Mack Townhomes

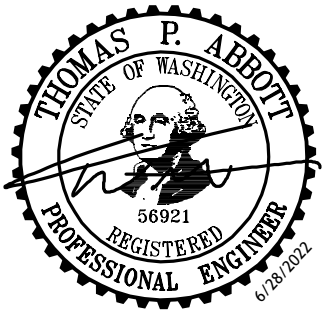
Preliminary Drainage Report

Prepared for

City of Marysville
80 Columbia Ave
Marysville, WA 98270

Prepared by
Tom Abbott, PE

Reviewed by
Tom Abbott, PE



June 2022 ***Job No: C22-172***

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APPENDICES

SECTION 1: PROJECT OVERVIEW

The proposed Mack Townhomes project is comprised of parcel number 30050900400300 and proposes the construction of 22 townhomes on a single lot with associated utilities, drive accesses, and open spaces on a 1.18-acre site. There are no frontage improvements proposed on the site, but access to the site will be from State Ave via an access easement to the south of the project. The project address is 11115 Smokey Point BLVD NE, Marysville, WA. See the Vicinity Map in the following pages for visual representation of the subject property.

Existing Site

The property is currently occupied by an industrial storage facility and associated vehicles. All structures on site will be demolished as part of the proposed development. The site is bordered to the north by R12 (Multi-Family Low) zoned lands. To the south, east and west the property is surrounded by MU (Mixed Use) zoned lands. A project with similar townhome architecture is currently being constructed just east of the property.

The proposed development will exist within the bounds of the Onsite Basin and the Offsite Access Road Basin which contributes runoff for the access road that leads south of the site. In the existing condition, there is no clear discharge from the site and it is assumed that all runoff infiltrates onsite. See Predeveloped and Developed Hydrology Maps in Appendix 4 for a visual representation of these basins.

A geotechnical engineering report was prepared by Earth Solutions Northwest (dated January, 2021) for the project just east of the proposed site. The City of Marysville has allowed this geotechnical report and its assumptions to be utilized for the proposed site due to proximity.

Site soils are classified as Marysville sand recessional outwash, revealing poorly graded sands. Groundwater seepage was not encountered in the investigation. The result of test pits performed on the site gives a design infiltration rate of 2 in/hr, which has been utilized in design assumptions for the infiltration systems in this report. The groundwater table was not encountered by the geotechnical engineer during field excavations, but a recommendation has been given to provide a groundwater elevation of 6 feet below existing grade. This assumption has been utilized in infiltration system design.

Proposed Development

The proposed Mack Townhomes project will develop parcel number 30050900400300 with 22 townhome units on a single lot and associated utilities, driveways, and landscaping, and open spaces. Stormwater will be infiltrated 100% onsite via a system of pervious pavements and infiltration trenches. Onsite development will disturb 1.18 acres, while offsite improvements will impact an additional 0.31 acres within easement and access areas. All existing structures will be demolished as part of the development.

Proposed Drainage System

This project is subject to the requirements of the 2014 Stormwater Management Manual for Western Washington (DOE Manual). In compliance with 2014 DOE Manual, all runoff from developed/disturbed surfaces must be collected, treated, and released to natural drainage courses unless it is dispersed or infiltrated. The project proposes to infiltrate 100% of stormwater runoff from pervious and impervious surfaces.

Proposed pollution generating impervious surfaces (PGIS) will exceed the 5,000 SF threshold and thus basic water quality treatment will be provided via water quality treatment structures that treat stormwater runoff from roadways and driveways prior to infiltration.

The disturbed area of the development is contained within an Onsite Basin, consisting of onsite developed area and the offsite Access Road Basin. Pervious pavement is proposed for driveways

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associated with units 1-4 and 12-22 while units 5-11 have standard driveway pavement. A separate infiltration area is proposed to infiltrate all roof runoff from the proposed buildings. See Section 4.0 for additional discussion regarding proposed stormwater management and water quality treatment measures.

Erosion/Sedimentation Control
Erosion control measures that will be utilized during construction will include a combination of silt fence, storm drain inlet protection and interceptor swales. See Section 2.0 for discussion of how SWPPP Elements are addressed.

Minimum Requirements
Per the 2014 DOE Manual, Minimum Requirements 1-9 apply to the proposed development.

Minimum Requirement #1: Preparation of Stormwater Site Plans
A report along with the construction plans, to be submitted at a later date, satisfies the minimum requirement.

Minimum Requirement #2: Construction Stormwater Pollution Prevention
See Section 2 of this Report for the SWPPP BMP Elements, and the SWPPP (submitted as a separate document) for a complete discussion of erosion control BMP's and their use specific to the site.

Minimum Requirement #3: Source of Pollution
Permanent source control BMPs are not applicable for the subject site since the associated activities for the new residence do not fall within the types of facilities listed within Volume IV of the DOE Manual (Residential developments are not required to implement source control BMP's). BMPs for erosion and sedimentation control are specified in the Construction Plans and the SWPPP.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls
Flow from the site will preserve its natural drainage pattern from the south to the northwest. Runoff flows towards an unnamed stream tributary to Quilceda Creek, which then discharges into Ebey Slough and Possession Sound.

Minimum Requirement #5: On-Site Stormwater Management
The project proposes to infiltrate 100% of stormwater runoff from the proposed development via pervious pavement and infiltration trenches. Two separate trenches will infiltrate pavement/driveway and roof runoff, respectively. Pervious pavement driveways are proposed for units 1-4 and 12-22.

Minimum Requirement #6: Runoff Treatment
The project will exceed the 5,000 SF PGHS threshold and basic water quality treatment is required for PGIS surfaces. Perkfilter water quality treatment units are proposed for collecting and treating stormwater runoff from driveways and pavement prior to infiltration.

Minimum Requirement #7: Flow Control
Utilizing design infiltration rates (2.0 in/hr) provided by the Geotechnical report prepared for the project adjacent, the project proposes to infiltrate 100% of stormwater runoff from the proposed development via pervious pavement and infiltration trenches. Two separate trenches will infiltrate pavement/driveway and roof runoff, respectively. Pervious pavement driveways are proposed for units 1-4 and 12-22.

Minimum Requirement #8: Wetlands Protection
There are no wetlands to protect within the site boundaries or any wetlands within a quarter mile downstream that will be impacted by the development.

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Minimum Requirement #9: Operation and Maintenance
See Operations and Maintenance in Section 6 of this report.

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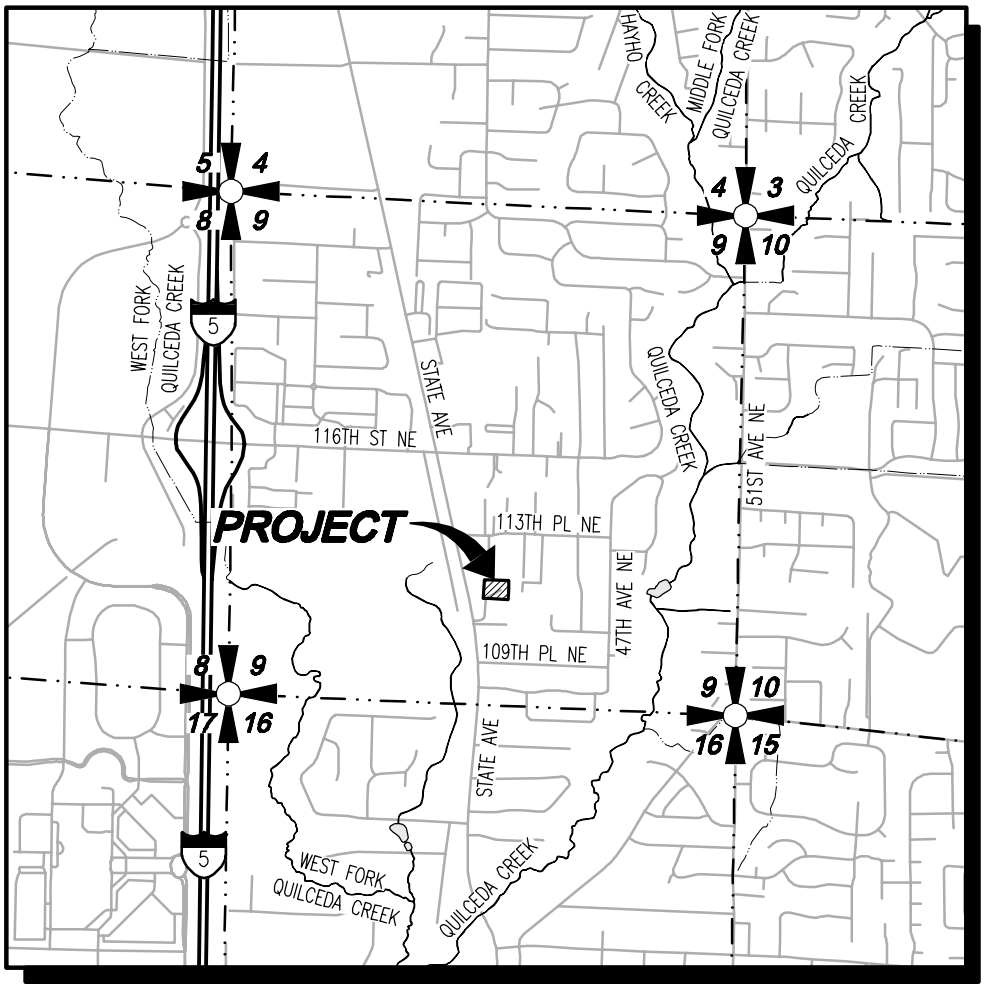
Appendix 1: Project Overview

1. Figure 1.0 – Vicinity Map
2. Figure 2.0 – Existing Conditions Map



VICINITY MAP

SCALE: 1"=2000'

Drawing: P:\Civil\2022\C22-172 Mack Townhomes\Drawings\Exhibits\C22172E-VM.dwg Plotted: Jun 15, 2022 - 5:03pm

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Kent Woodinville Olympia
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MACK TOWNHOMES

VICINITY MAP

FIGURE: 2.0

NAD 1983 HARN
STATEPLANE WASHINGTON
NORTH FIPS 4601 FEET

REVISION:
JOB NUMBER: C22-172
DRAWING NAME: C22-172-2.0
DESIGNER: TABBOTT
DRAWING BY: TABBOTT
DATE: 6/23/2022
SCALE: AS SHOWN
JURISDICTION: MARYSVILLE

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EXISTING CONDITIONS MAP

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Woodinville, WA 98072
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Kent
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Kent, WA 98030
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SOURCE INFORMATION

SOURCE AGENCY	DESCRIPTION
KING COUNTY GIS	PARCEL BOUNDARY
KING COUNTY GIS	CONTOURS GENERATED FROM BARE EARTH LIDAR (KING COUNTY). THIS DATA HAS A STATED VERTICAL ACCURACY OF APPROXIMATELY 1 FOOT.

SECTION 2: TEMPORARY EROSION AND SEDIMENT CONTROL DESIGN

SWPPP Design Elements

A Stormwater Pollution Prevention Plan (SWPPP) will be provided prior to construction. The SWPPP report is modeled under the guidelines of Volume II, Section 3 of the 2014 Stormwater Management Manual for Western Washington. Construction SWPPP Elements #1 through #13 are addressed below.

