

# City Heights Phase 4

Cle Elum, Washington

Date: March 1st, 2023

# Preliminary Storm Drainage Report

Prepared for City Heights Holdings, LLC 405 NW Gilman Blvd, Suite 102 Issaquah, WA 98027

Blueline Job No. 19-349

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3/1/23

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# Section 1 Project Overview

Project Name: City Heights

Project Parcels: 593835/956731\*, 956732/956733\* (Phase 4)

\* Per assessor, parcels are coupled and must be sold together.

Project Engineer: The Blueline Group

Brett Pudists, PE (425) 250-7247

Project Applicant: City Heights Holdings, LLC

Barbara Rodgers (425) 923-9610

Project Development Area: 20.07 acres (Phase 4)

Number of Lots: 45

#### 1.1 SITE INFORMATION

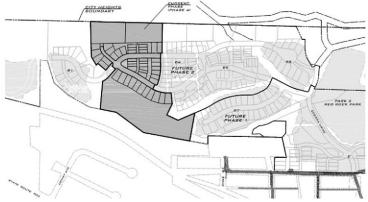
SITE INFORMATION		
Project location	City of Cle Elum	
Zoning	Planned Mixed Use Development (PMU)	
Climate Region (Figure 4.3.1 of 2004 SWMMEW)	Region I (East Slope Cascades)	
Average Annual Precipitation (Figure 4.3.1 of 2004	25 in/yr	
SWMMEW)		
P2year,24hour (Figure 4.3.3 of 2004 SWMMEW)*	2 in	
P10year,24hour (Figure 4.3.4 of 2004 SWMMEW)*	3.25 in	
P25year,24hour (Figure 4.3.5 of 2004 SWMMEW)*	3.5 in	
P100year,24hour (Figure 4.3.7 of 2004 SWMMEW)*	4.75 in	
Type of Soil per Geotech report	Underlain by forest duff or topsoil, silty	
	sand with gravel, & gravel with sand and	
	varying amounts of silt.	
Design Infiltration Rate per Geotech report	N/A, deemed infeasible	

<sup>\*</sup>Precipitation depth adjusted for rain-on-snow and snowmelt considerations, refer to Section 6.3 of this report for adjusted precipitation depths.



#### 1.2 EXECUTIVE SUMMARY

This Preliminary Storm Drainage Report is for the construction of City Heights Phase 4 a Planned Mixed Use (PMU) development. A majority of the build out condition of Phase 4 is tributary to Crystal Creek 4. The full buildout conditions for Pond B7-B referred to in this report (includes areas associated with phases 1-3 and a portion of Phase 4) were analyzed in *City Heights Phase 2 Storm Drainage Report Section 6*. Generally, the property is located within the NE ¼ of Section 27, Township 20 N, Range 15 East, W.M. See vicinity map below.



Vicinity Map, Not to Scale

The overall City Heights project is approximately 358 acres; however, this report will limit discussion to Phase 4, an overall area of 20.07 acres. Approximately 13.74

acres of Phase 4 will remain as onsite undeveloped & undisturbed area or future development and will therefore be excluded from flow control analysis for the site, leaving a total targeted area of 6.33 acres. A majority of Phase 4 is tributary to Pond B7-B. The basin associated with pond B7-B will be referred to as Crystal Creek 4 (Pond B7-B) throughout this report. This portion of the City Heights project is mostly forested. The developed portion of Phase 4 does not contain critical areas or steep slopes. The site is underlain by forest duff or topsoil, silty sand with gravel, & gravel with sand and varying amounts of silt. Please refer to the report prepared by Terra Associates, Inc. dated June 9, 2020 submitted under a separate cover. The site contains flat areas and slopes up to 65%.

