HOUT RESIDENCE

Stormwater Site Plan
Drainage Report

PROFESSIONAL ENGINEER: MOHAMED SAID MAHOUD
PE#23001965
EXPIRATION 06-12-2027

Site Address: 921 9TH ST SW PUYALLUP

FOR: DS CUSTOM CONSTRUCTION
10925 SE 226TH ST
KENT, WA
98031

JMDESIGNS AND PERMITTING LLC

DATE: October 2, 2025

Mohamed S Mahmoud
Digitally signed by Mohamed S Mahmoud
Date: 2025.11.05 21:55:52 -08'00'

MOHAMED SAID MAHMOUD
STATE OF WASHINGTON
23001965
REGISTERED PROFESSIONAL ENGINEER

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DRAINAGE REPORT

APPENDICES

Section I - Project Overview

Overview:

The project site is located on the east side of 9th St SW at the intersection with 10th Ave SW. This project consists of the construction of a single-family residence
The project will include 2,098 sf of roof, 970 sf of driveway, and 57 sf of walkways for a total of 3,125 sf of new hard surfaces. The existing water service will be extended to the new house.

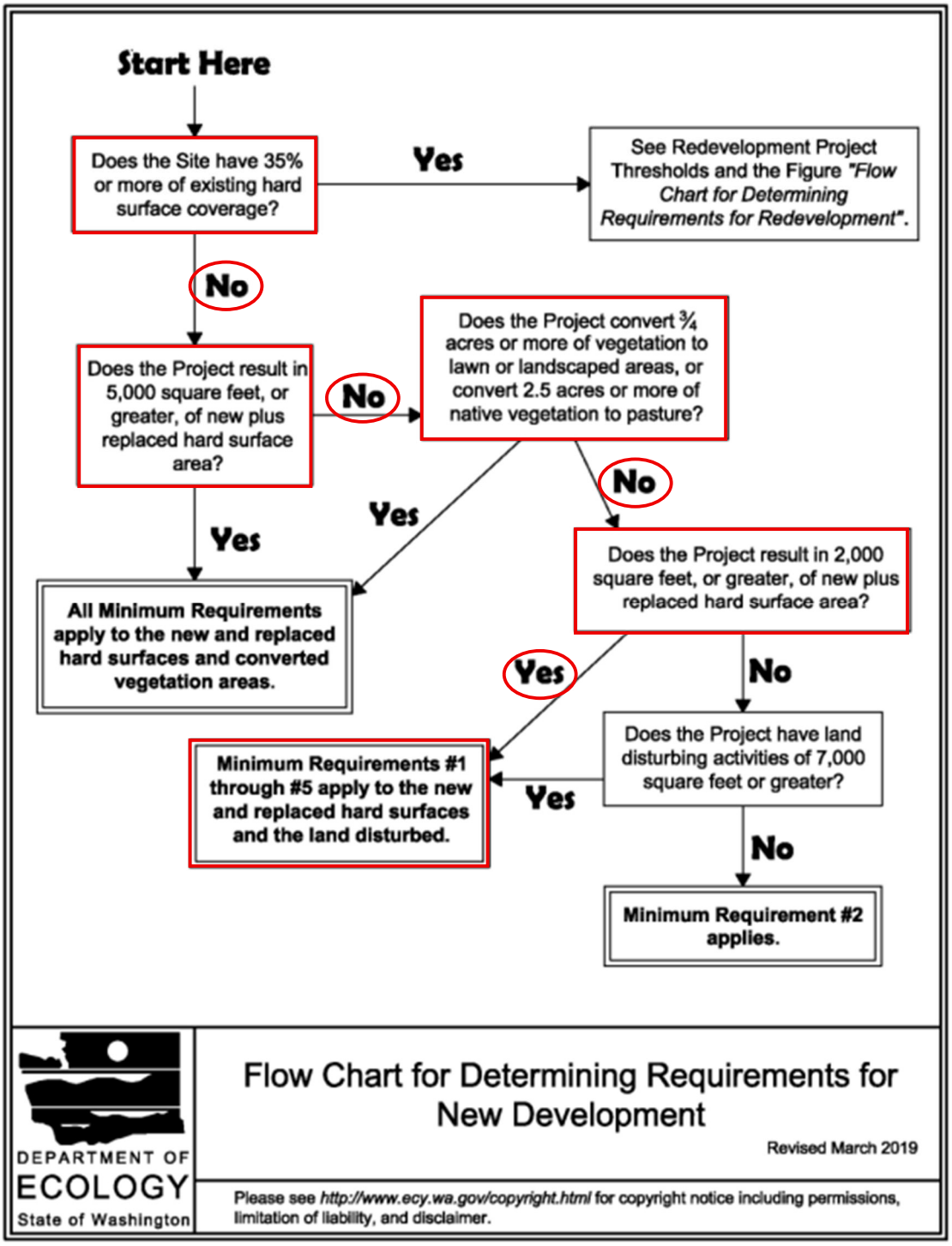
Project Requeriments:

Determination of Applicable Minimum Requirements

Per PMC 21.10.040 the City of Puyallup has adopted the Washington State Department of Ecology Stormwater Management Manual for Western Washington (SMMWW), with the version in effect being “the most current version approved for city use by the council.” The 2019 DOE Manual has been adopted by the City and is the controlling regulation and is referred to as “the Manual” or “SMMWW” hereinafter.

The project consists of 3,125 sf of new hard surfaces onsite. The existing hard surfaces are less tan 35% of the site and therefore, the project is considered new development. Since the total new plus replaced hard surfaces for the project are less than 5,000 square feet, and less than 0.75 acres of vegetation will be converted to lawn, minimum requirements #1-5 apply to the new hard surfaces and the land disturbed.

