DECCIO Engineering Inc.

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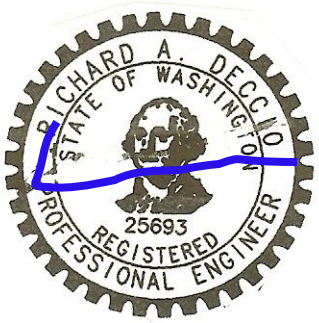
Spring of Life Church
Commercial Building Permit
Mukilteo Permit No:

Drainage Design Report, SWPP Plans & Drainage Plans

Property Location:

4711 116th Street SW
Everett, Washington



February 23, 2022

Prepared for:
Spring Of Life Church

Spring of Life Church, WA
STORMWATER DRAINAGE REPORT

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Appendix A:

Introduction

This report has been prepared at the request of the Spring of Life Church in support of a building and parking addition located at 4711 116th Street SW Mukilteo Washington. (Parcel #00788400000500 (Refer to **Site Location and Vicinity Map**).

This report addresses the drainage report contents and organization of MR 1 to MR 9 per DOE 2014 Stormwater Management Manual as adopted by the City of Mukilteo. Specifically we have designed the drainage using the ***LID applications as outlined in Volume 1, Chapter 2, Table 2.5.1 of the*** DOE 2014 Stormwater Management Manual.

Section 1: Project Overview

The project consists of the construction of a building addition and added parking to an existing church site. The existing site has a building and parking which will remain. There are no known sensitive areas on or adjacent to the site.

Once developed, the project will add a total of 19,764 sf of new impervious area consisting 6,732 sf for the new building, 10,782 sf for the additional parking area and 2,500 sf of new sidewalks.

Frontage improvements are required on 116th Street SW in the form of 5-ft sidewalks and a landscape strip along with a 30-ft wide landscape buffer behind the sidewalks. The existing curb and gutter will remain

The site proposes the use of a detention vault to address the runoff from the site. Water quality for the PGHS area will be provided by a StormFilter catch basin. Reverse slopes on the new sidewalks draining back into the 30-ft wide planters will address the runoff from the new sidewalks

Minimum Requirements:
The WWHM12 program was used to size the proposed detention vault. There are no proposed deviations or any site conditions which would affect the site design.

Conditions of Approval Summary

The City will issue the Conditions of approval once the project has been reviewed and approved

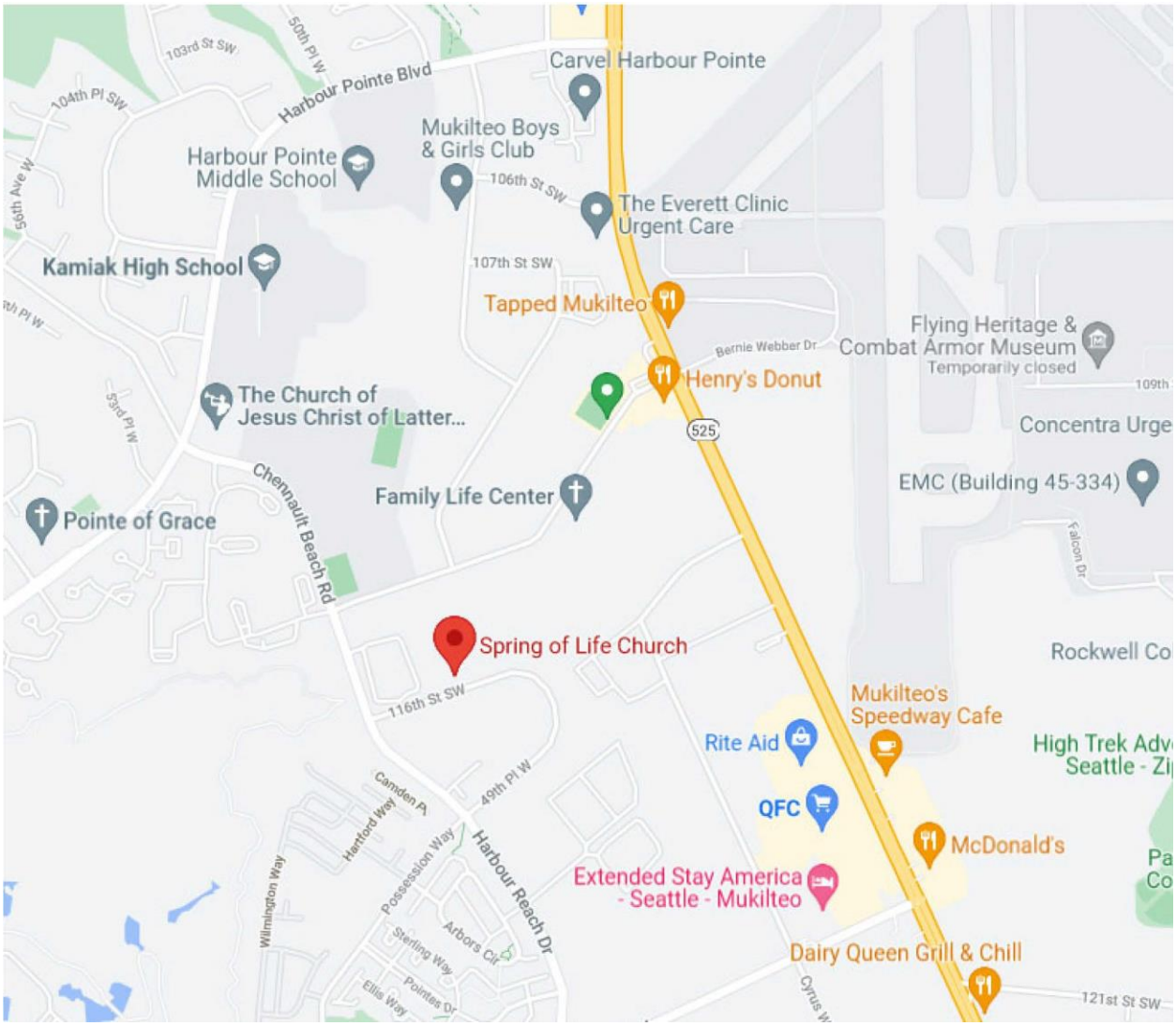


Figure 1: Vicinity Map

Section 2:
Existing Site and Basin Assessment

The project consists of the construction of a building addition and added parking to an existing church site. The existing site has a building and parking which will remain. There are no known sensitive areas on or adjacent to the site. The site itself slopes to the south and west with slopes around 2 to 8-percent. Currently all drainage is intercepted by the storm pipe system in 116th Street SW where it flows west and discharges to a detention pond located on a golf course. Based on the site contours there is no off-site runoff draining onto the property. The area of disturbance covers only the proposed site improvements.

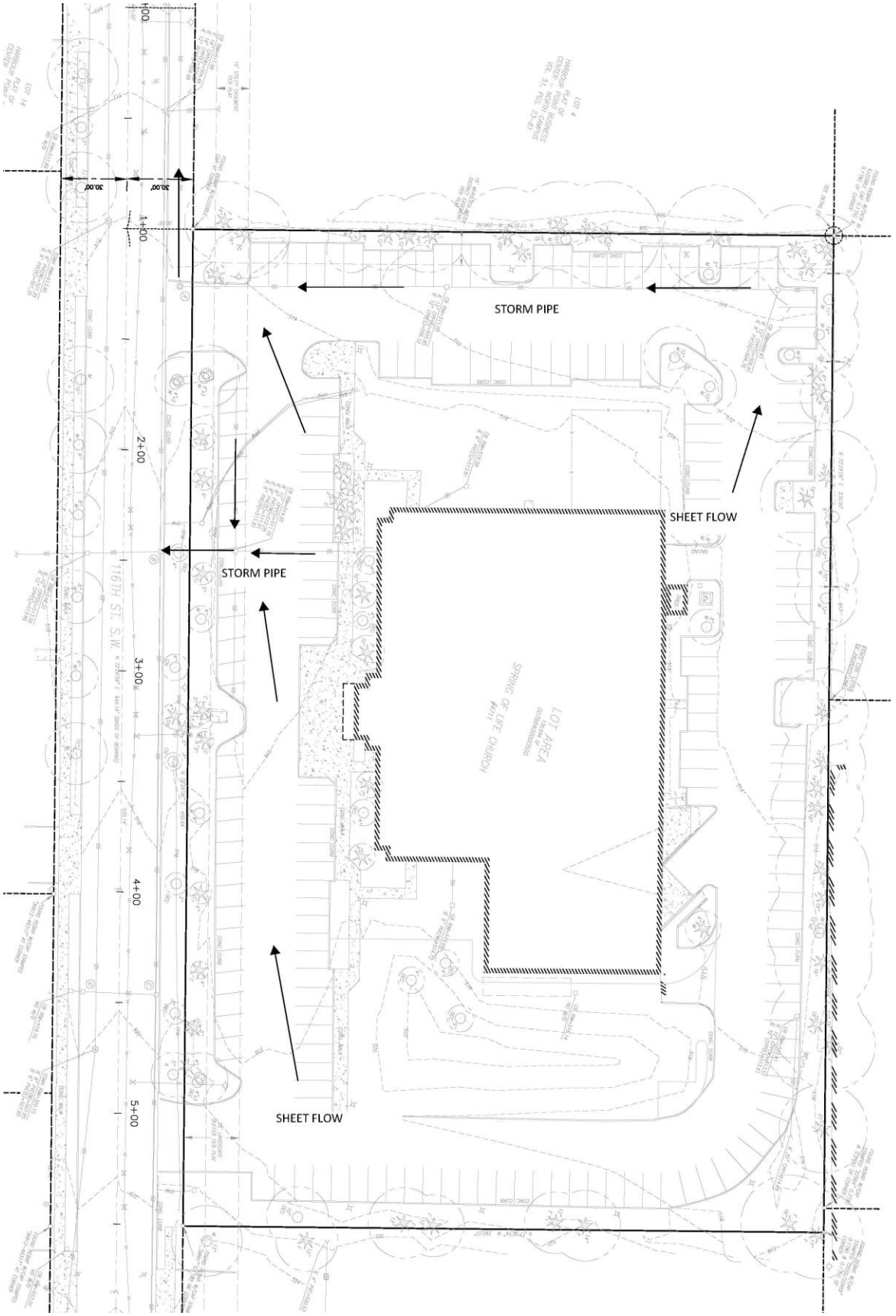
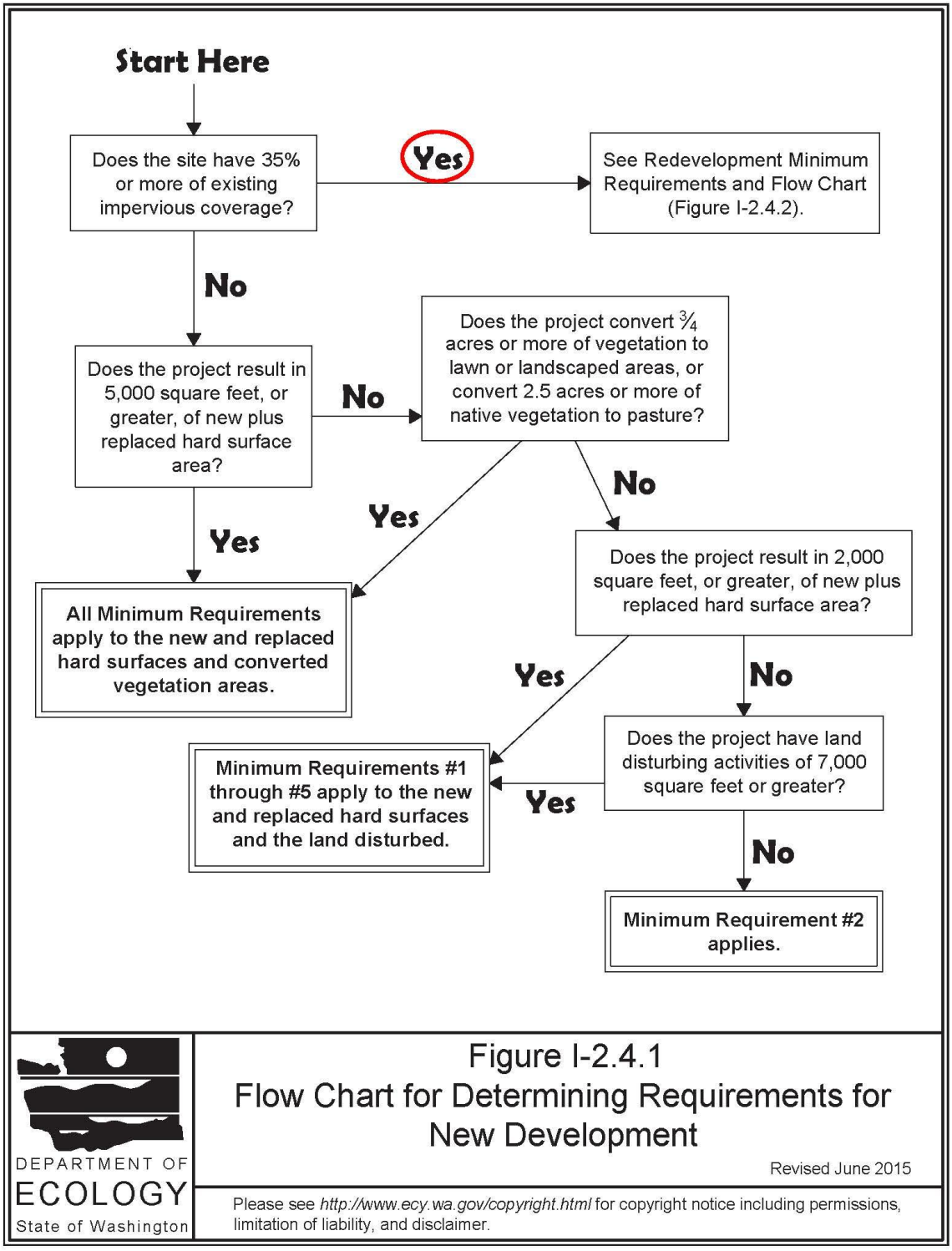