In the existing condition of Phase 4, runoff for Crystal Creek 4 generally sheet flows southeast before outfalling to the existing storm system within Phase 2, tributary to Pond B7-B. Refer to *City Heights Phase 2 Storm Drainage Report* Section 6 for Pond B7-B analysis. Undeveloped areas south of Phase 4 developed areas will sheet flow south and southwest, before entering Crystal Creek. Undeveloped areas upstream of Phase 4 developed areas will be collected and routed to a swale proposed in Phase 2 and will bypass Pond B7-B. Please refer to the Existing Conditions Exhibit included at the end of Section 2 in this report. Refer to *City Heights Phase 2 Storm Drainage Report* Section 3 for existing information related to Phase 4 and the Downstream Drainage Exhibit referencing the existing conditions of Crystal Creek 4.

In the proposed condition, Phase 4 will consist of approximately 45 lots, proposed roads, and open space tracts. A portion of Phase 4 will remain as onsite undeveloped & undetained area and be directed east by an existing swale anticipated to be built in Phase 2. The developed portion of Phase 4 that is not tributary to Pond B7-B (generally the rear yards of lots 144-154 and 157-159) will remain as vegetation and sheet flow southwest similar to existing conditions. The remaining portion of Phase 4 is tributary to the Pond B7-B and will be directed through



proposed utilities and infrastructure anticipated to be built in Phase 2. Refer to the Developed Conditions Exhibit included at the end of Section 2.

The project has been designed using the vested guidelines and requirements established in the 2004 Department of Ecology (DOE) Stormwater Management Manual for Eastern Washington (SWMMEW) and the City Heights Annexation and Development Agreement (DA), dated November 8, 2011.

The project will implement flow control BMPs per Chapter 6 of the 2004 SWMMEW. Per Section 4.2.7 of the 2004 SWMMEW, including rain-on-snow and snowmelt design, is optional guidance for detention and water quality design. However, rain-on-snow and snowmelt design requirements are applied for this project. For more information, refer to Section 6 of this report. Per the Geotechnical report provided by Terra Associates, Inc. dated June 9, 2020, infiltration is infeasible.

A detention pond (Pond B7-B) is proposed as a flow control facility for the site per BMP F6.10 to match the developed peak flows with existing peak flows for 50% of the 2-year storm event and the full 25-year storm event. Additionally, per the DA, while the manual stipulates that the design needs to assume a 25-year flood event, the City has requested, and the Ridge Entities have agreed, to design the stormwater system for City Heights assuming a 100-year flood event, thereby increasing the capacity of the system beyond what is required by current regulations. The project will not be required to remedy any already existing deficiencies in the existing system. Refer to City Heights Phase 2 Storm Drainage Report Section 6 for Pond B7-B analysis.

The project proposes more than 5,000 SF of pollutant-generating impervious surfaces (PGIS), is not a high-use site, and does not discharge to a wetland or phosphorous sensitive receiving waters. Per Section 2.2.5 of the 2004 SWMMEW, basic water quality treatment is required.



### **Section 2 Existing Conditions**

The City Heights project is located in Cle Elum, Washington. The Site generally consists of topographic conditions ranging from nearly flat/gently sloping to relatively steeply sloped ground with multiple topographic drainage features. Per the Geotechnical Engineering Report prepared by Terra Associates, Inc. dated June 9, 2020, onsite soils consist of forest duff and topsoil, silty sand with gravel, & gravel with sand and varying amounts of silt. See Geotechnical Report submitted under separate cover for more information.

