume the Hospital District will continue to operate BLS ambulance service concurrently with the Cle Elum Fire Department. If BLS service is coordinated by one public service provider, costs may likely decrease either for the Hospital District or the City of Cle Elum.
- *Property Tax Lag:* The two-year lag between construction and receipt of property tax revenues contributes to the net difference of revenues and expenses.

Similarly for the City of Cle Elum emergency services departments, subscriber fees attributable to service calls at UGA development would be tracked as UGA-induced expenses under the tentative mitigation agreement between Trendwest and Hospital District No. 2. To the extent that those

H-01

subscriber fees cause fiscal shortfalls, Trendwest would be responsible for mitigation payments subject to the details of the proposed mitigation arrangement.

J. KITTITAS COUNTY COMMUNICATIONS (KITTCOM)

As described above in Section V (Costs), it is anticipated that the subscriber fees will be set to cover costs to KITTCOM not covered through the telephone surcharge or grant monies. Subscriber fees (per-call basis) will be billed to affected public service providers (City of Cle Elum and Hospital District #2). Charges attributable to UGA development will be included in the shortfall monitoring and shortfall payment agreements between Trendwest and the City of Cle Elum and Trendwest and Hospital District #2.

H-01

VII. CUMULATIVE IMPACTS OF THE PROPOSED ACTION

The concurrent construction of MountainStar MPR and the Cle Elum UGA would pose significant cumulative impacts to the public service jurisdictions included in the fiscal analysis. The State of Washington, Kittitas County, School District 404, Hospital District 2, KITTCOM and the City of Cle Elum could experience particularly sizeable revenue and cost impacts as the MPR and UGA are jointly developed.

Cumulative fiscal impacts are calculated as the annual sum of revenues and public service costs from MPR development based upon results in the MountainStar MPR Environmental Impact Statement (Kittitas County, 2000) and fiscal impacts to public service providers as described for UGA Alternative 5 in preceding sections. Cumulative impact estimates assume that the MPR and the UGA will follow concurrent construction, i.e. Year 5 of MPR development is Year 5 of UGA development, etc.

MPR service costs and revenues have been re-estimated for the purposes of the UGA Alternative 5 cumulative analysis. As part of the RIDGE Settlement Agreement, Trendwest has agreed to reduce the number of residential units planned for the MPR. Specifically, the number of residential units has been reduced from 4,650 to 3,785. As a result, fiscal revenues from the MPR, as well as costs, will be reduced accordingly. A comprehensive, detailed re-estimation of the MPR fiscal impact analysis was beyond the scope of this analysis. However, for the purpose of estimating cumulative impacts, it was assumed that revenue and cost impacts of the MPR would be reduced by a factor of 18.6%, or percentage decrease in residential units and resulting population.

A. STATE OF WASHINGTON

Table VII-1 provides a summary of projected cumulative State revenues and costs for selected years of the build-out period. Combined revenues under Alternative 5 may likely range from over $3.5 million in Year 1 to over $16.5 million in Year 30. For all years, annual average revenues are estimated at approximately $13.5 million to $14 million; of that, one-time revenues would comprise $3 million to $3.5 million with recurring revenues in the range of $10 million to $10.5 million.

TABLE VII-1: STATE OF WASHINGTON CUMULATIVE FISCAL IMPACTS SUMMARY FROM DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$3,619	$11,683	$12,834	$15,605	$16,639	$413,984
One-Time Revenues	$2,623	$5,905	$3,130	$2,778	$1,934	$100,115
Recurring Revenues	$996	$5,778	$9,705	$12,827	$14,705	$313,869
Total Costs	$241	$1,935	$2,397	$3,183	$3,525	$80,084
One-Time Costs	$2	$2	$0	$0	$0	$136
Recurring Costs	$239	$1,933	$2,397	$3,183	$3,525	$79,948
Net Fiscal Impact	*$3,378*	*$9,748*	*$10,437*	*$12,422*	*$13,114*	*$333,900*
Recurring Net Revenues	$757	$3,845	$7,308	$9,644	$11,180	*$233,921*

Note: Figures may not sum due to rounding

H-01

Total identifiable costs to the State may reach the range of $2.5 million to $3 million on average annually over the thirty years of build-out. Costs may start out at under $250,000 in Year 1 and could climb to the neighborhood of $3.5 million to $4 million by Year 30.

Combined development under Alternative 5 is estimated to cause a positive net impact to the State of Washington. Net marginal surpluses are expected to start in the range of $3 million to $3.5 million in the first year of development and grow to between $13 million and $13.5 million in Year 30. The annual average net surplus would be between $11 million and $11.5 million.

Significant Unavoidable Adverse Impacts

In light of the estimated net fiscal surplus for the State, no significant unavoidable impacts from cumulative impacts are anticipated.

Mitigation

No mitigation would be required in light of positive net fiscal impacts.

B. KITTITAS COUNTY

Table VII-2 provides a summary of projected cumulative County revenues and costs for selected years of the build-out period. Based on the model assumptions employed, MPR and UGA development under Alternative 5 is likely to contribute to Kittitas County with annual average revenues ranging from $4 million to $4.5 million. Average annual recurring revenues would range between $3.5 million and $4 million.

TABLE VII-2: KITTITAS COUNTY CUMULATIVE FISCAL IMPACTS SUMMARY FROM DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$739	$3,059	$4,190	$5,063	$5,980	$130,610
One-Time Revenues	$559	$1,471	$831	$679	$367	$23,586
Recurring Revenues	$181	$1,588	$3,359	$4,384	$5,612	$107,023
Total Costs	$546	$1,846	$2,312	$2,695	$2,837	$70,012
One-Time Costs	$401	$675	$370	$294	$93	$10,204
Recurring Costs	$144	$1,171	$1,942	$2,401	$2,744	$59,808
Net Fiscal Impact	*$194*	*$1,213*	*$1,878*	*$2,368*	*$3,142*	*$60,598*
Recurring Net Revenues	$37	$417	$1,417	$1,982	$2,868	$47,215

Note: Figures may not sum due to rounding.

Average annual combined cost to Kittitas County under Alternative 5 and could reach the range of $2 million to $2.5 million. Of this, roughly 85 percent would be population-driven recurring costs. Cumulative costs to the County are projected to begin in Year 1 in the range of $500,000 and $550,000 and are then expected to increase to around $2.5 million to $3 million by Year 30.

H-01

Development under Alternative 5 is projected to result in an average annual net revenue gain of $2 million to $2.5 million.

Significant Unavoidable Adverse Impacts

In light of the estimated net fiscal surplus for the County, no significant unavoidable impacts from cumulative impacts are anticipated.

Mitigation

No mitigation would be required in light of positive net fiscal impacts.

C. CITY OF CLE ELUM

Table VII-3 provides a summary of projected cumulative City of Cle Elum revenues and costs for selected years of the build-out period. Construction of MountainStar MPR paired with UGA Alternative 5 would likely generate annual tax revenues in the range of $1 million to $1.5 million over all years of buildout. Revenues are likely to begin in Year 1 in the range of $450,000 and $500,000 and then increase to between $2 million and $2.5 million by the thirtieth year of development.

City costs would likely reach the range of $850,000 to $900,000 annually on average over the entire buildout period. During Year 1 of construction, total costs to the City could start between $450,000 and $500,000. By Year 30, costs to the City are projected to reach between $1 million and $1.5 million. As with solely UGA-induced impacts, the cumulative costs expressed here reflect the old KITTCOM subscriber fee agreement. To the extent that City of Cle Elum police and fire departments pay higher KITTCOM subscriber fees, cumulative cost projections would increase.

TABLE VII-3: CITY OF CLE ELUM CUMULATIVE FISCAL IMPACTS SUMMARY FROM DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$476	$639	$861	$1,419	$2,138	$36,324
One-Time Revenues	$462	$241	$102	$120	$94	$5,061
Recurring Revenues	$15	$398	$760	$1,299	$2,044	$31,263
Total Costs	$498	$702	$826	$1,003	$1,075	$26,529
One-Time Costs	$196	$30	$12	$13	$8	$986
Recurring Costs	$302	$671	$814	$990	$1,067	$25,544
Net Fiscal Impact	*($22)*	*($63)*	*$35*	*$416*	*$1,064*	$9,795
Recurring Net Revenues	($287)	($273)	($54)	$309	$978	$5,739

Note: Figures may not sum due to rounding.

Based on the assumptions of this analysis, the City of Cle Elum is projected to risk fiscal shortfalls through Year 7 of cumulative development under Alternative 5. For the first seven years, average annual shortfalls could reach $50,000.

H-01

For all other years, the City would likely receive net surpluses in the range of $10,000 to $20,000 in Year 8 and increase to roughly $1 million to $1.5 million by Year 30. For all years, Alternative 5 would generate the greatest positive net cumulative impact to the City of Cle Elum from all development alternatives with an annual average of between $300,000 and $350,000.

I-747 and Cumulative Fiscal Impacts

Cumulative fiscal impacts to the City of Cle Elum would likely also look differently if Cle Elum voters do not approve property tax revenue increases in excess of 1% annually as provided for by Initiative 747. For similar reasons listed in Section VI, cumulative fiscal impacts under I-747 are very speculative and were not modeled as a result.

However, the City of Cle Elum has no property tax jurisdiction at the MPR. Therefore, revenues to the City from MPR development, mostly sales tax revenue, would not be affected. Cumulative impacts would be reduced only the lower property tax revenue inflow as described in Section IV above.

Although I-747 would alter the existing and future fiscal situation for the City of Cle Elum, the City has negotiated mitigation with the applicant as part of the draft Conditions of Approval for the project in order to monitor annual, actualized costs and revenue flow due to Trendwest development (discussed below). Fiscal monitoring would include both impacts from UGA development as well as MPR development. Therefore, if I-747 has effects upon actual fiscal impacts measured during the monitoring process, it would be covered under the Conditions of Approval.

Significant Unavoidable Adverse Impacts

With implementation of the mitigation measures outlined below, no significant unavoidable adverse impacts would occur.

Mitigation

Subject to the Pre-Annexation Agreement between the City of Cle Elum and Trendwest Properties, the proposed UGA development is not permitted to cause existing citizens and ratepayers to suffer negative financial impacts as a result of dealing with Trendwest development activities within the UGA. As such, Trendwest and the City would execute a fiscal mitigation/shortfall agreement, consistent with the Conditions of Approval for the project, that accurately tracks projected revenues and expenses from UGA development.

- A Municipal Facilities and Services Expansion Plan would guide necessary capital and services expansion for the City regarding future UGA development.
- Monitoring of fiscal costs and revenues would occur to identify timing of costs relative to Trendwest-related revenue inflow in order to determine shortfall mitigation payments.
- Trendwest would pay for its share of planning and construction of water and wastewater treatment plants.

H-01

- Trendwest would pay for all reasonable staff and consultant fees related to City review and processing of development permits including those items in the Conditions of Approval. This includes funding for a City Planner and a City Administrator.

- A process for coordination between MPR security forces and Cle Elum-Roslyn police and Cle Elum fire service provision would be determined.

D. CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404

Net fiscal analysis of cumulative MPR and UGA development follows the outline established for net fiscal impacts of the UGA as described in Section VI. Analysis follows three steps:

- *Net Fiscal Impacts of Recurring Revenues and Expenses;*
- *Adequacy of Bond Revenues for Capital Expenditures; and*
- *Estimation of Excess M&O Revenue Capacity.*

Net Operating Impacts

Table VII-4 summarizes estimated fiscal revenues, non-capital facility costs, and net fiscal impacts for the Cle Elum/Roslyn School District. Here net impacts are defined as M&O levy revenues less total local, non-capital facility costs. Annual estimates of net fiscal impacts for all years of build-out are found in EXHIBIT 5.06 for Alternative 5.

Maintenance and operations levy revenues are projected to fall short of recurring costs in early years, though for shorter duration than projected for UGA development alone. Delays in property tax receipts after construction will largely be the cause of early shortfall occurrence. If the UGA and MPR are developed at a thirty-year velocity, shortfalls are not expected to continue further than Year 4 under Alternative 5. Under the assumptions of this analysis, early deficits are projected to just exceed $100,000 for the first four years. After M&O levy revenues catch up with annual operations expenses, Alternative 5 poses significant net fiscal benefits. Annual surpluses are projected to increase from between $30,000 and $40,000 annually in Year 5 to the neighborhood of $3 million to $3.5 million by Year 30 if O&M levy rates are held constant.

TABLE VII-4: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 FISCAL IMPACT SUMMARY DUE TO THE DEVELOPMENT OF MOUNTAINSTAR MPR AND CLE ELUM UGA UNDER ALTERNATIVE 5
(000'S OF CONSTANT 2000 DOLLARS)

Source of Costs	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Local Revenues	$3	$361	$1,066	$2,165	$3,979	$51,950
Total Local Costs (15%)	$41	$324	$404	$522	$583	$13,224
One-Time Costs	$0	$0	$0	$0	$0	$0
Recurring Costs	$41	$324	$404	$522	$583	$13,224
Net Fiscal Impact	*($41)*	*$37*	*$662*	*$1,642*	*$3,396*	*$38,715*

Note: Figures may not sum due to rounding.

H-01

The projected positive net operating revenues for the School District are contingent upon the assumption that the District M&O levies are approved by voters and resulting levy rates, determined by annual revenue needs and District assessed value base, never exceed the 2000 M&O rate during MPR and UGA development. In reality, public involvement in District expenditures may likely affect the true realization of net fiscal impacts. The following represent possible fiscal outcomes.

- *Expenditure-Matching Revenues:* Because revenue needs will be set to match additional UGA induced costs, levy rates likely will go down as assessed value increases.
- *Deficiency Recovery:* Net revenues may be dedicated to any existing service or capital deficiencies in the district, particularly after the failed M&O levy in 1998.
- *Capital Contributions:* A new fund may be established as a resource for capital equipment to minimize future need for bonds.
- *Additional Levy Constraint:* Significant positive net revenues may affect the passage of levies.

As indicated above, substantial operating net surpluses will likely result if levy rates held constant at existing levels. More likely, M&O levy rates would decline as increases in district assessed value exceeds enrollment increases from MPR and UGA development. However, the potential extra revenues generated, if the M&O levy rate is constant, may also be a measure of additional bond capacity School District 404 would have for future capital facilities and vehicles needs. The following section takes up this issue.

Capital Cost and Bond Levy Capacity

A discussion of potential capital costs required by the development of both MountainStar MPR and the UGA are discussed below, followed by analysis of potential bond revenue capacity for funding needed expenditures.

Capital Facilities Costs

UGA and MountainStar MPR development combined pose significant enrollment increases for District 404, though only slightly greater than for the UGA alone as expressed in Section V, Table V-9 due to the MPR's focus on short-term housing. As indicated by the District's Capital Facilities Plan, new school space will be required to house combined enrollment in both the short term (Years 1 through 7) and the long-term (Years 8 through 20 and beyond).

Table VII-5 below provides projected new enrollment for the UGA and MountainStar MPR, as well as natural enrollment growth independent of Trendwest-related development (as projected in the District Capital Facilities Expansion Plan). As before, Alternative 5 will likely induce the fastest and greatest need for additional school space. Alternative 4 will likely induce the least new enrollment and slightest need for new classroom space.

H-01

TABLE VII-5: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 ESTIMATED NATURAL AND CUMULATIVE MPR & UGA-INDUCED ENROLLMENT UNDER ALTERNATIVES 2, 3, 4, AND 5

Enrollment Source	Year 1	Year 5	Year 10	Year 20	Year 30
UGA Alt. 2, MPR & Natural Growth					
Elementary	34	178	247	334	415
Middle School	40	130	171	223	271
High School	24	125	175	238	296
Total	98	483	593	795	982
UGA Alt. 3, MPR & Natural Growth					
Elementary	37	196	287	408	507
Middle School	42	140	195	268	326
High School	27	137	203	291	362
Total	106	473	685	967	1,195
UGA Alt. 4, MPR & Natural Growth					
Elementary	37	138	185	281	367
Middle School	42	106	134	191	242
High School	27	96	130	200	261
Total	106	340	449	672	870
UGA Alt. 5, MPR & Natural Growth					
Elementary	30	248	325	459	559
Middle School	38	171	217	298	357
High School	22	175	241	328	400
Total	90	594	783	1,085	1,316

Note: Enrollment was calculated utilizing natural employment growth forecast in the School District Capital Facilities Plan, and combined with enrollment projections for the UGA and the new high-density MPR configuration.

Short-Term Capital Facility Needs

As described in Section V, School District 404 will purchase portable classrooms to accommodate enrollment growth through Year 7. Based on the classroom size standards outlined in Section V, enrollment projections in Table VII-5, and assuming the District maximizes the use of double-wide portables before Year 7, maximum cumulative portable classroom costs to the District from the MPR and UGA are summarized in Table VII-6 below.

H-01

TABLE VII-6: POTENTIAL NEW PORTABLE COSTS DUE TO MOUNTAINSTAR MPR AND UGA DEVELOPMENT ALTERNATIVES 2, 3, 4 & 5

Alternative	Year 7 Enrollment	Portables Needed	Total Cost
MPR & UGA Alt. 2			
Elementary	196	6 double	*$733,626*
Middle School	117	3 double	*$366,813*
High School	141	3 double	*$366,813*
Total			*$1,467,252*
MPR & UGA Alt. 3			
Elementary	229	6 double	*$733,626*
		1 single	*$77,952*
Middle School	138	3 double	*$366,813*
		1 single	*$77,952*
High School	165	4 double	*$489,084*
Total			*$1,745,427*
MPR & UGA Alt. 4			
Elementary	141	4 double	*$489,084*
Middle School	85	2 double	*$244,542*
High School	102	2 double	*$244,542*
		1 single	*$77,952*
Total			*$1,056,120*
MPR & UGA Alt. 5			
Elementary	272	8 double	*$978,168*
Middle School	163	4 double	*$489,084*
High School	196	3 double	*$366,813*
		1 single	*$77,952*
Total			*$1,834,065*

Note: Figures may not sum due to rounding. Portable costs are based on classroom cost figures found in the School District Capital Facilities Plan and extrapolated for the varying enrollment between the UGA development alternatives and the Reduced Density MPR scenario.

Actual portable purchase will depend upon a combination of three factors: natural enrollment growth, UGA-induced enrollment and MPR-induced enrollment. While Trendwest-related development will induce the greatest proportion of new portable need, concurrent natural enrollment growth may accelerate the need for portables and/or require greater portable costs for the District. Table VII-7 below summarizes potential annual portable costs for the District due to natural and Trendwest-related development.

As combined MPR and UGA assessed value increases over time, the Applicant will be responsible for a smaller share of portable and vehicle costs. Trendwest will no longer be responsible for matching payments according to the provisions of the mitigation agreement after Trendwest development reaches a value of $750 million assessed. Because MPR and UGA assessed value is projected to exceed $750 million before Year 7 under Alternative 5, the District can expect to incur very little of the projected portable expenses outlined in Table VII-7 below..

H-01

TABLE VII-7: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 ESTIMATED PORTABLE TIMING DUE TO NATURAL, MPR & UGA ENROLLMENT GROWTH UNDER ALTERNATIVES 2, 3, 4, AND 5

Natural Growth, MPR & UGA	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total
Alternative 2							
Elementary	$244,542 2 dbl	$244,542 2 dbl		$122,271 1 dbl		$122,271 1dbl	$733,626
Middle School	$122,271 1 dbl	$122,271 1 dbl		$122,271 1 dbl			$366,813
High School		$122,271 1 dbl	$77,952 1 sgl			$77,952 1 sgl	$278,175
Total	$366,813	$489,084	$77,952	$244,542	$0	$200,223	$1,378,614
Alternative 3							
Elementary	$244,542 2 dbl	$244,542 2 dbl	$122,271 1 dbl		$122,271 1 dbl	$122,271 1 dbl	$855,897
Middle School	$244,542 2 dbl		$77,952 1 sgl	$122,271 1 dbl			$444,765
High School		$122,271 1 dbl	$77,952 1 sgl		$122,271 1 dbl		$322,494
Total	$489,084	$366,813	$278,175	$122,271	$244,542	$122,271	$1,623,156
Alternative 4							
Elementary	$244,542 2 dbl	$122,271 1 dbl	$122,271 1 dbl		$77,952 1 sgl		$567,036
Middle School	$122,271 1 dbl	$122,271 1 dbl			$77,952 1 sgl		$322,494
High School			$122,271 1 dbl			$77,952 1 sgl	$200,223
Total	$366,813	$244,542	$244,542	$0	$155,904	$77,952	$1,089,753
Alternative 5							
Elementary	$366,813 3 dbl	$244,542 2 dbl	$122,271 1 dbl	$122,271 1 dbl	$122,271 1 dbl	$122,271 1 dbl	$1,100,439
Middle School	$244,542 2 dbl	$122,271 1 dbl		$122,271 1 dbl	$122,271 1 dbl		$611,355
High School		$122,271 1 dbl	$122,271 1 dbl			$122,271 1 dbl	$366,813
Total	$611,355	$489,084	$244,542	$244,542	$244,542	$244,542	$2,078,607

Note: Figures may not sum due to rounding. From the School District Capital Facilities Plan, altered for the higher-density MPR enrollment changes and extrapolated to each of the development alternatives.

Table VII-8 shows the schedule of capital expense matching rates identified in the mitigation agreement between Trendwest and the School District.

H-01

TABLE VII-8: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 SCHEDULE OF TRENDWEST CAPITAL EXPENSE MATCHING RATES

New Assessed MPR and UGA Valuation (millions)	Trendwest Match (%)
$0 - $450	100%
$451 - $600	75%
$601 - $750	50%
$751+	0%

Source: Mitigation Agreement between Trendwest and the Cle Elum-Roslyn School District #404 (9/5/2001).

School Bus Costs

Cumulative Trendwest-related enrollment would require the purchase of new school buses for the transportation of children to schools along SR 903. Based on the minor enrollment differences between Alternative 5 alone and with the MPR, it is not anticipated that the School District would need more than the 4 buses identified above in Section V. School District purchases of buses are also subject to the District mitigation agreement with the Applicant, including the matching payment schedule in Table VII-8, above.

As stated earlier, trigger points for such purchases would largely depend upon when enrollment is actually realized in addition to endogenous school district growth.

Long-Term Capital Facility Needs

The above enrollment projections for combined UGA and MPR development will require slightly greater, long-term school construction costs than for the UGA alone. Utilizing the same assumptions discussed in Section V, long-term construction costs for combined MPR and UGA-induced enrollment were calculated for each UGA development alternative. Results are summarized in Table VII-9 below.

Again, Alternative 5 poses the greatest costs for long-term classroom construction, followed by Alternatives 3, 2 and 4 in descending order. Because classroom construction is treated more generally as a long-term plan, timing of construction would depend on many factors, including actualized enrollment, property tax base, voter sentiment and other issues.

H-01

TABLE VII-9: POTENTIAL NEW CLASSROOM CONSTRUCTION COSTS DUE TO MPR AND UGA DEVELOPMENT ALTERNATIVES 2, 3, 4 & 5

Alternative	Year 30 Enrollment	Sq. Ft. per Pupil	State Cost per Sq. Ft.	Local Cost per Sq. Ft.	State Cost	Local Cost
Alternative 2						
Elementary	280	110	$26	$157	*$798,429*	*$4,819,778*
Middle School	168	135	$29	$186	*$660,056*	*$4,210,341*
High School	202	145	$29	$217	*$858,933*	*$6,349,638*
Total					*$2,317,417*	*$15,379,757*
Alternative 3						
Elementary	372	110	$26	$157	$1,062,897	$6,416,262
Middle School	223	135	$29	$186	$878,690	$5,604,957
High School	268	145	$29	$217	$1,143,442	$8,452,867
Total					*$3,085,028*	*$20,474,085*
Alternative 4						
Elementary	232	110	$26	$157	*$661,889*	*$3,995,547*
Middle School	139	135	$29	$186	*$547,179*	*$3,490,330*
High School	167	145	$29	$217	*$712,046*	*$5,263,785*
Total					*$1,921,115*	*$12,749,662*
Alternative 5						
Elementary	424	110	$26	$157	*$1,210,438*	*$7,306,904*
Middle School	254	135	$29	$186	*$1,000,661*	*$6,382,982*
High School	306	145	$29	$217	*$1,302,163*	*$9,626,210*
Total					*$3,513,262*	*$23,316,096*

Source: Johnson Gardner 2001; Cle Elum-Roslyn School District #404 Capital Facilities Plan

Capital Costs and Bond Revenue Capacity

An analysis of bond revenue capacity was conducted to determine the ability of new UGA and MPR assessed value to pay for needed school construction and transportation. Results of the analysis are presented in Table VII-10 below.

TABLE VII-10: CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 MAXIMUM BOND REVENUE CAPACITY FROM DEVELOPMENT OF MPR AND CLE ELUM UGA UNDER ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 5	Year 10	Year 15	Year 20	Year 30
Alternative 5					
Excess Bond Rate Capacity 1/	0.3687	0.6671	1.1836	1.1836	1.1836
x Annual Assessed Value (000s) 2/	$955,206	$1,509,764	$1,876,981	$2,373,477	$3,149,604
= Excess Bond Revenue Capacity	$352	$1,007	$2,222	$2,809	$4,498
+ Excess M&O Revenue Capacity	$37	$662	$1,071	$1,642	$3,396
= Maximum Bond Capacity (000s)	$389	$1,669	$3,293	$4,452	$7,894

1/ Defined as the current, 2000 levy rate of $1.1836 less the projected levy rate in the respective year of UGA development.
2/ The sum of existing District assessed value and annual assessed value of UGA development.

Assuming that the 2000 combined bond levy and M&O levy rate is the effective levy rate cap for existing residents within District 404, the District faces substantially growing capacity for additional

H-01

bond levies with MPR development included. In Years 1 through 12, excess bond rate capacity is defined as the difference between the 2000 bond levy rate and projected levy rates. After the current debt obligation is retired in Year 12, the District could seek new bond levies not exceeding a millage rate of $1,1836 per $1,000 of assessed value. Excess M&O revenue capacity are those revenues generated by the assumed constant M&O levy in excess of operating cost projections summarized in Section V above, i.e. net operating surpluses.

Under Alternative 5, excess bond rate capacity begins at $0.0259 per $1,000 assessed value and climbs to the range of $0.70 to $0.75 per $1,000 assessed value by Year 12. As Table VII-12 indicates, the total assessed value of District 404 is expected to climb from the 2000 level of $672 million to as high as $3.8 billion under Alternative 5 and MPR development. Growing assessed value, paired with growing additional levy rate capacity, points to significant resources for funding additional school space and bus expenditures as enrollment increases.

After adding excess M&O levy revenues, Alternative 5 will likely pose the greatest potential capacity for new bond issues before Year 12, with additional revenue growing from between $350,000 and $400,000 in Year 5 to as much as $2 million by Year 12. After the existing bond obligation is retired, new bond capacity could grow from roughly $3 million in Year 13 to the neighborhood of $7.9 million annually by Year 30.

However, based on guidelines in the District Capital Facilities Plan, new UGA-induced bond levy capacity may not completely satisfy UGA-induced demand for portables and buses in very early years of development. As previously stated, buses and portable space serving UGA enrollment will likely be needed within the first five years. However, turnkey-matching payments from the Applicant, consistent with the District mitigation agreement, will likely minimize District bus and portable expenses.

Assuming the District continues upkeep of all portables purchased, and assuming new bond issue would require twenty-year repayment at 5 percent annual interest, school construction could in fact be financed in a gradual manner continually supplemented with portable use. The following summarizes the earliest possible timing of new bond issues for all thirty-year needed bus expense and one-half of total, thirty-year school construction costs under Alternative 5.

- *Alternative 5:* Four buses ($380,000) and $12.1 million in local-share space and land costs could be funded by Year 8, with constant repayments at $982,000 annually.

Bond issues, posing no extra cost to existing residents, will likely be possible earlier as bus purchase will be more gradual than assumed. Furthermore, the District with public input will ultimately determine timing of school construction. However, natural enrollment growth will ultimately determine construction timing along with MPR and UGA-induced growth. School construction will likely be accelerated. However, the District Capital Facilities Expansion Plan does not give precise plans for construction timing as it does for portable purchases. Accordingly, while costs and bond levy capacity issues posed by the proposed development are addressed here, ramifications of natural growth and its precise effects on District decisions are beyond the scope of this analysis.

H-01

Significant Unavoidable Adverse Impacts

With implementation of mitigation measures identified below, no significant unavoidable adverse impacts are anticipated.

Mitigation

- The applicant will work with the District through a mutually agreed-to mitigation agreement until such time as Trendwest-related cumulative development reaches $751 million.
- Trendwest will grant 25 usable acres to the District, contingent on provisions outlined in the agreement.
- The applicant will make matching payments to the District for portable classrooms and school buses based on a sliding scale negatively correlated to the total assessed value of Trendwest-related development (see Table VII-9 as related discussion above).
- The applicant will provide portable student housing as triggered by 25 or more unhoused students from Trendwest development.
- The applicant will coordinate with the District on an annual enrollment survey to identify new student parents or guardians who are Trendwest employees, employees of major general contractors, subcontractors who earn over 50% of their gross income from work at the MountainStar & UGA sites, and new pupils living within the boundaries of the MPR and UGA.
- The applicant agrees to a pupil transportation audit occurring in October and May of each year where actual need for new buses will be measured. Based on the audit, written recommendations will be received by the applicant, whereby Trendwest will pay its proportionate share of new bus costs based on measured impacts resulting from Trendwest development.

E. KITTITAS COUNTY HOSPITAL DISTRICT NO. 2

Table VII-12 identifies cumulative impacts to Hospital District No. 2. Average annual revenue capacity would be between $700,000 to $800,000. Revenues are likely to range from $5,000 to $10,000 in Year 1 and increase to between $1.5 million to $2 million by Year 30.

Annual service costs identified by the Hospital District could range from $100,000 to $150,000 in Year 1 to between $500,000 and $550,000 in Year 30. Average annual costs would be $400,000 to $450,000. Costs from MPR and UGA development under this alternative are expected to be slightly higher than those projected for UGA Alternative 2, due to the greater number of permanent residents under Alternative 5.

H-01

TABLE VII-12: KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 CUMULATIVE FISCAL IMPACTS FROM DEVELOPMENT OF MOUNTAINSTAR MPR AND CLE ELUM UGA
ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5						
Total Revenues	$9	$175	$470	$902	$1,595	$21,704
Timber Excise Tax	$0	$133	$410	$824	$1,507	$19,755
Property Tax	$2	$0	$0	$0	$0	$6
Patient Fees	$8	$41	$60	$78	$88	$1,943
Total Costs	$109	$260	$356	$454	$523	$12,033
One-Time Costs	$0	$0	$0	$0	$0	$0
Recurring Costs	$109	$260	$356	$454	$523	$12,033
Net Fiscal Impact	*($100)*	*($85)*	*$113*	*$447*	*$1,071*	*$9,671*
Recurring Net Revenues	($100)	($85)	$113	$447	$1,071	$9,671

Note: Figures may not sum due to rounding.

In Years 1 through 7, the District is projected to incur costs in excess of tax revenues. Total costs may exceed tax inflow by as much as $100,000 to $150,000 in Year 1 and then dwindle to as little as $10,000 to $20,000 in Year 7. All other years, net fiscal impacts are expected to be positive in the range of $20,000 to $30,000 in Year 8 and exceeding $1 million by Year 30. Average annual tax surpluses would be between $300,000 to $350,000. As described in Section V, KITTCOM subscriber fees would be tracked by the fiscal monitoring plan to identify any necessary shortfall mitigation payments.

Significant Unavoidable Adverse Impacts

With implementation of mitigation measures identified below, no significant unavoidable adverse impacts to Hospital District No. 2 would be anticipated.

Mitigation

The following criteria would be used to negotiate a final mitigation agreement:

- Hospital District No. 2 will track property tax revenues and patient fees attributable to MPR and UGA development, as well as service costs due to dispatch calls to combined Trendwest development.

- To the extent that property tax revenues and patient fees, combined with a contribution already made by Trendwest to Hospital District No. 2, do not cover the calculated cost of service to Trendwest development, Trendwest will make monthly mitigation payments to avoid fiscal shortfalls.
- Capital expenses, most likely ambulance purchases, will either be leased or purchased with bonds.

H-01

- Capital costs will be included as part of operating expenses calculated for Trendwest development and will be subject to the monthly mitigation arrangement.
- Appropriate space will be provided for Hospital District No. 2 and necessary capital equipment at the proposed emergency services center to be funded by Trendwest.

F. KITTITAS COUNTY COMMUNICATIONS (KITTCOM)

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are anticipated.

Mitigation

The new billing arrangement and mitigation agreements between Trendwest and public service providers will ensure fiscal shortfalls will not occur for KITTCOM during UGA and MPR build-out.

G. NEARBY JURISDICTIONS

Cumulative fiscal impacts for nearby jurisdictions are limited to indirect impacts for all jurisdictions. A qualitative discussion of cumulative impacts to the nearby jurisdictions is found in Appendix H of the MountainStar MPR Draft EIS.

Cities of Roslyn and Ellensburg and Town of South Cle Elum

MPR and UGA development under Alternative 5 could generate revenues to the City of Roslyn in the range of $20,000 to $25,000 on average per year of buildout. Revenues to the City are projected to start in Year 1 at between $1,000 to $5,000, and increase to between $30,000 and $40,000 by Year 30. This projection would amount to a roughly 50 to 60 percent increase over 1998 projected City sales tax revenues of $42,000 (City of Roslyn, 1998).

TABLE VII-14: CITY OF ROSLYN AND CITY OF ELLENSBURG CUMULATIVE FISCAL IMPACTS FROM DEVELOPMENT OF MOUNTAINSTAR MPR AND CLE ELUM UGA ALTERNATIVE 5
(000's of Constant 2000 dollars)

	Year 1	Year 5	Year 10	Year 20	Year 30	All Years
Alternative 5 *Total Recurring Revenues*						
City of Roslyn	$3	$16	$22	$29	$33	$717
City of Ellensburg	$15	$88	$155	$155	$177	$3,850

Source: Johnson Gardner 2001

The City of Ellensburg may expect revenues from construction of MountainStar MPR and Cle Elum UGA under Alternative 5 ranging from $10,000 to $20,000 in Year 1, and increasing to between $150,000 and $200,000 by Year 30. The annual average revenues would be between $100,000 to $150,000. This estimated average would amount to a 5 to 10 percent increase in projected 1999 City sales tax revenues of $2.4 million (City of Ellensburg, 1999).

H-01

City of Roslyn

Significant Unavoidable Adverse Impacts

In light of anticipated positive cumulative net fiscal impacts below, no significant unavoidable adverse impacts to the City of Roslyn would be anticipated.

Mitigation

Consistent with the Settlement Agreement between the applicant and RIDGE, mitigation to the City of Roslyn would include:

- Trendwest would donate an agreed-to total dollar amount in annual increments for four years beginning upon the first anniversary of the recording of the first final plat for the MPR.
- The funds shall be used by Roslyn for capital improvements, which shall be selected by the City of Roslyn based on the results of a Trendwest-funded survey of Roslyn citizens and business owners.
- RIDGE and Trendwest shall mutually determine the content and methodology for such a survey, the analysis of the survey, and interpretation of the results.

City of Ellensburg

Significant Unavoidable Adverse Impacts

In light of anticipated positive cumulative net fiscal impacts below, no significant unavoidable adverse impacts to the City of Ellensburg would be anticipated.

Mitigation

No mitigation would be required due to positive net fiscal impacts.

Town of South Cle Elum

Significant Unavoidable Adverse Impacts

In light of anticipated positive cumulative net fiscal impacts below, no significant unavoidable adverse impacts to the City of Roslyn would be anticipated.

Mitigation

No mitigation would be necessary due to positive net fiscal impacts.

H-01

EXHIBIT 3.07

KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Hospital District No. 2 Fiscal Cost of Project (000s)										
Personnel Expenditures (Paramedics, EMTs and Account Clerks)	$13	$63	$90	$105	$117	$150	$154	$157	$159	$161
O&M Expenditures ($147/service call and $9/KITTCOM call)	$1	$3	$4	$5	$6	$7	$7	$7	$7	$7
Capital Expenditures (Ambulance for Emergency Crews)	$50	$50	$25	$25	$25	$25	$0	$0	$0	$0
Total Hospital District Fiscal Cost (000s)	$64	$116	$119	$135	$148	$182	$161	$164	$166	$169

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Hospital District No. 2 Fiscal Cost of Project (000s)										
Personnel Expenditures (Paramedics, EMTs and Account Clerks)	$164	$166	$168	$172	$177	$181	$184	$187	$190	$193
O&M Expenditures ($147/service call and $9/KITTCOM call)	$8	$8	$8	$8	$8	$9	$9	$9	$9	$9
Capital Expenditures (Ambulance for Emergency Crews)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Hospital District Fiscal Cost (000s)	$171	$174	$176	$180	$186	$190	$193	$196	$199	$202

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Hospital District No. 2 Fiscal Cost of Project (000s)										
Personnel Expenditures (Paramedics, EMTs and Account Clerks)	$195	$198	$200	$202	$203	$205	$206	$207	$207	$208
O&M Expenditures ($147/service call and $9/KITTCOM call)	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10
Capital Expenditures (Ambulance for Emergency Crews)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Hospital District Fiscal Cost (000s)	$205	$208	$210	$212	$213	$215	$216	$217	$218	$218

Personnel Costs for All Years (000s)	*$4,981*
O&M Costs for All Years (000s)	*$241*
Capital Expenditures for All Years (000s)	*$200*

SOURCE: Johnson Gardner

EXHIBIT 3.08

KITTITAS COUNTY COMMUNICATIONS (KITTCOM) FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
KITTCOM Calls Received	468	1,475	2,466	3,020	3,472	3,846	3,966	4,087	4,170	4,253
KITTCOM Fiscal Cost of Project (000s)										
Personnel Expenditures (Dispatchers and Shift Supervisors)	$7	$22	$37	$45	$52	$58	$60	$61	$63	$64
O&M Expenditures ($8,646/FTE Dispatcher)	$1	$4	$6	$8	$9	$10	$10	$10	$10	$11
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total KITTCOM Fiscal Cost (000s)	$8	$26	$43	$53	$61	$68	$70	$72	$73	$75

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
KITTCOM Calls Received	4,336	4,419	4,503	4,632	4,836	4,988	5,090	5,192	5,312	5,414
KITTCOM Fiscal Cost of Project (000s)										
Personnel Expenditures (Dispatchers and Shift Supervisors)	$65	$66	$68	$70	$73	$75	$76	$78	$80	$81
O&M Expenditures ($8,646/FTE Dispatcher)	$11	$11	$11	$12	$12	$12	$13	$13	$13	$13
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total KITTCOM Fiscal Cost (000s)	$76	$77	$79	$81	$85	$87	$89	$91	$93	$95

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
KITTCOM Calls Received	5,516	5,617	5,682	5,747	5,812	5,877	5,917	5,942	5,962	5,983
KITTCOM Fiscal Cost of Project (000s)										
Personnel Expenditures (Dispatchers and Shift Supervisors)	$83	$84	$85	$86	$87	$88	$89	$89	$89	$89
O&M Expenditures ($8,646/FTE Dispatcher)	$14	$14	$14	$14	$14	$15	$15	$15	$15	$15
Capital Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total KITTCOM Fiscal Cost (000s)	$96	$98	$99	$100	$101	$103	$103	$104	$104	$104

Personnel Costs for All Years (000s)	*$2,071*
O&M Costs for All Years (000s)	*$344*
Capital Expenditures for All Years (000s)	*$0*

SOURCE: Johnson Gardner

EXHIBIT 4.01

STATE OF WASHINGTON SUMMARY OF NET FISCAL IMPACTS
FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$2,243	$3,653	$3,847	$3,059	$3,102	$3,137	$2,564	$2,664	$2,634	$2,691	$29,594
One-Time Revenues	$2,079	$3,134	$2,910	$1,800	$1,553	$1,369	$692	$700	$609	$614	$15,460
Recurring Revenues	$164	$519	$937	$1,258	$1,549	$1,769	$1,872	$1,965	$2,025	$2,076	$14,134
Total Costs	$241	$753	$1,255	$1,541	$1,775	$1,965	$2,028	$2,090	$2,133	$2,176	$15,955
One-Time Costs	$2	$2	$2	$2	$2	$0	$0	$0	$0	$0	$10
Recurring Costs	$239	$751	$1,253	$1,539	$1,773	$1,965	$2,028	$2,090	$2,133	$2,176	$15,945
Net Fiscal Impact	*$2,002*	*$2,900*	*$2,592*	*$1,518*	*$1,328*	*$1,172*	*$536*	*$575*	*$501*	*$515*	$13,639
Recurring Net Revenues	-$75	-$232	-$316	-$281	-$224	-$197	-$156	-$125	-$107	-$99	-$1,811

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$2,727	$2,769	$2,830	$3,031	$3,349	$3,277	$3,203	$3,268	$3,385	$3,397	$60,831
One-Time Revenues	$613	$605	$611	$749	$978	$833	$699	$706	$763	$721	$22,739
Recurring Revenues	$2,114	$2,164	$2,219	$2,283	$2,371	$2,444	$2,504	$2,562	$2,623	$2,676	$38,092
Total Costs	$2,219	$2,377	$2,420	$2,487	$2,592	$2,670	$2,723	$2,776	$2,838	$2,890	$41,945
One-Time Costs	$0	$69	$0	$0	$0	$0	$0	$0	$0	$0	$79
Recurring Costs	$2,219	$2,308	$2,420	$2,487	$2,592	$2,670	$2,723	$2,776	$2,838	$2,890	$41,867
Net Fiscal Impact	*$508*	*$392*	*$410*	*$545*	*$758*	*$607*	*$480*	*$493*	*$548*	*$507*	$18,886
Recurring Net Revenues	-$104	-$144	-$201	-$204	-$221	-$227	-$219	-$214	-$215	-$214	-$3,774

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$3,452	$3,514	$3,452	$3,497	$3,540	$3,583	$3,550	$3,529	$3,540	$3,563	$96,051
One-Time Revenues	$728	$735	$628	$632	$637	$641	$579	$533	$522	$524	$28,899
Recurring Revenues	$2,724	$2,778	$2,824	$2,865	$2,903	$2,942	$2,971	$2,996	$3,018	$3,039	$67,152
Total Costs	$2,943	$2,995	$3,029	$3,062	$3,095	$3,129	$3,150	$3,163	$3,173	$3,184	$72,868
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$79
Recurring Costs	$2,943	$2,995	$3,029	$3,062	$3,095	$3,129	$3,150	$3,163	$3,173	$3,184	$72,789
Net Fiscal Impact	*$509*	*$518*	*$424*	*$435*	*$445*	*$454*	*$400*	*$366*	*$367*	*$379*	$23,183
Recurring Net Revenues	-$219	-$217	-$204	-$197	-$192	-$187	-$178	-$167	-$156	-$145	-$5,637

SOURCE: Johnson Gardner

EXHIBIT 4.02

**KITTITAS COUNTY SUMMARY OF NET FISCAL IMPACTS
FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$318	$396	$411	$345	$419	$499	$480	$522	$536	$557	$4,483
One-Time Revenues	$312	$377	$335	$175	$151	$136	$69	$69	$59	$59	$1,744
Recurring Revenues	$6	$19	$76	$170	$267	$363	$411	$452	$477	$498	$2,739
Total Costs	$379	$577	$631	$541	$561	$633	$596	$614	$620	$635	$5,787
One-Time Costs	$263	$308	$270	$139	$121	$110	$56	$56	$48	$48	$1,419
Recurring Costs	$116	$269	$361	$402	$440	$523	$540	$557	$572	$588	$4,368
Net Fiscal Impact	*($61)*	*($181)*	*($220)*	*($196)*	*($142)*	*($134)*	*($116)*	*($92)*	*($84)*	*($78)*	($1,304)
Recurring Net Revenues	($110)	($250)	($285)	($232)	($173)	($160)	($129)	($105)	($95)	($90)	($1,629)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$570	$589	$612	$646	$690	$697	$709	$734	$762	$779	$11,270
One-Time Revenues	$59	$59	$59	$73	$96	$80	$65	$65	$70	$65	$2,436
Recurring Revenues	$511	$530	$553	$573	$594	$617	$644	$669	$692	$714	$8,835
Total Costs	$650	$665	$681	$709	$749	$755	$759	$775	$796	$808	$13,135
One-Time Costs	$48	$48	$48	$59	$77	$64	$52	$52	$56	$52	$1,975
Recurring Costs	$603	$618	$633	$650	$672	$691	$707	$723	$740	$756	$11,161
Net Fiscal Impact	*($80)*	*($76)*	*($68)*	*($63)*	*($59)*	*($58)*	*($50)*	*($41)*	*($34)*	*($30)*	($1,865)
Recurring Net Revenues	($92)	($88)	($80)	($77)	($78)	($74)	($63)	($54)	($49)	($43)	($2,326)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$798	$822	$836	$859	$880	$901	$916	$932	$951	$972	$20,138
One-Time Revenues	$65	$65	$53	$53	$53	$54	$47	$42	$40	$40	$2,949
Recurring Revenues	$733	$757	$782	$805	$827	$848	$869	$891	$911	$931	$17,189
Total Costs	$824	$840	$845	$859	$873	$887	$894	$902	$913	$924	$21,897
One-Time Costs	$52	$52	$43	$43	$43	$43	$37	$33	$32	$32	$2,383
Recurring Costs	$772	$788	$802	$816	$831	$845	$857	$869	$881	$892	$19,515
Net Fiscal Impact	*($26)*	*($19)*	*($9)*	*($0)*	*$7*	*$14*	*$22*	*$30*	*$39*	*$47*	($1,760)
Recurring Net Revenues	($39)	($32)	($20)	($11)	($4)	$3	$12	$21	$30	$39	($2,326)

SOURCE: Johnson Gardner

EXHIBIT 4.03

CITY OF CLE ELUM SUMMARY OF NET FISCAL IMPACTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$336	$493	$527	$487	$591	$657	$629	$700	$738	$781	$5,939
One-Time Revenues	$332	$480	$444	$275	$241	$217	$112	$113	$101	$102	$2,416
Recurring Revenues	$4	$13	$83	$211	$350	$440	$518	$587	$637	$679	$3,523
Total Costs	$368	$427	$596	$591	$702	$757	$744	$756	$763	$826	$6,531
One-Time Costs	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12	$355
Recurring Costs	$302	$350	$529	$556	$671	$730	$730	$742	$751	$814	$6,176
Net Fiscal Impact	*($32)*	*$66*	*($69)*	*($104)*	*($110)*	*($100)*	*($115)*	*($56)*	*($26)*	*($45)*	($591)
Recurring Net Revenues	($298)	($338)	($445)	($345)	($321)	($289)	($213)	($155)	($114)	($135)	($2,653)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$811	$853	$906	$972	$1,052	$1,084	$1,127	$1,190	$1,256	$1,311	$16,500
One-Time Revenues	$101	$100	$101	$121	$154	$134	$116	$117	$125	$120	$3,606
Recurring Revenues	$710	$753	$805	$851	$898	$950	$1,011	$1,073	$1,131	$1,191	$12,894
Total Costs	$830	$838	$847	$886	$910	$920	$927	$992	$994	$1,003	$15,677
One-Time Costs	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13	$494
Recurring Costs	$818	$826	$835	$871	$891	$904	$914	$979	$980	$990	$15,183
Net Fiscal Impact	*($19)*	*$15*	*$59*	*$86*	*$142*	*$164*	*$200*	*$197*	*$263*	*$307*	$823
Recurring Net Revenues	($108)	($73)	($30)	($20)	$7	$46	$97	$93	$151	$200	($2,289)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$1,367	$1,435	$1,495	$1,567	$1,638	$1,712	$1,779	$1,851	$1,931	$2,014	$33,289
One-Time Revenues	$121	$123	$108	$109	$109	$110	$102	$95	$94	$94	$4,671
Recurring Revenues	$1,246	$1,312	$1,388	$1,458	$1,529	$1,601	$1,677	$1,756	$1,837	$1,919	$28,618
Total Costs	$1,011	$1,021	$1,031	$1,035	$1,046	$1,053	$1,059	$1,063	$1,070	$1,075	$26,139
One-Time Costs	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
Recurring Costs	$998	$1,008	$1,020	$1,025	$1,035	$1,042	$1,049	$1,055	$1,062	$1,067	$25,544
Net Fiscal Impact	*$356*	*$414*	*$465*	*$532*	*$592*	*$659*	*$720*	*$788*	*$861*	*$939*	$7,149
Recurring Net Revenues	$247	$304	$368	$434	$493	$559	$628	$701	$775	$853	$3,074

SOURCE: Johnson Gardner

EXHIBIT 4.04

CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 SUMMARY OF NET FISCAL IMPACTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	*$19*	*$17*	*$103*	*$199*	*$364*	*$474*	*$584*	*$665*	*$740*	*$807*	*$3,972*
Property Tax Revenues	$0	$0	$55	$160	$273	$357	$419	$479	$525	$564	$2,832
Timber Excise Tax Revenues	$2	$2	$2	$0	$0	$0	$0	$0	$0	$0	$5
Extra M&O Capacity	$17	$15	$46	$39	$91	$118	$166	$185	$215	$243	$1,135
Total Costs	*$41*	*$131*	*$220*	*$271*	*$312*	*$346*	*$357*	*$368*	*$375*	*$383*	*$2,803*
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$41	$131	$220	$271	$312	$346	$357	$368	$375	$383	$2,803
Net Fiscal Impact 1/	*($24)*	*($117)*	*($145)*	*($144)*	*($67)*	*($23)*	*$55*	*$102*	*$155*	*$202*	*($5)*

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	*$852*	*$913*	*$968*	*$1,018*	*$1,070*	*$1,127*	*$1,194*	*$1,263*	*$1,332*	*$1,402*	*$15,111*
Property Tax Revenues	$594	$635	$691	$741	$792	$850	$917	$986	$1,054	$1,125	$11,217
Timber Excise Tax Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5
Extra M&O Capacity	$257	$277	$277	$277	$277	$277	$277	$277	$277	$277	$3,889
Total Costs	*$390*	*$398*	*$406*	*$417*	*$436*	*$450*	*$459*	*$468*	*$479*	*$489*	*$7,196*
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$390	$398	$406	$417	$436	$450	$459	$468	$479	$489	$7,196
Net Fiscal Impact 1/	*$229*	*$269*	*$296*	*$315*	*$328*	*$349*	*$381*	*$414*	*$445*	*$479*	*$3,500*

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	*$1,469*	*$1,550*	*$1,642*	*$1,731*	*$1,822*	*$1,917*	*$2,018*	*$2,124*	*$2,234*	*$2,349*	*$33,967*
Property Tax Revenues	$1,192	$1,273	$1,365	$1,454	$1,545	$1,640	$1,740	$1,846	$1,957	$2,072	$27,300
Timber Excise Tax Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5
Extra M&O Capacity	$277	$277	$277	$277	$277	$277	$277	$277	$277	$277	$6,662
Total Costs	*$498*	*$507*	*$513*	*$519*	*$525*	*$531*	*$534*	*$537*	*$539*	*$540*	*$12,439*
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$498	$507	$513	$519	$525	$531	$534	$537	$539	$540	$12,439
Net Fiscal Impact 1/	*$511*	*$551*	*$602*	*$651*	*$701*	*$753*	*$811*	*$874*	*$940*	*$1,008*	*$10,902*

1/ Bond levy revenue is excluded from net fiscal impact calculation. Non-capital facility recurring costs would paid for by the M&O levy.
SOURCE: Johnson Gardner

EXHIBIT 4.05

KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 SUMMARY OF NET FISCAL IMPACTS
FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$3	$9	$27	$55	$86	$109	$127	$144	$157	$169	$887
Property Tax Revenues	$0	$0	$12	$37	$65	$86	$104	$120	$132	$143	$699
Patient Fees ($550 per EMS call)	$3	$9	$15	$18	$21	$23	$24	$25	$25	$26	$188
Total Costs	$64	$116	$119	$135	$148	$182	$161	$164	$166	$169	$1,424
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$64	$116	$119	$135	$148	$182	$161	$164	$166	$169	$1,424
Net Fiscal Impact	*($61)*	*($107)*	*($92)*	*($80)*	*($62)*	*($73)*	*($33)*	*($20)*	*($9)*	*$0*	($537)
Recurring Net Revenues	($61)	($107)	($92)	($80)	($62)	($73)	($33)	($20)	($9)	$0	($537)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$178	$191	$205	$219	$234	$250	$267	$286	$304	$323	$3,344
Property Tax Revenues	$152	$164	$178	$191	$204	$219	$237	$254	$272	$290	$2,860
Patient Fees ($550 per EMS call)	$26	$27	$27	$28	$29	$30	$31	$32	$32	$33	$483
Total Costs	$171	$174	$176	$180	$186	$190	$193	$196	$199	$202	$3,289
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$171	$174	$176	$180	$186	$190	$193	$196	$199	$202	$3,289
Net Fiscal Impact	*$7*	*$17*	*$29*	*$39*	*$48*	*$60*	*$75*	*$90*	*$105*	*$121*	$54
Recurring Net Revenues	$7	$17	$29	$39	$48	$60	$75	$90	$105	$121	$54

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$341	$362	$386	$410	$433	$458	$485	$512	$541	$570	$7,842
Property Tax Revenues	$308	$328	$352	$375	$399	$423	$449	$476	$505	$534	$7,009
Patient Fees ($550 per EMS call)	$33	$34	$34	$35	$35	$35	$36	$36	$36	$36	$833
Total Costs	$205	$208	$210	$212	$213	$215	$216	$217	$218	$218	$5,422
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$205	$208	$210	$212	$213	$215	$216	$217	$218	$218	$5,422
Net Fiscal Impact	*$136*	*$154*	*$177*	*$198*	*$220*	*$243*	*$268*	*$295*	*$323*	*$352*	$2,420
Recurring Net Revenues	$136	$154	$177	$198	$220	$243	$268	$295	$323	$352	$2,420

SOURCE: Johnson Gardner

EXHIBIT 4.06

KITTITAS COUNTY COMMUNICATIONS (KITTCOM) SUMMARY OF NET FISCAL IMPACTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Annual Revenues											
Operations Revenues	$4	$13	$22	$27	$31	$35	$36	$37	$38	$38	$281
Capital Revenues	$1	$3	$5	$7	$8	$9	$9	$10	$10	$10	$72
Annual Costs											
Operations Costs	$8	$26	$43	$53	$61	$68	$70	$72	$73	$75	$548
Net Operating Impact	*($4)*	*($13)*	*($21)*	*($26)*	*($30)*	*($33)*	*($34)*	*($35)*	*($36)*	*($36)*	($267)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Annual Revenues											
Operations Revenues	$39	$40	$41	$42	$44	$45	$46	$47	$48	$49	$719
Capital Revenues	$10	$10	$11	$11	$12	$12	$12	$12	$13	$13	$117
Annual Costs											
Operations Costs	$76	$77	$79	$81	$85	$87	$89	$91	$93	$95	$1,401
Net Operating Impact	*($37)*	*($38)*	*($38)*	*($39)*	*($41)*	*($42)*	*($43)*	*($44)*	*($45)*	*($46)*	($681)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Annual Revenues											
Operations Revenues	$50	$51	$51	$52	$52	$53	$53	$53	$54	$54	$1,242
Capital Revenues	$13	$14	$14	$14	$14	$14	$14	$14	$14	$15	$141
Annual Costs											
Operations Costs	$96	$98	$99	$100	$101	$103	$103	$104	$104	$104	$2,414
Net Operating Impact	*($47)*	*($48)*	*($48)*	*($49)*	*($49)*	*($50)*	*($50)*	*($50)*	*($50)*	*($50)*	($1,172)

SOURCE: Johnson Gardner

EXHIBIT 5.01

SUMMARY OF ESTIMATED REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State of Washington (000s)										
Permit Fee Revenues	$0	$1	$1	$1	$1	$1	$1	$1	$1	$0
Sales Tax	$3,128	$7,868	$9,019	$8,694	$8,748	$8,432	$8,505	$8,888	$8,882	$8,459
B&O Tax	$232	$596	$689	$692	$701	$677	$695	$718	$733	$712
Real Estate Excise Tax	$146	$483	$652	$738	$883	$965	$918	$952	$922	$971
Property Tax	$0	$0	$107	$428	$770	$1,058	$1,293	$1,486	$1,671	$1,817
Motor Vehicle Fuel Tax	$104	$234	$379	$487	$578	$661	$719	$793	$838	$875
Timber Excise Tax	$8	$8	$8	$0	$0	$0	$0	$0	$0	$0
State of Washington Total Revenue	$3,619	$9,189	$10,856	$11,041	$11,683	$11,795	$12,130	$12,838	$13,046	$12,834
State of Washington One-Time Revenue	$2,623	$7,071	$7,363	$6,356	$5,905	$4,993	$4,574	$4,222	$3,835	$3,130
State of Washington Recurring Revenue	$996	$2,118	$3,493	$4,685	$5,778	$6,802	$7,557	$8,616	$9,211	$9,705
Kittitas County (000s)										
Permit Fee Revenues	$401	$909	$833	$726	$675	$540	$462	$397	$403	$370
Sales Tax	$281	$1,028	$1,277	$1,352	$1,370	$1,364	$1,447	$1,578	$1,584	$1,500
Selective Hotel/Motel Tax	$32	$92	$152	$162	$171	$195	$203	$277	$285	$292
Real Estate Excise Tax	$2	$47	$81	$95	$122	$136	$146	$151	$144	$153
Property Tax	$0	$0	$71	$336	$630	$900	$1,135	$1,338	$1,547	$1,724
Shared Revenues	$0	$4	$23	$57	$89	$109	$126	$139	$145	$151
Timber Excise Tax	$23	$23	$23	$1	$1	$1	$1	$1	$1	$1
Kittitas County Total Revenue	$739	$2,103	$2,461	$2,729	$3,059	$3,246	$3,520	$3,882	$4,109	$4,190
Kittitas County One-Time Revenue	$559	$1,680	$1,693	$1,559	$1,471	$1,210	$1,160	$1,037	$987	$831
Kittitas County Recurring Revenue	$181	$424	$768	$1,170	$1,588	$2,036	$2,360	$2,845	$3,123	$3,359