Figure 2: Site Assessment and Summary


Start Here
Does the site have 35% or more of existing impervious coverage?
Yes
See Redevelopment Minimum Requirements and Flow Chart (Figure I-2.4.2).
No
Does the project result in 5,000 square feet, or greater, of new plus replaced hard surface area?
No
Does the project convert ¾ acres or more of vegetation to lawn or landscaped areas, or convert 2.5 acres or more of native vegetation to pasture?
Yes
No
Yes
Yes
All Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas.
Does the project result in 2,000 square feet, or greater, of new plus replaced hard surface area?
Yes
No
Minimum Requirements #1 through #5 apply to the new and replaced hard surfaces and the land disturbed.
Yes
Does the project have land disturbing activities of 7,000 square feet or greater?
No
Minimum Requirement #2 applies.
DEPARTMENT OF ECOLOGY
State of Washington
Figure I-2.4.1
Flow Chart for Determining Requirements for New Development
Revised June 2015
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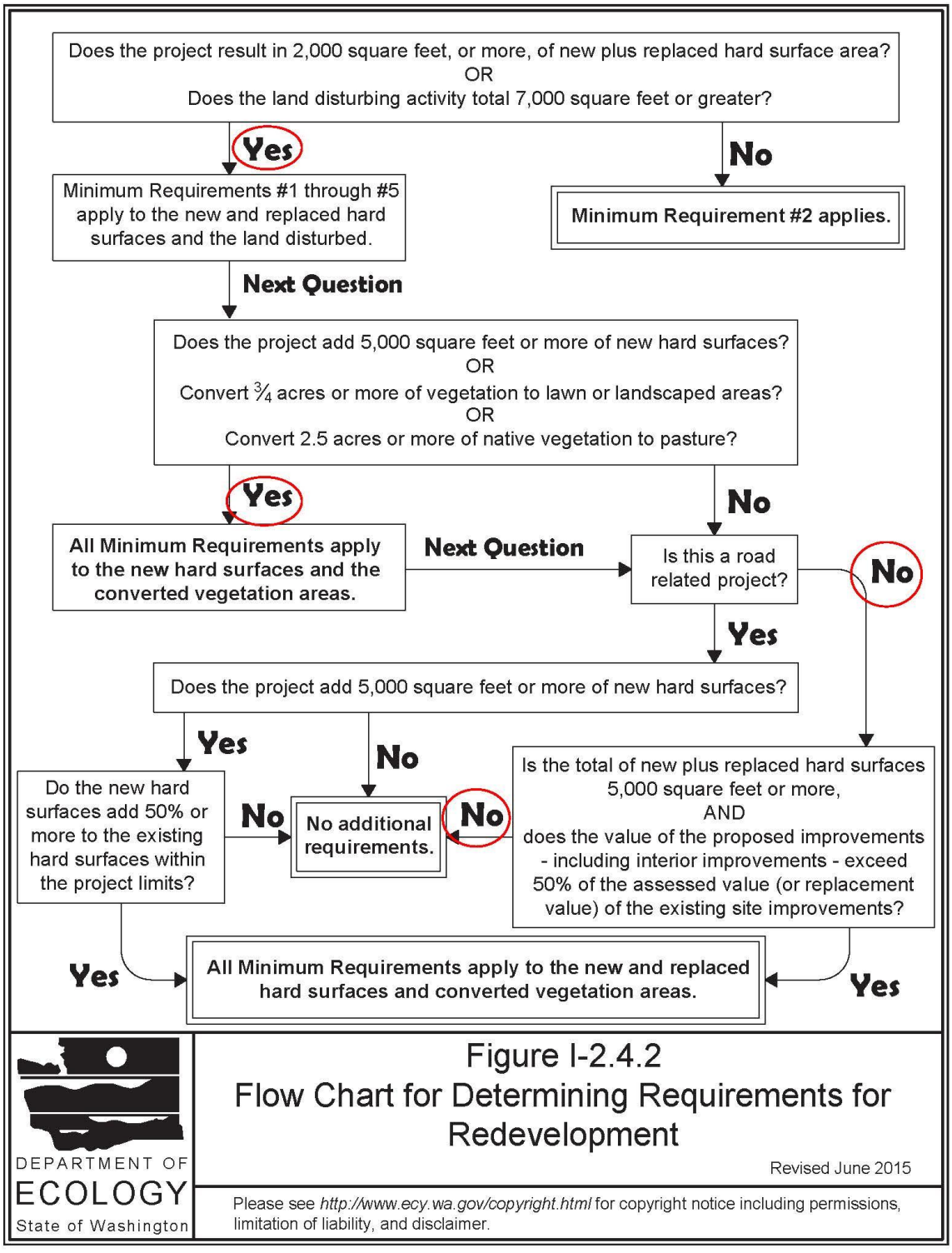
Does the project result in 2,000 square feet, or more, of new plus replaced hard surface area?
OR
Does the land disturbing activity total 7,000 square feet or greater?
Yes
No
Minimum Requirements #1 through #5 apply to the new and replaced hard surfaces and the land disturbed.
Minimum Requirement #2 applies.
Next Question
Does the project add 5,000 square feet or more of new hard surfaces?
OR
Convert ¾ acres or more of vegetation to lawn or landscaped areas?
OR
Convert 2.5 acres or more of native vegetation to pasture?
Yes
No
All Minimum Requirements apply to the new hard surfaces and the converted vegetation areas.
Next Question
Is this a road related project?
No
Yes
Does the project add 5,000 square feet or more of new hard surfaces?
Yes
No
Do the new hard surfaces add 50% or more to the existing hard surfaces within the project limits?
No
No additional requirements.
No
Is the total of new plus replaced hard surfaces 5,000 square feet or more,
AND
does the value of the proposed improvements - including interior improvements - exceed 50% of the assessed value (or replacement value) of the existing site improvements?
Yes
All Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas.
Yes
DEPARTMENT OF ECOLOGY
State of Washington
Figure I-2.4.2
Flow Chart for Determining Requirements for Redevelopment
Revised June 2015
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Section: 3
Offsite Analysis Report

OFF SITE ANALYSIS AND MITIGATION
An Off Site Analysis and Mitigation Study meeting requirements outlined in Section 2.5.1 was performed on November 20, 2021. The weather was overcast and cold at the time of the field inspection. **See Downstream Analysis Map.**

TASK I: PROJECT OVERVIEW & STUDY AREA DEFINITION
The proposed project is located on the north side of 116th St SW

Existing Site Conditions: The existing pervious cover is landscaping.

The site itself slopes to the south and west with slopes around 2 to 8-precent.