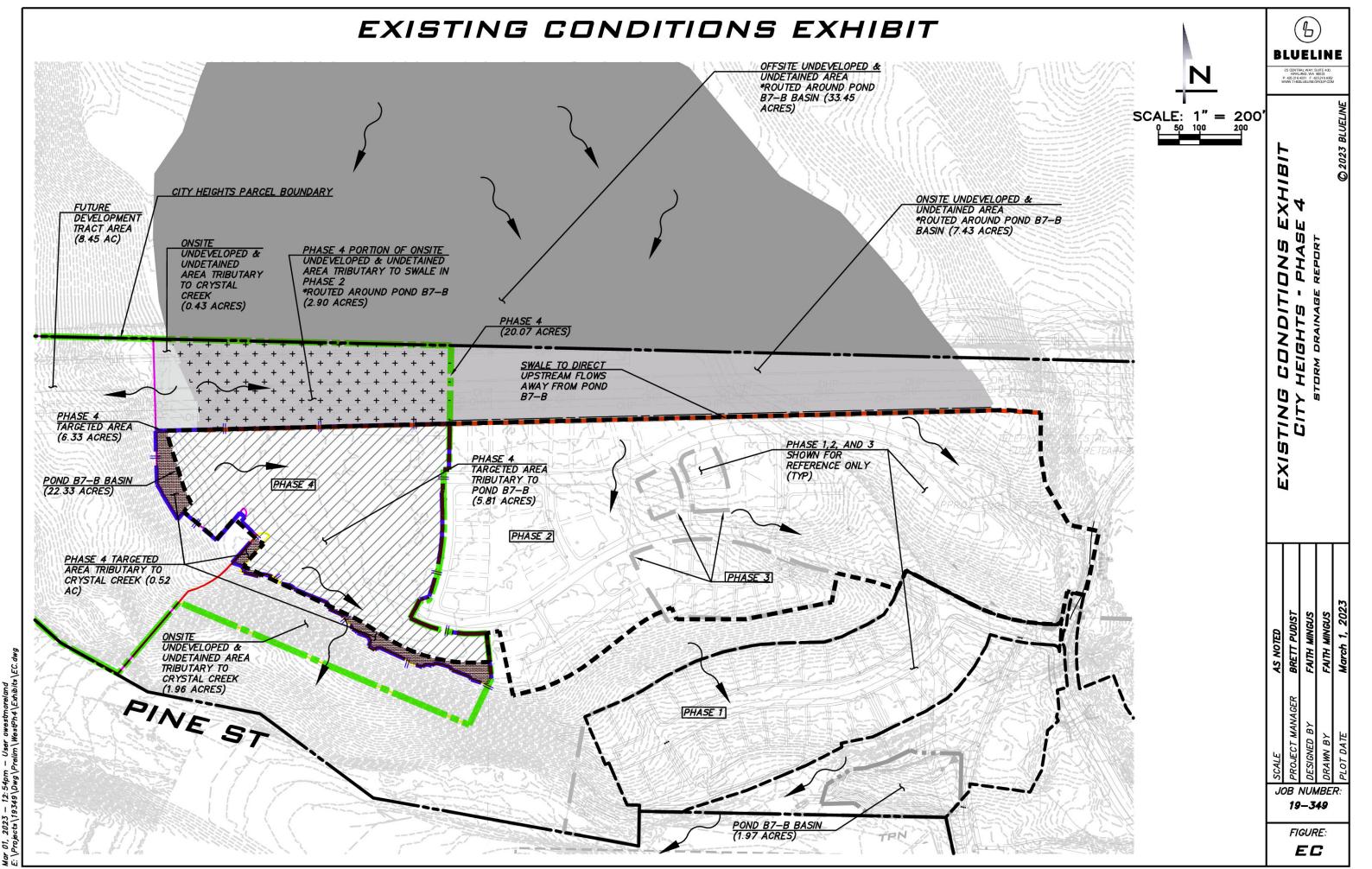
The majority of the site is a forested, undeveloped land west of the anticipated Phase 1, Phase 2, and Phase 3. The full buildout east of Phase 4 (part of the Pond B7-B basin) is assumed residential lots with associated utilities, stormwater detention and water quality facilities, access roadways and supporting utilities/infrastructure. The majority of Phase 4 is included in the Crystal Creek 4 basin. Approximately 13.74 acres of onsite undeveloped and undetained area or future development tract area is within the Phase 4 boundary. Approximately 2.90 acres of this area is tributary to the anticipated ditch and culvert system designed and developed within Phase 2 and will bypass Pond B7-B. The remaining 10.84 areas of undisturbed area, including 8.45 acres of future development tract area, will flow southwest and is tributary to Crystal Creek.

The total targeted area of Phase 4 is 6.33 acres. Approximately 5.81 acres is a part of Crystal Creek 4 Basin and tributary to Pond B7-B. Refer to *City Heights Phase 2 Storm Drainage Report* Section 3 for existing information related to Phase 4. The remaining 0.52 acres of the targeted area sheet flows southwest and is ultimately tributary to Crystal Creek. Refer to the *Existing Conditions Exhibit* in the following pages.

