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

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

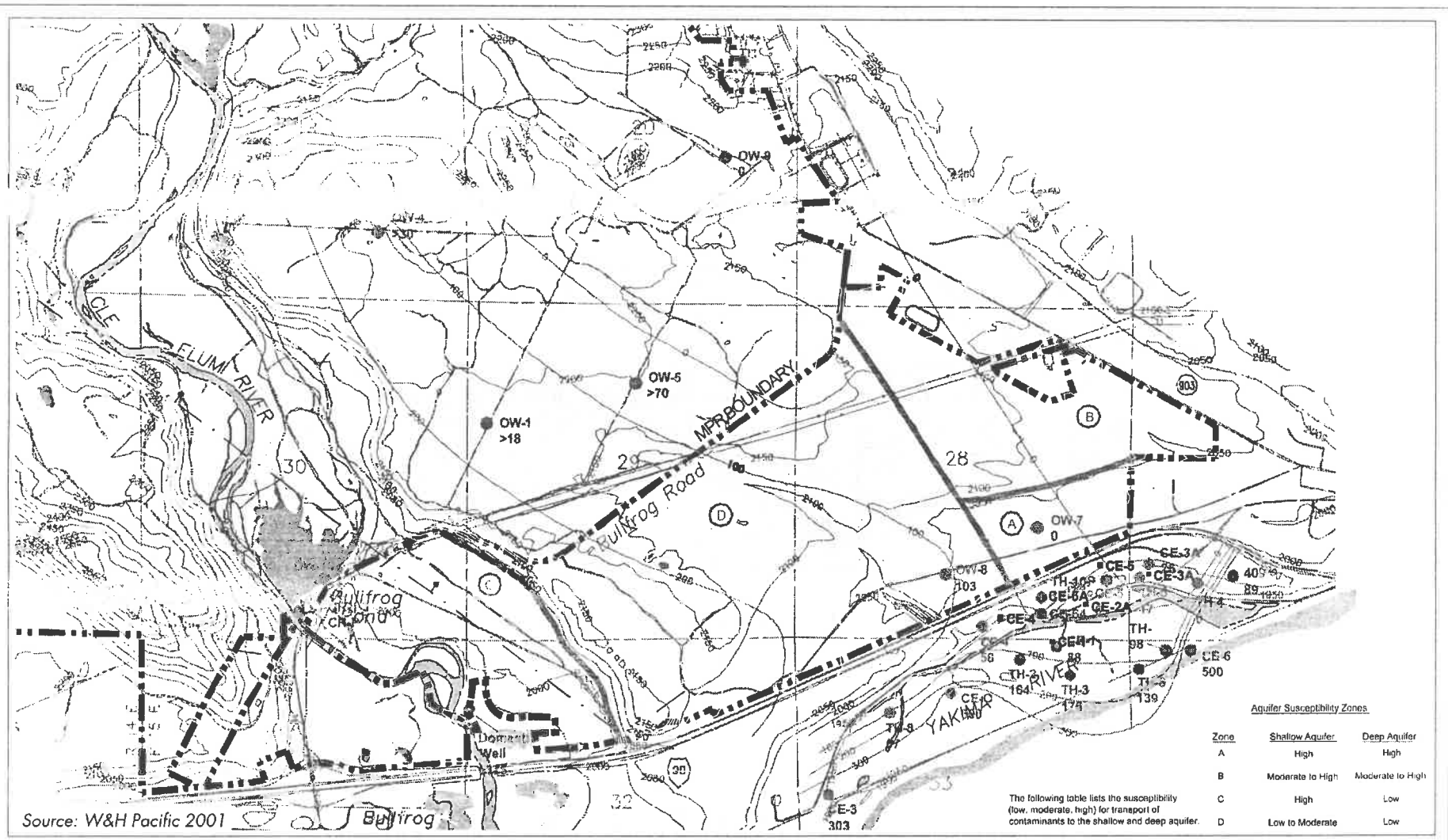
Alternative 5 lowers construction risk by avoiding development near the Cle Elum River in the highest risk portion of the UGA. This area labeled Management Zone C is described in the section entitled Stormwater Management Zones below. By avoiding development near the Cle Elum River, sediment introduction 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



0 2400'
Approximate Scale in Feet

CE-1 ■ Cle Elum Hatchery production well

aquifer susceptibility zone

FIGURE 3.3-1

MANAGEMENT ZONES AND AQUIFER SUSCEPTIBILITY

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

SHAPIRO & ASSOCIATES, INC.