TASK 2: REVIEW OF AVAILABLE INFORMATION ON STUDY AREA
Resource Review:
The following is a description of the resources that were reviewed for the preparation of this Level 1 Drainage Study:

A. **Basin Recognizance Summary:** Enclosed within are downstream and upstream basin area map which clearly define the flow pass and the drainage basins related to this project.
See **("Downstream Analysis Map")**

Evidence of Existing and Predicted Problems
Lack of capacity or constrictions in the existing drainage system.
- On-site: No evidence of any problem.
- Off-site: Streams
(no evidence of capacity or any other problems)

Overtopping, Scouring, Bank, Sloughing of Sedimentation
- On-site: No evidence of any problem.
- Off-site: Streams None Noted
Catch basins None Noted

Flooding etc.
- None Noted

Significant Destruction of Aquatic Habitat or Organisms
- None Noted

B. **Adopted Basin Plans:** Puget Sound Basin

C. **Floodplain/Floodway (FEMA Maps):** Does not appear to be located within the flood plain of the stream as determined by the FEMA maps.

D. **Other Off-Site Analysis Issues:** None Noted

TASK 3 & 4: FIELD INSPECTION AND DESCRIPTION OF DRAINAGE SYSTEM WITH EXISTING AND PREDICTED PROBLEMS

A Level 1 drainage analysis was performed for the site on November 20, 2021 to determine any pre-existing drainage problems downstream. The weather was overcast and cold. The total distance covered was over a mile downstream. **(Downstream Analysis Map)**

Level 1 Downstream Drainage Analysis:

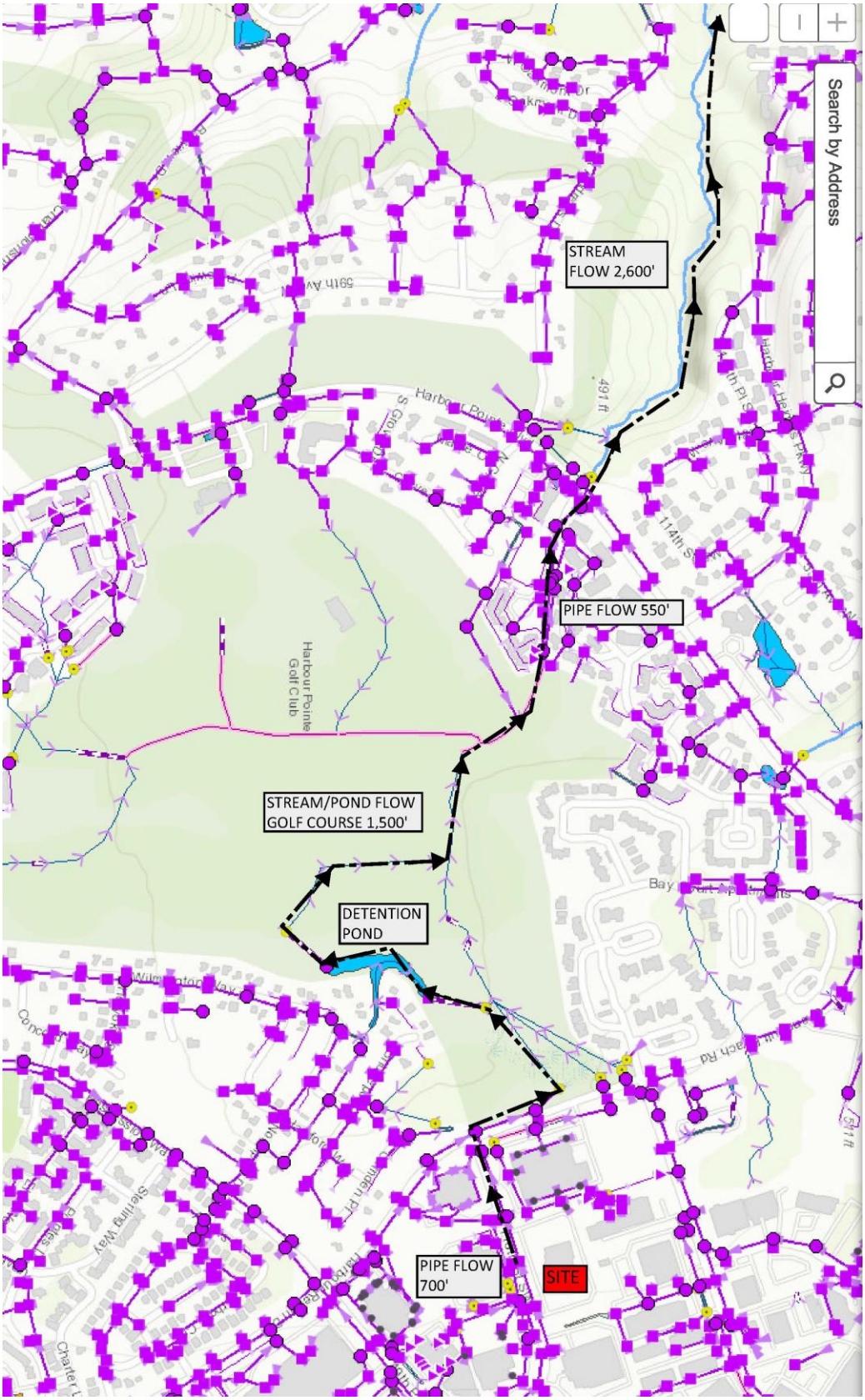
Section 1: Upstream Drainage Analysis:
As mentioned, there is no upstream area drainage onto the site and therefore the drainage is limited to the site itself.

A review of the upstream area indicated that there were no indications of capacity problems observed in the conveyance systems upstream of the site.

Section 2: 116th St SW to Golf Course to Stream
The drainage from the site discharge out to the street where it flows west via 12-inch storm pipes for a distance of 700-ft discharging to a stream located on the golf course. From here the stream flows west and into a detention pond located in the golf course. The runoff from the detention pond continues west via a stream to a subdivision where it flows via a storm pipes and catch basin system flowing across Harbor Point Blvd and discharging into a stream. This stream then flows west for a distance of 2,600 ft before discharging into Puget Sound.

The drainage system consisted of storm piping and stream channels. There appear to be no issues with the stream channel. However, nearly all of the downstream drainage system was on private property and not accessible to inspection.

Conclusions:
Since the project proposes detention for the site improvements, the project should have minimal impacts downstream.



Downstream Analysis Map

Section 4:
Minimum Requirements

- **Minimum Requirement #1:** Preparation of Stormwater Plans
  - The civil plans and Section 5 of this report addresses the preparation of the stormwater plans required for this project.

- **Minimum Requirement #2:** Construction Stormwater Pollution Prevention Narrative.
  - Section 6 of this report addresses all 13-elements of a SWPP Plan

- **Minimum Requirement #3:** Source Control of Pollution
  - The project does not fall under the "High Use Sites" covering commercial or industrial sites. Section 6 of this report covers further details for Source Control of Pollution.

- **Minimum Requirement #4:** Preservation of Natural Drainage Systems and Outfalls
  - All runoff currently leaves the site along the south-west end of the property flowing into 116th Street SW and the proposed discharge location is also at the same location, thereby maintaining the natural discharge location.

- **Minimum Requirement #5:** On-Site Stormwater Management BMP's
  - The project is required to use LID methods in the form of detention

- **Minimum Requirement #6**: Runoff Treatment
  - The site will provide water quality treatment in the form of a Contech StormFilter for the PGHS areas.

- **Minimum Requirement #7**: Flow Control
  - The detention volumes were sized using the WWHM12 program as covered under Section 5.

- **Minimum Requirement #8:** Wetlands Protection
  - There are no know sensitive areas located on or adjacent to the site.

- **Minimum Requirement #9:** Operations and Maintenance.
  - Section 9 of the report covers the Operations and Maintenance of the project. Which covers the StormFilter, Detention Vault and storm systems.

Section: 5
Stormwater Control Plan

MR-7 Flow Control Calculations:
Under Volume 1, Chapter 3.1.7 of the 2014 DOE-SWM Manual, the site was analyzed for detention and water quality. The project proposes to mitigate the site development improvements by providing on-site detention in the form of a vault with a StormFilter for water quality.

Per previous conversations with the City, the detention system will intercept the runoff from the proposed new parking area and the new building where it will be detained and released at the pre-developed rates.

Reverse slopes on the new sidewalks draining back into the 30-ft wide planters will address the runoff from the new sidewalks

The **WWHM Ver. 12 Hydraulic Simulation Model** was used to calculate the pre-developed and developed flows for the Hydrographs for the 2-year and 50-year, 24-hour duration design storm events for the existing and developed conditions. The hydrographs were generated using the following information:

WWHM12 Input Information

- Regional Gage Station: Everett
- Precip Scale: 1.00
- Soils Type: Till

Existing Site Hydrology

The existing area for the proposed site improvements is required to be forested. Therefore, the model requires a Previous Land Use to be Till, Forest. The **WWHM12** runoff was calculated from the existing forested conditions to determine the total allowable release rate from the Existing Site. (**See Figure 2A**: "Existing Site Conditions")

WWHM Input: On Site Area: Existing Sub-Basin

New Building Area:	6,732 sf
New Pavement Area:	10,782 sf
Total Site Area to be developed:	17,514 sf or 0.41 acres
Cover: Till, Forest,	

Developed Site Hydrology

Once developed, the project will add a total of 17,514 sf of new impervious area consisting 6,732 sf for the new building, 10,782 sf for the additional parking area. These areas will be detained in the new detention vault.

