Final Stormwater Report

FOR

Puyallup Raising Cane's

at

43rd Avenue SE and S Meridian Street,

Puyallup, WA 98373

June 11, 2026

PREPARED FOR:

Raising Restaurants, LLC.

6800 Bishop Road

Plano, TX 75024

PREPARED BY:

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KHA PROJECT #: 090042022

Kimley»Horn

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Disclosure Statement:

Contents

PROJECT NARRATIVE

The proposed **Raising Cane's Project** is located northwest of the 43rd Avenue SE and S Meridian Street intersection within APN 0419091073, in Puyallup, Pierce County, Washington. The proposed project consists of demolition of an existing commercial building and construction of a new commercial building with associated drive aisles, parking, utility infrastructure, and onsite stormwater management.

The purpose of this report is to provide an explanation of the proposed site improvements and to demonstrate how the project will meet stormwater requirements in accordance with the *City of Puyallup's Municipal Code 21.10 Storm Water Management, City of Puyallup - City Standards Section 200 Stormwater Management,* and the Department of Ecology's (DOE) *Stormwater Management Manual for Western Washington (SWMMWW), dated 2024*.

Flow control and runoff treatment calculations were performed using the Western Washington Hydrology Model 2012 (WWHM), an approved continuous simulation model by the DOE. WWHM uses the EPA Hydrologic Simulation Program Fortran (HSPF), which is a calibrated continuous simulation hydrologic model.

Water Quality, Quantity and Conveyance

The existing site consists of an asphalt parking lot with a restaurant located in the southern portion of the site. Existing runoff sheet flows to multiple catch basins onsite where it is collected and conveyed through a series of storm pipes and catch basins to the municipal storm system on the east side of the site along S Meridian Street.

The onsite improvements will include a new water quality vault, located west of the building footprint, to adequately treat stormwater runoff and an underground gravel infiltration facility, located downstream of the vault, to infiltrate stormwater runoff into native soils. During storm events exceeding the 100-year storm, emergency overflow will be discharged from the gravel infiltration facility into the existing municipal storm system along S Meridian Street.

Certificate of Engineer

The drainage report and data contained in this report was prepared under the direction and supervision of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

Prepared By: Liz Willmot, PE

6-11-26

1.0 – PROJECT OVERVIEW

1.1 – SITE LOCATION

The 0.89-acre site is located northwest of 43rd Avenue SE and S Meridian Street intersection in the City of Puyallup, Pierce County, Washington, as seen in Figure 1 below. The project site is located within APN 0419091073 and is bounded by S Meridian Street to the east and commercial properties to the north, south and west.

Figure 1 – Vicinity Map

1.2 – EXISTING CONDITIONS

The site contains an existing area of parking and pavement area of approximately 21,743 square feet, an existing building area of approximately 8,141 square feet, and approximately 10,364 square feet of landscaping. The site is bound by commercial parcels to the north, south, and west and S Meridian Street on the eastern frontage. There is an existing nail spa located north of the project area on the same parcel, an existing bank on the parcel to the south, as well as a commercial retail center on the parcel to the west that includes Best Buy, Mattress Depot, Men's Warehouse, and Ross Dress For Less.

The existing site has moderate slopes with a drop across the site of approximately 8 feet from the west to the east with an average slope of approximately 3.70%. Existing elevations onsite range from 455 feet to 447 feet. The project is located with Zone X, which is outside of the 100- or 500-year floodplain (See Appendix A-1).

The existing site soils have been classified via the United States Department of Agriculture (USDA) Soil survey as Everett very gravelly sandy loam, which is considered hydrologic soil group A. The USDA Soil Survey can be viewed in Appendix C-1.

A site geotechnical investigation was conducted by Terracon in April 2025 (See Appendix C-2). The geotechnical investigation consisted of seven (7) borings. The shallowest observed groundwater depth was 38 feet below ground surface. A summary of these borings can be viewed in Table 1 below.

Table 1 – Boring Log Summary

Boring (B) Designation	Boring Soil Description

B-01	• Fill –Silty Sand with Gravel (SM)
	  ○ To 13.5 feet BGS
	• Silty Gravel with Sand (GM)
	  ○ To 25.3 feet BGS

B-02	• Fill – Poorly Graded Sand with Gravel (SP)
	  ○ To 4.5 feet BGS
	• Silty Clayey Sand with Gravel (SC-SM)
	  ○ To 18.5 feet BGS
	• Silty Gravel with Sand (GM)
	  ○ To 25.4 feet BGS

B-03	• Fill – Silty Sand (SM)
	  ○ To 8.0 feet BGS
	• Silty Clayey Sand with Gravel (SC-SM)
	  ○ To 13.5 feet BGS
	• Silty Gravel with Sand (GM)
	  ○ To 25.3 feet BGS

B-04/MW-01	• Fill –Silty Sand with Gravel (SM)
	  ○ To 9.5 feet BGS
	• Silty Gravel with Sand (GM)
	  ○ To 48.0 feet BGS
	• Poorly Graded Sand with Silt and Gravel (SP-SM)
	  ○ To 50.8 feet BGS

B-05	• Silty Sand with Gravel (SM)
	  ○ To 7.0 feet BGS
	• Silty Gravel with Sand (GM)
	  ○ To 11.5 feet BGS

B-06	• Poorly Graded Sand with Silt and Gravel (SP-SM)
	  ○ To 4.5 feet BGS
	• Silty Gravel with Sand (GM)
	  ○ To 10.9 feet BGS

B-07	• Silty Sand (SM)
	  ○ To 10.4 feet BGS
	• Well Graded Gravel with Silt and Sand (GW-GM)
	  ○ To 11.5 feet BGS

In addition to the borings noted above, infiltration testing was performed by Terracon using one (1) small-scale pilot infiltration test (PIT). The measured infiltration rate was found to be 3.6 inches per hour resulting in a design infiltration rate of 1.3 inches per hour. The infiltration addendum is provided with the associated site geotechnical report in Appendix C-2.

1.3 – EXISTING ON-SITE STORMWATER SYSTEM

Stormwater runoff from the existing site generally sheet flows to the northeast and southeast corners and is collected in catch basins located onsite and on neighboring properties. Collected runoff is then routed through the municipal stormwater drainage system along S Meridian Street and 39th Avenue SW, conveyed through open natural grass-lined channels, and ultimately outfalls into an unnamed perennial stream, publicly owned by the City of Puyallup Public Works, located west of the project site. The existing drainage basin area and surface summary can be seen in the Pre-Developed Drainage Area Map in Appendix A-2.

1.4 – PROPOSED SITE CONDITIONS

Stormwater runoff will be captured in several catch basins placed at low points onsite and routed to a water quality vault, a Contech Modular Wetland, which will treat stormwater runoff for both oil and metals. Once treated for water quality, stormwater runoff will be routed into the underground gravel infiltration facility where it will fully infiltrate into native soils. During storm events exceeding the 100-year storm, emergency overflow will discharge from the gravel infiltration trench via an overflow riser into the existing municipal stormwater system along S Meridian Street for further conveyance. The downstream existing catch basin will be replaced with site improvements, see the provided drainage plans in Appendix A-4.

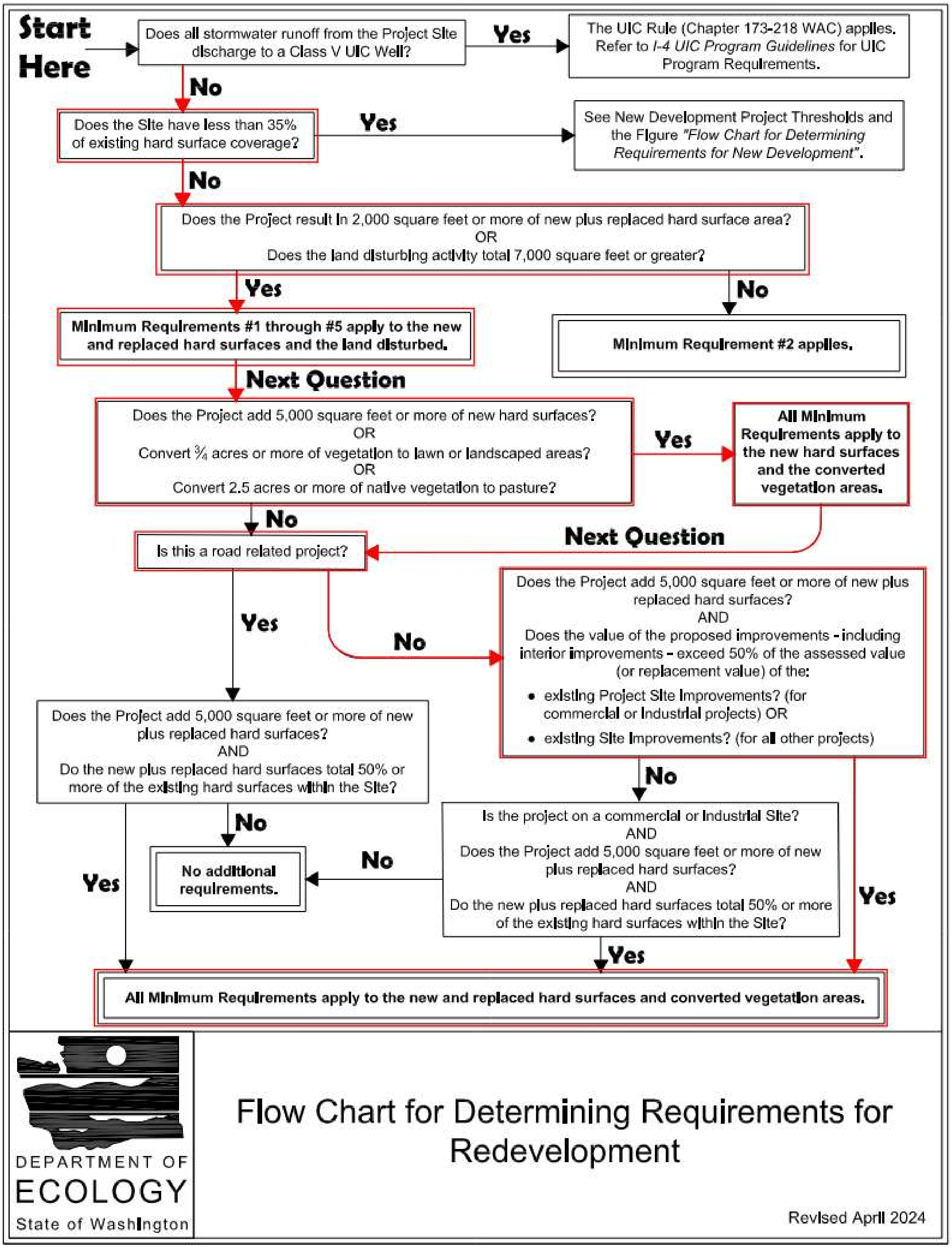
The underground gravel infiltration facility is sized to fully infiltrate all onsite surfaces, including the bypass area located primarily in the southern portion of the site. The disturbed bypass impervious surface area is larger than the undisturbed offsite impervious surface area flowing to the onsite basin, so the disturbed bypass impervious areas are used to conservatively size the gravel infiltration facility. The proposed drainage basin area and surface summary is provided in the Post-Developed Drainage Area Map in Appendix A-3.

2.0 – MINIMUM REQUIREMENTS (MRs)

2.1 – APPLICABLE MINIMUM REQUIREMENTS

The proposed project is a redevelopment project since the existing site has more than 35% impervious surface cover. To ensure stormwater meets the current SWMMWW requirements, the project site was evaluated using *Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment from Volume II of the SWMMWW* and can be seen in Figure 2 below. The project results in 2,000 square feet or more of new plus replaced hard surface area and adds more than 5,000 square feet of new plus replaced hard surface. Therefore, this project is required to meet all MRs for new and replaced hard surfaces and converted vegetated areas per the SWMMWW dated 2024. See the following sections below for a list of the MRs, the applicability of each to this project, and where additional information regarding compliance for each MR may be found in this report.

Figure 2 – Flow Chart for Determining Requirements for Redevelopment



A summary of the basin areas used for this project can be seen in Table 2 below.

Table 2 – Basin Area Summary

ONSITE BASIN	
POLLUTION GENERATING IMPERVOUS (ASPHALT/CONCRETE)	22,801 SF (0.52 AC)
NON-POLLUTION GENERATING IMPERVIOUS (ROOF)	3,598 SF (0.08 AC)
PERVIOUS (LANDSCAPING)	5,068 SF (0.12 AC)
POLLUTION GENERATING IMPERVIOUS AS BYPASS (ASPHALT)	4,233 SF (0.10 AC)
PERVIOUS AS BYPASS (LANDSCAPING)	4,492 SF (0.10 AC)
ONSITE BASIN TOTAL	**40,192 SF (0.92 AC)**

MR #1 – PREPARATION OF A STORMWATER SITE PLAN

The Grading and Drainage Plans and Erosion and Sediment Control Plans have been provided in Appendix A-4.

MR #2 –STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

As noted in SMMWW 1-3.4.2 MR2, projects which result in 2,000 square feet or more of new plus replaced hard surface area, or which disturb 7,000 square feet or more of land must prepare and submit a Construction Stormwater Pollution Prevention Plan (SWPPP). Refer to Appendix C-3 for the Construction Stormwater Pollution Prevention Plan (SWPPP).

MR #3 – SOURCE CONTROL OF POLLUTION

Water quality source control BMPs will be applied as applicable in accordance with the DOE's 2024 SWMMWW.

MR #4 – PRESERVATION OF NATURAL DRAINAGE SYSTEMS AND OUTFALLS

The existing drainage patterns will be maintained and improved to be in accordance with the 2024 SWMMWW Minimum Requirements for Redevelopment, as determined within Section 2.1 of this report. Stormwater runoff will be collected in catch basins and routed to the water quality vault and underground gravel infiltration facility where it will infiltrate into the native soils. During storm events exceeding the 100-year storm, emergency overflow will discharge to the existing municipal stormwater system along S Meridian Street from the underground gravel infiltration facility via an overflow riser.

MR #5 – ON-SITE STORMWATER MANAGEMENT

The project site is inside the Urban Growth Area (UGA), so the on-site stormwater management can use the LID BMPs from List #2 for all surfaces within each type of surface in List #2 or use any flow control BMPs desired to achieve the LID Performance Standard and apply BMP T5.13: Post-Construction Soil

Quality and Depth. The project site will use Flow Control BMPs to achieve the LID Performance Standard and apply BMP T5.13: Post-Construction Soil Quality and Depth. See Section 5.0 for additional information.