#### **2.1 UPSTREAM**

An upstream area of 40.88 acres sheet flows towards Crystal Creek 4, a portion of which drains toward Phase 4. This area will remain undeveloped and undetained. It is anticipated that this area will be collected via ditch and culvert system designed and developed in Phase 2 and will bypass the detention/water quality facilities and, as such, are not included in the analysis. Refer to *City Heights Phase 2 Storm Drainage Report* Section 6.0 for additional information.





### **Section 3 Developed Conditions**

The proposed Phase 4 project includes the creation of 45 lots (16 zero lot line attached, 29 single family detached) with associated utilities, proposed roads, open space tracts, and supporting utilities/infrastructure. Water quality and flow control improvements are described in Section 6 of this report. Drainage analysis associated with these permits will be addressed in further detail in separate drainage reports.

The developed conditions of Phase 4 include a total of 20.07 acres. Approximately 13.74 acres of Phase 4 will remain as onsite undeveloped & undetained area or future development tract area and will therefore not be included in the analysis of Phase 4. Approximately 2.90 acres of undeveloped area will be intercepted by a swale anticipated to be built in Phase 2. Refer to *City Heights Phase 2 Storm Drainage Report* Section 6 for swale analysis. The remaining 10.84 areas of undisturbed area, including 8.45 acres of future development tract area, will flow southwest and is tributary to Crystal Creek.

Approximately 6.33 acres remains as the Targeted area of Phase 4. For lots 144-154 and 157-159, 0.52 acres of rear will remain as vegetated area that sheet flows west, similar to existing conditions. The remaining 5.81 acres is a part of Crystal Creek 4 Basin and tributary to Pond B7-B. Refer to *City Heights Phase 2 Storm Drainage Report* Section 3 for existing information related to Phase 4. Refer to the *Developed Conditions Exhibit* in the following pages.

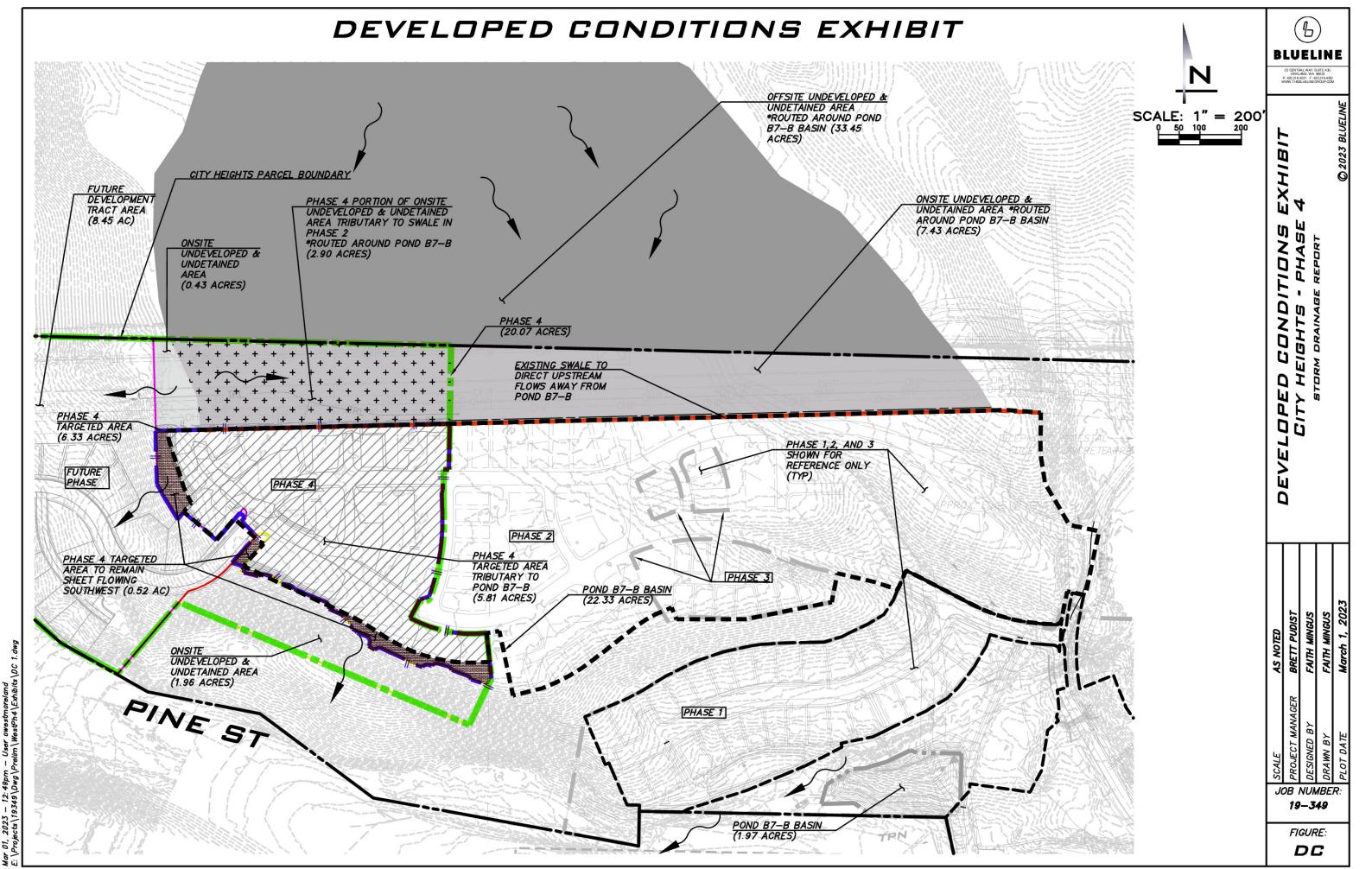
#### 3.1 CRYSTAL CREEK 4 (POND B7-B)