Impervious On Site Area: Developed Sub-Basin

New Building Area:	6,732 sf
New Pavement Area:	10,782 sf
Total Site Area to be developed:	17,514 sf or 0.41 acres

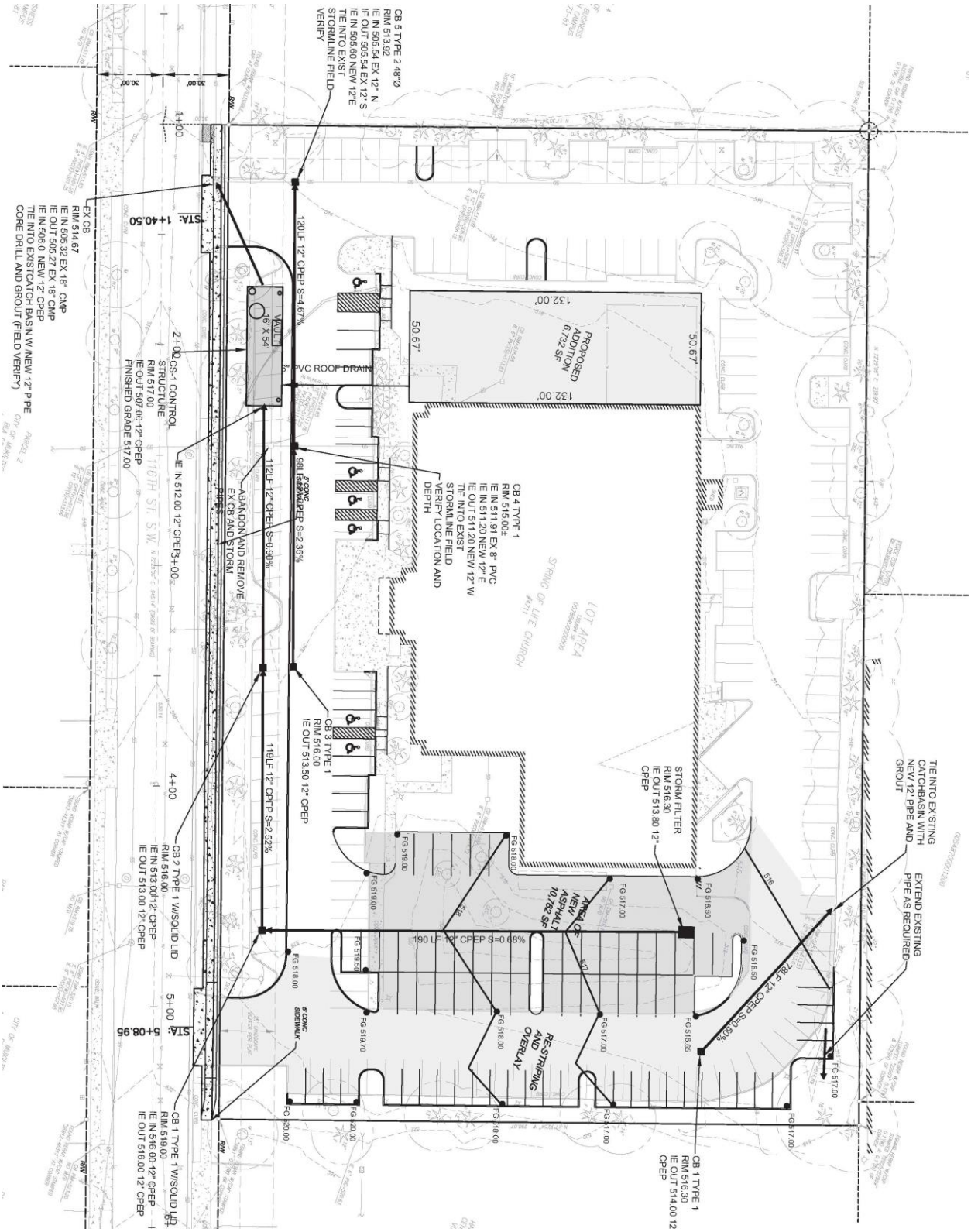


Figure 3. Site Development

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Alderwood gravelly sandy loam, 0 to 8 percent slopes	136.0	77.5%
5	Alderwood-Urban land complex, 2 to 8 percent slopes	25.4	14.5%

Results of WWHM12 Computer Analysis:

Storm Event	Exist. Site	Mitigated Site
• 2-year, return period:	0.01355 cfs	0.00833 cfs
• 50-year, return period:	0.03770 cfs	0.03459 cfs
• 100-year, return period:	0.04363 cfs	0.04353 cfs

Only the runoff the new site improvements will be detained and released at the required pre-developed rates See **Appendix B** for WWHM12 calculation results.

Maintenance Access: The paved parking area adjacent to the control structure will provide the required maintenance access.

Detention Calculation Results:
The stormwater run-off detained will provide flow control in the storage vault located at the south west corner of the property.

Results From WWHM12 Calculations:

Retention/Detention Facility

- Type Of Facility: Detention Vault
- Side Slopes: Vert Conc Walls
- Vault Bottom Width: 16.9-ft
- Vault Bottom Length: 50.8 ft
- Vault Bottom Area: 859 sf
- Effective Live Storage Depth: 7.0 ft
- Live Storage Volume Required: 6,010 cu.-ft
- Live Storage Volume Provided: 6,049 cu-ft (Vault 54' x 16'x7')
- Factor of Safety Req'd: N/A
- Water Quality Volume Provided: StormFilter
- Riser Head: 7.0 ft
- Riser Diameter: 12.00 inches
- Number of Orifices: 3

Orifices #	**Height**	**Diameter**
1	0.00 ft	0.48 inches
2	4.11 ft	0.57 inches
3	5.24 ft	0.48 inches
Over Flow 12" Dia.	6.0 ft	12.00 inches

The results of the **WWHM12 calculations** are included in **Appendix A**

New Sidewalks: The project will provide reverse slopes on the new sidewalk draining back into the on-site planter areas to address the runoff

CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The following conveyance capacity calculations for the on-site systems were calculated using the 100-year developed flow results from the WWHM12 Method storm calculations with 15-minute time steps. The pipe from the parking to the vault was considered the most critical section of pipe with a slope of 0.50 %. (See **Appendix A)**

Design results:

	Storm Event	**Dev. On Site**	
➢	100-year, return period:	0.45 cfs	:Developed flows for **12-inch pipe** from **parking area to the detention vault, is** used for conveyance design.

PIPE CAPACITY: ROADWAY

The **12- CPEP pipe** from the **parking** was sized to handle the runoff from the 100-year storm. (See **Appendix A** "Pipe Conveyance Charts")

Using D.O.T. Chart 35 "Design Charts For Open Channel Flow":

12" CPEP Pipe	Slope:	0.50 % Minimum Slope,	
	Mannings:	n = .012	
	100-Year Dev. Flows:	0.45 cfs	Design Flow

Capacity Results:

12" Pipe Capacity:	=	3.00 cfs (flowing full)	> 0.45 cfs required
Velocity:	=	3.25 fps	> 3.00 fps required

Therefore the 12" CPEP is adequate

12-INCH VAULT STANDPIPE OVERFLOWS:

The **12- Stand pipes** used as a **vertical over flows** for the vault were sized to handle the runoff from the 100-year developed storm. (See **Appendix A** "Figure III-2.38 "Riser Inflows Curves")

Vault #1:

Peak Stage above overflow: 0.5- feet from overflow to top of vault wall

Capacity Required: 0.45 cfs **Capacity Provided: 3.80 cfs**

Therefore, overflow ok

WATER QUALITY:

Landscaping BMP T5.13 "Post Construction Soil Quality and Depth"

The top soils will be stockpile on-site and reused per *"Implementation Options #3* per Volume V, Chapter 5, BMP T5.13 "Post Construction Soil Quality and Depth" which requires *"Stockpile existing top soils during grading and replace it prior to planting…"* In addition, the soils will be required to be tested for organic compliance. (See work sheets on following pages).

Parking Water Quality: Water quality will be provided by installing a "StormFilter" Catch Basin structure from Contech Engineered Solutions. The water quality structure is upstream of the vault and was sized to pick up the runoff from all the PGHS areas including the driveway/parking areas. "TM" treating flows from PGHS areas equal to the flows of the 6-month developed design storm.

The following information was used to determine the **Mass Loading** for the final design of the filter (See design results on the next page)

Linear Storm Filter Design:

- Total contributing area: 0.24 acres
- PGHS area draining to the StormFilter: 0.24 acres
- Water Quality Flow Rate: 0.027 cfs
- Peak Hydraulic Flow Rate: 0.29 cfs
- Height of sediment storage in detention vault: 0.5- ft

Sizing

Prepared by Richard Deccio P.E. on February 28, 2022

Spring Of Life – Stormwater Treatment System

Information provided:

- Total contributing area = 0.24ac
- Impervious area = 0.24ac
- Water quality flow = 0.027cfs
- Peak hydraulic flow rate = 0.29cfs
- Presiding agency = Mukilteo

Assumptions:

- Media = ZPG cartridges
- Cartridge flow rate = 11.25 gpm
- Drop required from rim to outlet = 3.05' minimum

Size and cost estimates:

The StormFilter is a flow-based system, and is therefore sized by calculating the peak water quality flow rate associated with the design storm. The water quality flow rate was calculated by the consulting engineer using WWHM12 program

11835 NE Glenn Widing Dr., Portland OR 97220
Toll-free: 800.548.4667 Fax: 800.561.1271

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Project Name:	Spring of Life Church		
Site Designation:		**Date:**	2/28/22
County or Independent City:	Mukilteo	**Design Engineer:**	RAD
State:	WA		

Flow Based Data:

Peak Design Flow (cfs)	0.29
Water Quality Flow (cfs)	0.027
Annual Rainfall (inches)	36
Total Drainage Area, A (ac)	0.24
Post Development Impervious Area, A_I (ac)	0.24
Pervious Area, A_P (ac)	0.00
% Impervious	100%
Runoff Coefficient, Rc	0.95

Flow Based Filter Sizing:

Filter Type	StormFilter
Structure Type	Catchbasin (Steel)
Cartridge Height	27"
Media Type	ZPG
Cartridge Flow Rate, gpm/sf	1.00 gpm/sf
Cartridges Required	1
Recommended Model	SFCB1
Maximum Water Quality Flow	0.03 cfs

Section 6:
SWPP Plan Narrative

The proposed project will require only minimal erosion and sedimentation control measures during construction. Clearing limits will be set in the field and basically limited to the new site improvments. Silt fences will be installed on the down gradient side of the site. A rock construction entrance pad, is required to be installed off of the main road and temporary seeding of the site will take place upon reaching the final sub-grade level. Any disturbed areas will be seeded and mulched to prevent erosion.

Pollution Source Control
Once site construction is complete, some small amounts of oils and grease will be present do to the daily traffic. In addition, small amounts of silt and dirt will be present.

Critical areas: None on site.

Source of water for erosion: Rainfall hydrology is the only source of runoff.

Measures proposed to prevent/minimize erosion: With summertime measures such as silt fence, hydro-mulching and the use of straw bales as required, the risk of erosion can be minimized. Greater source control measures shall be taken during winter construction such as seeding, mulching or plastic sheeting. Good construction practices will prevent sediment from leaving the site.

Conclusion: Potential for significant erosion and pollution impacts on or offsite is considered low for the following reasons:

- The site disturbance will be kept to a minimum
- Landscaping of the site will take place immediately upon site reaching final grade.
- No significant source of water is present on the site outside rainfall.
- Erosion control BMPs will be employed and adjusted seasonally.