Element #1 – Mark Clearing Limits

All clearing limits will be delineated with high visibility plastic fence and/or silt fence. See sheets ER-01 of the preliminary plans for locations and details.

Element #2 – Establish Construction Access

Stabilized construction accesses will be installed as shown on the preliminary plans. See sheets ER-01 and ER-02 of the preliminary plans for locations and details.

Element #3 – Control Flow Rates

Detention of construction period runoff will be provided by means of a sediment pond located at the northern portion of the site. See sheets ER-01 of the preliminary plans for location and details for flow and sediment control BMP's.

Element #4 – Install Sediment Controls

Silt fence, catch basin protection, and interceptor swales will be utilized to contain sediments within the project's clearing limits. See sheets ER-01 and ER-02 of the preliminary plans for locations and details.

Element #5 – Stabilize Soils

Exposed soils will be stabilized as specified in the Grading and Erosion Control Notes with temporary and permanent seeding, mulching, and plastic covering. See sheet ER-02 of the preliminary plans for notes.

Element #6 – Protect Slopes

Slopes are minor on the subject site. Slopes shall be protected as specified under Element #5.

Element #7 – Protect Drain Inlets

Storm drain inlet protection will be utilized to contain sediments within the project's clearing limits. See sheets ER-01 and ER-02 of the preliminary plans for locations and details.

Element #8 – Stabilize Channels and Outlets

Temporary channels, shall be stabilized with check dams. See sheets ER-01 and ER-02 of the preliminary plans for locations and details.

Element #9 – Control Pollutants

Pollutants shall be controlled as specified in Volume IV of the 2014 DOE Manual—Source Control BMPs to address potential sources of pollution which may exacerbate possible soil/groundwater contamination identified onsite.

Element #10 – Control De-Watering

There will be no de-watering as a part of this project. See sheet ER-02 of the preliminary plans for notes.

Element #11 – Maintain BMPs

Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes. See sheets ER-01 and ER-02 of the preliminary plans for the Construction Sequence and notes.

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Element #12: Manage the Project

The Grading and Erosion Control Notes specify seasonal work limitations. Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes. See sheets ER-01 and ER-02 of the preliminary plans for the Construction Sequence and notes.

Element #13: Protect on-site stormwater management BMPs

Infiltration areas are to be protected from overcompaction throughout construction for the sake of future infiltration BMP usage by construction fencing or other protective measures.

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SECTION 3: DOWNSTREAM ANALYSIS REPORT

Task 1. Study Area Definition and Maps

King County Bare Earth LiDAR, survey, and 2021 aerial photography were the best topographical references available for the area containing the site. The limits of the downstream analysis extend roughly 0.25 miles beyond the subject property's natural discharge location.

Task 2. Resource Review

All of the resources below have been reviewed for existing and potential issues near the project site:

Adopted Basin Plans

No Adopted Basin Plans were located that include the project site.

Drainage Basin

This site is located in the Quilceda Creek Basin. Site flows that do not infiltrate onsite flow west and south to Quilceda Creek, which then discharges into Ebey Slough and Possession Sound.

Floodplain / Floodway (FEMA) maps

According to FEMA floodplain mapping, the subject property is not within a floodplain. Reference the FEMA floodplain map (panel #53061C0710E) in Appendix 3.

Critical Areas Map

No critical areas have been identified on, or immediately adjacent to, the project site.

Drainage Complaints

No relevant issues were identified near the proposed site.

Road Drainage Problems

No issues were identified near the proposed site.

Soil Survey

Site soils are classified as Marysville sand recessional outwash, revealing poorly graded sands. Groundwater seepage was not encountered in the investigation. The result of test pits performed on the site gives a design infiltration rate of 2 in/hr, which has been utilized in design assumptions for the infiltration systems in this report.

Wetland Inventory Maps

No wetlands were identified on, or immediately adjacent to, the project site.

Migrating River Studies

Migrating River Studies are not considered applicable to the proposed development.

Section 303d List of Polluted Waters

Washington State Department of Ecology's Water Quality Assessment for Washington contains listings for Quilceda Creek downstream of the project. Please refer to Appendix 3 for copies of applicable 303(d) listings.

Water Quality Problems

Quilceda Creek has been listed as a category 5 water due to pH and Dissolved Oxygen concerns. No water quality problems were identified which would be exacerbated by the proposed development as the project intends to infiltrate all stormwater.

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Stormwater Compliance Plans
Not applicable to the proposed project.

Task 3. Field Inspection/Downstream Analysis
There is no discernable flowpath for surface water runoff from the site as topography is essentially flat. Given the soil types onsite, it is assumed that stormwater infiltrates onsite. For all stormwater that does not infiltrate, surface water is assumed to flow overlay generally south and west. Stormwater flows overland in this general direction before entering a roadside swale along State Ave. Flows generally travel south in the conveyance swale along State Ave prior to eventual discharge west into Quilceda Creek that occurs outside of the 0.25 mile boundary of analysis. See Figure 3.0, "Downstream Analysis Map" for a visual representation of current surface water discharge for stormwater that does not infiltrate onsite.

Task 4. Drainage System Description and Problem Descriptions
Based on the information available and all the resources available including visual inspection of the downstream flow path to the ¼-mile boundary, there is no evidence of existing or anticipated downstream drainage problems. All flows are adequately carried through natural channels to Ebey Slough and Possession Sound.

Task 5. Mitigation of Existing or Potential Drainage Problems
No evidence of existing or potential problems with downstream drainage conveyance infrastructure was found. Mitigation is not required.

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Appendix 3: Resource Review

1. Figure 3.0 - Downstream Analysis Map
2. Downstream Analysis Photograph
3. FEMA Floodplain Map – Panel #53061C0710E
4. USDA Soils Map
5. USDA Soils Description

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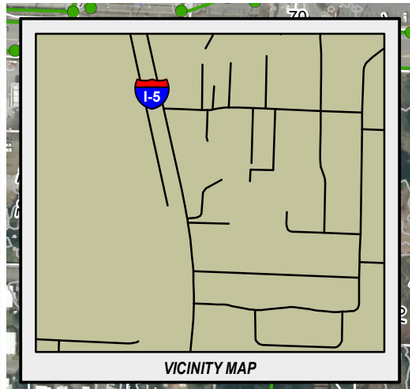

VICINITY MAP

116TH ST NE

113TH ST NE

PROJECT SITE

QUARTER MILE
BOUNDARY OF ANALYSIS

STATE AVE

47TH AVE NE

QUILCEDA CREEK

109TH PL NE

108TH PL NE

LEGEND

- Subject Property
- Parcel Boundary
- Watercourse
- Downstream Flowpath

Contours (LiDAR)

- 10 Foot Contour
- 2 Foot Contour

0 300 600

Scale in Feet

N

Downstream Analysis Map.mxd | MOD: 6/23/2022 | tabbott

SOURCE INFORMATION

SOURCE AGENCY	DESCRIPTION
SNOHOMISH COUNTY GIS	PARCEL BOUNDARY
SNOHOMISH COUNTY GIS	CONTOURS GENERATED FROM BARE EARTH LIDAR (KING COUNTY). THIS DATA HAS A STATED VERTICAL ACCURACY OF APPROXIMATELY 1 FOOT.

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Woodinville, WA 98072
T 425.806.1869

Kent
1851 Central Pl S, #101
Kent, WA 98030
T 425.462.2893

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DOWNSTREAM ANALYSIS MAP

NAD 1983 HARN
STATEPLANE WASHINGTON
NORTH FIPS 4601 FEET

REVISION:
JOB NUMBER: C22-172

DESIGNER: TABBOTT
DRAWING BY: TABBOTT
DATE: 6/23/2022
SCALE: AS SHOWN
JURISDICTION: MARYSVILLE

FIGURE:
3.0

Downstream Analysis Photographs

Image 1: Roadside conveyance ditch along State Ave

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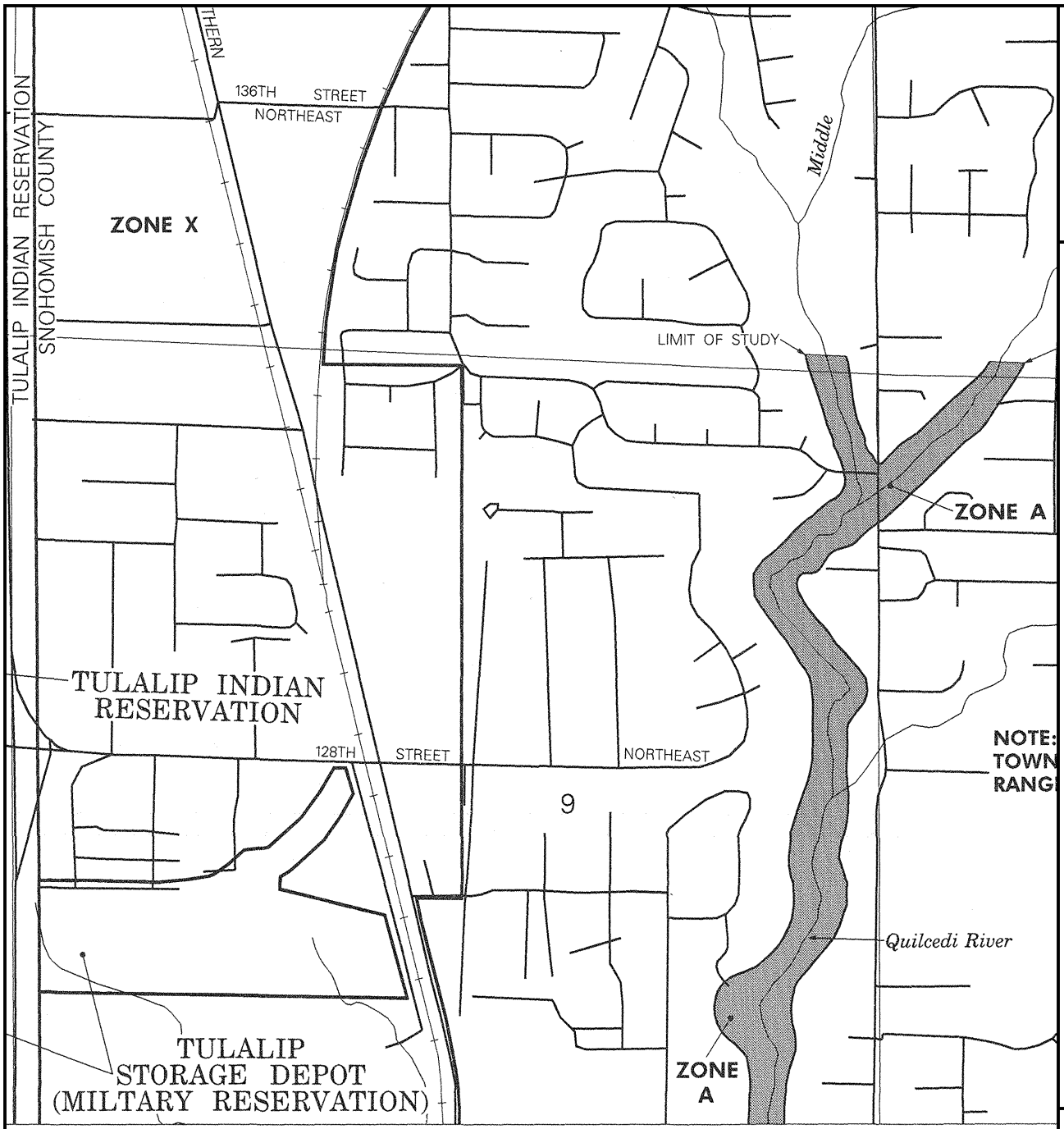

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

SNOHOMISH COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 710 OF 1575

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
SNOHOMISH COUNTY, UNINCORPORATED AREAS	535534	0710	E

MAP NUMBER
53061C0710 E

EFFECTIVE DATE:
NOVEMBER 8, 1999

Federal Emergency Management Agency

Soil Map—Snohomish County Area, Washington
(MACK Townhomes)

Map Scale: 1:524 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Snohomish County Area, Washington
Survey Area Data: Version 23, Aug 31, 2021

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

Date(s) aerial images were photographed: Aug 16, 2020—Aug 19, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
57	Ragnar fine sandy loam, 0 to 8 percent slopes	1.1	100.0%
Totals for Area of Interest		**1.1**	**100.0%**

SECTION 4: DETENTION AND WATER QUALITY TREATMENT DESIGN

4.1 Predeveloped Hydrology

The predeveloped conditions were modeled in WWHM for the purpose of peak flow determination. Based on the site location, the WWHM used the SeaTac Gage and a Precipitation Scale factor of 1.20.