MR #6 – RUNOFF TREATMENT

Runoff treatment will be provided via one onsite Contech Modular Wetland for oil control and metals treatment. See Section 6.0 of this report for additional information on runoff treatment.

MR #7 – FLOW CONTROL

Stormwater runoff will fully infiltrate into native soils via an underground gravel infiltration facility. During storm events exceeding the 100-year storm, emergency overflow will discharge to the existing municipal stormwater system along S Meridian Street from the gravel infiltration trench via an overflow riser. See Section 7.0 of this report for details on design and assumptions for these proposed facilities.

MR #8 – WETLAND PROTECTION

Runoff generated from the site does not discharge into a wetland (directly or indirectly).

MR #9 – OPERATIONS AND MAINTENANCE

An operations and maintenance (O&M) manual for the proposed stormwater management BMPs is included in Appendix C-4 of this report.

4.0 – PRESERVING NATURAL DRAINAGE SYSTEMS (MR#4)

No adjustments will be made to the existing natural discharge location. In the existing conditions, stormwater runoff is collected and routed to an unnamed perennial stream, publically owned by the City of Puyallup Public Works.

It is proposed that stormwater runoff will be infiltrated onsite to match forested conditions, as modeled in WWHM 2012. The proposed stormwater system preserves natural drainage patterns and improves the existing conditions by mitigating onsite runoff to the downstream municipal stormwater system through full infiltration up to the 100-year storm. During storm events exceeding the 100-year storm, emergency overflow will leave the site via an overflow riser and outfall into the municipal along S Meridian Street for further conveyance. Additionally, onsite runoff will be treated for water quality in accordance with MR#5 before being infiltrated into native soils for preservation of the underground aquifer.

A site visit was conducted on April 18th, 2025 to analyze the downstream conveyance system and existing onsite catch basin structures. Photos from this site visit have been provided below:

Photograph 1 – Existing Downstream Catch Basin Within South Access To Be Replaced – Discharge From Overflow Structure

Photograph 2 – Existing Downstream Catch Basin Within South Access – Upstream of S Meridian Tie-In

Photograph 3 – Existing Catch Basin Within S Meridian Street – Tie-In to Municipal System

Photograph 4 – Existing Catch Basin Within Proposed Landscaping Along Eastern Portion of the Site

5.0 – ON-SITE BMPS (MR#5)

As the proposed project site is not Flow Control exempt and is inside the Urban Growth Area (UGA), this project will use Flow Control BMPs to achieve the LID Performance Standard and apply BMP T5.13: Post-Construction Soil Quality and Depth.

The LID Performance Standard requires that stormwater discharges match developed durations to pre-developed duration for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow.

The LID Performance Standard is met by the infiltration facility that will fully infiltrate the onsite stormwater runoff. During storm events exceeding the 100-year storm, emergency overflow will leave the site via an overflow riser and outfall into the municipal along S Meridian Street for further conveyance. See Appendix B-2 for the WWHM2012 calculation for the LID Performance Standard.

Lawn and landscaped areas will be managed using BMP T5.13: Post-Construction Soil Quality and Depth.

6.0 – WATER QUALITY FACILITIES (MR#6)

The project site has been evaluated based on the current edition of the SWMMWW and water quality treatment will be required since new plus replaced pollution generating impervious surfaces (PGIS) exceed 5,000 square feet (SF).

The flow chart for water quality treatment was utilized to evaluate what treatment needs to be provided. A summary of the flow chart can be viewed below:

- Oil Control: The onsite basin is deemed to be a commercial site which is anticipated to have more than 300 total trips per day meaning oil control will be required.
- Pretreatment: To avoid the cost of additional structures and site constraints it was deemed infeasible.
- Phosphorous: The site's ultimate discharge point when storm events exceed the 100-yr storm event and for bypass runoff is an unnamed perennial stream, publicly owned by the City of Puyallup Public Works, located west of the site which is not listed as a 303(d) body of water and therefore phosphorus treatment is not required.
- Metals: Due to the anticipated high number of trips generated, it was determined that metals treatment would be required.

To ensure sufficient stormwater treatment, a Contech Modular Wetland was selected, which treats all the above listed contaminates. As seen in Figure 3 below, the water quality off-line flow was calculated to be 0.0597 cfs which was used to calculate the required vault size. See Appendix B-1 for the WWHM2012 calculations for water quality flow rates.

Figure 3 – Water Quality Flowrates (Onsite)

Water Quality
Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.0751 acre-feet
On-line facility target flow: 0.1037 cfs.
Adjusted for 15 min: 0.1037 cfs.
Off-line facility target flow: 0.0597 cfs.
Adjusted for 15 min: 0.0597 cfs.

7.0 – FLOW CONTROL (MR#7)

To ensure stormwater runoff is properly mitigated, an underground gravel infiltration facility is proposed to fully infiltrate runoff into native soils. During storm events exceeding the 100-year storm, emergency overflow from the gravel infiltration facility will outflow via an overflow riser into a proposed catch basin located within the access drive south of the property site before entering the municipal stormwater system within S Meridian Street and will ultimately outfall to an unnamed perennial stream owned by the City of Puyallup Public Works. A summary of the gravel infiltration trench can be seen in Table 3 below and can be viewed in Appendix B-3.

Table 3 – Gravel Infiltration Trench Summary

GRAVEL INFILTRATION TRENCH	AREA (SF)	DEPTH (FT)	[1]STORAGE (CF)	[2]BOTTOM ELEV.
Gravel Infiltration Trench	2,327	6	4,988	438.10

Notes:
[1]Storage includes void space and only accounts for the first 5 feet from bottom elevation with 1 foot freeboard. See Table 4 below and Appendix B-3 for additional information.
[2]Bottom elevation is considered bottom of gravel infiltration trench.

In WWHM, the gravel infiltration trenches were modeled using the gravel trench element, but since a series of 24-inch diameter pipes are being proposed, calculations to account for additional storage in these pipes and associated manifolds were done to provide a more realistic understanding of underground storage. An example calculation for the middle layer of Gravel Infiltration Trench was provided below to show how the pipe area was included to provide additional detention storage:

24" Perforated Pipe Storage Volume (cu-ft)

$$\frac{\pi}{4}(\text{Pipe Diameter})^2(\text{Pipe Length}) = \text{Pipe Volume}$$

$$\frac{\pi}{4}(2\text{ ft})^2\ (360\text{ ft}) = 1131\text{ cu-ft}$$

12" Manifold Storage Volume (cu-ft)

$$\frac{\pi}{4}(\text{Pipe Diameter})^2(\text{Pipe Length}) = \text{Pipe Volume}$$

$$\frac{\pi}{4}(1\text{ ft})^2\ (74\text{ ft}) = 58\text{ cu-ft}$$

Gravel Storage Volume (cu-ft)

$$((\text{Gravel Infiltration Trench Area})(\text{Depth})\text{- 24" Pipe Volume - 12" Manifold Volume})(\text{Porosity}) = \text{Gravel Storage Volume}$$

$$(2{,}327\text{ sf})(2\text{ ft})\text{- 1131 cu-ft - 58 cu-ft })(0.4) = 1386\text{ cu-ft}$$

Total Middle Layer Volume (cu-ft)

$$24\text{" Pipe Volume} + 12\text{" Manifold Volume} + \text{Gravel Storage Volume} = \text{Middle Layer Total Volume}$$

$$1131\text{ cu-ft} + 58\text{ cu-ft} + 1386\text{ cu-ft} = 2575\text{ cu-ft}$$

To ensure this storage volume was accurately represented for in WWHM, an adjustment to porosity was accounted for within the middle layer of the gravel infiltration trench. The calculations for the weighted porosity were as follows:

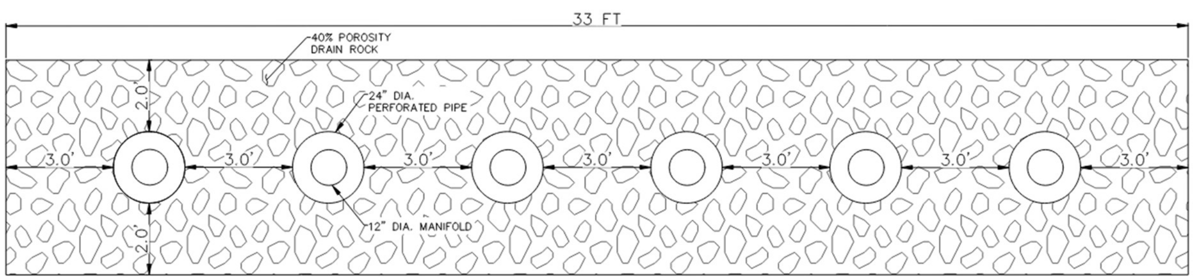
Total Middle Layer Porosity

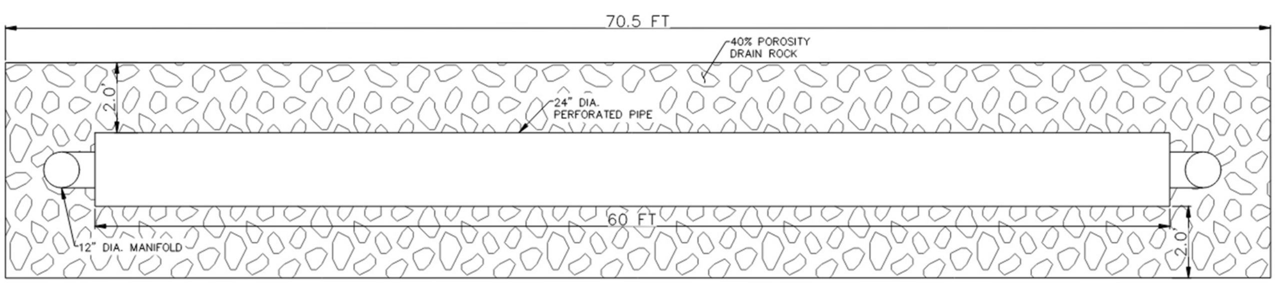
$$\frac{(\text{Total Middle Layer Volume})}{(\text{Gravel Infiltration Trench Area})(\text{Depth})} = \text{Middle Layer Porosity}$$

$$\frac{(2575\text{ cu-ft})}{(2327\text{ sf})(2\text{ ft})} = 55.33\%$$

A cross section showing how the above-mentioned calculations were made, is shown in Figure 4 below.

Figure 4 – Gravel Infiltration Trench #1 Cross Section





A summary of the gravel infiltration trench storage volume calculations has been provided in Table 4 below.

Table 4 – Gravel Infiltration Trench Sizing Summary

GRAVEL INFILTRATION TRENCH #1 (ONSITE)						
DESCRIPTION	CAD			WWHM		
	POROSITY (%)	DEPTH (FT)	VOLUME (CF)	POROSITY (%)	DEPTH (FT)	VOLUME (CF)
TOP LAYER	**40%**	**2**	**1,861**	**40%**	**2**	**1,861**
GRAVEL MIDDLE	40%	2	1,386	**55.33%**	**2**	**2,575**
360 LF OF 24" DIA. CMP	100%	---	1,130			
54 LF OF 12" DIA. PVC	100%	---	58			
MIDDLE LAYER TOTAL	**---**	**---**	**2,575**			
BOTTOM LAYER	**40%**	**2**	**1,861**	**40%**	**2**	**1,861**

8.0 – CONVEYANCE SYSTEMS

To meet City of Puyallup Section 2-4.3 Pipe System Design Criteria, the minimum design velocity for full flow storm pipes of 3-feet per second was maintained.

Example Velocity Calculation

$$Velocity = \frac{1.486}{\mathrm{n}}(R)^{2/3}(S)^{1/2} = \frac{1.486}{0.012}(1/4)^{2/3}(0.005)^{1/2} = 3.47\ fps$$

The conveyance system was designed to fully convey the 25-year storm event to ensure pipes do not exceed pipe capacity. The 100-year storm event was also evaluated to ensure no overtopping in the system.

Conveyance calculations were done using StormCAD and the output has been provided in Appendix B-3.

9.0 – WETLAND PROTECTION (MR#8)

There are no existing wetlands on or adjacent to the proposed site.

10.0 – OPERATIONS AND MAINTENANCE MANUAL (MR#9)

Operations and maintenance procedures for stormwater management BMPs are included in Appendix C-4.

Beyond what is listed in the manufacturer operations and maintenance manuals, all facilities shall be inspected after the first major storm of the wet season and a minimum of twice per year. Clean any trash or debris from water quality facilities during the inspection and replace treatment media if conditions listed in the manufacturer maintenance manual are observed.