Crystal Creek 4 is the portion of the development tributary to Stream C. A detention pond (Pond B7-B) is proposed to serve the full buildout of Crystal Creek 4 and is assumed to be approximately 106 residential lots, including that of Phase 4. Refer to *City Heights Phase 2 Storm Drainage Report* Section 3 and Section 6 for analysis, conveyance, and sizing for Pond B7-B.

#### **3.2 UPSTREAM**

In the developed condition of Phase 4, upstream flows will remain the same as that in the existing condition. Refer to section 2 of this report.





### Section 4 Off Site Analysis

This project is for Phase 4, a majority of which is tributary to Crystal Creek 4 Basin of the City Heights development. However, the full buildout condition of Crystal Creek 4 Basin was analyzed in *City Heights Phase 2 Storm Drainage Report* Section 6. As part of the EIS process, an offsite analysis for the entire City Heights development was prepared by Encompass Engineering & Surveying. An additional offsite analysis prepared by Barghausen Consulting Engineers, Inc. addresses the downstream system for the City Heights development. Refer to excerpts from the *Grading, Drainage and Utilities Engineering Report* that was prepared by Encompass Engineering & Surveying, dated March 24, 2010 and the *Downstream Drainage Analysis* prepared by Barghausen Consulting Engineers, Inc., dated February 25, 2011 refer to *City Heights Phase 2 Storm Drainage Report* Section 4. A supplemental field investigation was conducted by Blueline on April 24, 2020 to confirm the findings in these reports refer to *City Heights Phase 2 Storm Drainage Report* Section 4.

The following is a summary of the findings from the information used in preparing this report for Phase 4. Refer to the *Geotechnical Engineering Report and Geologic Hazard Assessment* prepared by Terra Associates, Inc. dated June 9, 2020, *Wetlands and Wildlife Habitat Report* prepared by Sewall Wetland Consulting, Inc. dated October 26, 2009, and *Impacts Analysis* prepared by Sewall Wetland Consulting, Inc. dated May 21, 2021 submitted under separate cover.