1981069

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.

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[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.

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[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.

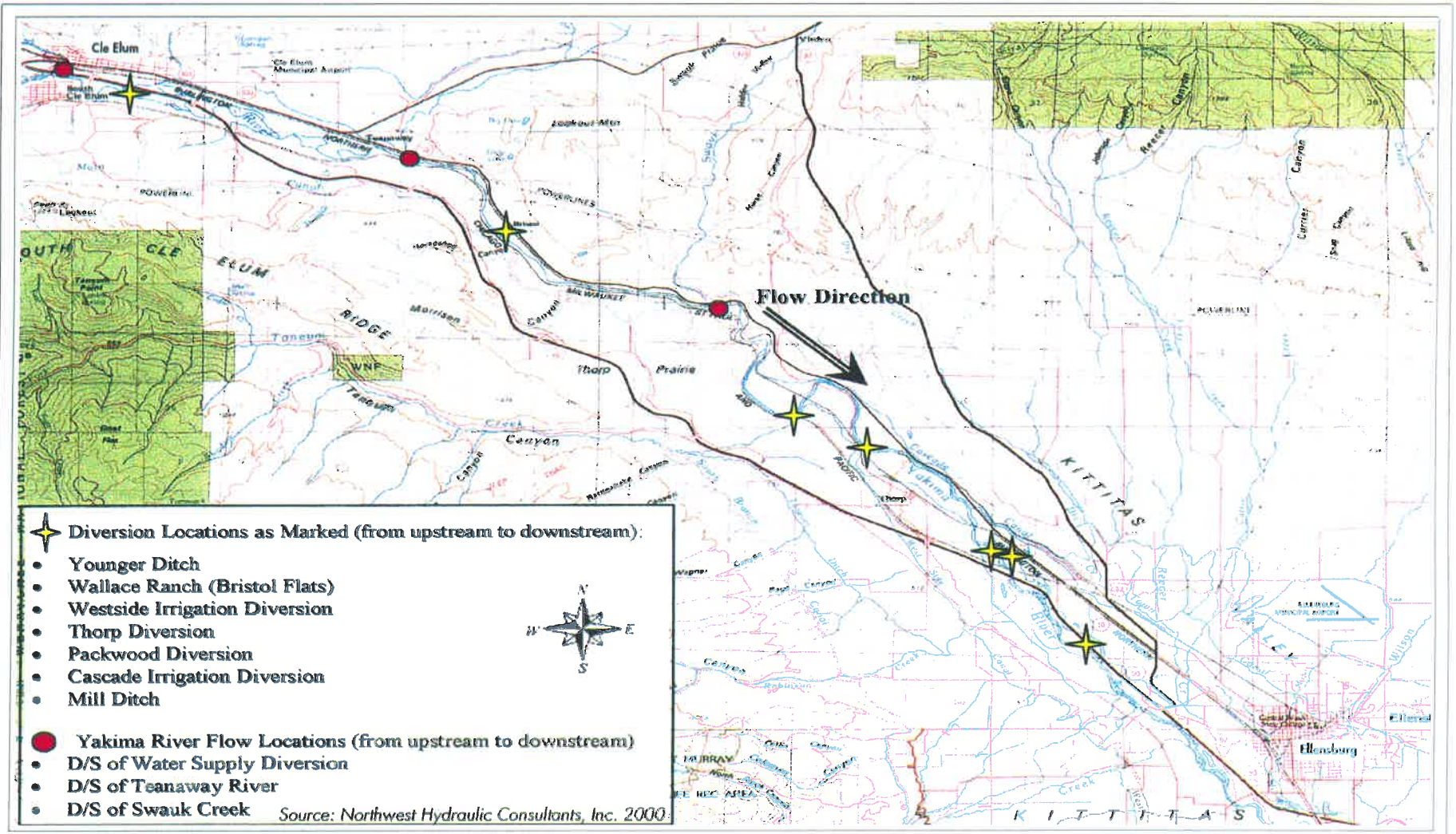
Mill Ditch. Because flows downstream of the Mill Ditch diversion would theoretically be the same in both the current and proposed conditions it seems unlikely that the Trendwest proposal would result in any significant impacts.

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

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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.