11.0 – OTHER PERMITS

Construction of this project and its stormwater facilities will require the following additional permits:

Construction Stormwater General Permit – Washington Department of Ecology (DOE)

12.0 – APPENDICES

Appendix A-1 – FEMA FIRMette

Appendix A-2 – Pre-Developed Drainage Area Map

Appendix A-3 – Post-Developed Drainage Area Map

Appendix A-4 – Drainage and TESC Plans

Appendix B-1 – Water Quality Modeling Output

Appendix B-2 – Flow Control Modeling Output

Appendix B-3 – Conveyance Calculations

Appendix C-1 – USGS Soil Survey

Appendix C-2 – Terracon Geotechnical Report

Appendix C-3 – Construction Stormwater Pollution Prevention Plan (SWPPP)

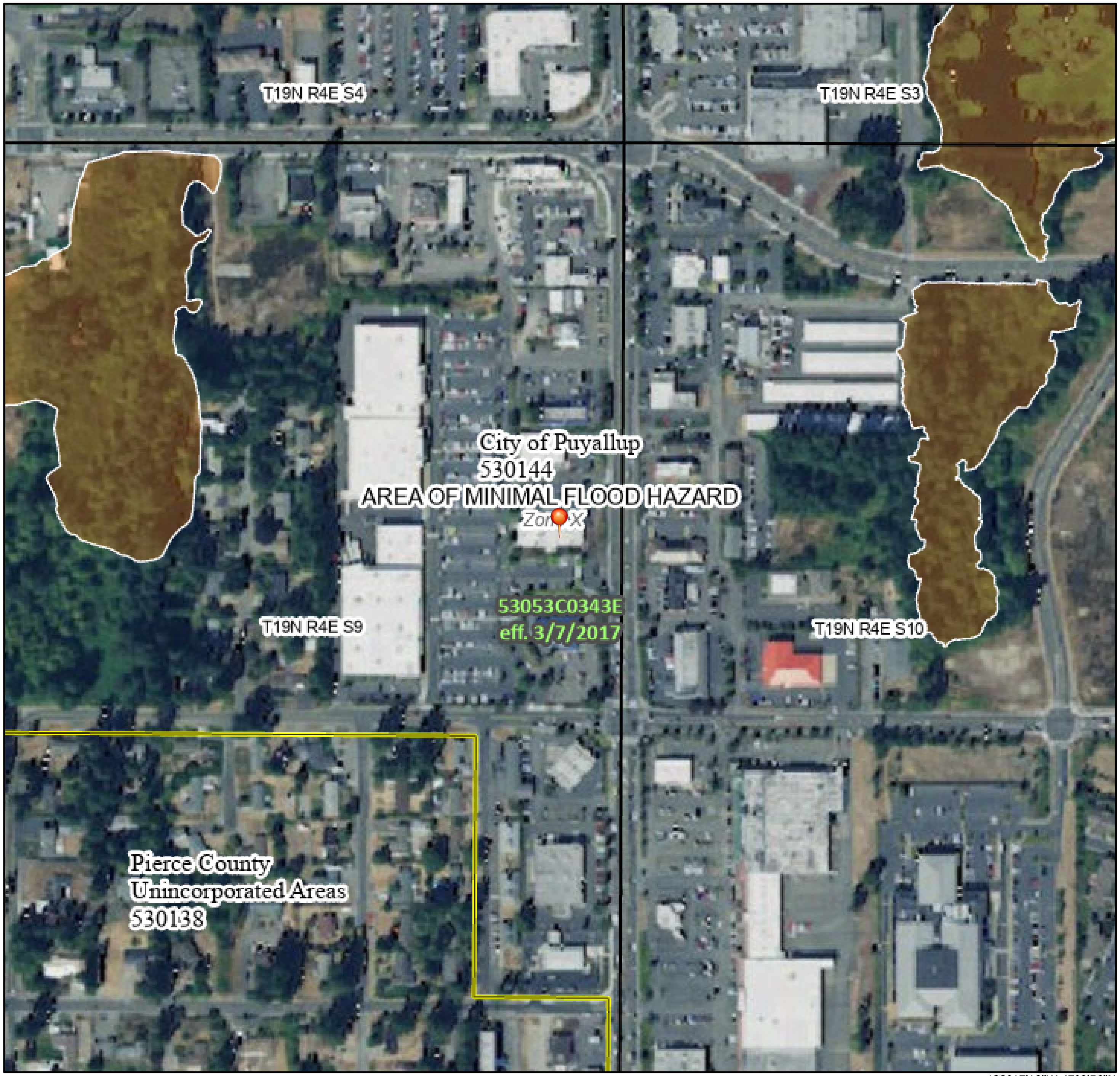
Appendix C-4 – Operations and Maintenance (O&M) Manual

Appendix A-1: FEMA FIRMette

National Flood Hazard Layer FIRMette

FEMA

122°17'56"W 47°9'21"N



122°17'18"W 47°8'56"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

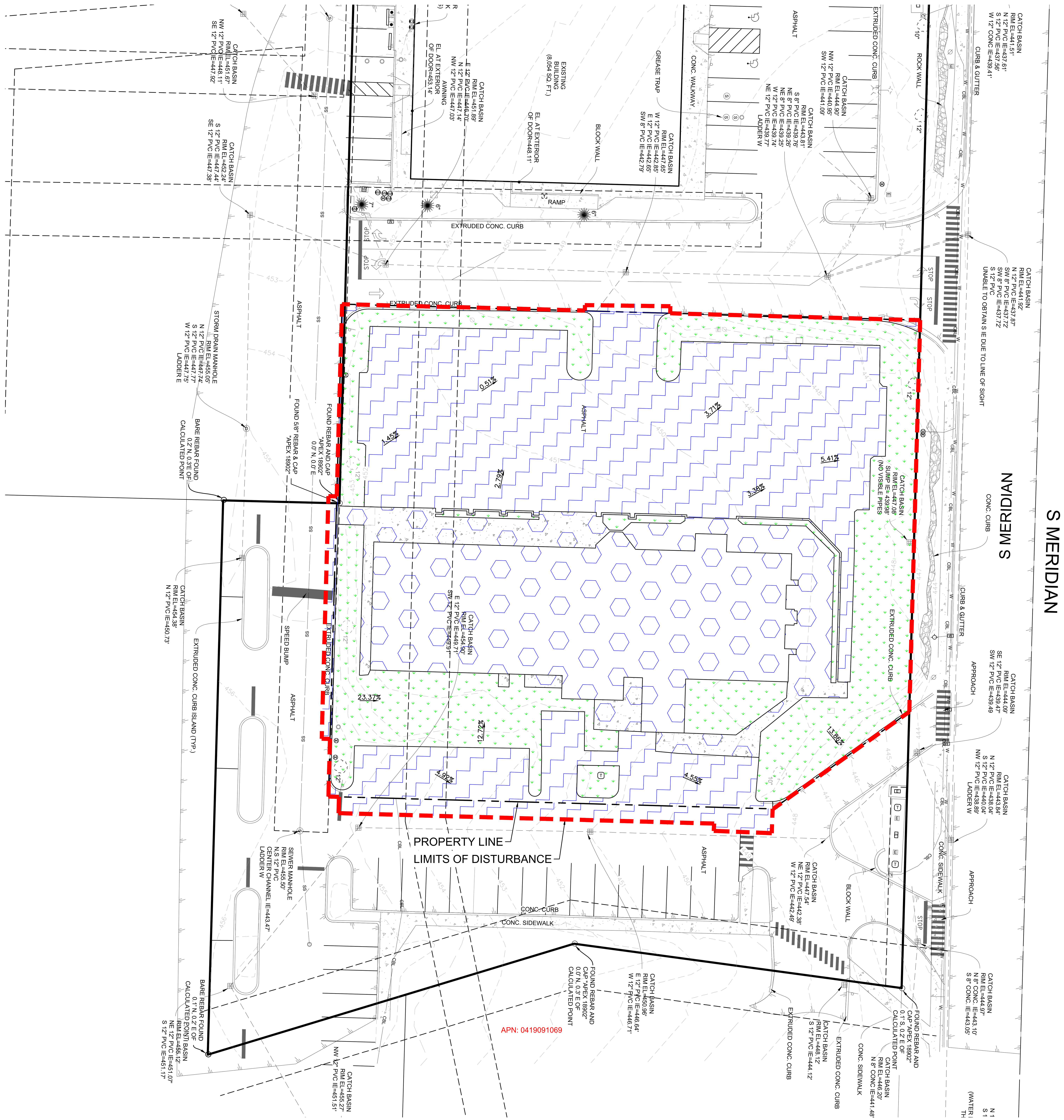
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/17/2025 at 7:22 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix A-2: Pre-Developed Drainage Area Map



LEGEND:

PROPERTY LINE (0.89 AC)

LIMITS OF DISTURBANCE (0.92 AC)

EXISTING SURFACE SUMMARY TABLE		
	SURFACE	AREA
	POLLUTION GENERATING IMPERVIOUS (ASPHALT/CONCRETE)	17,901 SF (0.41 AC)
	NON–POLLUTION GENERATING IMPERVIOUS (SIDEWALK/ROOF)	11,927 SF (0.27 AC)
	PERVIOUS (LANDSCAPING)	10,364 SF (0.24 AC)
	TOTAL:	40,192 SF (0.92 AC.)

NOTES:

1. ALL EXISTING ONSITE RUNOFF IS COLLECTED IN CATCH BASINS AND ROUTED TO THE EXISTING MUNICIPAL SYSTEM ALONG S MERIDIAN STREET, LOCATED EAST OF THE PROJECT SITE, AND CONSIDERED ONE BASIN.
2. THE EXISTING BASIN EXTENTS IS LIMITED TO THE PROPOSED LIMITS OF DISTURBANCE.

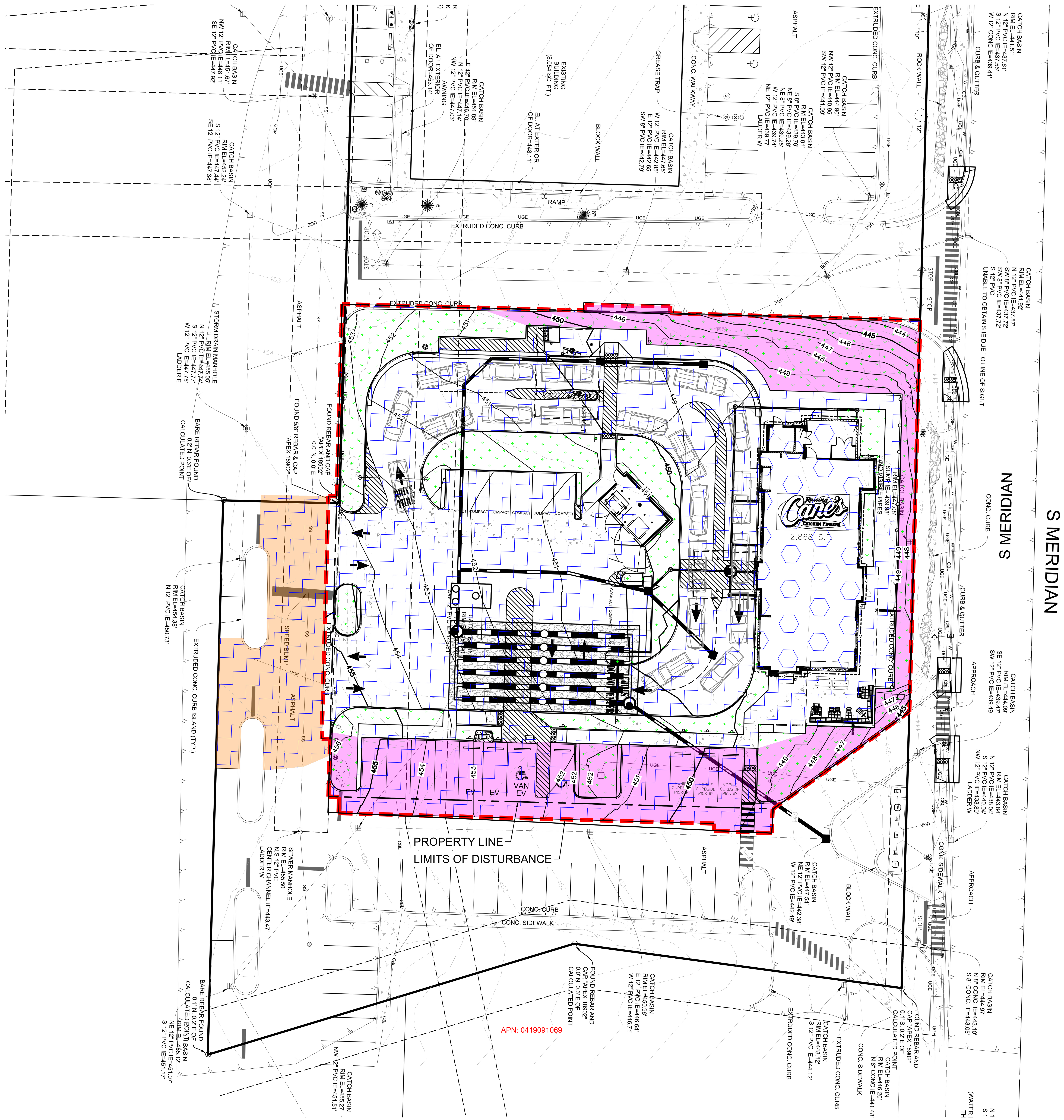
NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

PRE-DEVELOPED DRAINAGE AREA MAP

Kimley»Horn

Appendix A-3: Post-Developed Drainage Area Map



LEGEND:

PROPERTY LINE (0.89 AC)

LIMITS OF DISTURBANCE (0.92 AC)

PROPOSED SURFACE SUMMARY TABLE		
	SURFACE	AREA
	POLLUTION GENERATING IMPERVIOUS (ASPHALT/CONCRETE)	22,801 SF (0.52 AC)
	NON-POLLUTION GENERATING IMPERVIOUS (ROOF)	3,598 SF (0.08 AC)
	PERVIOUS (LANDSCAPING)	5,068 SF (0.12 AC)
	BYPASS POLLUTION GENERATING IMPERVIOUS (ASPHALT/CONCRETE)	4,233 SF (0.10 AC)
	BYPASS PERVIOUS (LANDSCAPING)	4,492 SF (0.10 AC)
	TOTAL:	40,192 SF (0.92 AC.)

CONTRIBUTING OFFSITE SURFACE SUMMARY TABLE		
	SURFACE	AREA
	POLLUTION GENERATING IMPERVIOUS CONTRIBUTING TO ONSITE BASIN (ASPHALT/CONCRETE)	2,977 SF (0.07 AC)
	TOTAL:	2,977 SF (0.07 AC.)

NOTES:

1. SINCE THE PROPOSED BYPASS POLLUTION GENERATING IMPERVIOUS SURFACE AREA (0.10 AC) IS GREATER THAN THE OFFSITE POLLUTION GENERATING SURFACE AREA (0.07 AC) CONTRIBUTING TO THE ONSITE BASIN, THE PROPOSED ONSITE STORMWATER FACILITIES USED FOR WATER QUALITY AND FLOW CONTROL (FULL INFILTRATION) ARE SIZED USING THE BYPASS AREA AS A CONSERVATIVE APPROACH FOR MODELING RUNOFF.