- The site is located within the Upper Yakima Watershed (DOE Mapping).
- Site is underlain by forest duff or topsoil, silty sand with gravel, & gravel with sand and varying amounts
  of silt. Weathered siltstone/sandstone were encountered in test pits near Summit View Road. See
  Geotechnical Report submitted under separate cover.
- The site contains two drainage basins that ultimately drain to the Yakima River (see downstream Exhibit in City Heights Phase 2 Storm Drainage Report Section 4).
- A majority of the site is analyzed under Phase 2 which contains onsite wetlands and streams per report by Sewall Wetland Consulting, Inc. dated October 26, 2009. (Refer to report submitted under separate cover for Sewall Map Figure 3.4-2).
- The site is not located within a floodplain (FEMA Flood Maps).
- The site is mapped within a critical aquifer recharge area with moderate risk of contamination (City of Cle Elum).
- The site contains slopes up to 65% in the waste rock pile area per geologic hazard assessment, Section 4.2
  of Geotechnical Report by Terra Associates, Inc. See Geotechnical Report submitted under separate cover.
- For Erosion Hazard Area, refer to Section 4.6 and 4.7 of Geotechnical Report by Terra Associates, Inc. See Geotechnical Report submitted under separate cover.
- For geologic hazard assessment, refer to Section 4.3 of Geotechnical Report by Terra Associates, Inc. See
   Geotechnical Report submitted under separate cover.
- For Seismic Assessment refer to Section 4.1.4 of Geotechnical Report by Terra Associates, Inc. See Geotechnical Report submitted under separate cover. The coal waste pile of development is classified as Class Site E per IBC.
- For Liquefication Assessment refer to Section 4.1.3 of Geotechnical Report by Terra Associates, Inc. See Geotechnical Report submitted under separate cover. The potential for liquefaction is low.
- Sedimentation accumulation in the conveyance system downstream was observed during the supplemental field investigation conducted by Blueline on April 24, 2020. Per the DA, the project will not



be required to remedy any already existing deficiencies in the existing system. Sediment removal is likely to occur as part of regular City maintenance.

#### 4.1 UPSTREAM CONDITIONS

An upstream area of 40.88 acres sheet flows towards Crystal Creek 4. This area will remain undeveloped and undetained. It is anticipated that this area will be collected via ditch and culvert system designed and developed in Phase 2 and will bypass the detention/water quality facilities and, as such, are not included in the analysis. Refer to City Heights Phase 2 Storm Drainage Report Section 6 for additional information.

#### **4.2 EXISTING DRAINAGE SYSTEM**

As part of the EIS process, an offsite analysis for the entire City Heights development was prepared by Encompass Engineering & Surveying. An additional offsite analysis prepared by Barghausen Consulting Engineers, Inc. addresses the downstream system for the City Heights development. Refer to excerpts from the *Grading, Drainage and Utilities Engineering Report* that was prepared by Encompass Engineering & Surveying, dated March 24, 2010 and the *Downstream Drainage Analysis* prepared by Barghausen Consulting Engineers, Inc., dated February 25, 2011 refer to *City Heights Phase 2 Storm Drainage Report* Section 4. A supplemental field investigation was conducted by Blueline to confirm the findings in these reports. Refer to *City Heights Phase 2 Storm Drainage Report* Section 4.2 for Blueline's findings and Downstream Analysis.



### **Section 5 Core Elements**

Compliance with Core Elements 1 through 8, per Section 2.2 of the 2004 SWMMEW, are listed below.

Core Element #1: Preparation of a Stormwater Site Plan:

Clearing, Grading and Infrastructure plans under separate cover and Storm Drainage Report herein have been prepared for the subject property.

Core Element #2: Construction Stormwater Pollution Prevention Plan (SWPPP):

The project will include temporary measures (silt fence, construction entrance) as well as permanent measures (seeding, landscaping) for control of stormwater during construction to be designed at the final engineering permit phase. See Section 7 for more information.

Core Element #3: Source Control of Pollution:

The site is mostly residential and is, therefore, anticipated to have minimal opportunities for pollution. The community will have an HOA which is encouraged to share educational information to future residents regarding water quality and to promote voluntary use of BMP's.