THE 13 ELEMENTS OF A CONSTRUCTION SWPPP

1. **Preserve Vegetation/Mark Clearing Limits:** The clearing limits are indicated on the plan sheet. Furthermore, clearing and grading will be limited to only areas that need to be disturbed for grading/construction of the road surface to preserve as much natural vegetation as possible. Field marking the clearing limits shall be completed prior to clearing and grubbing activities.
   BMP's: Preserve Natural Vegetation (VEG)
   Field Marking Clearing Limits (CL)
2. **Establish Construction Access:** Access to the construction site shall be limited to the rock construction entrance. The construction entrance shall be extended to provide access to the construction vehicle/equipment staging and employee parking areas.
   BMP's: Stabilized Construction Entrance (CE)
3. **Control of Flow Rates:** Storm water detention: No detention is proposed for the site since the increase in volume is less minimal
4. **Installation of Sediment Controls:** Sediment control will be provided through a combination of filtration through the surround on-site vegetation, filter fence, straw bails,
   BMP's: Silt Fence (FF) **If required**
5. **Soils Stabilization:** Temporary and permanent soil stabilization will be provided. Temporary stabilization will be provided through the application of straw and/or plastic sheeting to exposed, worked earth. From October 1 until April 30, no exposed soil may remain exposed and unworked for more than two days; after May 1, no exposed soil may remain exposed and unworked for more than seven days.
   BMP's: Plastic Sheeting,
6. **Slope Protection:** Slopes shall be protected from erosion through cover and prevention of concentrated surface runoff flows.
   BMP's: Plastic Sheeting,
7. **Protection of Permanent Drain Inlets:** Inlet protection will pe provided for all catch basins.
   BMP's: N/A
8. **Stabilization of Channels and Outlets:** All channel slopes shall be constructed and protected against erosion in accordance with City E.D.D.S.
   BMP's: None required
9. **Pollutant Control:** Pollutants shall be controlled as described in the Potential Pollutants section of this SWPPP.
10. **Dewatering Control:** De-watering: Interception of the water table is not expected to occur, even if there is an increase in precipitation. However, should ground water flows be encountered, the flows can be directed to on site native vegetation for cleanup.
    BMP's: Native vegetation (As Required)
11. **BMP Maintenance:** All BMP's and SWPPP elements shall be inspected daily and maintained as required.
12. **Project Management:** The project shall be managed in a cooperative effort by the project manager, contractor, engineer, and the City inspector. During the construction process, if unforeseen issues arise that cannot be resolved on site, construction activity (other than SWPPP maintenance) shall be halted and the City inspector and the project engineer are to be contacted and informed of the situation.

13. Protect On-Site Stormwater Management BMPs For Runoff From Roofs And Other Hard Surface

On-site stormwater management BMPs used for runoff from roofs and other hard surfaces include: full dispersion, roof downspout full infiltration or dispersion systems, perforated stubout connections, rain gardens, bioretention systems, permeable pavement, sheetflow dispersion, and concentrated flow dispersion. The areas on the site to be used for these BMPs shall be protected

from siltation and compaction during construction by sequencing the construction in a fashion to install these BMPs at the latter part of the construction grading operations, by excluding equipment from the BMPS and the associated areas, and by using the erosion and sedimentation control BMPs.
BMP C102: Buffer Zone

Water Pollution Source Control
Since the project is for a residential lot, the project does not fall under the "High Use Sites" covering commercial or industrial sites.

BMP C-151: Concrete Handling (Design and Installation Specifications)
Concrete truck chutes, pumps, and internals shall be washed out only into formed areas awaiting installation of concrete or asphalt. Unused concrete remaining in the truck and pump shall be returned to the originating batch plant for recycling.

Hand tools including, but not limited to, screeds, shovels, rakes, floats, and trowels shall be washed off only into formed areas awaiting installation of concrete or asphalt.

Equipment that cannot be easily moved, such as concrete pavers, shall only be washed in areas that do not directly drain to natural or constructed stormwater conveyances.

Washdown from areas such as concrete aggregate driveways shall not drain directly to natural or constructed stormwater conveyances.
When no formed areas are available, washwater and leftover product shall be contained in a lined container. Contained concrete shall be disposed of in a manner that does not violate groundwater or surface water quality standards

Maintenance Standards

Containers shall be checked for holes in the liner daily during concrete pours and repaired the same day

Section: 7
Special Reports and Studies

- **None**

Section: 8
Other Permits

- Building Permit required.
- (R/W) permit required

Section: 9
Operations and Maintenance

Stormwater System Description
The stormwater system for the access road and detention/water quality vault is fairly basic and contains the following elements:

- 100 lf of inch storm pipe
- Catch basins:
- Detention Vault
- Vault control structure with orifice release flows
- StormFilter 360

The stormwater runoff from the site is intercepted by the curbs and gutter, catch basins and storm piping, where it is directed over to the detention vault for controlled release. The discharge pipe will be located at the south-west corner of the site.

Water quality treatment of the site is accomplished through the use of a StormFilter 360 water quality manhole.

Storm Filter Cartridges O&M

A. Filter cartridges shall be delivered with the manhole. Contractor shall take appropriate action to protect the cartridges from sediment and other debris during construction. Methods for protecting the cartridges include but are not limited to:

1. Remove cartridges from the manhole and store appropriately. Cartridges shall be reinstalled to operate according to 3.4 B (see below).

2. Leave cartridges in the vault and plug inlet and outlet pipe to prevent stormwater from entering the vault.

The method ultimately selected shall be at Contractor's discretion and Contractor's risk

B. Filter cartridges shall not be placed in operation until the vault is clean and the project site is clean and stabilized (construction erosion control measures no longer required). The project site includes any surface that contributes storm drainage to the StormFilter. All impermeable surfaces shall be clean and free of dirt and debris. All catch basins, manholes and pipes shall be free of dirt and sediments. Contact Contech Engineered Solutions LLC . to assist with system activation and/or inspect the system for proper installation once site is clean and stabilized.

C. Contractor to install filter cartridges.

1) *Filter Cartridges With CSF Media and Slip Connector Fittings*: Tape shall be cleanly and completely removed from manifold fitting openings. Spool pieces (slip fittings) shall be inserted without glue into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be placed over the spool pieces to contact the vault floor. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

2) *Filter Cartridges with Threaded Connector Fittings:* Tape shall be cleanly and completely removed from manifold fitting openings. Threaded connectors shall be glued and inserted into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be threaded onto the connectors until they contact the vault floor. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

3) *Filter Cartridges with ¼-Turn Connector Fittings:* Tape shall be cleanly and completely removed from manifold fitting openings. ¼-turn connects shall be glued and inserted into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be turned onto the connector until they reach the hard stop on the connector – approximately ¼ revolution. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

PART 4 PERFORMANCE

4.1 Cartridge Operation

A. Each stormwater filtration system shall contain one or more siphon actuated media filter cartridges that maintain a uniform pressure profile across the face of the filter during operation. At the design flow rate the maximum filter hydraulic loading rate is not to exceed 2.1 gallons per minute per square foot of filter surface area. Stormwater shall enter the filter cartridges through sides and shall flow through the filter media radially from the outer perimeter to the inner cartridge lumen and shall have an average contact time no less than 38 seconds.

4.2 Documentation of Sediment Removal

A. The Filtration system should have the Washington GULD certification and approval from New Jersey DEP.

4.3 Cartridge Sediment Loading

A. Filter cartridges shall be of a design that has demonstrated a minimum sediment retention capacity of 22 pounds of silty loam per cartridge in laboratory tests without a reduction in hydraulic capacity. Laboratory data shall be corroborated with field observations showing similar longevity without impact to normal hydraulic performance of the stormwater filtration system. All laboratory and field tests submitted in support of this specification must have undergone peer review.

4.4 Overflow

A. The filter system will have a baffled, non-siphoning internal overflow with a minimum of 1.0 cfs capacity.

Access Roads/Easement

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet, i.e., trash and debris would fill up one standard size garbage can.	Trash and debris cleared from site.
	Blocked Roadway	Debris which could damage vehicle tires (glass or metal).	Roadway free of debris which could damage tires.
		Any obstructions which reduce clearance above road surface to less than 14 feet.	Roadway overhead clear to 14 feet high.
		Any obstructions restricting the access to a 10- to 12-foot width for a distance of more than 12 feet or any point restricting access to less than a 10-foot width.	Obstruction removed to allow at least a 12-foot access.
Road Surface	Settlement, Potholes, Mush Spots, Ruts	When any surface defect exceeds 6 inches in depth and 6 square feet in area. In general, any surface defect which hinders or prevents maintenance access.	Road surface uniformly smooth with no evidence of settlement, potholes, mush spots, or ruts.
	Vegetation in Road Surface	Weeds growing in the road surface that are more than 6 inches tall and less than 6 inches apart within a 400-square foot area.	Road surface free of weeds taller than 2 inches.
Shoulders and Ditches	Erosion Damage	Erosion within 1 foot of the roadway more than 8 inches wide and 6 inches deep.	Shoulder free of erosion and matching the surrounding road.
	Weeds and Brush	Weeds and brush exceed 18 inches in height or hinder maintenance access.	Weeds and brush cut to 2 inches in height or cleared in such a way as to allow maintenance access.

NO. 3 – CLOSED DETENTION SYSTEMS (PIPES/TANKS)			
Maintenance Component	**Defect**	**Conditions When Maintenance is Needed**	**Results Expected When Maintenance is Performed**
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point with debris and sediment.	Vents free of debris and sediment.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for ½ length of storage vault or any point depth exceeds 15% of diameter. Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than ½ length of tank.	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any crack allowing material to be transported into facility.	All joints between tank/pipe sections are sealed.
	Tank/Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape.	Tank/pipe repaired or replaced to design.
Manhole	Cover not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than ½ inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying 80 lbs of lift. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	King County Safety Office and/or maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks.	Ladder meets design standards and allows maintenance persons safe access.
Catch Basins		See "Catch Basins" Standard No. 5	See "Catch Basins" Standard No. 5

Conveyance Systems (Pipes & Ditches)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment and Debris	Accumulated sediment that exceeds 20% of the diameter of the pipe.	Pipe cleaned of all sediment and debris.
	Vegetation	Vegetation that reduces free movement of water through pipes.	All vegetation removed so water flows freely through pipes.
	Damaged	Protective coating is damaged; rust is causing more than 50% deterioration to any part of pipe.	Pipe repaired or replaced.
		Any dent that decreases the cross-section area of pipe by more than 20%.	Pipe repaired or replaced.
Open Ditches	Trash and Debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that matches design.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
Side Slopes	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Slopes should be stabilized by using appropriate erosion control measure(s): e.g., rock reinforcement, planting of grass, compaction.