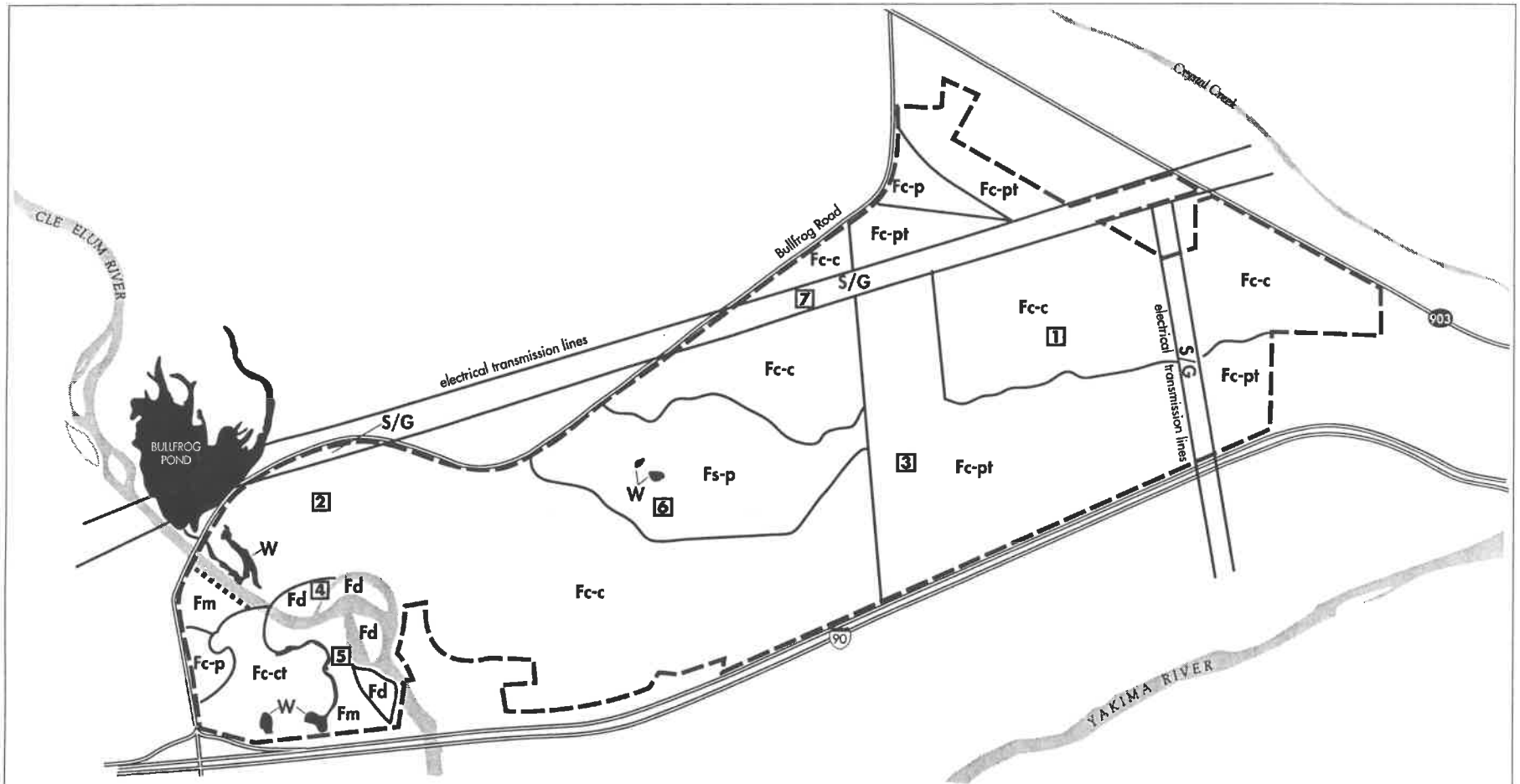
3.5.1 Affected Environment

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.



Source: Raedeke Associates, Inc. 1999a

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

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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.