Figure 3: Flow Chart for Determining Requirements for New Development



Discussion of Minimum Requirements

The Minimum Requirements per Section I-3.4 of the Manual:

Minimum Requirement #1: Preparation of Stormwater Site Plans
The Stormwater Site Plan consists of a report and construction plans. This report and the civil plans for building permit submittal satisfy Minimum Requirement #1.

Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPPP)

The SWPPP consists of a narrative and drawings. The narrative is addressed in Section V of this report. The civil drawings include a TESC plan, notes, and details.

Minimum Requirement #3: Source Control of Pollution

As a single-family residence, a Pollution Source Control Plan is not required for this project.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

The vicinity of the site is very flat. The general gradient is to the west. Any surface flows will be to the west off the site. The proposed improvements will infiltrate all runoff from hard surfaces and no grading of the is proposed. This will preserve the natural drainage system.

Provide where this exemption is in the manual, else identify applicable source control measures. [Drainage Report, pg. 5]

Minimum Requirement #5: On-site Stormwater Management

Because the project only triggers MR #1-5, and is inside the urban growth area, the project must either use the LID BMPs from List #1 or use any Flow Control BMPs to meet the LID Performance Standard and apply BMP T5.13: Post-Construction Soil Quality and Depth. This project will use List #1. For each surface the BMP's must be considered in the order listed for that type of surface and use the first BMP that is considered feasible.

The geotechnical report provided advises against the use of infiltration for this site. The geotechnical report and implemented stormwater systems need to be consistent with each other. [Drainage Report pg. 5]

<u>Lawn and Landscaped Areas:</u>

- All lawn and landscaped areas will meet the requirements of BMP T5.13, Post Construction Soil Quality and Depth with notes on the plans to this effect.

Roofs:

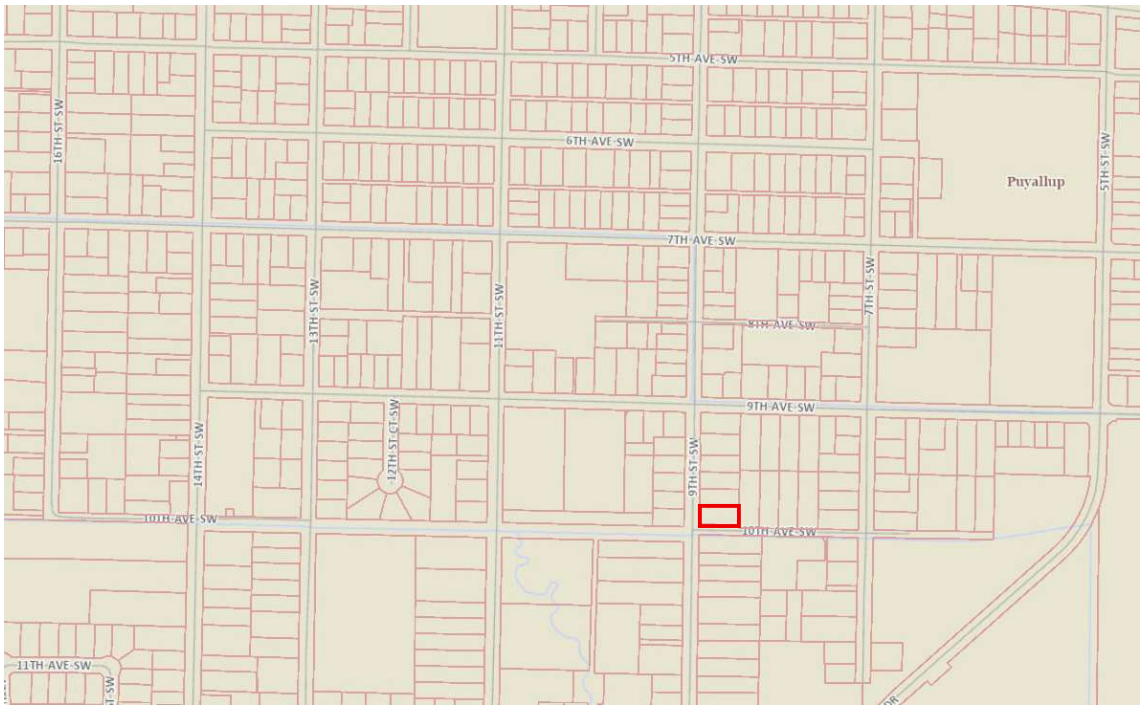
1. BMP T5.30: Full Dispersion – infeasible due to inadequate vegetated area to meet the 65:10 ratio.
2. BMP T5.10A: Downspout Full Infiltration – will be used for the new building.

Other Hard Surfaces:

1. BMP T5.30: Full Dispersion – infeasible due to inadequate vegetated area to meet the 65:10 ratio.
2. BMP T5.15: Permeable pavement – as an equivalent measure, full infiltration via the sameinfiltration trench for roof drains will be used. Both BMPs fully infiltrate all runoff.

Either provide permeable pavement as described by the list method, or show infeasibility and continue evaluating the list. BMP T5.10A states, "Downspout full infiltration systems are trench or drywell designs intended only for use in infiltrating runoff from roof downspout drains. They are not designed to directly infiltrate runoff from pollutant-generating impervious surfaces". [Drainage Report, pg. 5]

In the case that an infiltration trench will be used, a geotechnical engineer will need to complete an approved method of infiltration testing per the SWMMWW to determine the on-site infiltration rate, and monitor for seasonal high groundwater through the wet season (December 21st - March 21st). The monitoring will need to identify a clear peak in the seasonal high groundwater table. Note that any proposed infiltration system will need to meet the separation requirements as determined by the storm manual and city standards. [Drainage Report pg. 5]


5TH AVE SW
6TH AVE SW
7TH AVE SW
8TH AVE SW
9TH AVE SW
10TH AVE SW
11TH AVE SW
16TH ST SW
13TH ST SW
11TH ST SW
14TH ST SW
12TH ST CT SW
9TH ST SW
7TH ST SW
5TH ST SW
Puyallup

Section II – Existing Conditions Summary

Topography

In existing conditions project area is generally flat. There is a very slight gradient down to the west.

