LAND TECHNOLOGIES, INC.
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MAKING A "WAY" OUT OF "NO WAY"

163 Business Park LLC

163XX Smokey Point BLVD, Marysville, WA 98271

PN PA23016

LDA Submittal: July 2023

2nd Submittal: February 2024

Stormwater Site Plan Report for 163 RV Storage

Prepared by:
Mier Zhou, P.E.
360-652-9727
Email: Mier@landtechway.com

TYLER S. FOSTER
STATE OF WASHINGTON
53726
REGISTERED
PROFESSIONAL ENGINEER

02/12/2024

Reviewed by:
Tyler Foster, P.E.
360-653-9727
Email: Tyler@landtechway.com

Contents

Figures

Tables

Acronyms

The following acronyms and abbreviations may or may not be called out within the body of this report.

- ASTM - American Society for Testing and Materials
- BMPs - Best Management Practices
- CB - Catch Basin
- CAO - Critical Areas Ordinance
- CESCL - Certified Erosion and Sediment Control Lead
- DOE - Department of Ecology
- EDDS - Engineering Design & Development Standards
- FEMA - Federal Emergency Management Agency
- HSPF - Hydrological Simulation Program—Fortran
- LiDAR - Light Detecting And Ranging
- LDA - Land disturbing activity
- LID - Low Impact Development
- LID Manual - DOE 2005 LID Technical Guidance Manual for Puget Sound
- MRs - Minimum Requirements (for Stormwater Management)
- MS4 - Municipal Separate Storm Sewer System
- MSL - Mean Sea Level
- NAVD88 - North American Vertical Datum of 1888
- NGVD29 - National Geodetic Vertical Datum of 1929
- NPDES - National Pollutant Discharge Elimination System
- NRCS - Natural Resources Conservation Service
- NPGIS - Non-Pollutant Generating Impervious Surface
- O&M - Operations and Maintenance
- PGIS - Pollutant Generating Impervious Surface
- PGPS - Pollutant Generating Pervious Surface
- PLSS - Public Land Survey System
- POC - Point of Compliance
- RCW - Revised Code of Washington
- ROW - Right-of-Way
- SCDM-2010 - Snohomish County 2010 Drainage Manual
- SMMWW - DOE 2005 Stormwater Management Manual for Western Washington
- SWPPP - Stormwater Pollution Prevention Plan
- TDA - Threshold Discharge Area
- TESC - Temporary Erosion and Sediment Controls
- USDA - United States Department of Agriculture
- US EPA - United States Environmental Protection Agency
- WSDOT - Washington State Department of Transportation
- WWHM - Western Washington Hydrology Model

Section 1 – Report Summary

1.1 Project Description

163 Business Park LLC is proposing an RV storage site. The proposed site plan approval and subsequent grading permit will be on 10.01-*acres* of land in northern Marysville, WA off Smokey Point Blvd.

The parcel is currently vacant undeveloped wooded land. There is a Category III depression wetland located partially within the eastern portion of the site.

The entire parcel will be cleared. It is likely that some imported fill material will be needed to raise the site for separation to the groundwater table. Groundwater monitoring piezometers are currently in place for the 2023 Wet Season. The stormwater management strategy presented within this report assumes a very shallow groundwater depth to ensure feasibility for the design.

Access to the site will be from Smokey Point Blvd through lots on the west.

Three canopy RV storage areas will be centrally located in the parcel with six enclosed RV buildings along the perimeter of the site.

Stormwater management design will enforce LID Principles utilizing LID BMPs consistent with the DOE Stormwater Management Manual for Western Washington (SMMWW). LID Principles are to maintain natural hydrology to the maximum extent feasible. The project will employ interspersed stormwater management systems in lieu of a centralized collection system. The stormwater management system will consist of multiple bioretention cell BMPs and Rooftop Infiltration Trenches (BMP T5.10A). These BMPs will return rainfall to the soil column mimicking the natural vegetative systems that once presided on site.

The 2019 DOE Stormwater Management Manual for Western Washington adopted by City of Marysville will govern stormwater management practices and controls.

Per NRCS mappings, type “C/D” Custer fine sandy loam soils are found throughout the site. Sandy, permeable soils are found at depth.

The entire developable project area is in a single natural discharge area with a single discharge location to the onsite wetland. Stormwater BMPs will be employed to mitigate polluted and unpolluted surface water flows.

1.2 Project Data Summary

Existing and proposed project areas are presented for determination of stormwater management requirements based on prescribed thresholds as outlined in the Marysville Municipal Code (MMC 22C) and the 2019 SMMWW Vol-1, Ch-2, Section 2.4 are summarized in the following tables.

Table 1 - Project Parcel Summary

Project Data:	
Applicant	Richard Peterson
Site Owner	163 Business Park LLC
Project Name	163 RV Storage
Project T.S.R. Location	Twn 31 N, Rng 5 E, Sec 28, Qtr-SW
Project Address	163XX Smokey Point BLVD, Marysville, WA 98271
Parcel ID(s)	310528-003-016-00, 310528-003-017-00
Watershed	Snohomish
Basin	Snohomish
Sub-Basin	Quilceda Creek
WRIA Number	7
Analysis Standard	2019 DOE SMMWW

Table 2 - Project Area Analysis & Activities Summary

Existing Conditions:		
Total Site Area	435,940	sf (10.01 ac)
Existing Impervious Area	0	sf (0.00 ac) 0%
Proposed Activity:		
Proposed Activity	RV Storage	
Total Proposed Disturbance Area	387,895	sf (8.90 ac)
Proposed Grading Area	387,895	sf (8.90 ac)
Proposed New NPGIS	201,442	sf (4.62 ac)
Proposed New PGIS	144,211	sf (3.31 ac)
Proposed Replaced Impervious Area	0	sf (0.00 ac)
Native Vegetation convert to Lawn	0	sf (0.00 ac)
Native Vegetation convert to Pasture	0	sf (0.00 ac)
Total New Impervious Area	345,653	sf (7.94 ac)
Total Site Impervious Area (new+exist)	345,653	sf (7.94 ac)
Grading is ≤ 2 feet from P/L	No	
Any excavation 4+' at <1:1 slope to P/L	No	
Fill Slopes 4+' and >33% slope	No	

Section 2 - Minimum Requirements

2.1 Assessment of Minimum Requirements and Thresholds

Minimum requirements and thresholds are established by City of Marysville Municipal Code 14.15.050 – Minimum Requirements. Minimum Requirements for new development and Redevelopment are based on a development's disturbance area. Existing and proposed project areas for determination of stormwater management requirements are presented in Table 2.