Onsite Basin:

The predeveloped condition applied to the Onsite Basin, which is to be developed into landscape, sidewalk and pavement on the site. For visual representation of the listed basins, see Figure 4.0, "Predeveloped Hydrology Map". The values as modeled in WWHM are as follows:

Table 1: Predeveloped Conditions: Onsite Basin

Onsite Basin	
Ground Cover	Area (acre)
Forest, flat	0.60
Total	**0.60**

Offsite Access Road Basin:

The predeveloped condition applied to the Offsite Access Road Basin, which is to be developed into sidewalk and pavement for access to the site. For visual representation of the listed basins, see Figure 4.0, "Predeveloped Hydrology Map". The values as modeled in WWHM are as follows:

Table 2: Predeveloped Conditions: Offsite Access Road Basin

Offsite Access Road Basin	
Ground Cover	Area (acre)
Forest, flat	0.15
Total	**0.15**

Roofs Basin:

The predeveloped condition applied to the Roofs Basin, which is to be developed into the building footprint for the proposed buildings in the developed condition. For visual representation of the listed basins, see Figure 4.0, "Predeveloped Hydrology Map". The values as modeled in WWHM are as follows:

Table 3: Predeveloped Conditions: Roofs Basin

Roofs Basin	
Ground Cover	Area (acre)
Forest, flat	0.50
Total	**0.50**

Pervious Driveways Basin:

The predeveloped condition applied to the Pervious Driveways Basin, which is to be developed into pervious pavement driveways for Units 1-4 and 12-22 in the developed condition. For visual

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representation of the listed basins, see Figure 4.0, "Predeveloped Hydrology Map". The values as modeled in WWHM are as follows:

Table 4: Predeveloped Conditions: Pervious Driveways Basin

Pervious Driveways Basin	
Ground Cover	Area (acre)
Forest, flat	0.11
Total	**0.11**

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4.2 Developed Hydrology

The proposed Mack Townhomes project will develop parcel number 30050900400300 with 22 townhome units on a single lot and associated utilities, driveways, and landscaping, and open spaces. Stormwater will be infiltrated 100% onsite via a system of pervious pavements and infiltration trenches. All stormwater runoff from developed surfaces will be infiltrated via an infiltration trench or pervious pavement.

Onsite Basin:

The developed Onsite Basin is 0.55 acres comprised of Drive A pavement and sidewalk and landscaped area. Runoff from the Onsite Basin is tributary to the infiltration trench underneath the pavement within Drive A. In the developed condition, the Onsite Basin has been modeled using WWHM with the following areas and ground cover designations:

Table 5: Developed Conditions: Onsite Basin

Onsite Basin	
Ground Cover	Area (acre)
Roads, flat	0.25
Sidewalks, flat	0.04
Pasture, flat	0.26
Total	**0.55**

Offsite Access Road Basin:

The developed Offsite Access Road Basin is comprised of Drive A pavement and sidewalk within the access easement south of the project site. It is tributary to the infiltration trench underneath the pavement within Drive A. The Offsite Access Road Basin was modeled using WWHM with the following areas and ground cover designations:

Table 6: Developed Conditions: Offsite Access Road Basin

Offsite Access Road Basin	
Ground Cover	Area (acre)
Roads, flat	0.12
Sidewalk, flat	0.03
Total	**0.15**

Roofs Basin:

The developed Roofs Basin is comprised of roof area associated with the 4 proposed buildings. Downspouts collect and route runoff from the buildings to the infiltration area beneath the driveways for Units 5-11. The Roofs Basin was modeled using WWHM with the following areas and ground cover designations:

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Table 7: Developed Conditions: Roofs Basin

Roofs Basin	
Ground Cover	Area (acre)
Roofs, flat	0.50
Total	**0.50**

Pervious Driveways Basin:

The developed Pervious Driveways Basin is comprised of pervious driveway area for Units 1-4 and 12-22. Information on design of the Pervious Driveways can be found in Section 4.5. The Pervious Driveways Basin was modeled using WWHM using the pervious pavement tool with the following areas:

Table 8: Developed Conditions: Pervious Driveways Basin

Pervious Driveways Basin	
Ground Cover	Area (acre)
Driveway, flat*	0.11*
Total	**0.11**

* See section 4.5 for modeling information

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4.3 Infiltration Facilities Design

The project proposes to infiltrate stormwater runoff 100% via infiltration trenches and pervious pavement. Two separate infiltration trenches have been designed. The following are descriptions of the design parameters for both facilities while a summary of the pervious pavement driveway design can be found in Section 4.5:

Drive A Infiltration Facility:

The Drive A Infiltration Facility collects runoff from Drive A pavement and sidewalk as well as driveway runoff from units 5-11 and site landscaped areas. All stormwater is infiltrated 100% per WWHM modeling. The trench is located onsite underneath Drive A as well as under the offsite access road area within the access and utility easement.

The groundwater table in the area was not encountered by the geotechnical engineer during field excavations, but a recommendation has been given to provide a groundwater elevation of 6 feet below existing grade. The existing grade in the area of the infiltration trench is approximately EL = 68.50, which places the seasonal high groundwater elevation at approximately 62.50. This assumption has been utilized in infiltration system design.

A summary of the infiltration trench dimensions and WWHM modeling parameters can be seen below. See Appendix 4 for WWHM output, volume calculations, and additional facility design details.

Table 9: Drive A Infiltration Facility Design Summary

Drive A Infiltration Facility	
Begin Infiltration	65.75
Top of Infiltration	67.50
Live Storage Depth	1.75′
Groundwater Elevation (per Geotech)	62.50
Separation from Groundwater Elevation	3.25′
Modeled Footprint	290′x10.5′ = 3,045 SF
Provided Footprint	290′x10.5′ = 3,045 SF
Modeled Storage Volume	3,045 SF x 1.75′ = 5,329 CF
Provided Storage Volume	3,045 SF x 1.75′ = 5,329 CF
Void Space %	30%
Design Infiltration Rate	2.0 in/hr
Percent Infiltrated	100%

Roof Infiltration Facility:

The Roof Infiltration Facility collects runoff from the roofs of the 4 proposed buildings. All stormwater is infiltrated 100% per WWHM modeling. The trench is located onsite underneath driveways for units 5-11.

The groundwater table in the area was not encountered by the geotechnical engineer during field excavations, but a recommendation has been given to provide a groundwater elevation of 6 feet below existing grade. The existing grade in the area of the infiltration trench is approximately EL = 68.50, which places the seasonal high groundwater elevation at approximately 62.50. This assumption has been utilized in infiltration system design.

A summary of the infiltration trench dimensions and WWHM modeling parameters can be seen below. See Appendix 4 for WWHM output, volume calculations, and additional facility design details.

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Table 10: Roof Infiltration Facility Design Summary

Roof Infiltration Facility	
Begin Infiltration	66.00
Top of Infiltration	68.00
Live Storage Depth	2.0′
Groundwater Elevation (per Geotech)	62.50
Separation from Groundwater Elevation	3.50′
Modeled Footprint	140′x17′ = 2,380 SF
Provided Footprint	140′x17′ = 2,380 SF
Modeled Storage Volume	2,380 SF x 2.0′ = 4,760 CF
Provided Storage Volume	3,045 SF x 1.75′ = 5,329 CF
Void Space %	30%
Design Infiltration Rate	2.0 in/hr
Percent Infiltrated	100%

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4.4 Water Quality Treatment

Water Quality Treatment for the onsite developed area is accomplished through three Perkfilter catch basin water quality treatment units located along Drive A. A summary of design criteria is provided below:

Table 11: Perkfilter-1 Design Summary

Perkfilter-1	
Tributary Area	*0.15 AC*
Tributary PGIS Area	*0.15 AC*
Water Quality Flow Rate	0.0164 cfs
Number of Cartridges	1
Cartridge Height	12″
Internal Drop	1.8′
Peak Flow Rate	0.2020 cfs
Peak Flow Storm Event	100-year

Table 12: Perkfilter-2 Design Summary

Perkfilter-2	
Tributary Area	*0.10 AC*
Tributary PGIS Area	*0.06 AC*
Water Quality Flow Rate	0.0085 cfs
Number of Cartridges	1
Cartridge Height	12″
Internal Drop	1.8′
Peak Flow Rate	0.1118 cfs
Peak Flow Storm Event	100-year

Table 13: Perkfilter-3 Design Summary

Perkfilter-3	
Tributary Area	*0.40 AC*
Tributary PGIS Area	*0.21 AC*
Water Quality Flow Rate	0.0273 cfs
Number of Cartridges	1
Cartridge Height	12″
Internal Drop	1.8′
Peak Flow Rate	0.3880 cfs
Peak Flow Storm Event	100-year

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4.5 Pervious Pavement Design

Pervious pavement driveways have been designed for driveways on units 1-4 and 12-22. The driveways mitigate their own surface area and infiltrate 100% of stormwater runoff per WWHM modeling. A summary of design criteria is provided below:

Table 14: Pervious Pavement Driveways Design Summary

Pervious Pavement Driveways	
Top Pavement Section Depth	6″
Pavement Void Ratio	40%
Base Course Depth	9″
Base Course Void Ratio	30%
Pavement Area	4,900 SF
Design Infiltration Rate	2.0 in/hr
Percent Infiltrated	100%

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Appendix 4: Detention and Water Quality Design

1. Figure 4.0: Predeveloped Hydrology Map
2. Figure 5.0: Developed Hydrology Map
3. Perkfilter Details
4. WWHM2012 Output – Drive A Infiltration Facility
5. WWHM2012 Output – Roof Infiltration Facility
6. WWHM2012 Output – Pervious Pavement Driveways
7. WWHM2012 Output – Perfilter-1
8. WWHM2012 Output – Perfilter-2
9. WWHM2012 Output – Perfilter-3

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VICINITY MAP

PREDEVELOPED BASIN AREAS

OFFSITE ACCESS ROAD BASIN	
FOREST	0.15 AC
TOTAL =	0.15 AC
ONSITE BASIN	
FOREST	0.60 AC
TOTAL =	0.60 AC
ROOFS BASIN	
FOREST	0.50 AC
TOTAL =	0.50 AC
PERVIOUS DRIVEWAYS BASIN	
FOREST	0.11 AC
TOTAL =	0.11 AC

STATE AVE

LEGEND

- Subject Property
- Parcel Boundary
- Watercourse

Contours (LiDAR)

- 10 Foot Contour
- 2 Foot Contour

0 50 100

Scale in Feet

N

Predeveloped Hydrology Map.mxd | MOD: 6/23/2022 | tabbott

SOURCE INFORMATION

SOURCE AGENCY	DESCRIPTION
SNOHOMISH COUNTY GIS	PARCEL BOUNDARY
SNOHOMISH COUNTY GIS	CONTOURS GENERATED FROM BARE EARTH LIDAR (KING COUNTY). THIS DATA HAS A STATED VERTICAL ACCURACY OF APPROXIMATELY 1 FOOT.