EXHIBIT 5.01

SUMMARY OF ESTIMATED REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
City of Cle Elum (000s)										
Permit Fee Revenues	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12
Sales Tax	$241	$362	$344	$210	$183	$151	$85	$85	$74	$74
Selective Hotel/Motel Tax	$11	$19	$30	$39	$48	$55	$62	$71	$76	$80
Real Estate Excise Tax	$29	$54	$53	$56	$58	$60	$35	$37	$38	$39
Property Tax	$0	$0	$55	$161	$279	$367	$436	$499	$546	$586
Shared Revenues	$0	$0	$8	$25	$42	$51	$59	$65	$67	$69
Developer Contributions	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Total Revenue	$346	$512	$557	$526	$639	$712	$691	$771	$813	$861
City of Cle Elum One-Time Revenue	$332	$477	$440	$271	$237	$213	$112	$113	$101	$102
City of Cle Elum Recurring Revenue	$15	$36	$118	$255	$402	$500	$579	$658	$713	$760
City of Roslyn (000s)										
Sales Tax	$3	$7	$11	$14	$16	$16	$17	$19	$21	$22
City of Roslyn One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Roslyn Recurring Revenue	$3	$7	$11	$14	$16	$16	$17	$19	$21	$22
City of South Cle Elum (000s)										
Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum Recurring Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 5.01

SUMMARY OF ESTIMATED REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
City of Ellensburg (000s)										
Sales Tax	$15	$36	$58	$74	$88	$87	$95	$105	$111	$115
Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Total Revenue	$15	$36	$58	$74	$88	$87	$95	$105	$111	$115
City of Ellensburg One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Recurring Revenue	$15	$36	$58	$74	$88	$87	$95	$105	$111	$115
Cle Elum/Roslyn School District No. 404 (000s)										
Property Tax	$0	$0	$45	$190	$361	$520	$665	$800	$939	$1,066
Timber Excise Tax	$3	$3	$3	$0	$0	$0	$0	$0	$0	$0
Excess M& O Capacity	$15	$12	$12	$126	$270	$410	$543	$644	$767	$881
District 404 Total Tax Revenues	$18	$16	$60	$316	$631	$930	$1,209	$1,445	$1,706	$1,947
Kittitas County Hospital District No. 2 (000s)										
Property Tax	$0	$0	$17	$70	$133	$198	$254	$303	$358	$410
Timber Excise Tax	$2	$2	$2	$0	$0	$0	$0	$0	$0	$0
Patient Fees	$8	$18	$28	$35	$41	$47	$50	$55	$57	$60
District 2 Total Revenues	$9	$19	$46	$105	$175	$245	$304	$358	$416	$470

SOURCE: Johnson Gardner

EXHIBIT 5.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State of Washington (000s)										
Permit Fee Revenues	$0	$0	$0	$0	$1	$1	$1	$0	$0	$0
Sales Tax	$8,433	$8,556	$8,398	$8,480	$9,360	$9,801	$9,725	$9,848	$9,972	$10,123
B&O Tax	$708	$716	$707	$711	$777	$812	$809	$821	$832	$845
Real Estate Excise Tax	$964	$924	$963	$884	$837	$879	$926	$966	$1,004	$1,041
Property Tax	$1,928	$2,029	$2,062	$2,062	$2,115	$2,161	$2,229	$2,302	$2,362	$2,421
Motor Vehicle Fuel Tax	$911	$945	$964	$985	$1,019	$1,057	$1,088	$1,118	$1,147	$1,175
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State of Washington Total Revenue	$12,944	$13,170	$13,094	$13,123	$14,108	$14,711	$14,778	$15,055	$15,318	$15,605
State of Washington One-Time Revenue	$2,793	$2,587	$2,328	$2,195	$2,863	$3,113	$2,853	$2,811	$2,780	$2,778
State of Washington Recurring Revenue	$10,151	$10,583	$10,766	$10,928	$11,245	$11,598	$11,925	$12,244	$12,538	$12,827
Kittitas County (000s)										
Permit Fee Revenues	$286	$253	$298	$260	$317	$356	$320	$309	$296	$294
Sales Tax	$1,224	$1,237	$1,201	$1,189	$1,305	$1,397	$1,393	$1,405	$1,410	$1,436
Selective Hotel/Motel Tax	$300	$310	$311	$312	$314	$317	$320	$322	$324	$326
Real Estate Excise Tax	$152	$145	$152	$135	$124	$130	$137	$144	$150	$156
Property Tax	$1,872	$2,006	$2,057	$2,075	$2,157	$2,233	$2,334	$2,446	$2,546	$2,647
Shared Revenues	$155	$158	$162	$166	$171	$178	$186	$193	$199	$204
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Total Revenue	$3,989	$4,110	$4,182	$4,137	$4,390	$4,611	$4,692	$4,819	$4,926	$5,063
Kittitas County One-Time Revenue	$689	$622	$622	$539	$675	$779	$720	$701	$675	$679
Kittitas County Recurring Revenue	$3,300	$3,488	$3,560	$3,598	$3,714	$3,832	$3,972	$4,119	$4,251	$4,384

EXHIBIT 5.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
City of Ellensburg (000s)										
Sales Tax	$120	$125	$127	$130	$134	$139	$144	$148	$151	$155
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Total Revenues	$120	$125	$127	$130	$134	$139	$144	$148	$151	$155
City of Ellensburg One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Recurring Revenue	$120	$125	$127	$130	$134	$139	$144	$148	$151	$155
Cle Elum/Roslyn School District No. 404 (000s)										
Property Tax	$1,181	$1,296	$1,374	$1,434	$1,533	$1,634	$1,757	$1,892	$2,025	$2,165
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Excess M&O Capacity	$984	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083
District 404 Total Tax Revenues	$2,164	$2,379	$2,457	$2,516	$2,616	$2,717	$2,840	$2,975	$3,108	$3,248
Kittitas County Hospital District No. 2 (000s)										
Property Tax	$458	$503	$531	$549	$587	$625	$670	$720	$771	$824
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Patient Fees	$62	$64	$65	$67	$69	$71	$73	$75	$77	$78
District 2 Total Revenues	$520	$567	$597	$616	$656	$696	$743	$795	$847	$902

SOURCE: Johnson Gardner

EXHIBIT 5.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
City of Cle Elum (000s)										
Permit Fee Revenues	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13
Sales Tax	$159	$163	$165	$184	$215	$200	$186	$189	$198	$196
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$39	$38	$39	$40	$42	$44	$46	$48	$49	$51
Property Tax	$614	$656	$706	$750	$794	$843	$900	$959	$1,015	$1,072
Shared Revenues	$71	$72	$74	$75	$77	$79	$82	$85	$87	$88
Developer Contributions	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Total Revenues	$895	$941	$996	$1,063	$1,146	$1,181	$1,227	$1,293	$1,363	$1,419
City of Cle Elum One-Time Revenue	$101	$100	$101	$121	$154	$134	$116	$117	$125	$120
City of Cle Elum Recurring Revenue	$794	$841	$895	$942	$992	$1,047	$1,112	$1,176	$1,237	$1,299
City of Roslyn (000s)										
Sales Tax	$23	$24	$24	$24	$25	$26	$27	$28	$28	$29
City of Roslyn One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Roslyn Recurring Revenue	$23	$24	$24	$24	$25	$26	$27	$28	$28	$29
City of South Cle Elum (000s)										
Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum Recurring Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 5.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY
THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
State of Washington (000s)											
Permit Fee Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15
Sales Tax	$10,169	$10,195	$10,231	$10,174	$10,258	$10,323	$10,388	$10,250	$10,187	$10,225	$275,718
B&O Tax	$850	$854	$858	$856	$863	$869	$875	$866	$862	$866	$22,803
Real Estate Excise Tax	$1,077	$1,109	$1,139	$1,166	$1,189	$1,212	$1,233	$1,253	$1,268	$1,280	$28,943
Property Tax	$2,505	$2,551	$2,695	$2,658	$2,694	$2,741	$2,789	$2,836	$2,883	$2,926	$57,582
Motor Vehicle Fuel Tax	$1,201	$1,224	$1,245	$1,263	$1,280	$1,297	$1,312	$1,323	$1,333	$1,341	$28,895
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$28
State of Washington Total Revenue	$15,803	$15,935	$16,168	$16,117	$16,285	$16,442	$16,597	$16,529	$16,533	$16,639	$413,984
State of Washington One-Time Revenue	$2,683	$2,580	$2,496	$2,334	$2,325	$2,300	$2,278	$2,065	$1,946	$1,934	$100,115
State of Washington Recurring Revenue	$13,120	$13,354	$13,672	$13,782	$13,960	$14,142	$14,319	$14,463	$14,587	$14,705	$313,869
Kittitas County (000s)											
Permit Fee Revenues	$213	$194	$184	$158	$153	$147	$144	$115	$97	$93	$10,204
Sales Tax	$1,435	$1,431	$1,448	$1,431	$1,440	$1,446	$1,463	$1,441	$1,428	$1,432	$40,375
Selective Hotel/Motel Tax	$328	$330	$332	$333	$334	$335	$337	$338	$339	$339	$8,363
Real Estate Excise Tax	$162	$167	$171	$176	$179	$183	$186	$190	$192	$194	$4,303
Property Tax	$2,788	$2,876	$3,098	$3,076	$3,159	$3,259	$3,363	$3,468	$3,576	$3,680	$62,396
Shared Revenues	$210	$214	$219	$224	$227	$230	$234	$237	$239	$240	$4,890
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$78
Kittitas County Total Revenue	$5,135	$5,213	$5,452	$5,397	$5,493	$5,601	$5,726	$5,787	$5,870	$5,980	$130,610
Kittitas County One-Time Revenue	$581	$544	$537	$482	$475	$465	$468	$409	$373	$367	$23,586
Kittitas County Recurring Revenue	$4,554	$4,669	$4,915	$4,915	$5,018	$5,136	$5,258	$5,378	$5,497	$5,612	$107,023

EXHIBIT 5.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
City of Cle Elum (000s)											
Permit Fee Revenues	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
Sales Tax	$199	$201	$190	$192	$194	$196	$190	$185	$184	$186	$6,071
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$52	$53	$55	$56	$56	$57	$58	$59	$59	$59	$1,459
Property Tax	$1,124	$1,188	$1,262	$1,330	$1,400	$1,471	$1,545	$1,623	$1,703	$1,785	$25,666
Shared Revenues	$90	$92	$94	$95	$97	$98	$99	$100	$101	$101	$2,143
Developer Contributions	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Total Revenues	$1,478	$1,548	$1,611	$1,684	$1,757	$1,832	$1,901	$1,975	$2,055	$2,138	$35,934
City of Cle Elum One-Time Revenue	$121	$123	$108	$109	$109	$110	$102	$95	$94	$94	$4,651
City of Cle Elum Recurring Revenue	$1,357	$1,425	$1,503	$1,575	$1,648	$1,722	$1,799	$1,879	$1,961	$2,044	$31,283
City of Roslyn (000s)											
Sales Tax	$29	$30	$31	$31	$31	$32	$32	$32	$33	$33	$717
City of Roslyn One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Roslyn Recurring Revenue	$29	$30	$31	$31	$31	$32	$32	$32	$33	$33	$717
City of South Cle Elum (000s)											
Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum Recurring Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 5.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
City of Ellensburg (000s)											
Sales Tax	$158	$162	$164	$167	$169	$171	$173	$175	$176	$177	$3,850
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Total Revenues	$158	$162	$164	$167	$169	$171	$173	$175	$176	$177	$3,850
City of Ellensburg One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Recurring Revenue	$158	$162	$164	$167	$169	$171	$173	$175	$176	$177	$3,850
Cle Elum/Roslyn School District No. 404 (000s)											
Property Tax	$2,305	$2,461	$2,733	$2,810	$2,971	$3,152	$3,344	$3,546	$3,759	$3,979	$51,939
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11
Excess M&O Levy Capacity	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$1,083	$25,240
District 404 Total Revenues	$3,388	$3,544	$3,816	$3,893	$4,054	$4,235	$4,427	$4,629	$4,842	$5,062	$77,190
Kittitas County Hospital District No. 2 (000s)											
Property Tax	$876	$935	$1,041	$1,065	$1,125	$1,194	$1,266	$1,342	$1,423	$1,507	$19,755
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6
Patient Fees	$80	$81	$82	$83	$84	$85	$86	$87	$87	$88	$1,943
District 2 Total Revenues	$876	$935	$1,041	$1,065	$1,125	$1,194	$1,266	$1,342	$1,423	$1,507	$20,861

SOURCE: Johnson Gardner

EXHIBIT 5.02

SUMMARY OF ESTIMATED COSTS FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State of Washington (000s)										
Total Annual Service Costs	$241	$764	$1,290	$1,741	$1,935	$2,140	$2,224	$2,296	$2,348	$2,397
One-Time Service Costs	$2	$2	$2	$59	$2	$0	$0	$0	$0	$0
Recurring Service Costs	$239	$762	$1,288	$1,682	$1,933	$2,140	$2,224	$2,296	$2,348	$2,397
Kittitas County (000s)										
Total Annual Service Costs	$546	$1,470	$1,624	$1,738	$1,846	$1,870	$2,002	$2,063	$2,172	$2,312
One-Time Service Costs	$401	$909	$833	$726	$675	$540	$462	$397	$403	$370
Recurring Service Costs	$144	$562	$791	$1,013	$1,171	$1,330	$1,540	$1,666	$1,769	$1,942
City of Cle Elum (000s)										
Total Annual Service Costs	$368	$427	$596	$591	$702	$757	$744	$756	$763	$826
One-Time Service Costs	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12
Recurring Service Costs	$302	$350	$529	$556	$671	$730	$730	$742	$751	$814
Cle Elum/Roslyn School District No. 404 (000s)										
Total Annual Service Costs	$41	$133	$225	$279	$324	$360	$374	$386	$395	$404
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$41	$133	$225	$279	$324	$360	$374	$386	$395	$404
Kittitas County Hospital District No. 2 (000s)										
Total Annual Service Costs	$109	$193	$198	$245	$260	$345	$315	$350	$353	$356
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$109	$193	$198	$245	$260	$345	$315	$350	$353	$356

SOURCE: Johnson Gardner

EXHIBIT 5.02

SUMMARY OF ESTIMATED COSTS FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State of Washington (000s)										
Total Annual Service Costs	$2,445	$2,608	$2,656	$2,727	$2,840	$2,930	$2,991	$3,052	$3,122	$3,183
One-Time Service Costs	$0	$69	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$2,445	$2,539	$2,656	$2,727	$2,840	$2,930	$2,991	$3,052	$3,122	$3,183
Kittitas County (000s)										
Total Annual Service Costs	$2,246	$2,251	$2,394	$2,355	$2,437	$2,582	$2,554	$2,628	$2,691	$2,695
One-Time Service Costs	$286	$253	$298	$260	$317	$356	$320	$309	$296	$294
Recurring Service Costs	$1,961	$1,998	$2,095	$2,094	$2,120	$2,227	$2,234	$2,319	$2,394	$2,401
City of Cle Elum (000s)										
Total Annual Service Costs	$830	$838	$847	$886	$910	$920	$927	$992	$994	$1,003
One-Time Service Costs	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13
Recurring Service Costs	$818	$826	$835	$871	$891	$904	$914	$979	$980	$990
Cle Elum/Roslyn School District No. 404 (000s)										
Total Annual Service Costs	$413	$421	$429	$442	$462	$478	$489	$499	$512	$522
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$413	$421	$429	$442	$462	$478	$489	$499	$512	$522
Kittitas County Hospital District No. 2 (000s)										
Total Annual Service Costs	$389	$392	$395	$399	$405	$410	$444	$447	$451	$454
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$389	$392	$395	$399	$405	$410	$444	$447	$451	$454

SOURCE: Johnson Gardner

EXHIBIT 5.02

SUMMARY OF ESTIMATED COSTS FOR JURISDICTIONS AFFECTED BY
THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
State of Washington (000s)											
Total Annual Service Costs	$3,243	$3,301	$3,341	$3,379	$3,418	$3,456	$3,482	$3,498	$3,511	$3,525	$80,084
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$136
Recurring Service Costs	$3,243	$3,301	$3,341	$3,379	$3,418	$3,456	$3,482	$3,498	$3,511	$3,525	$79,948
Kittitas County (000s)											
Total Annual Service Costs	$2,649	$2,704	$2,690	$2,697	$2,756	$2,745	$2,824	$2,834	$2,799	$2,837	$70,012
One-Time Service Costs	$213	$194	$184	$158	$153	$147	$144	$115	$97	$93	$10,204
Recurring Service Costs	$2,436	$2,510	$2,505	$2,539	$2,603	$2,598	$2,680	$2,720	$2,702	$2,744	$59,808
City of Cle Elum (000s)											
Total Annual Service Costs	$1,011	$1,021	$1,031	$1,035	$1,046	$1,053	$1,059	$1,063	$1,070	$1,075	$26,139
One-Time Service Costs	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
Recurring Service Costs	$998	$1,008	$1,020	$1,025	$1,035	$1,042	$1,049	$1,055	$1,062	$1,067	$25,544
Cle Elum/Roslyn School District No. 404 (000s)											
Total Annual Service Costs	$533	$543	$550	$557	$564	$571	$575	$578	$580	$583	$13,224
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$533	$543	$550	$557	$564	$571	$575	$578	$580	$583	$13,224
Kittitas County Hospital District No. 2 (000s)											
Total Annual Service Costs	$458	$511	$513	$515	$517	$519	$521	$522	$522	$523	$12,033
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$458	$511	$513	$515	$517	$519	$521	$522	$522	$523	$12,033

SOURCE: Johnson Gardner

EXHIBIT 5.03

**STATE OF WASHINGTON SUMMARY OF NET FISCAL IMPACTS
FROM THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$3,619	$9,189	$10,856	$11,041	$11,683	$11,795	$12,130	$12,838	$13,046	$12,834	$109,031
One-Time Revenues	$2,623	$7,071	$7,363	$6,356	$5,905	$4,993	$4,574	$4,222	$3,835	$3,130	$50,072
Recurring Revenues	$996	$2,118	$3,493	$4,685	$5,778	$6,802	$7,557	$8,616	$9,211	$9,705	$58,960
Total Costs	$241	$764	$1,290	$1,741	$1,935	$2,140	$2,224	$2,296	$2,348	$2,397	$17,376
One-Time Costs	$2	$2	$2	$59	$2	$0	$0	$0	$0	$0	$67
Recurring Costs	$239	$762	$1,288	$1,682	$1,933	$2,140	$2,224	$2,296	$2,348	$2,397	$17,309
Net Fiscal Impact	*$3,378*	*$8,425*	*$9,566*	*$9,299*	*$9,748*	*$9,655*	*$9,906*	*$10,542*	*$10,698*	*$10,437*	$91,655
Recurring Net Revenues	$757	$1,356	$2,205	$3,003	$3,845	$4,662	$5,332	$6,320	$6,863	$7,308	$41,651

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$12,944	$13,170	$13,094	$13,123	$14,108	$14,711	$14,778	$15,055	$15,318	$15,605	$250,938
One-Time Revenues	$2,793	$2,587	$2,328	$2,195	$2,863	$3,113	$2,853	$2,811	$2,780	$2,778	$77,173
Recurring Revenues	$10,151	$10,583	$10,766	$10,928	$11,245	$11,598	$11,925	$12,244	$12,538	$12,827	$173,765
Total Costs	$2,445	$2,608	$2,656	$2,727	$2,840	$2,930	$2,991	$3,052	$3,122	$3,183	$45,931
One-Time Costs	$0	$69	$0	$0	$0	$0	$0	$0	$0	$0	$136
Recurring Costs	$2,445	$2,539	$2,656	$2,727	$2,840	$2,930	$2,991	$3,052	$3,122	$3,183	$45,794
Net Fiscal Impact	*$10,499*	*$10,562*	*$10,438*	*$10,395*	*$11,268*	*$11,782*	*$11,787*	*$12,003*	*$12,196*	*$12,422*	$205,007
Recurring Net Revenues	$7,706	$8,044	$8,110	$8,200	$8,405	$8,668	$8,934	$9,192	$9,415	$9,644	$127,970

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$15,803	$15,935	$16,168	$16,117	$16,285	$16,442	$16,597	$16,529	$16,533	$16,639	$413,984
One-Time Revenues	$2,683	$2,580	$2,496	$2,334	$2,325	$2,300	$2,278	$2,065	$1,946	$1,934	$100,115
Recurring Revenues	$13,120	$13,354	$13,672	$13,782	$13,960	$14,142	$14,319	$14,463	$14,587	$14,705	$313,869
Total Costs	$3,243	$3,301	$3,341	$3,379	$3,418	$3,456	$3,482	$3,498	$3,511	$3,525	$80,084
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$136
Recurring Costs	$3,243	$3,301	$3,341	$3,379	$3,418	$3,456	$3,482	$3,498	$3,511	$3,525	$79,948
Net Fiscal Impact	*$12,560*	*$12,633*	*$12,827*	*$12,737*	*$12,867*	*$12,986*	*$13,116*	*$13,030*	*$13,021*	*$13,114*	$333,900
Recurring Net Revenues	$9,877	$10,053	$10,331	$10,403	$10,542	$10,686	$10,838	$10,965	$11,076	$11,180	$233,921

SOURCE: Johnson Gardner

EXHIBIT 5.04

KITTITAS COUNTY SUMMARY OF NET FISCAL IMPACTS
FROM THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$739	$2,103	$2,461	$2,729	$3,059	$3,246	$3,520	$3,882	$4,109	$4,190	$30,038
One-Time Revenues	$559	$1,680	$1,693	$1,559	$1,471	$1,210	$1,160	$1,037	$987	$831	$12,185
Recurring Revenues	$181	$424	$768	$1,170	$1,588	$2,036	$2,360	$2,845	$3,123	$3,359	$17,853
Total Costs	$546	$1,470	$1,624	$1,738	$1,846	$1,870	$2,002	$2,063	$2,172	$2,312	$17,644
One-Time Costs	$401	$909	$833	$726	$675	$540	$462	$397	$403	$370	$5,716
Recurring Costs	$144	$562	$791	$1,013	$1,171	$1,330	$1,540	$1,666	$1,769	$1,942	$11,928
Net Fiscal Impact	*$194*	*$633*	*$837*	*$991*	*$1,213*	*$1,376*	*$1,517*	*$1,818*	*$1,937*	*$1,878*	$12,395
Recurring Net Revenues	$37	($138)	($23)	$158	$417	$706	$820	$1,179	$1,354	$1,417	$5,926

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$3,989	$4,110	$4,182	$4,137	$4,390	$4,611	$4,692	$4,819	$4,926	$5,063	$74,956
One-Time Revenues	$689	$622	$622	$539	$675	$779	$720	$701	$675	$679	$18,886
Recurring Revenues	$3,300	$3,488	$3,560	$3,598	$3,714	$3,832	$3,972	$4,119	$4,251	$4,384	$56,070
Total Costs	$2,246	$2,251	$2,394	$2,355	$2,437	$2,582	$2,554	$2,628	$2,691	$2,695	$42,477
One-Time Costs	$286	$253	$298	$260	$317	$356	$320	$309	$296	$294	$8,706
Recurring Costs	$1,961	$1,998	$2,095	$2,094	$2,120	$2,227	$2,234	$2,319	$2,394	$2,401	$33,771
Net Fiscal Impact	*$1,743*	*$1,858*	*$1,788*	*$1,783*	*$1,952*	*$2,029*	*$2,138*	*$2,191*	*$2,235*	*$2,368*	$32,479
Recurring Net Revenues	$1,340	$1,490	$1,464	$1,504	$1,594	$1,606	$1,738	$1,800	$1,856	$1,982	$22,299

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$5,135	$5,213	$5,452	$5,397	$5,493	$5,601	$5,726	$5,787	$5,870	$5,980	$130,610
One-Time Revenues	$581	$544	$537	$482	$475	$465	$468	$409	$373	$367	$23,586
Recurring Revenues	$4,554	$4,669	$4,915	$4,915	$5,018	$5,136	$5,258	$5,378	$5,497	$5,612	$107,023
Total Costs	$2,649	$2,704	$2,690	$2,697	$2,756	$2,745	$2,824	$2,834	$2,799	$2,837	$70,012
One-Time Costs	$213	$194	$184	$158	$153	$147	$144	$115	$97	$93	$10,204
Recurring Costs	$2,436	$2,510	$2,505	$2,539	$2,603	$2,598	$2,680	$2,720	$2,702	$2,744	$59,808
Net Fiscal Impact	*$2,487*	*$2,509*	*$2,763*	*$2,700*	*$2,737*	*$2,856*	*$2,902*	*$2,952*	*$3,071*	*$3,142*	$60,598
Recurring Net Revenues	$2,118	$2,159	$2,410	$2,376	$2,415	$2,538	$2,578	$2,658	$2,795	$2,868	$47,215

SOURCE: Johnson Gardner

EXHIBIT 5.05

CITY OF CLE ELUM SUMMARY OF NET FISCAL IMPACTS
FROM THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA
ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$476	$642	$687	$526	$639	$712	$691	$771	$813	$861	$6,820
One-Time Revenues	$462	$607	$570	$271	$237	$213	$112	$113	$101	$102	$2,786
Recurring Revenues	$15	$36	$118	$255	$402	$500	$579	$658	$713	$760	$4,034
Total Costs	$498	$557	$726	$591	$702	$757	$744	$756	$763	$826	$6,921
One-Time Costs	$196	$207	$198	$35	$30	$27	$14	$14	$12	$12	$745
Recurring Costs	$302	$350	$529	$556	$671	$730	$730	$742	$751	$814	$6,176
Net Fiscal Impact	*($22)*	*$85*	*($39)*	*($65)*	*($63)*	*($45)*	*($53)*	*$15*	*$50*	*$35*	($100)
Recurring Net Revenues	($287)	($315)	($411)	($301)	($269)	($230)	($151)	($84)	($38)	($54)	($2,142)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$895	$941	$996	$1,063	$1,146	$1,181	$1,227	$1,293	$1,363	$1,419	$18,346
One-Time Revenues	$101	$100	$101	$121	$154	$134	$116	$117	$125	$120	$3,976
Recurring Revenues	$794	$841	$895	$942	$992	$1,047	$1,112	$1,176	$1,237	$1,299	$14,369
Total Costs	$830	$838	$847	$886	$910	$920	$927	$992	$994	$1,003	$16,067
One-Time Costs	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13	$884
Recurring Costs	$818	$826	$835	$871	$891	$904	$914	$979	$980	$990	$15,183
Net Fiscal Impact	*$66*	*$103*	*$149*	*$178*	*$236*	*$261*	*$300*	*$301*	*$369*	*$416*	$2,279
Recurring Net Revenues	($24)	$15	$60	$71	$101	$143	$198	$197	$257	$309	($814)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$1,478	$1,548	$1,611	$1,684	$1,757	$1,832	$1,901	$1,975	$2,055	$2,138	$36,324
One-Time Revenues	$121	$123	$108	$109	$109	$110	$102	$95	$94	$94	$5,041
Recurring Revenues	$1,357	$1,425	$1,503	$1,575	$1,648	$1,722	$1,799	$1,879	$1,961	$2,044	$31,283
Total Costs	$1,011	$1,021	$1,031	$1,035	$1,046	$1,053	$1,059	$1,063	$1,070	$1,075	$26,529
One-Time Costs	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$986
Recurring Costs	$998	$1,008	$1,020	$1,025	$1,035	$1,042	$1,049	$1,055	$1,062	$1,067	$25,544
Net Fiscal Impact	*$467*	*$527*	*$580*	*$649*	*$711*	*$779*	*$842*	*$911*	*$985*	*$1,064*	$9,795
Recurring Net Revenues	$359	$418	$483	$551	$612	$680	$750	$824	$899	$978	$5,739

SOURCE: Johnson Gardner

EXHIBIT 5.06

CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 SUMMARY OF NET FISCAL IMPACTS FROM THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V
(In Thousands of Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$3	$3	$49	$190	$361	$520	$665	$800	$939	$1,066	$4,598
Property Tax Revenues	$0	$0	$45	$190	$361	$520	$665	$800	$939	$1,066	$4,586
Timber Excise Tax Revenues	$3	$3	$3	$0	$0	$0	$0	$0	$0	$0	$11
Total Costs	$41	$133	$225	$279	$324	$360	$374	$386	$395	$404	$2,923
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$41	$133	$225	$279	$324	$360	$374	$386	$395	$404	$2,923
Net Fiscal Impact	*($41)*	*($133)*	*($180)*	*($89)*	*$37*	*$160*	*$292*	*$414*	*$544*	*$662*	*$1,664*

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$1,181	$1,296	$1,374	$1,434	$1,533	$1,634	$1,757	$1,892	$2,025	$2,165	$20,889
Property Tax Revenues	$1,181	$1,296	$1,374	$1,434	$1,533	$1,634	$1,757	$1,892	$2,025	$2,165	$20,878
Timber Excise Tax Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11
Total Costs	$413	$421	$429	$442	$462	$478	$489	$499	$512	$522	$7,589
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$413	$421	$429	$442	$462	$478	$489	$499	$512	$522	$7,589
Net Fiscal Impact	*$768*	*$876*	*$945*	*$992*	*$1,071*	*$1,157*	*$1,269*	*$1,393*	*$1,514*	*$1,642*	*$13,289*

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$2,305	$2,461	$2,733	$2,810	$2,971	$3,152	$3,344	$3,546	$3,759	$3,979	$51,950
Property Tax Revenues	$2,305	$2,461	$2,733	$2,810	$2,971	$3,152	$3,344	$3,546	$3,759	$3,979	$51,939
Timber Excise Tax Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11
Total Costs	$533	$543	$550	$557	$564	$571	$575	$578	$580	$583	$13,224
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$533	$543	$550	$557	$564	$571	$575	$578	$580	$583	$13,224
Net Fiscal Impact	*$1,772*	*$1,918*	*$2,182*	*$2,253*	*$2,407*	*$2,581*	*$2,769*	*$2,968*	*$3,179*	*$3,396*	*$38,715*

SOURCE: Johnson Gardner

EXHIBIT 5.07

KITTITAS COUNTY HOSPITAL DISTRICT NO. 2 SUMMARY OF NET FISCAL IMPACTS FROM THE DEVELOPMENT OF MOUNTAINSTAR MPR AND THE CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Total Revenues	$9	$19	$46	$105	$175	$245	$304	$358	$416	$470	$2,147
Property Tax Revenues	$0	$0	$17	$70	$133	$198	$254	$303	$358	$410	$1,744
Timber Excise Tax Revenues	$2	$2	$2	$0	$0	$0	$0	$0	$0	$0	$6
Patient Fees	$8	$18	$28	$35	$41	$47	$50	$55	$57	$60	$398
Total Costs	$109	$193	$198	$245	$260	$345	$315	$350	$353	$356	$2,724
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$109	$193	$198	$245	$260	$345	$315	$350	$353	$356	$2,724
Net Fiscal Impact	*($100)*	*($174)*	*($151)*	*($140)*	*($85)*	*($100)*	*($11)*	*$8*	*$62*	*$113*	*($577)*
Recurring Net Revenues	($100)	($174)	($151)	($140)	($85)	($100)	($11)	$8	$62	$113	($577)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Total Revenues	$520	$567	$597	$616	$656	$696	$743	$795	$847	$902	$9,085
Property Tax Revenues	$458	$503	$531	$549	$587	$625	$670	$720	$771	$824	$7,980
Timber Excise Tax Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6
Patient Fees	$62	$64	$65	$67	$69	$71	$73	$75	$77	$78	$1,100
Total Costs	$389	$392	$395	$399	$405	$410	$444	$447	$451	$454	$6,912
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$389	$392	$395	$399	$405	$410	$444	$447	$451	$454	$6,912
Net Fiscal Impact	*$130*	*$175*	*$202*	*$217*	*$251*	*$286*	*$299*	*$348*	*$396*	*$447*	*$2,173*
Recurring Net Revenues	$130	$175	$202	$217	$251	$286	$299	$348	$396	$447	$2,173

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Total Revenues	$956	$1,016	$1,124	$1,148	$1,209	$1,279	$1,352	$1,429	$1,511	$1,595	$21,704
Property Tax Revenues	$876	$935	$1,041	$1,065	$1,125	$1,194	$1,266	$1,342	$1,423	$1,507	$19,755
Timber Excise Tax Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6
Patient Fees	$80	$81	$82	$83	$84	$85	$86	$87	$87	$88	$1,943
Total Costs	$458	$511	$513	$515	$517	$519	$521	$522	$522	$523	$12,033
One-Time Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs	$458	$511	$513	$515	$517	$519	$521	$522	$522	$523	$12,033
Net Fiscal Impact	*$498*	*$505*	*$611*	*$633*	*$692*	*$759*	*$832*	*$907*	*$988*	*$1,071*	*$9,671*
Recurring Net Revenues	$498	$505	$611	$633	$692	$759	$832	$907	$988	$1,071	$9,671

SOURCE: Johnson Gardner

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
City of Cle Elum										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
Effective Levy Rate	2.3893	2.3654	2.3417	2.3183	2.2951	2.2722	2.2494	2.2270	2.2047	2.1826
Revenue from Existing Development	$0	$0	$0	$53	$158	$276	$373	$448	$513	$562
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Prior Year Levy Rate	2.4134	2.3893	2.3654	2.3417	2.3183	2.2951	2.2722	2.2494	2.2270	2.2047
Revenue from New Development	$0	$0	$55	$107	$120	$92	$64	$51	$33	$24
Total Cle Elum Levy Revenue	*$0*	*$0*	*$55*	*$161*	*$279*	*$367*	*$436*	*$499*	*$546*	*$586*
School District No. 404 Bond Levy										
Existing District Valuation (2000)	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Total New District Valuation	$671,671	$671,671	$694,718	$740,483	$792,636	$832,951	$865,370	$895,303	$919,235	$940,072
Effective Bond Levy Rate	1.1577	1.1615	1.1216	1.0563	0.9820	0.9399	0.8902	0.8720	0.8473	0.8295
Bond Levy Revenue	$778	$780	$779	$782	$778	$783	$770	$781	$779	$780
Total School Bond Levy Revenue	*$0*	*$0*	*$26*	*$73*	*$119*	*$152*	*$172*	*$195*	*$210*	*$223*
School District No. 404 M&O Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
Capacity Levy Rate	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720
Revenue Capacity from Existing Development	$0	$0	$0	$29	$88	$154	$211	$256	$296	$328
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Capacity Levy Rate	1.0127	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720
Revenue Capacity from New Development	$0	$0	$29	$58	$66	$51	$36	$29	$19	$14
Total School M&O Levy Revenue Capacity	*$0*	*$0*	*$29*	*$88*	*$154*	*$205*	*$246*	*$284*	*$315*	*$341*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State of Washington										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
Effective Levy Rate	3.1491	3.0200	2.8961	2.7774	2.6635	2.5543	2.4496	2.3492	2.2528	2.1605
Revenue from Existing Development	$0	$0	$0	$64	$184	$310	$406	$472	$524	$557
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Prior Year Levy Rate	3.2837	3.1491	3.0200	2.8961	2.7774	2.6635	2.5543	2.4496	2.3492	2.2528
Revenue from New Development	$0	$0	$70	$133	$144	$107	$71	$55	$35	$24
Total Washington Levy Revenue	*$0*	*$0*	*$70*	*$197*	*$328*	*$416*	*$477*	*$528*	*$559*	*$581*
Kittitas County General Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
Effective Levy Rate	1.4425	1.4035	1.3656	1.3288	1.2929	1.2580	1.2240	1.1910	1.1588	1.1275
Revenue from Existing Development	$0	$0	$0	$31	$89	$153	$203	$239	$270	$290
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Prior Year Levy Rate	1.4825	1.4425	1.4035	1.3656	1.3288	1.2929	1.2580	1.2240	1.1910	1.1588
Revenue from New Development	$0	$0	$32	$62	$69	$52	$35	$28	$18	$12
Total County General Levy Revenue	*$0*	*$0*	*$32*	*$93*	*$158*	*$204*	*$238*	*$267*	*$287*	*$303*
Kittitas County Road Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Levy Rate	1.7551	1.7060	1.6582	1.6118	1.5667	1.5228	1.4802	1.4387	1.3984	1.3593
Revenue from Existing Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New UGA Construction Assessed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prior Year Levy Rate	1.8057	1.7551	1.7060	1.6582	1.6118	1.5667	1.5228	1.4802	1.4387	1.3984
Revenue from New Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total County Road Levy Revenue	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
New Home Valuation										
Lakefront	$1,525	$720	$1,113	$874	$499	$364	$312	$312	$226	$156
5,000-6,000 SF	$5,462	$10,516	$14,983	$12,259	$7,653	$5,331	$3,605	$3,605	$2,614	$1,803
7,000+ SF	$4,106	$10,710	$13,472	$12,256	$9,499	$6,291	$4,684	$4,689	$3,258	$3,258
Condominiums	$1,496	$7,582	$10,064	$8,466	$7,786	$7,480	$3,366	$0	$0	$0
Apartments	$1,980	$3,600	$3,732	$1,728	$0	$0	$0	$0	$0	$0
	$14,569	$33,128	$43,364	$35,582	$25,437	$19,466	$11,967	$8,606	$6,098	$5,216
New Commercial Valuation										
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facility 1/	$1,133	$2,727	$2,857	$1,133	$0	$1,199	$2,181	$2,181	$2,181	$2,181
Site Development	$7,345	$9,911	$5,714	$3,300	$2,511	$1,976	$612	$0	$0	$0
	$8,478	$12,638	$8,571	$4,433	$2,511	$3,175	$2,793	$2,181	$2,181	$2,181
New UGA Valuation	*$23,047*	*$45,766*	*$51,936*	*$40,015*	*$27,949*	*$22,641*	*$14,760*	*$10,787*	*$8,279*	*$7,397*
Existing Home Valuation										
Lakefront	$0	$1,525	$2,111	$3,092	$3,995	$4,601	$5,127	$5,631	$6,166	$6,670
5,000-6,000 SF	$0	$5,462	$13,388	$27,237	$38,874	$46,768	$53,932	$60,851	$68,121	$74,769
7,000+ SF	$0	$4,106	$17,100	$30,134	$44,109	$56,220	$64,550	$69,772	$75,329	$81,668
Condominiums	$0	$1,496	$9,160	$19,728	$29,279	$38,675	$48,283	$54,304	$57,291	$60,442
Apartments	$0	$1,980	$5,689	$9,734	$11,997	$12,657	$13,353	$14,088	$14,862	$15,680
	$0	$14,569	$47,448	$89,925	$128,254	$158,921	$185,244	$204,646	$221,769	$239,229
Existing Commercial Valuation										
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facility 1/	$0	$1,133	$3,922	$6,995	$8,513	$8,981	$10,674	$13,442	$16,362	$19,443
Site Development	$0	$7,345	$17,660	$24,345	$28,984	$33,089	$36,885	$39,526	$41,700	$43,993
	$0	$8,478	$21,582	$31,340	$37,496	$42,070	$47,559	$52,968	$58,062	$63,436
Existing UGA Valuation	*$0*	*$23,047*	*$69,029*	*$121,265*	*$165,751*	*$200,991*	*$232,803*	*$257,614*	*$279,831*	*$302,666*

EXHIBIT 2.05

ESTIMATED REAL ESTATE EXCISE TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Average Market Value (000s)											
Residential Property Sales											
Village Cluster Homes ($32,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,504
1/5th Acre Residential ($40,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,240
1/3rd Acre Residential ($65,500)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23,384
Condominiums - Whole ($150,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,000
Residential Property Resales											
Village Cluster Homes ($213,000)	$670	$691	$711	$725	$739	$753	$766	$780	$787	$794	$15,217
1/5th Acre Residential ($275,000)	$7,748	$7,987	$8,226	$8,386	$8,545	$8,704	$8,864	$8,908	$8,930	$8,930	$175,437
1/3rd Acre Residential ($360,000)	$8,496	$8,784	$9,072	$9,245	$9,418	$9,590	$9,763	$9,936	$10,051	$10,166	$190,886
Condominiums - Whole ($150,000)	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$107,400
Business Campus Land	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,000
Total Market Value of Sales	*$20,994*	*$21,542*	*$22,090*	*$22,435*	*$22,781*	*$23,127*	*$23,473*	*$23,704*	*$23,848*	*$23,970*	*$589,228*
Real Estate Excise Tax (000s)											
State Portion (1.28 cents/dollar) 1/	$266	$273	$280	$284	$289	$293	$297	$300	$302	$304	$7,467
County Portion (0.25 cents/dollar) 1/	$3	$3	$3	$3	$3	$4	$4	$4	$4	$4	$90
General Fund (26.5%)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$24
Capital Improvements Fund (73.5%)	$2	$2	$2	$3	$3	$3	$3	$3	$3	$3	$66
City of Cle Elum Portion (0.25 cents/dollar) 1/	$52	$53	$55	$56	$56	$57	$58	$59	$59	$59	$1,458
Total REET Revenues (000s)	*$321*	*$330*	*$338*	*$343*	*$349*	*$354*	*$359*	*$363*	*$365*	*$367*	*$9,015*

1/ Reflects 1% of State and City REET revenues retained by the County for administrative costs.

SOURCE: Johnson Gardner

EXHIBIT 2.05

ESTIMATED REAL ESTATE EXCISE TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Average Market Value (000s)										
Residential Property Sales										
Village Cluster Homes ($32,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1/5th Acre Residential ($40,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1/3rd Acre Residential ($65,500)	$1,048	$0	$0	$0	$0	$0	$0	$0	$0	$0
Condominiums - Whole ($150,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Residential Property Resales										
Village Cluster Homes ($213,000)	$431	$444	$458	$472	$499	$544	$580	$601	$622	$649
1/5th Acre Residential ($275,000)	$4,980	$5,139	$5,298	$5,458	$5,776	$6,294	$6,712	$6,951	$7,190	$7,509
1/3rd Acre Residential($360,000)	$5,270	$5,558	$5,846	$6,134	$6,480	$6,998	$7,344	$7,632	$7,920	$8,208
Condominiums - Whole ($150,000)	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080	$4,080
Business Campus Land	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Market Value of Sales	*$15,809*	*$15,222*	*$15,683*	*$16,144*	*$16,836*	*$17,917*	*$18,717*	*$19,265*	*$19,812*	*$20,447*
Real Estate Excise Tax (000s)										
State Portion (1.28 cents/dollar) 1/	$200	$193	$199	$205	$213	$227	$237	$244	$251	$259
County Portion (0.25 cents/dollar) 1/	$2	$2	$2	$2	$3	$3	$3	$3	$3	$3
General Fund (26.5%)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1
Capital Improvements Fund (73.5%)	$2	$2	$2	$2	$2	$2	$2	$2	$2	$2
City of Cle Elum Portion (0.25 cents/dollar) 1/	$39	$38	$39	$40	$42	$44	$46	$48	$49	$51
Total REET Revenues (000s)	*$242*	*$233*	*$240*	*$247*	*$258*	*$274*	*$286*	*$295*	*$303*	*$313*

1/ Reflects 1% of State and City REET revenues retained by the County for administrative costs.
SOURCE: Johnson Gardner

EXHIBIT 2.05

ESTIMATED REAL ESTATE EXCISE TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Average Market Value (000s)										
Residential Property Sales										
Village Cluster Homes ($32,000)	$1,504	$0	$0	$0	$0	$0	$0	$0	$0	$0
1/5th Acre Residential ($40,000)	$3,920	$3,240	$3,000	$2,600	$2,200	$1,280	$0	$0	$0	$0
1/3rd Acre Residential ($65,500)	$2,948	$4,323	$2,948	$2,293	$1,638	$1,638	$1,638	$1,638	$1,638	$1,638
Condominiums - Whole ($150,000)	$3,000	$12,750	$9,750	$9,000	$8,250	$8,250	$0	$0	$0	$0
Residential Property Resales										
Village Cluster Homes ($213,000)	$0	$0	$122	$231	$282	$320	$348	$375	$403	$417
1/5th Acre Residential ($275,000)	$0	$0	$1,414	$2,669	$3,267	$3,705	$4,023	$4,342	$4,661	$4,820
1/3rd Acre Residential($360,000)	$0	$0	$1,354	$2,362	$3,226	$3,830	$4,118	$4,406	$4,694	$4,982
Condominiums - Whole ($150,000)	$0	$0	$1,260	$2,040	$2,760	$3,420	$4,080	$4,080	$4,080	$4,080
Business Campus Land	$0	$1,600	$1,600	$1,600	$1,600	$1,600	$0	$0	$0	$0
Total Market Value of Sales	*$11,532*	*$21,913*	*$21,448*	*$22,794*	*$23,222*	*$24,043*	*$14,207*	*$14,842*	*$15,476*	*$15,937*
Real Estate Excise Tax (000s)										
State Portion (1.28 cents/dollar) 1/	$146	$278	$272	$289	$294	$305	$180	$188	$196	$202
County Portion (0.25 cents/dollar) 1/	$2	$3	$3	$3	$4	$4	$2	$2	$2	$2
General Fund (26.5%)	$0	$1	$1	$1	$1	$1	$1	$1	$1	$1
Capital Improvement Fund (73.5%)	$1	$2	$2	$3	$3	$3	$2	$2	$2	$2
City of Cle Elum Portion (0.25 cents/dollar) 1/	$29	$54	$53	$56	$57	$60	$35	$37	$38	$39
Total REET Revenues (000s)	*$176*	*$335*	*$328*	*$349*	*$355*	*$368*	*$217*	*$227*	*$237*	*$244*

1/ Reflects 1% of State and City REET revenues retained by the County for administrative costs.

SOURCE: Johnson Gardner

EXHIBIT 2.04

ESTIMATED BUSINESS & OCCUPATION TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State Business & Occupation Tax Revenue (000s)										
Taxable Retail Service Expenditures	$26,669	$44,930	$46,592	$36,901	$35,560	$34,650	$27,336	$27,943	$26,937	$27,357
Taxable Select Business Service Expenditures	$103	$317	$270	$0	$0	$0	$0	$0	$0	$0
B&O Tax Revenue from Retail Services (0.471%)	$126	$212	$219	$174	$167	$163	$129	$132	$127	$129
B&O Tax Revenue from Select Business Services (2.0%)	$2	$6	$5	$0	$0	$0	$0	$0	$0	$0
Total State B&O Tax Revenues	$128	$218	$225	$174	$167	$163	$129	$132	$127	$129
One-Time B&O Tax Revenue	$117	$183	$166	$102	$85	$72	$35	$35	$28	$28
Recurring B&O Tax Revenue	$11	$35	$59	$72	$82	$91	$94	$97	$99	$101

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State Business & Occupation Tax Revenue (000s)										
Taxable Retail Service Expenditures	$27,776	$28,196	$28,615	$31,155	$35,349	$33,842	$32,290	$32,803	$34,122	$33,923
Taxable Select Business Service Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
B&O Tax Revenue from Retail Services (0.471%)	$131	$133	$135	$147	$166	$159	$152	$155	$161	$160
B&O Tax Revenue from Select Business Services (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total State B&O Tax Revenues	$131	$133	$135	$147	$166	$159	$152	$155	$161	$160
One-Time B&O Tax Revenue	$28	$28	$28	$37	$52	$41	$31	$31	$35	$31
Recurring B&O Tax Revenue	$103	$105	$107	$110	$115	$118	$121	$123	$126	$129

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
State Business & Occupation Tax Revenue (000s)										
Taxable Retail Service Expenditures	$34,436	$34,949	$33,639	$33,965	$34,292	$34,618	$33,869	$33,297	$33,217	$33,319
Taxable Select Business Service Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
B&O Tax Revenue from Retail Services (0.471%)	$162	$165	$158	$160	$162	$163	$160	$157	$156	$157
B&O Tax Revenue from Select Business Services (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total State B&O Tax Revenues	$162	$165	$158	$160	$162	$163	$160	$157	$156	$157
One-Time B&O Tax Revenue	$31	$31	$24	$24	$24	$24	$19	$16	$15	$15
Recurring B&O Tax Revenue	$131	$133	$135	$136	$138	$140	$141	$141	$142	$142
State B&O Tax Revenues for All Years (000s)	***$4,689***									
One-Time B&O Revenues for All Years (000s)	***$1,412***									
Recurring B&O Revenues for All Years (000s)	***$3,277***									

SOURCE: Johnson Gardner

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
TOTAL SALES TAX (000s)											
Total Construction and Non-Horse Park Operations											
State Sales Tax Revenue	$1,888	$1,915	$1,826	$1,843	$1,860	$1,877	$1,826	$1,787	$1,781	$1,786	$56,473
County Sales Tax Revenue	$122	$124	$123	$124	$126	$127	$126	$126	$126	$126	$3,182
General Fund (1.00%)	$85	$87	$86	$87	$87	$88	$88	$87	$87	$88	$2,229
Law & Justice (0.01%)	$18	$19	$19	$19	$19	$19	$19	$19	$19	$19	$476
Prisons (0.01%)	$18	$19	$19	$19	$19	$19	$19	$19	$19	$19	$476
Cle Elum Sales Tax Revenue 3/	$87	$88	$74	$75	$75	$76	$68	$62	$60	$61	$3,425
Roslyn Sales Tax Revenue 3/	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$129
South Cle Elum Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Sales Tax Revenue 3/	$47	$48	$49	$49	$50	$50	$51	$51	$51	$51	$1,218
Horse Park Operations											
State Sales Tax Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Sales Tax Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.01%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.01%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cle Elum Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roslyn Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

1/ Per-room costs incorporate a share of non-room construction costs.

2/ Includes cost of community center and business park. See EXHIBIT 1.01 for a complete list of expenditure categories included.

3/ Additional retail sales tax revenues redistributed to County Law & Justice (0.1%) and Prisons (0.1%) reflected in County fund totals.

SOURCE: Johnson Gardner

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Lodging Expenditures (000s)											
Non-Horse Park Occupants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Horse Park Occupants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales and Hotel Tax Revenue from Lodging (000s)											
Non-Horse Park Occupants											
State Retail Sales Tax Share on Lodging (4.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Selective Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Horse Park Occupants											
State Retail Sales Tax Share on Lodging (4.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Selective Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Daily Non-Lodging Expenditures (000s)											
Non-Horse Park Development											
Eating & Drinking	$5,105	$5,199	$5,259	$5,319	$5,379	$5,439	$5,476	$5,499	$5,518	$5,537	$127,716
Recreation	$1,415	$1,441	$1,458	$1,475	$1,491	$1,508	$1,518	$1,525	$1,530	$1,535	$35,409
Retail Sales	$10,923	$11,124	$11,252	$11,381	$11,509	$11,637	$11,718	$11,767	$11,807	$11,847	$273,275
Ground Transportation	$4,978	$5,070	$5,128	$5,187	$5,245	$5,304	$5,340	$5,363	$5,381	$5,400	$124,549
Taxable Non-Lodging Expenditures	$22,421	$22,834	$23,098	$23,361	$23,624	$23,887	$24,052	$24,154	$24,236	$24,319	$560,950
Horse Park Development											
Eating & Drinking	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recreation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retail Sales	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground Transportation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxable Non-Lodging Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales Tax from Non-Lodging Expenditures (000s)											
Non-Horsepark Development											
State Retail Sales Tax (6.5%)	$1,457	$1,484	$1,501	$1,518	$1,536	$1,553	$1,563	$1,570	$1,575	$1,581	$36,462
County Retail Sales Tax (1.2%)	$112	$114	$115	$117	$118	$119	$120	$121	$121	$122	$2,720
General Fund (1.00%)	$77	$79	$79	$80	$81	$82	$83	$83	$83	$84	$1,844
Law & Justice (0.1%)	$17	$18	$18	$18	$18	$19	$19	$19	$19	$19	$438
Prisons (0.1%)	$17	$18	$18	$18	$18	$19	$19	$19	$19	$19	$438
Cle Elum Retail Sales Tax (1.0%) 3/	$31	$32	$32	$32	$33	$33	$33	$33	$34	$34	$808
Roslyn Retail Sales Tax (1.0%) 3/	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$129
Ellensburg Retail Sales Tax (1.0%) 3/	$47	$48	$49	$49	$50	$50	$51	$51	$51	$51	$1,218
Horse Park Development											
State Retail Sales Tax (6.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax (1.2%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cle Elum Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roslyn Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Construction Costs (000s)											
Residential Construction											
Village Cluster Homes ($132,000)	$160	$160	$107	$107	$107	$107	$107	$53	$53	$53	$6,204
1/5th Acre Residential ($182,000)	$1,977	$1,977	$1,318	$1,318	$1,318	$1,318	$364	$182	$0	$0	$73,872
1/3rd Acre Residential ($231,000)	$2,310	$2,310	$1,386	$1,386	$1,386	$1,386	$1,386	$924	$924	$924	$82,467
Condominiums ($119,250)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$40,545
Apartments ($60,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,040
Commercial/Non-Residential Construction											
Hotel ($19,770/room) 1/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facilities 2/	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$62,370
Site Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,369
Total Construction Costs	$6,628	$6,628	$4,992	$4,992	$4,992	$4,992	$4,038	$3,340	$3,158	$3,158	$307,867
Sales Tax from Construction (000s)											
State Retail Sales Tax (6.5%)	$431	$431	$324	$324	$324	$324	$262	$217	$205	$205	$20,011
County Retail Sales Tax (1.2%)	$10	$10	$7	$7	$7	$7	$6	$5	$5	$5	$462
General Fund (1.00%)	$8	$8	$6	$6	$6	$6	$5	$4	$4	$4	$385
Law & Justice (0.1%)	$1	$1	$1	$1	$1	$1	$1	$0	$0	$0	$38
Prisons (0.1%)	$1	$1	$1	$1	$1	$1	$1	$0	$0	$0	$38
Cle Elum Retail Sales Tax (1.0%) 3/	$56	$56	$42	$42	$42	$42	$34	$28	$27	$27	$2,617
Roslyn Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
South Cle Elum Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
TOTAL SALES TAX (000s)										
Total Construction and Non-Horse Park Operations										
State Sales Tax Revenue	$1,530	$1,552	$1,574	$1,731	$1,991	$1,883	$1,776	$1,803	$1,881	$1,861
County Sales Tax Revenue	$97	$99	$100	$106	$115	$114	$113	$115	$119	$120
General Fund (1.00%)	$68	$69	$70	$74	$81	$81	$79	$81	$83	$84
Law & Justice (0.01%)	$14	$15	$15	$16	$17	$17	$17	$17	$18	$18
Prisons (0.01%)	$14	$15	$15	$16	$17	$17	$17	$17	$18	$18
Cle Elum Sales Tax Revenue 3/	$75	$75	$76	$92	$120	$102	$85	$86	$92	$87
Roslyn Sales Tax Revenue 3/	$4	$4	$4	$4	$4	$4	$4	$5	$5	$5
South Cle Elum Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Sales Tax Revenue 3/	$37	$38	$39	$40	$41	$43	$44	$44	$46	$46
Horse Park Operations										
State Sales Tax Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Sales Tax Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.01%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.01%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cle Elum Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roslyn Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

1/ Per-room costs incorporate a share of non-room construction costs.

2/ Includes cost of community center and business park. See EXHIBIT 1.01 for a complete list of expenditure categories included.

3/ Additional retail sales tax revenues redistributed to County Law & Justice (0.1%) and Prisons (0.1%) reflected in County fund totals.

SOURCE: Johnson Gardner

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Lodging Expenditures (000s)										
Non-Horse Park Occupants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Horse Park Occupants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales and Hotel Tax Revenue from Lodging (000s)										
Non-Horse Park Occupants										
State Retail Sales Tax Share on Lodging (4.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Horse Park Occupants										
State Retail Sales Tax Share on Lodging (4.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF
CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Daily Non-Lodging Expenditures (000s)										
Non-Horse Park Development										
Eating & Drinking	$4,013	$4,090	$4,167	$4,287	$4,475	$4,617	$4,711	$4,805	$4,916	$5,011
Recreation	$1,113	$1,134	$1,155	$1,189	$1,241	$1,280	$1,306	$1,332	$1,363	$1,389
Retail Sales	$8,587	$8,752	$8,916	$9,173	$9,576	$9,878	$10,080	$10,281	$10,520	$10,721
Ground Transportation	$3,914	$3,989	$4,064	$4,181	$4,364	$4,502	$4,594	$4,686	$4,794	$4,886
Taxable Non-Lodging Expenditures	$17,626	$17,964	$18,302	$18,829	$19,656	$20,277	$20,691	$21,104	$21,593	$22,007
Horse Park Development										
Eating & Drinking	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recreation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retail Sales	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground Transportation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxable Non-Lodging Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales Tax from Non-Lodging Expenditures (000s)										
Non-Horse Park Development										
State Retail Sales Tax (6.5%)	$1,146	$1,168	$1,190	$1,224	$1,278	$1,318	$1,345	$1,372	$1,404	$1,430
County Retail Sales Tax (1.2%)	$88	$90	$91	$94	$98	$101	$103	$105	$108	$110
General Fund (1.00%)	$61	$62	$63	$65	$68	$70	$71	$73	$74	$76
Law & Justice (0.1%)	$14	$14	$14	$15	$15	$16	$16	$16	$17	$17
Prisons (0.1%)	$14	$14	$14	$15	$15	$16	$16	$16	$17	$17
Cle Elum Retail Sales Tax (1.0%) 3/	$24	$25	$25	$26	$27	$28	$29	$29	$30	$30
Roslyn Retail Sales Tax (1.0%) 3/	$4	$4	$4	$4	$4	$4	$4	$5	$5	$5
Ellensburg Retail Sales Tax (1.0%) 3/	$37	$38	$39	$40	$41	$43	$44	$44	$46	$46
Horse Park Development										
State Retail Sales Tax (6.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax (1.2%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cle Elum Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roslyn Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Construction Costs (000s)										
Residential Construction										
Village Cluster Homes ($132,000)	$107	$107	$107	$213	$347	$280	$160	$160	$213	$160
1/5th Acre Residential ($182,000)	$1,318	$1,318	$1,318	$2,636	$4,284	$3,460	$1,977	$1,977	$2,636	$1,977
1/3rd Acre Residential ($231,000)	$2,310	$2,310	$2,310	$2,772	$4,158	$2,772	$2,310	$2,310	$2,310	$2,310
Condominiums ($119,250)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Apartments ($60,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Commercial/Non-Residential Construction										
Hotel ($19,770/room) 1/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facilities 2/	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181
Site Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Construction Costs	$5,916	$5,916	$5,916	$7,803	$10,970	$8,693	$6,628	$6,628	$7,341	$6,628
Sales Tax from Construction (000s)										
State Retail Sales Tax (6.5%)	$385	$385	$385	$507	$713	$565	$431	$431	$477	$431
County Retail Sales Tax (1.2%)	$9	$9	$9	$12	$16	$13	$10	$10	$11	$10
General Fund (1.00%)	$7	$7	$7	$10	$14	$11	$8	$8	$9	$8
Law & Justice (0.1%)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1
Prisons (0.1%)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1
Cle Elum Retail Sales Tax (1.0%) 3/	$50	$50	$50	$66	$93	$74	$56	$56	$62	$56
Roslyn Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
South Cle Elum Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
TOTAL SALES TAX (000s)										
Total Construction and Non-Horse Park Operations										
State Sales Tax Revenue	$1,938	$3,061	$3,122	$2,207	$2,091	$2,008	$1,525	$1,557	$1,486	$1,508
County Sales Tax Revenue	$48	$80	$88	$71	$71	$101	$92	$94	$94	$95
General Fund (1.00%)	$38	$60	$63	$46	$44	$73	$65	$66	$66	$67
Law & Justice (0.01%)	$5	$10	$13	$12	$13	$14	$13	$14	$14	$14
Prisons (0.01%)	$5	$10	$13	$12	$13	$14	$13	$14	$14	$14
Cle Elum Sales Tax Revenue 3/	$241	$362	$344	$210	$183	$151	$85	$85	$74	$74
Roslyn Sales Tax Revenue 3/	$1	$2	$4	$5	$6	$3	$3	$4	$4	$4
South Cle Elum Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Sales Tax Revenue 3/	$6	$17	$29	$36	$41	$33	$34	$35	$36	$36
Horse Park Operations										
State Sales Tax Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Sales Tax Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.01%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.01%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cle Elum Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roslyn Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Sales Tax Revenue 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

1/ Per-room costs incorporate a share of non-room construction costs.