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

POST-DEVELOPED DRAINAGE AREA MAP

Kimley»Horn

Date: March 09, 2026 - 1:02pm / User: Taryn.Chisholm
Path: K:\SEA_Civil\090042 - Raising Cane's\090042022 - C1360 Meridian & 43rd, Puyallup, WA\CAD\Exhibits\2026.03.05_Drainage Exhibits\RC1360_Puyallup_WA_Prelim Drainage Exhibits.dwg

Appendix A-4: Grading and Drainage Plan

(Provided Separately)

Appendix B-1: Water Quality Modeling Output

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: RC C1360 Puyallup WA - Water Quality

Site Name:	RC C1360 Puyallup WA
Site Address:	Meridian and 43rd
City:	Puyallup
Report Date:	3/9/2026
Gage:	38 IN CENTRAL
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2024/06/28
Version:	4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Existing Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.92
Pervious Total	0.92
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.92

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.22
Pervious Total	0.22
Impervious Land Use	acre
ROOF TOPS FLAT	0.08
PARKING FLAT	0.62
Impervious Total	0.7
Basin Total	0.92

Element Flow Componants:

Surface	Interflow	Groundwater

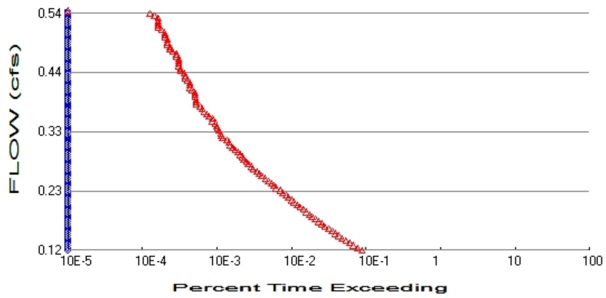
Componant Flows To:

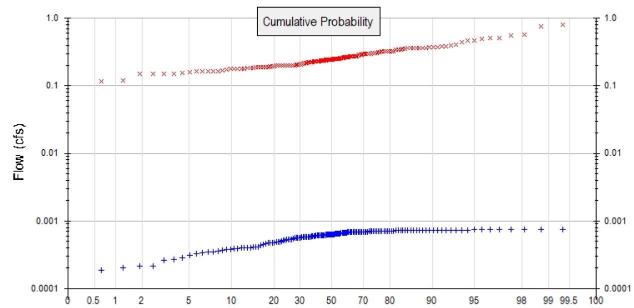
POC 1	POC 1

Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.92
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.22
Total Impervious Area: 0.7

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.000599
5 year	0.000739
10 year	0.000804
25 year	0.000864
50 year	0.000898
100 year	0.000925

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.245647
5 year	0.329967
10 year	0.391284
25 year	0.475241
50 year	0.542648
100 year	0.614358

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.001	0.290
1903	0.000	0.322
1904	0.001	0.364
1905	0.001	0.163
1906	0.000	0.183
1907	0.001	0.244
1908	0.001	0.201
1909	0.001	0.248
1910	0.001	0.237
1911	0.001	0.266

1912	0.001	0.474
1913	0.001	0.192
1914	0.001	0.805
1915	0.001	0.165
1916	0.001	0.309
1917	0.000	0.117
1918	0.001	0.247
1919	0.000	0.151
1920	0.001	0.201
1921	0.001	0.173
1922	0.001	0.271
1923	0.001	0.189
1924	0.000	0.357
1925	0.000	0.149
1926	0.001	0.291
1927	0.000	0.237
1928	0.001	0.176
1929	0.001	0.351
1930	0.001	0.367
1931	0.001	0.177
1932	0.001	0.191
1933	0.001	0.189
1934	0.001	0.308
1935	0.000	0.163
1936	0.001	0.228
1937	0.001	0.340
1938	0.001	0.166
1939	0.000	0.209
1940	0.001	0.368
1941	0.001	0.364
1942	0.000	0.274
1943	0.000	0.271
1944	0.001	0.390
1945	0.001	0.295
1946	0.001	0.229
1947	0.000	0.179
1948	0.001	0.246
1949	0.001	0.380
1950	0.000	0.215
1951	0.001	0.325
1952	0.001	0.367
1953	0.001	0.338
1954	0.001	0.200
1955	0.000	0.186
1956	0.000	0.183
1957	0.001	0.198
1958	0.001	0.248
1959	0.001	0.252
1960	0.001	0.195
1961	0.001	0.557
1962	0.001	0.240
1963	0.000	0.178
1964	0.000	0.516
1965	0.001	0.232
1966	0.001	0.194
1967	0.001	0.271
1968	0.001	0.229
1969	0.001	0.206

1970	0.001	0.235
1971	0.001	0.227
1972	0.001	0.752
1973	0.001	0.436
1974	0.001	0.316
1975	0.001	0.327
1976	0.001	0.348
1977	0.001	0.149
1978	0.001	0.258
1979	0.001	0.265
1980	0.001	0.261
1981	0.001	0.246
1982	0.000	0.200
1983	0.001	0.271
1984	0.001	0.270
1985	0.001	0.307
1986	0.001	0.156
1987	0.001	0.274
1988	0.000	0.163
1989	0.001	0.149
1990	0.001	0.197
1991	0.001	0.295
1992	0.001	0.280
1993	0.001	0.320
1994	0.001	0.219
1995	0.001	0.170
1996	0.001	0.229
1997	0.001	0.205
1998	0.001	0.243
1999	0.001	0.264
2000	0.001	0.232
2001	0.000	0.186
2002	0.001	0.338
2003	0.000	0.197
2004	0.001	0.296
2005	0.001	0.566
2006	0.001	0.265
2007	0.001	0.297
2008	0.001	0.245
2009	0.000	0.187
2010	0.000	0.240
2011	0.000	0.252
2012	0.001	0.234
2013	0.001	0.221
2014	0.001	0.214
2015	0.001	0.359
2016	0.000	0.224
2017	0.001	0.360
2018	0.001	0.224
2019	0.001	0.319
2020	0.001	0.261
2021	0.001	0.220
2022	0.000	0.375
2023	0.000	0.463
2024	0.001	0.497
2025	0.000	0.241
2026	0.001	0.265
2027	0.001	0.295

2028	0.000	0.116
2029	0.001	0.190
2030	0.001	0.380
2031	0.000	0.120
2032	0.000	0.202
2033	0.000	0.254
2034	0.001	0.199
2035	0.001	0.245
2036	0.000	0.199
2037	0.001	0.267
2038	0.001	0.254
2039	0.000	0.510
2040	0.001	0.199
2041	0.001	0.253
2042	0.001	0.292
2043	0.001	0.323
2044	0.001	0.222
2045	0.001	0.180
2046	0.001	0.199
2047	0.001	0.246
2048	0.001	0.203
2049	0.000	0.301
2050	0.001	0.224
2051	0.001	0.316
2052	0.001	0.241
2053	0.001	0.205
2054	0.001	0.407
2055	0.001	0.249
2056	0.000	0.321
2057	0.001	0.158
2058	0.001	0.302
2059	0.001	0.377

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0007	0.8050
2	0.0007	0.7515
3	0.0007	0.5658
4	0.0007	0.5574
5	0.0007	0.5162
6	0.0007	0.5096
7	0.0007	0.4969
8	0.0007	0.4741
9	0.0007	0.4627
10	0.0007	0.4365
11	0.0007	0.4067
12	0.0007	0.3897
13	0.0007	0.3801
14	0.0007	0.3797
15	0.0007	0.3771
16	0.0007	0.3745
17	0.0007	0.3683
18	0.0007	0.3673
19	0.0007	0.3673
20	0.0007	0.3640
21	0.0007	0.3639
22	0.0007	0.3599

23	0.0007	0.3589
24	0.0007	0.3572
25	0.0007	0.3509
26	0.0007	0.3477
27	0.0007	0.3396
28	0.0007	0.3384
29	0.0007	0.3382
30	0.0007	0.3266
31	0.0007	0.3250
32	0.0007	0.3229
33	0.0007	0.3215
34	0.0007	0.3213
35	0.0007	0.3203
36	0.0007	0.3193
37	0.0007	0.3159
38	0.0007	0.3156
39	0.0007	0.3088
40	0.0007	0.3078
41	0.0007	0.3069
42	0.0007	0.3024
43	0.0007	0.3007
44	0.0007	0.2969
45	0.0007	0.2961
46	0.0007	0.2953
47	0.0007	0.2951
48	0.0007	0.2948
49	0.0007	0.2920
50	0.0007	0.2910
51	0.0007	0.2901
52	0.0007	0.2803
53	0.0007	0.2737
54	0.0007	0.2737
55	0.0007	0.2715
56	0.0007	0.2714
57	0.0007	0.2714
58	0.0007	0.2710
59	0.0007	0.2698
60	0.0007	0.2673
61	0.0007	0.2655
62	0.0007	0.2654
63	0.0007	0.2647
64	0.0007	0.2645
65	0.0007	0.2644
66	0.0007	0.2613
67	0.0007	0.2610
68	0.0007	0.2584
69	0.0007	0.2542
70	0.0007	0.2536
71	0.0007	0.2531
72	0.0006	0.2523
73	0.0006	0.2516
74	0.0006	0.2490
75	0.0006	0.2484
76	0.0006	0.2477
77	0.0006	0.2474
78	0.0006	0.2459
79	0.0006	0.2459
80	0.0006	0.2456

81	0.0006	0.2449
82	0.0006	0.2447
83	0.0006	0.2441
84	0.0006	0.2431
85	0.0006	0.2412
86	0.0006	0.2410
87	0.0006	0.2398
88	0.0006	0.2396
89	0.0006	0.2370
90	0.0006	0.2366
91	0.0006	0.2346
92	0.0006	0.2341
93	0.0006	0.2323
94	0.0006	0.2320
95	0.0006	0.2292
96	0.0006	0.2289
97	0.0006	0.2288
98	0.0006	0.2283
99	0.0006	0.2275
100	0.0006	0.2243
101	0.0006	0.2240
102	0.0006	0.2237
103	0.0006	0.2219
104	0.0006	0.2208
105	0.0006	0.2203
106	0.0006	0.2191
107	0.0006	0.2149
108	0.0006	0.2135
109	0.0006	0.2089
110	0.0006	0.2063
111	0.0006	0.2049
112	0.0006	0.2046
113	0.0006	0.2027
114	0.0006	0.2023
115	0.0006	0.2013
116	0.0005	0.2007
117	0.0005	0.2001
118	0.0005	0.1997
119	0.0005	0.1994
120	0.0005	0.1991
121	0.0005	0.1990
122	0.0005	0.1987
123	0.0005	0.1981
124	0.0005	0.1974
125	0.0005	0.1973
126	0.0005	0.1953
127	0.0005	0.1937
128	0.0005	0.1918
129	0.0005	0.1911
130	0.0005	0.1900
131	0.0005	0.1894
132	0.0004	0.1891
133	0.0004	0.1868
134	0.0004	0.1863
135	0.0004	0.1857
136	0.0004	0.1831
137	0.0004	0.1826
138	0.0004	0.1796

139	0.0004	0.1788
140	0.0004	0.1781
141	0.0004	0.1771
142	0.0004	0.1758
143	0.0004	0.1727
144	0.0004	0.1703
145	0.0004	0.1660
146	0.0003	0.1651
147	0.0003	0.1633
148	0.0003	0.1633
149	0.0003	0.1632
150	0.0003	0.1580
151	0.0003	0.1559
152	0.0003	0.1513
153	0.0003	0.1493
154	0.0002	0.1493
155	0.0002	0.1492
156	0.0002	0.1195
157	0.0002	0.1167
158	0.0002	0.1156

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0003	0	4883	n/a	Fail
0.0003	0	4230	n/a	Fail
0.0003	0	3748	n/a	Fail
0.0003	0	3325	n/a	Fail
0.0003	0	2972	n/a	Fail
0.0003	0	2611	n/a	Fail
0.0003	0	2378	n/a	Fail
0.0003	0	2132	n/a	Fail
0.0003	0	1939	n/a	Fail
0.0004	0	1755	n/a	Fail
0.0004	0	1538	n/a	Fail
0.0004	0	1406	n/a	Fail
0.0004	0	1284	n/a	Fail
0.0004	0	1158	n/a	Fail
0.0004	0	1047	n/a	Fail
0.0004	0	963	n/a	Fail
0.0004	0	875	n/a	Fail
0.0004	0	805	n/a	Fail
0.0004	0	726	n/a	Fail
0.0004	0	656	n/a	Fail
0.0004	0	600	n/a	Fail
0.0004	0	552	n/a	Fail
0.0004	0	500	n/a	Fail
0.0004	0	470	n/a	Fail
0.0004	0	422	n/a	Fail
0.0005	0	394	n/a	Fail
0.0005	0	346	n/a	Fail
0.0005	0	324	n/a	Fail
0.0005	0	296	n/a	Fail
0.0005	0	270	n/a	Fail
0.0005	0	247	n/a	Fail
0.0005	0	221	n/a	Fail
0.0005	0	203	n/a	Fail
0.0005	0	189	n/a	Fail
0.0005	0	170	n/a	Fail
0.0005	0	159	n/a	Fail
0.0005	0	146	n/a	Fail
0.0005	0	137	n/a	Fail
0.0005	0	127	n/a	Fail
0.0005	0	122	n/a	Fail
0.0005	0	115	n/a	Fail
0.0005	0	106	n/a	Fail
0.0006	0	97	n/a	Fail
0.0006	0	90	n/a	Fail
0.0006	0	84	n/a	Fail
0.0006	0	80	n/a	Fail
0.0006	0	76	n/a	Fail
0.0006	0	66	n/a	Fail
0.0006	0	63	n/a	Fail
0.0006	0	62	n/a	Fail
0.0006	0	59	n/a	Fail
0.0006	0	56	n/a	Fail
0.0006	0	55	n/a	Fail

0.0006	0	53	n/a	Fail
0.0006	0	48	n/a	Fail
0.0006	0	48	n/a	Fail
0.0006	0	43	n/a	Fail
0.0006	0	40	n/a	Fail
0.0007	0	37	n/a	Fail
0.0007	0	35	n/a	Fail
0.0007	0	33	n/a	Fail
0.0007	0	29	n/a	Fail
0.0007	0	29	n/a	Fail
0.0007	0	29	n/a	Fail
0.0007	0	28	n/a	Fail
0.0007	0	28	n/a	Fail
0.0007	0	28	n/a	Fail
0.0007	0	26	n/a	Fail
0.0007	0	24	n/a	Fail
0.0007	0	24	n/a	Fail
0.0007	0	24	n/a	Fail
0.0007	0	22	n/a	Fail
0.0007	0	21	n/a	Fail
0.0007	0	21	n/a	Fail
0.0007	0	20	n/a	Fail
0.0008	0	18	n/a	Fail
0.0008	0	18	n/a	Fail
0.0008	0	17	n/a	Fail
0.0008	0	17	n/a	Fail
0.0008	0	17	n/a	Fail
0.0008	0	17	n/a	Fail
0.0008	0	16	n/a	Fail
0.0008	0	16	n/a	Fail
0.0008	0	14	n/a	Fail
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0.0008	0	13	n/a	Fail
0.0008	0	12	n/a	Fail
0.0008	0	12	n/a	Fail
0.0008	0	12	n/a	Fail
0.0008	0	11	n/a	Fail
0.0008	0	11	n/a	Fail
0.0008	0	11	n/a	Fail
0.0009	0	10	n/a	Fail
0.0009	0	9	n/a	Fail
0.0009	0	9	n/a	Fail
0.0009	0	9	n/a	Fail
0.0009	0	9	n/a	Fail
0.0009	0	9	n/a	Fail
0.0009	0	8	n/a	Fail
0.0009	0	7	n/a	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0751 acre-feet
On-line facility target flow:	0.1037 cfs.
Adjusted for 15 min:	0.1037 cfs.
Off-line facility target flow:	0.0597 cfs.
Adjusted for 15 min:	0.0597 cfs.