The existing impervious area is less than 35% so this project qualifies as 'new development'. The proposed condition of the fully developed site will have impervious area less than 2,000 sf. The project does not convert more than 2.5 acres of native vegetation to pasture. The project does cause more than 7,000 *square feet* of land disturbing activity. This requires construction activities and stormwater management to comply with Minimum Requirements 1 through 9. A full construction SWPPP is also required.

Minimum Requirements per the SMMWW:

MR-1: Prepare Stormwater Site Plan. MMC.14.15.050 (1)

MR-2: Stormwater Pollution Prevention Plan (SWPPP). MMC.14.15.050 (2)

MR-3: Water pollution source control for new development. MMC.14.15.050 (3)

MR-4: Preservation of natural drainage systems and outfalls. MMC.14.15.050 (4)

MR-5: On-site stormwater management. MMC.14.15.050 (5)

MR-6: Runoff treatment. MMC.14.15.050 (6)

MR-7: Flow control requirements. MMC.14.15.050 (7)

MR-8: Detention or treatment in wetlands and wetland buffers. MMC.14.15.050 (8)

MR-9: Inspection, operation and maintenance requirements. MMC.14.15.050 (9)

Each Minimum Requirements is described in the following sections. There are no additional requirements to be met.

2.2 MR #1: Preparation of Stormwater Site Plans

This document is the Stormwater Site Plan Report that addresses the requirements of MR-1. This section presents the portion of the Stormwater Site Plan that includes recommendations, calculations, and procedures required to adhere to Minimum Requirement #1. The evaluation of the existing site conditions follows.

2.2.1 Site Location

The site is located in the SW quarter of Section 28 of Township 31 North, Range 5 East. The street address is 163XX Smokey Point BLVD, Marysville, WA 98271 and the parcel is located on the east side of Smokey Point Blvd. See Figure 1 for a vicinity map.

2.2.2 Site Description, Existing Conditions

The project site is 10.01-*acres* parcel. The parcels are owned by 163 Business Park LLC. The Snohomish County parcel numbers are 310528-003-016-00, 310528-003-017-00. They are zoned General Commercial and are located within City of Marysville inside Snohomish County.

The site is undeveloped and is predominantly forested. The existing drainage system(s) are undetermined but largely surface runoff to the east and some infiltration. Surface runoff overall flows east. Surface runoff is due to the silty top layer of Custer soils.

The site is pasture with some large trees.

All maps and figures are presented in the Support Data section of this document.

A vicinity map that shows the site location is shown as Figure 1.

A site map that shows the property lines is shown in Figure 4.

A topographic map that shows the site boundaries, study area boundaries, and the downstream flow-paths is also presented in Figure 3.

2.2.3 Existing Basin Analysis

The project is defined by the development within the subject parcel. Existing project flow paths are shown in Figure 2.

The study area is located in the Quilceda Creek sub-basin of the Snohomish Basin in the Snohomish watershed (WRIA-7), which drains to the Puget Sound.

All existing flow assessment and site related basin delineations were established by tracing analysis of a LIDAR surface model.

2.2.4 Other Information on the Study Area

The site is not in or adjacent to a USEPA Sole Source Aquifer.

The site is not in a well-head protection area.

The site is not in a floodway or floodplain.

2.2.5 Critical Areas

A large depression Category III wetland is located partially on the southeast portion of the site. Category III wetlands carry 75-ft buffer. The plant community within the wetland is hydrophytic. (Wetland Resources, Inc., 2022)

2.2.6 Topography

The site and surrounding topography was analyzed using survey topographic points provided by the Puget Sound Lidar Consortium. A 3D surface model was generated.

The site has mostly flat slopes with a low point around 115 *feet*. The low point is located within the on-site wetland. The site slopes up from the wetland to a high point of 118 *feet* along the north property boundary.

Slopes average in the range of 0 to 2 percent for the majority of the developable area. The site has an average slope of 0.5%.

2.2.7 Soils

The majority of the site is situated on Custer fine sandy loam soils, a hydrologic Type-C/D soil per the NRCS mapping. Custer fine sandy loam soils have a 0-9 *inch* first layer of fine sandy loam with the remaining profile being sand. Much surface runoff is attributed to the fine sandy loam layer. No specific infiltration testing has yet to be performed for this project site. Infiltration testing is planned, and groundwater monitoring piezometers are in place and currently being recorded through 2022 wet season. Per The Riley Group, Inc., 4.3 in/hr infiltration rate is recommended. A 4.0 in/hr infiltration rate will be used for stormwater facility design.

Detailed physical and chemical properties of these soils are presented in Section 4.1. The NRCS mapping can be seen in Figure 5.

2.2.8 Field Inspection

The site has not been visited recently.

2.2.9 Upstream Analysis

An unregulated ditch flows east along the northern property of the site. A relative high point at 188 *MSL* is located along the western boundary of the site. This ditch and local high point intercept all upstream flows from flowing onto the site.

2.2.10 Downstream Analysis

The downstream area was established by tracing analysis of a LiDAR surface model and evaluation of various GIS data, aerial imagery, and City of Marysville Drainage Inventory. The development area flows to a Category III wetland. The wetland is located partially within the southeast portion of the site. Stormwater flows to the wetland and leaves the site at the southeast boundary of the site. Stromwater eventually flows to Hayho Creek. Hayho Creek travels south before reaching the Quilceda Creek. Quilceda Creek drains to the Puget Sound.

Figure 3 shows a portion of the downstream flow path.

2.3 MR #2: Stormwater Pollution Prevention Plans (SWPPPs)

MMC 14.15.050 (2) specifies the requirements for development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters. Volume I, Chapter 2.5.2 of the 2019 SMMWW specifies that all new development and redevelopment implement a Stormwater Pollution Prevention Plans (SWPPP), which is a list of 13 elements that present measures and methods for all permanent and temporary erosion and sediment control (TESC), pollution prevention, inspection/monitoring activities, and recordkeeping required during the proposed construction project.