Ground Cover
The site is covered with pasture.

Soils
See Geotech report.

Floodplain
The project site is within a floodplain.

Provide analysis for how this project is mitigating the grading changes within the floodplain, else revise the grading plan so that there will be no additional filled areas within the floodplain. [Drainage Report, pg. 7]

Section III – Off-Site Analysis

Problems
There are no known drainage problems along this downstream route.

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Section IV – Permanent Stormwater Control Plan

Basin Summary

The disturbed area for the overall project is 10,860 sf. This is the entire area of the lot.

Existing Site Hydrology

42 inch, East rainfall zone and WWHM is run with 15- minute intervals. The table below shows the land cover delineation for the hydraulic analysis.

EXISTING	SF	AC
C, Pasture, Flat	10,860	0.2494

The peak runoff rates calculated by WWHM2012 for predeveloped conditions are:

Flow Frequency

Flow(cfs) 0501 15m

2 Year = 0.0060
5 Year = 0.0096
10 Year = 0.0124
25 Year = 0.0164
50 Year = 0.0198
100 Year = 0.0234

This infiltration rate will need to be re-evaluated, as the report is outdated (The short plat was completed 20+ years ago). Additionally, the infiltration rate may have been determined using non-standard testing per current guidance from the adopted stormwater manual (2019 SWMMWW). [Drainage Report, pg. 9]

See Appendix A for WWHM analysis. POC 1 is used for all analyses.

Stormwater Management

To address MR #5, On-Site Stormwater Management BMP's in the form of a downspout infiltration trench will be used. A single trench will be used for the roof, driveway, and walkway runoff. Because more than roof runoff is routed to the trench, it will be sized using WWHM. To size a trench in WWHM, a gravel trench bed is used. The total depth of trench is set deeper than the design Depth with an outlet riser set at the design depth of trench, 2 feet. The porosity is set to 30%. The design infiltration rate is 7 in/hr per the short plat Drainage Report. The size of the trench is adjusted until there is no flow through the riser, i.e. 100% infiltration. To account for possible future enlargement of the driveway, the driveway area has been increased to an assumed 2,000 sf. The drainage area to the trench is:

DEVELOPED		
To Infiltration Trench	SF	AC
Roof	2098	0.048
Driveway, Flat	970	0.022
Walkway, Flat	57	0.0013
Total	3125	0.072

An infiltration trench with 286 sf of bottom area will provide 100% infiltration.

Include all on-site and off-site surfaces in this analysis. [Drainage Report, pg. 9]

Developed Site Hydrology

All non-hard surface areas will be lawn in the developed condition and this area will continue to sheet flow to the east as in existing conditions. The table below shows the land cover delineation for the developed site hydrologic analysis.

DEVELOPED		
Direct Discharge	SF	AC
C, Lawn, Flat	7735	0.1776

The peak runoff rates calculated by WWHM2012 are:

Flow Frequency

Flow(cfs) 0801 15m

2 Year = 0.0063
5 Year = 0.0125
10 Year = 0.0183
25 Year = 0.0282
50 Year = 0.0378
100 Year = 0.0495

See Appendix A for WWHM analysis. POC 1 is used for this analysis.

BMP T5.10A provides sizing guidance directly in the BMP, without the use of WWHM. Please revise the design to utilize the design criteria as listed within the BMP. [Drainage Report, pg. 10]

Section V – Construction Stormwater Pollution Prevention Plan

Following are the 12 elements of the SWPPP. Where specific BMP's are prescribed, they are explained as shown on the engineering drawings for the project. Alternate BMP's may be acceptable in lieu of, or as a supplement to the prescribed BMP's. Where identified, alternate BMP's are listed and requirements included.

Element #1 – Mark Clearing Limits

Construction fencing will be used to mark property line which equals clearing limits, except where boundary fencing already exists.

Element #2 – Establish Construction Access

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site. The specific BMPs related to establishing construction access that will be used on this project include:

- Stabilized Construction Entrance (C105)

Element #3 – Control Flow Rates
Due to the limited scope of work, no BMPs to control flow rates are required.

Element #4 – Install Sediment Controls
All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged to an infiltration facility. The specific BMPs to be used for controlling sediment on this project include:

- Silt Fence (C233)

Element #5 – Stabilize Soils
Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

- Temporary and Permanent Seeding (C120)
- Mulching (C121)

No soils shall remain exposed and unworked for more than 7 days during the dry season (May 1 to September 30) and 2 days during the wet season (October 1 to April 30). Regardless of the time of year, all soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on weather forecasts.
In general, cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

Alternate BMP's:
- Plastic Covering (C123)
- Sodding (C124)
- Topsoiling (C125)

Element #6 – Protect Slopes
The slopes within the clearing limits/area to be disturbed are nearly flat. Additional protection is not needed.

Element #7 – Protect Drain Inlets
All storm drain inlets and culverts made operable during construction shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) Will be implemented for all drainage inlets and culverts that could potentially be impacted by sedimentladen runoff on and near the project site. The following inlet protection measures will be applied on this project:

- Storm Drain Inlet Protection (C220)

Element #8 – Stabilize Channels and Outlets
Where site runoff is to be conveyed in channels or discharged to a stream or some other natural drainage point, efforts will be taken to prevent downstream erosion. No surface channels or outlets are proposed for this project.