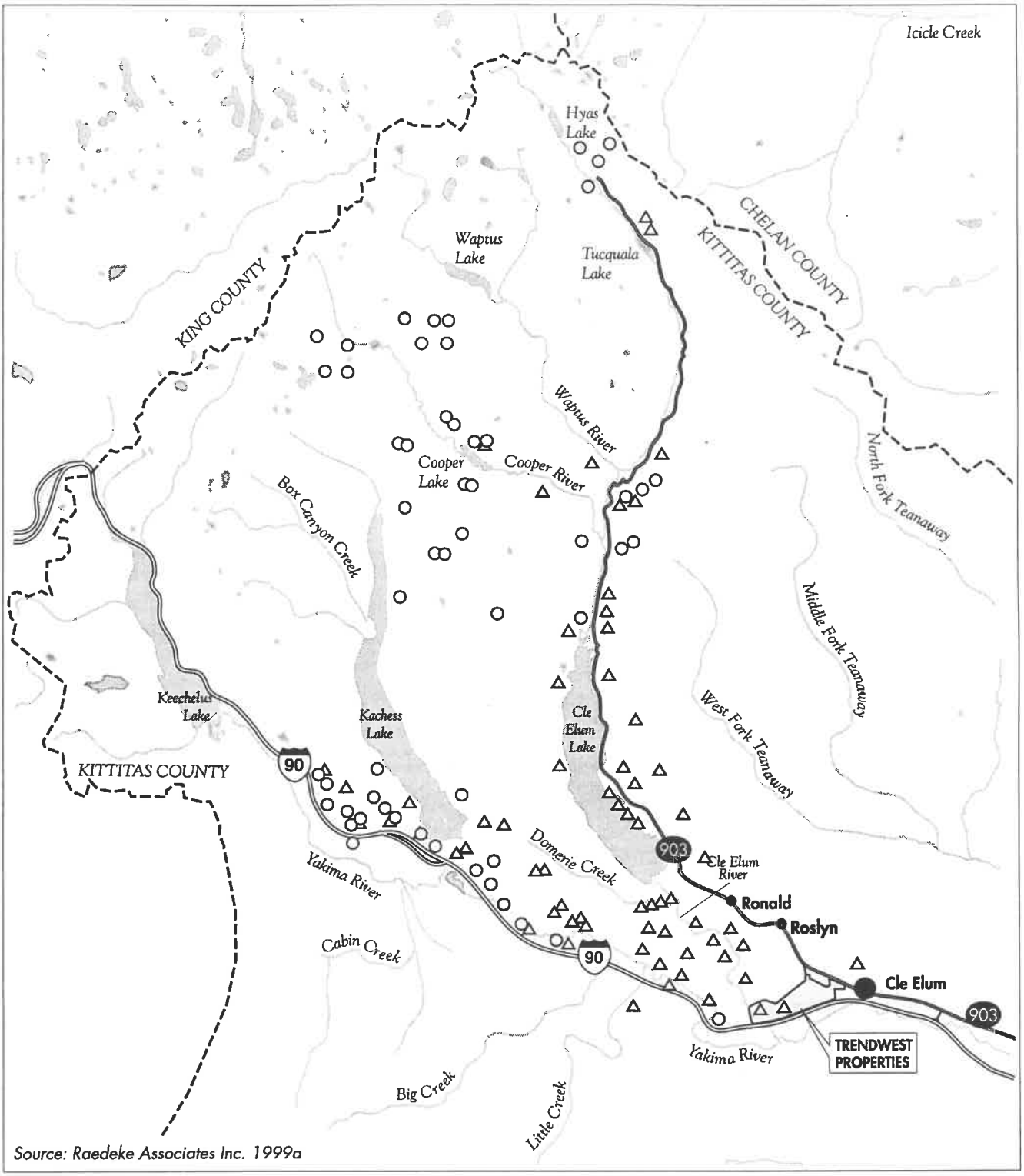
Riparian habitat encompasses the area beginning at the ordinary high water mark and extends to the portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic system. Riparian habitat includes the entire extent of the floodplain and riparian areas of wetlands, 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.



N

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.

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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

Graphics: Server\Graphics\Shapiro\Trendwest\Current\Fishing Impacts\ Figure 3.6-1 Rec Fishing Access 3.14.02

Cooper River
Cooper Lake
Cle Elum River
Keechelus Lake
Kachess Lake
Yakima River
Cle Elum Lake
North Fork Teanaway River
Middle Fork Teanaway River
West Fork Teanaway River
Teanaway River
Swauk Creek
97
90
82
MPR SITE
Easton
Roslyn
UGA
Cle Elum
Big Creek
Little Creek
Yakima River
dangerous floating
could be opened to floating with access
Taneum Creek
Town Ditch Diversion Dam
could be reopened to floating
ELLENSBURG
Manastash Creek
dangerous floating

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
existing mainstream access/launch site

FIGURE 3.6-1

RECREATIONAL FISHING ACCESS AND USE

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

1981069

SHAPIRO & ASSOCIATES, INC.