Based on the MR#2 thresholds, this project generates more than 2,000 *square feet* of impervious area, so a full SWPPP is required. Required elements for the SWPPP:

- SWPPP element 1: Preserve vegetation/mark clearing limits
- SWPPP element 2: Establish construction access
- SWPPP element 3: Control flow rates
- SWPPP element 4: Install sediment controls
- SWPPP element 5: Stabilize soils
- SWPPP element 6: Protect slopes
- SWPPP element 7: Protect permanent drain inlets
- SWPPP element 8: Stabilize channels and outlets
- SWPPP element 9: Control pollutants
- SWWP element 10: Control dewatering
- SWPPP element 11: Maintain best management practices
- SWPPP element 12: Manage the project
- SWPPP element 13: Protect On-Site Stormwater Management BMPs for Runoff from Roofs and Other Hard Surfaces

The SWPPP is assembled as a separate document for portability and reproduction purposes. The document is titled "**Stormwater Pollution Prevention Plan for 163 RV Storage**", dated February 2024. This document will be provided with Construction Plan Submittal.

2.4 MR #3: Source Control of Pollution

MMC 14.15.050 (3) specifies the requirements for water pollution source control for new development or redevelopment activities in accordance with Volume IV of the SMMWW. These activities are primarily commercial industrial developments that represent significant pollutant generation potential and the associated source control BMPs are designed to suit those activities.

Per Chapter 2.5.3, MR#3 does not apply to RV storage development, hence such source controls are not specified for this project.

2.5 MR #4: Preservation of Natural Drainage Systems and Outfalls

MMC 14.15.050 (4) specifies the requirements for preservation of natural drainage systems or outfalls for all new development and redevelopment activities under Minimum Requirement 4 in the 2019 SMMWW.

Natural drainage patterns as they once existed shall be retained. Existing conditions experience a sheet drainage pattern to the onsite wetland. Pre-developed conditions experience surface runoff. Stormwater generated onsite reaches the wetland through surface runoff.

2.6 MR #5: On-Site Stormwater Management

MMC 14.15.050 (5) specifies requirements for on-site stormwater BMPs. This requirement mandates that on-site stormwater runoff be infiltrated, dispersed, and/or retained to the maximum extent feasible without causing flooding or erosion impacts. Projects triggering Minimum Requirements 1 through 5 must use On-site stormwater management BMPs from List #1 for all surfaces or demonstrate compliance with the LID Performance Standard. Projects triggering Minimum Requirements 1 through 9 must meet the requirements of Table 2.5.1 in Vol. 1 of the 2019 SMMWW. Table 2.5.1 specifies the requirements for new or redevelopment depending on UGA and parcel size to meet the requirements of the LID Performance Standard and/or List #2. List #1 and List #2 specify stormwater BMPs in order of preference. The first BMP determined feasible is required.

This project triggers MR's 1-9. This project is within the City's UGA. This project is required to adhere to the LID Performance Standard or List #2 per Table 2.5.1.

List #1 and #2 contain appropriate BMPs to mitigate a particular developed surface. The surfaces included in the list are Lawn and Landscaped Areas, Roofs, and other hard surfaces (road/driveway/parking).

> Lawn/Landscape is required to utilize BMP T5.13, Post-Construction Soil Quality and Depth.
>
> Roofs are required to employ BMP T5.30 Full Dispersion or Downspout Infiltration, Rain Gardens or Bioretention, BMP T5.10A Downspout Dispersion Systems, or perforated stub-out connections. The first feasible BMP in this list must be used.
>
> Other Hard surfaces (Roads, Driveways, Parking Lots, Etc.) must utilize BMP T5.30 Full Dispersion, BMP T5.15 Permeable Pavement, Bioretention, Sheet Flow Dispersion, or Concentrated Flow Dispersion. The first feasible BMP in this list must be used.

Lawn/landscape will utilize BMP T5.13, Post Construction Soil Quality and Depth where applicable.

Roofs and Driveways will not be able to provide BMP T5.30 Full Dispersion. Full Dispersion requires 100 *foot* flow paths within native areas. The project will not be able to maintain 65% open space.

Individual Roof Infiltration is feasible based on the permeability of native soils at depth. Roofs will be routed to rooftop infiltration trenches per BMP T5.10A sized in accordance with Medium Sand. Geotechnical investigation revealed the site consistent with USDA "Gravelly Sand" at depth. Medium sand soils relate to 30*lf* per 1,000*sf* of rooftop. A total of 6,043 *lf* of 2-*ft* wide trench is required, or 12,087 *square feet*. Downspouts will be spaced at intervals not to exceed 100 lf but exact locations are not yet determined from Architects design drawings. Trenches will be placed around the perimeter of the buildings to readily accept stormwater for the future downspout roof design. Trenches are placed 10ft from the buildings foundation.

Some infiltration trenches may be located above fill material. The fill material below these infiltration trenches shall be gravelly, sand borrow from this same site. This shall be confirmed by the Geotech to form a continuous conduit to the clean, recessional outwash consistent with the Marysville Sand Member.

Aisle and Driveway/Parking will be routed to bioretention areas, BMP T5.14B. The bioretention cells will treat stormwater through filtering, phytoremediation, and microbial action from within the compost.

Bioretention cells will treat more than 91% of incoming stormwater generated from the PGIS (per MR #6). See Minimum Requirement #6.

Permeable pavement will not be used as the site will be an RV storage within the GC zone and subject to a maximum impervious coverage. Permeable pavement is cost prohibitive and undesirable for this site. Imported fill material across the site will render this BMP infeasible.

A site plan showing the stormwater management and development can be seen in Figure 4.

2.7 MR #6: Runoff Treatment

Minimum Requirement #6 in MMC 14.15.050 (6) specifies the requirements for providing runoff treatment. The threshold for requiring a treatment BMP is 5,000 *square feet* of PGIS (Pollution Generating Impervious Surface) or a total of more than ¾ of an acre of PGPS (Pollution Generating Pervious Surface).