Element #9 – Control Pollutants
All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well organized, and free of debris. If required, BMPs to be implemented to control specific sources of pollutants are discussed below.

Vehicles, construction equipment, and/or petroleum product storage/dispensing:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.
- On-site fueling tanks and petroleum product storage containers shall include secondary containment.
- Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment.
- In order to perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle.
- Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

Specific construction related BMP's to be used include:
Material Delivery, Storage and Containment (C153)

Element #10 – Control Dewatering

Work will commence during the dry season, therefore no dewatering is likely to be required. If groundwater is encountered during construction, the water from all de-watering systems for trenches and foundations may be disposed of in one of the following manners:

(1) Foundation, vault, and trench de-watering water which have similar characteristics to stormwater runoff at the site shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond.

(2) Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to or directly into surface waters of the state, provided the de-watering flow does not cause erosion or flooding of receiving waters. Clean de-watering water should not be routed through stormwater sediment ponds. Other disposal options for clean, nonturbid de-watering water may include:

(a) Infiltration;

(b) Transportation off-site in a vehicle (such as a vacuum flush truck) for legal disposal in a manner that does not pollute state waters;

(c) On-site chemical treatment or other suitable treatment technologies approved by the department and Washington State Department of Ecology;

(d) Sanitary sewer discharge with local sewer district approval, if there is no other option; and

(e) Use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized de-watering water.

Element #11 – Maintain BMPs

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMP's specifications. Visual monitoring of the BMPs will be conducted at least once every calendar week and within 24 hours of any rainfall event (typically around 0.5" in 24-hour period) that causes a discharge from the site. If the site becomes inactive, and is temporarily stabilized, the inspection frequency may be reduced to once every month, during the dry season.

All temporary erosion and sediment control BMPs shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. The need for TESC measures continuance or removal shall be determined by the designated site CESC lead person with concurrence of the County inspector. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

Element #12 – Manage the Project

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures. A Certified Erosion and Sedimentation Control Lead (CESCL) person shall be assigned to the

project and will file regular and special inspection reports with the County Planning and Land Services Department.
- Schedule major earthwork during the dry season.

In addition, project management will incorporate the key components listed below: As this project site is located west of the Cascade Mountain Crest, the project will be managed according to the following key project components:

Phasing of Construction

- The construction project is being phased to the extent practicable in order to prevent soil erosion, and, to the maximum extent possible, the transport of sediment from the site during construction.
- Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C 162).

Seasonal Work Limitations

- From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:

  • Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and

- Limitations on activities and the extent of disturbed areas; and

- Proposed erosion and sediment control measures.

- Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance.

- The following activities are exempt from the seasonal clearing and grading limitations:

  - Routine maintenance and necessary repair of erosion and sediment control BMPs;

  - Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil; and

  - Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

Coordination with Utilities and Other Jurisdictions

- Care has been taken to coordinate with utilities, other construction projects, and the local jurisdiction in preparing this SWPPP and scheduling the construction work.

Inspection and Monitoring

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:

  - Assess the site conditions and construction activities that could impact the quality of stormwater, and

・ Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

- A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.

- Whenever inspection and/or monitoring reveals that the BMPs identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

Maintaining an Updated Construction SWPPP

- This SWPPP shall be retained on-site or within reasonable access to the site.

- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

Specific management related BMP's to be used include:

- Certified Erosion and Sediment Control Lead (C160)

- Scheduling (C162)

Section VI – Special Reports and Studies

None.

Section VII – Other Permits

A building permit will be required for construction of the house.

Sewer and water service permits will be required.

Section VIII – Operation and Maintenance Manual

Minimum Requirement #9 is not triggered for this project so an Operations and Maintenance Manual is not required.

Section IX – Bond Quantities Worksheet

Any required bond amounts will be calculated if required for permit issuance.

APPENDIX A

WWHM Analysis

See notes above regarding WWHM analysis for infiltration trench sizing. [Drainage Report, pg. 18]

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: Hout

Site Name: Hout

Site Address:

City: Puyallup

Report Date: 10/02/2025

Gage: 42 IN EAST

Data Start: 10/01/1901

Data End: 09/30/2059

Timestep: 15 Minute

Precip Scale: 1.000

Version Date: 2023/01/27

Version: 4.2.19

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

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acre
C,Pasture,Flat	0.2494
Pervious Total	0.2494
Impervious Land Use	Acre
Impervious Total	0
Basin Total	0.2494

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acre
Pervious Total	0
Impervious Land Use	Acre

ROOF TOPS FLAT 0.048
DRIVEWAYS FLAT 0.022
WALKWALKS FLAT 0.0013

Impervious Total 0.072

Basin Total 0.072

Basin 2

Bypass:	Yes
GroundWater:	No
Pervious Land Use	Acre
C,Pasture,Flat	0.1776
Pervious Total	0.1776
Impervious Land Use	Acre
Impervious Total	0
Basin Total	0.1776

Routing Elements
Predeveloped Routing

Mitigated Routing

Gravel Trench Bed 1

Bottom Length: 27.00 ft.
Bottom Width: 10.50 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: 3
Pour Space of material for first layer: 0.3
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 7
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 45.842
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 45.842
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 2 ft.
Riser Diameter: 4 in.
Element Flows To:
Outlet 1 Outlet 2