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TEC HOLDINGS 123, LLC

MACK TOWNHOMES

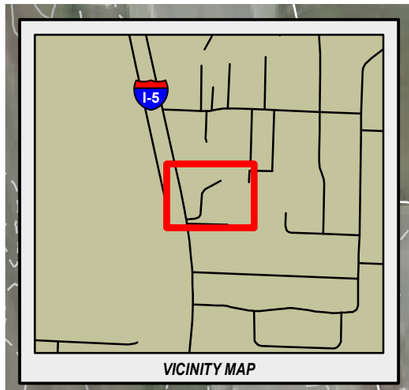
PREDEVELOPED HYDROLOGY MAP

NAD 1983 HARN
STATEPLANE WASHINGTON
NORTH FIPS 4601 FEET

REVISION:
JOB NUMBER: C22-172
DRAWING NAME: C22-172-4.0
DESIGNER: TABBOTT
DRAWING BY: TABBOTT
DATE: 6/23/2022
SCALE: AS SHOWN
JURISDICTION: MARYSVILLE

FIGURE:

4.0



VICINITY MAP

DEVELOPED BASIN AREAS

OFFSITE ACCESS ROAD BASIN	
ROADS	0.12 AC
SIDEWALKS	0.03 AC
TOTAL =	0.15 AC
ONSITE BASIN	
ROADS	0.25 AC
SIDEWALK	0.04 AC
PASTURE	0.26 AC
TOTAL =	0.55 AC
ROOFS BASIN	
ROOFS	0.50 AC
TOTAL =	0.50 AC
PERVIOUS DRIVEWAYS BASIN	
DRIVEWAY	0.11 AC
TOTAL =	0.11 AC

STATE AVE

LEGEND

- Subject Property
- Parcel Boundary
- Watercourse

Contours (LiDAR)

- 10 Foot Contour
- 2 Foot Contour

0 50 100

Scale in Feet

SOURCE INFORMATION

SOURCE AGENCY	DESCRIPTION
SNOHOMISH COUNTY GIS	PARCEL BOUNDARY
SNOHOMISH COUNTY GIS	CONTOURS GENERATED FROM BARE EARTH LIDAR (KING COUNTY). THIS DATA HAS A STATED VERTICAL ACCURACY OF APPROXIMATELY 1 FOOT.

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TEC HOLDINGS 123, LLC

MACK TOWNHOMES

DEVELOPED HYDROLOGY MAP

NAD 1983 HARN
STATEPLANE WASHINGTON
NORTH FIPS 4601 FEET

REVISION:
JOB NUMBER: C22-172

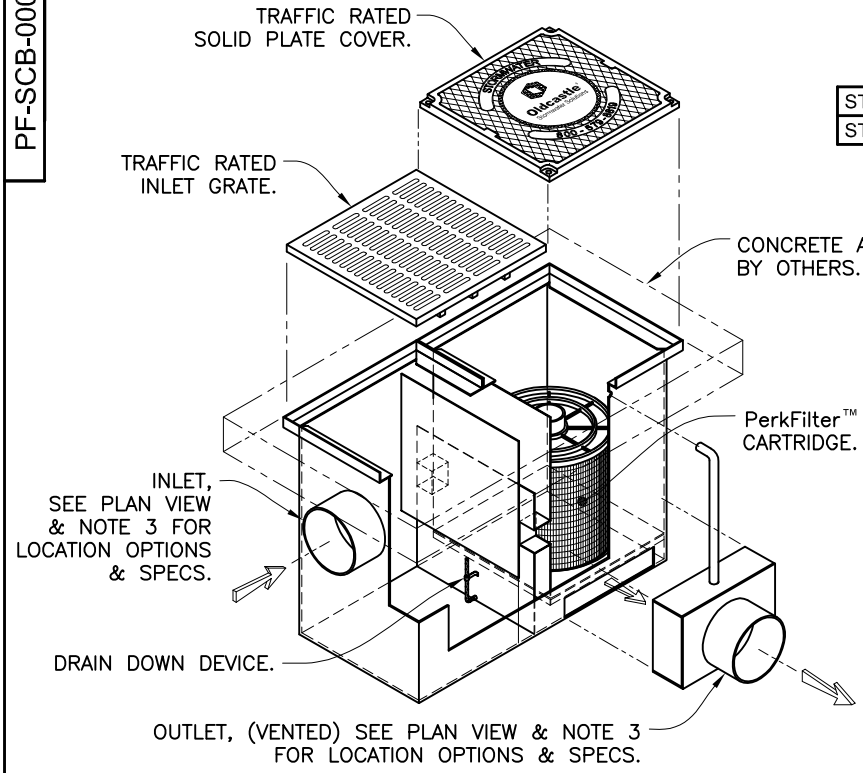
DESIGNER: TABBOTT
DRAWING BY: TABBOTT
DATE: 6/23/2022
SCALE: AS SHOWN
JURISDICTION: MARYSVILLE

FIGURE:
5.0

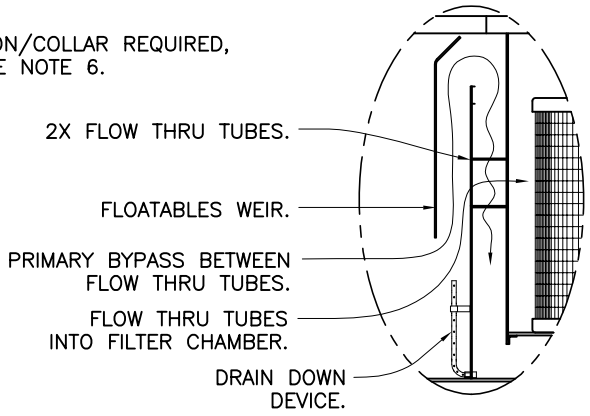
Developed Hydrology Map.mxd | MOD: 6/23/2022 | tabbott

PF-SCB-0001

	CARTRIDGE SIZE	TREATMENT FLOW RATE GPM / CFS	TOTAL FLOW CAPACITY CFS	MINIMUM DEPTH (FEET)
	12.00"	12 / 0.03	1.3	1.80
	18.00"	18 / 0.04	1.3	2.34
STACKED	12.00" + 12.00"	24 / 0.05	1.3	3.08
STACKED	18.00" + 12.00"	30 / 0.07	1.3	3.67



ISOMETRIC VIEW

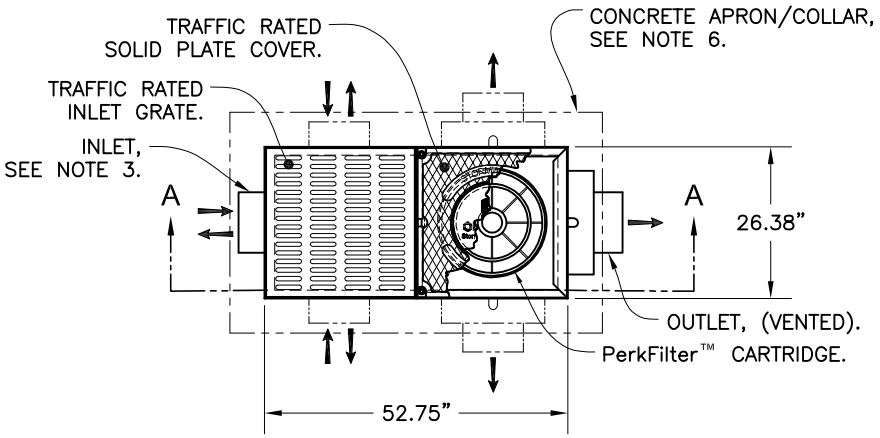


DETAIL A

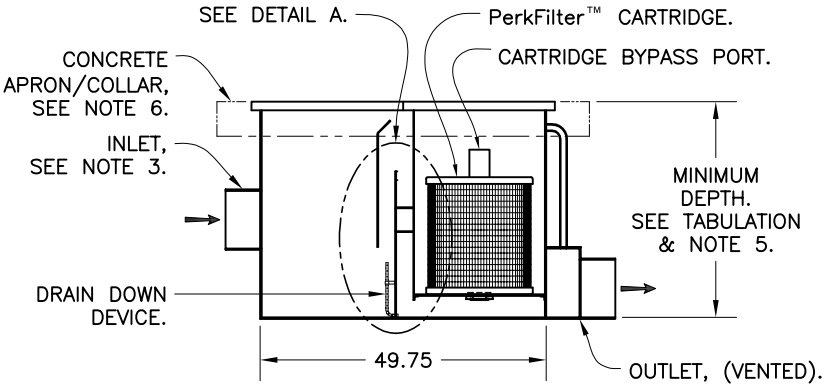
INLET / BYPASS ASSEMBLY & DRAIN DOWN SCALE: 1.5X

Notes:

1. All steel utilized in fabrication and shall be 1/4" plate per ASTM A36.
2. PerkFilter™ Catch basin shall be supplied with traffic rated (H20) bicycle-proof grates and solid plate cover.
3. Inlet pipe(s) may enter device on any of three sides of the inlet chamber. Outlet pipe may exit on any of all four sides. All pipe is Ø 12" maximum.
4. Inlet chamber shall be supplied with a DRAIN DOWN device designed to remove standing water between storm events.
5. For depths less than the specified minimum contact Oldcastle® Stormwater Solutions for engineering assistance.
6. Field poured Concrete Apron / Collar required, by others. Refer to PF-SCB-1000 for recommended configuration.
7. PerkFilter™ cartridge shall be maintained in accordance with manufacturer recommendations.