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.

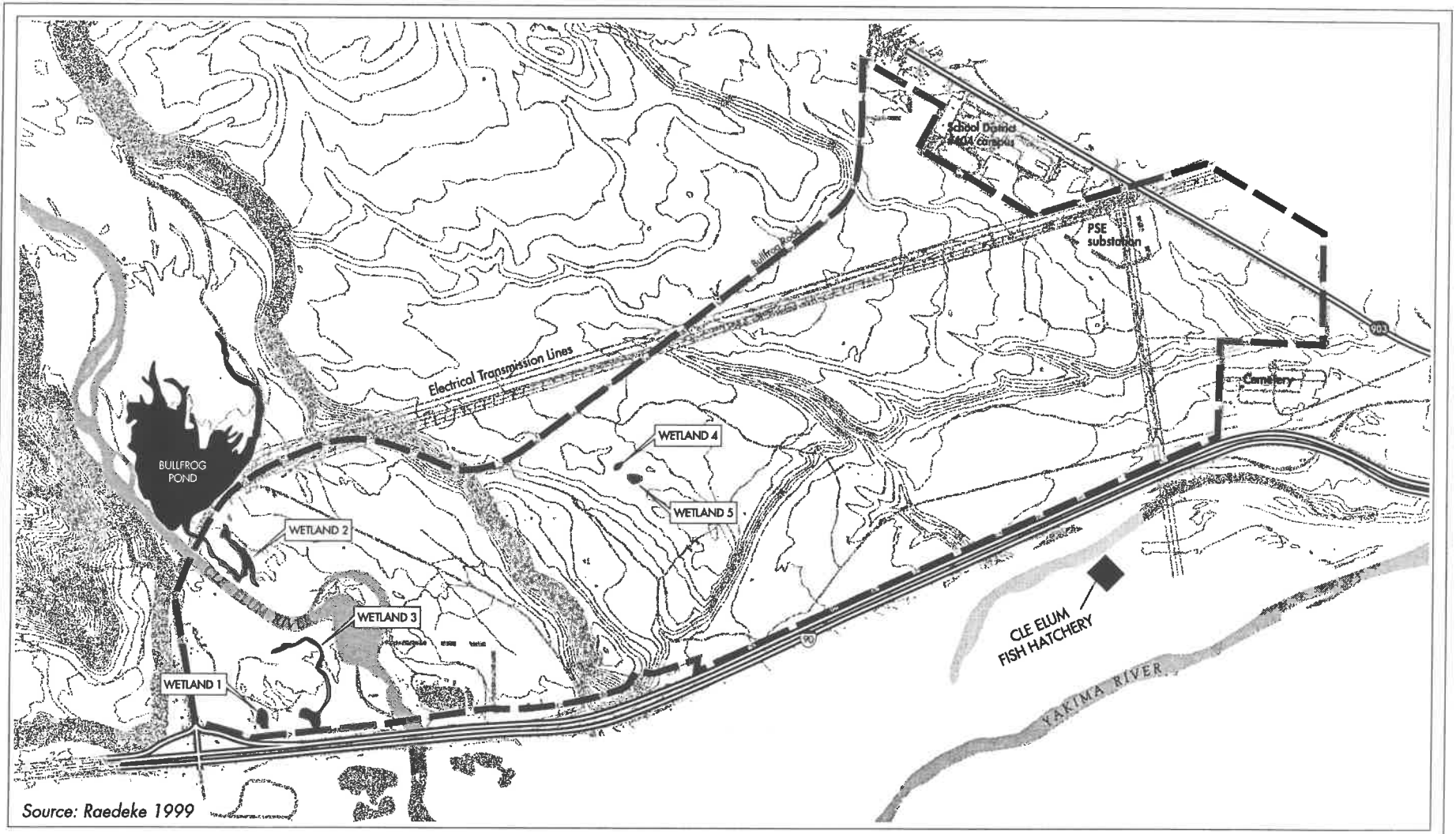
Wetland 1 is a 0.6-acre palustrine open water/emergent system that is a closed depression created as a result of roadway construction. Under the Cle Elum CAO, Wetland 1 likely would be designated as Category IV with a buffer of 25 feet.

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.