2/ Includes cost of community center and business park. See EXHIBIT 1.01 for a complete list of expenditure categories included.

3/ Additional retail sales tax revenues redistributed to County Law & Justice (0.1%) and Prisons (0.1%) reflected in County fund totals.

SOURCE: Johnson Gardner

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Lodging Expenditures (000s)										
Non-Horse Park Occupants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Horse Park Occupants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales and Hotel Tax Revenue from Lodging (000s)										
Non-Horse Park Occupants										
State Retail Sales Tax Share on Lodging (4.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Horse Park Occupants										
State Retail Sales Tax Share on Lodging (4.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Cle Elum Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Retail Sales Tax (1.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Hotel/Motel Tax (2.0%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Daily Non-Lodging Expenditures (000s)										
Non-Horse Park Development										
Eating & Drinking	$433	$1,365	$2,282	$2,795	$3,213	$3,559	$3,671	$3,782	$3,859	$3,936
Recreation	$120	$379	$633	$775	$891	$987	$1,018	$1,049	$1,070	$1,091
Retail Sales	$926	$2,921	$4,883	$5,980	$6,876	$7,616	$7,854	$8,092	$8,257	$8,422
Ground Transportation	$422	$1,331	$2,225	$2,725	$3,134	$3,471	$3,580	$3,688	$3,763	$3,838
Taxable Non-Lodging Expenditures	$1,900	$5,996	$10,023	$12,275	$14,114	$15,633	$16,122	$16,611	$16,950	$17,288
Horse Park Development										
Eating & Drinking	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recreation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retail Sales	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground Transportation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxable Non-Lodging Expenditures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales Tax from Non-Lodging Expenditures (000s)										
Non-Horse Park Development										
State Retail Sales Tax (6.5%)	$124	$390	$652	$798	$917	$1,016	$1,048	$1,080	$1,102	$1,124
County Retail Sales Tax (1.2%)	$6	$19	$31	$38	$44	$78	$81	$83	$85	$86
General Fund (1.00%)	$3	$9	$15	$19	$21	$54	$55	$57	$58	$59
Law & Justice (0.1%)	$2	$5	$8	$10	$11	$12	$13	$13	$13	$13
Prisons (0.1%)	$2	$5	$8	$10	$11	$12	$13	$13	$13	$13
Cle Elum Retail Sales Tax (1.0%) 3/	$4	$13	$21	$26	$30	$22	$22	$23	$23	$24
Roslyn Retail Sales Tax (1.0%) 3/	$1	$2	$4	$5	$6	$3	$3	$4	$4	$4
Ellensburg Retail Sales Tax (1.0%) 3/	$6	$17	$29	$36	$41	$33	$34	$35	$36	$36
Horse Park Development										
State Retail Sales Tax (6.5%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County Retail Sales Tax (1.2%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Fund (1.00%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Law & Justice (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prisons (0.1%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cle Elum Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roslyn Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.03

ESTIMATED SALES AND HOTEL TAX REVENUES FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Construction Costs (000s)										
Residential Construction										
Village Cluster Homes ($132,000)	$280	$667	$841	$400	$294	$213	$213	$213	$107	$107
1/5th Acre Residential ($182,000)	$3,460	$8,239	$10,381	$4,943	$3,625	$2,636	$2,636	$2,636	$1,318	$1,318
1/3rd Acre Residential ($231,000)	$2,772	$8,085	$8,085	$6,930	$4,851	$2,310	$2,310	$2,310	$2,310	$2,310
Condominiums ($119,250)	$2,385	$10,136	$7,751	$7,155	$6,559	$6,559	$0	$0	$0	$0
Apartments ($60,000)	$3,600	$3,600	$3,840	$0	$0	$0	$0	$0	$0	$0
Commercial/Non-Residential Construction										
Hotel ($19,770/room) 1/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facilities 2/	$2,060	$3,272	$2,518	$0	$0	$2,181	$2,181	$2,181	$2,181	$2,181
Site Development	$13,354	$7,094	$4,585	$2,248	$2,727	$1,361	$0	$0	$0	$0
Total Construction Costs	$27,912	$41,093	$38,001	$21,677	$18,055	$15,260	$7,341	$7,341	$5,916	$5,916
Sales Tax from Construction (000s)										
State Retail Sales Tax (6.5%)	$1,814	$2,671	$2,470	$1,409	$1,174	$992	$477	$477	$385	$385
County Retail Sales Tax (1.2%)	$42	$62	$57	$33	$27	$23	$11	$11	$9	$9
General Fund (1.00%)	$35	$51	$48	$27	$23	$19	$9	$9	$7	$7
Law & Justice (0.1%)	$3	$5	$5	$3	$2	$2	$1	$1	$1	$1
Prisons (0.1%)	$3	$5	$5	$3	$2	$2	$1	$1	$1	$1
Cle Elum Retail Sales Tax (1.0%) 3/	$237	$349	$323	$184	$153	$130	$62	$62	$50	$50
Roslyn Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
South Cle Elum Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ellensburg Retail Sales Tax (1.0%) 3/	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.02

ESTIMATED PERMIT FEE REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Mechanical Permit Fees (000s)											
Single Family Residential	$1	$1	$1	$1	$1	$1	$0	$0	$0	$0	$37
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22
Total Mechanical Permit Fees	$1	$1	$1	$1	$1	$1	$0	$0	$0	$0	$59
Fire & Life Safety Plan Review Fees (000s)											
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fire & Life Safety Plan Review Fees	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10
Sprinkler System Permit and Review Fees (000s)											
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Sprinkler System Permit and Review Fees	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23
Permits Fees for Non-Residential Development (000s)	$33	$33	$33	$33	$33	$33	$33	$33	$33	$33	$1,406
Total Local Permit Fee Revenue (000s)	***$65***	***$65***	***$53***	***$53***	***$53***	***$53***	***$46***	***$41***	***$40***	***$40***	***$2,978***
Total County Permit Fee Revenue (000s)	***$52***	***$52***	***$43***	***$43***	***$43***	***$43***	***$37***	***$33***	***$32***	***$32***	***$2,383***
Total Cle Elum Permit Fee Revenue (000s)	***$13***	***$13***	***$11***	***$11***	***$11***	***$11***	***$9***	***$8***	***$8***	***$8***	***$596***

SOURCE: Johnson Gardner

EXHIBIT 2.02

ESTIMATED PERMIT FEE REVENUES FROM THE DEVELOPMENT OF
CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
State of Washington											
State Building Code Fee (000s)											
Single Family Residential	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.0	$0.0	$0.0	$0.0	$3
Multifamily Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0
Total State Building Code Revenue	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.0	$0.0	$0.0	$0.0	$3.8
Local Development Permits											
Permit Issuance Fees (000s)											
Single Family Residential	$0.5	$0.5	$0.3	$0.3	$0.3	$0.3	$0.2	$0.1	$0.1	$0.1	$17
Multifamily Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$2
Total County Permit Issuance Fees	$0.5	$0.5	$0.3	$0.3	$0.3	$0.3	$0.2	$0.1	$0.1	$0.1	$19
Dwelling Unit Fees (000s)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1
Basic Building Permit Fees (000s)											
Single Family Residential	$20	$20	$13	$13	$13	$13	$9	$5	$5	$5	$745
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$200
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Basic Building Permit Revenue	$20	$20	$13	$13	$13	$13	$9	$5	$5	$5	$945
Plan Review Fees (000s)											
Single Family Residential	$10	$10	$7	$7	$7	$7	$4	$3	$2	$2	$382
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$133
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Plan Review Fees	$10	$10	$7	$7	$7	$7	$4	$3	$2	$2	$515

SOURCE: Johnson Gardner

EXHIBIT 2.02

ESTIMATED PERMIT FEE REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Mechanical Permit Fees (000s)										
Single Family Residential	$1	$1	$1	$1	$2	$2	$1	$1	$1	$1
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Mechanical Permit Fees	$1	$1	$1	$1	$2	$2	$1	$1	$1	$1
Fire & Life Safety Plan Review Fees (000s)										
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fire & Life Safety Plan Review Fees	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sprinkler System Permit and Review Fees (000s)										
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Sprinkler System Permit and Review Fees	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Permits Fees for Non-Residential Development (000s)	$33	$33	$33	$33	$33	$33	$33	$33	$33	$33
Total Local Permit Fee Revenue (000s)	***$60***	***$60***	***$60***	***$74***	***$97***	***$80***	***$65***	***$65***	***$70***	***$65***
Total County Permit Fee Revenue (000s)	$48	$48	$48	$59	$77	$64	$52	$52	$56	$52
Total Cle Elum Permit Fee Revenue (000s)	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13

SOURCE: Johnson Gardner

EXHIBIT 2.02

ESTIMATED PERMIT FEE REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State of Washington										
State Building Code Fee (000s)										
Single Family Residential	$0.1	$0.1	$0.1	$0.1	$0.2	$0.1	$0.1	$0.1	$0.1	$0.1
Multifamily Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total State Building Code Revenue	$0.1	$0.1	$0.1	$0.1	$0.2	$0.1	$0.1	$0.1	$0.1	$0.1
Local Development Permits										
Permit Issuance Fees (000s)										
Single Family Residential	$0.4	$0.4	$0.4	$0.6	$0.9	$0.7	$0.5	$0.5	$0.5	$0.5
Multifamily Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total County Permit Issuance Fees	$0.4	$0.4	$0.4	$0.6	$0.9	$0.7	$0.5	$0.5	$0.5	$0.5
Dwelling Unit Fees (000s)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Basic Building Permit Fees (000s)										
Single Family Residential	$17	$17	$17	$26	$40	$30	$20	$20	$24	$20
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Basic Building Permit Revenue	$17	$17	$17	$26	$40	$30	$20	$20	$24	$20
Plan Review Fees (000s)										
Single Family Residential	$9	$9	$9	$13	$21	$15	$10	$10	$12	$10
Multifamily Residential	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Plan Review Fees	$9	$9	$9	$13	$21	$15	$10	$10	$12	$10

SOURCE: Johnson Gardner

EXHIBIT 2.02

ESTIMATED PERMIT FEE REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Mechanical Permit Fees (000s)										
Single Family Residential	$2	$4	$5	$3	$2	$1	$1	$1	$1	$1
Multifamily Residential	$3	$6	$5	$3	$3	$3	$0	$0	$0	$0
Total Mechanical Permit Fees	$5	$10	$10	$6	$5	$4	$1	$1	$1	$1
Fire & Life Safety Plan Review Fees (000s)										
Multifamily Residential	$1	$3	$2	$1	$1	$1	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fire & Life Safety Plan Review Fees	$1	$3	$2	$1	$1	$1	$0	$0	$0	$0
Sprinkler System Permit and Review Fees (000s)										
Multifamily Residential	$3	$6	$6	$3	$2	$2	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Sprinkler System Permit and Review Fees	$3	$6	$6	$3	$2	$2	$0	$0	$0	$0
Permits Fees for Non-Residential Development (000s)	$231	$155	$107	$34	$41	$53	$33	$33	$33	$33
Total Local Permit Fee Revenue (000s)	*$329*	*$385*	*$338*	*$173*	*$151*	*$137*	*$70*	*$70*	*$60*	*$60*
Total County Permit Fee Revenue (000s)	$263	$308	$270	$139	$121	$110	$56	$56	$48	$48
Total Cle Elum Permit Fee Revenue (000s)	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12

SOURCE: Johnson Gardner

EXHIBIT 2.02

ESTIMATED PERMIT FEE REVENUES FROM THE DEVELOPMENT OF
CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State of Washington										
State Building Code Fee (000s)										
Single Family Residential	$0.1	$0.3	$0.4	$0.2	$0.2	$0.1	$0.1	$0.1	$0.1	$0.1
Multifamily Residential	$0.1	$0.1	$0.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total State Building Code Revenue	$0.2	$0.5	$0.5	$0.3	$0.2	$0.2	$0.1	$0.1	$0.1	$0.1
Local Development Permits										
Permit Issuance Fees (000s)										
Single Family Residential	$0.7	$1.7	$2.0	$1.2	$0.9	$0.5	$0.5	$0.5	$0.4	$0.4
Multifamily Residential	$0.3	$0.6	$0.5	$0.2	$0.2	$0.2	$0.0	$0.0	$0.0	$0.0
Total County Permit Issuance Fees	$1.0	$2.3	$2.5	$1.5	$1.1	$0.8	$0.5	$0.5	$0.4	$0.4
Dwelling Unit Fees (000s)	$0.1	$0.2	$0.2	$0.1	$0.1	$0.1	$0.0	$0.0	$0.0	$0.0
Basic Building Permit Fees (000s)										
Single Family Residential	$30	$78	$89	$56	$40	$24	$24	$24	$17	$17
Multifamily Residential	$26	$54	$46	$26	$24	$24	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Basic Building Permit Revenue	$55	$132	$135	$82	$64	$48	$24	$24	$17	$17
Plan Review Fees (000s)										
Single Family Residential	$15	$40	$45	$29	$21	$12	$12	$12	$9	$9
Multifamily Residential	$17	$36	$31	$17	$16	$16	$0	$0	$0	$0
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Plan Review Fees	$32	$76	$76	$46	$37	$28	$12	$12	$9	$9

SOURCE: Johnson Gardner

EXHIBIT 2.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
City of Ellensburg (000s)											
Sales Tax	$47	$48	$49	$49	$50	$50	$51	$51	$51	$51	$1,218
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Total Revenues	$47	$48	$49	$49	$50	$50	$51	$51	$51	$51	$1,218
City of Ellensburg One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Recurring Revenue	$47	$48	$49	$49	$50	$50	$51	$51	$51	$51	$1,218
Cle Elum/Roslyn School District No. 404 (000s)											
Property Tax	$1,192	$1,273	$1,365	$1,454	$1,545	$1,640	$1,740	$1,846	$1,957	$2,072	$27,300
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
District 404 Total Revenues	$1,192	$1,273	$1,365	$1,454	$1,545	$1,640	$1,740	$1,846	$1,957	$2,072	$27,302
Kittitas County Fire District No. 7 (000s)											
Property Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Hospital District No. 2 (000s)											
Property Tax	$308	$328	$352	$375	$399	$423	$449	$476	$505	$534	$7,009
Patient Fees ($550 per EMS call)	$33	$34	$34	$35	$35	$35	$36	$36	$36	$36	$833
Hospital District 2 Total Revenues	$341	$362	$386	$410	$433	$458	$485	$512	$541	$570	$7,842

SOURCE: Johnson Gardner

EXHIBIT 2.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
City of Cle Elum (000s)											
Permit Fee Revenues	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
Sales Tax	$87	$88	$74	$75	$75	$76	$68	$62	$60	$61	$3,425
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$52	$53	$55	$56	$56	$57	$58	$59	$59	$59	$1,458
Property Tax	$1,124	$1,188	$1,262	$1,330	$1,400	$1,471	$1,545	$1,623	$1,703	$1,785	$25,666
Shared Revenues	$90	$92	$94	$95	$97	$98	$99	$100	$101	$101	$2,143
City of Cle Elum Total Revenues	$1,367	$1,435	$1,495	$1,567	$1,638	$1,712	$1,779	$1,851	$1,931	$2,014	$33,289
City of Cle Elum One-Time Revenue	$121	$123	$108	$109	$109	$110	$102	$95	$94	$94	$4,671
City of Cle Elum Recurring Revenue	$1,246	$1,312	$1,388	$1,458	$1,529	$1,601	$1,677	$1,756	$1,837	$1,919	$28,618
City of Roslyn (000s)											
Sales Tax	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$129
City of Roslyn One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Roslyn Recurring Revenue	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$129
City of South Cle Elum (000s)											
Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum Recurring Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
State of Washington (000s)											
Permit Fee Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4
Sales Tax	$1,888	$1,915	$1,826	$1,843	$1,860	$1,877	$1,826	$1,787	$1,781	$1,786	$56,473
B&O Tax	$162	$165	$158	$160	$162	$163	$160	$157	$156	$157	$4,689
Real Estate Excise Tax	$266	$273	$280	$284	$289	$293	$297	$300	$302	$304	$7,467
Property Tax	$784	$803	$826	$844	$860	$875	$891	$906	$921	$935	$18,627
Motor Vehicle Fuel Tax	$351	$358	$362	$366	$370	$374	$377	$378	$380	$381	$8,787
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5
State of Washington Total Revenue	$3,452	$3,514	$3,452	$3,497	$3,540	$3,583	$3,550	$3,529	$3,540	$3,563	$96,051
State of Washington One-Time Revenue	$728	$735	$628	$632	$637	$641	$579	$533	$522	$524	$28,899
State of Washington Recurring Revenue	$2,724	$2,778	$2,824	$2,865	$2,903	$2,942	$2,971	$2,996	$3,018	$3,039	$67,152
Kittitas County (000s)											
Permit Fee Revenues	$52	$52	$43	$43	$43	$43	$37	$33	$32	$32	$2,383
Sales Tax	$122	$124	$123	$124	$126	$127	$126	$126	$126	$126	$3,182
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$3	$3	$3	$3	$3	$4	$4	$4	$4	$4	$90
Property Tax	-$480	$499	$521	$539	$558	$576	$595	$614	$633	$652	$11,123
Shared Revenues	$141	$144	$146	$149	$151	$153	$154	$156	$157	$158	$3,346
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14
Kittitas County Total Revenue	$798	$822	$836	$859	$880	$901	$916	$932	$951	$972	$20,138
Kittitas County One-Time Revenue	$65	$65	$53	$53	$53	$54	$47	$42	$40	$40	$2,949
Kittitas County Recurring Revenue	$733	$757	$782	$805	$827	$848	$869	$891	$911	$931	$17,189

EXHIBIT 2.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
City of Ellensburg (000s)										
Sales Tax	$37	$38	$39	$40	$41	$43	$44	$44	$46	$46
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Total Revenues	$37	$38	$39	$40	$41	$43	$44	$44	$46	$46
City of Ellensburg One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Recurring Revenue	$37	$38	$39	$40	$41	$43	$44	$44	$46	$46
Cle Elum/Roslyn School District No. 404 (000s)										
Property Tax	$594	$635	$691	$741	$792	$850	$917	$986	$1,054	$1,125
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
District 404 Total Revenues	$594	$635	$691	$741	$792	$850	$917	$986	$1,054	$1,125
Kittitas County Fire District No. 7 (000s)										
Property Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Hospital District No. 2 (000s)										
Property Tax	$152	$164	$178	$191	$204	$219	$237	$254	$272	$290
Patient Fees ($550 per EMS call)	$26	$27	$27	$28	$29	$30	$31	$32	$32	$33
Hospital District 2 Total Revenues	$178	$191	$205	$219	$234	$250	$267	$286	$304	$323

SOURCE: Johnson Gardner

EXHIBIT 2.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
City of Cle Elum (000s)										
Permit Fee Revenues	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13
Sales Tax	$75	$75	$76	$92	$120	$102	$85	$86	$92	$87
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$39	$38	$39	$40	$42	$44	$46	$48	$49	$51
Property Tax	$614	$656	$706	$750	$794	$843	$900	$959	$1,015	$1,072
Shared Revenues	$71	$72	$74	$75	$77	$79	$82	$85	$87	$88
City of Cle Elum Total Revenues	$811	$853	$906	$972	$1,052	$1,084	$1,127	$1,190	$1,256	$1,311
City of Cle Elum One-Time Revenue	$101	$100	$101	$121	$154	$134	$116	$117	$125	$120
City of Cle Elum Recurring Revenue	$710	$753	$805	$851	$898	$950	$1,011	$1,073	$1,131	$1,191
City of Roslyn (000s)										
Sales Tax	$4	$4	$4	$4	$4	$4	$4	$5	$5	$5
City of Roslyn One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Roslyn Recurring Revenue	$4	$4	$4	$4	$4	$4	$4	$5	$5	$5
City of South Cle Elum (000s)										
Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum Recurring Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.01

SUMMARY OF REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State of Washington (000s)										
Permit Fee Revenues	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sales Tax	$1,530	$1,552	$1,574	$1,731	$1,991	$1,883	$1,776	$1,803	$1,881	$1,861
B&O Tax	$131	$133	$135	$147	$166	$159	$152	$155	$161	$160
Real Estate Excise Tax	$200	$193	$199	$205	$213	$227	$237	$244	$251	$259
Property Tax	$589	$610	$636	$654	$671	$690	$714	$736	$755	$772
Motor Vehicle Fuel Tax	$276	$281	$287	$295	$308	$318	$324	$331	$338	$345
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State of Washington Total Revenue	$2,727	$2,769	$2,830	$3,031	$3,349	$3,277	$3,203	$3,268	$3,385	$3,397
State of Washington One-Time Revenue	$613	$605	$611	$749	$978	$833	$699	$706	$763	$721
State of Washington Recurring Revenue	$2,114	$2,164	$2,219	$2,283	$2,371	$2,444	$2,504	$2,562	$2,623	$2,676
Kittitas County (000s)										
Permit Fee Revenues	$48	$48	$48	$59	$77	$64	$52	$52	$56	$52
Sales Tax	$97	$99	$100	$106	$115	$114	$113	$115	$119	$120
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$2	$2	$2	$2	$3	$3	$3	$3	$3	$3
Property Tax	$312	$327	$346	$361	$376	$393	$412	$431	$449	$466
Shared Revenues	$111	$113	$115	$117	$120	$123	$128	$132	$135	$138
Timber Excise Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Total Revenue	$570	$589	$612	$646	$690	$697	$709	$734	$762	$779
Kittitas County One-Time Revenue	$59	$59	$59	$73	$96	$80	$65	$65	$70	$65
Kittitas County Recurring Revenue	$511	$530	$553	$573	$594	$617	$644	$669	$692	$714

H-01

EXHIBIT 2.01

SUMMARY OF ESTIMATED REVENUES FOR JURISDICTIONS AFFECTED BY
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
City of Ellensburg (000s)										
Sales Tax	$6	$17	$29	$36	$41	$33	$34	$35	$36	$36
Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Total Revenue	$6	$17	$29	$36	$41	$33	$34	$35	$36	$36
City of Ellensburg One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Ellensburg Recurring Revenue	$6	$17	$29	$36	$41	$33	$34	$35	$36	$36
Cle Elum/Roslyn School District No. 404 (000s)										
Property Tax	$0	$0	$55	$160	$273	$357	$419	$479	$525	$564
Timber Excise Tax	$1	$1	$1	$0	$0	$0	$0	$0	$0	$0
District 404 Total Revenues	$1	$1	$56	$160	$273	$357	$419	$479	$525	$564
Kittitas County Fire District No. 7 (000s)										
Property Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Hospital District No. 2 (000s)										
Property Tax	$0	$0	$12	$37	$65	$86	$104	$120	$132	$143
Patient Fees ($550 per EMS call)	$3	$9	$15	$18	$21	$23	$24	$25	$25	$26
Hospital District 2 Total Revenues	$3	$9	$27	$55	$86	$109	$127	$144	$157	$169

SOURCE: Johnson Gardner

EXHIBIT 2.01

SUMMARY OF ESTIMATED REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
City of Cle Elum (000s)										
Permit Fee Revenues	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12
Sales Tax	$241	$362	$344	$210	$183	$151	$85	$85	$74	$74
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$29	$54	$53	$56	$57	$60	$35	$37	$38	$39
Property Tax	$0	$0	$55	$161	$279	$367	$436	$499	$546	$586
Shared Revenues	$0	$0	$8	$25	$42	$51	$59	$65	$67	$69
City of Cle Elum Total Revenue	$336	$493	$527	$487	$591	$657	$629	$700	$738	$781
City of Cle Elum One-Time Revenue	$332	$480	$444	$275	$241	$217	$112	$113	$101	$102
City of Cle Elum Recurring Revenue	$4	$13	$83	$211	$350	$440	$518	$587	$637	$679
City of Roslyn (000s)										
Sales Tax	$1	$2	$4	$5	$6	$3	$3	$4	$4	$4
City of Roslyn One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of Roslyn Recurring Revenue	$1	$2	$4	$5	$6	$3	$3	$4	$4	$4
City of South Cle Elum (000s)										
Sales Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum One-Time Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
City of South Cle Elum Recurring Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

EXHIBIT 2.01

SUMMARY OF ESTIMATED REVENUES FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State of Washington (000s)										
Permit Fee Revenues	$0	$0	$1	$0	$0	$0	$0	$0	$0	$0
Sales Tax	$1,938	$3,061	$3,122	$2,207	$2,091	$2,008	$1,525	$1,557	$1,486	$1,508
B&O Tax	$128	$218	$225	$174	$167	$163	$129	$132	$127	$129
Real Estate Excise Tax	$146	$278	$272	$289	$294	$305	$180	$188	$196	$202
Property Tax	$0	$0	$70	$197	$328	$416	$477	$528	$559	$581
Motor Vehicle Fuel Tax	$30	$94	$157	$192	$221	$245	$253	$260	$265	$271
Timber Excise Tax	$2	$2	$2	$0	$0	$0	$0	$0	$0	$0
State of Washington Total Revenue	$2,243	$3,653	$3,847	$3,059	$3,102	$3,137	$2,564	$2,664	$2,634	$2,691
State of Washington One-Time Revenue	$2,079	$3,134	$2,910	$1,800	$1,553	$1,369	$692	$700	$609	$614
State of Washington Recurring Revenue	$164	$519	$937	$1,258	$1,549	$1,769	$1,872	$1,965	$2,025	$2,076
Kittitas County (000s)										
Permit Fee Revenues	$263	$308	$270	$139	$121	$110	$56	$56	$48	$48
Sales Tax	$48	$80	$88	$71	$71	$101	$92	$94	$94	$95
Selective Hotel/Motel Tax	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Real Estate Excise Tax	$2	$3	$3	$3	$4	$4	$2	$2	$2	$2
Property Tax	$0	$0	$32	$93	$158	$204	$238	$267	$287	$303
Shared Revenues	$0	$0	$12	$39	$65	$80	$92	$102	$105	$108
Timber Excise Tax	$5	$5	$5	$0	$0	$0	$0	$0	$0	$0
Kittitas County Total Revenue	$318	$396	$411	$345	$419	$499	$480	$522	$536	$557
Kittitas County One-Time Revenue	$312	$377	$335	$175	$151	$136	$69	$69	$59	$59
Kittitas County Recurring Revenue	$6	$19	$76	$170	$267	$363	$411	$452	$477	$498

EXHIBIT 1.01

DEVELOPMENT SCHEDULE OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Residential Sales											
Detached Units											
Lakefront Lots	0	0	0	0	0	0	0	0	0	0	47
7,000+ SF Lots	0	0	0	0	0	0	0	0	0	0	406
5,000-6,000 SF Lots	0	0	0	0	0	0	0	0	0	0	357
Attached Units											
Condominiums - Timeshare	0	0	0	0	0	0	0	0	0	0	0
Condominiums - Fractional Interest	0	0	0	0	0	0	0	0	0	0	0
Condominiums - Whole Ownership	0	0	0	0	0	0	0	0	0	0	340
Residential Construction											
Detached Units											
Lakefront Lots	1	1	1	1	1	1	1	0	0	0	47
7,000+ SF Lots	11	11	7	7	7	7	2	1	0	0	406
5,000-6,000 SF Lots	10	10	6	6	6	6	6	4	4	4	357
Attached Units											
Condominiums: Whole Ownership	0	0	0	0	0	0	0	0	0	0	340
Apartments	0	0	0	0	0	0	0	0	0	0	184
UGA Development Costs (000s)											
Infrastructure Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,914
Amenity Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,850
Lot Development Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,455
Business Park Construction	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$54,520
Total Development Costs:	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$93,739
Total Permit Costs 1/	$33	$33	$33	$33	$33	$33	$33	$33	$33	$33	

1/ Calculated as 1.5% of development costs (Trendwest Properties, 1998)
SOURCE: Trendwest Properties and Johnson Gardner, LLC

EXHIBIT 1.01

DEVELOPMENT SCHEDULE OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Residential Sales										
Detached Units										
Lakefront Lots	0	0	0	0	0	0	0	0	0	0
7,000+ SF Lots	0	0	0	0	0	0	0	0	0	0
5,000-6,000 SF Lots	16	0	0	0	0	0	0	0	0	0
Attached Units										
Condominiums - Timeshare	0	0	0	0	0	0	0	0	0	0
Condominiums - Fractional Interest	0	0	0	0	0	0	0	0	0	0
Condominiums - Whole Ownership	0	0	0	0	0	0	0	0	0	0
Residential Construction										
Detached Units										
Lakefront Lots	1	1	1	2	3	2	1	1	2	1
7,000+ SF Lots	7	7	7	14	24	19	11	11	14	11
5,000-6,000 SF Lots	10	10	10	12	18	12	10	10	10	10
Attached Units										
Condominiums: Whole Ownership	0	0	0	0	0	0	0	0	0	0
Apartments	0	0	0	0	0	0	0	0	0	0
UGA Development Costs (000s)										
Infrastructure Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenity Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lot Development Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Business Park Construction	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181
Total Development Costs:	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181
Total Permit Costs 1/	$33	$33	$33	$33	$33	$33	$33	$33	$33	$33

1/ Calculated as 1.5% of development costs (Trendwest Properties, 1998)
SOURCE: Trendwest Properties and Johnson Gardner, LLC

EXHIBIT 1.01

DEVELOPMENT SCHEDULE OF CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Residential Sales										
Detached Units										
Lakefront Lots	47	0	0	0	0	0	0	0	0	0
7,000+ SF Lots	98	81	75	65	55	32	0	0	0	0
5,000-6,000 SF Lots	45	66	45	35	25	25	25	25	25	25
Attached Units										
Condominiums - Timeshare	0	0	0	0	0	0	0	0	0	0
Condominiums - Fractional Interest	0	0	0	0	0	0	0	0	0	0
Condominiums - Whole Ownership	20	85	65	60	55	55	0	0	0	0
Residential Construction										
Detached Units										
Lakefront Lots	2	5	6	3	2	2	2	2	1	1
7,000+ SF Lots	19	45	57	27	20	14	14	14	7	7
5,000-6,000 SF Lots	12	35	35	30	21	10	10	10	10	10
Attached Units										
Condominiums: Whole Ownership	20	85	65	60	55	55	0	0	0	0
Apartments	60	60	64	0	0	0	0	0	0	0
UGA Development Costs (000s)										
Infrastructure Costs	$6,422	$2,097	$933	$25	$437	$0	$0	$0	$0	$0
Amenity Costs	$2,060	$3,272	$2,518	$0	$0	$0	$0	$0	$0	$0
Lot Development Costs	$6,932	$4,997	$3,652	$2,223	$2,290	$1,361	$0	$0	$0	$0
Business Park Construction	$0	$0	$0	$0	$0	$2,181	$2,181	$2,181	$2,181	$2,181
Total Development Costs:	$15,414	$10,366	$7,103	$2,248	$2,727	$3,542	$2,181	$2,181	$2,181	$2,181
Total Permit Costs 1/	$231	$155	$107	$34	$41	$53	$33	$33	$33	$33

1/ Calculated as 1.5% of development costs (Trendwest Properties, 1998)

SOURCE: Trendwest Properties and Johnson Gardner, LLC

Washington State Office of Financial Management. 1999. *Combined Statement of Revenues, Expenditures, and Changes in Fund Balances: All Government Fund Types and Expendable Trust Funds for the Fiscal Year Ended June 30, 1998.*

_____. 1999. 1998 Washington State Population Survey. July, 1999.

Washington State Office of Superintendent of Public Instruction, 2000.

Wilkins, David. 1999. Telephone interview with David Wilkins, Executive Director of the Sunriver Chamber of Commerce. May, 1999.

Willis, Don. 1999. Telephone interview with Don Willis, Sunriver Fire Department. May, 1999.

Wilson, Dan. 1998. Telephone interview with Chief Civil Deputy Wilson, Kittitas County Sheriff's Department. December, 1998.

Wolslegel, Al. 1999. Telephone interview with Al Wolslegel, Puget Sound Region of the Washington State Parks and Recreation Commission. April, 1999.

Zehm, Polly. 1999. Telephone interview with Polly Zehm, Regional Director of the Central Region Office of the Washington Department of Ecology. April, 1999.

H-01

R.S. Means, Inc. 1997. Square Foot Costs: 19th Annual Edition, Kingston, MA. 1997.

R.S. Means, Inc. 2000. Corporate website and database.

RIDGE Settlement Agreement, 2001. *Settlement Agreement Regarding mountainStar Master Planned Resort, Cle Elum Urban Growth Area and Supporting Infrastructure and Services.* 2001.

Shapiro and Associates. 1999. *Cle Elum Urban Growth Area Preliminary Environmental Impact Statement.* July, 1999.

Shelstad, Norm. 1999. Telephone interview with Norm Shelstad, Trendwest Properties. 1999.

Suing, Troy. 1999. Telephone interview with Troy Suing, Washington State Department of Transportation, Yakima, Washington. February, 1999.

Town of South Cle Elum. 1998. *Budget for Fiscal Year 1998.*

Trendwest Properties, Inc. 1997. *1997 Worldmark Timeshare Condominium Occupancy and Visitor Statistics.*

Trowbridge, Jim, 1999. Telephone interview with Fire Department Chief Jim Trowbridge, June 1999

U.S. Department of Labor. *CPI Detailed Report.* January, 1998.

U.S Department of Transportation. 1997. *Transportation in the United States, 1998*, Bureau of Transportation Statistics, 1997.

U.S. Census Bureau. *County Population for Washington State, 1998 (preliminary).*

Urban Land Institute, 1998.*Dollars & Cents of Shopping Centers: 1998.* ULI-The Urban Land Institute, Washington D.C., 1998.

Valazquez, Michelle. 1999. Telephone interview with Michelle Valazquez, Washington State Department of Health, Yakima, Washington. March, 1999.

Valdez, Santos, 2000. Telephone interview with Santos Valdez, Wapato Fire Department, March 2000.

Van Beek, Dwayne, 2000. Telephone interview with Dwayne Van Beek, Othello Fire Department, March 2000.

Washington State Department of Revenue. *Tax Reference Manual: Information on State and Local Taxes in Washington State.* January, 1996.

_____. *Table of Taxable Retail Sales for Selected Communities.* 1998.

H-01

Miloy, Brennan, 1999. Telephone interview with Brennan Miloy, Police Chief for the City of Cle Elum , Washington, June 1999.

Moyer & Associates. *Fiscal Impacts on Local Governments of Increased Assessed Valuation from the Cle Elum River Property.* March, 1997.

_____. 2000. *Impacts of UGA and MPR Enrollment on Classroom Space Requirements and Student Transportation in the Cle Elum School District.* August, 2000.

Moyer, Mike. 1999. Telephone correspondence with Mike Moyer, Trendwest Properties. April, 1999.

Nelson, Evelyn. 1998. Personal interview with Superintendent Nelson, Cle Elum/Roslyn School District No. 404. October, 1998.

_____. 1999. Telephone interview with Evelyn Nelson, Superintendent of Cle Elum/Roslyn School District No. 404. February, 1999.

Nelson, Sally, 1999. Telephone interview with Sally Nelson, South Cle Elum City Clerk. April, 1999.

Northrup, Dale, 2000. Telephone interview with Dale Northrup, Toppenish Fire Department, March 2000.

Omans, Rob. 1999. Telephone interview with Rob Omans, Kittitas County Department of Building and Fire Safety. January, 1999.

Plesha, Jan. 1998. Telephone interview with Jan Plesha, Kittitas County Hospital District No. 2. November, 1998.

Pless, Judy. 1999. Telephone interview with Judy Pless, Budget and Finance Manager, Kittitas County Auditor's Office. January, 1999.

Reinke, Steve. 1998. Telephone interview with Steve Reinke, Director of Kittitas County Communications (KITTCOM). December, 1998.

_____. 1999. Telephone interview with Steve Reinke, Director of Kittitas County Communications (KITTCOM). January, 1999.

_____. 2000. Telephone interview with Steve Reinke, Director of Kittitas County Communications (KITTCOM). January, 2000.

_____. 2000. Telephone interview with Steve Reinke, Director of Kittitas County Communications (KITTCOM). November, 2000.

Rominger, Iris. 1998. Telephone interview with Iris Rominger, Kittitas County Assessor. December, 1998.

H-01

Hughes Associates, Incorporated. *Draft Cle Elum Master Planned Resort Emergency Service Resource Evaluation.* October, 1998.

Hutson, Craig, 2000. Telephone interview with Craig Hutson, Ephrata Fire Department, March 2000.

Kibler, Carol, 2000. Telephone interview with Carol Kibler, Chelan Fire District No. 7, March 2000.

Kittitas County. 1998. *Kittitas County 1999 Annual Budget.* December, 1998.

_____. 1997. *Kittitas County 1998 Annual Budget.* December, 1997.

Kittitas County Communications. 1998. *KITTCOM Budget for Fiscal Year 1999.*

Kittitas County Department of Building & Fire Safety. *Building Permit Rates, Effective: January 13, 1999.* 1998.

_____. *Current Uniform Building Code, Building Permit Fees.* 1998.

Kittitas County Fire District No. 7. *Kittitas County Fire District No. 7 1999 Budget.* October, 1998.

Kittitas County Hospital District No. 2. *Kittitas County Hospital District No. 2 1999 Budget.* 1998.

Kittitas County Office of the Assessor. *Kittitas County Assessor's Report.* Various years.

Leonard, Jim, 2000. Telephone interview with Jim Leonard, Director of Public Works, City of Cle Elum, Washington, March 2000.

Malella, Tony, 2000. Telephone interview with Tony Malella, Department of Public Works, City of Ellensburg, Washington, March 2000.

Mack, Richard and Gary Richardson. 1998. *Financial Feasibility and Economic Impact of the Washington State Horse Park.* December, 1998.

McBride, Robert. 1998. Personal Interview with Sheriff McBride, Kittitas County Sheriff's Department. October, 1998.

MacKean, Jacky. Telephone interview with Jacky MacKean, Yakima County Building Department. January, 1999.

Meritt, Doug, 2000. Telephone interview with Doug Meritt, Prosser Fire Department, March 2000.

Microflex, Inc., 2001. Preliminary analysis of likely effects of I-747 upon City of Cle Elum property tax revenue stream by Mike Mulcahy. December, 2001.

H-01

Dillard, Jennifer. Electronic correspondence with Jennifer Dillard, Trendwest Properties. December, 1999.

Fields, Toni. 1999. Telephone interview with Toni Fields, Treasurer for the City of Cle Elum. April, 1999.

Fischer, Maria. 1999. Telephone interview with Maria Fischer, Roslyn City Clerk. April, 1999.

Forbes, James. 1998. Electronic correspondence with James Forbes. December, 1998.

Fortier, Dan, 2000. Telephone interview with Dan Fortier, Grant Fire District No. 3 for Quincy, March 2000.

Gyllenskog, Jerry. 1999. Telephone interview with Jerry Gyllenskog, Sunriver Police Department Captain. April, 1999.

Hall, Chris. 1999. Telephone interview with Chris Hall of the Washington Department of Ecology. April, 1999.

Haworth, Ron. 1998. Telephone interview with Fire District No. 7 consultant, Ron Haworth. December, 1998.

Hess, Phil, 2000. Telephone interview with Phil Hess, March 2000.

Hobson Johnson & Associates. *General Overview of the Economic and Fiscal Impacts Associated with Destination Resorts.* November, 1996.

_____. *Visitor Analysis for Cle Elum Master Planned Community, Kittitas County, Washington.* August, 1998.

_____. *Market Analysis for Cle Elum: A Mixed-Use Destination Resort in Kittitas County, Washington.* September, 1998.

_____. *Detailed Employment Analysis: Cle Elum Resort, Kittitas County, Washington.* January, 1999.

_____. Fiscal Impact Analysis of The Proposed MountianStar Master Planned Resort in Kittitas County, Washington. June, 1999.

_____. *Occupancy and Population Analysis for Development Within The Cle Elum Cle Elum Urban Growth Area In Kittitas County, Washington.* September, 1999.

Huckell/Weinman Associates, 1999. *MountainStar Master Planned Resort Draft Environmental Impact Statement.* July, 1999.

_____. *MountainStar Master Planned Resort Preliminary Draft Environmental Impact Statement.* February, 2000.

H-01

_____. 2001. Telephone interview with Mike Cecka, Cle Elum City Manager. December 2001.

City of Cle Elum. 1998. *Budget for Fiscal Year 1999.*

_____. 2000. Pre-Annexation Agreement between the City of Cle Elum and Trendwest Properties, July 2000.

_____. 2000. *Law Enforcement Agreement between the Cities of Cle Elum and Roslyn,* 2000.

_____. 2001. *City of Cle Elum Municipal Facilities and Services Expansion Plan for the Trendwest UGA Development.* December, 2001.

City of Ellensburg 1998. *Budget for Fiscal Year 1999.*

City of Roslyn. 1998. *Budget for Fiscal Year 1999.*

Claritas Inc. 1999. *Household Trends Report for Washington State.* 1998.

Clausing, Ted. 1999. Telephone interview with Officer Ted Clausing, Washington State Department of Fish and Wildlife. February, 1999.

Cle Elum/Roslyn School District No. 404. *F-195 Budget for Fiscal Year 1998-99.* June, 1998.

_____. Detail of program expenditures subject to approval of proposed 1998 property tax levy. 1998.

_____. *Cle Elum-Roslyn School District Capital Facilities Plan 2001-2020.* March 26 2001.

Cockill, George, 1999. Electronic Correspondence with George Cockill, April 1999.

_____. Telephone Interview with George Cockill, November 1999.

_____. Telephone Interview with George Cockill, March 2000.

Curry, Doug. 1998. Telephone interview with Chief Curry, Kittitas County Fire District No. 7. November, 1998.

Dean Runyan Associates. *Oregon Travel Impacts and Visitor Volume, 1991-1997p.* December, 1997.

_____. *Washington State Travel Impacts and Visitor Volume, 1991-1997p.* December, 1997.

DeGroot, Undersheriff. Telephone interview with Kittitas County Undersheriff De Groot. February, 2002.

Deschutes County "911" Community Agency. 1998. *1997 Statistics Report.*

H-01

BIBLIOGRAPHY

Allenbaugh, Beverly. 1998. Personal interview with Beverly Allenbaugh, Kittitas County Auditor. October, 1998.

American Automobile Association. 1995. *Oregon and Washington State Tourbook.* 1995.

American Business Directory. *1999 Washington Business Directory.* 1998. American Business Directories, Omaha, Nebraska, 1998.

Atelier ps. 1999. *Washington State Horse Park Final Master Plan Report.* The Washington State Horse Park Authority, March, 1999.

Barkee, Jon. 2002. Telephone interview with Jon Barkee, Trendwest UGA Project Engineer. January, 2002.

Bannister, Deliela. 1999. Telephone interview with Cle Elum City Clerk Deliela Bannister. April, 1999.

_____. 1999. Telephone interview with Cle Elum City Clerk, Deliela Bannister. June, 1999.

Berndt, Gary. 1998. Telephone interview with Gary Berndt, Director of Kittitas County Regional Office of Washington Department of Natural Resources. November, 1998.

_____. 1999. Telephone interview with Gary Berndt, Director of Kittitas County Regional Office of Washington Department of Natural Resources. June, 1999.

Bollen, Kevin, 2000. Telephone interview with Kevin Bollen, Omak Fire Department, March 2000.

Burchell, Robert W., David Listokin, and William R. Dolphin. *The New Practitioner's Guide to Fiscal Impact Analysis.* Center for Urban Policy Research, Rutgers, The State University of New Jersey, 1985.

Browning, Lawrence, 2000. Telephone interview with Lawrence Browning, Goldendale Fire Department, March 2000.

Cargill, Kaarin and Evelyn Nelson. 1998. Telephone interview with Kaarin Cargill, Business Manager, and Superintendent Nelson, Cle Elum/Roslyn School District No. 404. December, 1998.

Carpenter, Larry, 1999. Telephone interview with Larry Carpenter, Treasurer for the City of Ellensburg, April 1999.

Carr, Allen. 1999. Telephone interview with Allen Carr, International Conference of Building Officials, Bellevue, Washington. February, 1999.

Cecka, Mike. 2001. Email memorandum from Mike Cecka, Cle Elum City Manager. March 2001.

H-01

EXHIBIT 3.06

CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 1 to 10
Additional Enrollment 1/	70	222	372	458	527	585	603	622	635	647	4,741
Total District Cost from Additional Enrollment (000s)	$274	$876	$1,467	$1,804	$2,078	$2,305	$2,378	$2,451	$2,502	$2,552	$18,689
State-Funded Cost from Enrollment (000s)	$233	$745	$1,247	$1,533	$1,767	$1,959	$2,022	$2,084	$2,127	$2,170	$15,885
Local District Cost from Enrollment (000s)											
Personnel Expenditures (Certified, Classified)	$33	$105	$176	$216	$249	$276	$285	$293	$299	$305	$2,236
O&M Expenditures ($700/student)	$8	$25	$42	$52	$60	$67	$69	$71	$72	$74	$541
Capital Expenditures ($40/student)	$0	$1	$2	$3	$3	$3	$3	$3	$3	$4	$26
Total Local School District Fiscal Cost (000s)	$41	$131	$220	$271	$312	$346	$357	$368	$375	$383	$2,803

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 1 to 20
Additional Enrollment 1/	660	673	686	706	737	761	776	792	811	826	12,170
Total District Cost from Additional Enrollment (000s)	$2,603	$2,653	$2,704	$2,783	$2,906	$2,999	$3,061	$3,123	$3,196	$3,257	$47,974
State-Funded Cost from Enrollment (000s)	$2,213	$2,255	$2,298	$2,365	$2,470	$2,549	$2,602	$2,654	$2,716	$2,769	$40,778
Local District Cost from Enrollment (000s)											
Personnel Expenditures (Certified, Classified)	$311	$318	$324	$333	$348	$359	$366	$374	$382	$390	$5,741
O&M Expenditures ($700/student)	$75	$77	$78	$81	$84	$87	$89	$90	$92	$94	$1,389
Capital Expenditures ($40/student)	$4	$4	$4	$4	$4	$4	$4	$4	$4	$5	$67
Total Local School District Fiscal Cost (000s)	$390	$398	$406	$417	$436	$450	$459	$468	$479	$489	$4,419

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Years 1 to 30
Additional Enrollment 1/	842	858	868	878	888	898	904	908	911	914	21,036
Total District Cost from Additional Enrollment (000s)	$3,319	$3,381	$3,420	$3,460	$3,499	$3,538	$3,563	$3,578	$3,590	$3,603	$82,926
State-Funded Cost from Enrollment (000s)	$2,821	$2,874	$2,907	$2,941	$2,974	$3,008	$3,029	$3,041	$3,052	$3,062	$70,487
Local District Cost from Enrollment (000s)											
Personnel Expenditures (Certified, Classified)	$397	$405	$409	$414	$419	$423	$426	$428	$430	$431	$9,923
O&M Expenditures ($700/student)	$96	$98	$99	$100	$101	$102	$103	$104	$104	$104	$2,400
Capital Expenditures ($40/student)	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5	$116
Total Local School District Fiscal Cost (000s)	$498	$507	$513	$519	$525	$531	$534	$537	$539	$540	$12,439

1/ Reflects .71 students per for-sale primary residence and .53 students per apartment.
SOURCE: Johnson Gardner

EXHIBIT 3.05

CLE ELUM/ROSLYN SCHOOL DISTRICT NO. 404 ESTIMATED ENROLLMENT IMPACTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA DEVELOPMENT ALTERNATIVE V

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
For-Sale Housing Units/Households	53	223	387	507	605	686	712	739	757	775
x Children (K-12) per Household 1/	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
= **Enrollment from For-Sale Units**	**38**	**159**	**275**	**360**	**430**	**487**	**506**	**524**	**537**	**550**
Rental Apartment Units/Households	60	120	184	184	184	184	184	184	184	184
x Children (K-12) per Household 2/	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
= **Enrollment from Rental Apartment Units**	**32**	**64**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**
TOTAL ANNUAL ENROLLMENT IMPACTS	***70***	***222***	***372***	***458***	***527***	***585***	***603***	***622***	***635***	***647***

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
For-Sale Housing Units/Households	793	811	829	857	901	934	956	978	1004	1027
x Children (K-12) per Household 1/	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
= **Enrollment from For-Sale Units**	**563**	**576**	**588**	**608**	**640**	**663**	**679**	**695**	**713**	**729**
Rental Apartment Units/Households	184	184	184	184	184	184	184	184	184	184
x Children (K-12) per Household 2/	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
= **Enrollment from Rental Apartment Units**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**
TOTAL ANNUAL ENROLLMENT IMPACTS	***660***	***673***	***686***	***706***	***737***	***761***	***776***	***792***	***811***	***826***

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
For-Sale Housing Units/Households	1049	1071	1085	1099	1113	1127	1136	1141	1145	1150
x Children (K-12) per Household 1/	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
= **Enrollment from For-Sale Units**	**744**	**760**	**770**	**780**	**790**	**800**	**806**	**810**	**813**	**816**
Rental Apartment Units/Households	184	184	184	184	184	184	184	184	184	184
x Children (K-12) per Household 2/	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
= **Enrollment from Rental Apartment Units**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**	**98**
TOTAL ANNUAL ENROLLMENT IMPACTS	***842***	***858***	***868***	***878***	***888***	***898***	***904***	***908***	***911***	***914***

1/ Reflects the Washington State average number of school-age children per household where annual household income is at least $60,000 (1998 Washington State Population Survey, Office of Financial Management, 1999). $60,000 is the assumed, minimum qualifying annual household income for purchase of a condominium, the least expensive residential unit planned.

2/ Reflects the Washington State average number of school-age children per household where annual household income is less than $60,000 (1998 Washington State Population Survey, Office of Financial Management, 1999). It was assumed that those families choosing to reside within the Cle Elum UGA would locate in planned apartments if they were not income qualified for ownership.