Model Default Modifications

Total of 0 changes have been made.

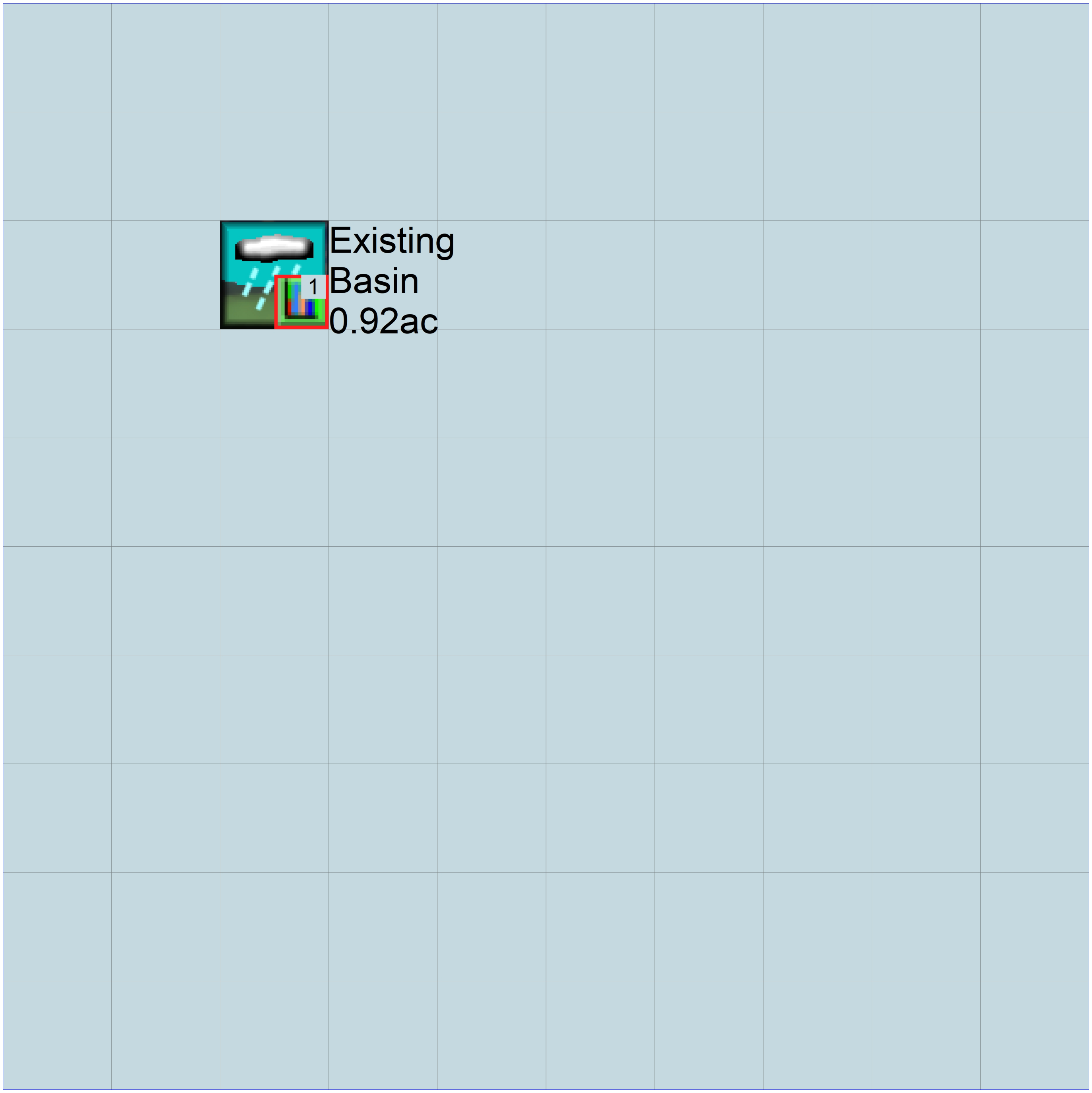
PERLND Changes

No PERLND changes have been made.

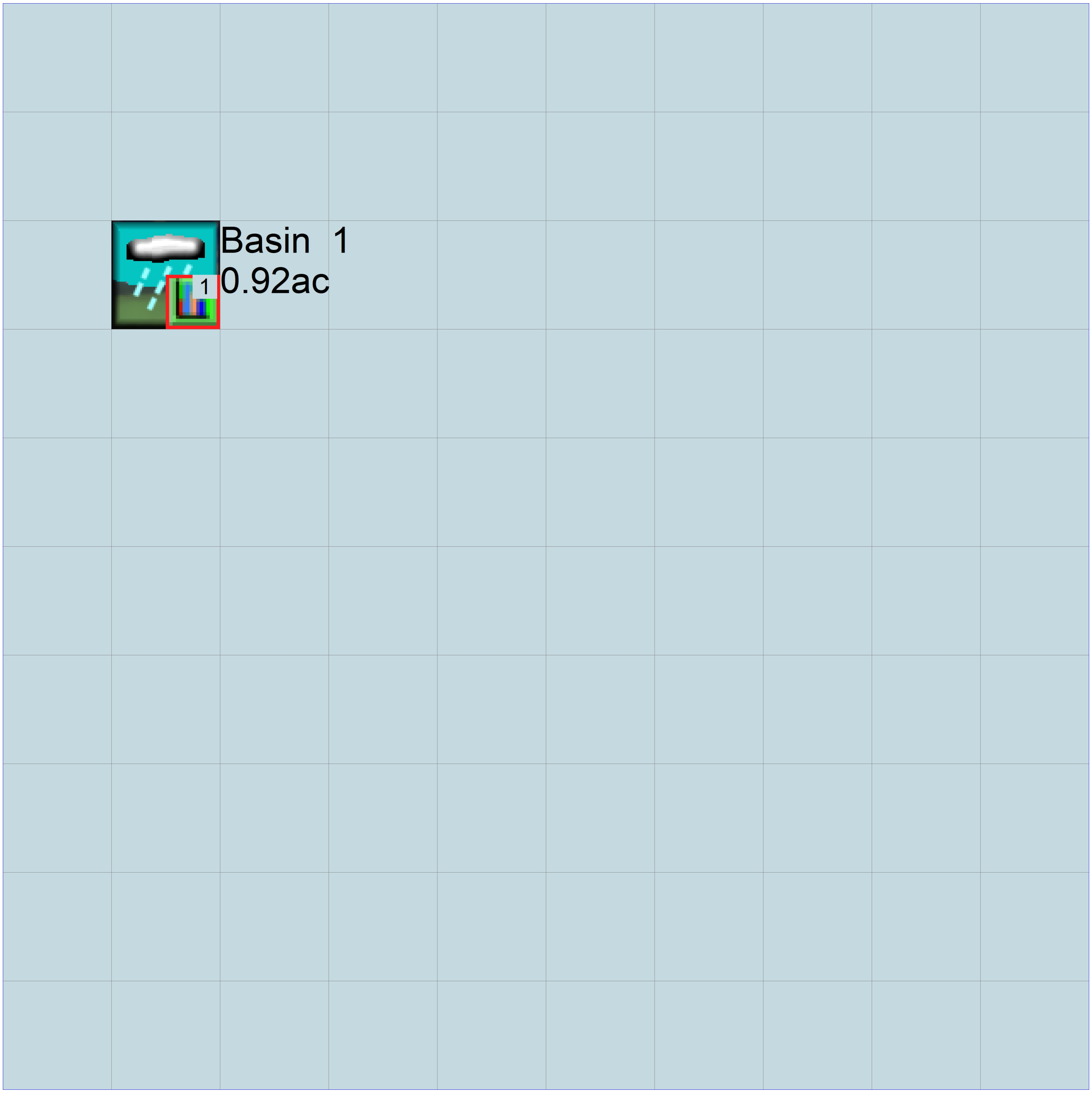
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   RC C1360 Puyallup WA - Water Quality.wdm
MESSU      25   PreRC C1360 Puyallup WA - Water Quality.MES
           27   PreRC C1360 Puyallup WA - Water Quality.L61
           28   PreRC C1360 Puyallup WA - Water Quality.L62
           30   POCRC C1360 Puyallup WA - Water Quality1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Existing Basin              MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                             in  out           ***
    1     A/B, Forest, Flat       1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    1         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    1         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    1         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1              0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                    ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1            0.2       0.5      0.35         0       0.7       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Existing Basin***
PERLND   1                        0.92     COPY   501     12
PERLND   1                        0.92     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *        *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM       1 EVAP      ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM       1 EVAP      ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   RC C1360 Puyallup WA - Water Quality.wdm
MESSU      25   MitRC C1360 Puyallup WA - Water Quality.MES
           27   MitRC C1360 Puyallup WA - Water Quality.L61
           28   MitRC C1360 Puyallup WA - Water Quality.L62
           30   POCRC C1360 Puyallup WA - Water Quality1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       7
      IMPLND       4
      IMPLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                            in  out           ***
    7      A/B, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    7         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    7         0    0    4    0    0    0    0    0    0    0    0    0    1    9
```

```
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    7         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    7              0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7            0.1       0.5      0.25         0       0.7      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    7              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out            ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
   11      PARKING/FLAT           1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    4    1    9
   11         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4             0         0
   11             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4             0         0
   11             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   7                        0.22     COPY   501     12
PERLND   7                        0.22     COPY   501     13
IMPLND   4                        0.08     COPY   501     15
IMPLND  11                        0.62     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                         in  out                             ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
```

```
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Appendix B-2: Flow Control Modeling Output

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: RC C1360 Puyallup WA - Flow Control

Site Name:	RC C1360 Puyallup WA
Site Address:	Meridian and 43rd
City:	Puyallup
Report Date:	3/9/2026
Gage:	38 IN CENTRAL
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2024/06/28
Version:	4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Existing Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Forest, Flat	0.92
Pervious Total	0.92
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.92

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.22
Pervious Total	0.22
Impervious Land Use	acre
ROOF TOPS FLAT	0.08
PARKING FLAT	0.62
Impervious Total	0.7
Basin Total	0.92

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Gravel Trench Bed 1	Gravel Trench Bed 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	70.50 ft.
Bottom Width:	33.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	2
Pour Space of material for first layer:	0.4
Material thickness of second layer:	2
Pour Space of material for second layer:	0.5533
Material thickness of third layer:	2
Pour Space of material for third layer:	0.4
Infiltration On	
Infiltration rate:	1.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	281.878
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	281.878
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure

Riser Height:	5 ft.
Riser Diameter:	18 in.

Element Outlets:

Outlet 1 Outlet 2

Outlet Flows To:

Gravel Trench Bed Hydraulic Table

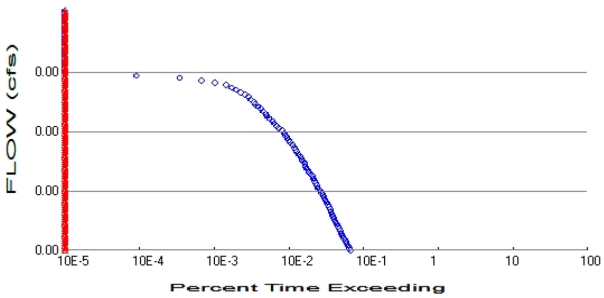
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.053	0.000	0.000	0.000
0.0667	0.053	0.001	0.000	0.070
0.1333	0.053	0.002	0.000	0.070
0.2000	0.053	0.004	0.000	0.070
0.2667	0.053	0.005	0.000	0.070
0.3333	0.053	0.007	0.000	0.070
0.4000	0.053	0.008	0.000	0.070
0.4667	0.053	0.010	0.000	0.070
0.5333	0.053	0.011	0.000	0.070
0.6000	0.053	0.012	0.000	0.070
0.6667	0.053	0.014	0.000	0.070
0.7333	0.053	0.015	0.000	0.070
0.8000	0.053	0.017	0.000	0.070
0.8667	0.053	0.018	0.000	0.070
0.9333	0.053	0.019	0.000	0.070
1.0000	0.053	0.021	0.000	0.070
1.0667	0.053	0.022	0.000	0.070
1.1333	0.053	0.024	0.000	0.070
1.2000	0.053	0.025	0.000	0.070
1.2667	0.053	0.027	0.000	0.070
1.3333	0.053	0.028	0.000	0.070
1.4000	0.053	0.029	0.000	0.070