Grounds (Landscaping)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Weeds (Non-poisonous)	Weeds growing in more than 20% of the landscaped area (trees and shrubs only).	Weeds present in less than 5% of the landscaped area.
	Safety Hazard	Any presence of poison ivy or other poisonous vegetation.	No poisonous vegetation present in a landscaped area.
	Trash or Litter	Paper, can, bottles, totaling more than 1 cubic foot within a landscaped area (trees and shrubs only) of 1,000 square feet.	Area clear of litter.
Trees and Shrubs	Damage	Limbs or parts of trees or shrubs that are split or broken which affect more than 25% of the total foliage of the tree or shrub.	Trees and shrubs with less than 5% of the total foliage with split or broken limbs.
		Trees or shrubs that have been blown down or knocked over.	Trees or shrub in place free of injury.
		Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Tree or shrub in place and adequately supported; remove any dead or diseased trees.

NO. 5 – CATCH BASINS

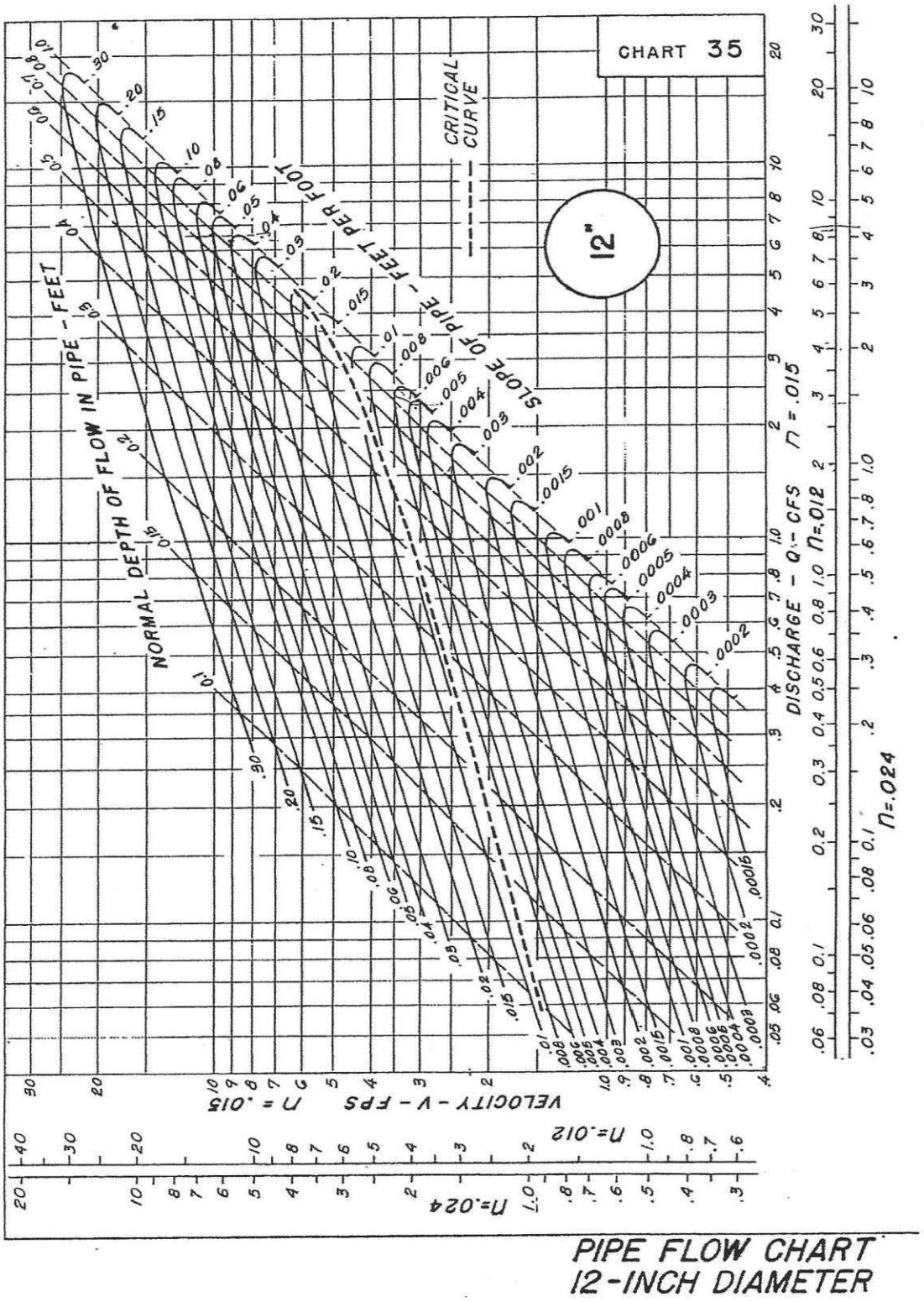
Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Trash or debris of more than ½ cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of basin by more than 10%.	No trash or debris located immediately in front of catch basin opening.
		Trash or debris (in the basin) that exceeds 1/3 the depth from the bottom of basin to invert of the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that would cause complaints or dangerous gases (e.g. methane)	No dead animals or vegetation present within the catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Structural Damage to Frame and/or Top Slab	Corner of frame extends more than ¾ inch past curb face into the street (if applicable)	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch (intent is to make sure all material is running into the basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e. separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in Basin Walls/Bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than ¼ inch wide at the joint of inlet/outlet pipe.
	Settlement/Misalignment	Basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.

NO. 5 – CATCH BASINS

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
	Fire Hazard	Presence of chemicals such as natural gas, oil, and gasoline.	No flammable chemicals present.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Pollution	Non-flammable chemicals of more than ½ cubic foot per three feet of basin length.	No pollution present other than surface film.
Catch Basin Cover	Cover Not In Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than ½ inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying 80 lbs. of lift; intent is keep cover from sealing off access to maintenance.	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (if applicable)		Grate with opening wider than 7/8 inch.	Grate openings meet design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

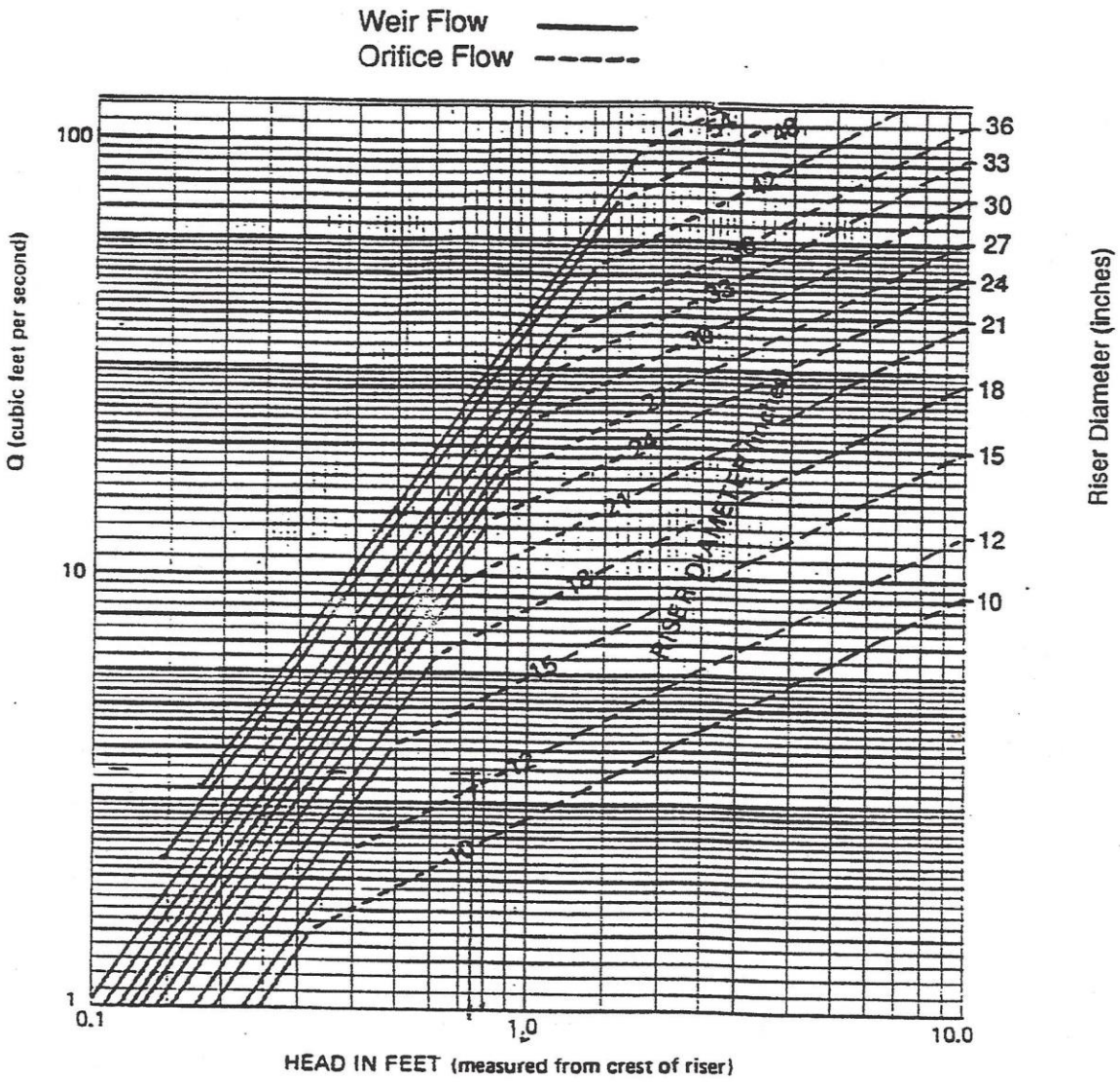
Appendix A:

Pipe Conveyance Calculation Charts
WWHM12 Method Results



PIPE FLOW CHART
12-INCH DIAMETER

Figure III-2.38 Riser Inflow Curves



SOURCE: USDA-SCS

$Q_{WIER} = 9.739\ DH^{3/2}$

$Q_{ORIFICE} = 3.782\ D^2H^{1/2}$

Q in cfs, D and H in feet

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default[2]
Site Name:	
Site Address:	
City:	
Report Date:	1/19/2022
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2019/09/13
Version:	4.2.17