This project is expected to generate 144,211 *square feet* (3.31 *acres*) of PGIS based on aisle, sidewalk, and parking areas, therefore treatment facility BMPs are required for this project.

Runoff treatment facility selection is outlined in Vol. I, Ch. 4.2, Step V of the 2019 SMMWW. Step V outlines the treatment facility selection flow chart based on the intended use of a project. Treatment selection is based on if the site is a high-use site, if the downstream receiving waters are phosphorous sensitive, and/or if the site is required to provide enhanced treatment. The definitions of high-use, phosphorous control, and enhanced treatment can be found in Step V in Section 4.2 of the 2019 SMMWW.

The project is not a high use site and infiltration is practicable for the site.

Basic treatment is provided through the use of a bioretention facility per Vol. III Section 3.3.12 of the 2019 SMMWW. The bioretention specified will provide enhanced treatment. The bio-cell treats stormwater through the percolation of stormwater through soils and their ability to absorb pollutants. See Vol III. Section 3.3.12 of the 2019 SMMWW for specific soil design criteria.

The bioretention cell mitigates polluted stormwater through physical, chemical and biological treatment processes. The treatment process will break down heavy metals that are not easily separated by physical means. Stormwater percolates through compost amended soils and plantings to obtain treatment. Stormwater flows through this part of the cell at a rate of 12.0 *inches/hour* for the BSM. Infiltration is allowed to occur below the bio-cells. The total percolated runoff through the bio-cell's amended soils is well over the 91% total runoff volume treatment requirement. The bioretention cells infiltrate 100%.

2.8 MR #7: Flow Control

Minimum Requirement #7 in MMC 14.15.050 (7) specifies the requirements for runoff flow control. The threshold for requiring Minimum Requirement #7 is 5,000 *square feet* of impervious surface. Flow control shall be provided if the project creates more than 10,000 *square feet* of effective impervious area in a threshold discharge area, converts ¾ of an acre or more of native vegetation to lawn, 2.5 *acres* or more native vegetation is converted to pasture, or a combination of impervious and converted pervious surfaces cause a 0.1 *cfs* increase in the 100-*year* flow frequency from a continuous simulation runoff model.

The project exceeds this requirement and is required to provide flow control. Flow Control is provided by infiltration. A small portion of the frontage bypasses facilities for infiltration. In order to provide access from Smokey Point Blvd to the property, a ramp is created to get up to the finished grade.

The project uses bioretention cells to treat and infiltrate all incoming stormwater flow from PGIS. The bioretention cell marginally detains stormwater but provides 100% treatment of stormwater generated by PGIS. The west biocell is comprised of 1.5 *feet* of amended soils. The east biocell is comprised of 1.5 *feet* of amended soils, 0.5 *feet* of clean chip filter and 2.0 *feet* rock storage. The bio-cell utilizes a 0.5 *foot* ponded area with 0.5 *feet* of freeboard to allow stormwater to infiltrate through the amended soils.

Roofs will be able to provide BMP T5.10A Full Infiltration. Infiltration requires suitable soils with depth. Onsite soils of loose to medium dense silty sand were found during site investigations by Riley Group. Seven rock infiltration chambers will be used to infiltrate stormwater generated from the rooftops. The rock infiltration chamber is 2 *feet* thick and a footprint of 12,267 *square feet* is required.

The combination of full infiltration BMPs for rooftops and Bioretention for aisles preclude the requirement for hydrologic modeling.

See Figure 4 for Basin Mapping.

2.9 MR #8: Wetlands Protection

Appendix I-C of 2019 SMMWW specifies requirements for detention or treatment in wetlands and wetland buffers as well as discharge of stormwater to a stream or wetland.

Since there is no detention or treatment in the critical areas, MR -8 does not apply to this project.

2.10 MR # 9: Operation and Maintenance

Minimum Requirement #9 specified MMC 14.15.050 (9) contains requirements for inspection, operation and maintenance of stormwater facilities and BMPs. Specific maintenance standards and requirements are outlined in Volume V of the 2019 SMMWW. The 2019 SMMWW requires the regular maintenance and inspection of drainage facilities.

For portability and reproduction purposes, the Operations and Maintenance Manual is presented in a separate stand-alone document titled "**Operations and Maintenance Manual for 163 RV Storage"**, dated **6 February 2024.** This document will be provided with the construction plan submittal.