PLAN VIEW



SECTION A-A

Media Filtration

PerkFilter™

Steel Catch Basin

Single Cartridge

Oldcastle® Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
PF-SCB-0001	NR	ECO-0143 NEW	JPR 12/2/16	SHEET 1 OF 1

WWHM2012
PROJECT REPORT

Project Name: Mack Townhomes_20220608
Site Name:
Site Address:
City :
Report Date: 6/8/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Onsite Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	.6
Pervious Total	0.6

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.6

Element Flows To:

Surface	Interflow	Groundwater

Name : Offsite Access Road
Bypass: No

GroundWater: No

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Pervious Land Use	acre
C, Forest, Flat	.15
Pervious Total	0.15

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.15

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Onsite Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Pasture, Flat	.26
Pervious Total	0.26

Impervious Land Use	acre
ROADS FLAT	0.25
SIDEWALKS FLAT	0.04
Impervious Total	0.29
Basin Total	0.55

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Name : Gravel Trench Bed 1
Bottom Length: 290.00 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

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Material thickness of first layer: 2
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: 2
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 114.334
Total Volume Through Riser (ac-ft.): 0.003
Total Volume Through Facility (ac-ft.): 114.338
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 1.75 ft.
Riser Diameter: 12 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	0.069	0.000	0.000	0.000
0.0222	0.069	0.000	0.000	0.141
0.0444	0.069	0.000	0.000	0.141
0.0667	0.069	0.001	0.000	0.141
0.0889	0.069	0.001	0.000	0.141
0.1111	0.069	0.002	0.000	0.141
0.1333	0.069	0.002	0.000	0.141
0.1556	0.069	0.003	0.000	0.141
0.1778	0.069	0.003	0.000	0.141
0.2000	0.069	0.004	0.000	0.141
0.2222	0.069	0.004	0.000	0.141
0.2444	0.069	0.005	0.000	0.141
0.2667	0.069	0.005	0.000	0.141
0.2889	0.069	0.006	0.000	0.141
0.3111	0.069	0.006	0.000	0.141
0.3333	0.069	0.007	0.000	0.141
0.3556	0.069	0.007	0.000	0.141
0.3778	0.069	0.007	0.000	0.141
0.4000	0.069	0.008	0.000	0.141
0.4222	0.069	0.008	0.000	0.141
0.4444	0.069	0.009	0.000	0.141
0.4667	0.069	0.009	0.000	0.141
0.4889	0.069	0.010	0.000	0.141
0.5111	0.069	0.010	0.000	0.141
0.5333	0.069	0.011	0.000	0.141
0.5556	0.069	0.011	0.000	0.141
0.5778	0.069	0.012	0.000	0.141

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0.6000	0.069	0.012	0.000	0.141
0.6222	0.069	0.013	0.000	0.141
0.6444	0.069	0.013	0.000	0.141
0.6667	0.069	0.014	0.000	0.141
0.6889	0.069	0.014	0.000	0.141
0.7111	0.069	0.014	0.000	0.141
0.7333	0.069	0.015	0.000	0.141
0.7556	0.069	0.015	0.000	0.141
0.7778	0.069	0.016	0.000	0.141
0.8000	0.069	0.016	0.000	0.141
0.8222	0.069	0.017	0.000	0.141
0.8444	0.069	0.017	0.000	0.141
0.8667	0.069	0.018	0.000	0.141
0.8889	0.069	0.018	0.000	0.141
0.9111	0.069	0.019	0.000	0.141
0.9333	0.069	0.019	0.000	0.141
0.9556	0.069	0.020	0.000	0.141
0.9778	0.069	0.020	0.000	0.141
1.0000	0.069	0.021	0.000	0.141
1.0222	0.069	0.021	0.000	0.141
1.0444	0.069	0.021	0.000	0.141
1.0667	0.069	0.022	0.000	0.141
1.0889	0.069	0.022	0.000	0.141
1.1111	0.069	0.023	0.000	0.141
1.1333	0.069	0.023	0.000	0.141
1.1556	0.069	0.024	0.000	0.141
1.1778	0.069	0.024	0.000	0.141
1.2000	0.069	0.025	0.000	0.141
1.2222	0.069	0.025	0.000	0.141
1.2444	0.069	0.026	0.000	0.141
1.2667	0.069	0.026	0.000	0.141
1.2889	0.069	0.027	0.000	0.141
1.3111	0.069	0.027	0.000	0.141
1.3333	0.069	0.028	0.000	0.141
1.3556	0.069	0.028	0.000	0.141
1.3778	0.069	0.028	0.000	0.141
1.4000	0.069	0.029	0.000	0.141
1.4222	0.069	0.029	0.000	0.141
1.4444	0.069	0.030	0.000	0.141
1.4667	0.069	0.030	0.000	0.141
1.4889	0.069	0.031	0.000	0.141
1.5111	0.069	0.031	0.000	0.141
1.5333	0.069	0.032	0.000	0.141
1.5556	0.069	0.032	0.000	0.141
1.5778	0.069	0.033	0.000	0.141
1.6000	0.069	0.033	0.000	0.141
1.6222	0.069	0.034	0.000	0.141
1.6444	0.069	0.034	0.000	0.141
1.6667	0.069	0.035	0.000	0.141
1.6889	0.069	0.035	0.000	0.141
1.7111	0.069	0.035	0.000	0.141
1.7333	0.069	0.036	0.000	0.141
1.7556	0.069	0.036	0.004	0.141
1.7778	0.069	0.037	0.049	0.141
1.8000	0.069	0.037	0.118	0.141

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1.8222	0.069	0.038	0.205	0.141
1.8444	0.069	0.038	0.306	0.141
1.8667	0.069	0.039	0.418	0.141
1.8889	0.069	0.039	0.540	0.141
1.9111	0.069	0.040	0.670	0.141
1.9333	0.069	0.040	0.804	0.141
1.9556	0.069	0.041	0.942	0.141
1.9778	0.069	0.041	1.080	0.141
2.0000	0.069	0.041	1.217	0.141

Name : Standard Driveways - Units 5-11
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
DRIVEWAYS FLAT	**0.05**
Impervious Total	**0.05**
Basin Total	**0.05**

Element Flows To:

Surface	**Interflow**	**Groundwater**
Gravel Trench Bed 1	Gravel Trench Bed 1	

Name : Offsite Access Road
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
ROADS FLAT	**0.12**
SIDEWALKS FLAT	**0.03**
Impervious Total	**0.15**
Basin Total	**0.15**

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Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.75
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.26
Total Impervious Area:0.49

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.0252
5 year	0.038658
10 year	0.049037
25 year	0.063886
50 year	0.076254
100 year	0.089779

Flow Frequency Return Periods for Mitigated. POC #1

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

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.025	0.000
1950	0.026	0.000
1951	0.023	0.000
1952	0.018	0.000
1953	0.015	0.000
1954	0.082	0.000
1955	0.032	0.000
1956	0.029	0.000

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1957	0.035	0.000
1958	0.026	0.000
1959	0.025	0.000
1960	0.024	0.000
1961	0.045	0.003
1962	0.022	0.000
1963	0.036	0.000
1964	0.026	0.000
1965	0.022	0.000
1966	0.013	0.000
1967	0.026	0.000
1968	0.032	0.000
1969	0.077	0.000
1970	0.018	0.000
1971	0.029	0.000
1972	0.021	0.000
1973	0.020	0.000
1974	0.043	0.000
1975	0.018	0.000
1976	0.018	0.000
1977	0.015	0.000
1978	0.018	0.000
1979	0.050	0.000
1980	0.024	0.000
1981	0.019	0.000
1982	0.024	0.000
1983	0.041	0.000
1984	0.025	0.000
1985	0.030	0.000
1986	0.070	0.000
1987	0.034	0.000
1988	0.017	0.000
1989	0.018	0.000
1990	0.023	0.000
1991	0.024	0.000
1992	0.018	0.000
1993	0.015	0.000
1994	0.017	0.000
1995	0.025	0.000
1996	0.042	0.000
1997	0.083	0.000
1998	0.015	0.000
1999	0.020	0.000
2000	0.015	0.000
2001	0.006	0.000
2002	0.023	0.000
2003	0.018	0.000
2004	0.030	0.000
2005	0.021	0.000
2006	0.056	0.000
2007	0.044	0.000
2008	0.062	0.000
2009	0.019	0.000

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Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0835	0.0026
2	0.0823	0.0000
3	0.0768	0.0000
4	0.0704	0.0000
5	0.0620	0.0000
6	0.0559	0.0000
7	0.0504	0.0000
8	0.0448	0.0000
9	0.0442	0.0000
10	0.0432	0.0000
11	0.0420	0.0000
12	0.0409	0.0000
13	0.0364	0.0000
14	0.0355	0.0000
15	0.0336	0.0000
16	0.0324	0.0000
17	0.0316	0.0000
18	0.0301	0.0000
19	0.0299	0.0000
20	0.0286	0.0000
21	0.0286	0.0000
22	0.0262	0.0000
23	0.0260	0.0000
24	0.0257	0.0000
25	0.0256	0.0000
26	0.0254	0.0000
27	0.0252	0.0000
28	0.0247	0.0000
29	0.0246	0.0000
30	0.0242	0.0000
31	0.0240	0.0000
32	0.0237	0.0000
33	0.0236	0.0000
34	0.0235	0.0000
35	0.0230	0.0000
36	0.0229	0.0000
37	0.0221	0.0000
38	0.0219	0.0000
39	0.0211	0.0000
40	0.0210	0.0000
41	0.0201	0.0000
42	0.0200	0.0000
43	0.0189	0.0000
44	0.0185	0.0000
45	0.0184	0.0000
46	0.0182	0.0000
47	0.0181	0.0000
48	0.0181	0.0000
49	0.0181	0.0000
50	0.0179	0.0000
51	0.0177	0.0000
52	0.0176	0.0000

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53	0.0174	0.0000
54	0.0168	0.0000
55	0.0154	0.0000
56	0.0153	0.0000
57	0.0153	0.0000
58	0.0152	0.0000
59	0.0151	0.0000
60	0.0128	0.0000
61	0.0060	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0020	315485	2	0	Pass
0.0021	303721	2	0	Pass
0.0022	292599	2	0	Pass
0.0023	281904	2	0	Pass
0.0024	272066	2	0	Pass
0.0026	262654	2	0	Pass
0.0027	253671	0	0	Pass
0.0028	244902	0	0	Pass
0.0029	236774	0	0	Pass
0.0030	229074	0	0	Pass
0.0031	221374	0	0	Pass
0.0032	214102	0	0	Pass
0.0033	207108	0	0	Pass
0.0034	200263	0	0	Pass
0.0035	193761	0	0	Pass
0.0036	187451	0	0	Pass
0.0037	181377	0	0	Pass
0.0038	175474	0	0	Pass
0.0039	169870	0	0	Pass
0.0040	164587	0	0	Pass
0.0042	159518	0	0	Pass
0.0043	154577	0	0	Pass
0.0044	149764	0	0	Pass
0.0045	145123	0	0	Pass
0.0046	140738	0	0	Pass
0.0047	136461	0	0	Pass
0.0048	132247	0	0	Pass
0.0049	128183	0	0	Pass
0.0050	124248	0	0	Pass
0.0051	120526	0	0	Pass
0.0052	116933	0	0	Pass
0.0053	113468	0	0	Pass
0.0054	110152	0	0	Pass
0.0055	107030	0	0	Pass
0.0057	104014	0	0	Pass
0.0058	101062	0	0	Pass
0.0059	98239	0	0	Pass