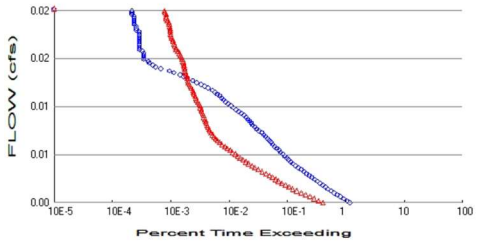
Gravel Trench Bed Hydraulic Table

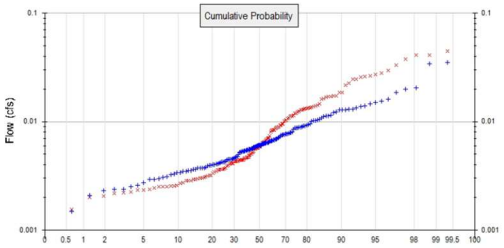
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.006	0.000	0.000	0.000
0.0333	0.006	0.000	0.000	0.045
0.0667	0.006	0.000	0.000	0.045
0.1000	0.006	0.000	0.000	0.045
0.1333	0.006	0.000	0.000	0.045
0.1667	0.006	0.000	0.000	0.045
0.2000	0.006	0.000	0.000	0.045
0.2333	0.006	0.000	0.000	0.045
0.2667	0.006	0.000	0.000	0.045
0.3000	0.006	0.000	0.000	0.045
0.3333	0.006	0.000	0.000	0.045

0.3667	0.006	0.000	0.000	0.045
0.4000	0.006	0.000	0.000	0.045
0.4333	0.006	0.000	0.000	0.045
0.4667	0.006	0.000	0.000	0.045
0.5000	0.006	0.001	0.000	0.045
0.5333	0.006	0.001	0.000	0.045
0.5667	0.006	0.001	0.000	0.045
0.6000	0.006	0.001	0.000	0.045
0.6333	0.006	0.001	0.000	0.045
0.6667	0.006	0.001	0.000	0.045
0.7000	0.006	0.001	0.000	0.045
0.7333	0.006	0.001	0.000	0.045
0.7667	0.006	0.001	0.000	0.045
0.8000	0.006	0.001	0.000	0.045
0.8333	0.006	0.001	0.000	0.045
0.8667	0.006	0.001	0.000	0.045
0.9000	0.006	0.001	0.000	0.045
0.9333	0.006	0.001	0.000	0.045
0.9667	0.006	0.001	0.000	0.045
1.0000	0.006	0.002	0.000	0.045
1.0333	0.006	0.002	0.000	0.045
1.0667	0.006	0.002	0.000	0.045
1.1000	0.006	0.002	0.000	0.045
1.1333	0.006	0.002	0.000	0.045
1.1667	0.006	0.002	0.000	0.045
1.2000	0.006	0.002	0.000	0.045
1.2333	0.006	0.002	0.000	0.045
1.2667	0.006	0.002	0.000	0.045
1.3000	0.006	0.002	0.000	0.045
1.3333	0.006	0.002	0.000	0.045
1.3667	0.006	0.002	0.000	0.045
1.4000	0.006	0.002	0.000	0.045
1.4333	0.006	0.002	0.000	0.045
1.4667	0.006	0.002	0.000	0.045
1.5000	0.006	0.002	0.000	0.045
1.5333	0.006	0.003	0.000	0.045
1.5667	0.006	0.003	0.000	0.045
1.6000	0.006	0.003	0.000	0.045
1.6333	0.006	0.003	0.000	0.045
1.6667	0.006	0.003	0.000	0.045
1.7000	0.006	0.003	0.000	0.045
1.7333	0.006	0.003	0.000	0.045
1.7667	0.006	0.003	0.000	0.045
1.8000	0.006	0.003	0.000	0.045
1.8333	0.006	0.003	0.000	0.045
1.8667	0.006	0.003	0.000	0.045
1.9000	0.006	0.003	0.000	0.045
1.9333	0.006	0.003	0.000	0.045
1.9667	0.006	0.003	0.000	0.045
2.0000	0.006	0.003	0.000	0.045
2.0333	0.006	0.004	0.021	0.045
2.0667	0.006	0.004	0.058	0.045
2.1000	0.006	0.004	0.096	0.045
2.1333	0.006	0.004	0.125	0.045
2.1667	0.006	0.004	0.142	0.045

2.2000	0.006	0.004	0.156	0.045
2.2333	0.006	0.004	0.169	0.045
2.2667	0.006	0.004	0.180	0.045
2.3000	0.006	0.004	0.191	0.045
2.3333	0.006	0.004	0.202	0.045
2.3667	0.006	0.004	0.211	0.045
2.4000	0.006	0.004	0.221	0.045
2.4333	0.006	0.004	0.230	0.045
2.4667	0.006	0.004	0.239	0.045
2.5000	0.006	0.004	0.247	0.045
2.5333	0.006	0.004	0.255	0.045
2.5667	0.006	0.005	0.263	0.045
2.6000	0.006	0.005	0.271	0.045
2.6333	0.006	0.005	0.278	0.045
2.6667	0.006	0.005	0.285	0.045
2.7000	0.006	0.005	0.292	0.045
2.7333	0.006	0.005	0.299	0.045
2.7667	0.006	0.005	0.306	0.045
2.8000	0.006	0.005	0.313	0.045
2.8333	0.006	0.005	0.319	0.045
2.8667	0.006	0.005	0.325	0.045
2.9000	0.006	0.005	0.332	0.045
2.9333	0.006	0.005	0.338	0.045
2.9667	0.006	0.005	0.344	0.045
3.0000	0.006	0.005	0.350	0.045

Analysis Results
POC 1





\+ Predeveloped
x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.2494
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.1776
Total Impervious Area: 0.072

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.006039
5 year	0.009632
10 year	0.012423
25 year	0.016424
50 year	0.019757
100 year	0.023399

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.006346
5 year	0.012482
10 year	0.018313
25 year	0.028204
50 year	0.037762
100 year	0.049529

Annual Peaks
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.005	0.004
1903	0.004	0.003
1904	0.013	0.022
1905	0.004	0.004
1906	0.002	0.002
1907	0.009	0.011