Section 3 - Maps & Figures

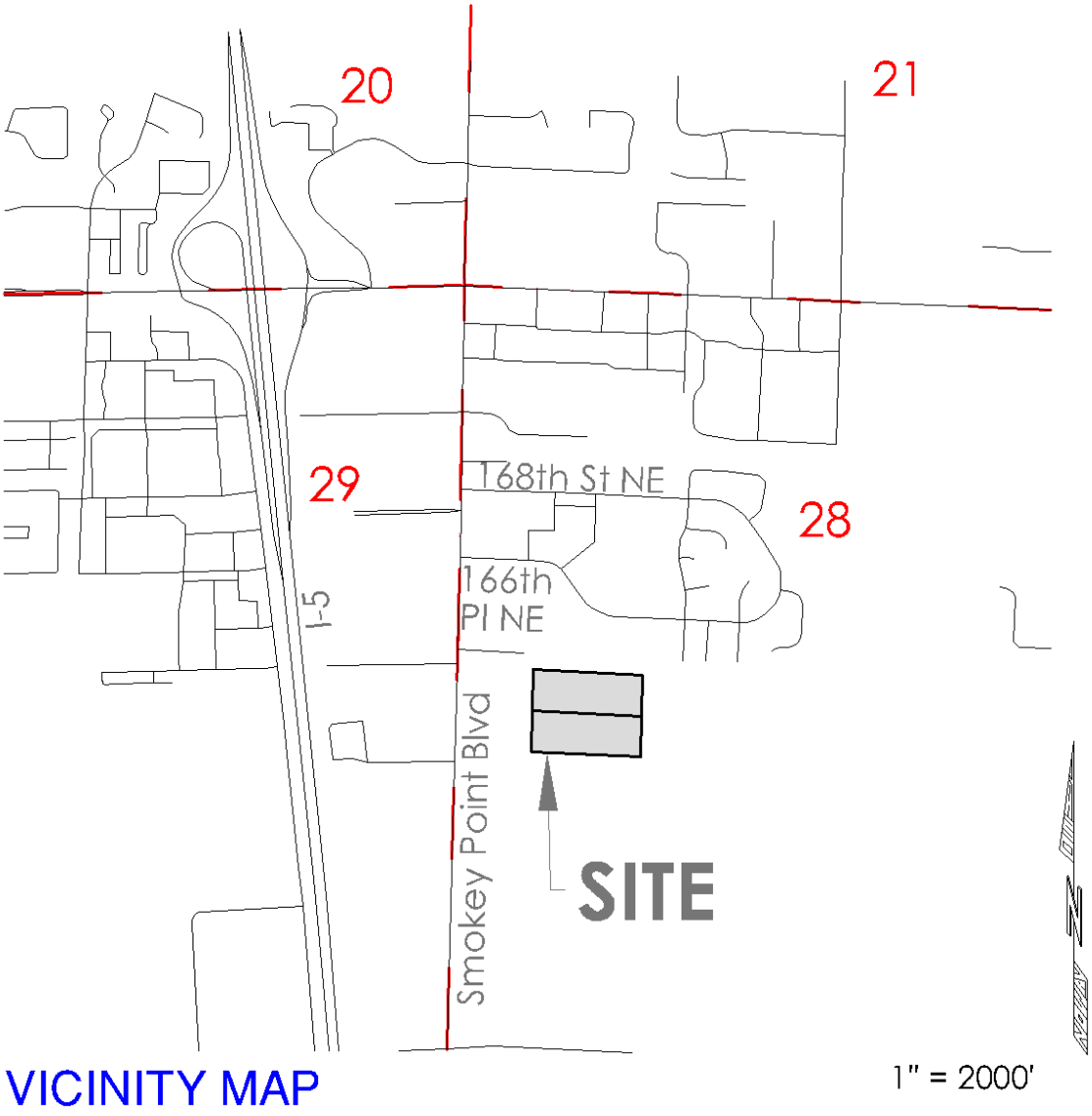

Figure 1 - Vicinity Map

Figure 2 - Existing Conditions (not to scale)

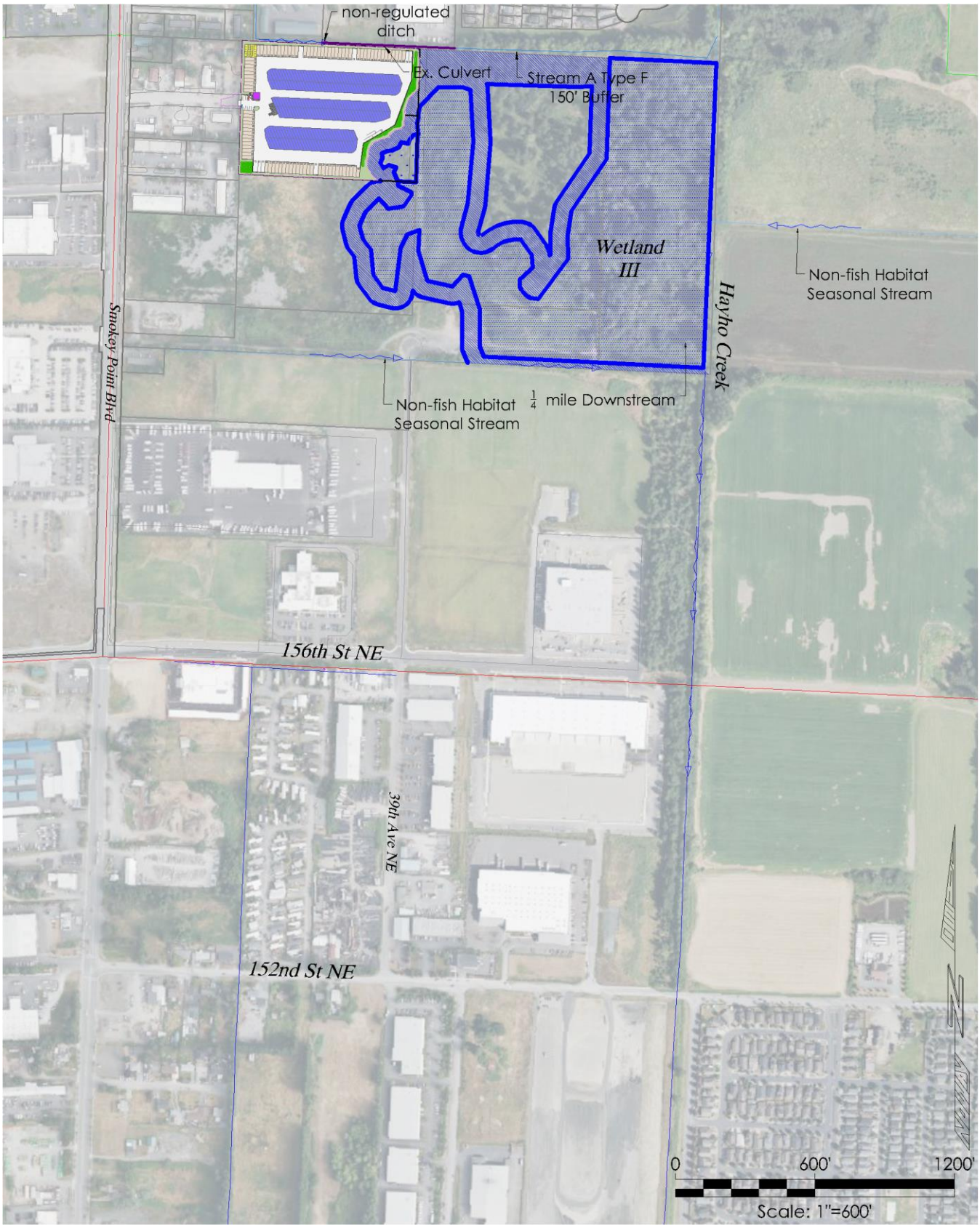

Figure 3 – Downstream Flow Path

Figure 4 - Site Plan

Figure 5 – Soil Map (Not to Scale)