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0.0060	95522	0	0	Pass
0.0061	92849	0	0	Pass
0.0062	90239	0	0	Pass
0.0063	87673	0	0	Pass
0.0064	85277	0	0	Pass
0.0065	83010	0	0	Pass
0.0066	80764	0	0	Pass
0.0067	78625	0	0	Pass
0.0068	76529	0	0	Pass
0.0069	74412	0	0	Pass
0.0070	72380	0	0	Pass
0.0071	70369	0	0	Pass
0.0073	68487	0	0	Pass
0.0074	66626	0	0	Pass
0.0075	64851	0	0	Pass
0.0076	63118	0	0	Pass
0.0077	61429	0	0	Pass
0.0078	59846	0	0	Pass
0.0079	58284	0	0	Pass
0.0080	56787	0	0	Pass
0.0081	55269	0	0	Pass
0.0082	53836	0	0	Pass
0.0083	52445	0	0	Pass
0.0084	51055	0	0	Pass
0.0085	49772	0	0	Pass
0.0086	48488	0	0	Pass
0.0088	47312	0	0	Pass
0.0089	46114	0	0	Pass
0.0090	44981	0	0	Pass
0.0091	43868	0	0	Pass
0.0092	42799	0	0	Pass
0.0093	41751	0	0	Pass
0.0094	40681	0	0	Pass
0.0095	39719	0	0	Pass
0.0096	38714	0	0	Pass
0.0097	37730	0	0	Pass
0.0098	36767	0	0	Pass
0.0099	35826	0	0	Pass
0.0100	34949	0	0	Pass
0.0101	34072	0	0	Pass
0.0102	33281	0	0	Pass
0.0104	32447	0	0	Pass
0.0105	31613	0	0	Pass
0.0106	30864	0	0	Pass
0.0107	30115	0	0	Pass
0.0108	29388	0	0	Pass
0.0109	28725	0	0	Pass
0.0110	28041	0	0	Pass
0.0111	27378	0	0	Pass
0.0112	26693	0	0	Pass
0.0113	26116	0	0	Pass
0.0114	25474	0	0	Pass
0.0115	24832	0	0	Pass
0.0116	24298	0	0	Pass
0.0117	23699	0	0	Pass

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0.0119	23100	0	0	Pass
0.0120	22608	0	0	Pass
0.0121	22073	0	0	Pass
0.0122	21539	0	0	Pass
0.0123	21079	0	0	Pass
0.0124	20587	0	0	Pass
0.0125	20084	0	0	Pass
0.0126	19590	0	0	Pass

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 Water Quality Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration Credit	Percent Infiltrated	Comment Percent Water Quality Treated
Gravel Trench Bed 1 POC	N	104.05			N	100.00	
Total Volume Infiltrated		104.05	0.00	0.00		100.00	0.00
						0%	No Treat. Credit

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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WWHM2012
PROJECT REPORT

Project Name: Roof Infiltration_20220608
Site Name:
Site Address:
City :
Report Date: 6/8/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Roofs
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	.5
Pervious Total	0.5

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.5

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Roofs
Bypass: No

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GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
ROOF TOPS FLAT	0.45
Impervious Total	0.45
Basin Total	0.45

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Name : Gravel Trench Bed 1
Bottom Length: 140.00 ft.
Bottom Width: 17.00 ft.
Trench bottom slope 1: 0 To 1
Trench Left side slope 0: 0 To 1
Trench right side slope 2: 0 To 1
Material thickness of first layer: 2.5
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: 2
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 87.008
Total Volume Through Riser (ac-ft.): 0.003
Total Volume Through Facility (ac-ft.): 87.011
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 2 ft.
Riser Diameter: 12 in.

Element Flows To:

Outlet 1	Outlet 2

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Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.054	0.000	0.000	0.000
0.0278	0.054	0.000	0.000	0.110
0.0556	0.054	0.000	0.000	0.110
0.0833	0.054	0.001	0.000	0.110
0.1111	0.054	0.001	0.000	0.110
0.1389	0.054	0.002	0.000	0.110
0.1667	0.054	0.002	0.000	0.110
0.1944	0.054	0.003	0.000	0.110
0.2222	0.054	0.003	0.000	0.110
0.2500	0.054	0.004	0.000	0.110
0.2778	0.054	0.004	0.000	0.110
0.3056	0.054	0.005	0.000	0.110
0.3333	0.054	0.005	0.000	0.110
0.3611	0.054	0.005	0.000	0.110
0.3889	0.054	0.006	0.000	0.110
0.4167	0.054	0.006	0.000	0.110
0.4444	0.054	0.007	0.000	0.110
0.4722	0.054	0.007	0.000	0.110
0.5000	0.054	0.008	0.000	0.110
0.5278	0.054	0.008	0.000	0.110
0.5556	0.054	0.009	0.000	0.110
0.5833	0.054	0.009	0.000	0.110
0.6111	0.054	0.010	0.000	0.110
0.6389	0.054	0.010	0.000	0.110
0.6667	0.054	0.010	0.000	0.110
0.6944	0.054	0.011	0.000	0.110
0.7222	0.054	0.011	0.000	0.110
0.7500	0.054	0.012	0.000	0.110
0.7778	0.054	0.012	0.000	0.110
0.8056	0.054	0.013	0.000	0.110
0.8333	0.054	0.013	0.000	0.110
0.8611	0.054	0.014	0.000	0.110
0.8889	0.054	0.014	0.000	0.110
0.9167	0.054	0.015	0.000	0.110
0.9444	0.054	0.015	0.000	0.110
0.9722	0.054	0.015	0.000	0.110
1.0000	0.054	0.016	0.000	0.110
1.0278	0.054	0.016	0.000	0.110
1.0556	0.054	0.017	0.000	0.110
1.0833	0.054	0.017	0.000	0.110
1.1111	0.054	0.018	0.000	0.110
1.1389	0.054	0.018	0.000	0.110
1.1667	0.054	0.019	0.000	0.110
1.1944	0.054	0.019	0.000	0.110
1.2222	0.054	0.020	0.000	0.110
1.2500	0.054	0.020	0.000	0.110
1.2778	0.054	0.020	0.000	0.110
1.3056	0.054	0.021	0.000	0.110
1.3333	0.054	0.021	0.000	0.110
1.3611	0.054	0.022	0.000	0.110
1.3889	0.054	0.022	0.000	0.110
1.4167	0.054	0.023	0.000	0.110
1.4444	0.054	0.023	0.000	0.110
1.4722	0.054	0.024	0.000	0.110

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1.5000	0.054	0.024	0.000	0.110
1.5278	0.054	0.025	0.000	0.110
1.5556	0.054	0.025	0.000	0.110
1.5833	0.054	0.026	0.000	0.110
1.6111	0.054	0.026	0.000	0.110
1.6389	0.054	0.026	0.000	0.110
1.6667	0.054	0.027	0.000	0.110
1.6944	0.054	0.027	0.000	0.110
1.7222	0.054	0.028	0.000	0.110
1.7500	0.054	0.028	0.000	0.110
1.7778	0.054	0.029	0.000	0.110
1.8056	0.054	0.029	0.000	0.110
1.8333	0.054	0.030	0.000	0.110
1.8611	0.054	0.030	0.000	0.110
1.8889	0.054	0.031	0.000	0.110
1.9167	0.054	0.031	0.000	0.110
1.9444	0.054	0.031	0.000	0.110
1.9722	0.054	0.032	0.000	0.110
2.0000	0.054	0.032	0.000	0.110
2.0278	0.054	0.033	0.049	0.110
2.0556	0.054	0.033	0.138	0.110
2.0833	0.054	0.034	0.254	0.110
2.1111	0.054	0.034	0.389	0.110
2.1389	0.054	0.035	0.540	0.110
2.1667	0.054	0.035	0.703	0.110
2.1944	0.054	0.036	0.873	0.110
2.2222	0.054	0.036	1.046	0.110
2.2500	0.054	0.036	1.217	0.110
2.2778	0.054	0.037	1.383	0.110
2.3056	0.054	0.037	1.540	0.110
2.3333	0.054	0.038	1.683	0.110
2.3611	0.054	0.038	1.811	0.110
2.3889	0.054	0.039	1.921	0.110
2.4167	0.054	0.039	2.013	0.110
2.4444	0.054	0.040	2.088	0.110
2.4722	0.054	0.040	2.149	0.110
2.5000	0.054	0.041	2.203	0.110

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.5
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.45

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Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.0168
5 year	0.025772
10 year	0.032691
25 year	0.042591
50 year	0.050836
100 year	0.059853

Flow Frequency Return Periods for Mitigated. POC #1

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

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.017	0.000
1950	0.017	0.000
1951	0.015	0.000
1952	0.012	0.000
1953	0.010	0.000
1954	0.055	0.000
1955	0.022	0.000
1956	0.019	0.000
1957	0.024	0.000
1958	0.017	0.000
1959	0.017	0.000
1960	0.016	0.000
1961	0.030	0.062
1962	0.015	0.000
1963	0.024	0.000
1964	0.017	0.000
1965	0.015	0.000
1966	0.009	0.000
1967	0.017	0.000
1968	0.021	0.000
1969	0.051	0.000
1970	0.012	0.000
1971	0.019	0.000
1972	0.014	0.000
1973	0.013	0.000
1974	0.029	0.000
1975	0.012	0.000
1976	0.012	0.000
1977	0.010	0.000
1978	0.012	0.000
1979	0.034	0.000

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1980	0.016	0.000
1981	0.012	0.000
1982	0.016	0.000
1983	0.027	0.000
1984	0.016	0.000
1985	0.020	0.000
1986	0.047	0.000
1987	0.022	0.000
1988	0.012	0.000
1989	0.012	0.000
1990	0.016	0.000
1991	0.016	0.000
1992	0.012	0.000
1993	0.010	0.000
1994	0.011	0.000
1995	0.016	0.000
1996	0.028	0.000
1997	0.056	0.000
1998	0.010	0.000
1999	0.013	0.000
2000	0.010	0.000
2001	0.004	0.000
2002	0.015	0.000
2003	0.012	0.000
2004	0.020	0.000
2005	0.014	0.000
2006	0.037	0.000
2007	0.029	0.000
2008	0.041	0.000
2009	0.013	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0557	0.0618
2	0.0549	0.0000
3	0.0512	0.0000
4	0.0469	0.0000
5	0.0414	0.0000
6	0.0373	0.0000
7	0.0336	0.0000
8	0.0298	0.0000
9	0.0295	0.0000
10	0.0288	0.0000
11	0.0280	0.0000
12	0.0273	0.0000
13	0.0243	0.0000
14	0.0236	0.0000
15	0.0224	0.0000
16	0.0216	0.0000
17	0.0211	0.0000
18	0.0201	0.0000
19	0.0200	0.0000
20	0.0191	0.0000

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21	0.0191	0.0000
22	0.0175	0.0000
23	0.0173	0.0000
24	0.0172	0.0000
25	0.0171	0.0000
26	0.0169	0.0000
27	0.0168	0.0000
28	0.0165	0.0000
29	0.0164	0.0000
30	0.0161	0.0000
31	0.0160	0.0000
32	0.0158	0.0000
33	0.0157	0.0000
34	0.0157	0.0000
35	0.0153	0.0000
36	0.0152	0.0000
37	0.0147	0.0000
38	0.0146	0.0000
39	0.0141	0.0000
40	0.0140	0.0000
41	0.0134	0.0000
42	0.0133	0.0000
43	0.0126	0.0000
44	0.0123	0.0000
45	0.0123	0.0000
46	0.0121	0.0000
47	0.0121	0.0000
48	0.0121	0.0000
49	0.0121	0.0000
50	0.0119	0.0000
51	0.0118	0.0000
52	0.0117	0.0000
53	0.0116	0.0000
54	0.0112	0.0000
55	0.0102	0.0000
56	0.0102	0.0000
57	0.0102	0.0000
58	0.0101	0.0000
59	0.0100	0.0000
60	0.0085	0.0000
61	0.0040	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0084	19590	4	0	Pass
0.0088	16987	4	0	Pass
0.0093	14662	4	0	Pass
0.0097	12726	4	0	Pass
0.0101	10934	4	0	Pass