SOURCE: Johnson Gardner

EXHIBIT 3.04

CITY OF CLE ELUM FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Development Review & Inspection Costs (000s)											
Total Review, Inspection, and Permit Fees 1/ 2/	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
Law Enforcement Fiscal Cost of Project (000s)											
Personnel Expenditures (Patrol Officers, Clerks)	$231	$232	$233	$234	$234	$235	$236	$236	$236	$236	$5,540
O&M Expenditures ($7,229/Officer)	$36	$36	$36	$36	$36	$36	$36	$36	$36	$36	$853
Capital Expenditures (Car, Equipment, Firearms, Workspace)	$26	$26	$29	$26	$26	$26	$26	$26	$26	$26	$789
KITTCOM Fees ($15/call)	$46	$47	$47	$48	$49	$49	$49	$50	$50	$50	$1,152
Total Fiscal Cost of Law Enforcement	$339	$341	$346	$343	$345	$346	$347	$347	$347	$348	$8,334
Emergency Fire Service Fiscal Cost (000s)											
Personnel Expenditures (Firefighters/EMS, Chief, Secretary)	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$3,198
O&M Expenditures ($681/Firefighter, $500 for training)	$11	$11	$12	$12	$12	$12	$13	$13	$13	$13	$315
Capital Expenditures (Station, Vehicles, Clothing, Hose)	$55	$54	$54	$54	$56	$55	$55	$55	$56	$56	$1,507
KITTCOM Fees ($9/call)	$2	$2	$3	$3	$3	$3	$3	$3	$3	$3	$72
Total Fiscal Cost of Emergency Fire Service	$181	$180	$181	$181	$183	$182	$183	$183	$184	$184	$5,091
Road Maintenance (000s)											
Miles of Maintained Roads	10.5	10.7	10.9	11.0	11.1	11.2	11.3	11.4	11.4	11.5	---
Personnel Expenditures (Public Works Dept.)	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$900
Annual Maintenance Costs ($12,000/mile)	$100	$102	$103	$104	$106	$107	$108	$108	$108	$109	$2,526
Capital Equipment (Sweeper, Plows, Loaders, Sander)	$67	$67	$67	$67	$67	$67	$67	$67	$67	$67	$1,659
Total Road Maintenance Costs	$197	$199	$200	$201	$202	$204	$204	$205	$205	$206	$5,086
Fiscal Cost of General Government Services (000s)											
Non-Residential, General Services Fiscal Cost	$133	$137	$141	$145	$149	$153	$157	$160	$164	$168	$3,297
Residential, General Services Fiscal Cost	$149	$151	$153	$155	$156	$158	$159	$160	$160	$161	$3,737
Total Proportional, Non-Emergency Service Fiscal Cost	$282	$288	$294	$300	$305	$311	$316	$320	$325	$329	$7,034
Total City Fiscal Cost of Project (000s)	$1,011	$1,021	$1,031	$1,035	$1,046	$1,053	$1,059	$1,063	$1,070	$1,075	$26,139
City of Cle Elum One-Time Service Costs (000s)	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
City of Cle Elum Recurring Service Costs (000s)	$998	$1,008	$1,020	$1,025	$1,035	$1,042	$1,049	$1,055	$1,062	$1,067	$25,544

1/ See Section IV in the text for detailed description of individual permits and fees.
2/ Detailed annual estimates of review, inspection, and permit fees are found in EXHIBIT 2.02.
SOURCE: Johnson Gardner

EXHIBIT 3.04

CITY OF CLE ELUM FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Development Review & Inspection Costs (000s)										
Total Review, Inspection, and Permit Fees 1/ 2/	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13
Law Enforcement Fiscal Cost of Project (000s)										
Personnel Expenditures (Patrol Officers, Clerks)	$184	$185	$186	$187	$190	$191	$192	$228	$229	$230
O&M Expenditures ($7,229/Officer)	$29	$29	$29	$29	$29	$29	$29	$36	$36	$36
Capital Expenditures (Car, Equipment, Firearms, Workspace)	$26	$26	$26	$26	$26	$26	$26	$39	$26	$26
KITTCOM Fees ($15/call)	$36	$37	$38	$39	$40	$42	$42	$43	$44	$45
Total Fiscal Cost of Law Enforcement	$275	$276	$278	$281	$285	$288	$289	$346	$335	$337
Emergency Fire Service Fiscal Cost (000s)										
Personnel Expenditures (Firefighters/EMS, Chief, Secretary)	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113
O&M Expenditures ($681/Firefighter, $500 for training)	$10	$10	$10	$10	$11	$11	$11	$11	$11	$11
Capital Expenditures (Station, Vehicles, Clothing, Hose)	$55	$54	$54	$54	$56	$55	$55	$55	$56	$56
KITTCOM Fees ($9/call)	$2	$2	$3	$3	$3	$3	$3	$3	$3	$3
Total Fiscal Cost of Emergency Fire Service	$179	$178	$178	$179	$182	$181	$181	$181	$183	$183
Road Maintenance (000s)										
Miles of Maintained Roads	8.2	8.4	8.6	8.8	9.2	9.5	9.7	9.9	10.1	10.3
Personnel Expenditures (Public Works Dept.)	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30
Annual Maintenance Costs ($12,000/mile)	$78	$80	$81	$84	$87	$90	$92	$94	$96	$98
Capital Equipment (Sweeper, Plows, Loaders, Sander)	$43	$43	$43	$67	$67	$67	$67	$67	$67	$67
Total Road Maintenance Costs	$152	$153	$155	$180	$184	$187	$189	$191	$193	$195
Fiscal Cost of General Government Services (000s)										
Non-Residential, General Services Fiscal Cost	$94	$98	$102	$106	$110	$113	$117	$121	$125	$129
Residential, General Services Fiscal Cost	$118	$120	$122	$126	$131	$135	$138	$140	$143	$146
Total Proportional, Non-Emergency Service Fiscal Cost	$212	$218	$224	$231	$240	$248	$255	$262	$269	$275
Total City Fiscal Cost of Project (000s)	$830	$838	$847	$886	$910	$920	$927	$992	$994	$1,003
City of Cle Elum One-Time Service Costs (000s)	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13
City of Cle Elum Recurring Service Costs (000s)	$818	$826	$835	$871	$891	$904	$914	$979	$980	$990

1/ See Section IV in the text for detailed description of individual permits and fees.
2/ Detailed annual estimates of review, inspection, and permit fees are found in EXHIBIT 2.02.
SOURCE: Johnson Gardner

EXHIBIT 3.04

CITY OF CLE ELUM FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Development Review & Inspection Costs (000s)										
Total Review, Inspection, and Permit Fees 1/ 2/	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12
Law Enforcement Fiscal Cost of Project (000s)										
Personnel Expenditures (Patrol Officers, Clerks)	$39	$50	$95	$101	$140	$145	$146	$147	$148	$183
O&M Expenditures ($7,229/Officer)	$7	$7	$14	$14	$22	$22	$22	$22	$22	$29
Capital Expenditures (Car, Equipment, Firearms, Workspace)	$33	$20	$33	$21	$34	$21	$21	$21	$21	$34
KITTCOM Fees ($9/call)	$4	$12	$21	$25	$29	$32	$33	$34	$35	$35
Total Fiscal Cost of Law Enforcement	$83	$89	$163	$162	$225	$219	$221	$224	$225	$282
Emergency Fire Service Fiscal Cost (000s)										
Personnel Expenditures (Firefighters/EMS, Chief, Secretary)	$53	$53	$83	$83	$113	$113	$113	$113	$113	$113
O&M Expenditures ($681/Firefighter, $500 for training)	$8	$8	$9	$9	$10	$9	$9	$9	$9	$9
Capital Expenditures (Station, Vehicles, Clothing, Hose)	$46	$22	$22	$23	$22	$65	$54	$54	$54	$52
KITTCOM Fees ($9/call)	$0	$1	$1	$2	$2	$2	$2	$2	$2	$2
Total Fiscal Cost of Emergency Fire Service	$107	$84	$115	$116	$146	$189	$178	$178	$178	$176
Road Maintenance (000s)										
Miles of Maintained Roads	1.3	3.4	5.5	6.5	7.0	7.3	7.5	7.7	7.9	8.1
Personnel Expenditures (Public Works Dept.)	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30
Annual Maintenance Costs ($12,000/mile)	$12	$32	$52	$62	$66	$69	$71	$74	$75	$77
Capital Equipment (Sweeper, Plows, Loaders, Sander)	$28	$28	$40	$40	$40	$43	$43	$43	$43	$43
Total Road Maintenance Costs	$70	$90	$122	$132	$136	$142	$145	$147	$148	$150
Fiscal Cost of General Government Services (000s)										
Non-Residential, General Services Fiscal Cost	$28	$46	$59	$63	$68	$74	$78	$82	$86	$90
Residential, General Services Fiscal Cost	$14	$41	$69	$83	$95	$105	$108	$111	$113	$116
Total Proportional, Non-Emergency Service Fiscal Cost	$41	$88	$128	$146	$163	$179	$186	$193	$200	$206
Total City Fiscal Cost of Project (000s)	$368	$427	$596	$591	$702	$757	$744	$756	$763	$826
City of Cle Elum One-Time Service Costs (000s)	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12
City of Cle Elum Recurring Service Costs (000s)	$302	$350	$529	$556	$671	$730	$730	$742	$751	$814

1/ See Section IV in the text for detailed description of individual permits and fees.
2/ Detailed annual estimates of review, inspection, and permit fees are found in EXHIBIT 2.02.
SOURCE: Johnson Gardner

March 15, 2002

EXHIBIT 3.03

KITTITAS COUNTY FISCAL COSTS FROM THE DEVELOPMENT OF THE CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Development Review & Inspection Costs (000s)										
Total Review, Inspection, and Permit Fees 1/ 2/	$48	$48	$48	$59	$77	$64	$52	$52	$56	$52
Law Enforcement Fiscal Cost of Project (000s)										
Personnel Expenditures (Deputies, Law Enforcement Clerks)	$81	$81	$81	$81	$82	$82	$82	$82	$82	$82
O&M Expenditures ($6,646/Deputy)	$14	$14	$14	$14	$14	$14	$14	$14	$14	$14
Capital Expenditures (Car, Equipment, Firearms, Workspace)	$15	$15	$15	$15	$15	$15	$15	$15	$15	$15
KITTCOM Fees ($15/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fiscal Cost of Law Enforcement	$110	$110	$110	$110	$111	$111	$111	$111	$111	$111
Fiscal Cost of General Government Services (000s)										
Non-Residential, Non-Police Fiscal Cost of Project	$251	$262	$272	$283	$293	$304	$314	$325	$335	$345
Residential, Non-Police Fiscal Cost of Project	$242	$246	$250	$257	$268	$277	$282	$287	$294	$299
Total Proportional, Non-Police Fiscal Cost of Project	$493	$508	$523	$540	$561	$580	$596	$612	$629	$645
Total County Fiscal Cost of Project (000s)	$650	$665	$681	$709	$749	$755	$759	$775	$796	$808
Kittitas County One-Time Service Costs (000s)	$48	$48	$48	$59	$77	$64	$52	$52	$56	$52
Kittitas County Recurring Service Costs (000s)	$603	$618	$633	$650	$672	$691	$707	$723	$740	$756

1/ See Section IV in the text for detailed description of individual permits and fees.
2/ Detailed annual estimates of review, inspection, and permit fees are found in EXHIBIT 2.02.
SOURCE: Johnson Gardner

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fire District No. 7 Regular Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Levy Rate	0.7089	0.6933	0.6780	0.6631	0.6485	0.6342	0.6203	0.6066	0.5933	0.5802
Revenue from Existing Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New UGA Construction Assessed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prior Year Levy Rate	0.7248	0.7089	0.6933	0.6780	0.6631	0.6485	0.6342	0.6203	0.6066	0.5933
Revenue from New Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fire District Levy Revenue	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Hospital District No. 2 Regular Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
Effective Levy Rate	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846
Revenue from Existing Development	$0	$0	$0	$7	$20	$35	$47	$57	$66	$73
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Prior Year Levy Rate	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846
Revenue from New Development	$0	$0	$7	$13	$15	$11	$8	$6	$4	$3
Total Hospital Regular Levy Revenue	*$0*	*$0*	*$7*	*$20*	*$34*	*$46*	*$55*	*$64*	*$70*	*$76*
Hospital District No. 2 EMS Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$23,047	$69,029	$121,265	$165,751	$200,991	$232,803	$257,614
Effective Levy Rate	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Revenue from Existing Development	$0	$0	$0	$6	$17	$30	$41	$50	$58	$64
New UGA Construction Assessed	$0	$0	$23,047	$45,766	$51,936	$40,015	$27,949	$22,641	$14,760	$10,787
Prior Year Levy Rate	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Revenue from New Development	$0	$0	$6	$11	$13	$10	$7	$6	$4	$3
Total Hospital District EMS Levy Revenue	*$0*	*$0*	*$6*	*$17*	*$30*	*$40*	*$48*	*$56*	*$62*	*$67*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
New Home Valuation										
Village	$156	$156	$156	$242	$419	$453	$313	$234	$277	$269
1/5 Acre	$1,803	$1,803	$1,803	$2,794	$4,844	$5,239	$3,616	$2,704	$3,200	$3,109
1/3 Acre	$3,258	$3,258	$3,258	$3,616	$4,985	$4,789	$3,551	$3,258	$3,258	$3,258
Condominiums	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Apartments	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$5,216	$5,216	$5,216	$6,652	$10,248	$10,481	$7,480	$6,196	$6,734	$6,636
New Commercial Valuation										
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facility 1/	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181
Site Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181
New UGA Valuation	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377	$8,915	$8,817
Existing Home Valuation										
Village	$7,134	$7,624	$8,142	$8,691	$9,333	$10,161	$11,087	$11,954	$12,791	$13,708
1/5 Acre	$80,943	$87,100	$93,004	$99,254	$106,785	$116,589	$127,579	$137,647	$147,376	$158,156
1/3 Acre	$88,379	$95,483	$103,001	$110,956	$119,301	$128,985	$139,350	$149,593	$160,141	$171,090
Condominiums	$63,766	$67,273	$70,973	$74,877	$78,995	$83,340	$87,924	$92,759	$97,861	$103,244
Apartments	$16,542	$17,452	$18,412	$19,425	$20,493	$21,620	$22,809	$24,064	$25,387	$26,783
	$256,764	$274,932	$293,533	$313,202	$334,907	$360,694	$388,748	$416,016	$443,556	$472,980
Existing Commercial Valuation										
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facility 1/	$22,693	$26,122	$29,740	$33,556	$37,583	$41,830	$46,312	$51,040	$56,028	$61,290
Site Development	$46,413	$48,966	$51,659	$54,500	$57,497	$60,660	$63,996	$67,516	$71,229	$75,147
	$69,106	$75,088	$81,398	$88,056	$95,080	$102,490	$110,308	$118,556	$127,257	$136,437
Existing UGA Valuation	*$325,870*	*$350,020*	*$374,931*	*$401,258*	*$429,988*	*$463,184*	*$499,056*	*$534,572*	*$570,813*	*$609,418*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State of Washington										
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
Effective Levy Rate	2.0719	1.9869	1.9055	1.8274	1.7524	1.6806	1.6117	1.5456	1.4822	1.4215
Revenue from Existing Development	$580	$601	$621	$640	$657	$674	$693	$716	$740	$760
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Prior Year Levy Rate	2.1605	2.0719	1.9869	1.9055	1.8274	1.7524	1.6806	1.6117	1.5456	1.4822
Revenue from New Development	$10	$8	$15	$14	$14	$15	$21	$20	$15	$12
Total Washington Levy Revenue	*$589*	*$610*	*$636*	*$654*	*$671*	*$690*	*$714*	*$736*	*$755*	*$772*
Kittitas County General Levy										
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
Effective Levy Rate	1.0971	1.0675	1.0386	1.0106	0.9833	0.9568	0.9309	0.9058	0.8813	0.8575
Revenue from Existing Development	$307	$323	$338	$354	$369	$384	$400	$420	$440	$458
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Prior Year Levy Rate	1.1275	1.0971	1.0675	1.0386	1.0106	0.9833	0.9568	0.9309	0.9058	0.8813
Revenue from New Development	$5	$4	$8	$8	$7	$9	$12	$12	$9	$7
Total County General Levy Revenue	*$312*	*$327*	*$346*	*$361*	*$376*	*$393*	*$412*	*$431*	*$449*	*$466*
Kittitas County Road Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Levy Rate	1.3212	1.2842	1.2483	1.2133	1.1793	1.1463	1.1142	1.0830	1.0527	1.0232
Revenue from Existing Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New UGA Construction Assessed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prior Year Levy Rate	1.3593	1.3212	1.2842	1.2483	1.2133	1.1793	1.1463	1.1142	1.0830	1.0527
Revenue from New Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total County Road Levy Revenue	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
City of Cle Elum										
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
Effective Levy Rate	2.1608	2.1392	2.1178	2.0966	2.0757	2.0549	2.0344	2.0140	1.9939	1.9739
Revenue from Existing Development	$605	$647	$690	$734	$778	$825	$875	$933	$995	$1,055
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Prior Year Levy Rate	2.1826	2.1608	2.1392	2.1178	2.0966	2.0757	2.0549	2.0344	2.0140	1.9939
Revenue from New Development	$10	$8	$16	$16	$16	$18	$26	$26	$19	$17
Total Cle Elum Levy Revenue	*$614*	*$656*	*$706*	*$750*	*$794*	*$843*	*$900*	*$959*	*$1,015*	*$1,072*
School District No. 404 Bond Levy										
Existing District Valuation (2000)	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Total New District Valuation	$955,950	$978,266	$1,004,938	$1,029,088	$1,053,999	$1,081,762	$1,114,087	$1,147,517	$1,180,388	$1,214,619
Effective Bond Levy Rate	0.8189	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003
Bond Levy Revenue	$783	$783	$804	$824	$844	$866	$892	$918	$945	$972
Total School Bond Levy Revenue	*$233*	*$245*	*$267*	*$286*	*$306*	*$328*	*$354*	*$381*	*$407*	*$435*
School District No. 404 M&O Levy										
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
Capacity Levy Rate	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720
Revenue Capacity from Existing Development	$356	$385	$415	$445	$477	$510	$547	$589	$635	$680
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Capacity Levy Rate	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720
Revenue Capacity from New Development	$6	$5	$9	$9	$9	$11	$16	$16	$12	$11
Total School M&O Levy Revenue Capacity	*$362*	*$390*	*$424*	*$455*	*$486*	*$522*	*$563*	*$605*	*$647*	*$691*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Fire District No. 7 Regular Levy										
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Levy Rate	0.5675	0.5550	0.5428	0.5308	0.5192	0.5077	0.4966	0.4856	0.4750	0.4645
Revenue from Existing Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New UGA Construction Assessed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prior Year Levy Rate	0.5802	0.5675	0.5550	0.5428	0.5308	0.5192	0.5077	0.4966	0.4856	0.4750
Revenue from New Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fire District Levy Revenue	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Hospital District No. 2 Regular Levy										
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
Effective Levy Rate	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846
Revenue from Existing Development	$80	$86	$93	$100	$107	$114	$122	$132	$142	$152
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Prior Year Levy Rate	0.1952	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846
Revenue from New Development	$1	$1	$2	$2	$2	$3	$4	$4	$3	$2
Total Hospital Regular Levy Revenue	*$81*	*$87*	*$95*	*$102*	*$109*	*$117*	*$126*	*$135*	*$145*	*$155*
Hospital District No. 2 EMS Levy										
Existing UGA Valuation on Tax Rolls	$279,831	$302,666	$325,870	$350,020	$374,931	$401,258	$429,988	$463,184	$499,056	$534,572
Effective Levy Rate	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Revenue from Existing Development	$70	$76	$81	$88	$94	$100	$107	$116	$125	$134
New UGA Construction Assessed	$4,448	$3,929	$7,397	$7,397	$7,397	$8,833	$12,429	$12,662	$9,661	$8,377
Prior Year Levy Rate	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Revenue from New Development	$1	$1	$2	$2	$2	$2	$3	$3	$2	$2
Total Hospital District EMS Levy Revenue	*$71*	*$77*	*$83*	*$89*	*$96*	*$103*	*$111*	*$119*	*$127*	*$136*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
New Home Valuation											
Village	$234	$234	$191	$156	$156	$156	$156	$113	$78	$78	$10,325
1/5 Acre	$2,704	$2,704	$2,208	$1,803	$1,803	$1,803	$1,085	$361	$112	$0	$113,326
1/3 Acre	$3,258	$3,258	$2,541	$1,955	$1,955	$1,955	$1,955	$1,596	$1,303	$1,303	$129,792
Condominiums	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,240
Apartments	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,040
	$6,196	$6,196	$4,940	$3,913	$3,913	$3,913	$3,196	$2,070	$1,493	$1,381	$310,723
New Commercial Valuation											
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facility 1/	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$61,389
Site Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,369
	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$2,181	$92,758
New UGA Valuation	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$3,674	$3,562	$403,481
Existing Home Valuation											
Village	$14,681	$15,675	$16,726	$17,805	$18,910	$20,076	$21,308	$22,610	$23,952	$25,335	$336,620
1/5 Acre	$169,459	$180,997	$193,191	$205,724	$218,552	$232,098	$246,401	$260,785	$275,320	$290,414	$3,816,775
1/3 Acre	$182,903	$195,401	$208,622	$222,103	$235,764	$250,199	$265,451	$281,877	$298,914	$316,651	$4,167,150
Condominiums	$108,922	$114,913	$121,233	$127,901	$134,935	$142,357	$150,186	$158,446	$167,161	$176,355	$2,542,080
Apartments	$28,256	$29,811	$31,450	$33,180	$35,005	$36,930	$38,961	$41,104	$43,365	$45,750	$676,838
	$504,221	$536,797	$571,221	$606,712	$643,165	$681,660	$722,308	$764,822	$808,713	$854,505	$11,539,462
Existing Commercial Valuation											
Hotels	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Campground	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amenities and General Facility 1/	$66,842	$72,699	$78,878	$85,397	$92,275	$99,531	$107,186	$115,262	$123,782	$132,771	$1,470,283
Site Development	$79,280	$83,640	$88,241	$93,094	$98,214	$103,616	$109,315	$115,327	$121,670	$128,362	$1,891,866
	$146,122	$156,339	$167,119	$178,491	$190,489	$203,147	$216,501	$230,589	$245,452	$261,133	$3,362,149
Existing UGA Valuation	*$650,343*	*$693,136*	*$738,340*	*$785,204*	*$833,654*	*$884,806*	*$938,809*	*$995,411*	*$1,054,165*	*$1,115,637*	*$14,901,612*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
State of Washington											
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
Effective Levy Rate	1.3632	1.3073	1.2537	1.2023	1.1530	1.1057	1.0604	1.0169	0.9752	0.9352	----
Revenue from Existing Development	$778	$797	$815	$833	$851	$868	$884	$900	$916	$931	$17,772
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Prior Year Levy Rate	1.4215	1.3632	1.3073	1.2537	1.2023	1.1530	1.1057	1.0604	1.0169	0.9752	----
Revenue from New Development	$6	$7	$11	$11	$9	$7	$7	$6	$5	$4	$856
Total Washington Levy Revenue	*$784*	*$803*	*$826*	*$844*	*$860*	*$875*	*$891*	*$906*	*$921*	*$935*	*$18,627*
Kittitas County General Levy											
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
Effective Levy Rate	0.8344	0.8119	0.7899	0.7686	0.7479	0.7277	0.7080	0.6889	0.6703	0.6522	----
Revenue from Existing Development	$476	$495	$514	$533	$552	$571	$590	$610	$629	$649	$10,687
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Prior Year Levy Rate	0.8575	0.8344	0.8119	0.7899	0.7686	0.7479	0.7277	0.7080	0.6889	0.6703	----
Revenue from New Development	$4	$4	$7	$7	$5	$5	$4	$4	$4	$3	$436
Total County General Levy Revenue	*$480*	*$499*	*$521*	*$539*	*$558*	*$576*	*$595*	*$614*	*$633*	*$652*	*$11,123*
Kittitas County Road Levy											
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Levy Rate	0.9946	0.9667	0.9397	0.9133	0.8878	0.8629	0.8388	0.8153	0.7924	0.7703	----
Revenue from Existing Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New UGA Construction Assessed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prior Year Levy Rate	1.0232	0.9946	0.9667	0.9397	0.9133	0.8878	0.8629	0.8388	0.8153	0.7924	----
Revenue from New Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total County Road Levy Revenue	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
City of Cle Elum											
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
Effective Levy Rate	1.9542	1.9347	1.9153	1.8962	1.8772	1.8584	1.8398	1.8214	1.8032	1.7852	----
Revenue from Existing Development	$1,115	$1,179	$1,246	$1,314	$1,386	$1,459	$1,534	$1,612	$1,693	$1,777	$24,835
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Prior Year Levy Rate	1.9739	1.9542	1.9347	1.9153	1.8962	1.8772	1.8584	1.8398	1.8214	1.8032	----
Revenue from New Development	$9	$9	$16	$16	$14	$11	$11	$11	$10	$8	$831
Total Cle Elum Levy Revenue	*$1,124*	*$1,188*	*$1,262*	*$1,330*	*$1,400*	*$1,471*	*$1,545*	*$1,623*	*$1,703*	*$1,785*	*$25,666*
School District No. 404 Bond Levy											
Existing District Valuation (2000)	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$671,671	$20,150,130
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Total New District Valuation	$1,246,932	$1,285,862	$1,330,391	$1,373,184	$1,417,132	$1,462,969	$1,511,419	$1,562,571	$1,615,856	$1,671,333	$33,262,375
Effective Bond Levy Rate	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	0.8003	----
Bond Levy Revenue	$998	$1,029	$1,065	$1,099	$1,134	$1,171	$1,210	$1,251	$1,293	$1,338	$28,006
Total School Bond Levy Revenue	*$460*	*$492*	*$527*	*$561*	*$597*	*$633*	*$672*	*$713*	*$756*	*$800*	*$10,622*
School District No. 404 M&O Levy											
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
Capacity Levy Rate	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	----
Revenue Capacity from Existing Development	$726	$775	$827	$882	$939	$999	$1,060	$1,125	$1,194	$1,266	$16,195
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Capacity Levy Rate	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	1.2720	----
Revenue Capacity from New Development	$6	$6	$11	$11	$9	$8	$8	$8	$7	$5	$484
Total School M&O Levy Revenue Capacity	*$732*	*$781*	*$838*	*$892*	*$948*	*$1,007*	*$1,068*	*$1,133*	*$1,201*	*$1,272*	*$16,679*

EXHIBIT 2.06

ESTIMATED PROPERTY TAX REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Fire District No. 7 Regular Levy											
Existing UGA Valuation on Tax Rolls	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Levy Rate	0.4543	0.4443	0.4345	0.4250	0.4156	0.4065	0.3975	0.3888	0.3802	0.3719	----
Revenue from Existing Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New UGA Construction Assessed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Prior Year Levy Rate	0.4645	0.4543	0.4443	0.4345	0.4250	0.4156	0.4065	0.3975	0.3888	0.3802	----
Revenue from New Development	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fire District Levy Revenue	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Hospital District No. 2 Regular Levy											
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
Effective Levy Rate	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	----
Revenue from Existing Development	$162	$173	$185	$197	$210	$223	$237	$252	$267	$283	$3,623
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Prior Year Levy Rate	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	0.2846	----
Revenue from New Development	$1	$1	$2	$2	$2	$2	$2	$2	$2	$1	$108
Total Hospital Regular Levy Revenue	*$164*	*$175*	*$187*	*$200*	*$212*	*$225*	*$239*	*$254*	*$269*	*$285*	*$3,731*
Hospital District No. 2 EMS Levy											
Existing UGA Valuation on Tax Rolls	$570,813	$609,418	$650,343	$693,136	$738,340	$785,204	$833,654	$884,806	$938,809	$995,411	$12,731,810
Effective Levy Rate	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	----
Revenue from Existing Development	$143	$152	$163	$173	$185	$196	$208	$221	$235	$249	$3,183
New UGA Construction Assessed	$4,448	$4,774	$8,377	$8,377	$7,121	$6,094	$6,094	$6,094	$5,376	$4,251	$380,436
Prior Year Levy Rate	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	----
Revenue from New Development	$1	$1	$2	$2	$2	$2	$2	$2	$1	$1	$95
Total Hospital District EMS Levy Revenue	*$144*	*$154*	*$165*	*$175*	*$186*	*$198*	*$210*	*$223*	*$236*	*$250*	*$3,278*

SOURCE: Johnson Gardner

EXHIBIT 2.07

ESTIMATED SHARED GOVERNMENT REVENUES FROM THE DEVELOPMENT OF CLE ELUM UGA ALTERNATIVE V (In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Washington State Fuel Tax Revenues (000s)										
Annual Fuel Expenditures by UGA Occupants	$129	$408	$683	$836	$961	$1,065	$1,098	$1,131	$1,154	$1,177
State Fuel Tax Revenue ($0.23/gallon)	$30	$94	$157	$192	$221	$245	$253	$260	$265	$271
Local Shared Revenue Distributions										
Full-Time Residents within Cle Elum UGA	243	768	1,284	1,572	1,808	2,003	2,065	2,128	2,171	2,215
Kittitas County Per Capita Distributions (000s)										
Motor Vehicle Fuel Tax ($50 per capita)	$0	$0	$12	$39	$65	$80	$92	$102	$105	$108
Liquor Sales Tax ($1 per capita)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transfer of Liquor Tax Revenue from Cle Elum (2%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Shared Revenues: Kittitas County	*$0*	*$0*	*$12*	*$39*	*$65*	*$80*	*$92*	*$102*	*$105*	*$108*
City of Cle Elum Per Capita Distributions (000s)										
Motor Vehicle Fuel Tax ($23 per capita)	$0	$0	$6	$18	$30	$37	$43	$47	$49	$50
Liquor Sales Tax ($9 per capita)	$0	$0	$2	$7	$12	$15	$17	$19	$19	$20
Less: 2% Distribution to Kittitas County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	$0	$2	$7	$12	$14	$16	$18	$19	$19
Total Shared Revenues: City of Cle Elum	*$0*	*$0*	*$8*	*$25*	*$42*	*$51*	*$59*	*$65*	*$67*	*$69*

SOURCE: Johnson Gardner

EXHIBIT 2.07

ESTIMATED SHARED GOVERNMENT REVENUES FROM THE DEVELOPMENT OF
CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Washington State Fuel Tax Revenues (000s)										
Annual Fuel Expenditures by UGA Occupants	$1,200	$1,223	$1,246	$1,282	$1,339	$1,381	$1,409	$1,437	$1,471	$1,499
State Fuel Tax Revenue ($0.23/gallon)	$276	$281	$287	$295	$308	$318	$324	$331	$338	$345
Local Shared Revenue Distributions										
Full-Time Residents within Cle Elum UGA	2,258	2,301	2,345	2,412	2,518	2,598	2,650	2,703	2,766	2,819
Kittitas County Per Capita Distributions (000s)										
Motor Vehicle Fuel Tax ($50 per capita)	$110	$112	$115	$117	$119	$123	$128	$132	$135	$137
Liquor Sales Tax ($1 per capita)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transfer of Liquor Tax Revenue from Cle Elum (2%)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Total Shared Revenues: Kittitas County	*$111*	*$113*	*$115*	*$117*	*$120*	*$123*	*$128*	*$132*	*$135*	*$138*
City of Cle Elum Per Capita Distributions (000s)										
Motor Vehicle Fuel Tax ($23 per capita)	$51	$52	$53	$54	$55	$57	$59	$61	$63	$64
Liquor Sales Tax ($9 per capita)	$20	$20	$21	$21	$22	$22	$23	$24	$25	$25
Less: 2% Distribution to Kittitas County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
	$20	$20	$20	$21	$21	$22	$23	$24	$24	$24
Total Shared Revenues: City of Cle Elum	*$71*	*$72*	*$74*	*$75*	*$77*	*$79*	*$82*	*$85*	*$87*	*$88*

SOURCE: Johnson Gardner

EXHIBIT 2.07

ESTIMATED SHARED GOVERNMENT REVENUES FROM THE DEVELOPMENT OF
CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Washington State Fuel Tax Revenues (000s)											
Annual Fuel Expenditures by UGA Occupants	$1,527	$1,555	$1,573	$1,591	$1,609	$1,627	$1,638	$1,645	$1,651	$1,656	$38,202
State Fuel Tax Revenue ($0.23/gallon)	$351	$358	$362	$366	$370	$374	$377	$378	$380	$381	$8,787
Local Shared Revenue Distributions											
Full-Time Residents within Cle Elum UGA	2,872	2,925	2,959	2,993	3,026	3,060	3,081	3,094	3,105	3,115	71,858
Kittitas County Per Capita Distributions (000s)											
Motor Vehicle Fuel Tax ($50 per capita)	$140	$143	$146	$149	$150	$152	$154	$155	$156	$157	$2,827
Liquor Sales Tax ($1 per capita)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transfer of Liquor Tax Revenue from Cle Elum (2%)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$12
	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$12
Total Shared Revenues: Kittitas County	*$141*	*$144*	*$146*	*$149*	*$151*	*$153*	*$154*	*$156*	*$157*	*$158*	$3,346
City of Cle Elum Per Capita Distributions (000s)											
Motor Vehicle Fuel Tax ($23 per capita)	$65	$66	$68	$69	$70	$71	$71	$72	$73	$73	$1,313
Liquor Sales Tax ($9 per capita)	$26	$26	$27	$27	$27	$28	$28	$28	$28	$29	$515
Less: 2% Distribution to Kittitas County	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$12
	$25	$26	$26	$27	$27	$27	$27	$28	$28	$28	$595
Total Shared Revenues: City of Cle Elum	*$90*	*$92*	*$94*	*$95*	*$97*	*$98*	*$99*	*$100*	*$101*	*$101*	$2,143

SOURCE: Johnson Gardner

EXHIBIT 2.08

ESTIMATED KITTCOM USER FEES AND TELEPHONE TAX REVENUE FROM
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operations Revenues (000s)										
Kittitas County Sheriff's Department ($15/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fire District No. 7 ($12/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hospital District No. 2 ($9/call)	$0.0	$0.1	$0.2	$0.3	$0.3	$0.4	$0.4	$0.4	$0.4	$0.4
Cle Elum Police Department ($9/call)	$4	$12	$21	$25	$29	$32	$33	$34	$35	$35
Cle Elum Fire Department ($9/call)	$0	$1	$1	$2	$2	$2	$2	$2	$2	$2
Total Subscriber Service Fees	$4	$13	$22	$27	$31	$35	$36	$37	$38	$38
Capital Equipment-Designated Revenues 1/										
Residential Units (2 lines/unit, $6 tax/year)	$1	$3	$5	$6	$7	$8	$9	$9	$9	$9
Hotel Complex Lines ($6 tax/year)	$0	$1	$1	$1	$1	$1	$1	$1	$1	$1
Administrative/General Facility Lines ($6 tax/year)	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Total Telephone Tax Revenue	$1	$3	$5	$7	$8	$9	$9	$10	$10	$10
Total KITTCOM Revenues (000s)	$5	$17	$28	$34	$39	$44	$45	$46	$47	$48

1/ Assumes no Primary Branch Exchange.
SOURCE: Johnson Gardner

EXHIBIT 2.08

ESTIMATED KITTCOM USER FEES AND TELEPHONE TAX REVENUE FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Operations Revenues (000s)										
Kittitas County Sheriff's Department ($15/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fire District No. 7 ($12/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hospital District No. 2 ($9/call)	$0.4	$0.4	$0.4	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5
Cle Elum Police Department ($9/call)	$36	$37	$38	$39	$40	$42	$42	$43	$44	$45
Cle Elum Fire Department ($9/call)	$2	$2	$3	$3	$3	$3	$3	$3	$3	$3
Total Subscriber Service Fees	$39	$40	$41	$42	$44	$45	$46	$47	$48	$49
Capital Equipment-Designated Revenues 1/										
Residential Units (2 lines/unit, $6 tax/year)	$10	$10	$10	$10	$11	$11	$11	$12	$12	$12
Hotel Complex Lines ($6 tax/year)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1
Administrative/General Facility Lines ($6 tax/year)	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Total Telephone Tax Revenue	$10	$10	$11	$11	$12	$12	$12	$12	$13	$13
Total KITTCOM Revenues (000s)	$49	$50	$51	$53	$55	$57	$58	$59	$61	$62

1/ Assumes no Primary Branch Exchange.
SOURCE: Johnson Gardner

EXHIBIT 2.08

ESTIMATED KITTCOM USER FEES AND TELEPHONE TAX REVENUE FROM THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Operations Revenues (000s)											
Kittitas County Sheriff's Department ($15/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fire District No. 7 ($12/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hospital District No. 2 ($9/call)	$0.5	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$14
Cle Elum Police Department ($9/call)	$46	$47	$47	$48	$49	$49	$49	$50	$50	$50	$1,152
Cle Elum Fire Department ($9/call)	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$77
Total Subscriber Service Fees	$50	$51	$51	$52	$52	$53	$53	$53	$54	$54	$1,242
Capital Equipment-Designated Revenues 1/											
Residential Units (2 lines/unit, $6 tax/year)	$13	$13	$13	$13	$13	$14	$14	$14	$14	$14	$308
Hotel Complex Lines ($6 tax/year)	$1	$1	$1	$1	$1	$1	$1	$1	$1	$1	$19
Administrative/General Facility Lines ($6 tax/year)	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$2
Total Telephone Tax Revenue	$13	$14	$14	$14	$14	$14	$14	$14	$14	$15	$329
Total KITTCOM Revenues (000s)	$63	$64	$65	$66	$66	$67	$68	$68	$68	$68	$1,571

1/ Assumes no Primary Branch Exchange.
SOURCE: Johnson Gardner

EXHIBIT 3.01

SUMMARY OF ESTIMATED COSTS FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
State of Washington (000s)										
Total Annual Service Costs	$241	$753	$1,255	$1,541	$1,775	$1,965	$2,028	$2,090	$2,133	$2,176
One-Time Service Costs	$2	$2	$2	$2	$2	$0	$0	$0	$0	$0
Recurring Service Costs	$239	$751	$1,253	$1,539	$1,773	$1,965	$2,028	$2,090	$2,133	$2,176
Kittitas County (000s)										
Total Annual Service Costs	$379	$577	$631	$541	$561	$633	$596	$614	$620	$635
One-Time Service Costs	$263	$308	$270	$139	$121	$110	$56	$56	$48	$48
Recurring Service Costs	$116	$269	$361	$402	$440	$523	$540	$557	$572	$588
City of Cle Elum (000s)										
Total Annual Service Costs	$368	$427	$596	$591	$702	$757	$744	$756	$763	$826
One-Time Service Costs	$66	$77	$68	$35	$30	$27	$14	$14	$12	$12
Recurring Service Costs	$302	$350	$529	$556	$671	$730	$730	$742	$751	$814
Cle Elum/Roslyn School District No. 404 (000s)										
Total Annual Service Costs	$41	$131	$220	$271	$312	$346	$357	$368	$375	$383
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$41	$131	$220	$271	$312	$346	$357	$368	$375	$383
Kittitas County Fire District No. 7 (000s)										
Total Annual Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Hospital District No. 2 (000s)										
Total Annual Service Costs	$64	$116	$119	$135	$148	$182	$161	$164	$166	$169
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$64	$116	$119	$135	$148	$182	$161	$164	$166	$169

SOURCE: Johnson Gardner

EXHIBIT 3.01

SUMMARY OF ESTIMATED COSTS FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
State of Washington (000s)										
Total Annual Service Costs	$2,219	$2,377	$2,420	$2,487	$2,592	$2,670	$2,723	$2,776	$2,838	$2,890
One-Time Service Costs	$0	$69	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$2,219	$2,308	$2,420	$2,487	$2,592	$2,670	$2,723	$2,776	$2,838	$2,890
Kittitas County (000s)										
Total Annual Service Costs	$650	$665	$681	$709	$749	$755	$759	$775	$796	$808
One-Time Service Costs	$48	$48	$48	$59	$77	$64	$52	$52	$56	$52
Recurring Service Costs	$603	$618	$633	$650	$672	$691	$707	$723	$740	$756
City of Cle Elum (000s)										
Total Annual Service Costs	$830	$838	$847	$886	$910	$920	$927	$992	$994	$1,003
One-Time Service Costs	$12	$12	$12	$15	$19	$16	$13	$13	$14	$13
Recurring Service Costs	$818	$826	$835	$871	$891	$904	$914	$979	$980	$990
Cle Elum/Roslyn School District No. 404 (000s)										
Total Annual Service Costs	$390	$398	$406	$417	$436	$450	$459	$468	$479	$489
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$390	$398	$406	$417	$436	$450	$459	$468	$479	$489
Kittitas County Fire District No. 7 (000s)										
Total Annual Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Hospital District No. 2 (000s)										
Total Annual Service Costs	$171	$174	$176	$180	$186	$190	$193	$196	$199	$202
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$171	$174	$176	$180	$186	$190	$193	$196	$199	$202

SOURCE: Johnson Gardner

EXHIBIT 3.01

SUMMARY OF ESTIMATED COSTS FOR JURISDICTIONS AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
State of Washington (000s)											
Total Annual Service Costs	$2,943	$2,995	$3,029	$3,062	$3,095	$3,129	$3,150	$3,163	$3,173	$3,184	$72,868
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$79
Recurring Service Costs	$2,943	$2,995	$3,029	$3,062	$3,095	$3,129	$3,150	$3,163	$3,173	$3,184	$72,789
Kittitas County (000s)											
Total Annual Service Costs	$824	$840	$845	$859	$873	$887	$894	$902	$913	$924	$21,897
One-Time Service Costs	$52	$52	$43	$43	$43	$43	$37	$33	$32	$32	$2,383
Recurring Service Costs	$772	$788	$802	$816	$831	$845	$857	$869	$881	$892	$19,515
City of Cle Elum (000s)											
Total Annual Service Costs	$1,011	$1,021	$1,031	$1,035	$1,046	$1,053	$1,059	$1,063	$1,070	$1,075	$26,139
One-Time Service Costs	$13	$13	$11	$11	$11	$11	$9	$8	$8	$8	$596
Recurring Service Costs	$998	$1,008	$1,020	$1,025	$1,035	$1,042	$1,049	$1,055	$1,062	$1,067	$25,544
Cle Elum/Roslyn School District No. 404 (000s)											
Total Annual Service Costs	$498	$507	$513	$519	$525	$531	$534	$537	$539	$540	$12,439
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$498	$507	$513	$519	$525	$531	$534	$537	$539	$540	$12,439
Kittitas County Fire District No. 7 (000s)											
Total Annual Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Kittitas County Hospital District No. 2 (000s)											
Total Annual Service Costs	$205	$208	$210	$212	$213	$215	$216	$217	$218	$218	$5,422
One-Time Service Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Service Costs	$205	$208	$210	$212	$213	$215	$216	$217	$218	$218	$5,422

SOURCE: Johnson Gardner

EXHIBIT 3.02

SUMMARY OF ESTIMATED COSTS FOR THE STATE OF WASHINGTON AFFECTED BY THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Department Costs for the State of Washington (000s)										
Department of Natural Resources	$2	$2	$2	$2	$2	$0	$0	$0	$0	$0
Department of Transportation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Washington State Patrol	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Department of Health	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Department of Ecology ($58,500/FTE)	$6	$6	$6	$6	$6	$6	$6	$6	$6	$6
Department of Fish and Wildlife	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Parks and Recreation Commission	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Departmental Costs	$8	$8	$8	$8	$8	$6	$6	$6	$6	$6
Distributions to School District 404	$233	$745	$1,247	$1,533	$1,767	$1,959	$2,022	$2,084	$2,127	$2,170
Total Annual State Costs	*$241*	*$753*	*$1,255*	*$1,541*	*$1,775*	*$1,965*	*$2,028*	*$2,090*	*$2,133*	*$2,176*
One-Time Costs for State of Washington	$2	$2	$2	$2	$2	$0	$0	$0	$0	$0
Recurring Costs for State of Washington	$239	$751	$1,253	$1,539	$1,773	$1,965	$2,028	$2,090	$2,133	$2,176

SOURCE: Johnson Gardner

EXHIBIT 3.02

SUMMARY OF ESTIMATED COSTS FOR THE STATE OF WASHINGTON AFFECTED BY
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Department Costs for the State of Washington (000s)										
Department of Natural Resources	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Department of Transportation	$0	$32	$32	$32	$32	$32	$32	$32	$32	$32
Washington State Patrol	$0	$83	$83	$83	$83	$83	$83	$83	$83	$83
Department of Health	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Department of Ecology ($58,500/FTE)	$6	$6	$6	$6	$6	$6	$6	$6	$6	$6
Department of Fish and Wildlife	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Parks and Recreation Commission	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Departmental Costs	$6	$121	$121	$121	$121	$121	$121	$121	$121	$121
Distributions to School District 404	$2,213	$2,255	$2,298	$2,365	$2,470	$2,549	$2,602	$2,654	$2,716	$2,769
Total Annual State Costs	*$2,219*	*$2,377*	*$2,420*	*$2,487*	*$2,592*	*$2,670*	*$2,723*	*$2,776*	*$2,838*	*$2,890*
One-Time Costs for State of Washington	$0	$69	$0	$0	$0	$0	$0	$0	$0	$0
Recurring Costs for State of Washington	$2,219	$2,308	$2,420	$2,487	$2,592	$2,670	$2,723	$2,776	$2,838	$2,890

SOURCE: Johnson Gardner

EXHIBIT 3.02

SUMMARY OF ESTIMATED COSTS FOR THE STATE OF WASHINGTON AFFECTED BY
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	All Years
Department Costs for the State of Washington (000s)											
Department of Natural Resources	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10
Department of Transportation	$32	$32	$32	$32	$32	$32	$32	$32	$32	$32	$608
Washington State Patrol	$83	$83	$83	$83	$83	$83	$83	$83	$83	$83	$1,583
Department of Health	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Department of Ecology ($58,500/FTE)	$6	$6	$6	$6	$6	$6	$6	$6	$6	$6	$180
Department of Fish and Wildlife	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Parks and Recreation Commission	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Departmental Costs	$121	$121	$121	$121	$121	$121	$121	$121	$121	$121	$2,381
Distributions to School District 404	$2,821	$2,874	$2,907	$2,941	$2,974	$3,008	$3,029	$3,041	$3,052	$3,062	$70,487
Total Annual State Costs	*$2,943*	*$2,995*	*$3,029*	*$3,062*	*$3,095*	*$3,129*	*$3,150*	*$3,163*	*$3,173*	*$3,184*	$72,868
One-Time Costs for State of Washington	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$79
Recurring Costs for State of Washington	$2,943	$2,995	$3,029	$3,062	$3,095	$3,129	$3,150	$3,163	$3,173	$3,184	$72,789

SOURCE: Johnson Gardner

EXHIBIT 3.03

KITTITAS COUNTY FISCAL COSTS FROM
THE DEVELOPMENT OF THE CLE ELUM UGA
ALTERNATIVE V
(In Constant 2000 Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Development Review & Inspection Costs (000s)										
Total Review, Inspection, and Permit Fees 1/ 2/	$263	$308	$270	$139	$121	$110	$56	$56	$48	$48
Law Enforcement Fiscal Cost of Project (000s)										
Personnel Expenditures (Deputies, Law Enforcement Clerks)	$1	$39	$41	$42	$42	$80	$80	$80	$81	$81
O&M Expenditures ($6,646/Deputy)	$0	$7	$7	$7	$7	$14	$14	$14	$14	$14
Capital Expenditures (Car, Equipment, Firearms, Workspace)	$13	$14	$14	$14	$14	$15	$15	$15	$15	$15
KITTCOM Fees ($15/call)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fiscal Cost of Law Enforcement	$13	$60	$62	$63	$63	$109	$109	$109	$110	$110
Fiscal Cost of General Government Services (000s)										
Non-Residential, Non-Police Fiscal Cost of Project	$74	$124	$158	$169	$182	$199	$209	$220	$230	$241
Residential, Non-Police Fiscal Cost of Project	$28	$85	$141	$171	$195	$215	$222	$228	$233	$237
Total Proportional, Non-Police Fiscal Cost of Project	$102	$209	$299	$340	$377	$414	$431	$448	$463	$478
Total County Fiscal Cost of Project (000s)	$379	$577	$631	$541	$561	$633	$596	$614	$620	$635
Kittitas County One-Time Service Costs (000s)	$263	$308	$270	$139	$121	$110	$56	$56	$48	$48
Kittitas County Recurring Service Costs (000s)	$116	$269	$361	$402	$440	$523	$540	$557	$572	$588

1/ See Section IV in the text for detailed description of individual permits and fees.
2/ Detailed annual estimates of review, inspection, and permit fees are found in EXHIBIT 2.02.
SOURCE: Johnson Gardner

Appendix E

Site Engineering Technical Report



Site Engineering Technical Report

Trendwest Properties:
Cle Elum UGA
Cle Elum, Washington

For

Trendwest Properties, Inc.
Redmond, Washington

March 2002



By

W&H Pacific, Inc.
3350 Monte Villa Parkway
Bothell, Washington 98021

Site Engineering Technical Report

Trendwest Properties:
Cle Elum UGA
Cle Elum, Washington

For

Trendwest Properties, Inc.
Redmond, Washington

March 2002



EXPIRES: DEC. 7, 2003

By

W&H Pacific, Inc.
3350 Monte Villa Parkway
Bothell, Washington 98021

Table of Contents

Section	Contents	Page
	Introduction	i – 1
1	Site Information	1-1
	Clearing, Grading and Impervious Area Information	1-1
	Project Clearing	1-1
	Site Grading	1-1
	Imported Materials Alternative	1-2
	Artificial Water Bodies – Alternative 5	1-3
2	Hydrologic Modeling	2-1
	Hydrologic Model	2-1
	Preliminary Existing Condition Models	2-2
	Land Segments	2-2
	Existing Condition Modeling Results	2-14
	Developed Condition Modeling	2-15
	Modeling Concept	2-15
	Models	2-16
	Routing	2-16
	Mitigated Developed Condition Model Results	2-22
3	Preliminary Water Plans	3-1
	System Capacity Requirements	3-1
	Treated (Domestic) Water Requirements	3-1
	Untreated Water Requirements	3-8
	Water Use Standards	3-9
	Source of Water Supply	3-10
	Proposed Joint Participation Project	3-10
	Water Intakes	3-10
	Water Treatment Alternatives	3-13
	Preliminary Water Distribution System Plan	3-13
	Pressure Zones	3-23
	Treated Water Storage	3-23
	Transmission/Distribution Lines	3-24
	Pumping Systems	3-24
	Water System Modeling	3-24
	Water Use Standards	3-25
	Indoor Water Use Standards	3-25
	Outdoor Water Use Standards	3-26
	Recommendations to Achieve Irrigation Efficiency	3-27

Contents (Cont.)

		Page
4	Preliminary Sewer Plans	4-1
	Wastewater Flow Projections	4-1
	Collection and Conveyance System	4-13
	Wastewater Treatment and Disposal	4-14
	Flows and Loadings	4-14
	Wastewater Treatment and Disposal Alternatives	4-16
	On-Site Wastewater Systems	4-18
5	Solid Wastes	5-1
	Solid Waste Sources and Classifications	5-1
	Sources of Solid Wastes	5-1
	Classifications of Solid Wastes	5-1
	Waste Stream Quantities and Management	5-3
	CDL Wastes	5-3
	Municipal and Other Wastes	5-5
	Septage Wastes	5-8
	Land Clearing Wastes	5-8
	Waste Loading Impacts	5-8

Cited References

Table

1-1	Estimated Cleared and Impervious Areas, Acres	1-1
1-2	Estimated Earthwork Quantities, Cubic Yards	1-2
2-1	Soil-Cover-Slope Complexes	2-5
2-2	Existing Subbasin Soil Types	2-13
2-3	Pre-Developed Condition Subbasin Land-Use/Land Cover	2-14
2-4	Pre-Developed Condition Annual Flow Volumes for UGA Basins at the Drainage Boundary	2-15
2-5	Pre-Developed Condition Peak Flow Analysis	2-15
2-6	Developed Condition Subbasin Land-use/Land Cover, Alternative 2	2-21
2-7	Mitigated Developed Condition Annual Flow Volumes for UGA Basins, Alternative 2	2-23
2-8	Impervious Area Summaries	2-24
2-9	Estimated Annual Runoff, Alternatives 2, 3, 4, and 5	2-25
3-1	Single Family Residences	3-1
3-2	Condominium Units	3-1

H-01

Contents (Cont.)

Table		Page
3-3	Apartment Units	3-2
3-4	Golf Course Clubhouse Users	3-3
3-5	Average Daily Treated Water Demand at Buildout Trendwest Demands, mgd	3-4
3-6	Average Daily Treated Water Demands at Buildout for Non-Trendwest Demands, mgd	3-4
3-7	Peaking Factors	3-4
3-8	Maximum Month Treated Water Demands, Trendwest Demands	3-5
3-9	Maximum Month Treated Water Demands, Non-Trendwest Demands	3-5
3-10	Monthly Net Site Lake Evaporation	3-9
3-11	Trendwest Untreated Water Demands, acre-feet/month	3-9
3-12	Non-Trendwest Untreated Water Demands, acre-feet/month	3-9
3-13	Treated Water Storage Requirements, Gallons	3-23
3-14	Allowable Irrigated Areas	3-26
3-15	Turf Irrigation Requirements	3-26
3-16	Maximum Allowable Irrigation Volumes	3-26
4-1	Wastewater Generation as a Fraction of Water Demand	4-1
4-2	Infiltration/Inflow as a Fraction of Inside Wastewater Production	4-1
4-3	Wastewater Generation – Single Family	4-2
4-4	Wastewater Generation – Condominium and Apartment Units	4-2
4-5	Monthly Wastewater Flow at Buildout, mgd	4-3
4-6	Preliminary Lift Station Design Parameters	4-13
4-7	Projected Wastewater Flows for Alternative 2, mgd	4-14
4-8	Projected Wastewater Flows for Alternative 3, mgd	4-14
4-9	Projected Wastewater Flows for Alternative 4, mgd	4-15
4-10	Projected Wastewater Flows for Alternative 5, mgd	4-15
4-11	Projected UGA Loadings for Alternatives 2, 3, 4 and 5, lb. per day	4-15
4-12	Regional Wastewater Flows at Year 30	4-16
4-13	Summary of Pollutant Loads at Year 30	4-16
5-1	Estimated Residential Building Areas, Cle Elum UGA	5-3
5-2	Estimated Non-Residential Building Areas, Cle Elum UGA	5-4
5-3	Projected CDL Generation Rates (Tons/Year) and Total Quantity at Full Buildout, Cle Elum UGA	5-4
5-4	Solid Waste Production (Tons/Year), Cle Elum UGA	5-6

H-01

Contents (Cont.)

Page

Figure

2-1	Existing Subbasins	2-3
2-2	Soil Types	2-7
2-3	Existing Vegetative Cover	2-9
2-4	Slope Map	2-11
2-5	Developed Condition Basin Boundaries	2-17
2-6	Permeable and Impermeable Area Model Schematic	2-19
3-1	Raw Water Intake and Treatment Plant Location	3-11
3-2	Preliminary Water Plan – Alternative 2	3-15
3-3	Preliminary Water Plan – Alternative 3	3-17
3-4	Preliminary Water Plan – Alternative 4	3-19
3-5	Preliminary Water Plan – Alternative 5	3-21
4-1	Preliminary Sewer Plan – Alternative 2	4-5
4-2	Preliminary Sewer Plan – Alternative 3	4-7
4-3	Preliminary Sewer Plan – Alternative 4	4-9
4-4	Preliminary Sewer Plan – Alternative 5	4-11

H-01

Introduction

This document presents information on the preliminary engineering and planning analyses performed for the Cle Elum UGA development alternatives by W&H Pacific, Inc., at the request of Trendwest Properties, Inc.

Alternatives 2, 3, and 4 were evaluated in the Draft EIS published in March 2000. Following publication of the Draft EIS and in response to public comment, a Master Site Plan Application was submitted to the City of Cle Elum in August 2001. The Master Site Plan is evaluated in the Final EIS as Alternative 5. A detailed description of Alternative 5 is included in Chapter 2 of the Final EIS, Description of Alternatives. Information on Alternatives 2, 3, 4, and 5 is presented in the Site Engineering Technical Report to facilitate a comparative impact analysis. The information includes the following:

Grading Analysis (Alternatives 2, 3, 4 and 5)
Hydrologic Modeling (Alternatives 2, 3, 4 and 5)

- Existing conditions runoff modeling
- Developed Conditions runoff modeling

Preliminary Water Plans (Alternatives 2, 3, 4 and 5)

- Water demand estimate
- Preliminary water system plan

Preliminary Sewer Plans (Alternatives 2, 3, 4 and 5)

- Wastewater flow estimate
- Preliminary sewer system plan

Clearing, Grading and Impervious Area Information

The following provides estimates of areas to be cleared during construction of the project, impervious areas, and volumes of cut and fill from project grading.

Project Clearing

In order to maintain the natural setting of the project, the extent of clearing associated with project construction would be kept to reasonable minimums through project design. Estimated areas to be cleared are presented in **Table 1-1** by type of land use category. Cleared areas for roads were assumed to be the full road right-of-way over the length of the roads. The road right-of-way was assumed to be 60 feet. Cleared areas for other land uses were taken as the assumed maximum developed area for each land use.

Impervious areas by land use category are also presented in **Table 1-1**. A width of 30 feet was used in the impervious area calculations for the roads.

Table 1-1: Estimated Cleared and Impervious Areas, Acres[a]

Land Use	UGA Alt 2		UGA Alt 3		UGA Alt 4		UGA Alt 5[b]	
	Area Cleared	Impervious Area	Area Cleared	Impervious Area	Area Cleared	Impervious Area	Area Cleared	Impervious Area
Residential	75	53	111	75	65	45	161	104
Lodging	6	5	6	5	6	5	0	0
Golf Courses	154	12	154	12	154	12	0	0
Roads	65	32	87	43	70	35	122	61
Public Facilities	5	3	5	3	5	3	23	4
Community Recreation Center	4	2	4	2	4	2	10	6
School Expansion	14	12	14	12	14	12	17	8
Cemetery Expansion	5	1	5	1	2	0	8	1
Business Park	78	60	56	44	28	22	62	63
Horse Park/RV Park	145	100	12	10	145	100	0	0
Total	550	279	453	205	492	235	403	247

[a] Note: Numbers may not sum to totals shown due to rounding
[b] Excludes Reserve Area.

Site Grading

The general considerations for grading throughout the site include the following:

- Clearing limits would be minimized as discussed previously.
- Grading will be performed to provide positive drainage.
- Grading designs would seek reasonable balances of cut and fill by development area phases.
- No excavated materials are expected to be transported off-site.

- Except as discussed in the following sections, no general borrow materials are expected to be imported from off-site sources.
- Excavated topsoil would be stockpiled and reused in golf course (Alternatives 2, 3, and 4) and landscaped areas.
- Erosion and sedimentation control measures would be implemented.

Estimated earthwork quantities are presented in **Table 1-2**. Roadway quantities to subgrade have been determined from a preliminary roadway vertical design based on the horizontal alignments presented in the proposed traffic circulation plan for each of the UGA alternatives. Quantities of cut and fill for other land uses were estimated on the basis of unit area volume procedures for each land use type. The unit area volumes were applied to the assumed maximum development areas estimated for each land use category.

Table 1-2: Estimated Earthwork Quantities, Cubic Yards

	UGA Alt 2		UGA Alt 3		UGA Alt 4		UGA Alt 5[b]	
Land Use	**Cut**	**Fill**	**Cut**	**Fill**	**Cut**	**Fill**	**Cut**	**Fill**
Residential	110,000	67,000	142,000	88,000	88,000	54,000	116,000	75,000
Lodging	22,000	18,000	22,000	18,000	22,000	18,000	0	0
Golf Courses	310,000	372,000	310,000	372,000	310,000	372,000	0	0
Roads	74,000	14,000	113,000	149,000	80,000	17,000	79,000	16,000
Public/Other Facilitiesa	4,000	3,000	4,000	3,000	4,000	3,000	82,000	15,000
Community Recreation Center	6,000	6,000	6,000	6,000	6,000	6,000	19,000	19,000
School Expansion	23,000	23,000	23,000	23,000	23,000	23,000	37,000	37,000
Cemetery Expansion	4,000	9,000	4,000	9,000	1,000	3,000	8,000	16,000
Business Park	313,000	250,000	226,000	181,000	113,000	90,000	303,000	242,000
Horse Park/RV Park	234,000	234,000	19,000	19,000	234,000	234,000	0	0
Total	1,100,000	996,000	869,000	868,000	881,000	820,000	584,000	420,000

[a] Includes maintenance area and water treatment plant.
[b] Excludes Reserve Area

Imported Materials Alternative

In the event on-site materials are not processed for construction, imported materials will be required. These materials would include: gravel base course and crushed rock base course materials for roadway, parking and paved trails; asphalt concrete; and bedding materials for pipelines. The estimated total volume of these materials is 204,000 cubic yards. This estimate is likely conservative, particularly for the Preferred Alternative (Alternative 5), as suitable materials from excavation for the artificial water bodies should provide a part of the project aggregate needs. It is assumed that material for private construction (residence driveways, etc.) would be imported whether or not on site materials were used for the public facilities.

Delivery of imported materials would follow the proposed construction schedule for the infrastructure located within the UGA, which is estimated to be 5 years. Assuming a six-month construction season for site work (May – October), approximately 6,800 cubic yards per month

would be delivered to the site. Assuming 12 cubic yard capacity trucks are used, the material importing activities would generate about 570 truck trips per month.

Some stockpiling of materials on site would be expected such as bedding materials for pipeline construction. Stockpiling would tend to increase daily truck trip volumes over the average daily truck trip volume for the construction season. However, the truck trip volume for the season would not be expected to change.

Artificial Water Bodies – Alternative 5

The conceptual site plan for Alternative 5 includes a number of artificial water bodies (small lakes or ponds) to provide landscape and recreational amenities for the community. A total surface area of 15 acres is proposed for 8 to 10 ponds and lakes. The largest lake would be about 10 acres in size, and located as a part the neighborhood clubhouse complex. The remaining lakes and ponds would average around one-half acre in size.

For the large lake, uses would include swimming, non-motorized boating and canoeing, fishing, and waterfowl viewing. A pedestrian trail system would border the lake's perimeter to allow for recreational walking and nature viewing, and perhaps locations for picnicking. The lake would be 10 to 15 feet in depth and lined to prevent leakage into the groundwater system. To protect the water quality of the lake, stormwater would not be discharged to the lake. Grading adjacent to the lake would be designed to direct shoreline runoff away from the lake.

The water in the large lake would be exchanged at least twice per year to assist in maintaining water quality and minimizing undesirable aquatic vegetation growth. The source of exchange water would be untreated water diverted from the Yakima River for irrigation of the MountainStar MPR golf courses. A portion of the water being delivered to the MPR golf courses would be diverted to the lake. The points of delivery to, and discharge from, the lake would be selected to promote the exchange effectiveness and circulation within the lake. The exchange water would be lower in temperature than the lake water. This will be beneficial to coolwater fish in the lake. The exchange water discharge from the lake would be pumped to the MPR golf course irrigation ponds. The delivery and discharge points as well as the monthly discharge rates to the lake would be determined during project design. Aeration of the lake at one or more locations may be provided to maintain desired dissolved oxygen levels.

For the smaller lakes, perimeter trail walking and nature viewing would be the principal use objectives. Some of the small lakes could have wetland components to attract waterfowl and other bird life. These lakes would also be lined. Water exchange in these smaller lakes is desirable, and could be accomplished by the method described for the large lake where the MPR untreated water transmission main was in close proximity to the lakes. Alternatively, treated water to be used for UGA common area irrigation could be routed through the smaller lakes and

the pumped to points of irrigation. Roof runoff or other stormwater (after treatment) might be discharged to the smaller lakes to assist in lake water exchange.

All lakes would have controls to maintain water surfaces at their functional design levels. Water needed to make up for evaporative losses from the lakes has been included in the water demands for Alternative 5.