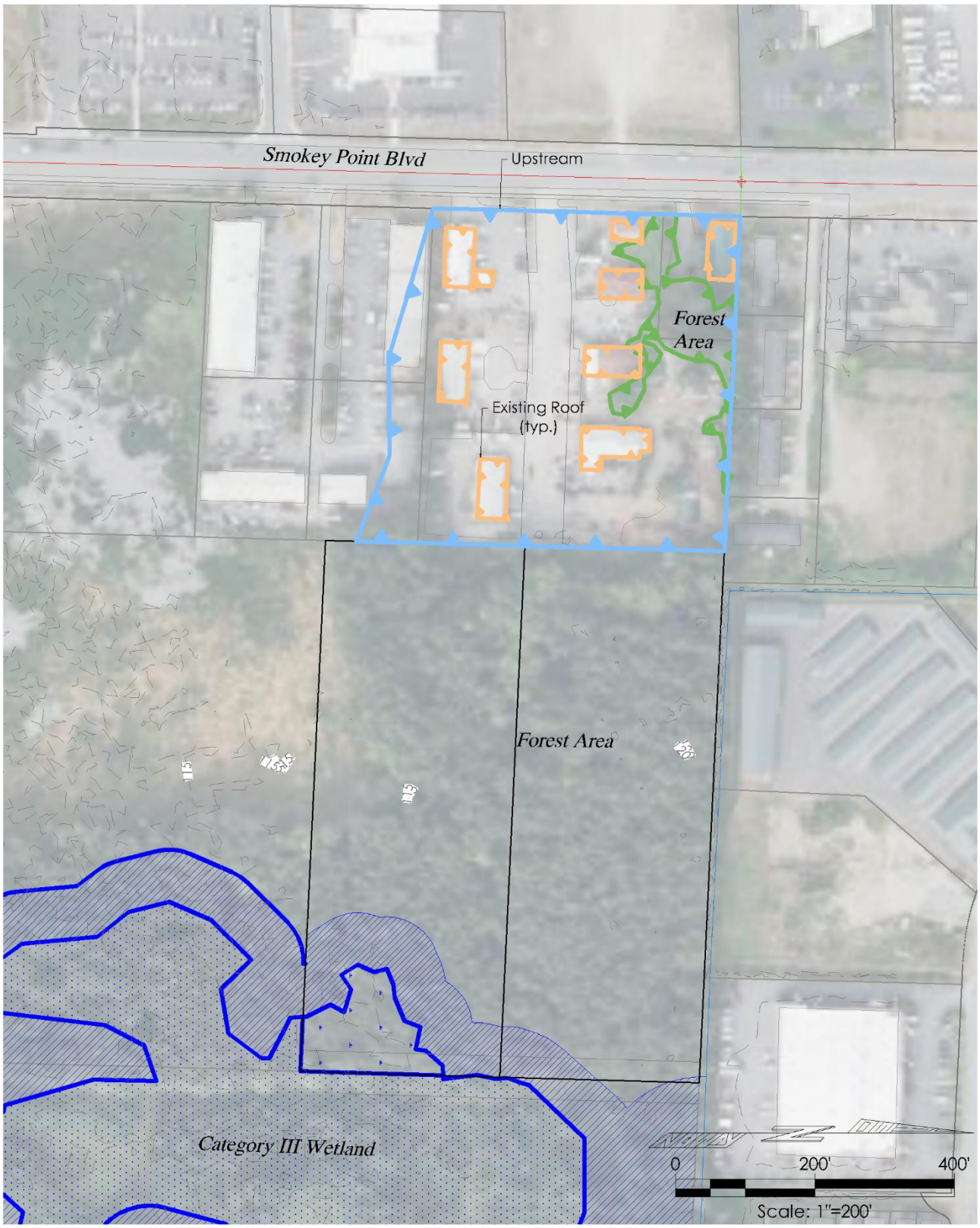

Figure 6 – Predeveloped Basin

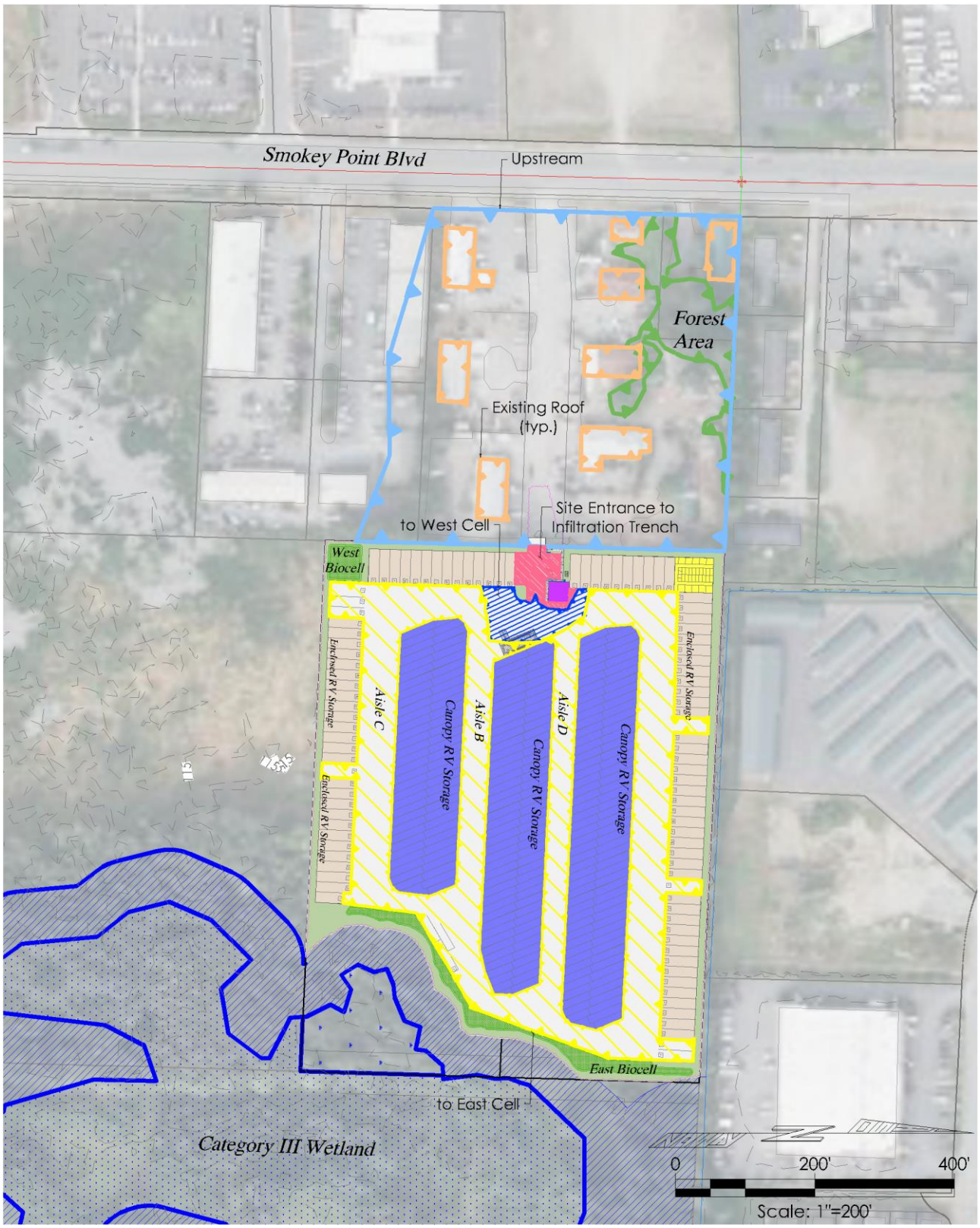

Figure 7 – Developed Basin

Section 4 - Support Data

4.1 Soils Data

13—Custer fine sandy loam

Map Unit Setting
National map unit symbol: 2hy0
Elevation: 0 to 150 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Prime farmland if irrigated and drained
Map Unit Composition
*Custer, undrained, and similar soils:*85 percent
*Minor components:*15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Custer, Undrained
Setting
*Landform:*Outwash plains
*Parent material:*Glacial outwash
Typical profile
H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 35 inches: sand
H3 - 35 to 60 inches: sand
Properties and qualities
*Slope:*0 to 2 percent
*Depth to restrictive feature:*20 to 40 inches to strongly contrasting textural stratification
*Drainage class:*Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):*Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:*About 0 to 12 inches
*Frequency of flooding:*None
*Frequency of ponding:*None
*Maximum salinity:*Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F002XA007WA - Puget Lowlands Wet Forest
Forage suitability group: Wet Soils (G002XN102WA)
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes
Minor Components
Norma, undrained
*Percent of map unit:*5 percent
*Landform:*Depressions
*Other vegetative classification:*Wet Soils (G002XN102WA)

Hydric soil rating: Yes
Indianola
*Percent of map unit:*5 percent
Hydric soil rating: No
Custer, drained
*Percent of map unit:*5 percent
*Landform:*Depressions
*Other vegetative classification:*Soils with Few Limitations (G002XN502WA)
Hydric soil rating: Yes

39—Norma loam

Map Unit Setting
National map unit symbol: 2hyx
Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Prime farmland if drained
Map Unit Composition
*Norma, undrained, and similar soils:*85 percent
*Minor components:*15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Norma, Undrained
Setting
*Landform:*Drainageways, depressions
*Parent material:*Alluvium
Typical profile
H1 - 0 to 10 inches: ashy loam
H2 - 10 to 28 inches: sandy loam
H3 - 28 to 60 inches: sandy loam
Properties and qualities
*Slope:*0 to 3 percent
*Depth to restrictive feature:*More than 80 inches
*Drainage class:*Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):*Moderately high to high (0.57 to 1.98 in/hr)
*Depth to water table:*About 0 inches
*Frequency of flooding:*None
*Frequency of ponding:*Frequent
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D