1908	0.006	0.005
1909	0.006	0.006
1910	0.009	0.013
1911	0.006	0.009
1912	0.034	0.045
1913	0.009	0.006
1914	0.002	0.038
1915	0.004	0.003
1916	0.006	0.007
1917	0.003	0.002
1918	0.006	0.004
1919	0.005	0.004
1920	0.006	0.008
1921	0.006	0.006
1922	0.008	0.014
1923	0.006	0.007
1924	0.004	0.003
1925	0.004	0.003
1926	0.006	0.005
1927	0.005	0.003
1928	0.005	0.004
1929	0.009	0.012
1930	0.006	0.004
1931	0.006	0.004
1932	0.005	0.004
1933	0.006	0.005
1934	0.013	0.019
1935	0.005	0.003
1936	0.005	0.006
1937	0.009	0.014
1938	0.006	0.004
1939	0.001	0.002
1940	0.006	0.006
1941	0.004	0.003
1942	0.009	0.013
1943	0.004	0.006
1944	0.012	0.017
1945	0.007	0.005
1946	0.005	0.009
1947	0.003	0.002
1948	0.012	0.009
1949	0.011	0.009
1950	0.004	0.003
1951	0.005	0.003
1952	0.019	0.033
1953	0.014	0.026
1954	0.005	0.005
1955	0.005	0.003
1956	0.003	0.002
1957	0.007	0.005
1958	0.015	0.016
1959	0.010	0.014
1960	0.003	0.003
1961	0.010	0.025
1962	0.006	0.005

1963	0.003	0.003
1964	0.004	0.027
1965	0.011	0.011
1966	0.004	0.003
1967	0.006	0.013
1968	0.007	0.005
1969	0.005	0.005
1970	0.008	0.010
1971	0.011	0.012
1972	0.007	0.041
1973	0.010	0.011
1974	0.007	0.012
1975	0.013	0.027
1976	0.009	0.018
1977	0.004	0.002
1978	0.010	0.017
1979	0.003	0.008
1980	0.006	0.013
1981	0.006	0.006
1982	0.004	0.003
1983	0.009	0.011
1984	0.006	0.009
1985	0.008	0.017
1986	0.006	0.004
1987	0.013	0.014
1988	0.007	0.004
1989	0.006	0.004
1990	0.007	0.006
1991	0.006	0.010
1992	0.007	0.009
1993	0.008	0.006
1994	0.011	0.011
1995	0.003	0.003
1996	0.013	0.012
1997	0.005	0.004
1998	0.007	0.010
1999	0.002	0.002
2000	0.005	0.006
2001	0.003	0.003
2002	0.013	0.026
2003	0.007	0.006
2004	0.006	0.008
2005	0.020	0.028
2006	0.004	0.003
2007	0.004	0.008
2008	0.006	0.007
2009	0.004	0.003
2010	0.004	0.005
2011	0.003	0.002
2012	0.008	0.006
2013	0.004	0.008
2014	0.003	0.005
2015	0.010	0.025
2016	0.003	0.003
2017	0.008	0.007

2018	0.015	0.016
2019	0.021	0.023
2020	0.006	0.011
2021	0.008	0.009
2022	0.003	0.007
2023	0.007	0.007
2024	0.035	0.041
2025	0.006	0.004
2026	0.010	0.009
2027	0.005	0.004
2028	0.004	0.003
2029	0.006	0.006
2030	0.011	0.013
2031	0.004	0.003
2032	0.003	0.002
2033	0.004	0.003
2034	0.004	0.004
2035	0.014	0.013
2036	0.007	0.006
2037	0.002	0.003
2038	0.008	0.014
2039	0.001	0.002
2040	0.004	0.004
2041	0.005	0.006
2042	0.015	0.013
2043	0.008	0.009
2044	0.009	0.008
2045	0.006	0.004
2046	0.007	0.005
2047	0.005	0.004
2048	0.007	0.004
2049	0.006	0.006
2050	0.005	0.006
2051	0.009	0.017
2052	0.004	0.003
2053	0.007	0.005
2054	0.016	0.030
2055	0.004	0.004
2056	0.003	0.002
2057	0.005	0.004
2058	0.006	0.004
2059	0.009	0.017

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0350	0.0449
2	0.0343	0.0413
3	0.0205	0.0412
4	0.0200	0.0375
5	0.0185	0.0333
6	0.0162	0.0297
7	0.0154	0.0279
8	0.0150	0.0273
9	0.0146	0.0265

10	0.0140	0.0262
11	0.0138	0.0257
12	0.0134	0.0246
13	0.0131	0.0246
14	0.0130	0.0225
15	0.0129	0.0216
16	0.0129	0.0186
17	0.0128	0.0185
18	0.0122	0.0173
19	0.0121	0.0173
20	0.0114	0.0170
21	0.0113	0.0170
22	0.0112	0.0168
23	0.0111	0.0163
24	0.0109	0.0160
25	0.0105	0.0145
26	0.0104	0.0142
27	0.0102	0.0140
28	0.0102	0.0138
29	0.0100	0.0136
30	0.0095	0.0134
31	0.0094	0.0134
32	0.0093	0.0132
33	0.0092	0.0132
34	0.0091	0.0130
35	0.0090	0.0129
36	0.0089	0.0129
37	0.0088	0.0124
38	0.0088	0.0123
39	0.0088	0.0120
40	0.0087	0.0120
41	0.0085	0.0114
42	0.0081	0.0113
43	0.0079	0.0113
44	0.0079	0.0112
45	0.0078	0.0109
46	0.0077	0.0107
47	0.0077	0.0104
48	0.0076	0.0102
49	0.0076	0.0101
50	0.0075	0.0095
51	0.0075	0.0095
52	0.0075	0.0093
53	0.0073	0.0092
54	0.0072	0.0090
55	0.0071	0.0089
56	0.0070	0.0089
57	0.0069	0.0087
58	0.0069	0.0087
59	0.0068	0.0084
60	0.0068	0.0084
61	0.0067	0.0083
62	0.0067	0.0083
63	0.0066	0.0081
64	0.0066	0.0080