Not To Scale

City of Cle Elum UGA

FIGURE 3.7-1

WETLANDS

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

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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

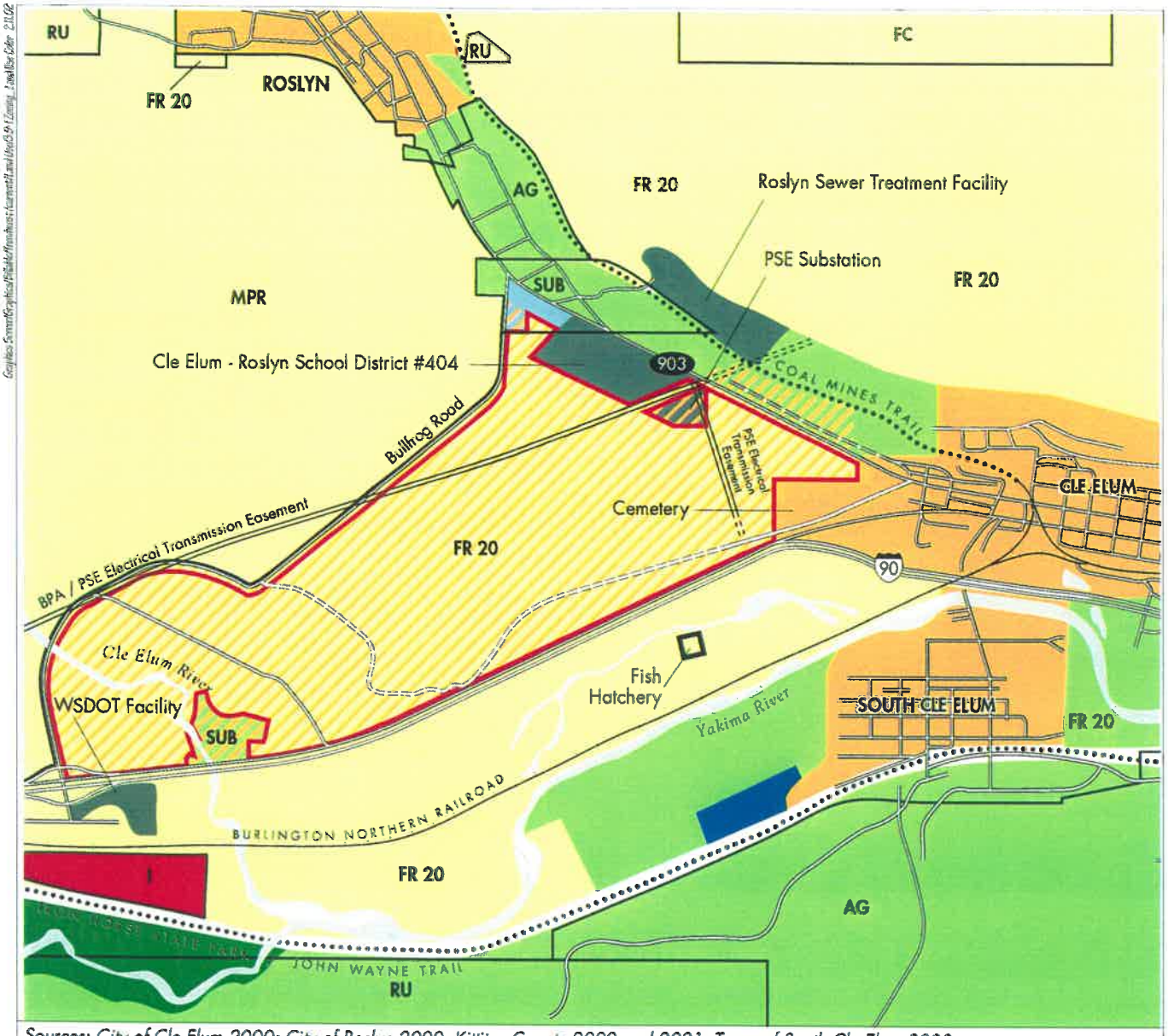
Existing land use and zoning in Kittitas County, the cities of Cle Elum and Roslyn, and Town of South Cle Elum are discussed in Section 3.10 of the Draft EIS. The Cle Elum UGA is located immediately west of the City of Cle Elum and is bounded on the north and west by Bullfrog Road, on the east by SR 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
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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

Housing Type	Year 5			Year 20			Year 30		
	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