Ecological site: F002XA007WA - Puget Lowlands Wet Forest
Forage suitability group: Wet Soils (G002XN102WA)
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes
Minor Components
Terric medisaprists, undrained
*Percent of map unit:*5 percent
*Landform:*Depressions
*Other vegetative classification:*Wet Soils (G002XN102WA)
Hydric soil rating: Yes
Bellingham, undrained
*Percent of map unit:*5 percent
*Landform:*Depressions
*Other vegetative classification:*Wet Soils (G002XN102WA)
Hydric soil rating: Yes
Norma, drained
*Percent of map unit:*5 percent
*Landform:*Depressions
*Other vegetative classification:*Seasonally Wet Soils (G002XN202WA)
Hydric soil rating: Yes

Section 5 Works Cited

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Wetland Resources, Inc. (2022). *Critical Areas Determination Report for LEE & Associates - Smokey Point Blvd.* Everett, WA 98208.

5.1 Topographic Data

- The various on and off site topography, utilities, and drainage elements were professionally surveyed by Pacific Coast Surveying in 2015.

- Snohomish County 2003 LiDAR survey was used to augment the existing site topography and the downstream and surrounding areas.

The modeled coordinate system:
Lateral - Washington State Plan Plane - North, FIPS 4601;
Vertical – NAVD 88

Section 6 - Continuous Simulation Modeling

6.1 Continuous Simulation Background

HSPF based continuous simulation modeling was used to evaluate the hydrologic performances of the pre-developed and developed sub-basins in order to accurately assess flow rates.

The currently adopted continuous simulation models use the HSPF (Hydraulic Simulation Program in FORTRAN) software engine. The HSPF model uses a robust and detail accounting of the 'water budget', including evaporation, evapotranspiration, interception, interflow, and groundwater. The modeling accounts for and assesses land segment areas that include vegetation or impervious cover, soil types, and slopes. The modeling also uses utilized over 50 years of continuous rainfall data (precipitation) and evaporation data for the area. The HSPF continuous modeling is considered the best available science for hydrologic analysis.

6.2 Modeling Methodology

HSPF modeling was managed via the Western Washington Hydrology Model (WWHM) interface program. The current professional version of WWHM by Clearcreek Solutions, Inc., WWHM-2012 was used. The current data precipitation and evaporation set provided by DOE with the WWHM-2012 software interface was used that includes quantized data in 15-minute time steps from October 1948 to October 2009.