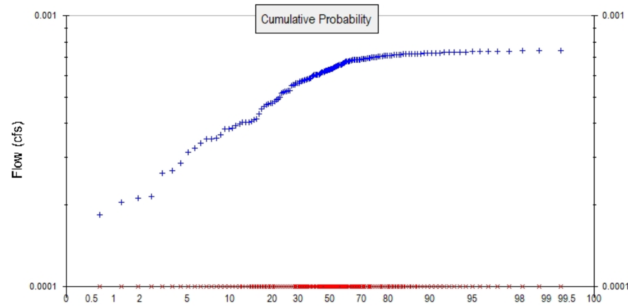
1.4667	0.053	0.031	0.000	0.070
1.5333	0.053	0.032	0.000	0.070
1.6000	0.053	0.034	0.000	0.070
1.6667	0.053	0.035	0.000	0.070
1.7333	0.053	0.037	0.000	0.070
1.8000	0.053	0.038	0.000	0.070
1.8667	0.053	0.039	0.000	0.070
1.9333	0.053	0.041	0.000	0.070
2.0000	0.053	0.042	0.000	0.070
2.0667	0.053	0.044	0.000	0.070
2.1333	0.053	0.046	0.000	0.070
2.2000	0.053	0.048	0.000	0.070
2.2667	0.053	0.050	0.000	0.070
2.3333	0.053	0.052	0.000	0.070
2.4000	0.053	0.054	0.000	0.070
2.4667	0.053	0.056	0.000	0.070
2.5333	0.053	0.058	0.000	0.070
2.6000	0.053	0.060	0.000	0.070
2.6667	0.053	0.062	0.000	0.070
2.7333	0.053	0.064	0.000	0.070
2.8000	0.053	0.066	0.000	0.070
2.8667	0.053	0.068	0.000	0.070
2.9333	0.053	0.070	0.000	0.070
3.0000	0.053	0.072	0.000	0.070
3.0667	0.053	0.074	0.000	0.070
3.1333	0.053	0.076	0.000	0.070
3.2000	0.053	0.078	0.000	0.070
3.2667	0.053	0.080	0.000	0.070
3.3333	0.053	0.082	0.000	0.070
3.4000	0.053	0.084	0.000	0.070
3.4667	0.053	0.086	0.000	0.070
3.5333	0.053	0.088	0.000	0.070
3.6000	0.053	0.090	0.000	0.070
3.6667	0.053	0.092	0.000	0.070
3.7333	0.053	0.093	0.000	0.070
3.8000	0.053	0.095	0.000	0.070
3.8667	0.053	0.097	0.000	0.070
3.9333	0.053	0.099	0.000	0.070
4.0000	0.053	0.101	0.000	0.070
4.0667	0.053	0.102	0.000	0.070
4.1333	0.053	0.104	0.000	0.070
4.2000	0.053	0.105	0.000	0.070
4.2667	0.053	0.107	0.000	0.070
4.3333	0.053	0.108	0.000	0.070
4.4000	0.053	0.109	0.000	0.070
4.4667	0.053	0.111	0.000	0.070
4.5333	0.053	0.112	0.000	0.070
4.6000	0.053	0.114	0.000	0.070
4.6667	0.053	0.115	0.000	0.070
4.7333	0.053	0.117	0.000	0.070
4.8000	0.053	0.118	0.000	0.070
4.8667	0.053	0.119	0.000	0.070
4.9333	0.053	0.121	0.000	0.070
5.0000	0.053	0.122	0.000	0.070
5.0667	0.053	0.124	0.273	0.070
5.1333	0.053	0.125	0.771	0.070
5.2000	0.053	0.126	1.404	0.070
5.2667	0.053	0.128	2.123	0.070

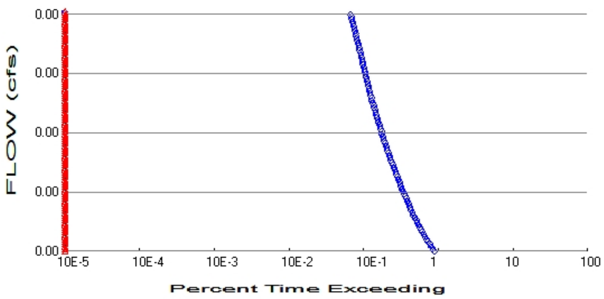
5.3333	0.053	0.129	2.882	0.070
5.4000	0.053	0.131	3.632	0.070
5.4667	0.053	0.132	4.326	0.070
5.5333	0.053	0.134	4.924	0.070
5.6000	0.053	0.135	5.401	0.070
5.6667	0.053	0.136	5.754	0.070
5.7333	0.053	0.138	6.014	0.070
5.8000	0.053	0.139	6.338	0.070
5.8667	0.053	0.141	6.597	0.070
5.9333	0.053	0.142	6.846	0.070
6.0000	0.053	0.144	7.086	0.070

Analysis Results

POC 1







+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.92
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.22
Total Impervious Area: 0.7

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000599
5 year	0.000739
10 year	0.000804
25 year	0.000864
50 year	0.000898
100 year	0.000925

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.001	0.000
1903	0.000	0.000
1904	0.001	0.000
1905	0.001	0.000
1906	0.000	0.000
1907	0.001	0.000
1908	0.001	0.000
1909	0.001	0.000
1910	0.001	0.000
1911	0.001	0.000
1912	0.001	0.000
1913	0.001	0.000
1914	0.001	0.000
1915	0.001	0.000
1916	0.001	0.000
1917	0.000	0.000
1918	0.001	0.000
1919	0.000	0.000
1920	0.001	0.000
1921	0.001	0.000
1922	0.001	0.000
1923	0.001	0.000
1924	0.000	0.000
1925	0.000	0.000
1926	0.001	0.000
1927	0.000	0.000
1928	0.001	0.000
1929	0.001	0.000
1930	0.001	0.000
1931	0.001	0.000
1932	0.001	0.000
1933	0.001	0.000
1934	0.001	0.000
1935	0.000	0.000
1936	0.001	0.000
1937	0.001	0.000
1938	0.001	0.000
1939	0.000	0.000
1940	0.001	0.000
1941	0.001	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.001	0.000
1945	0.001	0.000
1946	0.001	0.000
1947	0.000	0.000
1948	0.001	0.000
1949	0.001	0.000
1950	0.000	0.000
1951	0.001	0.000
1952	0.001	0.000
1953	0.001	0.000
1954	0.001	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.001	0.000

1958	0.001	0.000
1959	0.001	0.000
1960	0.001	0.000
1961	0.001	0.000
1962	0.001	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.001	0.000
1966	0.001	0.000
1967	0.001	0.000
1968	0.001	0.000
1969	0.001	0.000
1970	0.001	0.000
1971	0.001	0.000
1972	0.001	0.000
1973	0.001	0.000
1974	0.001	0.000
1975	0.001	0.000
1976	0.001	0.000
1977	0.001	0.000
1978	0.001	0.000
1979	0.001	0.000
1980	0.001	0.000
1981	0.001	0.000
1982	0.000	0.000
1983	0.001	0.000
1984	0.001	0.000
1985	0.001	0.000
1986	0.001	0.000
1987	0.001	0.000
1988	0.000	0.000
1989	0.001	0.000
1990	0.001	0.000
1991	0.001	0.000
1992	0.001	0.000
1993	0.001	0.000
1994	0.001	0.000
1995	0.001	0.000
1996	0.001	0.000
1997	0.001	0.000
1998	0.001	0.000
1999	0.001	0.000
2000	0.001	0.000
2001	0.000	0.000
2002	0.001	0.000
2003	0.000	0.000
2004	0.001	0.000
2005	0.001	0.000
2006	0.001	0.000
2007	0.001	0.000
2008	0.001	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.001	0.000
2013	0.001	0.000
2014	0.001	0.000
2015	0.001	0.000

2016	0.000	0.000
2017	0.001	0.000
2018	0.001	0.000
2019	0.001	0.000
2020	0.001	0.000
2021	0.001	0.000
2022	0.000	0.000
2023	0.000	0.000
2024	0.001	0.000
2025	0.000	0.000
2026	0.001	0.000
2027	0.001	0.000
2028	0.000	0.000
2029	0.001	0.000
2030	0.001	0.000
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.001	0.000
2035	0.001	0.000
2036	0.000	0.000
2037	0.001	0.000
2038	0.001	0.000
2039	0.000	0.000
2040	0.001	0.000
2041	0.001	0.000
2042	0.001	0.000
2043	0.001	0.000
2044	0.001	0.000
2045	0.001	0.000
2046	0.001	0.000
2047	0.001	0.000
2048	0.001	0.000
2049	0.000	0.000
2050	0.001	0.000
2051	0.001	0.000
2052	0.001	0.000
2053	0.001	0.000
2054	0.001	0.000
2055	0.001	0.000
2056	0.000	0.000
2057	0.001	0.000
2058	0.001	0.000
2059	0.001	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0007	0.0000
2	0.0007	0.0000
3	0.0007	0.0000
4	0.0007	0.0000
5	0.0007	0.0000
6	0.0007	0.0000
7	0.0007	0.0000
8	0.0007	0.0000
9	0.0007	0.0000
10	0.0007	0.0000

11	0.0007	0.0000
12	0.0007	0.0000
13	0.0007	0.0000
14	0.0007	0.0000
15	0.0007	0.0000
16	0.0007	0.0000
17	0.0007	0.0000
18	0.0007	0.0000
19	0.0007	0.0000
20	0.0007	0.0000
21	0.0007	0.0000
22	0.0007	0.0000
23	0.0007	0.0000
24	0.0007	0.0000
25	0.0007	0.0000
26	0.0007	0.0000
27	0.0007	0.0000
28	0.0007	0.0000
29	0.0007	0.0000
30	0.0007	0.0000
31	0.0007	0.0000
32	0.0007	0.0000
33	0.0007	0.0000
34	0.0007	0.0000
35	0.0007	0.0000
36	0.0007	0.0000
37	0.0007	0.0000
38	0.0007	0.0000
39	0.0007	0.0000
40	0.0007	0.0000
41	0.0007	0.0000
42	0.0007	0.0000
43	0.0007	0.0000
44	0.0007	0.0000
45	0.0007	0.0000
46	0.0007	0.0000
47	0.0007	0.0000
48	0.0007	0.0000
49	0.0007	0.0000
50	0.0007	0.0000
51	0.0007	0.0000
52	0.0007	0.0000
53	0.0007	0.0000
54	0.0007	0.0000
55	0.0007	0.0000
56	0.0007	0.0000
57	0.0007	0.0000
58	0.0007	0.0000
59	0.0007	0.0000
60	0.0007	0.0000
61	0.0007	0.0000
62	0.0007	0.0000
63	0.0007	0.0000
64	0.0007	0.0000
65	0.0007	0.0000
66	0.0007	0.0000
67	0.0007	0.0000
68	0.0007	0.0000

69	0.0007	0.0000
70	0.0007	0.0000
71	0.0007	0.0000
72	0.0006	0.0000
73	0.0006	0.0000
74	0.0006	0.0000
75	0.0006	0.0000
76	0.0006	0.0000
77	0.0006	0.0000
78	0.0006	0.0000
79	0.0006	0.0000
80	0.0006	0.0000
81	0.0006	0.0000
82	0.0006	0.0000
83	0.0006	0.0000
84	0.0006	0.0000
85	0.0006	0.0000
86	0.0006	0.0000
87	0.0006	0.0000
88	0.0006	0.0000
89	0.0006	0.0000
90	0.0006	0.0000
91	0.0006	0.0000
92	0.0006	0.0000
93	0.0006	0.0000
94	0.0006	0.0000
95	0.0006	0.0000
96	0.0006	0.0000
97	0.0006	0.0000
98	0.0006	0.0000
99	0.0006	0.0000
100	0.0006	0.0000
101	0.0006	0.0000
102	0.0006	0.0000
103	0.0006	0.0000
104	0.0006	0.0000
105	0.0006	0.0000
106	0.0006	0.0000
107	0.0006	0.0000
108	0.0006	0.0000
109	0.0006	0.0000
110	0.0006	0.0000
111	0.0006	0.0000
112	0.0006	0.0000
113	0.0006	0.0000
114	0.0006	0.0000
115	0.0006	0.0000
116	0.0005	0.0000
117	0.0005	0.0000
118	0.0005	0.0000
119	0.0005	0.0000
120	0.0005	0.0000
121	0.0005	0.0000
122	0.0005	0.0000
123	0.0005	0.0000
124	0.0005	0.0000
125	0.0005	0.0000
126	0.0005	0.0000

127	0.0005	0.0000
128	0.0005	0.0000
129	0.0005	0.0000
130	0.0005	0.0000
131	0.0005	0.0000
132	0.0004	0.0000
133	0.0004	0.0000
134	0.0004	0.0000
135	0.0004	0.0000
136	0.0004	0.0000
137	0.0004	0.0000
138	0.0004	0.0000
139	0.0004	0.0000
140	0.0004	0.0000
141	0.0004	0.0000
142	0.0004	0.0000
143	0.0004	0.0000
144	0.0004	0.0000
145	0.0004	0.0000
146	0.0003	0.0000
147	0.0003	0.0000
148	0.0003	0.0000
149	0.0003	0.0000
150	0.0003	0.0000
151	0.0003	0.0000
152	0.0003	0.0000
153	0.0003	0.0000
154	0.0002	0.0000
155	0.0002	0.0000
156	0.0002	0.0000
157	0.0002	0.0000
158	0.0002	0.0000

LID Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	49451	0	0	Pass
0.0001	46791	0	0	Pass
0.0001	44082	0	0	Pass
0.0001	42337	0	0	Pass
0.0001	40071	0	0	Pass
0.0001	38647	0	0	Pass
0.0001	36731	0	0	Pass
0.0001	35517	0	0	Pass
0.0001	33728	0	0	Pass
0.0001	32620	0	0	Pass
0.0001	31224	0	0	Pass
0.0001	30299	0	0	Pass
0.0001	28880	0	0	Pass
0.0001	28066	0	0	Pass
0.0001	26808	0	0	Pass
0.0001	25728	0	0	Pass
0.0001	25008	0	0	Pass
0.0001	23955	0	0	Pass
0.0001	23362	0	0	Pass
0.0001	22520	0	0	Pass
0.0001	21989	0	0	Pass
0.0001	21202	0	0	Pass
0.0001	20626	0	0	Pass
0.0001	19789	0	0	Pass
0.0001	19329	0	0	Pass
0.0001	18670	0	0	Pass
0.0001	18221	0	0	Pass
0.0001	17579	0	0	Pass
0.0001	17041	0	0	Pass
0.0001	16676	0	0	Pass
0.0001	16111	0	0	Pass
0.0001	15712	0	0	Pass
0.0001	15152	0	0	Pass
0.0001	14870	0	0	Pass
0.0001	14399	0	0	Pass
0.0001	14160	0	0	Pass
0.0001	13689	0	0	Pass
0.0001	13340	0	0	Pass
0.0001	12908	0	0	Pass
0.0001	12504	0	0	Pass
0.0001	12249	0	0	Pass
0.0002	11845	0	0	Pass
0.0002	11623	0	0	Pass
0.0002	11296	0	0	Pass
0.0002	11030	0	0	Pass
0.0002	10726	0	0	Pass
0.0002	10465	0	0	Pass
0.0002	10183	0	0	Pass
0.0002	10016	0	0	Pass
0.0002	9756	0	0	Pass
0.0002	9590	0	0	Pass
0.0002	9363	0	0	Pass
0.0002	9158	0	0	Pass