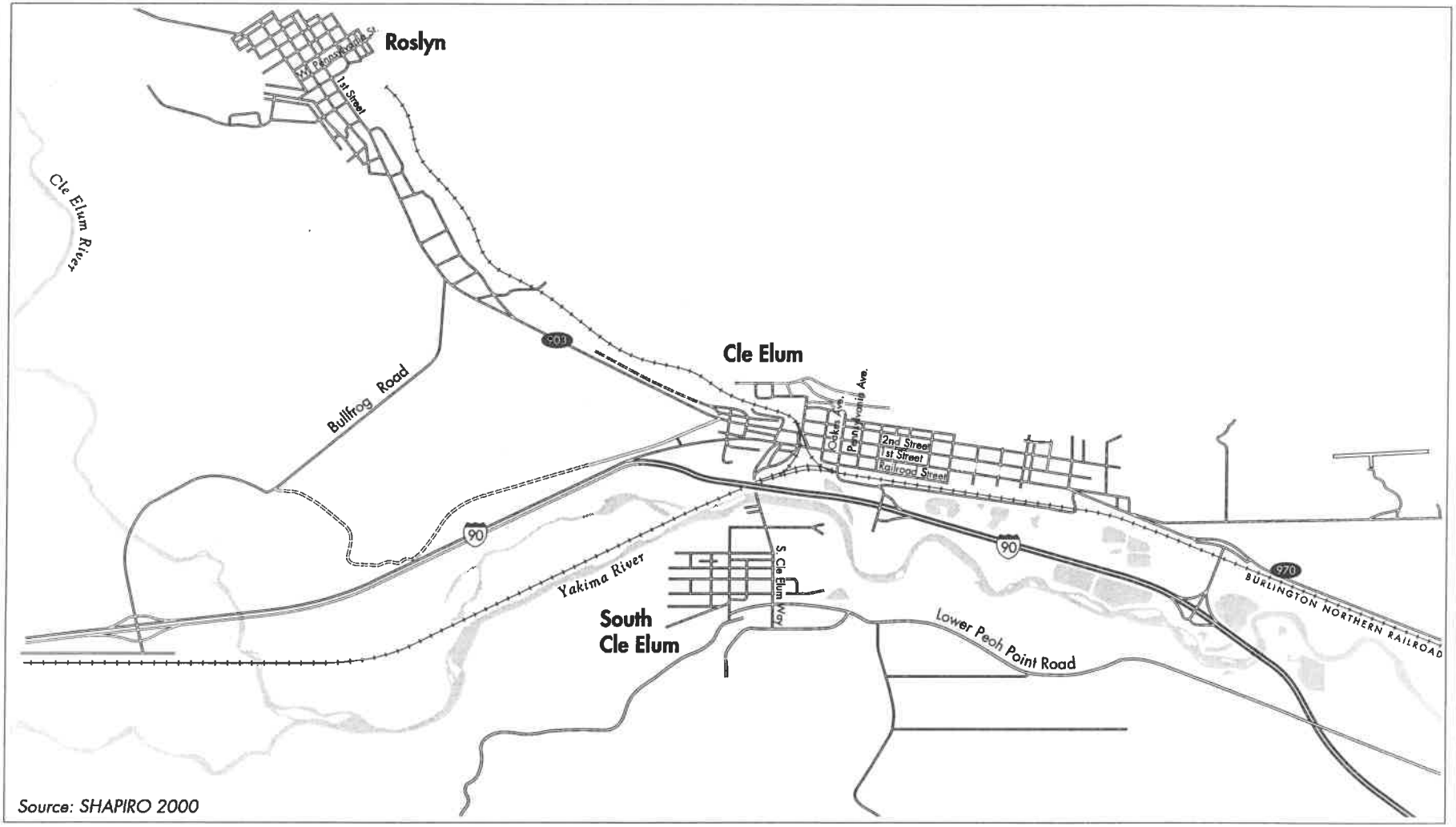
Similar to Alternatives 2, 3, and 4, park and recreation resources proposed under Alternative 5 would provide the community with a greater amount, and a wider array, of recreational opportunities than currently exists. Parks currently proposed within the UGA include 0.25 to 0.5-acre pocket parks in each 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.



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Approximate Scale in Miles

FIGURE 3.14-1

EXISTING ROADWAY NETWORK

TRENDWEST PROPERTIES: CLE ELUM UGA
FINAL EIS

SHAPIRO & ASSOCIATES, INC.

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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.