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, Forest, Mod	0.41
Pervious Total	0.41
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.41

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.11
DRIVEWAYS FLAT	0.3
Impervious Total	0.41
Basin Total	0.41

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Vault 1

Width: 16.9251873393584 ft.
Length: 50.7755620180747 ft.
Depth: 8 ft.
Discharge Structure
Riser Height: 7 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 0.48 in. Elevation:0 ft.
Orifice 2 Diameter: 0.57 in. Elevation:4.109 ft.
Orifice 3 Diameter: 0.48 in. Elevation:5.24291666666669 ft.
Element Flows To:
Outlet 1 Outlet 2

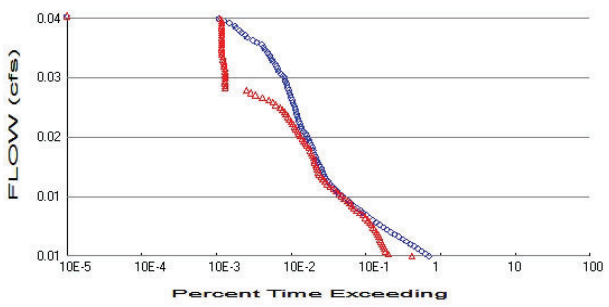
Vault Hydraulic Table

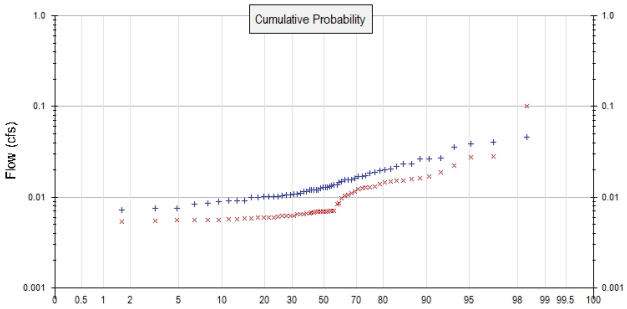
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.019	0.000	0.000	0.000
0.0889	0.019	0.001	0.001	0.000
0.1778	0.019	0.003	0.001	0.000
0.2667	0.019	0.005	0.001	0.000
0.3556	0.019	0.007	0.002	0.000
0.4444	0.019	0.008	0.002	0.000
0.5333	0.019	0.010	0.002	0.000
0.6222	0.019	0.012	0.002	0.000
0.7111	0.019	0.014	0.003	0.000
0.8000	0.019	0.015	0.003	0.000
0.8889	0.019	0.017	0.003	0.000
0.9778	0.019	0.019	0.003	0.000
1.0667	0.019	0.021	0.003	0.000
1.1556	0.019	0.022	0.003	0.000
1.2444	0.019	0.024	0.003	0.000
1.3333	0.019	0.026	0.004	0.000
1.4222	0.019	0.028	0.004	0.000
1.5111	0.019	0.029	0.004	0.000
1.6000	0.019	0.031	0.004	0.000
1.6889	0.019	0.033	0.004	0.000
1.7778	0.019	0.035	0.004	0.000
1.8667	0.019	0.036	0.004	0.000
1.9556	0.019	0.038	0.004	0.000
2.0444	0.019	0.040	0.005	0.000
2.1333	0.019	0.042	0.005	0.000
2.2222	0.019	0.043	0.005	0.000
2.3111	0.019	0.045	0.005	0.000
2.4000	0.019	0.047	0.005	0.000
2.4889	0.019	0.049	0.005	0.000
2.5778	0.019	0.050	0.005	0.000
2.6667	0.019	0.052	0.005	0.000
2.7556	0.019	0.054	0.005	0.000
2.8444	0.019	0.056	0.005	0.000
2.9333	0.019	0.057	0.006	0.000
3.0222	0.019	0.059	0.006	0.000
3.1111	0.019	0.061	0.006	0.000
3.2000	0.019	0.063	0.006	0.000
3.2889	0.019	0.064	0.006	0.000

3.3778	0.019	0.066	0.006	0.000
3.4667	0.019	0.068	0.006	0.000
3.5556	0.019	0.070	0.006	0.000
3.6444	0.019	0.071	0.006	0.000
3.7333	0.019	0.073	0.006	0.000
3.8222	0.019	0.075	0.006	0.000
3.9111	0.019	0.077	0.007	0.000
4.0000	0.019	0.078	0.007	0.000
4.0889	0.019	0.080	0.007	0.000
4.1778	0.019	0.082	0.009	0.000
4.2667	0.019	0.084	0.010	0.000
4.3556	0.019	0.085	0.011	0.000
4.4444	0.019	0.087	0.012	0.000
4.5333	0.019	0.089	0.013	0.000
4.6222	0.019	0.091	0.013	0.000
4.7111	0.019	0.092	0.014	0.000
4.8000	0.019	0.094	0.015	0.000
4.8889	0.019	0.096	0.015	0.000
4.9778	0.019	0.098	0.016	0.000
5.0667	0.019	0.100	0.016	0.000
5.1556	0.019	0.101	0.017	0.000
5.2444	0.019	0.103	0.017	0.000
5.3333	0.019	0.105	0.018	0.000
5.4222	0.019	0.107	0.019	0.000
5.5111	0.019	0.108	0.020	0.000
5.6000	0.019	0.110	0.021	0.000
5.6889	0.019	0.112	0.021	0.000
5.7778	0.019	0.114	0.022	0.000
5.8667	0.019	0.115	0.023	0.000
5.9556	0.019	0.117	0.023	0.000
6.0444	0.019	0.119	0.024	0.000
6.1333	0.019	0.121	0.024	0.000
6.2222	0.019	0.122	0.025	0.000
6.3111	0.019	0.124	0.025	0.000
6.4000	0.019	0.126	0.026	0.000
6.4889	0.019	0.128	0.026	0.000
6.5778	0.019	0.129	0.026	0.000
6.6667	0.019	0.131	0.027	0.000
6.7556	0.019	0.133	0.027	0.000
6.8444	0.019	0.135	0.028	0.000
6.9333	0.019	0.136	0.028	0.000
7.0222	0.019	0.138	0.081	0.000
7.1111	0.019	0.140	0.617	0.000
7.2000	0.019	0.142	1.434	0.000
7.2889	0.019	0.143	2.405	0.000
7.3778	0.019	0.145	3.416	0.000
7.4667	0.019	0.147	4.357	0.000
7.5556	0.019	0.149	5.128	0.000
7.6444	0.019	0.150	5.681	0.000
7.7333	0.019	0.152	6.046	0.000
7.8222	0.019	0.154	6.458	0.000
7.9111	0.019	0.156	6.797	0.000
8.0000	0.019	0.157	7.119	0.000
8.0889	0.019	0.159	7.428	0.000
8.1778	0.000	0.000	7.724	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.41
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.41

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.01355
5 year	0.020277
10 year	0.025257
25 year	0.032142
50 year	0.037701
100 year	0.043629

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.008327
5 year	0.013715
10 year	0.018597
25 year	0.026637
50 year	0.034259
100 year	0.043537

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.009	0.007
1950	0.016	0.007
1951	0.012	0.006
1952	0.010	0.006
1953	0.009	0.006
1954	0.039	0.007
1955	0.020	0.013
1956	0.016	0.015
1957	0.019	0.011
1958	0.016	0.006

1959	0.015	0.007
1960	0.013	0.008
1961	0.014	0.013
1962	0.012	0.006
1963	0.019	0.006
1964	0.013	0.005
1965	0.011	0.007
1966	0.007	0.006
1967	0.017	0.006
1968	0.020	0.010
1969	0.027	0.006
1970	0.010	0.006
1971	0.016	0.016
1972	0.014	0.007
1973	0.010	0.007
1974	0.022	0.007
1975	0.010	0.006
1976	0.010	0.007
1977	0.009	0.006
1978	0.011	0.006
1979	0.023	0.006
1980	0.013	0.005
1981	0.010	0.006
1982	0.013	0.015
1983	0.021	0.006
1984	0.012	0.019
1985	0.017	0.013
1986	0.041	0.027
1987	0.017	0.022
1988	0.011	0.015
1989	0.010	0.006
1990	0.012	0.012
1991	0.013	0.007
1992	0.011	0.007
1993	0.008	0.006
1994	0.007	0.007
1995	0.013	0.014
1996	0.027	0.013
1997	0.046	0.100
1998	0.009	0.006
1999	0.011	0.010
2000	0.008	0.016
2001	0.003	0.005
2002	0.012	0.011
2003	0.009	0.007
2004	0.015	0.017
2005	0.011	0.007
2006	0.026	0.014
2007	0.023	0.012
2008	0.035	0.028
2009	0.010	0.009

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0461	0.1002
2	0.0407	0.0280
3	0.0385	0.0273

4	0.0353	0.0225
5	0.0269	0.0189
6	0.0267	0.0168
7	0.0263	0.0163
8	0.0234	0.0158
9	0.0231	0.0152
10	0.0216	0.0150
11	0.0206	0.0147
12	0.0199	0.0144
13	0.0197	0.0139
14	0.0189	0.0130
15	0.0186	0.0129
16	0.0172	0.0129
17	0.0169	0.0126
18	0.0168	0.0122
19	0.0161	0.0116
20	0.0156	0.0110
21	0.0156	0.0107
22	0.0155	0.0104
23	0.0148	0.0097
24	0.0147	0.0085
25	0.0137	0.0084
26	0.0136	0.0071
27	0.0133	0.0071
28	0.0131	0.0071
29	0.0129	0.0070
30	0.0129	0.0069
31	0.0129	0.0069
32	0.0127	0.0069
33	0.0121	0.0069
34	0.0121	0.0069
35	0.0121	0.0067
36	0.0120	0.0067
37	0.0119	0.0067
38	0.0114	0.0067
39	0.0114	0.0065
40	0.0110	0.0064
41	0.0109	0.0064
42	0.0107	0.0063
43	0.0106	0.0062
44	0.0105	0.0062
45	0.0103	0.0062
46	0.0102	0.0061
47	0.0101	0.0060
48	0.0101	0.0060
49	0.0100	0.0060
50	0.0099	0.0059
51	0.0098	0.0058
52	0.0092	0.0058
53	0.0092	0.0058
54	0.0090	0.0057
55	0.0089	0.0056
56	0.0086	0.0056
57	0.0084	0.0056
58	0.0076	0.0056
59	0.0075	0.0055
60	0.0072	0.0054
61	0.0032	0.0048