65	0.0066	0.0074
66	0.0065	0.0071
67	0.0064	0.0071
68	0.0064	0.0070
69	0.0064	0.0068
70	0.0063	0.0067
71	0.0063	0.0064
72	0.0063	0.0064
73	0.0063	0.0064
74	0.0062	0.0064
75	0.0062	0.0063
76	0.0062	0.0061
77	0.0061	0.0061
78	0.0061	0.0059
79	0.0060	0.0059
80	0.0060	0.0058
81	0.0060	0.0058
82	0.0060	0.0057
83	0.0060	0.0057
84	0.0059	0.0057
85	0.0058	0.0057
86	0.0058	0.0057
87	0.0058	0.0056
88	0.0058	0.0053
89	0.0057	0.0053
90	0.0056	0.0051
91	0.0056	0.0050
92	0.0056	0.0050
93	0.0056	0.0049
94	0.0056	0.0049
95	0.0055	0.0047
96	0.0055	0.0047
97	0.0054	0.0046
98	0.0054	0.0046
99	0.0054	0.0046
100	0.0054	0.0046
101	0.0053	0.0044
102	0.0053	0.0044
103	0.0052	0.0044
104	0.0052	0.0044
105	0.0052	0.0044
106	0.0050	0.0043
107	0.0048	0.0043
108	0.0047	0.0043
109	0.0047	0.0043
110	0.0046	0.0043
111	0.0045	0.0041
112	0.0045	0.0041
113	0.0045	0.0041
114	0.0045	0.0041
115	0.0045	0.0039
116	0.0044	0.0039
117	0.0043	0.0037
118	0.0042	0.0037
119	0.0042	0.0036

120	0.0042	0.0036
121	0.0042	0.0036
122	0.0041	0.0036
123	0.0041	0.0036
124	0.0041	0.0035
125	0.0040	0.0034
126	0.0040	0.0033
127	0.0040	0.0032
128	0.0040	0.0032
129	0.0039	0.0031
130	0.0038	0.0031
131	0.0037	0.0031
132	0.0037	0.0030
133	0.0037	0.0030
134	0.0037	0.0030
135	0.0036	0.0029
136	0.0036	0.0029
137	0.0035	0.0029
138	0.0035	0.0029
139	0.0035	0.0028
140	0.0035	0.0027
141	0.0034	0.0027
142	0.0034	0.0026
143	0.0033	0.0025
144	0.0033	0.0025
145	0.0031	0.0025
146	0.0031	0.0025
147	0.0030	0.0025
148	0.0029	0.0024
149	0.0029	0.0024
150	0.0027	0.0024
151	0.0026	0.0023
152	0.0025	0.0022
153	0.0024	0.0022
154	0.0024	0.0022
155	0.0023	0.0021
156	0.0021	0.0020
157	0.0015	0.0016
158	0.0012	0.0015

Duration Flows
The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0030	65262	22332	34	Pass
0.0032	57229	18764	32	Pass
0.0034	50359	15828	31	Pass
0.0035	44287	13385	30	Pass
0.0037	39002	11357	29	Pass
0.0039	34664	9507	27	Pass
0.0040	30747	8050	26	Pass
0.0042	27412	6792	24	Pass
0.0044	24615	5867	23	Pass
0.0045	22038	5099	23	Pass
0.0047	19861	4408	22	Pass
0.0049	17845	3858	21	Pass
0.0050	16083	3436	21	Pass
0.0052	14415	3035	21	Pass
0.0054	13008	2712	20	Pass
0.0056	11756	2366	20	Pass
0.0057	10559	2026	19	Pass
0.0059	9496	1725	18	Pass
0.0061	8515	1509	17	Pass
0.0062	7645	1353	17	Pass
0.0064	6920	1185	17	Pass
0.0066	6305	1062	16	Pass
0.0067	5784	947	16	Pass
0.0069	5342	849	15	Pass
0.0071	4958	770	15	Pass
0.0072	4603	702	15	Pass
0.0074	4263	626	14	Pass
0.0076	3944	571	14	Pass
0.0078	3615	514	14	Pass
0.0079	3343	468	13	Pass
0.0081	3096	417	13	Pass
0.0083	2879	377	13	Pass
0.0084	2683	349	13	Pass
0.0086	2496	325	13	Pass
0.0088	2348	306	13	Pass
0.0089	2181	287	13	Pass
0.0091	2015	268	13	Pass
0.0093	1799	256	14	Pass
0.0094	1642	250	15	Pass
0.0096	1519	239	15	Pass
0.0098	1414	230	16	Pass
0.0100	1326	223	16	Pass
0.0101	1234	217	17	Pass
0.0103	1158	212	18	Pass
0.0105	1083	206	19	Pass
0.0106	998	202	20	Pass
0.0108	891	195	21	Pass
0.0110	806	187	23	Pass
0.0111	719	183	25	Pass