Core Element #4: Preservation of Natural Drainage Systems:

The site consists of two drainage basins ultimately tributary to Crystal Creek. In the proposed condition Crystal Creek 4 will enter a proposed conveyance system which will be routed to a tightline conveyance system, a biofiltration swale and a detention pond (Pond B7-B) prior to outleting into a dispersion trench upstream of Stream C. Crystal Creek Basin areas within Phase 4 will remain sheet flowing south and southwest similar to the existing conditions. The proposed project will preserve the natural drainage system. See Section 4 of *City Heights Phase 2 Storm Drainage Report* provided by Blueline for the downstream analysis.

#### Core Element #5: Runoff Treatment:

The project proposes more than 5,000 SF of PGIS, is not a high-use site, and does not discharge to a wetland or phosphorous sensitive receiving waters. Per Section 2.2.5 of the 2004 SWMMEW, basic water quality treatment is required.

#### Core Element #6: Flow Control:

The project will implement flow control BMPs per Chapter 6 of the 2004 SWMMEW. A detention pond (Pond B7-B) is proposed per BMP F6.10 to meet the allowable developed peak flows and not exceed the pre-developed rates for the following storm events: 50% of the 2-year storm event, 25-year storm event, and 100-year storm event (per DA).

Core Element #7: Operation and Maintenance:

An Operation and Maintenance Manual is provided.

#### Core Element #8: Local Requirements:

The project has been designed using the guidelines and requirements established in the 2004 SWMMEW and the City Heights Annexation and Development Agreement (DA), dated November 8, 2011. The DA contains references to local requirements and vesting.



### Section 6 Permanent Stormwater Control Plan

#### **6.1 EXISTING HYDROLOGY**

The existing site of Phase 4, of the City Heights development is undeveloped and forested. An area breakdown of the existing conditions is summarized below. Approximately 2.90 acres of Phase 4 is onsite undeveloped and undetained area tributary to the anticipated ditch and culvert system designed and developed within Phase 2 and therefore are excluded from the drainage analysis. The remaining 10.84 areas of undisturbed area, including 8.45 acres of future development tract area, will flow southwest and is tributary to Crystal Creek.

Excluding the onsite undeveloped and undetained areas from the Phase 4 hydrology analysis leaves the total targeted site at approximately 6.33 acres. A majority of Phase 4 (5.81 acres) is a part of the full buildout condition for Crystal Creek 4 Basin and was analyzed and modeled in *City Heights Phase 2 Storm Drainage Report Section 6.* The remaining 0.52 acres of Phase 4 will remain as vegetated area that sheet flows south and southwest toward Crystal Creek, similar to the existing condition, and therefore is excluded from the drainage analysis.

#### TRIBUTARY TO CRYSTAL CREEK 4 (POND B7-B)

#### **EXISTING CONDITIONS**

Pervious (CN=73)

Forest	5.81	ac
TOTAL EXISTING CONDITIONS TRIBUTARY TO		
POND B7-B (SOIL GROUP C)	5.81	ac

#### 6.2 DEVELOPED HYDROLOGY

The proposed Phase 4 project includes the creation of 45 lots (16 zero lot line attached, 29 single family detached). Excluding the onsite undeveloped and undetained areas from the Phase 4 hydrology analysis leaves the total targeted site at approximately 6.33 acres. A majority of the targeted site area of Phase 4 (5.81 acres) is tributary to Pond B7-B. For lots 144-154 and 157-159, 0.52 acres of the rear lots will remain as vegetated area that sheet flows west, similar to existing conditions, and therefore is excluded from the drainage analysis. The full buildout condition for Crystal Creek 4 Basin were analyzed in Phase 2, refer to Refer to *City Heights Phase 2 Storm Drainage Report*. Onsite storm drain infrastructure within Crystal Creek 4 Basin will collect and convey drainage to Pond B7-B. The areas used to run the drainage model associated with the developed basins conditions are summarized *City Heights Phase 2 Storm Drainage Report*.

Approximately 2.90 acres of Phase 4 onsite undeveloped and undetained area is tributary to the anticipated ditch and culvert system designed and developed within Phase 2. The remaining 10.84 areas of undisturbed area, including 8.45 acres of future development tract area, will flow southwest and is tributary to Crystal Creek.