A lake management and maintenance program would be necessary for all lakes. The applicable community or property owner association would operate the program for individual lakes. The program(s) would be modeled after existing volunteer lake management and monitoring programs, such as presented in the EPA's *Volunteer Lake Monitoring: A Methods Manual*. Monitoring elements suitable for volunteers include, for example, algae, aquatic plants and dissolved oxygen. For the large lake, coliform bacteria monitoring will be required to assure safe water quality conditions for swimming.

H-01

Hydrologic modeling was performed for the UGA (Alternative 2) to: (1) gain an understanding of the existing or pre-development hydrology of the site; and (2) estimate the hydrologic impacts of the proposed development for use in developing proposed mitigations. Alternative 2 represents the highest impact alternative. The results of the hydrologic modeling performed to simulate existing and developed condition flows for the project are presented below, and analyzed comparatively for Alternatives 3, 4, and 5. The simulation model is described first, followed by a summary of the data inputs to the model. The results of existing and developed conditions flow analyses are then presented for each of the UGA subbasins.

Hydrologic Model

The hydrologic simulation model used for the UGA is the same model used by W&H Pacific for the neighboring MountainStar Master Planned Resort project. The model is the Hydrologic Simulation Program – Fortran (HSPF) Release 11, (United States Environmental Protection Agency, 1996). The model continuously simulates the rainfall-runoff response of a watershed by simulating the physical process response to changing climatic conditions. HSPF is a standard hydrologic computational tool. The Washington State Department of Ecology (Ecology) notes that HSPF is relatively complex to use, and is best suited for basin plans and master drainage plans. Ecology requires the use of a continuous simulation model for basin plans. Due to the large size of the MountainStar watershed (19.5 square miles) and environmental review considerations, the HSPF model was selected for that project.

Input to the model includes land segment information such as soil parameters, elevation and vegetation parameters, as well as several continuous climatological time series for the time period being simulated. The climatological parameters required by HSPF for runoff and snow simulation are:

- Precipitation
- Evaporation
- Air temperature
- Dewpoint temperature
- Solar radiation
- Wind movement

Runoff is modeled as the combined effect of surface flow, shallow subsurface flow (interflow) and groundwater flow response to climatological conditions. The distribution of flow between runoff mechanisms is determined by land segment characteristics such as soil moisture content, infiltration rate, and interception storage. The model generates flow from pervious and impervious land segments, and routes it through the drainage network. The drainage network can include pipes, streams, vaults, detention ponds, lakes and wetlands.

Snow accumulation and melt are simulated based on energy balance equations. Snow pack conditions, including ice content, density, albedo (reflectivity of the snow) and temperature, change over time according to climate conditions. Snowmelt water is added to precipitation inputs to the land segment and is routed through the land segment runoff mechanisms before entering the drainage network.

Output from the model can include, for example: groundwater, interflow and surface flows, snow pack and snow water equivalent, and wetland or detention pond storage.

The land segments used in the model are organized into soil-cover-slope complexes. The coding used in the complexes for the site is summarized below.

Soil Type	Cover	Slope
B = Bedrock T = Till O = Outwash S = Saturated	F = Forest G = Grassed O = Open	F = Flat (0 – 6%) G = Gradual (Moderate) (6 – 15 %) S = Steep (>15%)

Preliminary Existing Condition Models

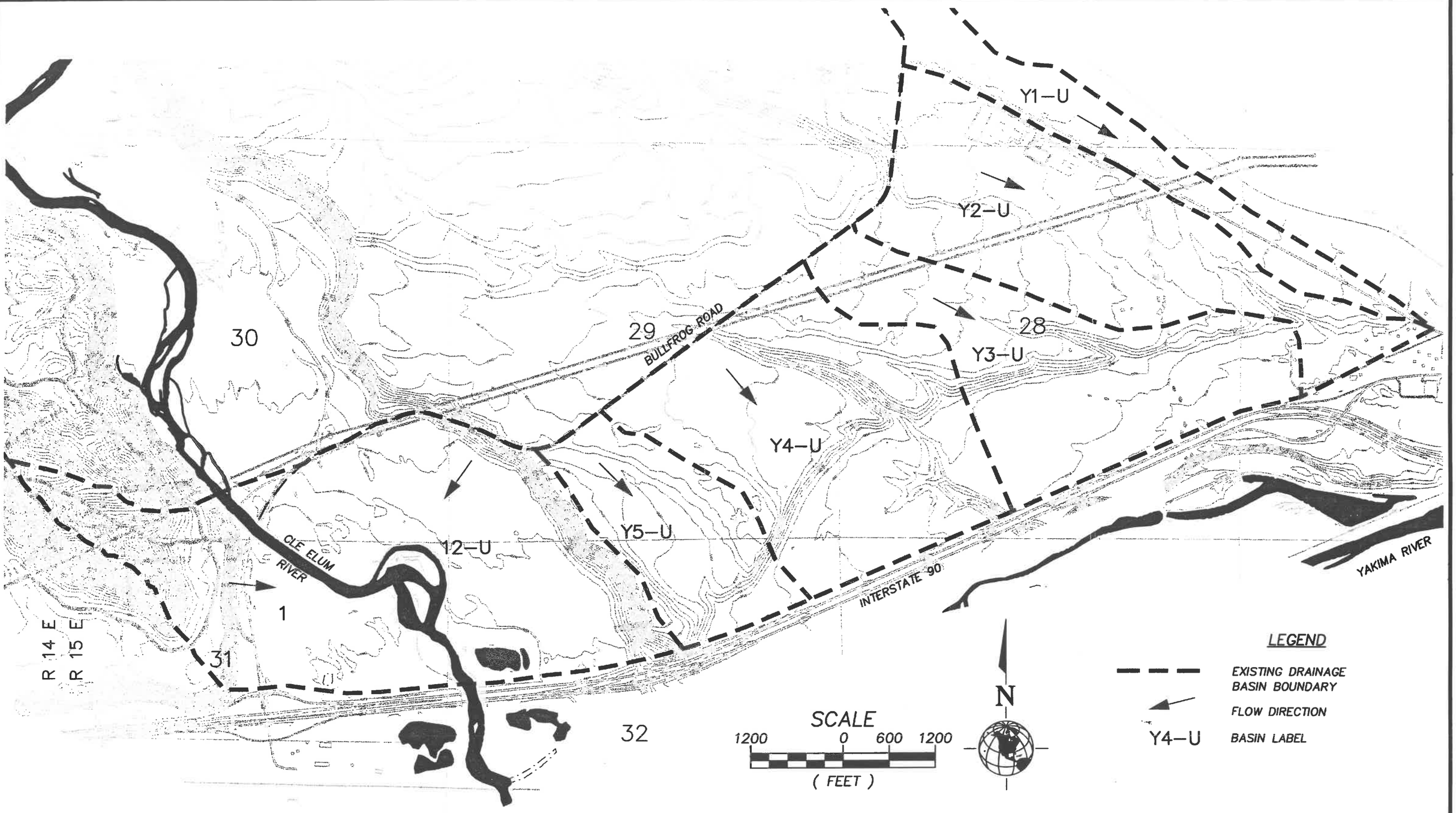
Preliminary existing conditions HSPF logic models have been developed for each of the UGA subbasins. Bullfrog road is the northerly limit of the subbasin. The basins are being modeled as basins without streams because of their lack of active stream systems. These include Subbasin 12-U and Subbasins Y1-U through Y5-U. Subbasins boundaries for each of the models are shown in **Figure 2-1**.

Land Segments

The drainage basins were broken into homogeneous land segments according to soil type, vegetative cover, and average slope conditions. The categories chosen for land segment classification are based on classifications by Dinicola[a]. The categories and the resulting shorthand nomenclature are contained in **Table 2-1**. The nomenclature is based on the first letter of the soil type, vegetative cover, and slope in order.

[a] Dinicola, R.S. *Characterization and Simulation of Rainfall-Runoff Relations for Headwater Basins in Western King and Snohomish Counties, Washington.* U.S. Geological Survey. 1990.

H-01



W&H PACIFIC

Cle Elum Urban Growth Area

Figure 2-1
Existing Subbasins

I: \PROJECTS\TRENDWEST PROPERTIES\516758\AUTOCAD\LUGAES01.DWG KJG 1/20/00

01

Table 2-1: Soil-Cover-Slope Complexes

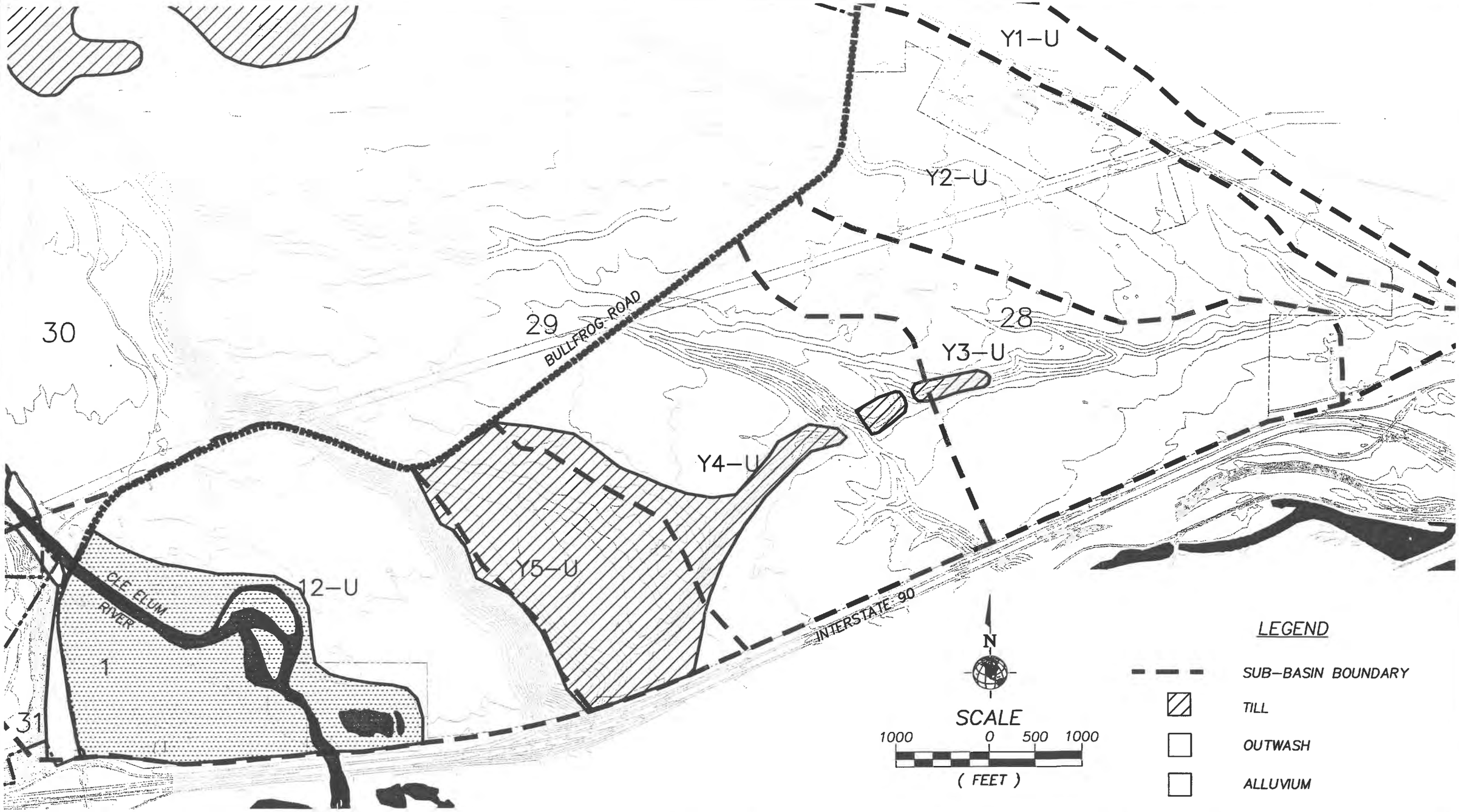
Nomenclature	Soil Type	Vegetative Cover	Slope
OFF	Outwash	Forest	Flat
OFG	Outwash	Forest	Gradual
OFS	Outwash	Forest	Steep
OOF	Outwash	Successional[a]	Flat
OOG	Outwash	Successional[a]	Gradual
OOS	Outwash	Successional[a]	Steep
BFF	Bedrock	Forest	Flat
BFG	Bedrock	Forest	Gradual
BFS	Bedrock	Forest	Steep
BOG	Bedrock	Successional[a]	Gradual
BOS	Bedrock	Successional[a]	Steep
SFF	Saturated	Forest	Flat
SFG	Saturated	Forest	Gradual
SFS	Saturated	Forest	Steep
SOF	Saturated	Successional[a]	Flat
SOG	Saturated	Successional[a]	Gradual
SOS	Saturated	Successional[a]	Steep
TFF	Till	Forest	Flat
TFG	Till	Forest	Gradual
TFS	Till	Forest	Steep
TOF	Till	Successional[a]	Flat
TOG	Till	Successional[a]	Gradual
TOS	Till	Successional[a]	Steep

[a] Early Forest Successional.

Soil Type. CDM (formerly AGI Technologies) characterized soil types throughout the UGA site. These soil types were aggregated by American Engineering Corporation into four general soil types for the hydrologic model. The four model soil types are bedrock, till, outwash and saturated. **Table 2-2** summarizes the soil types present in each of the subbasins. The soil types for the UGA watershed are shown in **Figure 2-2**.

Cover. Vegetative cover information obtained from aerial photos was field verified and analyzed by Raedeke Associates, Inc. The cover classes identified by Raedeke were reduced to two general cover classes for the hydrologic model. W&H Pacific, Inc., performed aggregation. The two classes were early forest successional and forested. The early forest successional class is composed of grassland, bare ground, shrubs, riparian shrubs, forest harvest and sections of forest early secessional cover classes identified by Raedeke Associates, Inc. The forest cover class is composed of mixed, coniferous, thinned coniferous, and deciduous forest classes identified by Raedeke Associates, Inc. The vegetative cover types for the UGA watershed are shown in **Figure 2-3**.

H-01



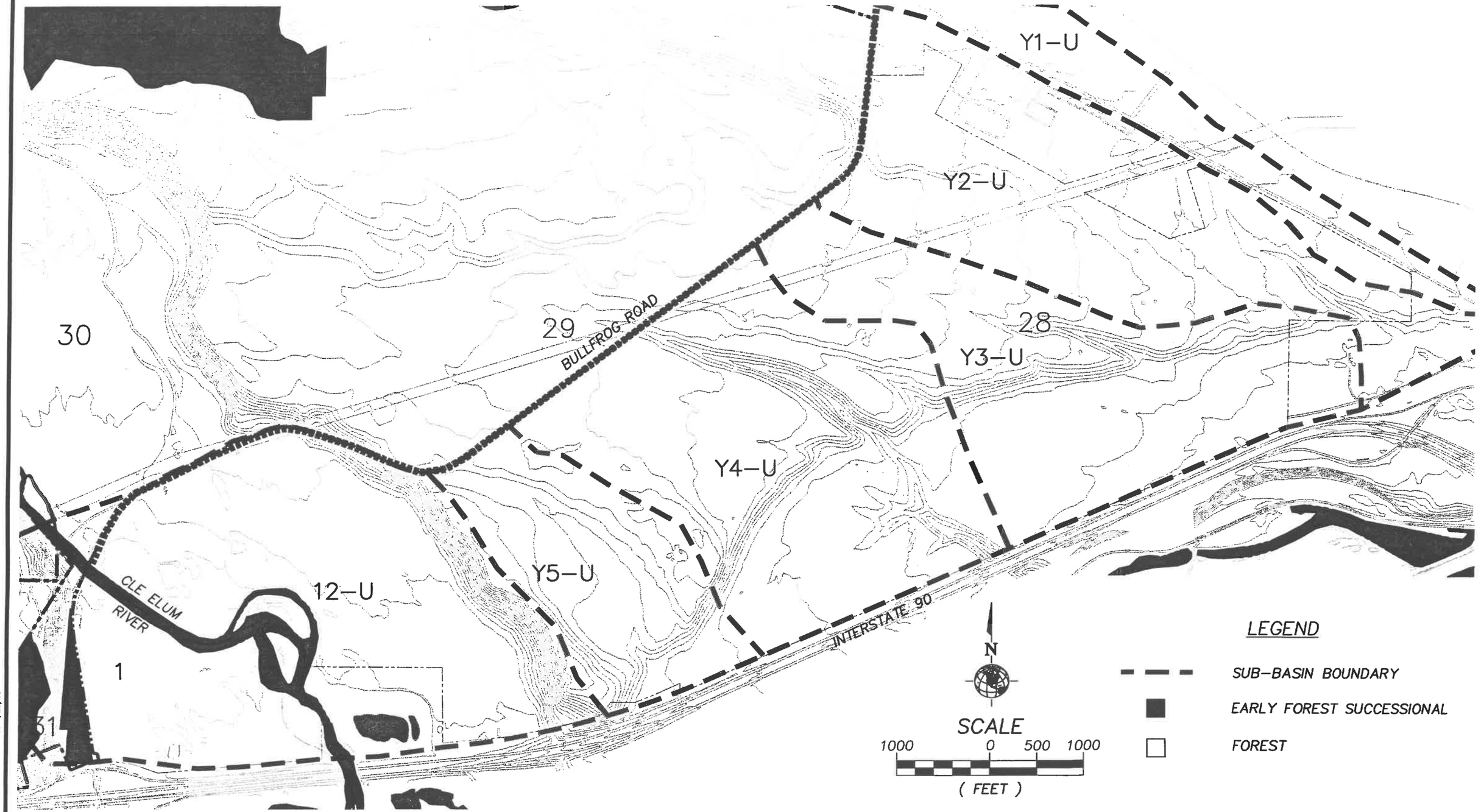
SOURCE: AGI TECHNOLOGIES

W&H PACIFIC

Cle Elum Urban Growth Area

Figure 2-2
Soil Types

L:\PROJECTS\TRENDWEST PROPERTIES INC\816796 UGA GRAPHICS\AUTOCAD\LMTSSC01.DWG-P5 NFH 12/07/01

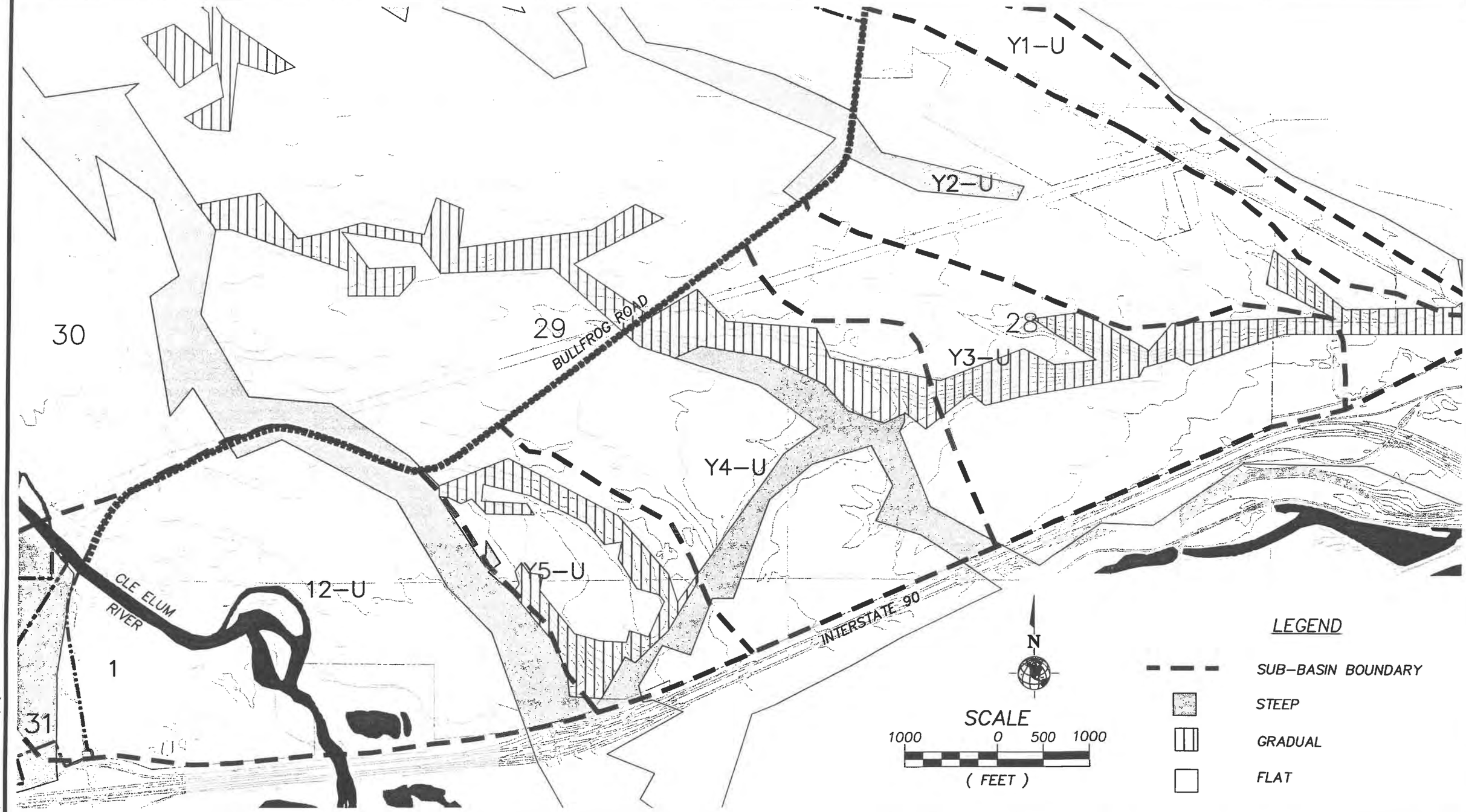


W&H PACIFIC

Cle Elum Urban Growth Area

Figure 2-3
Existing Vegetative Cover

I:\PROJECT\19500801\DWG\LUOASCO1.DWG—P6 KJG 1/20/00



W&H PACIFIC

Cle Elum Urban Growth Area

Figure 2-4
Slope Map

I:\PROJECT\1950080\DWG\LUGASC01.DWG–F4 KJG 1/20/00

H-01

Table 2-2: Existing Subbasin Soil Types

Subbasin	Basin Area (acres)	Till (acres)	Outwash (acres)	Bedrock Area (acres)	Saturated (acres)	Impervious (acres)
Basin 1-1U	90	-	90	-	-	-
Basin 1-2U	85	-	40	45	-	-
Basin 12-U	248	2	246	-	-	-
Basin Y1-U	100	-	94	-	-	6
Basin Y2-U1	97	-	97	-	-	-
Basin Y2-U2	57	-	57	-	-	-
Basin Y2-U3	28	-	28	-	-	-
Basin Y2-U4	102	-	93	-	-	9
Basin Y3-U1	70	-	70	-	-	-
Basin Y3-U2	15	-	15	-	-	-
Basin Y3-U3	61	2	59	-	-	-
Basin Y3-U4	65	-	65	-	-	-
Basin Y3-U5	20	-	20	-	-	-
Basin Y4-U1	105	26	79	-	-	-
Basin Y4-U2	93	11	82	-	-	-
Basin Y4-U3	64	1	63	-	-	-
Basin Y4-U4	26	1	25	-	-	-
Basin Y5-U1	96	96	-	-	-	-
Basin Y5-U2	31	26	5	-	-	-

Slope. Three slope categories were used for the analysis: Flat (0-6 percent), Gradual (Moderate) (6-15 percent) and Steep (+15 percent). Average slope was analyzed in SoftDesk v.8 using 10-ft contours for the project site. W&H Pacific, Inc. performed the slope analysis. The results of the slope category delineation for the project watershed are shown in **Figure 2-4**.

Soil-Cover-Slope-Complex Summary. The dominate soil-cover-slope class is OFF. Other classes occupying more than 3 percent of the site include OFG, OFS, TFF and TFS.

A summary of the existing conditions land use for the site is contained in **Table 2-3**.

Table 2-3: Pre-Development Condition Subbasin Land-Use/Land Cover

Subbasin	Basin Area (acres)	Undisturbed Area (acres)	Total Converted (acres)	Landscape Area (acres)	Impervious Roads (acres)	Impervious Other (acres)
Basin 1-1U	90.0	90.0	-	-	-	-
Basin 1-2U	85.0	85.0	-	-	-	-
Basin 12-U	248.0	248.0	-	-	-	-
Basin Y1-U	100.0	94.0	6.0	-	-	6.0
Basin Y2-U1	97.0	97.0	-	-	-	-
Basin Y2-U2	57.0	57.0	-	-	-	-
Basin Y2-U3	28.0	28.0	-	-	-	-
Basin Y2-U4	102.0	93.0	9.0	-	-	9.0
Basin Y3-U1	70.0	70.0	-	-	-	-
Basin Y3-U2	15.0	15.0	-	-	-	-
Basin Y3-U3	61.0	61.0	-	-	-	-
Basin Y3-U4	65.0	65.0	-	-	-	-
Basin Y3-U5	20.0	20.0	-	-	-	-
Basin Y4-U1	105.0	109.0	-	-	-	-
Basin Y4-U2	93.0	93.0	-	-	-	-
Basin Y4-U3	64.0	64.0	-	-	-	-
Basin Y4-U4	26.0	26.0	-	-	-	-
Basin Y5-U1	96.0	96.0	-	-	-	-
Basin Y5-U2	31.0	31.0	-	-	-	-

Existing Condition Modeling Results

Model output consists of 29 water years of hourly runoff data for each drainage basin (October 1961 through December 1990). This period was governed by the availability of solar radiation data, a required input to the model. The runoff data were used to perform an annual flood frequency and flow duration analysis. Peak flows were developed according to the procedures outlined in U.S. Water Resources Council Bulletin 17B.

Annual flow and peak flow summaries for each subbasin, are presented in **Tables 2-4** and **2-5**, respectively. Peak flow for these subbasins, which do not contain streams, is the sum of groundwater, shallow surface, and surface flow for all land segments within the basin. This flow can be thought of, potentially, as the subbasin's contribution to either the Cle Elum River or the Yakima River depending on location.

H-01

Table 2-4: Pre-Developed Condition Annual Flow Volumes for UGA Basins at the Drainage Boundary

Drainage Basin	Total Basin Area (ac)	Average Annual Flow					Flow Distribution (as percentage of total flow)		
		Total Flow (ac-ft)	Total Flow/ Unit Area (ac-ft/ac)	Surface Flow (ac-ft)	Interflow (ac-ft)	Groundwater Flow (ac-ft)	Surface	Interflow	Groundwater
Basin 1	175	323.2	1.9	0.5	9.1	313.7	0%	3%	97%
Basin 12	248	310.7	1.3	18.8	0.0	292.0	6%	0%	94%
BSN Y1-U	100	110.6	1.1	12.5	0.0	98.2	11%	0%	89%
BSN Y2-U	284	311.2	1.1	18.8	0.0	292.4	6%	0%	94%
BSN Y3-U	231	240.5	1.0	0.2	0.7	239.7	0%	0%	100%
BSN Y4-U	288	299.6	1.0	0.6	13.7	285.3	0%	5%	95%
BSN Y5-U	127	184.3	1.4	2.9	73.5	107.9	2%	40%	59%

Note: Percentages may not add up to 100 percent due to rounding.

Table 2-5: Pre-Developed Condition Peak Flow Analysis

	Flow from Melt and Rain Events: January 1 – December 31 (cfs)					
	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Basin 1	1.70	2.46	2.91	3.43	3.77	4.09
Basin 12	1.51	2.22	2.80	3.66	4.40	5.25
BSN Y1-U	1.37	1.84	2.18	2.63	2.99	3.36
BSN Y2-U	2.43	3.21	3.75	4.45	5.00	5.56
BSN Y3-U	0.90	1.38	1.77	2.36	2.87	3.46
BSN Y4-U	1.19	1.81	2.30	3.00	3.60	4.27
BSN Y5-U	1.47	2.36	3.06	4.05	4.88	5.77

Developed Condition Modeling

Modeling Concept

The developed condition drainage concept includes collection and conveyance facilities, water quality treatment facilities, infiltration basins, and detention basins. The HSPF developed condition models include basin area reaches, routing protocols (describing locations to where stormwater is routed), detention basins, and infiltration basins. The water quality facilities do not significantly alter the peak flows or flow volumes and, therefore, are not constructed in the modeling. To be conservative the interflow and surface flow of the subbasin area upstream of the roadside ditches is routed to the subbasin stormwater facility. This is a conservative approach because the roadside ditches are not modeled as losing reaches, whereas in reality some of the upslope basin interflow and surface flow would infiltrate prior to reaching the infiltration basins. Groundwater discharges are routed to the outlet of the basin in which they are generated.

H-01

A typical HSPF model includes the basin area containing slope, vegetation, soil, and climate characteristics; a routing description indicating the detention facility, stream, or wetland to which the contributing area is routed; and the detention or infiltration facility (for mitigated developed condition models).

Models

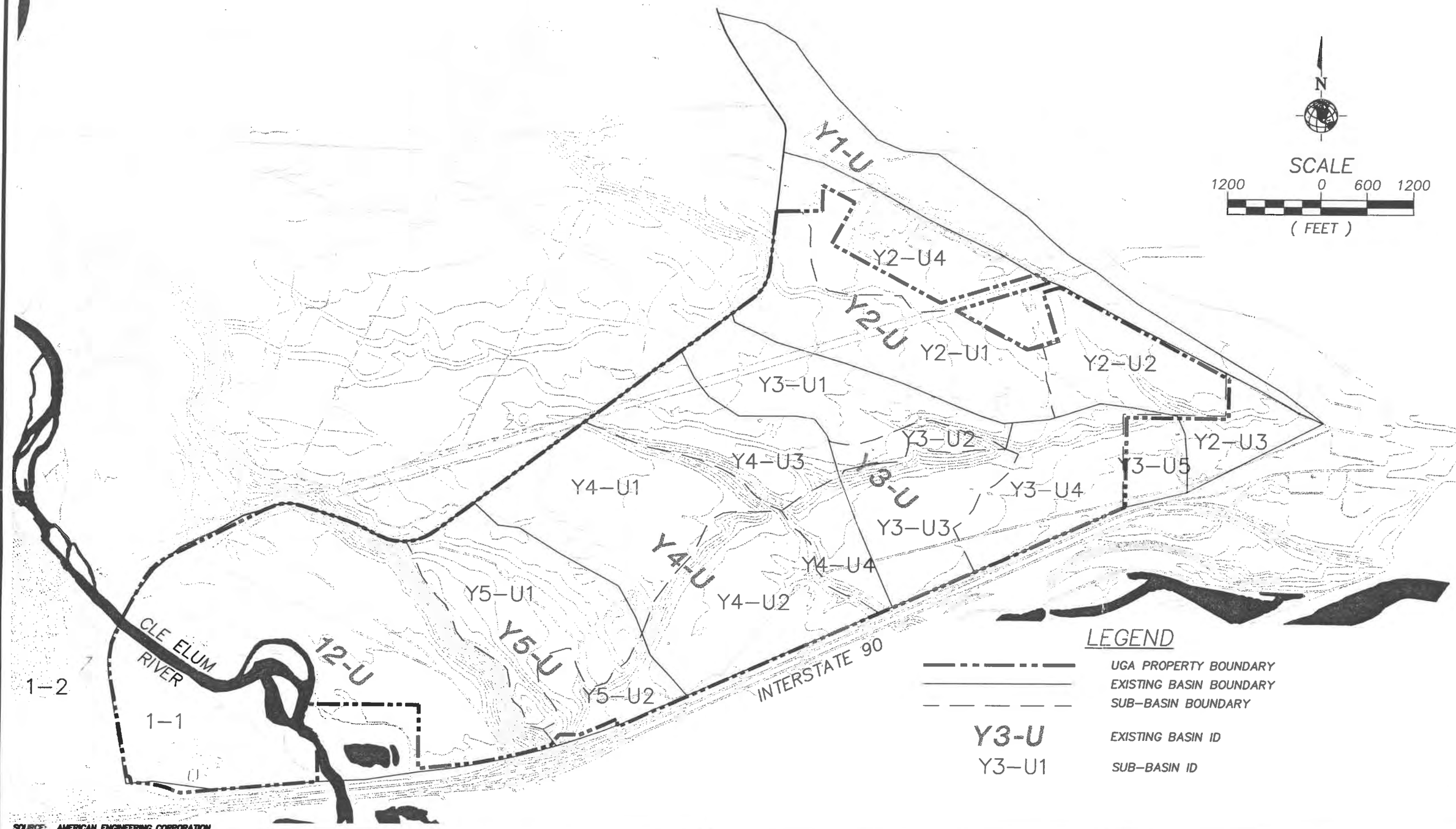
To estimate the developed site runoff volumes and runoff rates, developed condition models were generated. These models contain developed land use/land cover characteristics, developed basin conveyance systems, and infiltration and detention ponds. The purpose of these models is to evaluate the effectiveness of the proposed stormwater detention facilities to provide developed condition runoff characteristics equivalent to existing basins stormwater runoff characteristics. **Table 2-6** provides a summary of land use/land cover for developed conditions. The runoff volumes at both the existing drainage basin boundaries and the discharge from the stormwater facilities were determined. The HSPF model results will be used to evaluate the effect of the development on stream flow volumes.

Routing

The stormwater routing for the developed condition modeling was developed based on two different sets of tributary areas: pond tributary areas and undisturbed existing basins. Developed condition basin boundaries are shown in **Figure 2-5**. Pond tributary areas include all areas that are tributary to an infiltration or detention pond. Pond tributary areas consist of pervious land segments representing landscaping and undisturbed areas that are upstream of interceptor swales and impervious land segments representing roads, parking lots, roofs, and driveways. The pond tributary areas are labeled sequentially according to the existing basin in which they discharge. For example, pond Y4-U4 is the fourth pond discharging to the existing drainage basin Y4-U. Only one pond is modeled for each tributary area in order to compute total storage necessary. In practice, the total storage may be divided into multiple ponds. Undisturbed existing basins consist of the portions of the existing condition basins that are not tributary to a pond. Undisturbed existing basins contain mostly pervious land segments.

HSPF models three different types of runoff for pervious land: surface flow, interflow, and groundwater flow. Runoff from impervious land occurs only as surface flow. Each of these runoff types can be routed independently for each land segment. The stormwater routing for developed basins and pond tributary areas is shown in **Figure 2-6** and is explained in further detail in the following paragraphs.

H-01



SOURCE: AMERICAN ENGINEERING CORPORATION

W&H PACIFIC

Cle Elum Urban Growth Area

Figure 2-5
Developed Condition Basin Boundaries

H-GEO

I:\PROJECT\TRENDWEST PROPERTIES\816798 UGA GRAPHICS EIS\AUTOCAD\LUGA\EB01.DWG EPG 11/13/00

INFILTRATION FACILITY TRIBUTARY AREA LOCATED OUTSIDE PREDEVELOPMENT BASIN

- –INTERCEPTED AREA
- –LANDSCAPE
- –ROOF & DRIVEWAY
- –ROAD & PARKING LOT

AGWO

AGWO

PREDEVELOPMENT BASIN DOWNSTREAM POINT

SURO – ALL UNITS

SURO

SURO, IFWO

SURO, IFWO

INFILTRATION FACILITY TRIBUTARY AREA LOCATED WITHIN PREDEVELOPMENT BASIN BOUNDARY

- –ROOF & DRIVEWAY
- –ROAD & PARKING LOT
- –INTERCEPTED AREA
- –LANDSCAPE AND GOLF COURSE

SURO – ALL UNITS

SURO

SURO, IFWO

SURO, IFWO

INFILTRATION FACILITY

INFILT

GROUNDWATER SIMULATOR

OVERFLOW

GROUNDWATER FLOW

AGWO

AGWO

PREDEVELOPMENT BASIN DOWNSTREAM POINT

UNDISTURBED PREDEVELOPMENT CONDITION BASIN

SURO, IFWO, AGWO

LEGEND

SURO– SURFACE RUNOFF
IFWO– INTERFLOW
AGWO– GROUNDWATER FLOW

W&H PACIFIC

Cle Elum Urban Growth Area

Figure 2-6
Permeable and Impermeable Area Model Schematic

H:\PROJECTS\TRENDWEST PROPERTIES\616798\AUTOCAD\LUGAEX02.DWG PWH 1/20/00

Table 2-6: Developed Condition Subbasin Land-use/Land Cover, Alternative 2[a]

Subbasin	Basin Area (acres)	Undisturbed Area (acres)	Total Converted (acres)	Landscape Area (acres)	Impervious Roads (acres)	Impervious Other (acres)
Basin 1-1U	90.0	42.8	47.2	36.5	6.0	4.7
Basin 1-2U	85.0	85.0	0.0	0.0	0.0	0.0
Basin 12-U	248.0	210.2	37.8	15.6	8.5	13.7
Basin Y1-U	100.0	94.0	6.0	0.0	0.0	6.0
Basin Y2-U1	97.0	19.0	78.0	39.0	19.5	19.5
Basin Y2-U2	57.0	17.0	40.0	23.0	7.0	10.0
Basin Y2-U3	28.0	28.0	0.0	0.0	0.0	0.0
Basin Y2-U4	102.0	93.0	9.0	0.0	0.0	9.0
Basin Y3-U1	70.0	14.0	56.0	28.0	14.0	14.0
Basin Y3-U2	15.0	0.0	15.0	8.0	1.7	5.3
Basin Y3-U3	61.0	13.0	48.0	36.0	3.1	8.9
Basin Y3-U4	65.0	7.0	58.0	15.0	30.0	13.0
Basin Y3-U5	20.0	20.0	0.0	0.0	0.0	0.0
Basin Y4-U1	105.0	4.0	101.0	85.5	3.9	11.6
Basin Y4-U2	93.0	14.0	79.0	76.0	3.0	0.0
Basin Y4-U3	64.0	8.0	56.0	48.0	2.6	5.4
Basin Y4-U4	26.0	3.0	23.0	22.0	0.9	0.1
Basin Y5-U1	96.0	10.0	86.0	71.0	3.8	11.2
Basin Y5-U2	31.0	10.0	21.0	20.5	0.0	0.5
	1453.0	692.0	761.0	524.1	104.0	132.9

a. Based on November 1999 land use/cover definition.

Existing Basin Routing. The routing for the undisturbed portion of existing basins is straightforward - all runoff (surface flow, interflow, and groundwater flow) originating within the basin is routed to the existing basin downstream point.

Pond Tributary Area Routing. Pervious undisturbed, impervious, and landscape areas as provided by American Engineering were used to model the tributary pond areas.

Pond tributary area runoff is the sum of runoff from development areas and from intercepted upslope undeveloped areas. The roadside ditches alter the existing drainage path for the surface runoff and interflow. The groundwater flow from the intercepted upslope area, pervious area, and landscape area is routed to the existing basin downstream point. Groundwater flow from intercepted areas in other basins is routed to the existing downstream point of the basin in which it originated. Surface flow and interflow runoff from golf course areas in the modeled Alternative 2 are routed to the developed basin infiltration ponds. Groundwater flow from the golf course areas is routed to the existing basin downstream point of the basin in which that portion of the golf course is located. Golf course runoff may be modified in the future depending on choice of mitigation techniques.

The roadside ditches are expected to intercept the surface flow and interflow from basin developed and undeveloped areas. Thus, the surface runoff from pervious areas, roads, parking

lots, other impervious surfaces, landscape, intercepted area within the basin, and intercepted area from adjacent basins is routed to the basin infiltration pond. Interflow from pervious areas, landscape area, intercepted area within the basin, and intercepted area from adjacent basins is also routed to the infiltration pond.

Surface runoff from driveways and commercial roofs will be routed to the developed basin infiltration pond. Infiltrated stormwater from infiltration ponds will be routed to the existing basin groundwater.

A groundwater simulator is used to simulate the behavior of water infiltrated from infiltration ponds. The groundwater simulator is different from groundwater flow simulation of HSPFs. The groundwater simulator is used to extend the ability of HSPF to model surface flows that are returned to the ground through infiltration. The groundwater simulator is a reservoir with a large storage capacity. It simulates a groundwater recession curve using a linear relationship between storage and discharge. The slope of the recession curve is set equal to the HSPF recession parameter for the surrounding soil type. For purposes of hydrologic modeling of the UGA basins, it has been assumed that each subbasin will have multiple infiltration facilities. Therefore, runoff infiltrated to groundwater will be attenuated as assumed with the use of the groundwater simulator. For basins without streams, volumes calculated are compared only on an annual basis. This is because the groundwater simulator is used on the developed condition models and not on the existing condition models.

Mitigated Developed Condition Model Results

Developed mitigated condition annual flow volumes at basin boundaries is provided in **Table 2-7**. The comparison between existing and developed annual runoff volumes is provided as a percentage of existing flow in the table. The mitigated volumes were based on fully infiltrating surface flows in infiltration ponds. The exception is runoff from existing impervious areas not modified by project development or captured by project stormwater management facilities. These ponds had preliminary design rates of 2 to 10 inches per hour.

It should be noted that the modeling described in this section is based on the November 1999 land use/cover definitions for Alternative 2. Due to the evolving nature of conceptual land use plans, modifications have occurred since that time. However, HSPF modeling for the latest revision of the UGA project description has not been performed. This is because stormwater runoff volumes can be reasonably estimated for impact purposes based on the original modeling effort and the current proposed site plan.

H-01

Table 2-7: Mitigated Developed Condition Annual Flow Volumes for UGA Basins, Alternative 2

Drainage Basin	Total Basin Area (Ac.)	Average Annual Flow					Flow Distribution (as percentage of total flow)			Comparison to Existing Conditions	
		Total Flow (ac-ft)	Total Flow/Unit Area (ac-ft/ac)	Surface (ac-ft)	Interflow (ac-ft)	Groundwater (ac-ft)	Surface	Interflow	Groundwater	Percent Increase in Annual Flow	Percent Decrease in Surface Flow
Basin 1	175	348.5	2.0	0.3	9.1	339.2	0%	3%	97%	8%	40%
Basin 12	248	353.6	1.4	0.1	0.0	353.6	0%	0%	100%	14%	100%
BSN Y1	100	110.6	1.1	12.5	0.0	98.2	11%[1]	0%	89%	0%	0%
BSN Y2	284	376.1	1.3	18.7	0.0	357.4	5%[1]	0%	95%	21%	1%
BSN Y3	231	348.3	1.5	0.0	0.0	348.2	0%	0%	100%	45%	92%
BSN Y4	288	375.4	1.3	0.0	0.0	375.4	0%	0%	100%	25%	99%
BSN Y5	127	229.8	1.8	0.0	0.0	229.8	0%	0%	100%	25%	100%

1. Positive values reflect runoff from existing impervious areas not modified by project development or captured by project stormwater management facilities.
2. Based on November 1999 land use/cover definition.

Impervious and landscaped areas for Alternatives 2, 3, 4, and 5 are summarized in Table 2-8. The development alternatives have similar impervious area to that modeled and would, therefore, be expected to generate comparable stormwater volume for infiltration.

Table 2-8: Impervious and Landscape Area Summaries[b]

Surface Type, Acres	Project Alternative							
	2		3		4		5[c]	
	Impervious Area	Landscape Area	Impervious Area	Landscape Area	Impervious Area	Landscape Area	Impervious Area	Landscape Area
Roadways	32	32	43	43	35	35	61	61
Residential	53	21	75	36	45	21	104	50
Lodging	5	1	5	1	5	1	0	0
Golf Course	12	142	12	142	12	142	0	0
Public Facilities [a]	17	11	17	11	16	8	19	22
Business Park	60	18	44	12	22	6	63	7
Horse Park	90	43	0	0	90	43	0	0
RV Park	10	2	10	2	10	2	0	0
Total	279	271	205	247	235	257	247	140

[a] Maintenance area, water treatment plant, Community Recreation Center, School Expansion, and Cemetery Expansion.
[b] Note: Numbers may not sum to totals shown due to rounding.
[c] Excludes Reserve Area.

As previously described, modeling was performed based on November 1999 conceptual land use cover assumptions for Alternative 2. Alternative 2, as modeled, had 524 acres of landscape and 237 acres of impervious surface. Subsequent site planning modifications resulted in changes in impervious and landscape areas that are shown in Table 2-8. Landscaped area ranges from 140 acres (Alternative 5) to between 247 and 271 acres for Alternatives 2, 3, and 4. Impervious surface under Alternatives 2, 3, 4, and 5 ranges from 205 to 279 acres.

Based on the HSPF model used to model runoff, outwash landscape generates an average of about one-tenth the runoff of impervious surface per year. Using this approximation, the total runoff can be estimated using an equivalent impervious area. For the modeled Alternative 2, the equivalent impervious area is about 289 acres. The average annual surface flow and interflow components of runoff were estimated at 2,142 acre-feet for the modeled Alternative 2. This equates to an average of 7.40 acre-feet per acre of equivalent impervious area.

Using this estimated runoff per acre the stormwater runoff for the currently proposed alternatives 2, 3, 4 and 5 can be estimated. The equivalent impervious area and estimated runoff for each alternative are summarized in **Table 2-9**.

Table 2-9: Estimated Annual Runoff, Alternatives 2, 3, 4 and 5

Alternative	Equivalent Impervious Area, Acres	Estimated Average Runoff (Surface and Interflow), Ac-Ft
2	306	2,264
3	230	1,702
4	261	1,931
5	263	1,946

As can be noted from the table above, the estimated stormwater runoff for Alternative 2, as analyzed in the Draft EIS, is about 6 percent greater than the runoff estimated for the November 1999 Alternative 2. Alternatives 3, 4, and 5 are expected to generate less runoff than was estimated for the November 1999 Alternative 2.

A variation in stormwater runoff estimates for a particular drainage basin would be addressed with fewer or more stormwater quality and runoff control facilities depending on whether the estimated runoff for that basin increased or decreased.

The purpose of this section is to provide information on the preliminary water system concepts for Alternatives 2, 3 4, and 5. The information presented is intended for use in EIS-related evaluations and analyses.

System Capacity Requirements

Two water systems are proposed for the UGA area - a treated water system and an untreated water system. The treated water system is a standard potable water system providing water to all dwelling units and commercial uses in the area. Under Alternatives 2, 3, or 4, the untreated water system would provide irrigation water to the golf courses, recreational fields, Washington State Horse Park irrigated areas, and the larger public landscape areas. Under Alternative 5, the untreated water system would provide irrigation water to public landscape areas and evaporation make-up water to the artificial water bodies.

Treated (Domestic) Water Requirements

Water demands for the development were based on Washington State Department of Health standard unit demands. Unit interior water demands for each unit type proposed for the UGA under Alternatives 2, 3, 4, or 5 are described below.

Single Family, Multi-Family and Condominiums. Unit interior demands for single family residences, condominium units, and multi-family unit accommodations are summarized in **Tables 3-1, 3-2**, and **3-3**, respectively.

Table 3-1: Single Family Residences

	Primary Residences
Party Size	2.4
Unit Demand (gpdpc)	100
Total Interior Unit Demand (gpd)	240
Average Annual Occupancy	92%

Table 3-2: Condominium Units

	Timeshare[a] Condominiums	Wholly-owned Primary Condominiums
Party Size	2.5	2.4
Unit Demand (gpdpc)	100	100
Total Interior Unit Demand (gpd)	250	240
Average Annual Occupancy	70%	92%

[a] Timeshare condominiums apply to Alternatives 2, 3, and 4 only.

H-01

Table 3-3: Apartment Units

	Primary Residences
Party Size	2.4
Unit Demand (gpdpc)	100
Total Interior Unit Demand (gpd)	210
Average Annual Occupancy	92%

Unit outside water use was based on 800 to 1,200 square feet for single family units, 500 to 1,000 square feet for condominiums, and 400 square feet for multi-family units.

Project Components - Alternatives 2, 3, and 4. Unit demands for project components specific to Alternatives 2, 3, and 4 are provided in the following.

- **Business Park**. Potable water use for the business center was based on 0.085 gpd/square-foot of office space. Irrigated landscaped area was provided by Kent Berryman & Associates.

- **Lodge.** Inside water use was based on 1.5 persons per unit and a unit demand of 50 gpd/person/unit. Non-guest room demands, including restaurant and bar, are taken as 30 gpd/person/unit. The total daily demand is 120 gpd per unit. Average annual occupancy was assumed to be 60 percent (Hobson Johnson Associates, 1999).

- **Campground Guests.** Campsite water use was based on 3.2 persons per unit and a unit demand of 50 gpd/person/unit. The total daily unit demand is 160 gpd per unit. Outside water use was assumed at 1.5 acres of irrigated landscaped areas throughout the campground site. Average annual occupancy was assumed to be 43 percent (Hobson Johnson Associates, 1999).

- **Horse Park Visitors, Employees, and Horses**. Water use per employee and equestrian visitor was estimated at 20 gpd/person. Water use per horse was estimated at 40 gpd/horse. Monthly variation in equestrian park users, boarded horses, event horses, and horse park employees was provided by Atelier PS Landscape Architects.

- **Community Recreation Center**. The community recreation center demand was based on 20 gallons per day per community center visitor. Visitor estimates are estimated to be 50 persons/day during the winter, spring, and fall months and 75 persons/day during the summer months.

- **Employees.** Employees would be individuals employed at the golf course clubhouse, maintenance personal, etc. The number of employees is estimated to be 50 persons.

- **Golf Course Club House**. The golf course clubhouse demand is estimated to be 12 gpd/person. User estimates are provided in **Table 3-4**.

H-01

Table 3-4: Golf Course Clubhouse Users

Month	Weekday Persons (person/day)	Weekend Persons (persons/day)
January	40	80
February	40	80
March	40	80
April	40	80
May	50	150
June	100	200
July	100	200
August	100	200
September	100	200
October	50	150
November	40	80
December	40	80

The ultimate water system demands are based on full buildout of all proposed units and occupancy projections provided by Hobson Johnson Associates, Inc. Monthly water demands have been generated for the UGA for each year of the project through buildout.

Residential water demands were estimated based on inside and outside (irrigation) water demands. Monthly inside water demands were calculated as the number of occupied units for the month times the unit demands. Hobson Johnson Associates also provided monthly occupancy estimates for each unit type throughout the buildout of the UGA. The occupancy estimates provided the information needed to generate seasonally varying water demands. Outside water demands were calculated as the number of units times the landscape areas times the unit landscape water demands. Unit irrigation demands for residential landscape, lawns and the campground landscaping were based on the Washington State Irrigation Guide (WSIG) average annual net irrigation demands for pasture/turf at Cle Elum (18.1 inches/year). An irrigation efficiency of 60 percent was used to calculate total demands. A factor of 10 percent was added to the demands to account for system losses, maintenance demands, and miscellaneous public uses.

The water demands within each development area of the alternatives were determined based on the preliminary land use plans.

The monthly treated water demands at buildout are separated into Trendwest and non-Trendwest demands for water rights purposes. Monthly treated water demands at buildout for Alternatives 2, 3, 4 and 5 for Trendwest and non-Trendwest are presented in **Tables 3-5** and **3-6**, respectively. Non-Trendwest demands include the cemetery expansion area, business park, school expansion area, and Community Recreation Center.

Table 3-5: Average Daily Treated Water Demands at Buildout Trendwest Demands,[a] mgd

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average	Total (ac-ft)
Alternative 2[b]	0.24	0.24	0.27	0.29	0.32	0.43	0.53	0.49	0.43	0.29	0.26	0.26	0.34	379
Alternative 3	0.31	0.31	0.33	0.34	0.36	0.50	0.63	0.56	0.51	0.34	0.32	0.33	0.40	452
Alternative 4[b]	0.21	0.21	0.22	0.23	0.24	0.34	0.42	0.38	0.34	0.23	0.22	0.22	0.27	304
Alternative 5[c]	0.33	0.33	0.33	0.33	0.33	0.47	0.60	0.53	0.48	0.33	0.33	0.33	0.39	442

[a] Includes system loss allowance.
[b] Includes demands for Washington State Horse Park.
[c] Excludes Reserve Area.

Table 3-6: Average Daily Treated Water Demands at Buildout for Non-Trendwest Demands,[a, b] mgd

Alternative	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average	Total (ac-ft)
Alternative 2	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	100
Alternative 3	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06	63
Alternative 4	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	32
Alternative 5[c]	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	100

[a] Includes system loss allowance.
[b] Non-Trendwest treated water demands include the Business Park and Community Recreation Center.
[c] Excludes Reserve Area.

Peaking factors used for the UGA water system design are presented in **Table 3-7,** and are applied to maximum month average daily demands. Equalizing storage will be provided to accommodate hourly peak requirements. These peaking factors are applicable only to the treated water demands.

Table 3-7: Peaking Factors

Ratio	Peaking Factor
Maximum Daily to Average Daily (Maximum Month)	1.5
Maximum Hourly to Average Daily (Maximum Month)	2.2

Using the above average daily water demands and peaking factors, the maximum month design demands (at buildout) for the Trendwest demands are given in **Table 3-8.** The maximum month design demands (at buildout) for non-Trendwest demands are given in **Table 3-9.**

H-01

Table 3-8: Maximum Month Treated Water Demands, Trendwest Demands

	Average Daily Demand (ADD)[a,b]	Maximum Day Demand (MDD)[a,c]	Peak Hour Demand (PHD)[a,d]
Alternative 2	0.53 mgd (370 gpm)	0.78 mgd (540 gpm)	1.13 mgd (780 gpm)
Alternative 3	0.63 mgd (440 gpm)	0.92 mgd (640 gpm)	1.34 mgd (930 gpm)
Alternative 4	0.42 mgd (290 gpm)	0.61 mgd (420 gpm)	0.88 mgd (610 gpm)
Alternative 5[e]	0.60 mgd (417 gpm)	0.88 mgd (611 gpm)	1.27 mgd (882 gpm)

[a] For treated water the daily system loss is calculated as total annual demand x 10% / 365 = 31,000gpd (UGA, Alt 2), 36,700 gpd (UGA, Alt 3), 24,700 gpd (UGA, Alt 4), 35,800 gpd (UGA, Alt 5).
[b] ADD is calculated as maximum month estimated demand + system loss.
[c] MDD is calculated as maximum month estimated demand x 1.5 + system loss.
[d] PHD is calculated as maximum month estimated demand x 2.2 + system loss.
[e] Excludes Reserve Area.

Table 3-9: Maximum Month Treated Water Demands, Non-Trendwest Demands

	Average Daily Demand (ADD)[a,b]	Maximum Day Demand (MDD)[a,c]	Peak Hour Demand (PHD)[a,d]
Alternative 2	0.09 mgd (60 gpm)	0.13 mgd (90 gpm)	0.19 mgd (130 gpm)
Alternative 3	0.06 mgd (40 gpm)	0.08 mgd (60 gpm)	0.12 mgd (80 gpm)
Alternative 4	0.03 mgd (20 gpm)	0.04 mgd (30 gpm)	0.06 mgd 40 gpm)
Alternative 5[e]	0.09 mgd (60 gpm)	0.13 mgd (90 gpm)	0.19 mgd (130 gpm)

[a] For treated water the daily system loss is calculated as total annual demand x 10% / 365 = 8,100 gpd (UGA, Alt 2), 5,100 gpd (UGA, Alt 3), 2,600 gpd (UGA, Alt 4), 8,100 gpd (UGA Alt 5).
[b] ADD is calculated as maximum month estimated demand + system loss.
[c] MDD is calculated as maximum month estimated demand x 1.5 + system loss.
[d] PHD is calculated as maximum month estimated demand x 2.2 + system loss.
[e] Excludes Reserve Area.

Equivalent Residential Unit (ERU) Demands. The Washington State Department of Health uses the concept of ERUs to equate non-residential or multi-family water usage to a specific number of single family residences. As this is a customary way of expressing demands, an ERU value has been developed for the UGA.

The June 1999 publication, *Water System Design Manual*, by DOH, contains guidance for establishing water demands. The suggested methods (in order of preference) include:

1. Reliable metered water use records;
2. Comparable metered water use data from analogous water systems; and
3. Criteria as presented in the DOH design manual.

As there is not a water system in the UGA at present, there are no system meter records from the UGA service area available for use. The existing City meter records could be used if the City system qualified as an analogous system. The DOH Design Manual defines analogous systems as:

> *Analogous water systems are defined as systems with similar characteristics such as demographics, housing sizes, income levels, lot*

sizes, climate, water pricing structure, conservation practices, use restrictions, and soils and landscaping [see WAC 246-290-221(1)(a)].

Based on these criteria, the proposed UGA system and City's existing system would not be considered analogous for the following reasons:

1. The City system has been in place for many years, whereas the UGA will be a completely new system. The losses in the City system are likely much larger than would be experienced with the UGA system constructed to contemporary municipal standards.
2. A consumption based rate schedule will be in place for the UGA, whereas one has not been in place for the City system until recently. Prior to the adoption of the consumption-based rate schedule, metered services in the City were billed on a flat rate charge basis.
3. The UGA will restrict the amount of area that may be irrigated. The water demands assume all lots will be irrigated to the maximum permissible area. In reality, many lot owners will landscape with low water demand landscaping. There are no existing City landscaping restrictions.
4. The UGA residential construction will follow the current Uniform Plumbing Code requirements. These requirements provide for water saving devices and construction methods that were not used for construction of the vast majority of City residences. Additionally, the new residential construction in the UGA will not necessitate that faucets be run in the winter to prevent freezing as is currently done for many residences in the City of Cle Elum.

As neither metered records nor an analogous system are available, the third method outlined by DOH applies. This was the basic method used for the UGA.

The ERU value for the UGA are based on analyses of:

- Internal demands.
- External (irrigation) demands.
- Peaking factors to adjust from Average Daily Demand (ADD) to Maximum Day Demand (MDD).

Internal demands were based on a standard residential demand of 100 gallons per day per capita (gpcd). A single-family residential occupancy of 2.4 persons per dwelling unit was used, based on the Hobson Johnson Associates, Inc. occupancy analysis for the UGA, as discussed previously. From these values, an ADD internal demand of 240 gallons per day (gpd) was calculated (2.4 persons/unit x 100 gpcd).

Relative to the internal demand estimate, it should be noted that Ecology specifies a 100 gpcd wastewater flow (which includes normal infiltration) for dwellings served by new systems. As

H-01

unit internal water demands and wastewater contributions are closely related, the 100 gpcd water demand value is supported by Ecology's wastewater criteria.