0.0113	650	179	27	Pass
0.0115	584	175	29	Pass
0.0116	532	170	31	Pass
0.0118	484	159	32	Pass
0.0120	448	155	34	Pass
0.0121	413	147	35	Pass
0.0123	382	144	37	Pass
0.0125	344	138	40	Pass
0.0127	318	135	42	Pass
0.0128	286	133	46	Pass
0.0130	243	124	51	Pass
0.0132	211	120	56	Pass
0.0133	181	116	64	Pass
0.0135	152	111	73	Pass
0.0137	131	108	82	Pass
0.0138	107	107	100	Pass
0.0140	92	105	114	Fail
0.0142	79	101	127	Fail
0.0143	63	98	155	Fail
0.0145	53	96	181	Fail
0.0147	37	95	256	Fail
0.0149	30	94	313	Fail
0.0150	27	93	344	Fail
0.0152	24	92	383	Fail
0.0154	23	90	391	Fail
0.0155	19	87	457	Fail
0.0157	19	85	447	Fail
0.0159	19	81	426	Fail
0.0160	19	77	405	Fail
0.0162	18	73	405	Fail
0.0164	16	67	418	Fail
0.0165	16	67	418	Fail
0.0167	16	65	406	Fail
0.0169	16	63	393	Fail
0.0171	16	60	375	Fail
0.0172	16	60	375	Fail
0.0174	16	57	356	Fail
0.0176	16	56	350	Fail
0.0177	16	55	343	Fail
0.0179	16	54	337	Fail
0.0181	14	54	385	Fail
0.0182	14	54	385	Fail
0.0184	14	53	378	Fail
0.0186	13	52	400	Fail
0.0187	13	51	392	Fail
0.0189	13	48	369	Fail
0.0191	13	46	353	Fail
0.0192	13	46	353	Fail
0.0194	12	46	383	Fail
0.0196	12	44	366	Fail
0.0198	12	43	358	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.

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	☐	41.72			☐	100.00			
Total Volume Infiltrated		41.72	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 = Failed

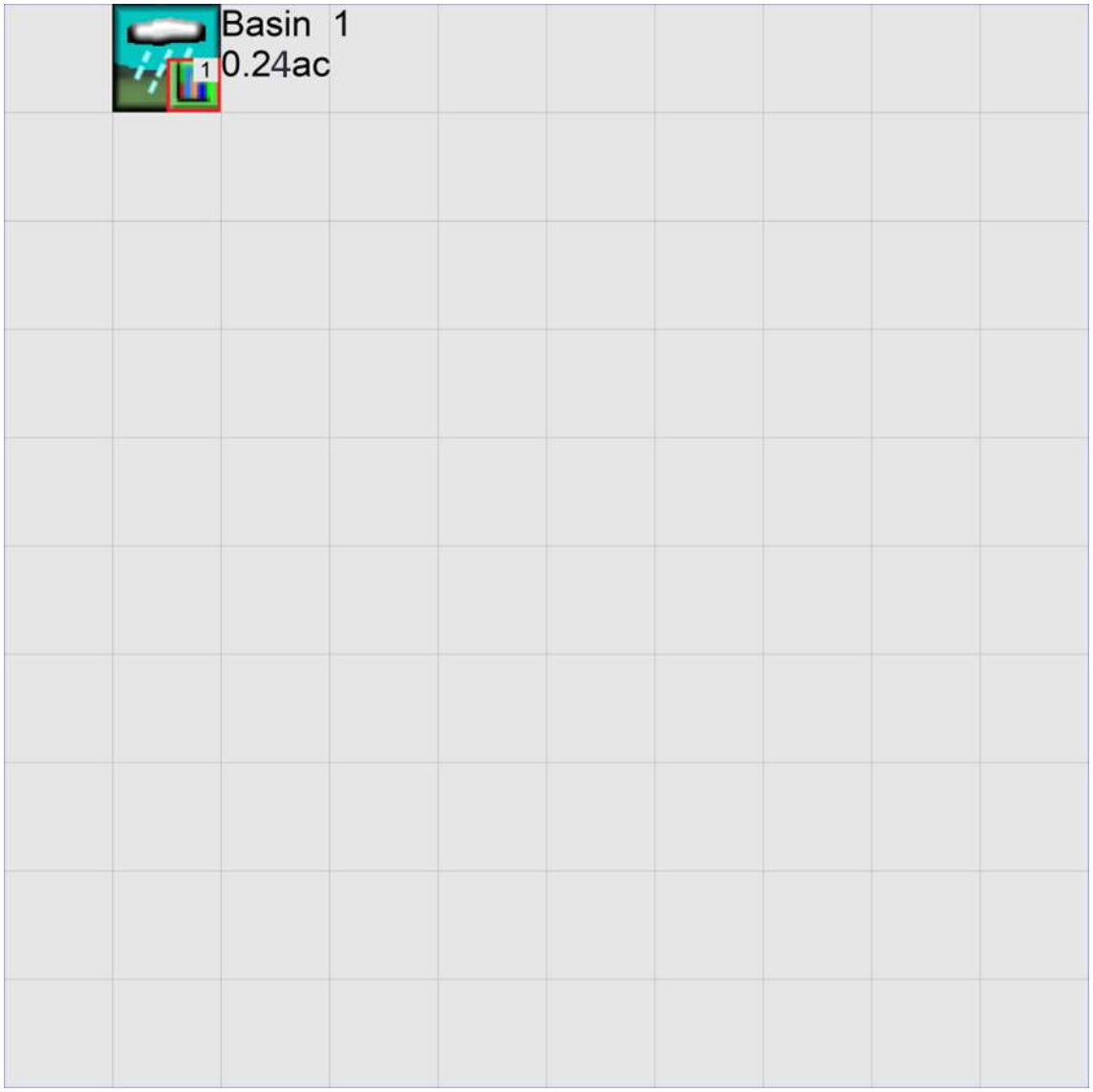
Model Default Modifications

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

Mitigated UCI File

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclamer
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APPENDIX B

Soil Report

Provide updated soils report with the information requested in returned comments, in resubmittal. [Drainage Report, pg. 47]