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0.0105	9443	4	0	Pass
0.0110	8168	4	0	Pass
0.0114	7075	4	0	Pass
0.0118	6145	4	0	Pass
0.0123	5319	4	0	Pass
0.0127	4661	4	0	Pass
0.0131	4070	4	0	Pass
0.0135	3553	4	0	Pass
0.0140	3136	4	0	Pass
0.0144	2759	4	0	Pass
0.0148	2453	4	0	Pass
0.0153	2154	4	0	Pass
0.0157	1895	4	0	Pass
0.0161	1657	4	0	Pass
0.0165	1508	4	0	Pass
0.0170	1370	4	0	Pass
0.0174	1250	4	0	Pass
0.0178	1154	4	0	Pass
0.0183	1071	4	0	Pass
0.0187	1009	4	0	Pass
0.0191	950	4	0	Pass
0.0195	888	3	0	Pass
0.0200	825	3	0	Pass
0.0204	777	3	0	Pass
0.0208	733	3	0	Pass
0.0213	687	3	0	Pass
0.0217	649	3	0	Pass
0.0221	622	3	0	Pass
0.0225	602	3	0	Pass
0.0230	583	3	0	Pass
0.0234	561	2	0	Pass
0.0238	538	2	0	Pass
0.0243	507	2	0	Pass
0.0247	488	2	0	Pass
0.0251	473	2	0	Pass
0.0255	457	2	0	Pass
0.0260	440	2	0	Pass
0.0264	424	2	0	Pass
0.0268	409	2	0	Pass
0.0273	394	2	0	Pass
0.0277	380	2	0	Pass
0.0281	368	2	0	Pass
0.0285	353	2	0	Pass
0.0290	341	2	0	Pass
0.0294	333	2	0	Pass
0.0298	322	2	0	Pass
0.0303	313	2	0	Pass
0.0307	304	2	0	Pass
0.0311	293	2	0	Pass
0.0315	284	2	0	Pass
0.0320	276	2	0	Pass
0.0324	265	2	0	Pass
0.0328	257	2	0	Pass
0.0333	241	2	0	Pass
0.0337	234	2	0	Pass

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0.0341	226	2	0	Pass
0.0345	212	2	0	Pass
0.0350	205	2	0	Pass
0.0354	195	2	1	Pass
0.0358	187	2	1	Pass
0.0363	177	2	1	Pass
0.0367	166	2	1	Pass
0.0371	160	2	1	Pass
0.0375	150	2	1	Pass
0.0380	146	2	1	Pass
0.0384	135	2	1	Pass
0.0388	128	2	1	Pass
0.0393	120	2	1	Pass
0.0397	111	2	1	Pass
0.0401	99	2	2	Pass
0.0405	85	2	2	Pass
0.0410	75	2	2	Pass
0.0414	63	2	3	Pass
0.0418	59	2	3	Pass
0.0423	56	2	3	Pass
0.0427	49	2	4	Pass
0.0431	42	2	4	Pass
0.0435	39	2	5	Pass
0.0440	37	2	5	Pass
0.0444	36	2	5	Pass
0.0448	30	2	6	Pass
0.0453	28	2	7	Pass
0.0457	26	2	7	Pass
0.0461	19	2	10	Pass
0.0465	16	2	12	Pass
0.0470	13	2	15	Pass
0.0474	8	2	25	Pass
0.0478	6	2	33	Pass
0.0483	5	2	40	Pass
0.0487	4	2	50	Pass
0.0491	4	2	50	Pass
0.0496	3	2	66	Pass
0.0500	3	2	66	Pass
0.0504	3	2	66	Pass
0.0508	3	2	66	Pass

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 Water Quality	Total Volume Percent Treatment?	Volume Needs	Infiltration Through	Infiltration Volume	Cumulative Volume	Comment

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Volume	Water Quality	Treatment	Facility	(ac-ft.)	Infiltration
Infiltrated	Treated	(ac-ft)	(ac-ft)		Credit
Gravel Trench Bed 1 POC	N	79.18			N
100.00					
Total Volume Infiltrated		79.18	0.00	0.00	
100.00 0.00	0%	No Treat. Credit			

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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WWHM2012
PROJECT REPORT

Project Name: Pervious Pavement 20220608
Site Name:
Site Address:
City :
Report Date: 6/22/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Pervious Driveways (Units 1-4 & 12-22)
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	.11
Pervious Total	0.11

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.11

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Permeable Pavement 1
Pavement Area: 0.1125 ft.
Pavement Length: 70.00 ft.

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Pavement Width: 70.00 ft.
Pavement slope 1: 0 To 1
Pavement thickness: 0.5
Pour Space of Pavement: 0.4
Material thickness of second layer: 0.75
Pour Space of material for second layer: 0.3
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 2
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 20.318
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 20.318
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 1.354

Element Flows To:
Outlet 1 **Outlet 2**

Permeable Pavement Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.112	0.000	0.000	0.000
0.0139	0.112	0.000	0.000	0.226
0.0278	0.112	0.000	0.000	0.226
0.0417	0.112	0.001	0.000	0.226
0.0556	0.112	0.001	0.000	0.226
0.0694	0.112	0.002	0.000	0.226
0.0833	0.112	0.002	0.000	0.226
0.0972	0.112	0.003	0.000	0.226
0.1111	0.112	0.003	0.000	0.226
0.1250	0.112	0.004	0.000	0.226
0.1389	0.112	0.004	0.000	0.226
0.1528	0.112	0.005	0.000	0.226
0.1667	0.112	0.005	0.000	0.226
0.1806	0.112	0.006	0.000	0.226
0.1944	0.112	0.006	0.000	0.226
0.2083	0.112	0.007	0.000	0.226
0.2222	0.112	0.007	0.000	0.226
0.2361	0.112	0.008	0.000	0.226
0.2500	0.112	0.008	0.000	0.226
0.2639	0.112	0.008	0.000	0.226
0.2778	0.112	0.009	0.000	0.226
0.2917	0.112	0.009	0.000	0.226
0.3056	0.112	0.010	0.000	0.226
0.3194	0.112	0.010	0.000	0.226
0.3333	0.112	0.011	0.000	0.226
0.3472	0.112	0.011	0.000	0.226
0.3611	0.112	0.012	0.000	0.226
0.3750	0.112	0.012	0.000	0.226

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0.3889	0.112	0.013	0.000	0.226
0.4028	0.112	0.013	0.000	0.226
0.4167	0.112	0.014	0.000	0.226
0.4306	0.112	0.014	0.000	0.226
0.4444	0.112	0.015	0.000	0.226
0.4583	0.112	0.015	0.000	0.226
0.4722	0.112	0.015	0.000	0.226
0.4861	0.112	0.016	0.000	0.226
0.5000	0.112	0.016	0.000	0.226
0.5139	0.112	0.017	0.000	0.226
0.5278	0.112	0.017	0.000	0.226
0.5417	0.112	0.018	0.000	0.226
0.5556	0.112	0.018	0.000	0.226
0.5694	0.112	0.019	0.000	0.226
0.5833	0.112	0.019	0.000	0.226
0.5972	0.112	0.020	0.000	0.226
0.6111	0.112	0.020	0.000	0.226
0.6250	0.112	0.021	0.000	0.226
0.6389	0.112	0.021	0.000	0.226
0.6528	0.112	0.022	0.000	0.226
0.6667	0.112	0.022	0.000	0.226
0.6806	0.112	0.023	0.000	0.226
0.6944	0.112	0.023	0.000	0.226
0.7083	0.112	0.023	0.000	0.226
0.7222	0.112	0.024	0.000	0.226
0.7361	0.112	0.024	0.000	0.226
0.7500	0.112	0.025	0.000	0.226
0.7639	0.112	0.025	0.000	0.226
0.7778	0.112	0.026	0.000	0.226
0.7917	0.112	0.027	0.000	0.226
0.8056	0.112	0.027	0.000	0.226
0.8194	0.112	0.028	0.000	0.226
0.8333	0.112	0.029	0.000	0.226
0.8472	0.112	0.029	0.000	0.226
0.8611	0.112	0.030	0.000	0.226
0.8750	0.112	0.030	0.000	0.226
0.8889	0.112	0.031	0.000	0.226
0.9028	0.112	0.032	0.000	0.226
0.9167	0.112	0.032	0.000	0.226
0.9306	0.112	0.033	0.000	0.226
0.9444	0.112	0.034	0.000	0.226
0.9583	0.112	0.034	0.000	0.226
0.9722	0.112	0.035	0.000	0.226
0.9861	0.112	0.035	0.000	0.226
1.0000	0.112	0.036	0.000	0.226
1.0139	0.112	0.037	0.000	0.226
1.0278	0.112	0.037	0.000	0.226
1.0417	0.112	0.038	0.000	0.226
1.0556	0.112	0.039	0.000	0.226
1.0694	0.112	0.039	0.000	0.226
1.0833	0.112	0.040	0.000	0.226
1.0972	0.112	0.040	0.000	0.226
1.1111	0.112	0.041	0.000	0.226
1.1250	0.112	0.042	0.000	0.226
1.1389	0.112	0.042	0.000	0.226

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1.1528	0.112	0.043	0.000	0.226
1.1667	0.112	0.044	0.000	0.226
1.1806	0.112	0.044	0.000	0.226
1.1944	0.112	0.045	0.000	0.226
1.2083	0.112	0.045	0.000	0.226
1.2222	0.112	0.046	0.000	0.226
1.2361	0.112	0.047	0.000	0.226
1.2500	0.112	0.047	0.000	0.226

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.11
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.112489

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.003696
5 year	0.00567
10 year	0.007192
25 year	0.00937
50 year	0.011184
100 year	0.013168

Flow Frequency Return Periods for Mitigated. POC #1

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

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.004	0.000
1950	0.004	0.000
1951	0.003	0.000
1952	0.003	0.000
1953	0.002	0.000

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1954	0.012	0.000
1955	0.005	0.000
1956	0.004	0.000
1957	0.005	0.000
1958	0.004	0.000
1959	0.004	0.000
1960	0.003	0.000
1961	0.007	0.000
1962	0.003	0.000
1963	0.005	0.000
1964	0.004	0.000
1965	0.003	0.000
1966	0.002	0.000
1967	0.004	0.000
1968	0.005	0.000
1969	0.011	0.000
1970	0.003	0.000
1971	0.004	0.000
1972	0.003	0.000
1973	0.003	0.000
1974	0.006	0.000
1975	0.003	0.000
1976	0.003	0.000
1977	0.002	0.000
1978	0.003	0.000
1979	0.007	0.000
1980	0.003	0.000
1981	0.003	0.000
1982	0.004	0.000
1983	0.006	0.000
1984	0.004	0.000
1985	0.004	0.000
1986	0.010	0.000
1987	0.005	0.000
1988	0.003	0.000
1989	0.003	0.000
1990	0.003	0.000
1991	0.004	0.000
1992	0.003	0.000
1993	0.002	0.000
1994	0.002	0.000
1995	0.004	0.000
1996	0.006	0.000
1997	0.012	0.000
1998	0.002	0.000
1999	0.003	0.000
2000	0.002	0.000
2001	0.001	0.000
2002	0.003	0.000
2003	0.003	0.000
2004	0.004	0.000
2005	0.003	0.000
2006	0.008	0.000
2007	0.006	0.000
2008	0.009	0.000