Irrigation demands were based on a maximum allowable (per proposed CC&Rs) residential irrigated landscape area of 1,200 square feet, net irrigation requirements for pasture/turf at Cle Elum as given in the Washington State Irrigation Guide and a residential irrigation application efficiency of 60 percent. Homeowners will be required to install efficient irrigation systems, and to operate the systems effectively. The total annual net irrigation demand is 18.1 inches. On an average annual basis, this irrigation demand equates to a daily rate of about 62 gpd per unit. The maximum month net irrigation demand (July) is 6.5 inches. During July, the average daily demand is about 261 gpd [(6.5 inches/12 inches/foot) x (1/60 percent efficiency) x (1200 square feet) x (7.48 gallons/cubic foot) x (1/31 days)].

The ADD value is calculated as 240 gpd (internal) plus 62 gpd (irrigation) for a total of 302 gpd per ERU. The average peak month (July) demand is calculated as 240 gpd (internal) plus 261 (irrigation) for a total of 501 gpd. The MDD demand is calculated as 1.5 times the average peak month demand, or about 750 gpd (1.5 x 501 gpd). The resulting peaking factor for ADD to MDD is about 2.5.

The ERU value does not include an allowance for system losses and miscellaneous public uses. System losses and miscellaneous public uses (flushing of mains, fire suppression water, etc.) are calculated as 10 percent of the average annual demand, as discussed previously. This allowance is included in the capacity requirements for the water system facilities and in water demands used in the water supply analysis.

As discussed earlier, the preferred method of establishing ERUs is from meter records. Once residences are occupied in the UGA, water meter records from a consumption based rate structure will be available for the UGA. From the operating records, the preliminary UGA ERU values of 302 gpd/ERU ADD and 750 gpd/ERU MDD presented can be evaluated. The actual ERU values from monitoring may be higher or lower than the values presented here.

In accordance with the City of Cle Elum's adopted water policy for the UGA, the City will initially issue certificates of water availability for the project based on the water use rate set forth in the City's Comprehensive Water Plan (October 1997), which is currently 610 gallons per ERU. The Washington State DOH design criteria requires a minimum of three years of historical consumption data be used in establishing ERU average demand.

Water system plans are required by DOH to be updated at least every six years. An analysis of ERU values is a required part of a plan update. Therefore, in addition to initial monitoring and evaluation of the UGA ERU values, a more formal evaluation will need to be performed by the City every six years.

Fire Flows. Chapter 248-57-500 Washington Administrative Code (WAC), specifies minimum fire flow demands of 500 gpm for 30 minutes for residential areas, and 750 gpm for 60 minutes for commercial and multi-family areas. The City of Cle Elum has not established fire flow requirements for structures within the City. However, its 1997 Comprehensive Water Plan recommends 3,000 gpm for two hours for its commercial areas and 500 gpm for residential areas. For the purposes of environmental review, all UGA commercial structures were assumed to be equipped with interior fire sprinkler systems. Also assumed was a fire demand of 1,500 gpm per the 1997 Uniform Fire Code (6,000 gpm requirement assumed with full building sprinkler reduction allowance of 75 percent and four hour duration, per Appendix III-A of the Uniform Fire Code). The 1,500 gpm demand is the fire suppression demand on the distribution system and includes both the interior sprinkler demand and exterior hydrant demand. The building designers will determine the sprinkler portion of the required fire flow rate at the building. This fire flow demand was used in the preliminary sizing of the water system for both commercial and residential areas. Minimum fire demands for the UGA will be determined by the City and included in the update to the City's Water System Plan to include the UGA. All proposed construction will be evaluated by the City of Cle Elum and the Kittitas County Fire Marshall for compliance with applicable fire protection safety standards.

Untreated Water Requirements

Depending on the alternative, untreated water demands consist of golf course irrigation, recreational irrigation, public landscape irrigation, and artificial water body evaporation make-up. Untreated water demands were calculated as the irrigated land area times the unit landscape water demands. Unit irrigation demands for the golf courses and other highly maintained landscaped areas have been assigned demands that provide for an adequate supply of water in 9 out of 10 years. This is appropriate because of large initial cost of the facilities. The total annual net irrigation demand for these uses is 23.0 inches, which includes some early and late season demands specific to golf course and recreation field maintenance. An irrigation efficiency of 80 percent for golf course areas, and 70 percent for recreation areas, was used to calculate total demands.

Evaporation from artificial water bodies (i.e., lakes or golf course ponds) was calculated from net unit monthly evaporation rates. Net evaporation is calculated as lake evaporation less precipitation. Lake evaporation is calculated as pan evaporation times an appropriate pan coefficient. Monthly pan evaporation values were taken from the pan evaporation time series derived for the HSPF hydrologic simulation model used for drainage planning (refer to Section 2). A pan coefficient of 0.75 was used to convert the monthly pan evaporation values to lake evaporation. Net evaporation occurs only during the months of April through September. In other months of the year, site precipitation exceeds site lake evaporation. Monthly net evaporation rates for the site are given in **Table 3-10**.

H-01

Table 3-10: Monthly Net Site Lake Evaporation, Inches

April	May	June	July	August	September	Total
0.7	2.7	3.9	5.2	4.3	1.9	18.7

A preliminary design of untreated water system for each alternative has not yet been prepared. Golf course irrigation supply ponds would be constructed with equalizing storage that would allow peak daily irrigation demands to be met from a constant 24-hour supply. The ponds would also provide storage for emergency conditions. The pumping systems to the ponds would have the capacity to deliver daily demands as well as deliver make-up water for emergency storage that has been used.

The projected monthly untreated water demands at buildout for Trendwest demands and non-Trendwest demands, for the uses identified earlier, are provided in **Tables 3-11** and **3-12**, respectively.

Table 3-11: Trendwest Untreated Water Demands[a], acre-feet/month

Alternative	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Alternative 2	0	0	0	6	12	106	182	135	98	9	0	0	548
Alternative 3	0	0	0	7	14	81	128	95	68	10	0	0	403
Alternative 4	0	0	0	7	14	117	199	148	107	10	0	0	603
Alternative 5[b]	0	0	0	1	3	6	8	7	3	0	0	0	28

[a] Includes system loss allowance.
[b] Excludes Reserve Area.

Table 3-12: Non-Trendwest Untreated Water Demands[a, b], acre-feet/month

Alternative	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Alternative 2	0	0	0	0	0	14	27	20	14	0	0	0	75
Alternative 3	0	0	0	0	0	11	21	15	11	0	0	0	58
Alternative 4	0	0	0	0	0	6	12	9	6	0	0	0	33
Alternative 5[c]	0	0	0	0	0	18	35	26	19	0	0	0	98

[a] Includes system loss allowance.
[b] Non-Trendwest untreated water demands include irrigation for the School Expansion, Cemetery Expansion, Business Park and the Community Center.
[c] Excludes Reserve Area.

Water Use Standards

Draft Water Use Standards have been prepared as part of the Draft Development Standards for the Trendwest Master Site Plan Application (Alternative 5). While Alternative 5 is considered the preferred alternative, these Standards would also apply to Trendwest uses in Alternatives 2, 3, and 4. The Standards would be required under the project CC & R's. The Draft Water Use Standards are provided at the end of this section. The conditions of approval as well as the CC&Rs will require that these water use standards in the UGA be met.

H-01

Source of Water Supply

Proposed Joint Participation Project

The City of Cle Elum and Town of South Cle Elum are planning to construct a new 4 mgd capacity (expandable to 8 mgd) water treatment plant, which is scheduled for completion in 2003. Trendwest has entered into an agreement with the City of Cle Elum to participate in the project's river intake facilities, transmission mains, distribution mains, reservoir and water treatment plant. The proposed plant location is on Trendwest property, just west of SR 903 and south of the Puget Sound Energy Substation as shown in **Figure 3-1**. Trendwest stand-alone alternatives were described in the Draft EIS.

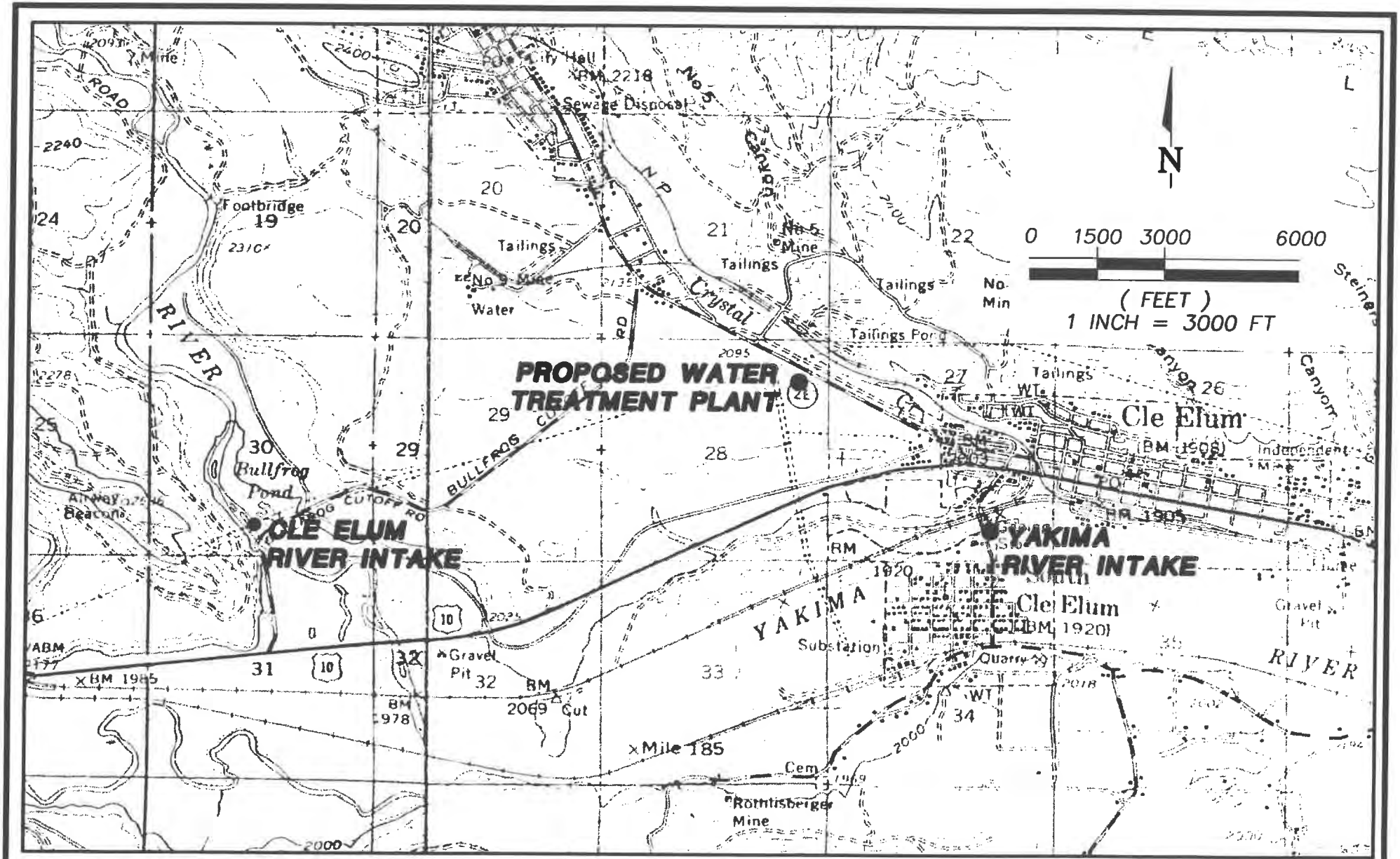
Water Intakes

The intakes are proposed to be side bank surface water intakes, one drawing water from the Cle Elum River, and one drawing water from the Yakima River. The Cle Elum intake is proposed to be located on the east bank of the river, between the two Bullfrog Road bridges. The Yakima River intake is proposed to be located at the City's existing water treatment plant surface diversion location on the south bank of the river. These locations are shown in **Figure 3-1**. In-river work will be required to construct river training structures to maintain the diversion. The domestic water for the UGA would be treated at the new water treatment facility, and pumped to storage reservoirs located within the MountainStar MPR site and the City of Cle Elum. The lower pressure zone of the UGA will be supplied by the City's existing new 0.50 MG reservoir located outside the UGA. The upper UGA pressure zone will be supplied by a reservoir located in the MPR. Under Alternatives 2, 3, and 4, untreated irrigation water would be pumped directly from the intakes to storage ponds in golf courses within the property, as previously discussed. Under Alternative 5, untreated water would be delivered to the lake features of the alternative. Under all alternatives, an intermediate booster or distribution pumping station would likely be installed to receive water pumped from the river and transfer it to points of use or storage.

Selection of side bank intake structures was made after completion of an exploratory program to determine the feasibility of infiltration facilities or well fields located a short distance inland from the banks of the rivers. Associated Earth Sciences, Inc. (AESI) conducted the exploratory program in late 1999. The program included drilling several exploratory borings at locations on both the north and south banks of the Yakima River east of the South Cle Elum bridge, and on the east bank of the Cle Elum River between the two Bullfrog Road bridges. Preliminary results of the program indicate that the saturated thickness of the water table (floodplain) aquifer ranges from approximately 5 feet at the Yakima River site to 23 feet at the Cle Elum River site, with the aquifer underlain by a regionally extensive silt/clay unit. The limited saturated thickness at the Yakima River sites precluded any plans for further testing and analysis for the construction of an infiltration gallery along the Yakima River.

H-01

I:\PROJECTS\TRENDWEST PROPERTIES\19500802\DWG\LMTSWP04.DWG NHE 12/20/01



W&H PACIFIC

Cle Elum Urban Growth Area

Figure 3-1
Raw Water Intake &
Treatment Plant Locations

11-01

At the Cle Elum River site one test (pumping) well was completed with four observation wells to determine the feasibility of the construction of an infiltration gallery or well field. Stepped-and continuous rate aquifer tests were completed in the pump well during late 1999. Preliminary analysis of the aquifer test data indicate low yields compared to project needs. The conclusions from this program are that extensive infiltration galleries with attendant difficult construction, or extensive shallow well fields, would be required to meet project demands. It was therefore concluded that side bank intake structures, which is the City's current method of diversion on both the Yakima and the Cle Elum Rivers, was the only feasible method of diversion.

Water Treatment System Alternatives

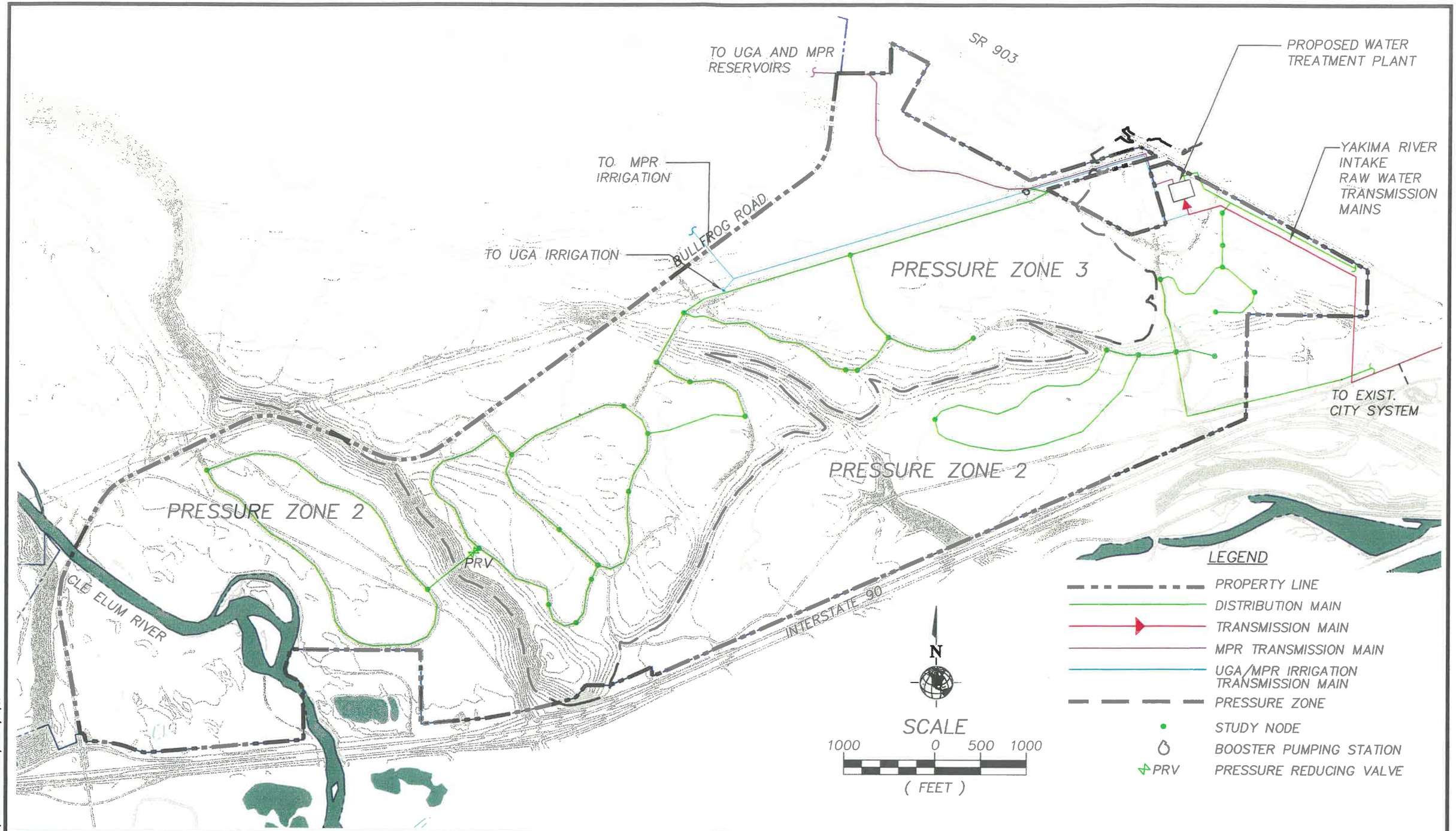
The proposed water treatment plant and water system improvements are discussed in the draft report, *"Project Report for Water System Improvements Including Water Treatment"*, prepared by Huibregtse, Louman Associates, Inc., September 1998. It outlines the proposed water treatment processes and identifies a number of potential alternatives for filtration and disinfection processes. The proposed water treatment processes include coagulation with flash mixing, flocculation, filtration, disinfection, and to remove solid matter in the backwash water, sedimentation. Solids from the treatment process would be disposed of at a landfill that accepts water treatment plant sludge.

The treated water quality is required to meet the standards of the Surface Water Treatment Rule (SWTR) and Part 6 of Chapter 246-290 WAC. The SWTR pertains to all public water systems, which utilize a surface water source, and was implemented to minimize contamination of public water systems by pathogenic organisms and viruses.

Construction documents for the water treatment plant and intake facility are currently being prepared. Environmental and permitting documents in support of this project include a SEPA (MDNS by City), biological assessment, NEPA environmental report, JARPA submittal, shoreline substantial development permit, floodplain development permit application, and WDNR state aquatic land lease application.

Preliminary Water Distribution System Plan

The preliminary water distribution system for domestic supply includes water reservoirs, transmission lines, distribution lines, and pressure reducing stations. The major facilities for Alternatives 2, 3, 4 and 5 are shown on **Figures 3-2, 3-3, 3-4 and 3-5**, respectively, along with topographic contours. Also shown on **Figures 3-2, 3-3, 3-4 and 3-5** are MPR water utilities that will pass through the UGA. These include a treated domestic water transmission main and an untreated raw water irrigation transmission main. The sizing of preliminary water systems for each alternative has been designed in accordance with Washington State Department of Health standards.

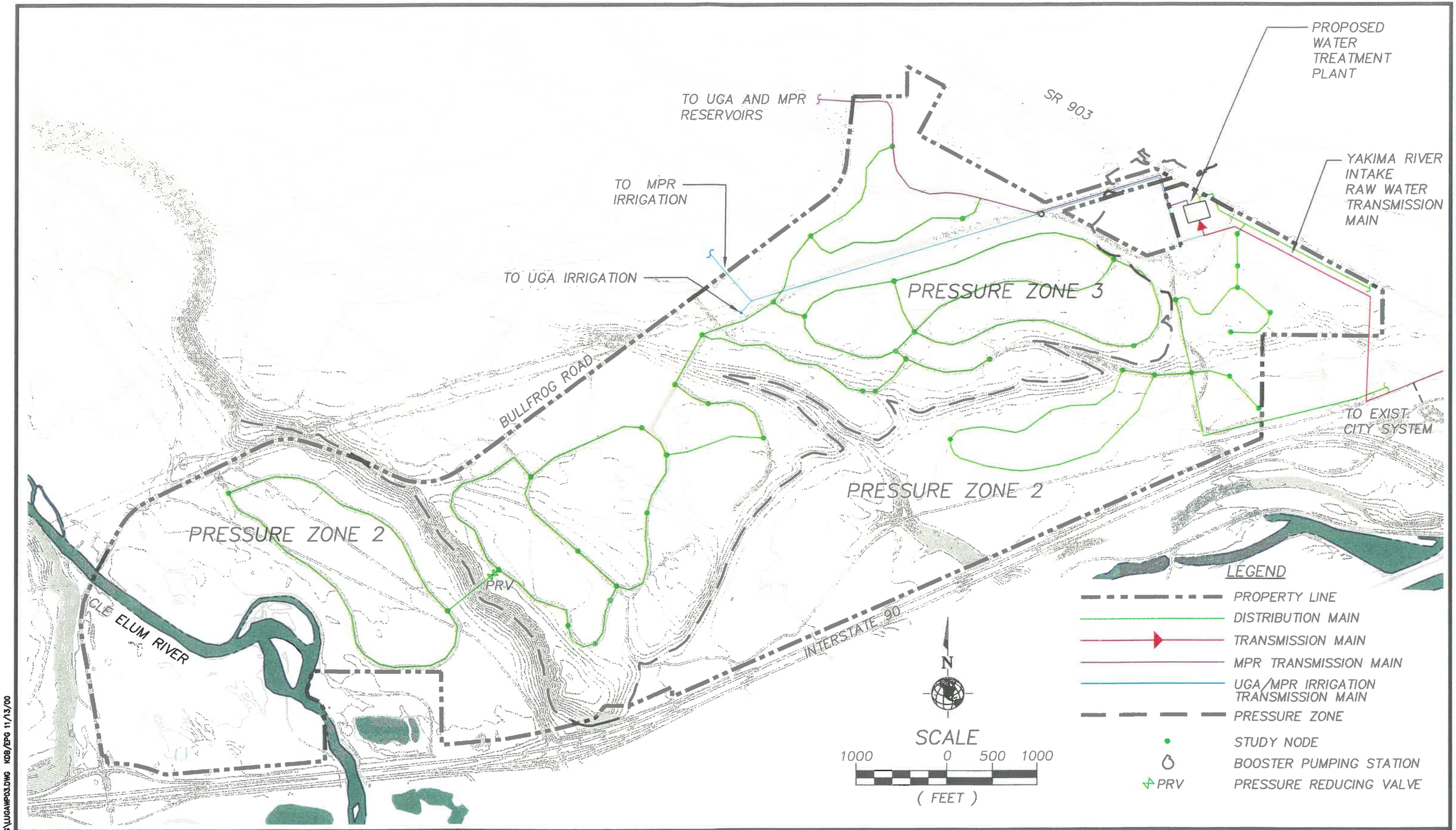


W&H PACIFIC

Cle Elum Urban Growth Area

Figure 3-2
Preliminary Water Plan
Alternative 2

H:\PROJECT\19500802\DWG\LUGAWP02.DWG TDG/EPG 11/02/00

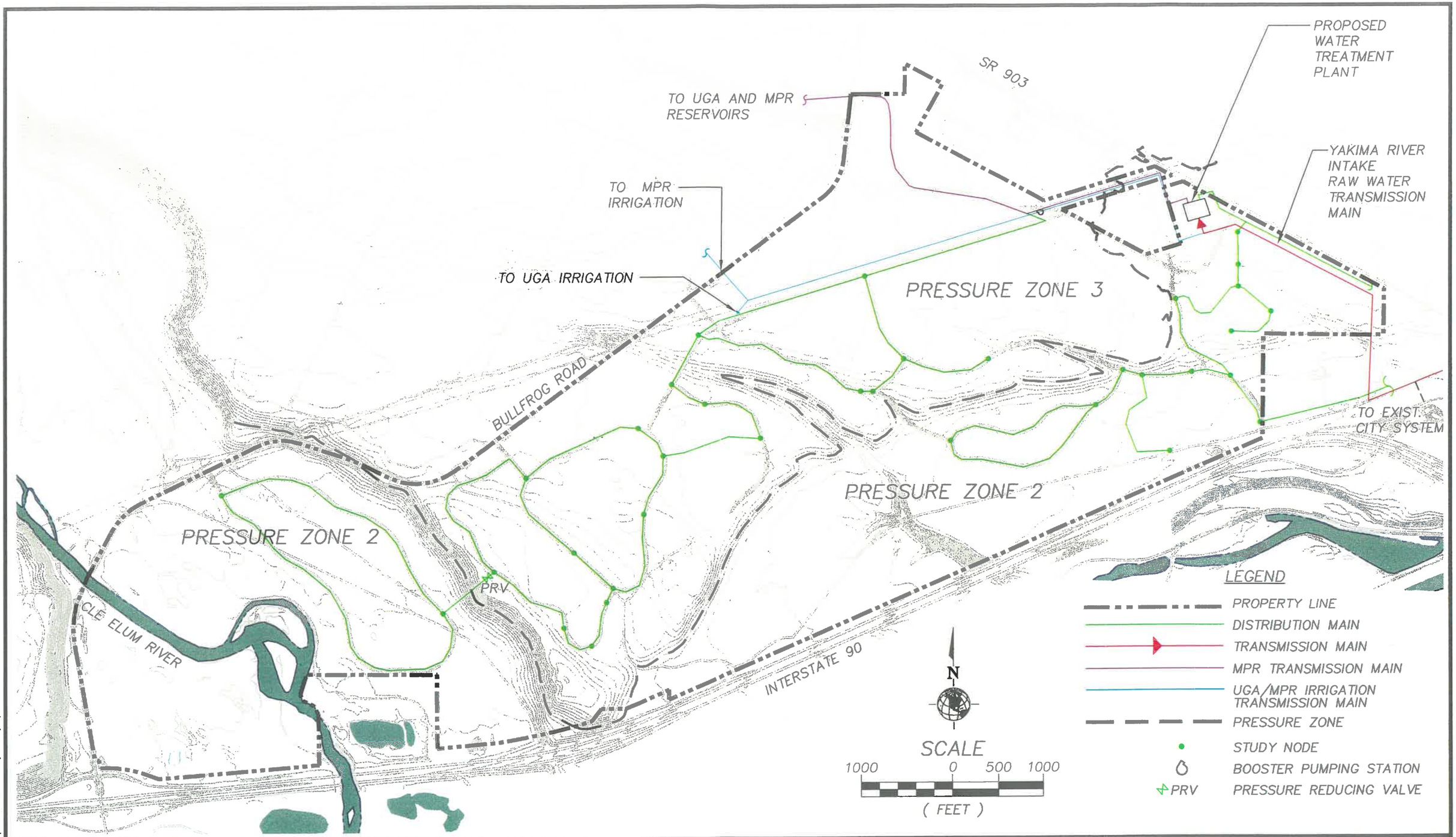


W&H PACIFIC

Cle Elum Urban Growth Area

Figure 3-3
Preliminary Water Plan
Alternative 3

I:\PROJECT\19500802\DWG\LUGAWP03.DWG KDB/EPG 11/13/00

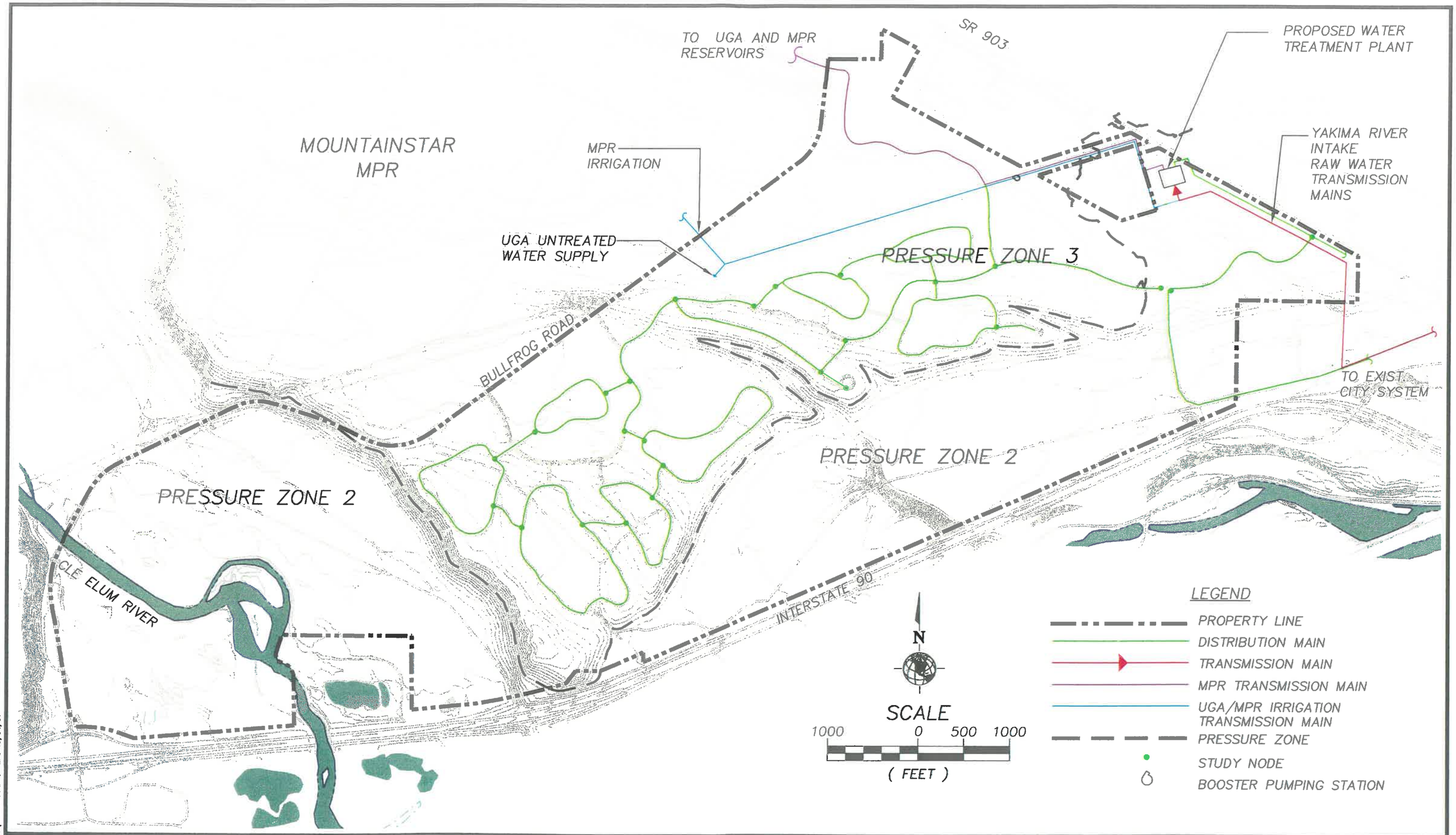


W&H PACIFIC

Cle Elum Urban Growth Area

Figure 3-4
Preliminary Water Plan
Alternative 4

I:\PROJECT\19500802\DWG\UGAWP04.DWG KDB/EPC 11/13/00



H:\PROJECT\19500802\DWG\LUGAWP08.DWG EPG 10/04/01

W&H PACIFIC

Cle Elum Urban Growth Area

Figure 3-5
Preliminary Water Plan
Alternative 5

MPR GRAVITY SEWER MAIN

MPR GRAVITY SEWER MAIN

MPR FORCEMAIN

MPR PS

BULLFROG ROAD

MOUNTAINSTAR MPR

PS #4

TO TREATMENT PLANT

PS #3

TO TREATMENT PLANT

PS #1

PS #2

CLE ELUM RIVER

PS #5

INTERSTATE 90

N

SCALE

1000 0 500 1000

(FEET)

LEGEND

- PROPERTY LINE
- MPR/UGA GRAVITY SEWER
- MPR FORCEMAIN
- GRAVITY SEWER
- SEWER FORCEMAIN
- PS #3 PUMPING STATION

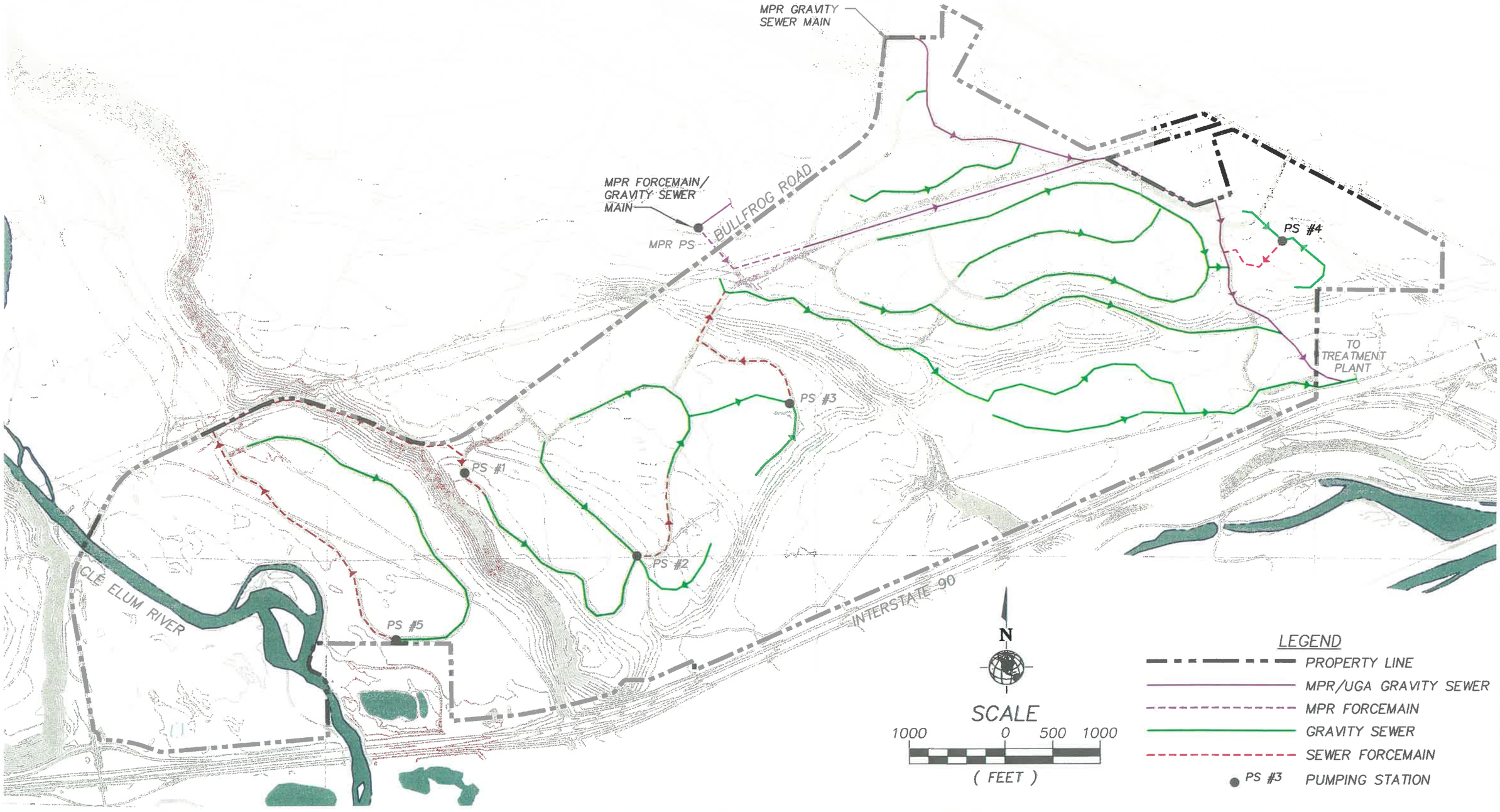
W&H PACIFIC

Cle Elum Urban Growth Area

Figure 4-1
Preliminary Sewer Plan
Alternative 2

I:\PROJECT\19500802\DWG\LUGASS02.DWG KDB/EPG 11/02/00

I-01

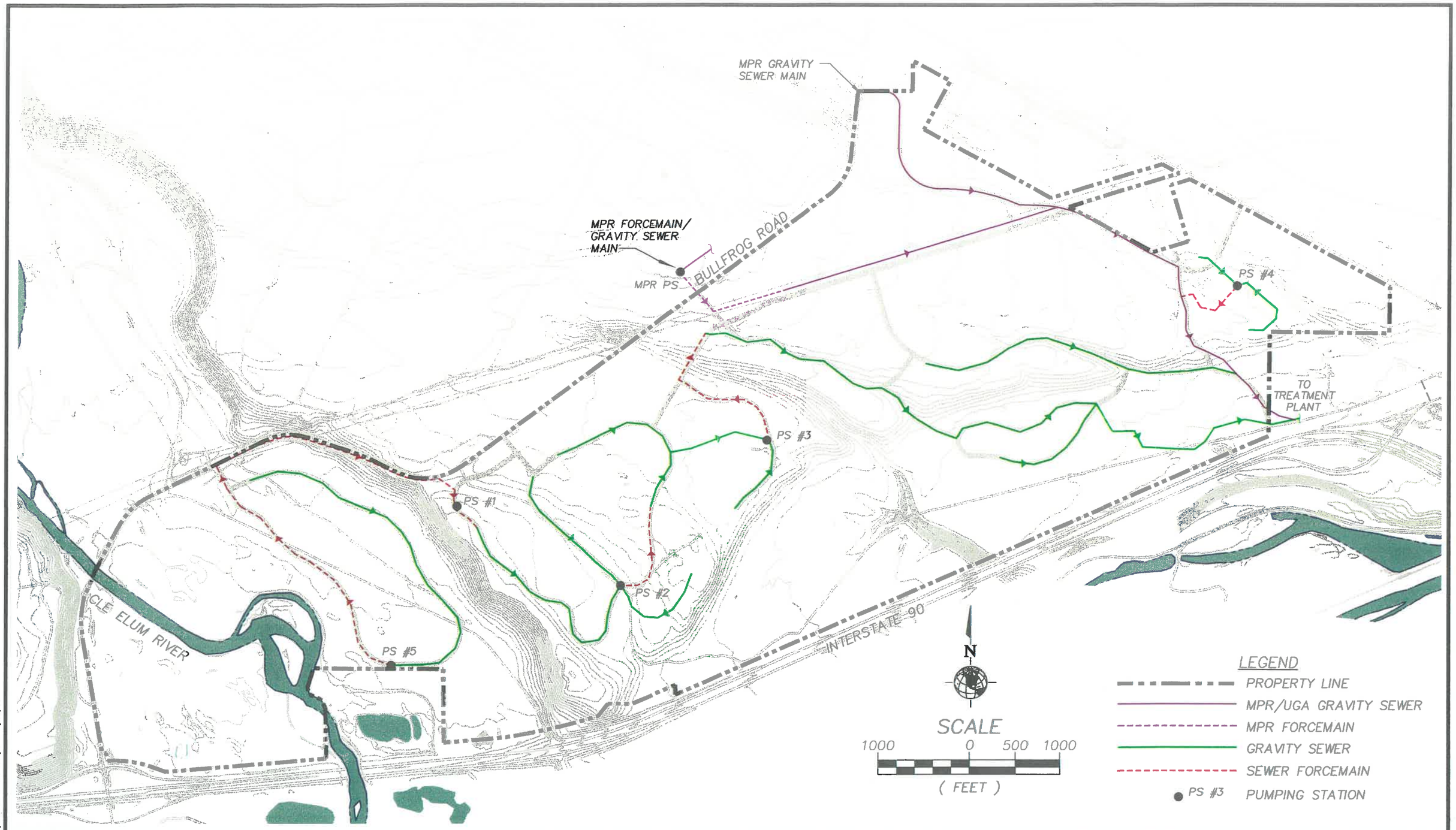


W&H PACIFIC

Cle Elum Urban Growth Area

Figure 4-2
Preliminary Sewer Plan
Alternative 3

H:\PROJECT\19500802\DWG\UGASS03.DWG KDB/EPG 11/02/00



W&H PACIFIC

Cle Elum Urban Growth Area

Figure 4-3
Preliminary Sewer Plan
Alternative 4

I:\PROJECT\95008802\DWG\UGASSG4.DWG KDB/EPG 11/02/00

MPR GRAVITY SEWER MAIN

BULLFROG ROAD

MOUNTAINSTAR MPR

PS#2

FUTURE GRAVITY CONNECTION

TO TREATMENT PLANT

PS#1

CLE ELUM RIVER

INTERSTATE 90

N

SCALE

1000 0 500 1000

(FEET)

LEGEND

PROPERTY LINE

MPR/UGA GRAVITY SEWER

GRAVITY SEWER

SEWER FORCEMAIN

• PS#2 PUMPING STATION

W&H PACIFIC

Cle Elum Urban Growth Area

Figure 4-4
Preliminary Sewer Plan
Alternative 5

E:\PROJECT\19500802\DWG\LUGASS07.DWG \EPG 10\04\04

HDL

Collection and Conveyance System

The preliminary sewer systems layout for Alternatives 2, 3, 4 and 5 are shown in **Figures 4-1, 4-2, 4-3** and **4-4**, respectively. The systems are based on the planning areas defined by the preliminary land use site plans for each alternative. Gravity sewer and gravity force mains that will convey MPR flows through the UGA are also shown on these figures. The gravity mains will also convey the UGA flows that can be intercepted by these mains. A deeper gravity main in lieu of the MPR pumping station and force main shown is an alternative being evaluated by the MPR.

Preliminary sizing of the collection system is in accordance with the requirements set forth in the publication, "Criteria for Sewage Works Design" by the Washington Department of Ecology. The sizes of gravity sewers for Alternatives 2, 3, 4 and 5 range from 8 inches to 12 inches in diameter. The sizes of force mains for each alternative range from 4 inches to 6 inches in diameter.

The topography of the site requires a number of wastewater lift stations to transport sewage from lower to higher elevations. The locations of these stations are shown in **Figures 4-1, 4-2, 4-3, and 4-4**, respectively. Preliminary design conditions for each sewage lift station with 5 hp or more requirements are presented in **Table 4-6.**

Table 4-6: Preliminary Lift Station Design Parameters

Alternative	Lift Station No.	Capacity (gpm)	Head (ft)	Power Input[a] (HP)
2	1	96	30	5
	2	224	51	10
	3	337	55	11
	4	140	52	5
	6	81	158	21
3	2	197	49	10
	3	303	46	11
	4	98	40	5
	6	56	149	18
4	2	140	72	10
	3	233	34	7.5
	6	55	149	18
5	1	264	10	7.5

[a] Input horsepower values are given rather than standard motor horsepower values.

Wastewater Treatment and Disposal

Flows and Loadings

Estimated wastewater flows for Alternatives 2, 3, 4 and 5 are provided in **Tables 4-7, 4-8, 4-9**, and **4-10** respectively. Estimated wastewater loadings, in terms of biochemical oxygen demand (BOD) and total suspended solids (TSS) are given in **Table 4-11**. These loadings are based on a unit loading for BOD and TSS of 0.2 pounds per day per person. Population equivalents were calculated on the basis of 100 gpd per capita.

Table 4-7: Projected Wastewater Flows for Alternative 2, mgd[a]

Flow Condition	Year 5	Year 20	Year 30
Annual Average	0.27	0.32	0.33
Wet Weather (Oct.-Apr.):			
Average	0.26	0.31	0.33
Peak Hourly	0.91	1.10	1.14
Dry Weather (May-Sept.):			
Average	0.28	0.33	0.34
Peak Hourly	0.97	1.15	1.19

[a] Includes wastewater flows for non-Trendwest demands located in the UGA.

Table 4-8: Projected Wastewater Flows for Alternative 3, mgd[a]

Flow Condition	Year 5	Year 20	Year 30
Annual Average	0.24	0.33	0.35
Wet Weather (Oct.-Apr.):			
Average	0.23	0.32	0.35
Peak Hourly	0.80	1.12	1.21
Dry Weather (May-Sept.):			
Average	0.25	0.34	0.35
Peak Hourly	0.87	1.20	1.22

[a] Includes wastewater flows for non-Trendwest demands located in the UGA.

H-01

Table 4-9 - Projected Wastewater Flows for Alternative 4, mgd[a]

Flow Condition	Year 5	Year 20	Year 30
Annual Average	0.17	0.21	0.22
Wet Weather (Oct.-Apr.):			
Average	0.16	0.20	0.22
Peak Hourly	0.56	0.71	0.77
Dry Weather (May-Sept.):			
Average	0.18	0.22	0.23
Peak Hourly	0.61	0.76	0.81

[a] Includes wastewater flows for non-Trendwest demands located in the UGA.

Table 4-10 – Projected Wastewater Flows for Alternative 5, mgd[a,b]

Flow Condition	Year 5	Year 20	Year 30
Annual Average	0.25	0.33	0.36
Wet Weather (Oct.-Apr.):			
Average	0.26	0.34	0.37
Peak Hourly	0.90	1.19	1.28
Dry Weather (May-Sept.):			
Average	0.24	0.32	0.35
Peak Hourly	0.85	1.13	1.21

[a] Includes wastewater flows for non-Trendwest demands located in the UGA.
[b] Excludes reserve area.

Table 4-11 – Projected UGA Loadings for Alternatives 2, 3, 4, 5 lb. per day[a]

Alternative No.	BOD & TSS	Year 5	Year 20	Year 30
2	Annual Average	540	640	660
	Max. Month Average (Aug.)	570	670	690
3	Annual Average	480	660	690
	Max. Month Average (Aug.)	510	700	700
4	Annual Average	330	420	450
	Max. Month Average (Aug.)	360	440	470
5[b]	Annual Average	510	670	720
	Max. Month Average (Aug.)	530	700	760

[a] Includes wastewater flows for non-Trendwest demands located in the UGA.
[b] Excludes Reserve Area.

Wastewater Treatment and Disposal Alternatives

A regional wastewater facility planning study is underway by Earth Tech for local area entities and the UGA and MPR. Trendwest is a financial participant in the study. This alternative is described in the following section. Trendwest standalone alternatives, which would require a public entity (such as a sewer district) to operate, have been described in the Draft EIS.

With the regional alternative, wastewater treatment for the UGA would be accomplished at a new facility. The plant would be located at the existing Cle Elum treatment plant at the east end of the City. From preliminary regional facility planning efforts (Earth Tech), the estimate of capacity for this facility for a 30-year planning horizon is about 3.6 million gallons per day. The plant study area for this flow includes the City of Cle Elum, the Town of South Cle Elum, the City of Roslyn, Ronald, Pine Loc III (existing units), the UGA and the MPR. Trendwest would be a financial participant.

Maximum monthly wastewater design flows and pollutant loads for the study area for Year 30 (UGA and MPR Buildout) are presented in **Tables 4-12 and 4-13**, respectively (Earth Tech, February 2002). The flows are based on the MPR Reduced Density Alternative and UGA Alternative 5.

Table 4-12: Regional Wastewater Flows at Year 30[a]

Condition	Maximum Month Flow, mgd
Winter (March)	
Average	3.6
Peak Hour	10.7
Summer (August)	
Average	2.3
Peak Hour	8.0

[a] Source: Cle Elum Regional Sewage Facilities Plan Data, Earth Tech, February 2002.

Table 4-13: Summary of Pollutant Loads at Year 30[a]

Parameter	BOD5	TSS
August		
Average Day Influent pounds	4,767	4,388
Influent Concentration mg/l	256	236
Effluent Concentration mg/l	15	15
Effluent pounds	279	279
Percent Removal	94	94
March		
Average Day Influent pounds	3,979	3,775
Influent Concentration mg/l	132	126
Effluent Concentration mg/l	15	15
Effluent pounds	451	451
Percent Removal	89	88

[a] Source: Earth Tech, February 2002.

H-01

The portion of the regional wastewater flows and loadings attributed to the MountainStar MPR and Cle Elum UGA are as follows (Earth Tech, February 2002):

- Average Flows: Winter 1.3 mgd, Summer 1.3 mgd
- Average Influent BOD: Winter 2,198 lbs/day, Summer 2,685 lbs/day
- Average Influent TSS: Winter 1,685 lbs/day, Summer 2,123 lbs/day

The proposed treatment process is one of the forms of the activated sludge process. This process provides the capability of meeting anticipated permit standards. Disposal of treated effluent from the regional plant would be to the Yakima River via an upgraded outfall. An outfall study will be prepared as a part of the facility plan. The outfall study will include a hydraulic analysis (dilution analysis) to evaluate how effluent pollutants are dispersed (see Section 3.1.6 of the FEIS for additional details). Sludge handling and disposal alternatives would be evaluated in the facility plan to be submitted to Ecology. Composting of sludge would be one of the alternatives considered.

The City of Cle Elum has constructed interim improvements that bring its wastewater treatment plant into compliance. A new MDNS discharge permit has been issued. The steps in the regional project process include:

- An agreement between Trendwest and Cle Elum, South Cle Elum, and potentially Roslyn, to participate in the regional project.
- Modification of Cle Elum's NPDES permit to include a schedule for the planning, design and construction of the project.
- Preparation of a facility plan for the project with supporting SEPA documentation for approval by Ecology (in progress).
- Preparation of construction plans and specifications for the treatment plant and associated conveyance system.
- Permitting and environmental review.
- Construction and start-up of the regional facilities.

The interim capacity improvements were sized for about 150,000 gallons per day of added treatment capacity for the regional service area of Cle Elum, South Cle Elum and the Trendwest properties. The improvements to the Cle Elum plant for interim capacity included the addition of mechanical aeration, mixers and baffles in Cells No. 1 and No. 2, the addition of baffles in Cell No. 2 of the existing lagoon system, a constructed wetland in Cell No. 3 (final cell), effluent aeration in a reaeration chamber, and ultra-violet irradiation disinfection.

The temporary sewer connection alignment from the MPR and UGA service areas to the City system has not yet been constructed. The initial sewer from the UGA boundary east would be along Ranger Road to a location east of the Pacific Pride facility. From that location, the

alignment would be via Ranger Station Road and Second Street to Oakes Street where the line would be routed south to connect with the South Cle Elum trunk sewer.

On-Site Wastewater Systems

Proposed development on Trendwest properties within the UGA includes two temporary on-site septic tank and drainfield systems to serve the sales office and maintenance facility in advance of the availability of sewer service to their locations. These systems will be abandoned after connection to the UGA collection system. The systems will be abandoned in accordance with Kittitas County Health Department requirements.

The potential exists to have golf course comfort stations that are served by septic tank and drainfield systems if the needed locations are remote from sanitary sewer facilities. It is probable that there would be no more than two stations being served by septic tanks and drainfields. Assuming similar usage as expected for the MPR trail systems comfort stations, two golf course systems would generate an additional 800 gallons of septage per year. Refer to Page 5-8 of the Solid Waste section for discussion of disposal of septage wastes.

H-01

Section 5 Solid Wastes

Presented in this section are the expected sources and quantities of solid wastes that would be generated by Alternatives 2, 3, 4 and 5. The estimated quantities are considered relative to the capacities of the existing Kittitas County solid waste management facilities. Also presented are the solid waste management provisions anticipated for the UGA

Solid Waste Sources and Classifications

Sources of Solid Waste

Sources of solid waste are, primarily, related to land use. Based on the land uses proposed within the Cle Elum UGA for the four development alternatives, the source categories of solid waste including wastes from construction and operations are as follows:

1. ***Construction and Inert Waste (CDL):*** Construction and inert waste includes waste material that is produced in the process of construction of new structures. (Note: Construction wastes from renovation or demolition of structures are estimated to be minor through buildout and are, therefore, not estimated.) Structures include buildings of all types, both residential and nonresidential, as well as roads, utilities and bridges.

2. ***Residential***: Residential solid waste would be generated from single family residences, multi-family units and in temporary and permanent RV parks.

3. ***Commercial***: Commercial solid waste would be generated from the neighborhood center, community recreation center, horse park and business park.

4. ***Streets and Recreation Areas***: This source includes waste from all internal roads and alleys and recreation areas.

5. ***Water and Wastewater Treatment***: This source includes waste from the water and wastewater treatment facilities.

Classification of Solid Wastes

The solid wastes that will be generated from the UGA are classified as follows:

1. ***Construction and Demolition Debris (CDL)***: This waste stream is composed of both construction and demolition wastes, each of which includes inert and non-inert components. Demolition waste is defined as the solid waste resulting from the demolition or razing of buildings, roads, and other manmade structures (WAC 173-304-100(19)). Demolition waste consists of, but is not limited to, concrete, brick, bituminous concrete, wood and masonry, composition roofing, and roofing paper, steel, and minor amounts of other metals like copper. Inert waste is non-combustible, non-dangerous wastes that are likely to retain their

physical and chemical structure under the expected conditions of disposal, including resistance to biological attack and chemical attack from acidic rainwater (WAC 173-304-100(40)). Specific components of demolition waste – drywall, plaster, wood, and asphalt shingles – are not considered inert waste.

Neither drywall nor wood waste are considered CDL for disposal. Drywall must be disposed of as municipal solid waste. Wood waste can be recycled, given away, converted to wood chips, or disposed of as municipal solid waste.

2. ***Municipal Wastes***: These include food wastes and rubbish. Food wastes are the animal, fruit or vegetable residues resulting from the handling, preparation, cooking, and eating of foods. They are generated from the residential and commercial areas.

   Rubbish consists of combustible and noncombustible solid wastes of households, institutions, commercial activities, excluding food wastes or other highly putrescible materials. It is produced by the residential, commercial and recreational land uses.

3. ***Hazardous/Moderate Risk Wastes***: These include chemical, biological, flammable, explosive, or radioactive wastes that pose a moderate risk, immediately or over time, to human, plant or animal life. In the UGA, moderate risk wastes will be generally produced by households and commercial operations in small quantities. These waste materials include many common products, such as:

   - Oil based and water based paints
   - Paint thinners and solvents
   - Adhesives, glues and sealant
   - Brake fluid and antifreeze
   - Used motor oil
   - Car batteries
   - Pesticides/herbicides
   - Photograph chemicals
   - Unwanted fuels (gasoline, kerosene)

4. ***Biosolids/Septage***: Biosolids include the solid and semi-solid wastes from water and wastewater treatment facilities in this classification. Septage (the combination of sludge, scum and liquid pumped from septic tanks) is also included in this classification.

5. ***Yard Waste***: This includes leaves, grass clippings, brush, garden waste, tree trunks, holiday trees and prunings from trees or shrubs. Yard waste results from the care and maintenance of landscaped areas. It is mostly generated by residential, commercial, street, and recreational land uses.

H-01

6. ***Land Clearing***: Land clearing waste includes trees and vegetation removed for construction, but not sold as timber.

Waste Stream Quantities and Management

The waste stream quantities estimates from the project construction and operation of each alternative along with proposed management procedures for the UGA alternatives are presented in this section.

CDL Wastes

Generation Estimate. CDL wastes have been estimated based on 4.38 lbs/sf of new construction for residential areas and 3.89 lbs/sf of new construction for non-residential areas (EPA, "Characterization of Building-Related Construction and Demolition Debris in the United State," 1998). Quantity estimates are based on these rates and the building areas given in **Tables 5-1** and **5-2**. Estimated CDL quantities by year are given in **Table 5-3** for Alternatives 2 through 5. According to the 1995 survey by Metropolitan Service District in Portland, Oregon, construction debris is typically comprised of 5 percent asphalt and concrete; 67 percent waste wood; 0.4 percent metal; 3 percent asphalt shingle; 20 percent drywall; and about 5 percent deconstruction. The majority of residential units in the UGA will be constructed with metal roofs. Therefore, there will be a minor asphalt shingle component, and the metal component will increase accordingly. The composition of CDL estimated for the UGA is: wood waste, 70.5 percent; asphalt and concrete, 5.3 percent; drywall, 21.0 percent; metals and metal roofing, 3.2 percent.

Inert CDL waste will be collected on-site and hauled directly to the Kittitas County Inert/Demolition Debris Waste Landfill at Ryegrass. Non-inert CDL wastes will be collected on-site and hauled to the Cle Elum transfer station for disposal. No inert construction waste will be hauled to Kittitas County-owned transfer stations. A CDL recycling program will be developed that will require participation of all Trendwest Properties' contractors working in the UGA. The program will be approved by the Kittitas County Solid Waste Department prior to the start of construction.

Table 5-1: Estimated Residential Building Areas, Cle Elum UGA

Residential Building Area, sf			
Alternative 2	**Alternative 3**	**Alternative 4**	**Alternative 5[a]**
1,672,000	2,587,000	1,519,000	2,719,000

[a] Excludes buildings in 175-acre reserve parcel, for which uses are undefined.

Table 5-2: Estimated Non-Residential Building Areas, Cle Elum UGA

	Total Building Area, sf			
Facility	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5[a]**
Water Treatment Plant	13,000	13,000	13,000	13,000
Golf Course Clubhouse/Recreation Center	17,000	17,000	17,000	-
Temporary Sales Center	8,000	8,000	8,000	-
Golf Maintenance Building	6,000	6,000	6,000	-
General Maintenance Building	6,000	6,000	6,000	9,000
Activity/Multi-purpose Barn	6,000	6,000	6,000	-
Lodge	45,000	45,000	45,000	-
Horse Park	545,000	-	545,000	-
Community Center	10,000	10,000	10,000	10,000
Business Park	950,000	600,000	300,000	950,000
RV Park/Temporary RV Park	4,500	4,500	4,500	2,500[b]
Residential Recreation Buildings/ Neighborhood Center	10,500	10,500	10,500	12,500
Total	**1,621,000**	**726,000**	**971,000**	**997,000**

[a] Excludes Reserve Area.
[b] Temporary RV park.