The assumed percent impervious for each type of area is listed in the area tables below. Lot area coverage is based on anticipated house and garage footprints. This is conservative as it is anticipated that roof drains will not be directly connected to the conveyance system. The portion of the developed basin located on single-family lots is assumed to contain 50% impervious coverage. Zero lot line attached lots contain between 60% and 70%



impervious coverage and are modeled as 70% impervious coverage. Right-of-way and private access tract impervious areas are based on the road sections and is increased where there are driveway cuts in the right-of-way. Lot coverage assumptions are consistent with the City Heights Phase 2 Storm Drainage Report.

### TRIBUTARY TO CRYSTAL CREEK 4 (Pond B7-B)

#### **DEVELOPED CONDITIONS**

Impervious (CN=98)

Lata FOOV impragrations Discount Alata 144 104 0		
Lots 50% impervious: Phase 4 lots 144-164 &		
181-188	1.40	ac
Lots 70% impervious: Phase 4 lots 165-180	0.67	ac
·		
50' ROW Latitude Dr (69% impervious)	0.37	ac
50' ROW Discovery Dr (81% impervious)	0.45	ac
D: 1 A T 1/4000/:	0.44	
Private Access Tract (100% impervious)	0.14	ac
DI A (4000)	0.45	
Road A (100% impervious)	0.15	ac
TOTAL IMPERIATE	2.10	
TOTAL IMPERVIOUS	3.18	ac

Pervious (CN=74)

10111000 (011 1 1)		
Lots 50% pervious: Phase 4 lots 144-164 & 181-		
188	1.40	ac
Lots 70% impervious: Phase 4 lots 165-180	0.29	ac
50' ROW Latitude Dr (31% pervious)	0.16	ac
50' ROW Discovery Dr (19% pervious)	0.10	ac
Open Space Tracts (100% pervious)*	0.68	ac
TOTAL PERVIOUS (SOIL GROUP C)	2.63	ac
TOTAL DEVELOPED CONDITIONS TRIBUTARY TO		
POND B7-B	5.81	ac

<sup>\*</sup>Pervious areas (other than forest) are modeled as 50% Pasture CN=74 and 50% Forest CN=73 in anticipation that forested areas will remain where feasible to preserve the natural feel of the development.



#### **6.3 DESIGN PARAMETERS**

Refer to Section 6.4 of the City Heights Phase 2 Storm Drainage Report for the design parameters.

#### **6.4 LID BMP IMPLEMENTATION**

LID BMPs will be implemented for the project to the maximum extent feasible per the 2004 SWMMEW recommendations. Per the Geotechnical Engineering Report prepared by Terra Associates, infiltration as a primary means of stormwater flow control and management will not be feasible. Amended soils will be applied to landscaped areas on the site. Additionally, native vegetation will be preserved in many of the proposed open space tracts.

#### **6.5 CONVEYANCE SYSTEM DESIGN**

Per the City Heights Annexation and Development Agreement, dated November 8, 2011 the storm drain conveyance system will be designed to convey the 100-year storm.

The conveyance system will be designed at final engineering. The design will address the Phase 4 portion of the system tributary to Pond B7-B and the system for upstream areas that will bypass the pond. Upstream flows will be collected via ditch north of the development and conveyed to the anticipated ditch and culvert system installed as part of Phase 2.



# Section 7 SWPPP

A SWPPP will be submitted under a separate cover prior to construction.



# **Section 8 Special Reports and Studies**

Refer to the *Geotechnical Engineering Report and Geologic Hazard Assessment* prepared by Terra Associates, Inc. dated June 9, 2020, *Wetlands and Wildlife Habitat Report* prepared by Sewall Wetland Consulting, Inc. dated October 26, 2009, and *Impacts Analysis* reports prepared by Sewall Wetland Consulting, Inc. dated March 8, 2022.



# **Section 9 Other Permits**

A Forest Practices Application (FPA) is required for City Heights Phase 4.



# Section 10 Operation and Maintenance

An operations and maintenance manual will be provided with the final engineering submittal.