0.0002	9003	0	0	Pass
0.0002	8720	0	0	Pass
0.0002	8543	0	0	Pass
0.0002	8310	0	0	Pass
0.0002	8166	0	0	Pass
0.0002	7972	0	0	Pass
0.0002	7845	0	0	Pass
0.0002	7667	0	0	Pass
0.0002	7540	0	0	Pass
0.0002	7352	0	0	Pass
0.0002	7169	0	0	Pass
0.0002	7064	0	0	Pass
0.0002	6881	0	0	Pass
0.0002	6753	0	0	Pass
0.0002	6626	0	0	Pass
0.0002	6537	0	0	Pass
0.0002	6382	0	0	Pass
0.0002	6305	0	0	Pass
0.0002	6194	0	0	Pass
0.0002	6100	0	0	Pass
0.0002	5950	0	0	Pass
0.0002	5884	0	0	Pass
0.0002	5756	0	0	Pass
0.0002	5645	0	0	Pass
0.0002	5573	0	0	Pass
0.0002	5439	0	0	Pass
0.0002	5384	0	0	Pass
0.0003	5274	0	0	Pass
0.0003	5209	0	0	Pass
0.0003	5084	0	0	Pass
0.0003	5022	0	0	Pass
0.0003	4903	0	0	Pass
0.0003	4831	0	0	Pass
0.0003	4750	0	0	Pass
0.0003	4640	0	0	Pass
0.0003	4560	0	0	Pass
0.0003	4465	0	0	Pass
0.0003	4400	0	0	Pass
0.0003	4326	0	0	Pass
0.0003	4263	0	0	Pass
0.0003	4171	0	0	Pass
0.0003	4107	0	0	Pass
0.0003	4022	0	0	Pass
0.0003	3942	0	0	Pass
0.0003	3843	0	0	Pass
0.0003	3806	0	0	Pass
0.0003	3723	0	0	Pass

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0003	3723	0	0	Pass
0.0003	3558	0	0	Pass
0.0003	3407	0	0	Pass
0.0003	3264	0	0	Pass
0.0003	3144	0	0	Pass
0.0003	3021	0	0	Pass
0.0003	2904	0	0	Pass
0.0003	2792	0	0	Pass
0.0003	2692	0	0	Pass
0.0004	2607	0	0	Pass
0.0004	2501	0	0	Pass
0.0004	2413	0	0	Pass
0.0004	2317	0	0	Pass
0.0004	2230	0	0	Pass
0.0004	2156	0	0	Pass
0.0004	2080	0	0	Pass
0.0004	2023	0	0	Pass
0.0004	1956	0	0	Pass
0.0004	1893	0	0	Pass
0.0004	1831	0	0	Pass
0.0004	1765	0	0	Pass
0.0004	1700	0	0	Pass
0.0004	1638	0	0	Pass
0.0004	1586	0	0	Pass
0.0004	1504	0	0	Pass
0.0005	1453	0	0	Pass
0.0005	1361	0	0	Pass
0.0005	1308	0	0	Pass
0.0005	1259	0	0	Pass
0.0005	1213	0	0	Pass
0.0005	1169	0	0	Pass
0.0005	1127	0	0	Pass
0.0005	1064	0	0	Pass
0.0005	1009	0	0	Pass
0.0005	963	0	0	Pass
0.0005	922	0	0	Pass
0.0005	905	0	0	Pass
0.0005	866	0	0	Pass
0.0005	815	0	0	Pass
0.0005	792	0	0	Pass
0.0005	752	0	0	Pass
0.0005	701	0	0	Pass
0.0006	679	0	0	Pass
0.0006	653	0	0	Pass
0.0006	622	0	0	Pass
0.0006	570	0	0	Pass
0.0006	549	0	0	Pass
0.0006	523	0	0	Pass
0.0006	501	0	0	Pass
0.0006	475	0	0	Pass
0.0006	443	0	0	Pass
0.0006	401	0	0	Pass
0.0006	379	0	0	Pass

0.0006	354	0	0	Pass
0.0006	333	0	0	Pass
0.0006	302	0	0	Pass
0.0006	281	0	0	Pass
0.0006	270	0	0	Pass
0.0007	247	0	0	Pass
0.0007	231	0	0	Pass
0.0007	214	0	0	Pass
0.0007	197	0	0	Pass
0.0007	187	0	0	Pass
0.0007	172	0	0	Pass
0.0007	158	0	0	Pass
0.0007	143	0	0	Pass
0.0007	124	0	0	Pass
0.0007	109	0	0	Pass
0.0007	94	0	0	Pass
0.0007	80	0	0	Pass
0.0007	57	0	0	Pass
0.0007	37	0	0	Pass
0.0007	19	0	0	Pass
0.0007	5	0	0	Pass
0.0007	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0008	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass
0.0009	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	256.51			☐	100.00			
Total Volume Infiltrated		256.51	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

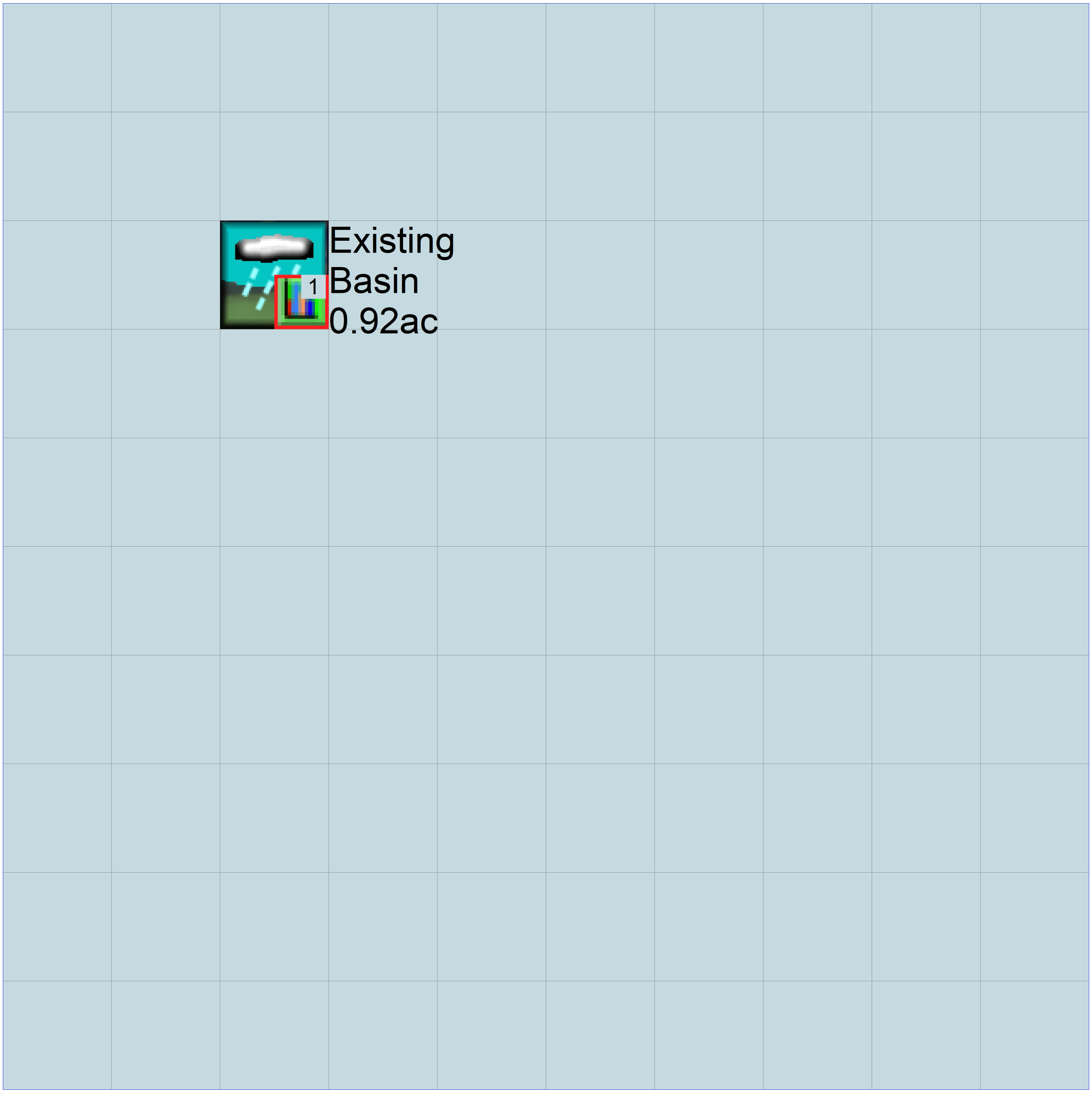
PERLND Changes

No PERLND changes have been made.

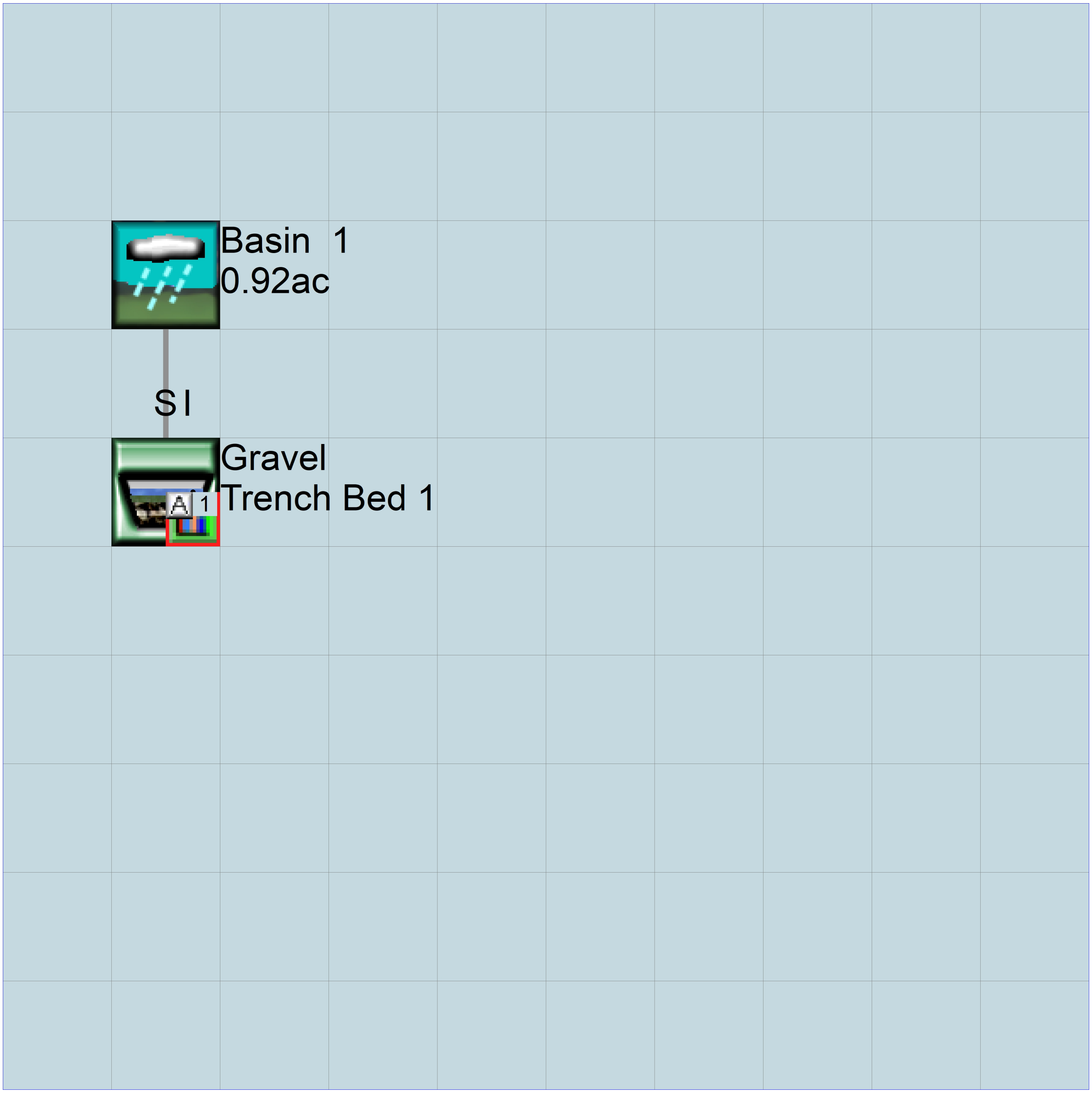
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   RC C1360 Puyallup WA - Flow Control.wdm
MESSU      25   PreRC C1360 Puyallup WA - Flow Control.MES
           27   PreRC C1360 Puyallup WA - Flow Control.L61
           28   PreRC C1360 Puyallup WA - Flow Control.L62
           30   POCRC C1360 Puyallup WA - Flow Control1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Existing Basin              MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                             in  out           ***
    1     A/B, Forest, Flat       1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    1         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    1         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    1        0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1             0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1            0.2       0.5      0.35         0       0.7       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Existing Basin***
PERLND   1                        0.92     COPY   501     12
PERLND   1                        0.92     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM       1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM       1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   RC C1360 Puyallup WA - Flow Control.wdm
MESSU      25   MitRC C1360 Puyallup WA - Flow Control.MES
           27   MitRC C1360 Puyallup WA - Flow Control.L61
           28   MitRC C1360 Puyallup WA - Flow Control.L62
           30   POCRC C1360 Puyallup WA - Flow Control1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       7
      IMPLND       4
      IMPLND      11
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Gravel Trench Bed 1         MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out          ***
    7      A/B, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    7         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    7         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    7         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    7              0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7            0.1       0.5      0.25         0       0.7      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    7              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                       in  out          ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
   11      PARKING/FLAT           1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    4    1    9
   11         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
```

```
    4             400      0.01       0.1       0.1
   11             400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4               0         0
   11               0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4               0         0
   11               0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   7                        0.22     RCHRES   1      2
PERLND   7                        0.22     RCHRES   1      3
IMPLND   4                        0.08     RCHRES   1      5
IMPLND  11                        0.62     RCHRES   1      5

******Routing******
PERLND   7                        0.22     COPY     1     12
IMPLND   4                        0.08     COPY     1     15
IMPLND  11                        0.62     COPY     1     15
PERLND   7                        0.22     COPY     1     13
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                              in  out                        ***
    1     Gravel Trench Be-009    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
```