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0068	14904	8806	59	Pass
0.0071	13336	4276	32	Pass
0.0074	11907	3888	32	Pass
0.0077	10613	3788	35	Pass
0.0080	9428	3649	38	Pass
0.0083	8397	3533	42	Pass
0.0086	7490	3379	45	Pass
0.0090	6656	3292	49	Pass
0.0093	5905	3200	54	Pass
0.0096	5217	3099	59	Pass
0.0099	4624	2969	64	Pass
0.0102	4096	2830	69	Pass
0.0105	3683	2680	72	Pass
0.0108	3266	2541	77	Pass
0.0111	2939	2402	81	Pass
0.0115	2627	2269	86	Pass
0.0118	2372	2111	88	Pass
0.0121	2145	1956	91	Pass
0.0124	1948	1767	90	Pass
0.0127	1790	1600	89	Pass
0.0130	1621	1461	90	Pass
0.0133	1471	1386	94	Pass
0.0136	1338	1301	97	Pass
0.0140	1230	1197	97	Pass
0.0143	1121	1096	97	Pass
0.0146	1034	1012	97	Pass
0.0149	946	929	98	Pass
0.0152	871	852	97	Pass
0.0155	812	785	96	Pass
0.0158	755	709	93	Pass
0.0161	710	650	91	Pass
0.0165	671	606	90	Pass
0.0168	627	571	91	Pass
0.0171	603	537	89	Pass
0.0174	583	510	87	Pass
0.0177	567	488	86	Pass
0.0180	548	478	87	Pass
0.0183	526	469	89	Pass
0.0186	502	455	90	Pass
0.0190	484	444	91	Pass
0.0193	468	435	92	Pass
0.0196	456	425	93	Pass
0.0199	442	412	93	Pass
0.0202	428	398	92	Pass
0.0205	420	384	91	Pass
0.0208	409	366	89	Pass
0.0211	398	344	86	Pass
0.0215	385	332	86	Pass
0.0218	374	318	85	Pass
0.0221	354	297	83	Pass
0.0224	344	281	81	Pass
0.0227	331	269	81	Pass
0.0230	312	259	83	Pass

0.0233	296	246	83	Pass
0.0236	288	235	81	Pass
0.0240	279	225	80	Pass
0.0243	273	215	78	Pass
0.0246	266	203	76	Pass
0.0249	258	195	75	Pass
0.0252	254	183	72	Pass
0.0255	249	173	69	Pass
0.0258	245	162	66	Pass
0.0261	240	151	62	Pass
0.0265	232	133	57	Pass
0.0268	225	121	53	Pass
0.0271	219	107	48	Pass
0.0274	214	88	41	Pass
0.0277	210	72	34	Pass
0.0280	203	62	30	Pass
0.0283	197	54	27	Pass
0.0286	192	28	14	Pass
0.0290	188	28	14	Pass
0.0293	185	28	15	Pass
0.0296	179	28	15	Pass
0.0299	175	28	16	Pass
0.0302	168	28	16	Pass
0.0305	157	28	17	Pass
0.0308	145	28	19	Pass
0.0311	141	28	19	Pass
0.0315	135	27	20	Pass
0.0318	130	27	20	Pass
0.0321	123	27	21	Pass
0.0324	117	26	22	Pass
0.0327	112	26	23	Pass
0.0330	107	25	23	Pass
0.0333	103	25	24	Pass
0.0336	97	25	25	Pass
0.0340	91	25	27	Pass
0.0343	86	25	29	Pass
0.0346	74	25	33	Pass
0.0349	65	25	38	Pass
0.0352	55	25	45	Pass
0.0355	52	25	48	Pass
0.0358	47	25	53	Pass
0.0361	43	25	58	Pass
0.0365	39	25	64	Pass
0.0368	38	25	65	Pass
0.0371	32	25	78	Pass
0.0374	27	25	92	Pass
0.0377	23	24	104	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0112 acre-feet
On-line facility target flow:	0.0056 cfs.
Adjusted for 15 min:	0.0056 cfs.
Off-line facility target flow:	0.0037 cfs.
Adjusted for 15 min:	0.0037 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
Vault 1 POC	☐	58.08			☐	0.00			
Total Volume Infiltrated		58.08	0.00	0.00		0.00	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       1948 10 01        END    2009 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   default[2].wdm
MESSU       25   Predefault[2].MES
            27   Predefault[2].L61
            28   Predefault[2].L62
            30   POCdefault[2]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      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           ***
   12     C, Forest, Steep        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 ***
   12         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  *********
   12         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 ***
   12         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
   12              0       4.5      0.08       400      0.15       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   12             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   12          0.2       0.3      0.35         6       0.3       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
   12             0         0         0         0       2.5         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#   ***
Basin  1***
PERLND  12                       0.41     COPY   501     12
PERLND  12                       0.41     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    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           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       1948 10 01        END    2009 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   default[2].wdm
MESSU       25   Mitdefault[2].MES
            27   Mitdefault[2].L61
            28   Mitdefault[2].L62
            30   POCdefault[2]1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      IMPLND        4
      IMPLND        5
      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         Vault  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           ***
  END GEN-INFO
  *** Section PWATER***

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

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

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

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  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
  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
    5      DRIVEWAYS/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
    5         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    0    1    9
    5         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
    5         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
    5            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    5              0         0
```

```
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    5              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
IMPLND   4                        0.11     RCHRES   1      5
IMPLND   5                         0.3     RCHRES   1      5

******Routing******
IMPLND   4                        0.11     COPY     1     15
IMPLND   5                         0.3     COPY     1     15
RCHRES   1                           1     COPY   501     16
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     Vault  1                1    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  0  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  0.0  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    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.019729  0.000000  0.000000
  0.088889  0.019729  0.001754  0.001049
  0.177778  0.019729  0.003507  0.001483
  0.266667  0.019729  0.005261  0.001816
  0.355556  0.019729  0.007015  0.002097
  0.444444  0.019729  0.008768  0.002345
  0.533333  0.019729  0.010522  0.002568
  0.622222  0.019729  0.012276  0.002774
  0.711111  0.019729  0.014029  0.002966
  0.800000  0.019729  0.015783  0.003146
  0.888889  0.019729  0.017537  0.003316
  0.977778  0.019729  0.019290  0.003478
  1.066667  0.019729  0.021044  0.003632
  1.155556  0.019729  0.022798  0.003781
  1.244444  0.019729  0.024551  0.003923
  1.333333  0.019729  0.026305  0.004061
  1.422222  0.019729  0.028059  0.004194
  1.511111  0.019729  0.029812  0.004323
  1.600000  0.019729  0.031566  0.004449
  1.688889  0.019729  0.033320  0.004571
  1.777778  0.019729  0.035073  0.004689
  1.866667  0.019729  0.036827  0.004805
  1.955556  0.019729  0.038581  0.004918
  2.044444  0.019729  0.040334  0.005029
  2.133333  0.019729  0.042088  0.005137
  2.222222  0.019729  0.043842  0.005243
  2.311111  0.019729  0.045595  0.005347
  2.400000  0.019729  0.047349  0.005448
  2.488889  0.019729  0.049103  0.005548
  2.577778  0.019729  0.050856  0.005647
  2.666667  0.019729  0.052610  0.005743
  2.755556  0.019729  0.054364  0.005838
  2.844444  0.019729  0.056117  0.005931
  2.933333  0.019729  0.057871  0.006023
  3.022222  0.019729  0.059625  0.006114
  3.111111  0.019729  0.061378  0.006203
  3.200000  0.019729  0.063132  0.006291
  3.288889  0.019729  0.064886  0.006378
  3.377778  0.019729  0.066639  0.006464
  3.466667  0.019729  0.068393  0.006548
  3.555556  0.019729  0.070147  0.006632
  3.644444  0.019729  0.071900  0.006714
  3.733333  0.019729  0.073654  0.006795
  3.822222  0.019729  0.075408  0.006876
  3.911111  0.019729  0.077161  0.006955
  4.000000  0.019729  0.078915  0.007034
  4.088889  0.019729  0.080669  0.007112
  4.177778  0.019729  0.082422  0.009501
  4.266667  0.019729  0.084176  0.010765
  4.355556  0.019729  0.085930  0.011718
  4.444444  0.019729  0.087683  0.012521
  4.533333  0.019729  0.089437  0.013231
  4.622222  0.019729  0.091191  0.013877
  4.711111  0.019729  0.092945  0.014475
  4.800000  0.019729  0.094698  0.015034
```

```
  4.888889  0.019729  0.096452  0.015562
  4.977778  0.019729  0.098206  0.016065
  5.066667  0.019729  0.099959  0.016544
  5.155556  0.019729  0.101713  0.017005
  5.244444  0.019729  0.103467  0.017586
  5.333333  0.019729  0.105220  0.018935
  5.422222  0.019729  0.106974  0.019782
  5.511111  0.019729  0.108728  0.020518
  5.600000  0.019729  0.110481  0.021190
  5.688889  0.019729  0.112235  0.021819
  5.777778  0.019729  0.113989  0.022415
  5.866667  0.019729  0.115742  0.022985
  5.955556  0.019729  0.117496  0.023533
  6.044444  0.019729  0.119250  0.024061
  6.133333  0.019729  0.121003  0.024573
  6.222222  0.019729  0.122757  0.025070
  6.311111  0.019729  0.124511  0.025554
  6.400000  0.019729  0.126264  0.026025
  6.488889  0.019729  0.128018  0.026486
  6.577778  0.019729  0.129772  0.026936
  6.666667  0.019729  0.131525  0.027377
  6.755556  0.019729  0.133279  0.027810
  6.844444  0.019729  0.135033  0.028234
  6.933333  0.019729  0.136786  0.028650
  7.022222  0.019729  0.138540  0.081796
  7.111111  0.019729  0.140294  0.617267
  7.200000  0.019729  0.142047  1.434322
  7.288889  0.019729  0.143801  2.404972
  7.377778  0.019729  0.145555  3.416915
  7.466667  0.019729  0.147308  4.357037
  7.555556  0.019729  0.149062  5.128737
  7.644444  0.019729  0.150816  5.681171
  7.733333  0.019729  0.152569  6.046105
  7.822222  0.019729  0.154323  6.458414
  7.911111  0.019729  0.156077  6.797204
  8.000000  0.019729  0.157830  7.119846
  8.088889  0.019729  0.159584  7.428451
  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    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           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   STAGE  1 1        1      WDM   1001 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        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

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

```
  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

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