Table 5-3: Projected CDL Generation Rates (Tons/Year) and Total Quantity at Full Buildout, Cle Elum UGA

Buildout Year	Alternative 2		Alternative 3		Alternative 4		Alternative 5[a]	
	Residential	Non-residential	Residential	Non-residential	Residential	Non-residential	Residential	Non-residential
1	369	108	444	108	464	108	378	47
2	503	88	643	88	457	88	876	24
3	511	606	745	51	453	561	890	76
4	523	606	500	51	295	561	526	76
5	315	95	419	71	134	50	416	66
10	38	66	76	42	50	21	99	66
20	54	66	134	42	66	21	120	66
30	22	66	41	42	28	21	22	62
Buildout Total (tons)[b]	**3,661**	**3,151**	**5,666**	**1,411**	**3,327**	**1,887**	**5,955**	**1,939**

[a] Excludes Reserve Area.
[b] Buildout total represents the cumulative total quantity of CDL produced over the 30-year buildout period.

The generation estimates presented in **Table 5-3** do not include wastes from road, utility and non-building structure construction. Estimating criteria for this waste stream were not found in the literature. However, the magnitude of this waste stream is expected to be minor in comparison to the building CDL.

Management Provisions. CDL collection points will be locations specified by the City of Cle Elum through its building permit process. Inert and non-inert waste will be handled as described in the following.

H-01

Inert Wastes. Drop boxes will be maintained on-site for temporary storage of inert wastes during construction. Inert wastes collected in drop boxes will be hauled directly to the permitted Ryegrass CDL landfill by the contractors or by Waste Management by agreement with the contractors. The recyclable materials will be segregated from the waste stream on-site.

Non-Inert Wastes. Non-inert wastes will be temporarily stored in separate drop boxes on-site until hauled to the Cle Elum Transfer Station. The wastes except for the recyclables will then be transported to the Greater Wenatchee Landfill, Douglas County for the final disposal. Recycled materials will be segregated from the waste stream as discussed for inert wastes.

Wood Wastes. Construction wood waste will be handled on-site. Wood wastes will not be hauled to the Kittitas County municipal solid waste facilities. Wood waste will be given away as firewood, chipped, or recycled.

Municipal and Other Wastes

Generation Estimates. A generation rate of 5.45 lbs./person/day, based on 1999 Washington State average municipal solid waste production, has been applied to the residential areas and the temporary RV park. For the business park, the waste stream quantities have been estimated based on a generation rate of 0.16 lb/person/day (Tchobanoglous, "Integrated Solid Waste Management: Engineering Principles and Management Issues," 1993). This rate is multiplied by the projected occupancy (number of occupants times 365 days, times the occupancy rate). Waste stream quantities have not been estimated for the reserve area because definitive plans are not available for this area.

A generation rate of 0.25 lb/person/day has been used for wastes produced by street and alley cleaning (Tchobanoglous, "Solid Waste Management: Engineering Principles and Management Issues", 1993).

Yard waste has been estimated based on a generation rate of 0.44 lbs./person/day (EPA, *Decision-Maker's Guide to Solid Waste Management*, Second Edition, 1995). This may be a conservative rate, given the limited irrigated landscaping that will be allowed by the project's CC&Rs on individual lots. A unit area generation rate was not found in the literature to compare to the per capita rate.

The household hazardous/moderate risk waste rate has been based on 1997-1999 Kittitas County records during which households generated an annual average of 103.7 pounds, equivalent to a daily average of 0.29 pounds per household or 0.13 pounds per person per day using the Kittitas County persons per household data. The UGA value of 2.4 persons per household and number of units was multiplied by the 0.13 pounds per person per day to estimate solid waste generation for the UGA

H-01

Projections of municipal solid waste generation for Alternatives 2 through 5 are presented in **Table 5-4**, together with projections for yard and hazardous/moderate risk wastes.

Table 5-4: Solid Waste Production (tons/year), Cle Elum UGA

Buildout Year	Alternative 2	Alternative 3	Alternative 4	Alternative 5[a]
Project Year 1				
Municipal[b]	292	310	335	305
Yard	21	24	26	24
Hazardous/Moderate Risk	6	7	8	7
Total (tons/year)	**319**	**341**	**369**	**336**
Project Year 2				
Municipal	763	711	703	587
Yard	55	55	54	45
Hazardous/Moderate Risk	16	16	16	13
Total (tons/year)	**834**	**782**	**773**	**645**
Project Year 3				
Municipal	1,135	1,109	993	1,097
Yard	83	85	76	88
Hazardous/Moderate Risk	24	25	23	26
Total (tons/year)	**1,242**	**1,219**	**1,092**	**1,211**
Project Year 4				
Municipal	1,512	1,394	1,148	1,662
Yard	110	107	88	128
Hazardous/Moderate Risk	32	32	26	38
Total (tons/year)	**1,654**	**1,533**	**1,262**	**1,828**
Project Year 5				
Municipal	2,150	2,037	1,495	1,917
Yard	157	156	114	148
Hazardous/Moderate Risk	46	46	34	44
Total (tons/year)	**2,353**	**2,239**	**1,663**	**2,109**
Project Year 10				
Municipal	2,504	2,556	1,663	2,431
Yard	183	196	127	187
Hazardous/Moderate Risk	54	58	38	55
Total (tons/year)	**2,741**	**2,810**	**1,828**	**2,673**
Project Year 20				
Municipal	2,756	3,052	1,958	3,018
Yard	200	233	150	231
Hazardous/Moderate Risk	59	69	44	68
Total (tons/year)	**3,015**	**3,354**	**2,152**	**3,317**
Project Year 30				
Municipal	2,929	3,340	2,147	3,363
Yard	211	255	163	256
Hazardous/Moderate Risk	62	75	48	76
Total (tons/year)	**3,202**	**3,670**	**2,358**	**3,695**

[a] Excludes Reserve Area.
[b] Residential and commercial generation.

H-01

Management Provisions. The Trendwest UGA development will generate an estimated 3,363 tons of municipal solid wastes annually at full buildout (Alternative 5, Year 30). Waste Management of Ellensburg or its successors will collect the wastes from UGA. The methods and points of connection will vary by type of use and accommodation. The principal arrangements are likely to be as follows:

Accommodation/Area	Collection Responsibility	Collection Point
Single family residential	Residents	Curb-side pickup by Waste Management
Multi-family residential	Residents	Central dumpsters
Business Park, lodge, horse park, RV park areas	Operators/tenants	Central dumpsters

The wastes will then be hauled to the Cle Elum Transfer Station prior to transport to the Greater Wenatchee Landfill in Douglas County for final disposal.

Yard waste disposal by residents will be by curb-side pickup by Waste Management, or self-haul to an allowable transfer station. Yard waste disposal for commercial operators/tenants will be the responsibility of their commercial landscape services.

Streets will be cleaned periodically in accordance with City of Cle Elum practices.

Hazardous/moderate risk wastes will be disposed of by residents and commercial operators/tenants at local community-sponsored turn-in events.

Recycling. Chapter 70.95 RCW establishes statewide recycling and waste reduction goals. A goal of 50 percent was established for 1995, realizing this would be more easily achieved in urban areas than rural eastern Washington areas. Kittitias County's goal is for an overall recycling rate of 50 percent by 2003 for the Kittitas County Solid Waste Management Plan. According to the Kittitas County Solid Waste Management Plan, a "best guess" of the recycling rate in 1997 is between 15 and 20 percent.

Recycling within the UGA will be encouraged. Many of the residents will move from areas with effective recycling programs, and will expect similar programs to be in place in the UGA. Curbside recycling is possible, but not included in the program at this time. Preliminarily, the recycling program elements are expected to include recycle bins at each central dumpster location for use by residents and commercial operators/tenants. It is recommended that the dumpster/recycle stations be designed so that the dumpsters can be removed without moving the recycling containers. These stations will receive aluminum, tin, glass, plastic bottles and milk jugs, mixed paper, and newspaper. The destination(s) of these materials will be determined at a later date.

H-01

Septage Wastes

Septage waste from the UGA will be limited to three permanent comfort stations serving trails or golf courses. These comfort stations would be served by septic tanks and drainfields due to their distance from UGA sewers. Additionally, up to two temporary stations are possible for sales and maintenance facilities constructed prior to availability of sewer service at those locations. The septic tanks would be pumped once every three to five years, and hauled directly to the County evaporation lagoons at Ryegrass Landfill for final disposal. An RV waste dumping facility will not be located in the UGA. For this reason, it is proposed that the temporary RV Campground be served by the UGA sewer system.

Land Clearing Wastes

It is not anticipated that any wastes generated from UGA land clearing operations will be hauled to Kittitas County solid waste facilities. Land clearing wastes remaining after removal of saleable timber will likely be burned, given away as free firewood, or chipped on-site. Chipped wood wastes could be marketed as pulp material, or made available free of charge to the public.

Waste Loading Impacts

Based on data presented in **Table 5-3** and **5-4**, Alternative 5 generates the greatest quantities of CDL and MSW. Therefore, assessment of impacts on existing solid waste facilities will be based on Alternative 5.

Cle Elum Transfer Station. The Cle Elum transfer station is reported by Kittitas County to have processed 4,632 tons of waste in 1999. Customers made a total of 20,646 deliveries to the transfer station. The station is reported to be near capacity, based on the number of cars queued at the station on Saturdays. Tuesdays are also busy days at the station, as it is closed Sundays and Mondays.

Assuming that 5,000 tons of municipal solid waste per year were to be processed in Year 1 of the UGA, UGA Alternative 5 municipal solid wastes would add 103 tons (without recycle), or 2 percent, to the then existing station loading (without recycle, assuming MSW generation lags construction MSW generation by one year). Similarly, for Year 5, the UGA would add 1,779 tons, or 36 percent, above an assumed 5,000-ton per year loading. The annual generation at Year 30 for the UGA is estimated at 3,383 tons per year, or 68 percent above an assumed 5,000-ton per year existing loading.

Based on the daily ratio of 4 cubic yards of MSW waste per ton, the daily average storage needs for the UGA (without recycle) would be 20 cubic yards for Year 5; 27 cubic yards for Year 10; and 36 cubic yards for Year 30.

H-01

The existing Cle Elum transfer station will need to be expanded in capacity to accommodate the UGA. However, the exact timing of need for capacity expansion relative to the UGA demands needs to be determined. Loading impacts to the Cle Elum transfer station will be minimal during the early years of the UGA because mandatory curbside pick-up will be in effect for the UGA. Curbside pick-up will distribute the waste loadings throughout the week instead of being concentrated on Saturdays and Tuesdays.

Design of the expansion of the Cle Elum Transfer Station is currently underway by Kittitas County. The capacity of expanded facility will take into account the capacity needs of the UGA.

Trendwest Properties will be responsible for its fair share of the costs associated with improvements to the Cle Elum Transfer Station required to mitigate identified impacts attributable to the project.

Ryegrass CDL Land Fill. UGA CDL inert wastes will be hauled to the CDL landfill at the Ryegrass site for disposal. According to the data from the Solid Waste Program of Kittitas County, currently 40 to 50 percent of capacity at the acre CDL landfill is filled. When the landfill reaches 60 percent capacity, the County would apply for a new permit for additional space at the existing landfill.

About 5 percent of the CDL wastes will be inert and hauled to the CDL landfill. During the first five years of construction, the total estimated CDL (non-Business Park) and inert waste volume is estimated at 157 tons (without recycle). Assuming an in-place density of 100 pounds per cubic foot on the average (concrete is in the range of 140 to 160 pounds per cubic foot), the year volume would be about 3,600 cubic feet, or 0.08 acres one foot deep. An effective recycling program would likely reduce this volume substantially.

Even with an effective recycling program, the UGA CDL wastes, together with other Kittitas County CDL wastes, will necessitate the enlargement of the CDL landfill facility.

Ryegrass Septage Ponds. Kittitas County currently has a septage lagoon facility at the Ryegrass site. The facility has two 350,000-gallon lagoons. The estimated 1999 accepted volume is 750,000 gallons. Because of the high summer evaporation rate, the facility was able to handle this volume easily. Kittitas County believes the facility has additional capacity, and this will be confirmed through future monitoring is planned. The annual UGA volume from the three trailside/golf septic systems should not impact the facility, based on the County's current understanding of the facility's capacity. In addition to the Ryegrass septage ponds, the proposed Regional Wastewater Treatment Plant may include a septage receiving facility that could accommodate the UGA.

Pressure Zones

The study area for each alternative is split into two pressure zones at an elevation of approximately 2,080 feet. Zone 3 (upper elevation pressure zone) encompass the elevations between 2,154 and 2,080. Zone 2 (lower elevation pressure zone) encompasses the elevations between 2,080 and 2,000. Pressure reducing stations would be installed at most of distribution lines crossing the boundary between Zones 3 and 2.

Treated Water Storage

Storage for the project includes the following elements:

- Equalizing storage to minimize pumping capacities required to meet peak hour demands.
- Fire storage to provide the required fire flow volume.
- Standby storage to provide water to the system during emergencies.
- Operational storage for pump protection.

Two storage reservoirs are proposed to serve the UGA for each alternative. These include a storage tank designed to serve the upper pressure zone, and a 0.50 MG regional reservoir recently constructed by the City of Cle Elum designed to serve the lower pressure zone. The lower pressure zone reservoir would serve the City of Cle Elum, Town of South Cle Elum and the UGA. The upper zone storage requirements for each alternative are listed in **Table 3-13**. Lower zone storage is included in the proposed City reservoir. Equalizing storage volumes were calculated by mass diagram methods. Standby storage was calculated as two times the average annual demand for the pressure zone. The provision for emergency power generation could reduce standby storage requirements. Fire suppression storage was based on 1,500 gpm for four hours. Operational storage will be determined during project design.

Table 3-13: Treated Water Storage Requirements, Gallons

Alternative	Service Area	Equalization Storage[1]	Fire Flow Storage	Standby Storage	Total Storage
2	Upper Pressure Zone	115,000	360,000	419,000	894,000
3	Upper Pressure Zone	150,000	360,000	552,000	1,062,000
4	Upper Pressure Zone	90,000	360,000	326,000	776,000
5	Upper Pressure Zone	188,000	360,000	787,000	1,335,000

[1] Size is based on equalizing storage for 24-hour pumping.

Transmission/Distribution Mains

Transmission mains will convey water from the Yakima River water intake structure to the proposed water treatment plant, and to irrigation storage ponds. These lines are expected to be 18 inches in diameter. The currently planned alignment to the plant is shown in **Figures 3-2, 3-3, 3-4, and 3-5**.

The distribution systems for Alternatives 2, 3, 4, and 5 are comprised of looping water distribution pipe networks of 8- to 12-inch diameter waterlines. The distribution system for each alternative will provide water at pressures between 31 and 72 psi to all services during maximum day demand.

The untreated irrigation demands for artificial water body evaporation make-up water and golf course and other landscape irrigation would be served from the transmission main shown in **Figures 3-2, 3-3, 3-4, and 3-5**. This line will serve both the MPR and UGA demands. The domestic supply transmission main for the MPR would be constructed parallel to the UGA/MPR irrigation main at an offset distance conforming to DOH standards. Much of the alignment of these mains would be located in the BPA powerline easement. If practicable, the two mains would be constructed at the same time.

Pumping Systems

The UGA upper zone reservoir and water distribution system for each alternative will be supplied by pumps at the water treatment plant. These pumps will be sized as a part of the treatment plant design. Sizing will accommodate UGA upper zone demands as well as a portion of the City of Cle Elum's water demands.

Water System Modeling

The preliminary water systems for the study area for Alternatives 2, 3 and 4 were modeled and analyzed using the Cybernet Water Distribution Modeling software. The water system for Alternative 5 was sized based on the modeling results for the other alternatives. The analysis was performed for average day demand, maximum day demand, maximum day with coincident fire flow, and peak hour demand. The fire demand nodes were selected at all junctions in the system to simulate the maximum effect on piping and pressures. The fire flow demand simulated was 1,500 gpm for residential and commercial areas. The lower system boundary node, which is the connection to the proposed water treatment plant, was set at the gradeline elevation of 2,160 feet for the water system model. This elevation represents the proposed operating elevation of the lower pressure zone regional storage reservoir planned by the City of Cle Elum.

The following criteria was used for the distribution system sizing:

- Minimum system pressure of 30 psi during peak hour demand.

H-01

- Minimum system pressure of 20 psi during maximum day demand plus fire flow conditions.
- Maximum system pressure of 100 psi during all flow conditions.
- Maximum velocity of 10 fps during maximum day demand plus fire flow conditions.
- Maximum velocity of 7 fps during maximum day demand.

Preliminary model results for each alternative indicate that the minimum residual pressure (20 psi) is provided during maximum day demand with coincident 1,500-gpm fire flow demand. During peak hour demands, the minimum pressure is 31 psi, which is greater than the minimum allowable of 30 psi. The maximum pressure of 72 psi is less than the maximum allowable of 100 psi. The model will be used to verify preliminary distribution system sizing and operating pressures for the final water system layout prior to design.

Water Use Standards

The following provides the water use standards contained in the Draft Development Standards for the Preferred Alternative (Alternative). As discussed previously, these standards would also apply to Alternatives 2, 3, and 4.

The UGA project planning principles include conservation objectives for both indoor and outdoor water use. Water rights for the project were procured in sufficient quantities to serve the needs of the residents with (1) indoor conservation measures in-place, and (2) irrigated area limitations and irrigation conservation measures in-place.

Indoor Water Use Standards

Water conservation fixtures to be installed in residential and residential-related buildings are as follows:

- 1.6 gallons per flush gravity flush toilets.
- 2.5 gallons per minute shower heads.
- 2.5 gallons per minute aerators on all faucets.
- 1.0 gallons per flush urinals.

Although the use of water conservation appliances is not required, residents are encouraged to evaluate the option of installing the following water conservation appliances and devices:

- Water efficient dishwashers (6 gallons per load).
- WashWise clothes washing machines (<24 gallons per load).
- Refrigerators with cold water dispensers.
- Pressure-reducing valves installed at individual services where system pressures exceed 60 psi to reduce pressures to 45 psi (to be maintained by homeowner).

Outdoor Water Use Standards

Irrigated area limitations by unit type are set forth in **Table 3-14**.

Table 3-14: Allowable Irrigated Areas

Unit Type	Maximum Irrigated Landscape Area, SF
Single Family Residential per Lot	1,000
Wholly-Owned Condominium per Unit	1,000
Multi-Family per Unit	400
Temporary RV Park per Space	200

The volume of water available to each lot for irrigation is based on:

1. the maximum area per unit given in **Table 3-14**,
2. the net amount of water needed to maintain turf, and
3. an irrigation efficiency of 60 percent.

The net unit area irrigation requirement for turf and the resulting applied irrigation rate at a 60 percent irrigation efficiency are given in **Table 3-15**. Maximum monthly irrigation allowances for each maximum irrigated area are presented in **Table 3-16**.

Table 3-15: Turf Irrigation Requirements

Month	Net Irrigation Requirement, in.[a]	Applied Irrigation Requirement, in.[b]
May	0.0	0.0
June	3.3	5.5
July	6.5	10.8
August	4.8	8.0
September	3.5	5.8
October	0.0	0.0
Total	18.1	30.2

[a] Source: Washington State Irrigation Guide, turf/pasture requirements, Cle Elum.
[b] At 60 percent irrigation efficiency.

Table 3-16: Maximum Allowable Irrigation Volumes

Residential Landscape Area, SF	Maximum Irrigation Volume by Month, Gallons			
	June	July	August	September
200	685	1,346	999	923
400	1,371	2,692	1,004	1,446
1,000	3,428	6,732	4,986	3,615

H-01

It will be necessary to achieve a 60 percent residential irrigation efficiency value to not exceed the irrigation volume given for each maximum area in **Table 3-16**.

Irrigation during the months of April and May will either not be practiced or will be very minor. The Washington State Irrigation Guide lists the growing season for a large number of grasses and vegetable crops at Cle Elum. The growing season for turf begins June 3 and ends October 7. A net irrigation requirement for turf is not shown in the Guide for October, which indicates the requirement during the first seven days are essentially zero. The growing season for green beans, cucumbers, and squash begins July 17 and ends October 7. As with turf, no requirements for October are shown for these crops in the Guide. Spring vegetables, such as peas and onions, have a growing season starting May 15. Corn and tomatoes have a growing season starting date of June 24. Based on these growing season start dates, residential landscape watering, except for a few specific home vegetables, will not begin until June. As the demand will be negligible during April, May and October, the water use policies will not specifically prohibit irrigation during these months.

Water use policies will be contained in the CC&R's for the project.

Recommendations to Achieve Irrigation Efficiency

The 60 percent efficiency can be obtained in several ways, or with a combination of methods. The first and most obvious is to control the applied irrigation water quantity such that no more than 30.2 inches of irrigation per unit area is applied to the landscape each year. Another method is to reduce the square-footage of turf on the lot and substitute other forms of landscape requiring less water. An additional method is to plant drought resistant turf requiring less water than the 18.1 inches/year that is required by the turf/pasture vegetation. Several species of suitable turf exist that require less than 18.1 inches/year. Any combination of these methods and others can be used to decrease the water consumption for the residential landscape areas. Pamphlets and other information are available from the City, which discuss the benefits of low-water use landscaping, and providing technical information on how to improve the efficiency of water use.

The aforementioned water saving methods are all components of a landscaping principle called Xeriscape™, which began in Denver, Colorado, in 1981. Xeriscape™ benefits landowners through reduced water costs, reduced maintenance, and beautiful landscapes. Xeriscape™ is a successful method for reducing landscape water needs by 60 percent. Residential and commercial property owners will be encouraged to follow some of the landscaping principles included in the Xeriscape™ landscape methodology.

Xeriscape™ consists of seven primary steps: design, soil improvement, inclusion of mulch areas, area-specific low flow irrigation systems, use of low water demand plants, and proper maintenance. These Xeriscape™ methods are summarized below.

H-01

- **Planning and Design**. The landscape should be designed using the principle of hydrazones - grouping plants of similar watering requirements together. Low water use plants are placed away from water intensive areas such as turf, thus reducing the tendency to apply water equally over the entire landscape. Hydrazones allow the homeowner (or professional gardener) to water each hydrazone according to the water needs of the plants within each zone.

- **Use of low water demand plants.** Use of native plants that do not require supplemental water can be just as colorful and beautiful as typical plants used in landscaping, and they will require significantly less water.

- **Reduction in turf areas.** Turf requires the most water in landscape; thus, reduction in turf area can lead to a significant reduction in outdoor water consumption. Turf is important to landscape, but it should not be used simply as a ground cover. Use should be limited to high activity and high visibility areas.

- **Soil improvement.** For a healthy, properly developed, properly draining, and water efficient turf, the recommended topsoil root-zone is 12 inches (6-inch minimum).

- **Inclusion of mulch areas.** Mulch covers soils, saves moisture, reduces water consuming weed growth, and adds variety to the landscape. Plants should be used to cover the majority of the mulch areas.

- **Efficient Irrigation.** There are a variety of irrigation system technologies and methods, including micro-irrigation systems, drip irrigation, underground automatic irrigation, and un-timed sprinklers. Efficiency with any irrigation system is obtained through proper maintenance and adjustment of the system so that only the landscape is watered, and the appropriate quantity of water is applied.

- **Appropriate Maintenance.** Proper maintenance of the turf and landscape is required to keep water use to a minimum. Lawns should be fertilized infrequently to avoid excessive growth, weeds should be removed because they compete for water, and diseased and dead plants should be removed.

To achieve the required irrigation efficiency of 60 percent or greater, it is recommended that two or more of the following Xeriscape™ principles be chosen and implemented by the property owner:

- Use of Chewings Fescue, SR 5100 seed, or equivalent drought resistant low water demand turf, for turf seeding.

H-01

- Reduce turf area to 70 percent of the allowable irrigated landscape envelope for the unit purchased and leave the remaining area native or plant alternative landscape consuming less water than turf.
- Installation of a metered, automatic irrigation system with programmable controller to vary application rates over the irrigation season.

The homeowners are encouraged to do the following as well:

- Remove first 12-inches of native soil and amend to achieve a topsoil mixture or replace the native soil with 12-inches of topsoil for all areas to be planned with turf.
- Use only required quantity of fertilizer, as use of excessive fertilizer leads to plants that require more water.
- Incorporate hydrazones in the planting scheme of the landscape.
- Use mulch areas in the landscape.
- Water between the hours of 5 a.m. to 8 a.m.
- Properly maintain the landscape by removing weeds, limiting fertilizer application, and mow turf to a minimum of 3 to 4 inches.

Presented in this section is information on the preliminary sewer system concepts for Alternative 2, 3, 4, and 5. In addition, information is provided on the proposed wastewater treatment and disposal facilities to serve the UGA and MPR.

Wastewater Flow Projections

Wastewater generation is a function of water use or demand. Hobson Johnson Associates, Inc. provided monthly occupancy estimates for each unit type through buildout of the UGA as well as monthly visitor estimates. These data provided information necessary to generate estimates of seasonally varying water demand. The wastewater production is calculated as a percentage of inside water demand, as shown in **Table 4-1**. The percent return values were developed considering Ecology's standard flow rate for new systems (including normal infiltration), side sewer length considerations relative to the type of unit appropriate adjustments infiltration, and typical wastewater flow data presented in the literature (i.e., Metcalf & Eddy, *Wastewater Engineering – Treatment, Disposal, Reuse*, 3rd edition). For purposes of system pipe sizing and design, seasonally varying infiltration and inflow percentages, shown in **Table 4-2**, were applied to the wastewater generation estimates.

Table 4-1: Wastewater Generation/Return Flow as a Fraction of Inside Water Demand

Unit Type	Percentage of Water Demand
Lodge[a]	95
Apartment & Condominium	90
Single Family	80
Daytime Visitors/Employees[a]	80
Campground	80
Business Center	80

[a] Alternatives 2, 3, and 4 only.

Table 4-2: Infiltration/Inflow as a Percentage of Maximum Month Wastewater Production

Month	Infiltration/Inflow, Percentage of Wastewater Production
January	20
February	25
March	25
April	15
May	15
June	10
July	10
August	10
September	10
October	10
November	10
December	15

H-01

Usual practice is to estimate infiltration/inflow rates as a maximum value on a per acre basis. However, seasonally varying infiltration/inflow (I/I) rates have been used to estimate the monthly I/I return flow component for the water supply analysis. Very little inflow is expected, as the UGA will prohibit discharge of stormwater to the sanitary sewer system. Ecology's standard residential unit rate of 100 gpcd includes an allowance for normal infiltration. From **Table 4-1**, the normal wastewater is 80 percent times the water demand of 100 gpcd, or 80 gpcd. From **Table 4-2**, the normal maximum seasonal I/I allowance is 25 percent of maximum month wastewater generation. Using the 80 gpcd inside generation for the maximum month and the 25 percent I/I allowance, the seasonal maximum wastewater generation would be:

80 gpcd + 25 percent x 80 gpcd = 100 gpcd.

This is the same value as recommended by Ecology for new sewer systems in its publication "Criteria for Sewage Works Design."

Wastewater generation for single family, condominium and apartment units are summarized in **Tables 4-3** and **4-4**, respectively.

Table 4-3: Wastewater Generation – Single Family

Parameter	Primary Residences
Party Size	2.4
Unit Water Demand (gpdpc)	100
Wastewater Production Percentage	80%
Total Wastewater Production (gpd)	192

Table 4-4: Wastewater Generation - Condominium and Apartment Units

Parameter	Wholly Owned Condominiums	Time Share Condominiums Non-primary Residences[a]	Apartment Primary Residences
Party Size	2.4	2.5	2.4
Unit Water Demand (gpdpc)	100	100	100
Wastewater Production Percentage	90%	90%	90%
Total Wastewater Production (gpd)	216	225	189

[a] Alternatives 2, 3, and 4 only.

Business Park wastewater production, which is assumed at 80 percent of inside water use, is assumed to be 0.068 gallons/day per square foot of the building.

H-01

Wastewater production estimates for project components associated with Alternatives 2, 3, and 4 only are provided in the following.

For the lodge, a daily wastewater production of 114 gpd per room was used. This was based on 1.5 persons per room, a demand of 80 gpd per person (for both guestroom and non-guestroom demands), and a 95 percent wastewater fraction of water demand.

For the campground, a daily wastewater production of 128 gpd per campsite was used. This is based on 3.2 persons per campsite, 50 gpd per person water demand and an 80 percent wastewater fraction of water demand.

For visitor and employees, 16 gpd per person was used based on a water demand of 20 gpd per person and an 80 percent wastewater fraction of water demand.

The projected monthly wastewater flows at buildout for Alternatives 2, 3, 4 and 5 are provided in **Table 4-5.**

Table 4-5: Monthly Wastewater Flow at Buildout, mgd[a]

Alter-native	Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average Annual
2	30 w/o I/I[b]	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.30	0.28	0.27	0.27	0.29
2	30 w/ I/I	0.32	0.35	0.35	0.33	0.34	0.34	0.34	0.35	0.33	0.31	0.30	0.32	0.33
3	30 w/o I/I	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.32	0.31	0.30	0.29	0.29	0.30
3	30 w/ I/I	0.34	0.37	0.37	0.34	0.35	0.34	0.35	0.35	0.34	0.33	0.32	0.34	0.35
4	30 w/o I/I	0.17	0.18	0.18	0.19	0.20	0.21	0.21	0.22	0.21	0.19	0.18	0.18	0.19
4	30 w/ I/I	0.22	0.23	0.24	0.22	0.23	0.23	0.23	0.24	0.23	0.21	0.20	0.21	0.22
5[c]	30 w/o I/I	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
5[c]	30 w/ I/I	0.30	0.32	0.31	0.29	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.28

[a] Includes wastewater flows from Non-Trendwest facilities located in the UGA.
[b] I/I represents infiltration and inflow, which varies by month from 10 percent to 25 percent of maximum month inside wastewater production.
[c] Excludes Reserve Area.

Appendix F

Transportation



TABLE OF CONTENTS
Appendix F

1. PM Peak Hour Trip Generation Volumes
2. Intersection Traffic Volumes
3. Intersection Levels-of-Service
4. Traffic Signal Warrants

PM Peak Hour Trip Generation Volumes



Table F-1: PM Peak Hour Trip Generation Volumes, Year 5, Alternatives 1, 2, 3, 4, and 5

Land Use	Directional Distribution (%)		Project Alternatives									
	Enter	Exit	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
			Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Residential												
Single-family												
• Weekday	64	36	12	7	69	39	160	90	85	48	208	117
• Saturday	54	46	9	7	54	46	124	106	66	56	162	138
• Sunday	53	47	8	6	48	42	112	99	60	53	145	130
Multifamily												
Whole Interest Condominium												
• Weekday	65	35	NA[1]	NA	50	27	26	14	30	16	100	54
• Saturday	54	46	NA	NA	36	31	19	12	21	18	72	62
• Sunday	49	51	NA	NA	32	33	17	17	19	19	63	65
Apartment												
• Weekday	61	39	NA	NA	122	78	113	72	75	48	75	48
• Saturday	NA	NA	NA	NA	78	78	72	72	48	48	48	48
• Sunday	NA	NA	NA	NA	76	76	70	70	47	47	47	47
Timeshare[2]												
• Weekday	44	56	NA	NA	12	16	10	12	10	12		
• Saturday	48	52	NA	NA	16	17	12	13	12	13		
• Sunday	46	54	NA	NA	15	18	12	14	12	14		
Non-residential												
Community Center												
• Weekday	37	63	NA	NA	47	80	47	80	47	80	19	32
• Saturday	49	51	NA	NA	35	36	35	36	35	36	14	15
• Sunday	56	44	NA	NA	47	37	47	37	47	37	19	14
Business Park												
• Weekday	23	77	NA	NA	11	37	7	23	3	12	11	37
• Saturday	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
• Sunday	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lodge[2]												
• Weekday	50	50	NA	NA	18	18	9	9	13	13		
• Saturday	NA	NA	NA	NA	37	37	18	18	28	28		
• Sunday	NA	NA	NA	NA	37	37	18	18	28	28		
Golf Course[2]												
• Weekday	43	57	NA	NA	28	37	28	37	28	37		
• Saturday	49	51	NA	NA	40	42	40	42	40	42		
• Sunday	NA	NA	NA	NA	40	40	40	40	40	40		
RV Park[2]												
• Weekday	NA	NA	NA	NA	31	31	28	28	21	21		
• Saturday	NA	NA	NA	NA	31	31	28	28	21	21		
• Sunday	NA	NA	NA	NA	31	31	28	28	21	21		
Horse Park[2,3]			NA	NA	6/45	63/450	NA	NA	6/45	63/450		
Total Trips												
• Weekday	NA	NA	12	7	394	426	428	365	318	350	413	288
• Saturday	NA	NA	9	7	372	768	348	327	316	709	296	263
• Sunday	NA	NA	8	6	371	764	344	323	309	709	274	256

1 NA = Information is not available or not applicable.

2 This feature is not a component of Alternative 5.

3 Numbers for total traffic volumes provided by Atelier, ps. Traffic volumes entering the Horse Park are assumed at 10% of total volume during PM peak hour. Weekday PM peak hour volumes estimated at 65 vehicle trips. Weekend PM peak hour (July/August) volumes estimated at 450 vehicle trips.

Table F-2: PM Peak Hour Trip Generation Volumes, Year 10, Alternatives 1, 2, 3, 4, and 5

Land Use	Directional Distribution (%)		Project Alternatives									
			Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Residential												
Single-family												
• weekday	64	36	12	7	99	56	227	127	129	72	283	159
• Saturday	54	46	9	7	77	66	176	150	100	85	220	187
• Sunday	53	47	8	6	69	61	159	141	90	80	197	175
Multifamily												
Whole Interest Condominium												
• weekday	65	35	NA[1]	NA	80	43	48	26	30	16	120	64
• Saturday	54	46	NA	NA	58	50	35	29	21	18	86	74
• Sunday	49	51	NA	NA	51	52	30	31	19	19	75	78
Apartment												
• weekday	61	39	NA	NA	122	78	131	84	75	48	75	48
• Saturday	NA	NA	NA	NA	78	78	84	84	48	48	48	48
• Sunday	NA	NA	NA	NA	76	76	82	82	47	47	47	47
Timeshare[2]												
• weekday	44	56	NA	NA	12	16	10	12	10	12		
• Saturday	48	52	NA	NA	16	17	12	13	12	13		
• Sunday	46	54	NA	NA	15	18	12	14	12	14		
Non-residential												
Community Center												
• weekday	37	63	NA	NA	47	80	47	80	47	80	19	32
• Saturday	49	51	NA	NA	35	36	35	36	35	36	14	15
• Sunday	56	44	NA	NA	47	37	47	37	47	37	19	14
Business Park												
• weekday	23	77	NA	NA	38	128	24	81	89	298	38	128
• Saturday	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
• Sunday	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lodge[2]												
• weekday	50	50	NA	NA	18	18	9	9	13	13		
• Saturday	NA	NA	NA	NA	37	37	18	18	28	28		
• Sunday	NA	NA	NA	NA	37	37	18	18	28	28		
Golf Course[2]												
• weekday	43	57	NA	NA	28	37	28	37	28	37		
• Saturday	49	51	NA	NA	40	42	40	42	40	42		
• Sunday	NA	NA	NA	NA	40	40	40	40	40	40		
RV Park[2]												
• weekday	NA	NA	NA	NA	31	31	28	28	21	21		
• Saturday	NA	NA	NA	NA	31	31	28	28	21	21		
• Sunday	NA	NA	NA	NA	31	31	28	28	21	21		
Horse Park[2,3]			NA	NA	6/45	63/450	NA	NA	6/45	63/450		
Total Trips												
• weekday	NA	NA	12	7	371	550	552	484	448	659	535	431
• Saturday	NA	NA	9	7	417	807	425	400	350	741	368	324
• Sunday	NA	NA	8	6	411	802	416	391	349	736	338	314

1 NA = Information is not available or not applicable.

2 This feature is not a component of Alternative 5.

3 Numbers for total traffic volumes provided by Atelier, ps. Traffic volumes entering the Horse Park are assumed at 10% of total volume during PM peak hour. Weekday PM peak hour volumes estimated at 65 vehicle trips. Weekend PM peak hour (July/August) volumes estimated at 450 vehicle trips.

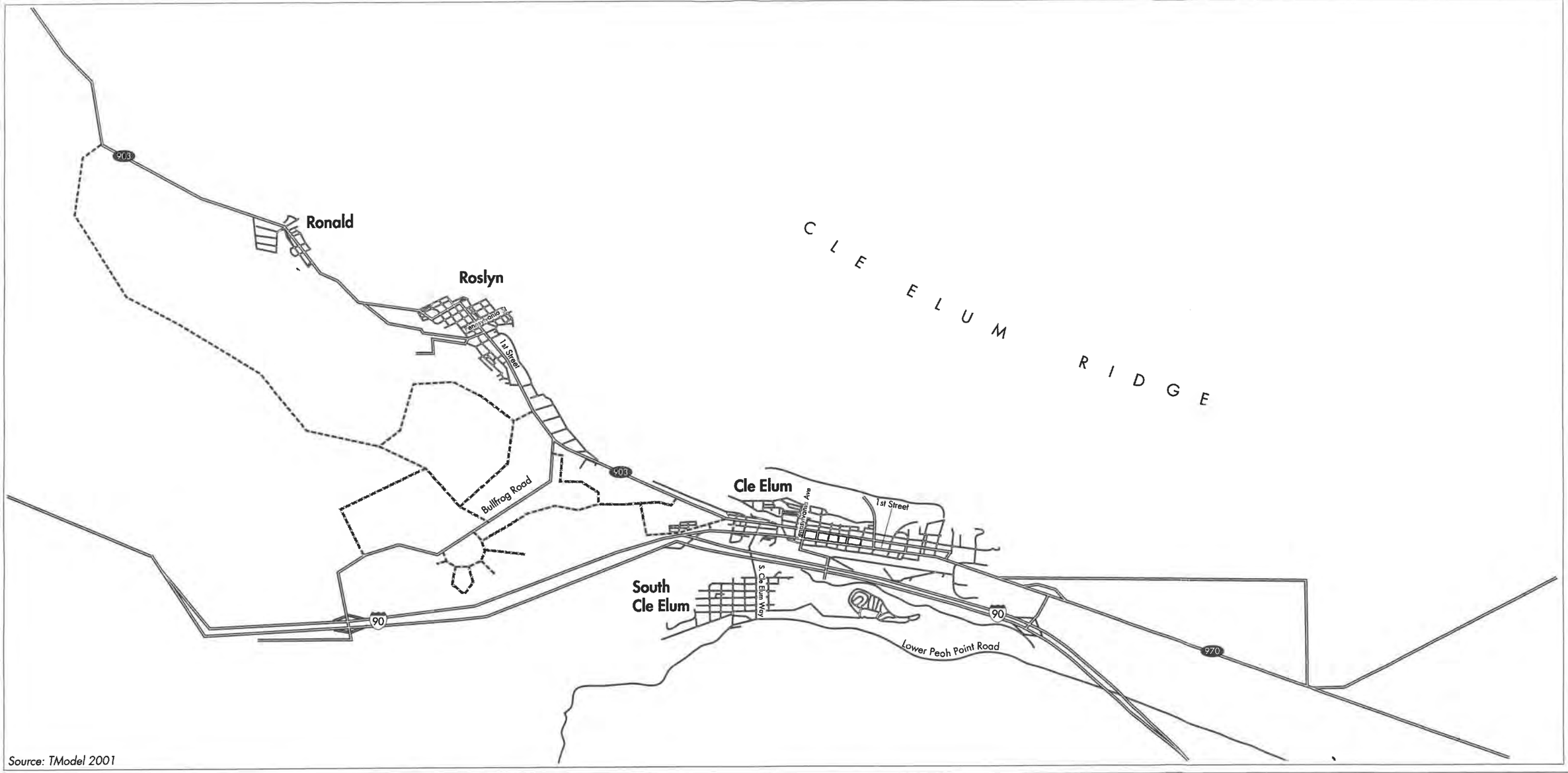
Table F-3: PM Peak Hour Trip Generation Volumes, Year 30, Alternatives 1, 2, 3, 4, and 5

Land Use	Directional Distribution		Project Alternatives									
			Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Residential												
Single-family												
• weekday	64	36	64	36	195	109	426	240	251	141	529	297
• Saturday	54	46	50	42	151	129	331	282	195	166	411	350
• Sunday	53	47	45	39	136	120	297	264	175	155	369	328
Multifamily												
Whole Interest Condo												
• weekday	65	35	NA[1]	NA	80	43	48	26	30	16	119	65
• Saturday	54	46	NA	NA	58	50	35	29	21	18	86	74
• Sunday	49	51	NA	NA	51	52	30	31	19	19	75	78
Apartment												
• weekday	61	39	NA	NA	122	78	131	84	75	48	75	48
• Saturday	NA	NA	NA	NA	78	78	84	84	48	48	48	48
• Sunday	NA	NA	NA	NA	76	76	82	82	47	47	47	47
Timeshare[2]												
• weekday	44	56	NA	NA	12	16	10	12	10	12		
• Saturday	48	52	NA	NA	16	17	12	13	12	13		
• Sunday	46	54	NA	NA	15	18	12	14	12	14		
Non-Residential												
Community Center												
• weekday	37	63	NA	NA	47	80	47	80	47	80	19	32
• Saturday	49	51	NA	NA	35	36	35	36	35	36	14	15
• Sunday	56	44	NA	NA	47	37	47	37	47	37	19	14
Business Park												
• weekday	23	77	NA	NA	148	495	93	312	47	156	148	494
• Saturday	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
• Sunday	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lodge[2]												
• weekday	50	50	NA	NA	18	18	9	9	13	13		
• Saturday	NA	NA	NA	NA	37	37	18	18	28	28		
• Sunday	NA	NA	NA	NA	37	37	18	18	28	28		
Golf Course[2]												
• weekday	43	57	NA	NA	28	37	28	37	28	37		
• Saturday	49	51	NA	NA	40	42	41	40	40	42		
• Sunday	NA	NA	NA	NA	40	40	40	40	40	40		
RV Park[2]												
• weekday	NA	NA	NA	NA	31	31	28	28	21	21		
• Saturday	NA	NA	NA	NA	31	31	28	28	21	21		
• Sunday	NA	NA	NA	NA	31	31	28	28	21	21		
Horse Park[2,3]			NA	NA	6/45	65/450	NA	NA	6/45	63/450		
Total Trips												
• weekday	NA	NA	64	36	787	972	820	828	528	587	890	936
• Saturday	NA	NA	50	42	491	870	581	530	445	822	559	487
• Sunday	NA	NA	45	39	478	861	554	514	434	811	510	467

1 NA = Information is not available or not applicable.

2 This feature is not a component of Alternative 5.

3 Numbers for total traffic volumes provided by Atelier, ps. Traffic volumes entering the Horse Park are assumed at 10% of total volume during PM peak hour. Weekday PM peak hour volumes estimated at 65 vehicle trips. Weekend PM peak hour (July/August) volumes estimated at 450 vehicle trips.



Source: TModel 2001

0 7000'

Approximate Scale in Feet

proposed roadway

FIGURE F-1

MODEL AREA NETWORK

Trendwest Properties: Cle Elum UGA
Final EIS

H-01

1981069

SHAPIRO & ASSOCIATES, INC.

S:\Studio HO\Files\Graphics\98\Old Net Trendwest Properties\Current\Traffic Anl\Ill\Fig F-2 Traffic Analysis Zones 2.9.02



Source: TModel 2001

0 0.5

Approximate Scale in Miles

FIGURE F-2

TRAFFIC ANALYSIS ZONES

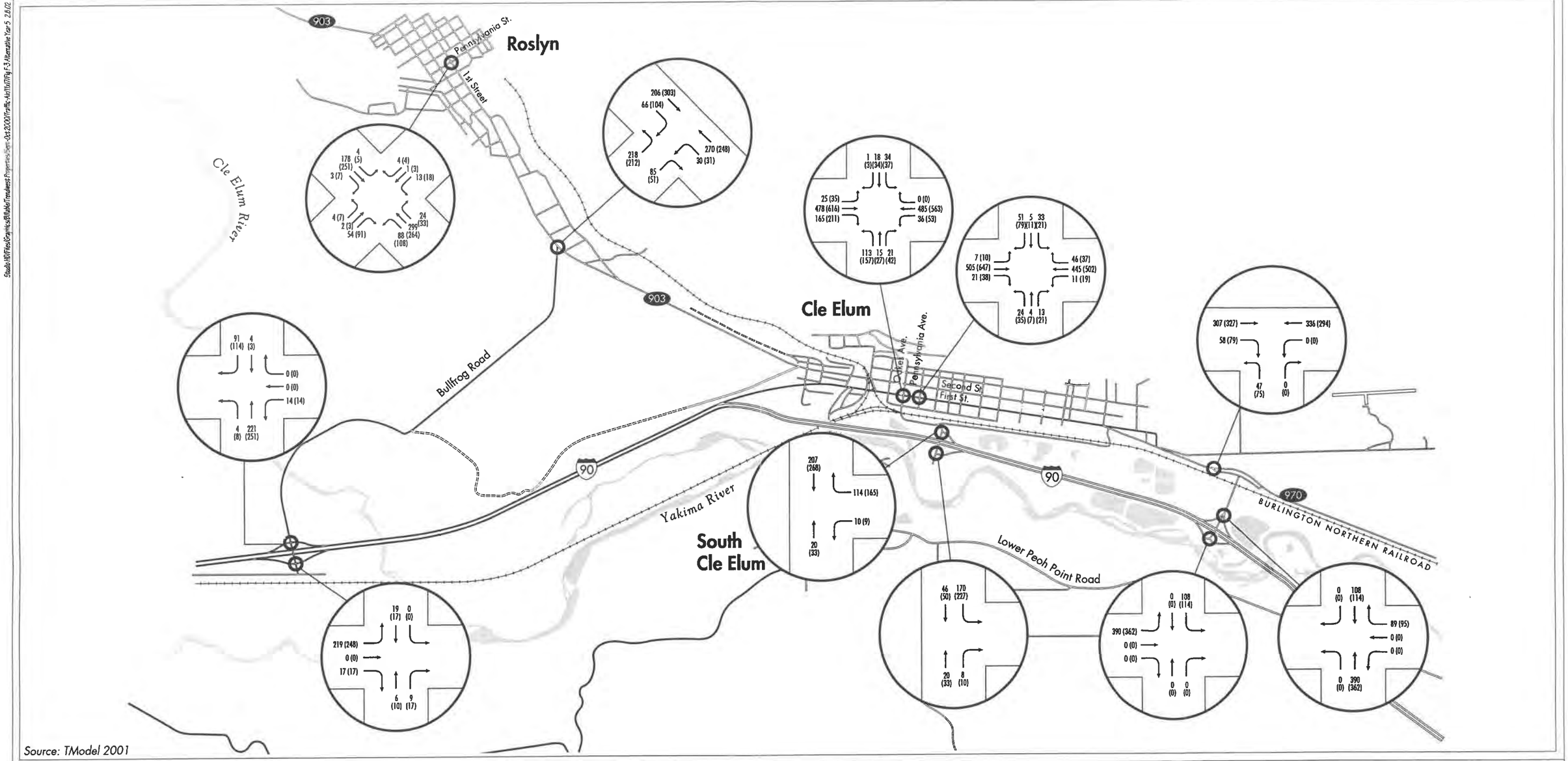
Trendwest Properties: Cle Elum UGA
Final EIS

H-01

1981069

SHAPIRO & ASSOCIATES, INC.

Studio 1801Files\Graphics\BlackTreeMaps\Presentations\Figures\Oct 2002\Traffic-Alt1\Alt1Fig F-3 Alternative Year 5 2.6.02



Source: TModel 2001

Not to Scale

46 weekday
(51) weekend

FIGURE F-3

ALTERNATIVE 1 (NO ACTION) PM PEAK HOUR VOLUMES
Year 5

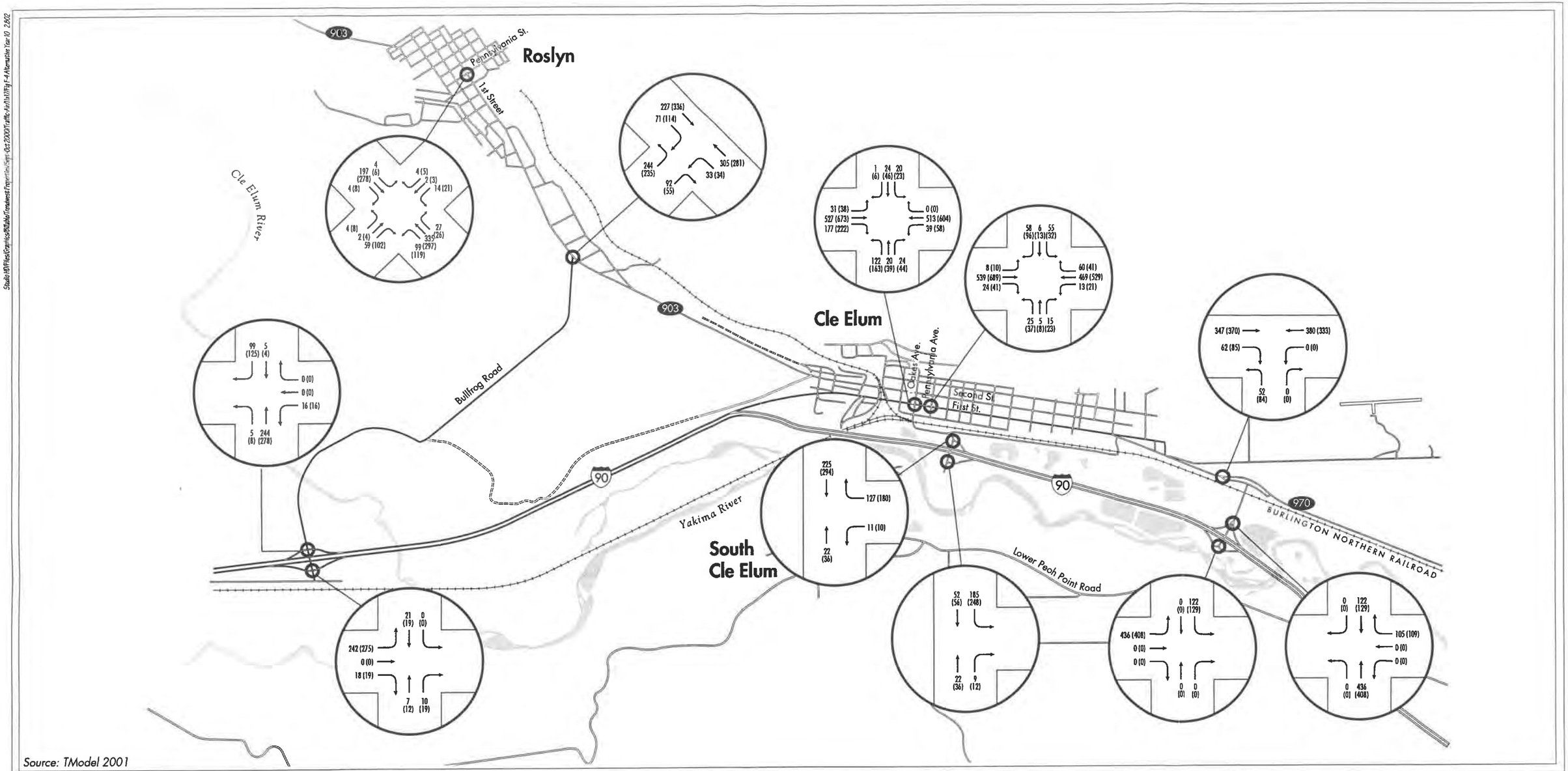
Trendwest Properties: Cle Elum UGA
Final EIS

H-01

1981069

SHAPIRO & ASSOCIATES, INC.

Studio 1/01/Files/Graphics/RSB/Alts/Treatments Preparation/Figure 0s1 2/2/01 Traffic-1s-1n1h1/Fig F-4 Alternative Year 10 2.802



Source: TModel 2001

Not to Scale

51 weekday
(56) weekend

FIGURE F-4

ALTERNATIVE 1 (NO ACTION) PM PEAK HOUR VOLUMES
Year 10

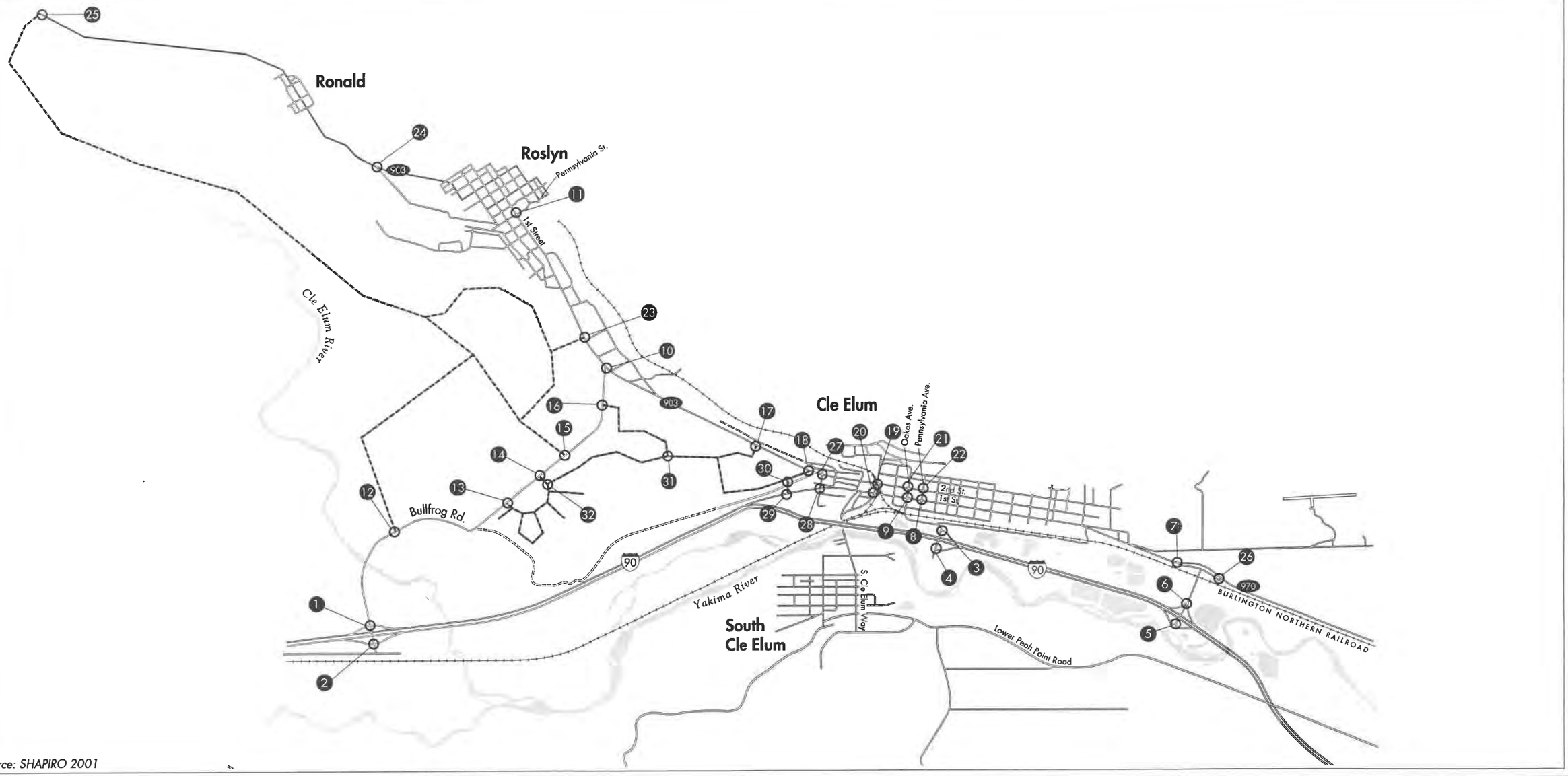
Trendwest Properties: Cle Elum UGA
Final EIS

H-01

1981069

SHAPIRO & ASSOCIATES, INC.

Studio 1401/Files/Graphics/Billable/Trendwest/Figures/LocalCurrent/Traffic/Vol1to7/TIFFs/Vol1to7TIFFs/ F-5 Intersection Volumes 2.0.02



Source: SHAPIRO 2001

N

Not to Scale

modeled future

FIGURE F-5

TRANSPORTATION NETWORK AND INTERSECTION TRAFFIC FORECAST LOCATIONS

Trendwest Properties: Cle Elum UGA
Final EIS

H-01

1981069

SHAPIRO & ASSOCIATES, INC.