```
    RCHRES  Flags for each HYDR Section                                     ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1          0          4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE       1
   92    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)    (cfs)     (cfs)    (ft/sec)    (Minutes)***
  0.000000  0.053409  0.000000  0.000000  0.000000
  0.066667  0.053409  0.001424  0.000000  0.070010
  0.133333  0.053409  0.002848  0.000000  0.070010
  0.200000  0.053409  0.004273  0.000000  0.070010
  0.266667  0.053409  0.005697  0.000000  0.070010
  0.333333  0.053409  0.007121  0.000000  0.070010
  0.400000  0.053409  0.008545  0.000000  0.070010
  0.466667  0.053409  0.009970  0.000000  0.070010
  0.533333  0.053409  0.011394  0.000000  0.070010
  0.600000  0.053409  0.012818  0.000000  0.070010
  0.666667  0.053409  0.014242  0.000000  0.070010
  0.733333  0.053409  0.015667  0.000000  0.070010
  0.800000  0.053409  0.017091  0.000000  0.070010
  0.866667  0.053409  0.018515  0.000000  0.070010
  0.933333  0.053409  0.019939  0.000000  0.070010
  1.000000  0.053409  0.021364  0.000000  0.070010
  1.066667  0.053409  0.022788  0.000000  0.070010
  1.133333  0.053409  0.024212  0.000000  0.070010
  1.200000  0.053409  0.025636  0.000000  0.070010
  1.266667  0.053409  0.027061  0.000000  0.070010
  1.333333  0.053409  0.028485  0.000000  0.070010
  1.400000  0.053409  0.029909  0.000000  0.070010
  1.466667  0.053409  0.031333  0.000000  0.070010
  1.533333  0.053409  0.032758  0.000000  0.070010
  1.600000  0.053409  0.034182  0.000000  0.070010
  1.666667  0.053409  0.035606  0.000000  0.070010
  1.733333  0.053409  0.037030  0.000000  0.070010
  1.800000  0.053409  0.038455  0.000000  0.070010
  1.866667  0.053409  0.039879  0.000000  0.070010
  1.933333  0.053409  0.041303  0.000000  0.070010
  2.000000  0.053409  0.042727  0.000000  0.070010
  2.066667  0.053409  0.044697  0.000000  0.070010
  2.133333  0.053409  0.046667  0.000000  0.070010
  2.200000  0.053409  0.048638  0.000000  0.070010
  2.266667  0.053409  0.050608  0.000000  0.070010
  2.333333  0.053409  0.052578  0.000000  0.070010
  2.400000  0.053409  0.054548  0.000000  0.070010
  2.466667  0.053409  0.056518  0.000000  0.070010
  2.533333  0.053409  0.058488  0.000000  0.070010
  2.600000  0.053409  0.060458  0.000000  0.070010
  2.666667  0.053409  0.062428  0.000000  0.070010
  2.733333  0.053409  0.064398  0.000000  0.070010
```

```
  2.800000  0.053409  0.066368  0.000000  0.070010
  2.866667  0.053409  0.068338  0.000000  0.070010
  2.933333  0.053409  0.070308  0.000000  0.070010
  3.000000  0.053409  0.072279  0.000000  0.070010
  3.066667  0.053409  0.074249  0.000000  0.070010
  3.133333  0.053409  0.076219  0.000000  0.070010
  3.200000  0.053409  0.078189  0.000000  0.070010
  3.266667  0.053409  0.080159  0.000000  0.070010
  3.333333  0.053409  0.082129  0.000000  0.070010
  3.400000  0.053409  0.084099  0.000000  0.070010
  3.466667  0.053409  0.086069  0.000000  0.070010
  3.533333  0.053409  0.088039  0.000000  0.070010
  3.600000  0.053409  0.090009  0.000000  0.070010
  3.666667  0.053409  0.091979  0.000000  0.070010
  3.733333  0.053409  0.093949  0.000000  0.070010
  3.800000  0.053409  0.095920  0.000000  0.070010
  3.866667  0.053409  0.097890  0.000000  0.070010
  3.933333  0.053409  0.099860  0.000000  0.070010
  4.000000  0.053409  0.101284  0.000000  0.070010
  4.066667  0.053409  0.102708  0.000000  0.070010
  4.133333  0.053409  0.104132  0.000000  0.070010
  4.200000  0.053409  0.105557  0.000000  0.070010
  4.266667  0.053409  0.106981  0.000000  0.070010
  4.333333  0.053409  0.108405  0.000000  0.070010
  4.400000  0.053409  0.109829  0.000000  0.070010
  4.466667  0.053409  0.111254  0.000000  0.070010
  4.533333  0.053409  0.112678  0.000000  0.070010
  4.600000  0.053409  0.114102  0.000000  0.070010
  4.666667  0.053409  0.115526  0.000000  0.070010
  4.733333  0.053409  0.116951  0.000000  0.070010
  4.800000  0.053409  0.118375  0.000000  0.070010
  4.866667  0.053409  0.119799  0.000000  0.070010
  4.933333  0.053409  0.121223  0.000000  0.070010
  5.000000  0.053409  0.122648  0.000000  0.070010
  5.066667  0.053409  0.124072  0.273695  0.070010
  5.133333  0.053409  0.125496  0.771465  0.070010
  5.200000  0.053409  0.126920  1.404464  0.070010
  5.266667  0.053409  0.128345  2.123824  0.070010
  5.333333  0.053409  0.129769  2.882519  0.070010
  5.400000  0.053409  0.131193  3.632201  0.070010
  5.466667  0.053409  0.132617  4.326027  0.070010
  5.533333  0.053409  0.134042  4.924197  0.070010
  5.600000  0.053409  0.135466  5.401220  0.070010
  5.666667  0.053409  0.136890  5.754494  0.070010
  5.733333  0.053409  0.138314  6.013989  0.070010
  5.800000  0.053409  0.139738  6.338508  0.070010
  5.866667  0.053409  0.141163  6.597328  0.070010
  5.933333  0.053409  0.142587  6.846371  0.070010
  6.000000  0.053409  0.144011  7.086668  0.070010
  6.066667  0.053409  0.147572  7.319079  0.070010
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
```

```
COPY      1 OUTPUT MEAN   1 1     48.4       WDM    701 FLOW     ENGL       REPL
COPY    501 OUTPUT MEAN   1 1     48.4       WDM    801 FLOW     ENGL       REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17

END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Appendix B-3: Conveyance Calculations

Showing like this due to pipe at 0% slope

Confirmed HGL for both 25 and 100 Year is within pipe

25 Year

FlexTable: Conduit Table

Start Node	Stop Node	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Manning's n
29 (oSTRM)	O-2	9.0	0.005	12.0	1.76	3.69	2.73	64.4	0.012
WQ-01 (oSTRM)	29 (oSTRM)	4.5	0.110	12.0	1.76	11.44	12.83	13.7	0.012
1 (oSTRM)	WQ-01 (oSTRM)	4.5	0.000	12.0	1.76	2.24	0.04	4,556.3	0.012
TEE-01 (oSTRM)	1 (oSTRM)	5.0	0.005	12.0	1.76	3.69	2.73	64.4	0.012
MH-02 (oSTRM)	CO-04 (oSTRM)	22.4	0.009	6.0	0.26	2.88	0.58	44.8	0.012
CO-04 (oSTRM)	CB-04 (oSTRM)	11.6	0.009	6.0	0.26	2.88	0.58	44.8	0.012
CO-05 (oSTRM)	MH-02 (oSTRM)	8.8	0.103	4.0	0.06	4.63	0.66	8.6	0.012
TEE-03 (oSTRM)	MH-02 (oSTRM)	10.0	0.009	6.0	0.15	2.47	0.58	25.2	0.012
C0-03 (oSTRM)	MH-02 (oSTRM)	8.7	0.054	6.0	0.06	3.50	1.41	4.1	0.012
MH-4	C0-03 (oSTRM)	9.9	0.054	6.0	0.06	3.50	1.41	4.1	0.012
MH-1	CO-01 (oSTRM)	2.9	0.009	6.0	0.03	1.58	0.58	5.5	0.012
CO-01 (oSTRM)	CO-02 (oSTRM)	45.5	0.009	6.0	0.03	1.58	0.58	5.5	0.012
CB-03 (oSTRM)	CB-04 (oSTRM)	34.0	0.013	8.0	0.35	3.47	1.48	23.7	0.012
CB-04 (oSTRM)	WYE-03 (oSTRM)	30.4	0.013	12.0	1.11	4.64	4.36	25.5	0.012
CB-01 (oSTRM)	CB-02 (oSTRM)	38.5	0.005	12.0	0.34	2.37	2.73	12.6	0.012
CB-02 (oSTRM)	WYE-01 (oSTRM)	40.7	0.005	12.0	0.65	2.85	2.73	23.7	0.012
CO-02 (oSTRM)	TEE-02 (oSTRM)	35.1	0.009	6.0	0.03	1.58	0.58	5.5	0.012
MH-3	TEE-03 (oSTRM)	9.9	0.092	6.0	0.06	4.25	1.84	3.1	0.012
MH-2	TEE-02 (oSTRM)	9.9	0.077	6.0	0.06	3.99	1.69	3.4	0.012
TEE-02 (oSTRM)	TEE-03 (oSTRM)	16.4	0.009	6.0	0.09	2.14	0.58	15.3	0.012
WYE-03 (oSTRM)	TEE-01 (oSTRM)	41.0	0.013	12.0	1.11	4.64	4.36	25.5	0.012
WYE-01 (oSTRM)	WYE-02 (oSTRM)	14.1	0.005	12.0	0.65	2.85	2.73	23.7	0.012
WYE-02 (oSTRM)	TEE-01 (oSTRM)	69.3	0.005	12.0	0.65	2.85	2.73	23.7	0.012

Showing like this due to pipe at 0% slope

Confirmed HGL for both 25 and 100 Year is within pipe

100 Year

FlexTable: Conduit Table

Start Node	Stop Node	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Manning's n
29 (oSTRM)	O-2	9.0	0.005	12.0	2.01	3.80	2.73	73.6	0.012
WQ-01 (oSTRM)	29 (oSTRM)	4.5	0.110	12.0	2.01	11.89	12.83	15.7	0.012
1 (oSTRM)	WQ-01 (oSTRM)	4.5	0.000	12.0	2.01	2.56	0.04	5,207.2	0.012
TEE-01 (oSTRM)	1 (oSTRM)	5.0	0.005	12.0	2.01	3.80	2.73	73.6	0.012
MH-02 (oSTRM)	CO-04 (oSTRM)	22.4	0.009	6.0	0.30	2.98	0.58	51.2	0.012
CO-04 (oSTRM)	CB-04 (oSTRM)	11.6	0.009	6.0	0.30	2.98	0.58	51.2	0.012
CO-05 (oSTRM)	MH-02 (oSTRM)	8.8	0.103	4.0	0.07	4.83	0.66	9.9	0.012
TEE-03 (oSTRM)	MH-02 (oSTRM)	10.0	0.009	6.0	0.17	2.56	0.58	28.7	0.012
C0-03 (oSTRM)	MH-02 (oSTRM)	8.7	0.054	6.0	0.07	3.65	1.41	4.6	0.012
MH-4	C0-03 (oSTRM)	9.9	0.054	6.0	0.07	3.65	1.41	4.6	0.012
MH-1	CO-01 (oSTRM)	2.9	0.009	6.0	0.04	1.65	0.58	6.2	0.012
CO-01 (oSTRM)	CO-02 (oSTRM)	45.5	0.009	6.0	0.04	1.65	0.58	6.2	0.012
CB-03 (oSTRM)	CB-04 (oSTRM)	34.0	0.013	8.0	0.40	3.60	1.48	27.1	0.012
CB-04 (oSTRM)	WYE-03 (oSTRM)	30.4	0.013	12.0	1.27	4.81	4.36	29.2	0.012
CB-01 (oSTRM)	CB-02 (oSTRM)	38.5	0.005	12.0	0.39	2.47	2.73	14.4	0.012
CB-02 (oSTRM)	WYE-01 (oSTRM)	40.7	0.005	12.0	0.74	2.95	2.73	27.1	0.012
CO-02 (oSTRM)	TEE-02 (oSTRM)	35.1	0.009	6.0	0.04	1.65	0.58	6.2	0.012
MH-3	TEE-03 (oSTRM)	9.9	0.092	6.0	0.07	4.42	1.84	3.5	0.012
MH-2	TEE-02 (oSTRM)	9.9	0.077	6.0	0.07	4.15	1.69	3.9	0.012
TEE-02 (oSTRM)	TEE-03 (oSTRM)	16.4	0.009	6.0	0.10	2.22	0.58	17.5	0.012
WYE-03 (oSTRM)	TEE-01 (oSTRM)	41.0	0.013	12.0	1.27	4.81	4.36	29.2	0.012
WYE-01 (oSTRM)	WYE-02 (oSTRM)	14.1	0.005	12.0	0.74	2.95	2.73	27.1	0.012
WYE-02 (oSTRM)	TEE-01 (oSTRM)	69.3	0.005	12.0	0.74	2.95	2.73	27.1	0.012

Appendix C-1: USGS Soil Survey

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Pierce County Area, Washington

RC C1360 Puyallup WA

October 27, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:690 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 10, 20, 40, 60

Feet: 0, 30, 60, 120, 180

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 21, Aug 28, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 31, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13B	Everett very gravelly sandy loam, 0 to 8 percent slopes	1.9	100.0%
Totals for Area of Interest		**1.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pierce County Area, Washington

13B—Everett very gravelly sandy loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t629
Elevation: 30 to 900 feet
Mean annual precipitation: 35 to 91 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 180 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Everett and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Everett

Setting

Landform: Eskers, moraines, kames
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glacial outwash

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: very gravelly sandy loam
Bw - 3 to 24 inches: very gravelly sandy loam
C1 - 24 to 35 inches: very gravelly loamy sand
C2 - 35 to 60 inches: extremely cobbly coarse sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: F002XA004WA - Puget Lowlands Forest
Forage suitability group: Droughty Soils (G002XS401WA), Droughty Soils (G002XF403WA), Droughty Soils (G002XN402WA)
Other vegetative classification: Droughty Soils (G002XS401WA), Droughty Soils (G002XF403WA), Droughty Soils (G002XN402WA)
Hydric soil rating: No

Minor Components

Alderwood

Percent of map unit: 10 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest, talf
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Indianola

Percent of map unit: 10 percent
Landform: Eskers, kames, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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Appendix C-2: Terracon Geotechnical Report

(Provided Separately)

Appendix C-3: Construction Stormwater Pollution Prevention Plan (SWPPP)

(Provided Separately)

Appendix C-4: Operations and Maintenance (O&M) Manual

(Provided Separately)