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2009 0.003 0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0122	0.0000
2	0.0121	0.0000
3	0.0113	0.0000
4	0.0103	0.0000
5	0.0091	0.0000
6	0.0082	0.0000
7	0.0074	0.0000
8	0.0066	0.0000
9	0.0065	0.0000
10	0.0063	0.0000
11	0.0062	0.0000
12	0.0060	0.0000
13	0.0053	0.0000
14	0.0052	0.0000
15	0.0049	0.0000
16	0.0048	0.0000
17	0.0046	0.0000
18	0.0044	0.0000
19	0.0044	0.0000
20	0.0042	0.0000
21	0.0042	0.0000
22	0.0038	0.0000
23	0.0038	0.0000
24	0.0038	0.0000
25	0.0038	0.0000
26	0.0037	0.0000
27	0.0037	0.0000
28	0.0036	0.0000
29	0.0036	0.0000
30	0.0035	0.0000
31	0.0035	0.0000
32	0.0035	0.0000
33	0.0035	0.0000
34	0.0034	0.0000
35	0.0034	0.0000
36	0.0034	0.0000
37	0.0032	0.0000
38	0.0032	0.0000
39	0.0031	0.0000
40	0.0031	0.0000
41	0.0029	0.0000
42	0.0029	0.0000
43	0.0028	0.0000
44	0.0027	0.0000
45	0.0027	0.0000
46	0.0027	0.0000
47	0.0027	0.0000
48	0.0027	0.0000
49	0.0027	0.0000

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50	0.0026	0.0000
51	0.0026	0.0000
52	0.0026	0.0000
53	0.0026	0.0000
54	0.0025	0.0000
55	0.0023	0.0000
56	0.0022	0.0000
57	0.0022	0.0000
58	0.0022	0.0000
59	0.0022	0.0000
60	0.0019	0.0000
61	0.0009	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0018	19590	0	0	Pass
0.0019	16993	0	0	Pass
0.0020	14675	0	0	Pass
0.0021	12741	0	0	Pass
0.0022	10925	0	0	Pass
0.0023	9439	0	0	Pass
0.0024	8173	0	0	Pass
0.0025	7075	0	0	Pass
0.0026	6130	0	0	Pass
0.0027	5313	0	0	Pass
0.0028	4654	0	0	Pass
0.0029	4066	0	0	Pass
0.0030	3551	0	0	Pass
0.0031	3140	0	0	Pass
0.0032	2759	0	0	Pass
0.0033	2447	0	0	Pass
0.0034	2145	0	0	Pass
0.0035	1892	0	0	Pass
0.0035	1656	0	0	Pass
0.0036	1508	0	0	Pass
0.0037	1370	0	0	Pass
0.0038	1250	0	0	Pass
0.0039	1154	0	0	Pass
0.0040	1069	0	0	Pass
0.0041	1009	0	0	Pass
0.0042	950	0	0	Pass
0.0043	888	0	0	Pass
0.0044	825	0	0	Pass
0.0045	777	0	0	Pass
0.0046	733	0	0	Pass
0.0047	686	0	0	Pass
0.0048	648	0	0	Pass
0.0049	622	0	0	Pass
0.0050	602	0	0	Pass

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0.0051	583	0	0	Pass
0.0051	561	0	0	Pass
0.0052	538	0	0	Pass
0.0053	506	0	0	Pass
0.0054	487	0	0	Pass
0.0055	473	0	0	Pass
0.0056	457	0	0	Pass
0.0057	440	0	0	Pass
0.0058	424	0	0	Pass
0.0059	408	0	0	Pass
0.0060	394	0	0	Pass
0.0061	380	0	0	Pass
0.0062	368	0	0	Pass
0.0063	353	0	0	Pass
0.0064	341	0	0	Pass
0.0065	333	0	0	Pass
0.0066	322	0	0	Pass
0.0067	313	0	0	Pass
0.0068	302	0	0	Pass
0.0068	293	0	0	Pass
0.0069	284	0	0	Pass
0.0070	276	0	0	Pass
0.0071	265	0	0	Pass
0.0072	257	0	0	Pass
0.0073	241	0	0	Pass
0.0074	234	0	0	Pass
0.0075	224	0	0	Pass
0.0076	212	0	0	Pass
0.0077	205	0	0	Pass
0.0078	195	0	0	Pass
0.0079	187	0	0	Pass
0.0080	177	0	0	Pass
0.0081	166	0	0	Pass
0.0082	160	0	0	Pass
0.0083	150	0	0	Pass
0.0084	146	0	0	Pass
0.0084	135	0	0	Pass
0.0085	128	0	0	Pass
0.0086	120	0	0	Pass
0.0087	111	0	0	Pass
0.0088	99	0	0	Pass
0.0089	85	0	0	Pass
0.0090	75	0	0	Pass
0.0091	63	0	0	Pass
0.0092	59	0	0	Pass
0.0093	56	0	0	Pass
0.0094	49	0	0	Pass
0.0095	42	0	0	Pass
0.0096	39	0	0	Pass
0.0097	37	0	0	Pass
0.0098	36	0	0	Pass
0.0099	30	0	0	Pass
0.0100	28	0	0	Pass
0.0101	26	0	0	Pass
0.0101	20	0	0	Pass

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0.0102	16	0	0	Pass
0.0103	14	0	0	Pass
0.0104	9	0	0	Pass
0.0105	6	0	0	Pass
0.0106	5	0	0	Pass
0.0107	4	0	0	Pass
0.0108	4	0	0	Pass
0.0109	3	0	0	Pass
0.0110	3	0	0	Pass
0.0111	3	0	0	Pass
0.0112	3	0	0	Pass

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	Total Volume	Volume	Infiltration	Cumulative	Percent	Water Quality	Percent	Comment
	Treatment?	Needs	Through	Volume	Volume				
		Treatment	Facility	(ac-ft.)	Infiltration				
		(ac-ft)	(ac-ft)		Credit				
Permeable Pavement 1 POC	N	18.49			N				
100.00									
Total Volume Infiltrated		18.49	0.00	0.00					
100.00	0.00	0%	No Treat. Credit						

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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WWHM2012
PROJECT REPORT

Project Name: Perkfilter-1
Site Name:
Site Address:
City :
Report Date: 6/22/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	.15
Pervious Total	0.15

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.15

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Perkfilter-1
Bypass: No

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GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
ROADS FLAT	0.12
SIDEWALKS FLAT	0.03
Impervious Total	0.15
Basin Total	0.15

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.15
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.15

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.00504
5 year	0.007732
10 year	0.009807
25 year	0.012777
50 year	0.015251
100 year	0.017956

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.013384
5 year	0.016712
10 year	0.019045
25 year	0.022145
50 year	0.024568
100 year	0.027091

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

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.0181 **acre-feet**
On-line facility target flow: 0.029 **cfs.**
Adjusted for 15 min: 0.029 **cfs.**
Off-line facility target flow: 0.0164 **cfs.**
Adjusted for 15 min: 0.0164 **cfs.**

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WWHM2012
PROJECT REPORT

Project Name: Perkfilter-2
Site Name:
Site Address:
City :
Report Date: 6/22/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	.15
Pervious Total	0.15

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.15

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Perkfilter-2
Bypass: No

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GroundWater: No

Pervious Land Use	acre
C, Pasture, Flat	.02
Pervious Total	0.02

Impervious Land Use	acre
ROADS FLAT	0.06
SIDEWALKS FLAT	0.02
Impervious Total	0.08
Basin Total	0.1

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.15
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.02
Total Impervious Area:0.08

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.00504
5 year	0.007732
10 year	0.009807
25 year	0.012777
50 year	0.015251
100 year	0.017956

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.007396
5 year	0.009304
10 year	0.010649
25 year	0.012444
50 year	0.013854
100 year	0.015327

The development has an increase in flow durations
from 1/2 Predeveloped 2 year flow to the 2 year flow

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

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.01 acre-feet
On-line facility target flow: 0.0151 cfs.
Adjusted for 15 min: 0.0151 cfs.
Off-line facility target flow: 0.0085 cfs.
Adjusted for 15 min: 0.0085 cfs.

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WWHM2012
PROJECT REPORT

Project Name: Perkfilter-3
Site Name:
Site Address:
City :
Report Date: 6/28/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2021/08/18
Version : 4.2.18

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	.4
Pervious Total	0.4

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.4

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Perkfilter-3
Bypass: No

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GroundWater: No

Pervious Land Use	acre
C, Pasture, Flat	.14
Pervious Total	0.14

Impervious Land Use	acre
ROADS FLAT	0.21
SIDEWALKS FLAT	0.05
Impervious Total	0.26
Basin Total	0.4

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.4
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.14
Total Impervious Area:0.26

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.01344
5 year	0.020618
10 year	0.026153
25 year	0.034073
50 year	0.040669
100 year	0.047882

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.025054
5 year	0.031803
10 year	0.036596
25 year	0.043032
50 year	0.04811
100 year	0.053438

Water Quality BMP Flow and Volume for POC #1

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On-line facility volume: 0.0344 **acre-feet**
On-line facility target flow: 0.0483 **cfs.**
Adjusted for 15 min: 0.0483 **cfs.**
Off-line facility target flow: 0.0273 **cfs.**
Adjusted for 15 min: 0.0273 **cfs.**

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SECTION 5: CONVEYANCE DESIGN

Conveyance analysis and design will be included in the construction drainage report to be submitted at a later date.

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Table V-4.5.2(3) Maintenance Standards - Closed Detention Systems (Tanks/Vaults) (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 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 normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See "Catch Basins" (No. 5)	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(4) Maintenance Standards - Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as

Table V-4.5.2(4) Maintenance Standards - Control Structure/Flow Restrictor (continued)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
		are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).
Catch Basin	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(5) Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks. Frame is sit-

Table V-4.5.2(5) Maintenance Standards - Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	ting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 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.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
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	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into	Mechanism opens with

Table V-4.5.2(5) Maintenance Standards - Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Working	frame have less than 1/2 inch of thread.	proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (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, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	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.

Table V-4.5.2(6) Maintenance Standards - Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4

Table V-4.5.2(1) Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

Table V-4.5.2(2) Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Poisonous/Noxious Vegetation	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Contaminants and Pollution	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Rodent Holes	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1)
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate	Sediment is removed

Table V-4.5.2(2) Maintenance Standards - Infiltration (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	and/or facility is cleaned so that infiltration system works according to design.
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Piping	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway	Rock Missing	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

SECTION 6: OPERATIONS AND MAINTENANCE MANUAL

The proposed storm drainage system consists of buried pipes, catch basins, Perkfilter water quality treatment units, infiltration trenches, pervious pavement driveways, and two Perkfilter catch basin structures. These facilities will require periodic maintenance and inspection. Inspection and maintenance procedures are contained on the following pages.

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SECTION 7: SPECIAL REPORTS AND STUDIES

The following studies were conducted in preparation of this Report:

"Geotechnical Engineering Study – Proposed Residential Development, Balam 6-Plex", Earth Solutions Northwest, January, 2021

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