Intersection Traffic Volumes



Table F-4 Intersection Traffic Volumes

Intersection	Model Node	Location	Alternative	Data Set	Year	Time	Traffic Entering Intersection																Traffic Leaving Intersection			
							Northbound				Southbound				Eastbound				Westbound							
							Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total North	Total South	Total East	Total West
1	152	WB I-90 Ramps @ Bullfrog	5	Background+ UGA	5	Weekday	4	324	0	328	0	12	113	125	0	0	0	0	14	0	9	23				
						Weekend	7	335	0	342	0	10	134	144	0	0	0	0	13	0	8	21				
					10	Weekday	4	349	0	353	0	16	121	137	0	0	0	0	16	0	13	29				
						Weekend	8	372	0	380	0	14	146	160	0	0	0	0	15	0	12	27				
				Background+ UGA+MPR	5	Weekday	3	405	0	408	0	49	146	195	0	0	0	0	14	0	32	46				
						Weekend	6	456	0	462	0	53	198	251	0	0	0	0	13	0	36	49				
					10	Weekday	3	445	0	448	0	60	164	224	0	0	0	0	16	0	36	52				
						Weekend	6	523	0	529	0	68	227	295	0	0	0	0	14	0	43	57				
2	154	EB I-90 Ramps @ Bullfrog	5	Background+ UGA	5	Weekday	0	7	9	16	7	19	0	26	321	0	16	337	0	0	0	0				
						Weekend	0	11	16	27	6	17	0	23	331	0	16	347	0	0	0	0				
					10	Weekday	0	8	10	18	10	22	0	32	345	0	17	362	0	0	0	0				
						Weekend	0	13	18	31	9	19	0	28	367	0	18	385	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	0	7	8	15	42	21	0	63	401	0	14	415	0	0	0	0				
						Weekend	0	12	15	27	47	19	0	66	450	0	15	465	0	0	0	0				
					10	Weekday	0	8	9	17	52	24	0	76	440	0	15	455	0	0	0	0				
						Weekend	0	14	17	31	61	22	0	83	515	0	16	531	0	0	0	0				
3	303	WB I-90 Ramps @ Oakes	5	Background+ UGA	5	Weekday	0	21	0	21	0	210	0	210	0	0	0	0	10	0	126	136				
						Weekend	0	33	0	33	0	270	0	270	0	0	0	0	9	0	176	185				
					10	Weekday	0	23	0	23	0	230	0	230	0	0	0	0	11	0	134	145				
						Weekend	0	36	0	36	0	294	0	294	0	0	0	0	10	0	189	199				
				Background+ UGA+MPR	5	Weekday	0	22	0	22	0	206	0	206	0	0	0	0	9	0	121	130				
						Weekend	0	34	0	34	0	281	0	281	0	0	0	0	9	0	187	196				
					10	Weekday	0	24	0	24	0	223	0	223	0	0	0	0	9	0	129	138				
						Weekend	0	37	0	37	0	305	0	305	0	0	0	0	14	0	43	57				
4	296	EB I-90 Ramps @ Oakes	5	Background+ UGA	5	Weekday	0	21	7	28	173	46	0	219	0	0	0	0	0	0	0	0				
						Weekend	0	33	10	43	229	50	0	279	0	0	0	0	0	0	0	0				
					10	Weekday	0	23	8	31	190	52	0	142	0	0	0	0	0	0	0	0				
						Weekend	0	36	11	47	249	56	0	305	0	0	0	0	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	0	22	6	28	168	46	0	214	0	0	0	0	0	0	0	0				
						Weekend	0	34	9	43	240	50	0	290	0	0	0	0	0	0	0	0				
					10	Weekday	0	24	6	30	181	52	0	233	0	0	0	0	0	0	0	0				
						Weekend	0	37	10	47	259	56	0	315	0	0	0	0	0	0	0	0				
5	327	EB I-90 Ramps @ SR 970	5	Background+ UGA	5	Weekday	0	0	0	0	104	0	0	104	389	0	0	389	0	0	0	0				
						Weekend	0	0	0	0	111	0	0	111	361	0	0	361	0	0	0	0				
					10	Weekday	0	0	0	0	116	0	0	116	434	0	0	434	0	0	0	0				
						Weekend	0	0	0	0	125	0	0	125	406	0	0	406	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	0	0	0	0	92	0	0	92	400	0	0	400	0	0	0	0				
						Weekend	0	0	0	0	103	0	0	103	372	0	0	372	0	0	0	0				
					10	Weekday	0	0	0	0	101	0	0	101	444	0	0	444	0	0	0	0				
						Weekend	0	0	0	0	113	0	0	113	417	0	0	417	0	0	0	0				
6	325	WB I-90 Ramps @ SR 970	5	Background+ UGA	5	Weekday	0	389	0	389	0	104	0	104	0	0	0	0	0	0	88	88				
						Weekend	0	361	0	361	0	111	0	111	0	0	0	0	0	0	94	94				
					10	Weekday	0	434	0	434	0	116	0	116	0	0	0	0	0	0	102	102				
						Weekend	0	406	0	406	0	125	0	125	0	0	0	0	0	0	108	108				
				Background+ UGA+MPR	5	Weekday	0	400	0	400	0	92	0	92	0	0	0	0	0	0	81	81				
						Weekend	0	372	0	372	0	103	0	103	0	0	0	0	0	0	90	90				
					10	Weekday	0	444	0	444	0	101	0	101	0	0	0	0	0	0	93	93				
						Weekend	0	417	0	417	0	113	0	113	0	0	0	0	0	0	102	102				
7	323	West End SR 903 Spur @ SR970	5	Background+ UGA	5	Weekday	45	0	0	45	0	0	0	0	0	316	54	370	0	372	0	372				
						Weekend	74	0	0	74	0	0	0	0	0	333	77	410	0	312	0	312				
					10	Weekday	49	0	0	49	0	0	0	0	0	361	56	417	0	409	0	409				
						Weekend	83	0	0	83	0	0	0	0	0	377	82	459	0	354	0	354				
				Background+ UGA+MPR	5	Weekday	38	0	0	38	0	0	0	0	0	301	43	344	0	351	0	351				
						Weekend	70	0	0	70	0	0	0	0	0	350	69	419	0	326	0	326				
					10	Weekday	39	0	0	39	0	0	0	0	0	346	42	388	0	384	0	384				
						Weekend	76	0	0	76	0	0	0	0	0	399	71	470	0	371	0	371				

Table F-4 Continued

Intersection	Model Node	Location	Alternative	Data Set	Year	Time	Traffic Entering Intersection														Traffic Leaving Intersection			
							Northbound				Southbound				Eastbound				Westbound				Total	Total	Total	Total
							Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	North	South	East	West
8	292	First @ Pennsylvania - Cle Elum	5	Background+ UGA	5	Weekday	24	5	13	42	40	6	48	94	7	513	21	541	11	469	67	547				
						Weekend	34	7	20	61	32	12	77	121	9	642	37	688	18	506	55	579				
					10	Weekday	25	6	14	45	70	7	57	134	8	549	23	580	12	483	72	567				
						Weekend	36	9	22	67	36	13	92	141	10	686	41	737	20	532	61	613				
				Background+ UGA+MPR	5	Weekday	22	6	12	40	46	7	45	98	6	502	20	528	11	444	92	547				
						Weekend	33	9	20	62	61	13	74	148	9	643	36	688	18	498	60	576				
					10	Weekday	24	8	14	46	58	8	52	118	7	560	22	589	12	455	101	568				
						Weekend	36	10	22	68	75	15	87	177	9	686	39	734	20	524	91	635				
9	291	First @ Oakes - Cle Elum	5	Background+ UGA	5	Weekday	120	21	21	162	19	10	1	30	25	501	179	705	33	508	0	541				
						Weekend	159	37	41	237	20	35	4	59	33	627	213	873	51	567	0	618				
					10	Weekday	122	30	23	175	19	20	2	41	29	538	189	756	36	529	0	565				
						Weekend	172	41	43	256	23	37	6	66	36	671	234	941	55	604	0	659				
				Background+ UGA+MPR	5	Weekday	112	28	20	160	19	9	1	29	21	490	181	692	30	481	0	511				
						Weekend	158	51	40	249	20	24	5	49	36	629	240	905	48	558	0	606				
					10	Weekday	113	37	21	171	18	13	2	33	25	549	193	767	32	498	0	530				
						Weekend	174	55	41	270	18	46	6	70	44	675	241	960	52	592	3	647				
10	223	Bullfrog @ SR 903	5	Background+ UGA	5	Weekday	241	0	100	341	0	0	0	0	0	194	94	288	65	257	0	322				
						Weekend	225	0	70	295	0	0	0	0	0	289	134	423	60	238	0	298				
					10	Weekday	267	0	115	382	0	0	0	0	0	211	104	315	85	296	0	381				
						Weekend	250	0	84	334	0	0	0	0	0	319	150	469	77	269	0	346				
				Background+ UGA+MPR	5	Weekday	237	0	195	432	0	0	0	0	0	236	104	340	130	268	0	398				
						Weekend	237	0	179	416	0	0	0	0	0	330	154	484	159	268	0	427				
					10	Weekday	256	0	247	503	0	0	0	0	0	270	117	387	185	307	0	492				
						Weekend	255	0	229	484	0	0	0	0	0	378	173	551	216	305	0	521				
11	192	SR903 @ Pennsylvania - Roslyn	5	Background+ UGA	5	Weekday	89	305	24	418	4	189	3	196	3	2	56	61	13	1	3	17				
						Weekend	108	265	23	396	5	260	7	272	7	3	93	103	19	3	4	26				
					10	Weekday	100	343	28	471	4	208	4	216	4	2	60	66	14	2	4	20				
						Weekend	120	297	26	443	5	289	8	302	8	3	104	115	21	3	5	29				
				Background+ UGA+MPR	5	Weekday	88	292	24	404	4	197	3	204	4	2	56	62	13	2	3	18				
						Weekend	110	271	23	404	5	276	7	288	7	3	95	105	19	3	4	26				
					10	Weekday	99	323	27	449	4	214	4	222	4	2	61	67	14	2	4	20				
						Weekend	122	302	26	450	5	305	7	317	7	3	107	117	21	3	4	28				
12	159	MPR Access West Access @ Bullfrog	5	Background+ UGA	5	Weekday	0	333	0	333	0	126	0	126	0	0	0	0	0	0	0	0				
						Weekend	0	344	0	344	0	144	0	144	0	0	0	0	0	0	0	0				
					10	Weekday	0	362	0	362	0	138	0	138	0	0	0	0	0	0	0	0				
						Weekend	0	384	0	384	0	160	0	160	0	0	0	0	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	0	437	0	437	0	195	0	195	0	0	0	0	0	0	0	0				
						Weekend	0	492	0	492	0	251	0	251	0	0	0	0	0	0	0	0				
					10	Weekday	0	481	0	481	0	225	0	225	0	0	0	0	0	0	0	0				
						Weekend	0	566	0	566	0	295	0	295	0	0	0	0	0	0	0	0				
13	185	West UGA Access @ Bullfrog	5	Background+ UGA	5	Weekday	0	0	0	0	0	0	0	0	0	333	0	333	0	126	0	126				
						Weekend	0	0	0	0	0	0	0	0	0	344	0	344	0	144	0	144				
					10	Weekday	0	0	0	0	0	0	0	0	0	362	0	362	0	138	0	138				
						Weekend	0	0	0	0	0	0	0	0	0	384	0	384	0	160	0	160				
				Background+ UGA+MPR	5	Weekday	0	0	0	0	7	0	56	63	74	363	0	437	0	140	1	141				
						Weekend	0	0	0	0	4	0	60	64	86	406	0	492	0	192	2	194				
					10	Weekday	0	0	0	0	7	0	61	68	75	407	0	482	0	164	2	166				
						Weekend	0	0	0	0	4	0	76	80	90	476	0	566	0	219	2	221				
14	198	Center UGA Access @ Bullfrog	5	Background+ UGA	5	Weekday	7	0	8	15	0	0	0	0	0	311	21	332	12	118	0	130				
						Weekend	6	0	7	13	0	0	0	0	0	324	19	343	11	138	0	149				
					10	Weekday	12	0	11	23	0	0	0	0	0	329	32	361	16	126	0	142				
						Weekend	10	0	9	19	0	0	0	0	0	355	29	384	14	150	0	164				
				Background+ UGA+MPR	5	Weekday	6	0	9	15	0	0	0	0	0	351	18	369	14	136	0	150				
						Weekend	5	0	7	12	0	0	0	0	0	393	17	410	12	188	0	200				
					10	Weekday	8	0	13	21	0	0	0	0	0	387	27	414	19	157	0	176				
						Weekend	9	0	10	19	0	0	0	0	0	455	25	480	16	213	0	229				

Table F-4 Continued

Intersection	Model Node	Location	Alternative	Data Set	Year	Time	Traffic Entering Intersection																Traffic Leaving Intersection			
							Northbound				Southbound				Eastbound				Westbound				Total	Total	Total	Total
							Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	North	South	East	West
15	209	Main MPR Access @ Bullfrog	5	Background+ UGA	5	Weekday	33	0	37	70	0	0	0	0	0	220	100	320	53	97	0	150				
						Weekend	28	0	29	57	0	0	0	0	0	246	85	331	44	120	0	164				
					10	Weekday	37	0	51	88	0	0	0	0	0	236	105	341	76	106	0	182				
						Weekend	31	0	42	73	0	0	0	0	0	271	93	364	63	132	0	195				
				Background+ UGA+MPR	5	Weekday	25	0	52	77	0	0	0	0	0	276	85	361	73	125	0	198				
						Weekend	24	0	42	66	0	0	0	0	0	324	76	400	63	176	0	239				
					10	Weekday	26	0	74	100	0	0	0	0	0	313	86	399	105	150	0	255				
						Weekend	26	0	58	84	0	0	0	0	0	385	80	465	91	203	0	294				
16	226	East UGA/Community Center Access @ Bullfrog	5	Background+ UGA	5	Weekday	0	257	0	257	0	150	0	150	0	0	0	0	0	0	0	0				
						Weekend	0	275	0	275	0	164	0	164	0	0	0	0	0	0	0	0				
					10	Weekday	0	286	0	286	0	181	0	181	0	0	0	0	0	0	0	0				
						Weekend	0	313	0	313	0	196	0	196	0	0	0	0	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	103	225	0	328	0	133	97	230	128	0	65	193	0	0	0	0				
						Weekend	109	257	0	366	0	149	138	287	143	0	90	233	0	0	0	0				
					10	Weekday	146	241	0	387	0	158	142	300	175	0	96	271	0	0	0	0				
						Weekend	162	281	0	443	0	173	188	361	187	0	120	307	0	0	0	0				
17	258	UGA Access @ 903	5	Background+ UGA	5	Weekday	0	247	3	250	17	128	0	145	0	0	0	0	2	0	17	19				
						Weekend	0	263	1	264	18	158	0	176	0	0	0	0	1	0	11	12				
					10	Weekday	0	276	3	279	18	156	0	174	0	0	0	0	2	0	22	24				
						Weekend	0	300	1	301	18	188	0	206	0	0	0	0	1	0	12	13				
				Background+ UGA+MPR	5	Weekday	0	343	3	346	18	204	0	222	0	0	0	0	3	0	17	20				
						Weekend	0	387	1	388	17	279	0	296	0	0	0	0	2	0	11	13				
					10	Weekday	0	405	3	408	20	269	0	289	0	0	0	0	3	0	20	23				
						Weekend	0	454	1	455	18	352	0	370	0	0	0	0	2	0	11	13				
18	266	Ranger Station Road @ SR 903	5	Background+ UGA	5	Weekday	0	0	0	0	0	0	0	0	0	350	0	350	0	299	0	299				
						Weekend	0	0	0	0	0	0	0	0	0	370	0	370	0	317	0	317				
					10	Weekday	0	0	0	0	0	0	0	0	0	387	0	387	0	352	0	352				
						Weekend	0	0	0	0	0	0	0	0	0	414	0	414	0	366	0	366				
				Background+ UGA+MPR	5	Weekday	0	0	0	0	0	0	0	0	0	480	0	480	0	369	0	369				
						Weekend	0	0	0	0	0	0	0	0	0	512	0	512	0	436	0	436				
					10	Weekday	0	0	0	0	0	0	0	0	0	569	0	569	0	455	0	455				
						Weekend	0	0	0	0	0	0	0	0	0	607	0	607	0	529	0	529				
19	283	S Cle Elum Way @ 2nd Street	5	Background+ UGA	5	Weekday	5	0	107	112	0	0	0	0	0	334	7	441	118	289	0	407				
						Weekend	2	0	75	77	0	0	0	0	0	360	3	363	101	308	0	409				
					10	Weekday	15	0	161	176	0	0	0	0	0	372	10	382	131	333	0	464				
						Weekend	4	0	84	88	0	0	0	0	0	406	3	409	102	357	0	459				
				Background+ UGA+MPR	5	Weekday	6	0	98	104	0	0	0	0	0	461	8	469	112	356	0	468				
						Weekend	2	0	69	71	0	0	0	0	0	500	2	502	94	425	0	519				
					10	Weekday	20	0	47	67	0	0	0	0	0	549	12	561	120	429	0	549				
						Weekend	4	0	74	78	0	0	0	0	0	596	3	599	62	517	0	609				
20	274	S Cle Elum @ First Street	5	Background+ UGA	5	Weekday	28	0	37	65	0	0	0	0	0	442	18	460	31	415	0	446				
						Weekend	33	0	69	102	0	0	0	0	0	442	25	467	62	415	0	477				
					10	Weekday	28	0	39	67	0	0	0	0	0	522	24	546	33	457	0	490				
						Weekend	32	0	74	106	0	0	0	0	0	487	26	513	69	455	0	524				
				Background+ UGA+MPR	5	Weekday	27	0	34	61	0	0	0	0	0	555	22	577	31	474	0	505				
						Weekend	37	0	63	100	0	0	0	0	0	570	29	599	61	519	0	580				
					10	Weekday	28	0	30	58	0	0	0	0	0	680	28	708	33	541	0	574				
						Weekend	38	0	62	100	0	0	0	0	0	661	32	693	68	598	0	666				
21	289	2nd @ Oaks - Cle Elum	5	Background+ UGA	5	Weekday	337	0	56	393	0	0	0	0	0	132	221	353	17	104	0	121				
						Weekend	313	0	45	358	0	0	0	0	0	211	207	418	19	147	0	166				
					10	Weekday	333	0	59	392	0	0	0	0	0	188	217	405	17	146	0	163				
						Weekend	320	0	47	367	0	0	0	0	0	247	225	472	20	181	0	201				
				Background+ UGA+MPR	5	Weekday	342	0	60	402	0	0	0	0	0	152	267	419	17	148	0	165				
						Weekend	342	0	66	408	0	0	0	0	0	205	259	464	18	205	0	223				
					10	Weekday	348	0	64	412	0	0	0	0	0	191	274	465	16	202	0	218				
						Weekend	364	0	71	435	0	0	0	0	0	267	242	509	19	257	0	276				

Table F-4 Continued

Intersection	Model Node	Location	Alternative	Data Set	Year	Time	Traffic Entering Intersection														Traffic Leaving Intersection			
							Northbound				Southbound				Eastbound				Westbound				Total	Total	Total	Total
							Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	North	South	East	West
22	290	2nd @ Pennsylvania - Cle Elum	5	Background+ UGA	5	Weekday	53	56	136	245	180	54	5	239	40	407	149	596	172	170	296	638				
						Weekend	73	57	183	313	176	45	5	226	27	529	169	725	188	270	274	732				
					10	Weekday	57	63	154	274	176	55	4	235	41	446	173	660	194	182	288	664				
						Weekend	79	65	207	351	191	48	5	244	26	558	187	771	214	294	277	785				
				Background+ UGA+MPR	5	Weekday	49	64	132	245	215	64	4	283	43	364	144	551	165	147	295	607				
						Weekend	70	68	179	317	219	53	4	276	48	526	171	745	186	251	292	729				
					10	Weekday	52	73	148	273	220	67	3	290	46	423	169	638	184	152	293	629				
						Weekend	74	80	201	355	204	52	5	261	50	576	199	825	208	267	306	781				
23	219	MPR Access @ 903	5	Background+ UGA	5	Weekday	17	0	29	46	0	0	0	0	0	103	30	133	0	128	0	128				
						Weekend	30	0	40	70	0	0	0	0	0	176	59	235	0	142	0	142				
					10	Weekday	25	0	33	58	0	0	0	0	0	146	40	186	0	165	0	165				
						Weekend	33	0	44	77	0	0	0	0	0	208	65	273	0	179	0	179				
				Background+ UGA+MPR	5	Weekday	24	0	25	49	0	0	0	0	0	127	28	155	0	162	0	162				
						Weekend	45	0	43	88	0	0	0	0	0	200	48	248	0	183	0	183				
					10	Weekday	33	0	29	62	0	0	0	0	0	157	34	191	0	209	0	209				
						Weekend	50	0	51	101	0	0	0	0	0	243	71	314	0	233	0	233				
24	156	SR 903 @ Horvat Road	5	Background+ UGA	5	Weekday	68	0	11	79	0	0	0	0	0	89	44	133	50	61	0	111				
						Weekend	57	0	15	72	0	0	0	0	0	177	40	217	82	85	0	167				
					10	Weekday	74	0	12	86	0	0	0	0	0	105	75	180	59	91	0	150				
						Weekend	65	0	16	81	0	0	0	0	0	208	44	252	97	114	0	211				
				Background+ UGA+MPR	5	Weekday	94	0	10	104	0	0	0	0	0	100	51	151	47	68	0	115				
						Weekend	63	0	14	77	0	0	0	0	0	174	69	243	78	120	0	198				
					10	Weekday	105	0	11	116	0	0	0	0	0	123	64	187	54	104	0	158				
						Weekend	95	0	15	110	0	0	0	0	0	209	84	293	92	138	0	230				
25	114	North MPR Access @ 903	5	Background+ UGA	5	Weekday	0	488	0	488	0	284	0	284	0	0	0	0	0	0	0	0				
						Weekend	0	454	0	454	0	414	0	414	0	0	0	0	0	0	0	0				
					10	Weekday	0	550	0	550	0	310	0	310	0	0	0	0	0	0	0	0				
						Weekend	0	508	0	508	0	460	0	460	0	0	0	0	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	34	460	0	494	0	287	6	293	14	0	49	63	0	0	0	0				
						Weekend	43	453	0	496	0	425	11	436	13	0	50	63	0	0	0	0				
					10	Weekday	45	506	0	551	0	308	11	319	24	0	74	98	0	0	0	0				
						Weekend	57	494	0	551	0	465	19	484	27	0	77	104	0	0	0	0				
26	332	East End SR903 Spur @ SR970	5	Background+ UGA	5	Weekday	11	0	0	0	0	0	0	0	0	153	11	164	0	236	0	236				
						Weekend	13	0	0	13	0	0	0	0	0	199	16	215	0	186	0	186				
					10	Weekday	13	0	0	13	0	0	0	0	0	169	12	181	0	265	0	265				
						Weekend	15	0	0	15	0	0	0	0	0	222	18	240	0	210	0	210				
				Background+ UGA+MPR	5	Weekday	10	0	0	10	0	0	0	0	0	161	11	172	0	233	0	233				
						Weekend	13	0	0	13	0	0	0	0	0	214	16	230	0	191	0	191				
					10	Weekday	11	0	0	11	0	0	0	0	0	175	12	187	0	244	0	244				
						Weekend	14	0	0	14	0	0	0	0	0	236	18	254	0	213	0	213				
27	352	Pine Street @ SR903	5	Background+ UGA	5	Weekday	0	143	0	143	0	108	0	108	0	0	0	0	0	0	0	0				
						Weekend	0	79	0	79	0	121	0	121	0	0	0	0	0	0	0	0				
					10	Weekday	0	162	0	162	0	121	0	121	0	0	0	0	0	0	0	0				
						Weekend	0	90	0	90	0	135	0	135	0	0	0	0	0	0	0	0				
				Background+ UGA+MPR	5	Weekday	20	113	0	133	0	86	21	107	30	0	34	64	0	0	0	0				
						Weekend	24	69	0	93	0	108	21	129	16	0	36	52	0	0	0	0				
					10	Weekday	23	123	0	146	0	93	25	118	39	0	40	79	0	0	0	0				
						Weekend	29	77	0	106	0	117	27	144	21	0	44	65	0	0	0	0				
28	353	Pine Street @ West First	5	Background+ UGA	5	Weekday	0	0	432	432	0	0	0	0	0	316	0	316	223	372	0	595				
						Weekend	0	0	381	381	0	0	0	0	0	333	0	333	168	312	0	480				
					10	Weekday	0	0	487	487	0	0	0	0	0	361	0	361	252	409	0	661				
						Weekend	0	0	431	431	0	0	0	0	0	377	0	377	190	354	0	544				
				Background+ UGA+MPR	5	Weekday	0	0	444	444	0	0	0	0	0	301	0	301	234	351	0	585				
						Weekend	0	0	392	392	0	0	0	0	0	350	0	350	178	326	0	504				
					10	Weekday	0	0	498	498	0	0	0	0	0	346	0	346	263	384	0	647				
						Weekend	0	0	444	444	0	0	0	0	0	399	0	399	200	371	0	571				

Table F-4 Continued

Intersection	Model Node	Location	Alternative	Data Set	Year	Time	Traffic Entering Intersection														Traffic Leaving Intersection			
							Northbound				Southbound				Eastbound				Westbound							
							Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total North	Total South	Total East	Total West
29	356	Ranger Station Connector @ West First	5	Background+ UGA	5	Weekday	34	0	29	63	0	0	0	0	0	341	138	479	15	412	0	427				
						Weekend	51	0	49	100	0	0	0	0	0	373	138	511	27	427	0	454				
					10	Weekday	38	0	27	65	0	0	0	0	0	389	172	561	17	453	0	470				
						Weekend	55	0	64	119	0	0	0	0	0	411	150	561	27	469	0	496				
				Background+ UGA+MPR	5	Weekday	39	0	16	55	0	0	0	0	0	421	168	589	13	465	0	478				
						Weekend	62	0	18	80	0	0	0	0	0	453	180	633	25	518	0	543				
					10	Weekday	45	0	11	56	0	0	0	0	0	466	244	710	14	529	0	543				
						Weekend	70	0	22	92	0	0	0	0	0	491	232	723	23	596	0	619				
30	357	Ranger Station Connector @ Ranger Station Road	5	Background+ UGA	5	Weekday	1	1	4	6	108	3	42	153	59	489	4	552	7	208	3	218				
						Weekend	1	2	6	9	97	2	67	166	95	622	3	720	6	334	3	343				
					10	Weekday	1	2	5	8	137	4	47	188	60	524	4	588	4	8	222	234				
						Weekend	2	2	6	10	105	2	71	178	113	658	4	775	7	362	4	373				
				Background+ UGA+MPR	5	Weekday	1	2	4	7	129	4	49	182	51	425	3	479	7	181	3	191				
						Weekend	1	2	6	9	129	2	74	205	75	610	3	688	6	311	4	321				
					10	Weekday	1	2	5	8	196	4	58	258	50	444	4	498	7	186	4	197				
						Weekend	2	2	6	10	174	2	79	255	85	644	3	732	7	329	4	340				
31	239	UGA Internal Intersection East	5	Background+ UGA	5	Weekday	0	0	0	0	4	0	13	17	33	470	0	503	0	161	4	165				
						Weekend	0	0	0	0	14	0	16	30	37	551	0	588	0	229	10	239				
					10	Weekday	0	0	0	0	8	0	22	30	36	494	0	530	0	171	4	175				
						Weekend	0	0	0	0	18	0	17	35	37	587	0	624	0	243	13	256				
				Background+ UGA+MPR	5	Weekday	0	0	0	0	8	0	10	18	25	382	0	407	0	129	4	133				
						Weekend	0	0	0	0	18	0	14	32	33	506	0	539	0	202	11	213				
					10	Weekday	0	0	0	0	16	0	16	32	24	381	0	405	0	130	6	136				
						Weekend	0	0	0	0	27	0	15	42	31	523	0	554	0	205	13	218				
32	213	UGA Internal Intersection West	5	Background+ UGA	5	Weekday	4	0	32	36	0	0	0	0	0	1	5	6	13	1	0	14				
						Weekend	5	0	42	47	0	0	0	0	0	2	7	9	23	2	0	25				
					10	Weekday	9	0	31	40	0	0	0	0	0	1	11	12	18	1	0	19				
						Weekend	8	0	41	49	0	0	0	0	0	2	8	10	26	2	0	28				
				Background+ UGA+MPR	5	Weekday	4	0	25	29	0	0	0	0	0	1	5	6	12	1	0	13				
						Weekend	6	0	38	44	0	0	0	0	0	2	7	9	24	2	0	26				
					10	Weekday	8	0	32	40	0	0	0	0	0	2	11	13	21	1	0	22				
						Weekend	8	0	36	44	0	0	0	0	0	3	10	13	32	3	0	35				

Intersection Level-of-Service



Table F-5: Intersection Levels-of-Service, Year 5 Weekday, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternatives				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	A	B	B	B	B
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	B	B	B	B	C
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	A	A	A	A	B
First Street/Oakes	B	F	F	F	B
• Northbound	F (54.0)[2,3]				
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	A	B	B	B	A
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
West End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903	A	A	A	A	A
SR 903/Pine Street	A	A	A	A	A
West First/Pine Street	A	C	C	C	A
• Southbound Through		F (72.4)[2,3]	F (64.0)[2,3]	F (60.1)[2,3]	
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Table F-6: Intersection Levels-of-Service, Year 5 Weekend, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	B	B	B	B	B
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	B	C	B	C	C
• Northbound		E (34.8)[2,3]		E (33.9)[2,3]	
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	B	A	A	A	B
First Street/Oakes	F	F	F	F	F
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	A	B	B	B	A
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
West End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903	A	A	A	A	A
SR 903/Pine Street	A	A	A	A	A
West First/Pine Street	A	F	E	F	A
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Table F-7: Intersection Levels-of-Service, Year 10 Weekday, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	B	B	B	B	B
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	C	C	C	C	F
• Northbound	E (37.2)[2,3]	F (48.4)[2,3]	F (47.3)[2,3]	E (43.7)[2,3]	
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	B	A	A	A	C
First Street/Oakes	C	F	F	F	D
• Northbound	F (128.0)[2,3]				
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	A	B	B	B	A
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
West End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903	A	A	A	A	A
SR 903/Pine Street	A	A	A	A	A
West First/Pine Street	A	D	D	C	A
• Southbound Through		F (186.0)[2,3]	F (127.6)[2,3]	F (82.6)[2,3]	
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Table F-8: Intersection Levels-of-Service, Year 10 Weekend, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	B	B	B	B	B
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	C	D	D	D	F
• Northbound	F (61.1)[2,3]	F (87.2)[2,3]		F (83.1)[2,3]	
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	B	A	A	A	C
First Street/Oakes	F	F	F	F	F
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	A	B	B	B	A
• Northbound	E (37.6)[2,3]				
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
East End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903 Spur	A	A	A	A	A
SR 903/Pine Street	A	A	A	A	A
West First/Pine Street	A	F	F	F	B
• Southbound Through	E (36.7)[2,3]				
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Table F-9: Intersection Levels-of-Service with MPR, Year 5 Weekday, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	A	B	C	B	C
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	B	F	F	F	F
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	A	A	A	A	C
First Street/Oakes	F	F	F	F	B
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	B	B	B	B	A
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
West End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903	A	A	A	A	A
SR 903/Pine Street	NA	A	A	A	A
West First/Pine Street	NA	F	F	F	A
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.

Table F-10: Intersection Levels-of-Service with MPR, Year 5 Weekend, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	B	C	C	B	D
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	B	A	B	A
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	B	F	F	F	F
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	A	A	A	A	D
First Street/Oakes	F	F	F	F	F
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	B	B	B	B	A
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
West End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903	A	A	A	A	A
SR 903/Pine Street	NA	B	A	B	A
• Northbound Through		E (33.9)[2,3]		E (30.5)[2,3]	
West First/Pine Street	NA	F	E	F	A
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Table F-11: Intersection Levels-of-Service with MPR, Year 10 Weekday, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	B	C	C	C	D
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	B	A	A	B
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	C E (34.0)[2,3]	F	F	F	F
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	B	A	A	A	D
First Street/Oakes	F	F	F	F	C
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	B	B	B	B	A
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
West End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	A	A	A	B
SR 970/East End SR 903	A	A	A	A	A
SR 903/Pine Street	NA	B	B	B	A
West First/Pine Street	NA	F	F	F	B
West First/UGA Access	NA	A	A	A	B

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Table F-12: Intersection Levels-of-Service with MPR, Year 10 Weekend, Alternatives 1, 2, 3, 4, and 5

Intersection	Alternative				
	1	2	3	4	5
SR 903/MPR Access	NA[1]	A	A	A	A
Bullfrog/WB I-90 Ramp	A	A	A	A	A
Bullfrog/EB I-90 Ramp	B	C	E	C	F
SR 903/Hovart Road	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	A	A	A	A
Bullfrog/UGA Access	NA	A	A	A	A
SR 903/Pennsylvania-Roslyn	A	A	A	A	A
Bullfrog/UGA/MPR Access	NA	C	C	C	C
• Eastbound Through		E (42.0)[2,3]	E (33.2)[2,3]	E (38.2)[2,3]	
SR 903/MPR Access	NA	A	A	A	A
SR 903/Bullfrog	C	F	F	F	F
• Northbound	F (52.0)[2,3]				
Bullfrog/UGA/MPR Access	NA	A	A	A	A
SR 903/UGA/other Access	NA	A	A	A	A
SR 903/Ranger Station Rd	A	A	A	A	A
First Street/S Cle Elum Way	F	F	F	F	F
Second Street/S Cle Elum Way	A	A	A	A	F
First Street/Oakes	F	F	F	F	F
Second Street/Oakes	A	A	A	A	A
Second Street/Pennsylvania-Cle Elum	A	A	A	A	A
First/Pennsylvania-Cle Elum	B	F	F	F	C
Oakes/EB I-90 Ramp	A	A	A	A	A
Oakes/WB I-90 Ramp	A	A	A	A	A
East End SR 903/SR 907	A	A	A	A	A
SR 970/WB I-90 Ramp	A	A	A	A	A
SR 970/EB I-90 Ramp	B	B	B	B	B
SR 970/East End SR 903 Spur	A	A	A	A	A
SR 903/Pine Street	NA	C	C	E	A
• Northbound Through		F (92.2)[2,3]	F (90.6)[2,3]		
West First/Pine Street	NA	F	F	F	F
West First/UGA Access	NA	A	A	A	A

1 NA – not applicable.
2 Indicates critical movement.
3 Number identifies delay in seconds per vehicle.

Traffic Signal Warrants



TRAFFIC SIGNAL WARRANTS

—Excerpt of Section C of the Manual on Uniform Traffic Control Devices

4C-1 Advance Engineering Data Required

A comprehensive investigation of traffic conditions and physical characteristics of the location is required to determine the necessity for a signal installation and to furnish necessary data for the proper design and operation of a signal that is found to be warranted. Such data desirably should include:

1. The number of vehicles entering the intersection in each hour from each approach during 16 consecutive hours of a representative day. The 16 hours selected should contain the greatest percentage of the 24-hour traffic.
2. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles and, in some locations, bicycles), during each 15-minute period of the two hours in the morning and of the two hours in the afternoon during which total traffic entering the intersection is greatest.
3. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in paragraph (2) above and also during hours of highest pedestrian volume. Where young or elderly persons need special consideration, the pedestrians may be classified by general observation and recorded by age groups as follows:
   (a) under 13 years
   (b) 13 to 60 years
   (c) over 60 years
4. The 85-percentile speed of all vehicles on the uncontrolled approaches to the location.
5. A conditions diagram showing details of the physical layout, including such features as intersectional geometrics, channelization, grades, sight-distance restrictions, bus stops and routings, parking conditions, pavement markings, street lighting, driveways, location of nearby railroad crossings, distance to nearest signals, utility poles and fixtures, and adjacent land use.
6. A collision diagram showing accident experience by type, location, direction of movement, severity, time of day, date, and day of week for at least one year.

The following data are also desirable for a more precise understanding of the operation of the intersection and may be obtained during the periods specified in (2) above:

1. Vehicle-seconds delay determined separately for each approach.
2. The number and distribution of gaps in vehicular traffic on the major street when minor-street traffic finds it possible to use the intersection safely.
3. The 85-percentile speed of vehicles on controlled approaches at a point near to the intersection but unaffected by the control.
4. Pedestrian delay time for at least two 3(minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or a Sunday.

Adequate roadway capacity at a signalized intersection is desirable. Widening of both the major street and the minor street may be warranted to reduce the delays caused by assignment of right-of-way at intersections controlled by traffic signals. Widening of the minor street is often beneficial to operation on the major street because it reduces the green time that must be assigned to minor street traffic. In urban areas, the effect of widening can be achieved by elimination of parking at intersectional approaches. It is always desirable to have at least two lanes for moving traffic on each approach to a signalized intersection. Additional width may be necessary on the leaving side of the intersection, as well as the approach side, in order to clear traffic through the intersection effectively. Before an intersection is widened, the additional green time needed by pedestrians to cross the widened streets should be checked to ensure that it will not exceed the green time saved through improved vehicular flow.

4C-2 Warrants for Traffic Signal Installation

Traffic control signals should not be installed unless one or more of the signal warrants in this Manual are met. The satisfaction of a warrant or warrants is not in itself justification for a signal. Information should be obtained by means of engineering studies and compared with the requirements set forth in the warrants. The engineering study should indicate the installation of a traffic signal will improve the overall safety and/or operation of the intersection. If these requirements are not met, a traffic signal should neither be put into operation nor continued in operation (if already installed).

For the purpose of warranting signalization, a wide-median intersection should be considered as one intersection.

When a traffic control signal is indicated as being warranted, it is presumed that the signal and all related traffic control devices and markings are installed according to the standards set forth in this Manual. It is further presumed that signal indications are properly phased, that roadways are properly designed, that adjacent traffic signals are properly coordinated, that there is adequate supervision of the operation and maintenance of the signal and all of its related devices, and that the traffic signal controller will be selected on the basis of engineering study and judgment.

An investigation of the need for traffic signal control should include where applicable, at least an analysis of the factors contained in the following warrants:

Warrant 1—Minimum vehicular volume.
Warrant 2—Interruption of continuous traffic.
Warrant 3—Minimum pedestrian volume.
Warrant 4—School crossings.
Warrant 5—Progressive movement.
Warrant 6—Accident experience.
Warrant 7—Systems.
Warrant 8—Combination of warrants.
Warrant 9—Four Hour Volumes.

Warrant 10—Peak Hour Delay.
Warrant 11—Peak Hour Volume.

The analysis should consider the effects of the right turn vehicles from the minor street approaches. Engineering judgment should be used to determine what, if any, portion of the right turn traffic is subtracted from the minor street traffic count when evaluating the count against the above warrants.

4C-3 Warrant 1, Minimum Vehicular Volume

The Minimum Vehicular Volume warrant is intended for application where the volume of intersecting traffic is the principal reason for consideration of signal installation. The warrant is satisfied when, for each of any 8 hours of an average day, the traffic volumes given in the table below exist on the major street and on the higher-volume minor- street approach to the intersection. An "average" day is defined as a weekday representing traffic volumes normally and repeatedly found at the location.

MINIMUM VEHICULAR VOLUMES FOR WARRANT 1

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)	Vehicles per hour on higher-volume minor-street approach (one direction only)
Major Street	Minor Street		
1	1	500	150
2 or more	1	600	150
2 or more	2 or more	600	200
1	2 or more	500	200

These major-street and minor-street volumes are for the same 8 hours. During those 8 hours, the direction of higher volume on the minor street may be on one approach during some hours and on the opposite approach during other hours.

When the 85-percentile speed of major-street traffic exceeds 40 mph in either an urban or a rural area, or when the intersection Lies within the built-up area of an isolated community having a population of less than 10,000, the Minimum Vehicular Volume warrant is 70 percent of the requirements above.

4C-4 Warrant 2, Interruption of Continuous Traffic

The Interruption of Continuous Traffic warrant applies to operating conditions where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard in entering or crossing the major street. The warrant is satisfied when, for each of any 8 hours of an average day, the traffic volumes given in the table below exist on the major street and on the higher-volume minor- street approach to the intersection, and the signal installation will not seriously disrupt progressive traffic flow.

MINIMUM VEHICULAR VOLUMES FOR WARRANT 2

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)	Vehicles per hour on higher-volume minor-street approach (one direction only)
Major Street	Minor Street		
1	1	750	75
2 or more	1	900	75
2 or more	2 or more	900	100
1	2 or more	750	100

These major-street and minor-street volumes are for the same 8 hours. During those 8 hours, the direction of higher volume on the minor street may be on one approach during some hours and on the opposite approach during other hours.

When the 85-percentile speed of major-street traffic exceeds 40 mph in either an urban or a rural area, or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the Interruption of Continuous Traffic warrant is 70 percent of the requirements above.

4C-5 Warrant 3, Minimum Pedestrian Volume

A traffic signal may be warranted where the pedestrian volume crossing the major street at an intersection or mid-block location during an average day is:

100 or more for each of any four hours; or
190 or more during any one hour.

The pedestrian volume crossing the major street may be reduced as much as 50 percent of the values given above when the predominant pedestrian crossing speed is below 3.5 feet per second.

In addition to a minimum pedestrian volume of that stated above, there shall be less than 60 gaps per hour in the traffic stream of adequate length for pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. Where there is a divided street having a median of sufficient width for the pedestrian(s) to wait, the requirement applies separately to each direction of vehicular traffic.

Where coordinated traffic signals on each side of the study location provide for platooned traffic which result in fewer than 60 gaps per hour of adequate length for the pedestrians to cross the street, a traffic signal may not be warranted.

This warrant applies only to those locations where the nearest traffic signal along the major street is greater than 300 feet and where a new traffic signal at the study location would not unduly restrict platooned flow of traffic. Curbside parking at non-intersection locations should be prohibited for 100 feet in advance of and 20 feet beyond the crosswalk.

A signal installed under this warrant should be of the traffic-actuated type with push buttons for pedestrians crossing the main street. If such a signal is installed within a signal system, it should be coordinated if the signal system is coordinated.

Signals installed according to this warrant shall be equipped with pedestrian indications conforming to requirements set forth in other sections of this Manual.

4C-6 Warrant 4, School Crossing

A traffic control signal may be warranted at an established school crossing when a traffic engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at the school crossing shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period (sec. 7A-3). When traffic control signals are installed entirely under this warrant:

1. Pedestrian indications shall be provided at least for each crosswalk established as a school crossing.
2. At an intersection, the signal normally should be traffic-actuated. As a minimum, it should be semi-traffic-actuated, but full actuation with detectors on all approaches may be desirable. Intersection installations that can be fitted into progressive signal systems may have pretimed control.
3. At non-intersection crossings, the signal should be pedestrian- actuated, parking and other obstructions to view should be prohibited for at least 100 feet in advance of and 20 feet beyond the crosswalk, and the markings. Special police supervision and/or enforcement should be provided for a new non-intersection installation. Installation should include suitable standard signs and pavement

4C-7 Warrant 5, Progressive Movement

Progressive movement control sometimes necessitates traffic signal installations at intersections where they would not otherwise be warranted, in order to maintain proper grouping of vehicles and effectively regulate group speed. The Progressive Movement warrant is satisfied when:

1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning and speed control, or
2. On a two-way street, adjacent signals do not provide the necessary degree of platooning and speed control and the proposed and adjacent signals could constitute a progressive signal system.

The installation of a signal according to this warrant should be based on the 85th-percentile speed unless an engineering study indicates that another speed is more desirable.

The installation of a signal according to this warrant should not be considered where the resultant signal spacing would be less than 1000 feet.

4C-8 Warrant 6, Accident Experience

The Accident Experience warrant is satisfied when:

1. Adequate trial of less restrictive remedies with satisfactory observance and enforcement has failed to reduce the accident frequency and
2. Five or more reported accidents, of types susceptible to correction b traffic signal control, have occurred within a 12-month period, each accident involving personal injury or property damage apparently exceeding the applicable requirements for a reportable accident; and
3. There exists a volume of vehicular and pedestrian traffic not less than 80 percent of the requirements specified either in the Minimum Vehicular Volume warrant, the Interruption of Continuous Traffic warrant, or the Minimum Pedestrian Volume warrant; and
4. The signal installation will not seriously disrupt progressive traffic flow.

Any traffic signal installed solely on the Accident Experience warrant should be semi-traffic-actuated (with control devices which provide proper coordination if installed at an intersection within a coordinated system and normally should be fully traffic-actuated if installed at an isolate intersection.

4C-9 Warrant 7, Systems Warrant

A traffic signal installation at some intersections may be warranted to encourage concentration and organization of traffic flow networks. The Systems Warrant is applicable when the common intersection of two or more major routes: (1) has a total existing, or immediately projected, entering volume of at least 1000 vehicles during the peak hour of a typical weekday and has five year projected traffic volumes, based on an engineering study, which meet one or more of Warrants 1, 2, 8, 9, and 11 during an average weekday; or (2) has a total existing or immediately projected entering volume of at least 1000 vehicles for each of any five hours of a Saturday and/or Sunday.

A major route as used in the above warrant has one or more of the following characteristics:

1. It is part of the street or highway system that serves as the principal network for through traffic flow;
2. It includes rural or suburban highways outside, entering or traversing a city;
3. It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study.

4G-10 Warrant 8, Combination of Warrants

In exceptional cases, signals occasionally may be justified where no single warrant is satisfied but where Warrants 1 and 2 are satisfied to the extent of 80 percent or more of the stated values. Adequate trial of other remedial measures which cause less delay and inconvenience to traffic should precede installation of signals under this warrant.

4C-10.1 Warrant 9--Four Hour Volumes

The Four Hour Volume Warrant is satisfied when each of any four hours of an average day the plotted points representing the vehicles per hour on the major street (total of both approaches)

and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the curve in Figure 4-7 for the existing combination of approach lanes.

When the 85th percentile speed of the major street traffic exceeds 40 miles per hour or when the intersection lies within a built-up area of an isolated community having a population less than 10,000, the four hour volume requirement is satisfied when the plotted points referred to fall above the curve in Figure 4-8 for the existing combination of approach lanes.

4C-10.2 Warrant 10, Peak Hour Delay

The peak hour delay warrant is intended for application where traffic conditions are such that for one hour of the day minor street traffic suffers undue delay in entering or crossing the major street. The peak hour delay warrant is satisfied when the conditions given below exist for one hour (any four consecutive 15-minute periods) of an average weekday.

The peak hour delay warrant is met when:

1. The total delay experienced by the traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle hours for a two-lane approach, and
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, and
3. The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four (or more) approaches or 650 vph for intersections with three approaches.

4C-10.3 Warrant 11, Peak Hour Volume

The peak hour volume warrant is also intended for application when traffic conditions are such that for one hour of the day minor street traffic suffers undue traffic delay in entering or crossing the major street.

The peak hour volume warrant is satisfied when the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicle per hour of the higher volume minor street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the curve in Figure 4-5 for the existing combination of approach lakes.

When the 85th percentile speed of major street traffic exceeds 40 mph or when the intersection lies within a built-up area of an isolated community having a population less than 10,000, the peak hour volume requirements is satisfied when the plotted point referred to above falls above the curve in Figure 4-6 for the existing combination of approach lanes.

4C-ll Factors Governing Selection of Type of Control

The principal factors that may lead to the favorable consideration of traffic-actuated control in the selection of the type of signal control include:

1. Low, fluctuating or unbalanced traffic volumes.
2. High side street traffic volumes and delays only during the peak hours.
3. The pedestrian or accident warrant is the only warrant which is met.
4. The installation is to provide for one-way movement of two-way traffic.
5. The installation is at a non-intersection location.

Appendix G

Agency Correspondence



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
P. O. Box 848
Ephrata, Washington 98823
Phone: 509-754-8580 Fax: 509-754-8575

December 13, 2001

Calvin Kelly Douglas
Shapiro & Associates Inc.
101 Yessler Way, Suite 400
Seattle, Washington 98104

RE: Species List Request
FWS Reference: 02-SP-E0064

Thank you for your request of December 3, 2001. The following threatened and endangered species, and candidate species may be present near the project area in Kittitas County, Washington:

LISTED
Endangered
Gray wolf *(Canis lupus)*

Threatened
Bald eagle *(Haliaeetus leucocephalus)*
Bull trout *(Salvelinus confluentus)*
Canada lynx *(Lynx canadensis)*
Grizzly bear *(Ursus arctos = U.a. horribilis)*
Marbled murrelet *(Brachyramphus marmoratus marmoratus)*
Northern spotted owl *(Strix occidentalis caurina)*
Ute ladies'-tresses *(Spiranthes diluvialis)*, plant

Designated
Critical habitat for the northern spotted owl

CANDIDATE
Basalt daisy *(Erigeron basalticus)*, plant
Western sage grouse *(Centrocercus urophasianus phaios)*
Western yellow-billed cuckoo (*Coccyzus americanus*)

This list fulfills the requirements of the U. S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act).

If there is federal agency involvement in this project (funding, authorization, or other action), the

involved federal agency must meet its responsibilities under section 7 of the Endangered Species Act of 1973, as amended (Act), as outlined in Enclosure A. Enclosure A includes a discussion of the contents of a Biological Assessment (BA), which provides an analysis of the impacts of the project on listed and proposed species, and designated and proposed critical habitat. Preparation of a BA is required for all major construction projects. Even if a BA is not prepared, potential project effects on listed and proposed species should be addressed in the environmental review for this project. Federal agencies may designate, in writing, a non-federal representative to prepare a BA. However, the involved federal agency retains responsibility for the BA, its adequacy, and ultimate compliance with section 7 of the Act.

Preparation of a BA would be prudent when listed or proposed species, or designated or proposed critical habitat, occur within the project area. Should the BA determine that a listed species is likely to be affected by the project, the involved federal agency should request section 7 consultation with the U. S. Fish and Wildlife Service (Service). If a proposed species is likely to be jeopardized by the project, regulations require conferencing between the involved federal agency and the Service. If the BA concludes that the project will have no effect on any listed or proposed species, we would appreciate receiving a copy for our information.

Candidate species receive no protection under the Act, but are included for your use during planning of the project. Candidate species could be formally proposed and listed during project planning, thereby falling within the scope of section 7 of the Act. Protection provided to these species now may preclude possible listing in the future. If evaluation of the subject project indicates that it is likely to adversely impact a candidate species, we encourage you to modify the project to minimize/avoid these impacts.

If there is no federal agency involvement in your project, and you determine that it may negatively impact a listed or proposed species, you may contact us regarding the potential need for permitting your actions under section 10 of the Act.

Several species of anadromous fishes that have been listed by the National Marine Fisheries Service (NMFS) may occur in the project area. Please contact NMFS in Seattle, Washington, at (206) 526-6150, in Portland, Oregon, at (503) 231-2319, or in Boise, Idaho, at (208) 378-5696 to request a list of these species.

If you would like information concerning state listed species or species of concern, you may contact the Washington Department of Fish and Wildlife, at (360) 902-2543, for fish and wildlife species; or the Washington Department of Natural Resources, at (360) 902-1667, for plant species.

This letter fulfills the requirements of the Service under section 7 of the Act. Should the project plans change significantly, or if the project is delayed more than 90 days, you should request an update to this response.

Thank you for your efforts to protect our nation's species and their habitats. If you have any questions concerning the above information, please contact Gregg Kurz at (509) 754-8580.

Sincerely,

Mark D. Miller

Supervisor

Enclosure

State of Washington

DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N, Olympia, WA 98501-1091 - (360) 902-2200; TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

Date: OCT 2 5 2001

Dear Habitats and Species Requester:

Enclosed are the habitats and species products you requested from the Washington Department of Fish and Wildlife (WDFW). This package may also contain documentation to help you understand and use these products.

These products only include information that WDFW maintains in a computer database. They are not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife, nor are they designed to provide you with guidance on interpreting this information and determining how to proceed in consideration of fish and wildlife. These products only document the location of important fish and wildlife resources to the best of our knowledge. It is important to note that habitats or species may occur on the ground in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site-specific surveys are frequently necessary to rule out the presence of priority habitats or species.

Your project may require further field inspection or you may need to contact our field biologists or others in WDFW to assist you in interpreting and applying this information. Generally, for assistance on a specific project, you should contact the WDFW Habitat Program Manager for your county and ask for the area habitat biologist for your project area. Refer to the enclosed directory for those contacts.

Please note that sections potentially impacted by spotted owl management concerns are displayed on the 1:24,000 scale standard map products. If specific details on spotted owl site centers are required they must be requested separately.

These products are designed for users external to the forest practice permit process and as such does not reflect all the information pertinent to forest practice review. The Forest Practice Rules adopted August 22, 1997 by the Forest Practice Board and administered by the Washington Department of Natural Resources require forest practice applications to be screened against marbled murrelet detection areas and detection sections. Marbled murrelet detection locations are included in the standard priority habitats and species products, but the detection areas and detection sections are not included. If your project is affected by Forest Practice Regulations, you should specially request murrelet detection areas.

WDFW updates this information as additional data become available. Because fish and wildlife species are mobile and because habitats and species information changes, project reviews for fish and wildlife should not rest solely on mapped information. Instead, they should also consider new information gathered from current field investigations. Remember, habitats and species information can only show that a species or habitat type is present, they cannot show that a species or habitat type is not present. These products should not be used for future projects. Please obtain updates rather than use outdated information.
Because of the high volume of requests for information that WDFW receives, we need to charge for these products to recover some of our costs. Enclosed is an invoice itemizing the costs for your request and instructions for submitting payment.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE - SENSITIVE INFORMATION REPORT
FOR TOWNSHIP: T20R15E
Report Date: October 25, 2001

This map contains the following species and/or habitat locations that are deemed sensitive by the Washington Department of Fish and Wildlife Sensitive Fish and Wildlife Policy.

PHS CODE/ SPPCODE	COMMON NAME	USE CODE	USE DESCRIPTION
ACGE	NORTHERN GOSHAWK	B	BREEDING OCCURRENCE
CONTE	SHARPTAIL SNAKE	IO	INDIVIDUAL OCCURRENCE
STOC	SPOTTED OWL		SITE CENTER

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE - PHS POLYGON REPORT
FOR TOWNSHIP: T20R15E
Report Date: October 25, 2001

****** PHS POLYGON CROSS REFERENCE SHEET ******

PHS POLY#	PHS FORM NUMBER	PHS CODE*USE CODE
1		
2	900000	*-
3	902894	RIPAR*-
4	900000	*-
5	900000	*-
6	901509	CEEL*PA-
7	901509-902894	CEEL*PA-RIPAR*-
8	901509	CEEL*PA-
9	901509	CEEL*PA-
10	901287	CEEL*RLC-
11	901287-901746	CEEL*RLC-RIPAR*-
12	901287	CEEL*RLC-
13	917950	CONTE*IO-
14	902892-917950	RIPAR*-CONTE*IO-
15	902892	RIPAR*-
16	917950	CONTE*IO-
17	900000	*-
18	900000	*-
19	901746	RIPAR*-
20	901288	CEEL*RC-
21	901288-901746	CEEL*RC-RIPAR*-
22	901288-902892	CEEL*RC-RIPAR*-
23	901288-901289-902892	CEEL*RC-AISP*B-RIPAR*-
24	901288-901289	CEEL*RC-AISP*B-
25	901289-901746	AISP*B-RIPAR*-
26	901289-902892	AISP*B-RIPAR*-
27	902891	UNOS*-
28	902891	UNOS*-

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PRIORITY ANADROMOUS AND RESIDENT FISH PRESENCE REPORT FROM THE STREAMNET DATABASE
FOR TOWNSHIP T20R15E
Report Date: October 25, 2001

PRIORITY ANADROMOUS FISH PRESENCE

CODE	COMMON NAME	STREAM NAME	STREAM LLID	RECORD DATE	SOURCE
CHSP	Spring Chinook	Cle Elum River	1209901471771	05-12-97	P. Harvester,WDFW
STSU	Summer Steelhead	Cle Elum River	1209901471771	05-02-97	P. Harvester, WDFW
CHSP	Spring Chinook	Middle Fork Teanaway River	1208968472571	05-12-97	P. Harvester,WDFW
STSU	Summer Steelhead	Middle Fork Teanaway River	1208968472571	05-02-97	P. Harvester, WDFW
CHSP	Spring Chinook	Teanaway River	1208336471670	05-12-97	P. Harvester,WDFW
STSU	Summer Steelhead	Teanaway River	1208336471670	05-02-97	P. Harvester, WDFW
CHSP	Spring Chinook	West Fork Teanaway River	1208968472581	05-12-97	P. Harvester,WDFW
STSU	Summer Steelhead	West Fork Teanaway River	1208968472581	05-02-97	P. Harvester, WDFW
CHSP	Spring Chinook	Yakima River	1192269462537	05-12-97	P. Harvester,WDFW
STSU	Summer Steelhead	Yakima River	1192269462537	05-02-97	P. Harvester, WDFW

PRIORITY RESIDENT FISH PRESENCE

CODE	COMMON NAME	STREAM NAME	STREAM LLID	RECORD DATE	SOURCE
RBT	Rainbow Trout	Cle Elum River	1209901471771	06/12/92	WDFW Staff
RBT	Rainbow Trout	Yakima River	1192269462537	06/12/92	WDFW Staff
DBT	Dolly Varden/Bull Trout	Yakima River	1192269462537	08-21-00	Eric Anderson, WDFW

The fish information in this report only includes data that the Washington Department of Fish and Wildlife (WDFW) maintains in a central database. This information only documents the location of important fish resources to the best of our knowledge. It is not a complete inventory of the fish species in the state. Fish are identifed as priority by WDFW if they meet 1 of 3 criterion as listed in the Priority Habitats and Species List.

For questions on the StreamNet Database, please contact Martin Hudson at (360) 902 2487.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

November 26, 2001

Calvin Kelly Douglas
Shapiro & Associates Inc
101 Yesler Way – Ste 400
Seattle WA 98104

SUBJECT: Trendwest Properties Proposed Development, Cle Elum (T20N R15E S21,27-34)

We've searched the Natural Heritage Information System for information on significant natural features in your project area. Currently, we have no records for rare plants or high quality ecosystems in the vicinity of your project.

The information provided by the Washington Natural Heritage Program is based solely on existing information in the database. In the absence of field inventories, we cannot state whether or not a given site contains high quality ecosystems or rare species; there may be significant natural features in your study area of which we are not aware.

The Washington Natural Heritage Program is responsible for information on the state's endangered, threatened, and sensitive plants as well as high quality ecosystems. We have begun to add information to our database on selected groups of animals of conservation concern, such as freshwater mussels, butterflies and bats. We now make this information available in our reports along with information on rare plants and high quality ecosystems.

The authority for protection of animal species in Washington rests with the Department of Fish and Wildlife which manages and interprets data on wildlife species of concern in the state. To ensure that you receive information on all animal species of concern, please contact Priority Habitats and Species, Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia, WA 98501-1091, or by phone (360) 902-2543.

If you have the opportunity, visit our website at http:// www.wa.gov/dnr and click on *Programs & Topics*. Please do not hesitate to call me at (360) 902-1667 if you have any questions, or by E-Mail: sandra.moody@wadnr.gov.

Sincerely,

Sandy Swope Moody

Sandy Swope Moody, Environmental Review Coordinator
Washington Natural Heritage Program
Asset Management & Protection Division
PO Box 47014
Olympia WA 98504-7014