The WWHM program comes packaged with generic, well considered HSPF modeling parameters. These settings allow for the modeling of the majority of the topological conditions found in the Puget Sound area. Where conditions fall reasonably outside the range of the default HSPF parameters, adjustments should be made to more accurately reflect those conditions. These is generally limited to the pervious land segments (IMPLNDS) and are mostly limited to slopes (SLSUR), infiltration rates (INFILT), and length of flow path (LSUR). For this project, HSPF parameters were not adjusted to reflect site conditions.

6.2.1 Existing Conditions

The surface vegetative cover is assumed fully forested with an average slope of 0.5% in the area of development, based on the LIDAR based TIN analysis. The LIDAR model represents the pre-graded conditions and is in accordance with the predeveloped requirements to be represented as native vegetation and soils that existed at a site prior to the influence of Euro-American settlement.

The NRCS soil mapping of Alderwood Urban Land complex within the modeled area.

6.2.2 Developed Conditions

The site is being developed to accommodate RV storages. Stormwater from the site flows southeasterly through the on-site wetland.

Default mapping for flat road was used for the road and driveway areas. Roof for the rooftop areas. Pasture was used for the amended soils bioretention cell and disturbed areas through the site. Lateral basins are used to represent land segments that are not directly connected to conveyance systems. Stormwater generated from these surfaces will sheet flow to a downstream conveyance system or permeate soils without the threat of erosion or flooding concerns.

The bioretention cell is to be excavated to 3 or 4 ft depths and the soils replaced with amended soils. Infiltration is not used for the site.

It should be noted that when ponds, bio-swales, or other open detention facilities are used, the corresponding WWHM analysis module includes the ponded area. Consequently, this area is not included in the basin land segment mappings so the total area is often different between the developed (Basin) and pre-developed (Onsite TDA) conditions.

The current DOE specification for amended soils in 2019 is labeled as 'SMMWW' in the Bio-Swale and other WWHM modules that employ amended soils. The parameters for modeling the SMMWW are preset and based on current state-of-the-art modeling using a combination of the Darcy's and Van Genuchten's equations to account for the variability of permeability and water content as the soils transition from dry or partly damp to saturated conditions as the bioretention cell cycles through the process of filling, emptying, and drying out. The SMMWW settings based on the WSU amended soils.

The gravel bed element in WWHM was used to model the rock detention chamber for the site. Surface runoff from some pasture areas are connected to bioretention cells and interflow from the pasture areas are connected to gravel trenches.

The following section is the WWHM output for the modeled site.

The following figure details each element and contributing area.

Section 7 - Software Output

The following WWHM reports in this section represent individual sub-basin analysis for hydrologic flow evaluations. The following heading is common to all reports.

WWHM2012

PROJECT REPORT

Project Name: Biocell 2023-02-08
Site Name: Smokey Point 4
Site Address: 163XX Smokey Point Blvd
City : Marysville, WA
Report Date: 2/8/2023
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2019/09/13
Version : 4.2.17

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

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : CA Buffer
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Flat	.672

Element Flows To:

Surface	Interflow	Groundwater

Name : Site
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Flat	3.456

Element Flows To:

Surface	Interflow	Groundwater

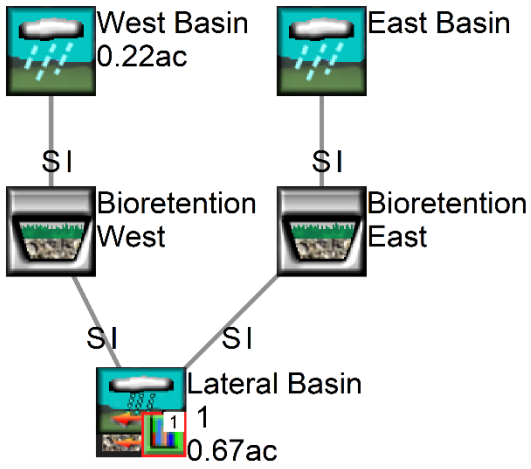
MITIGATED LAND USE

Name : West Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Pasture, Flat	.031
Pervious Total	**0.031**

Impervious Land Use	acre
DRIVEWAYS FLAT	0.184
Impervious Total	**0.184**
Basin Total	**0.215**



Element Flows To:

Surface	Interflow	Groundwater
Surface ention West	Surface ention West	

Name : Bioretention West
Bottom Length: 195.00 ft.
Bottom Width: 10.00 ft.
Material thickness of first layer: 1.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 0
Material type for second layer: Sand
Material thickness of third layer: 0
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 4
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 41.126
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 41.126
Percent Infiltrated: 100
Total Precip Applied to Facility: 9.424
Total Evap From Facility: 3.793
Underdrain not used
Discharge Structure
Riser Height: 0.5 ft.
Riser Diameter: 12 in.

Element Flows To:

Outlet 1	Outlet 2
Lateral Basin 1	Lateral Basin 1

Bioretention West Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0448	0.0000	0.0000	0.0000
0.0275	0.0448	0.0006	0.0000	0.0000
0.0549	0.0448	0.0011	0.0000	0.0000
0.0824	0.0448	0.0017	0.0000	0.0000
0.1099	0.0448	0.0022	0.0000	0.0000
0.1374	0.0448	0.0028	0.0001	0.0001
0.1648	0.0448	0.0034	0.0025	0.0025
0.1923	0.0448	0.0039	0.0035	0.0035
0.2198	0.0448	0.0045	0.0049	0.0049
0.2473	0.0448	0.0051	0.0065	0.0065
0.2747	0.0448	0.0056	0.0083	0.0083
0.3022	0.0448	0.0062	0.0105	0.0105
0.3297	0.0448	0.0067	0.0130	0.0130
0.3571	0.0448	0.0073	0.0158	0.0158
0.3846	0.0448	0.0079	0.0189	0.0189
0.4121	0.0448	0.0084	0.0223	0.0223
0.4396	0.0448	0.0090	0.0261	0.0261
0.4670	0.0448	0.0096	0.0303	0.0303
0.4945	0.0448	0.0101	0.0348	0.0348
0.5220	0.0448	0.0107	0.0398	0.0398
0.5495	0.0448	0.0112	0.0451	0.0451
0.5769	0.0448	0.0118	0.0508	0.0508
0.6044	0.0448	0.0124	0.0570	0.0570
0.6319	0.0448	0.0129	0.0635	0.0635
0.6593	0.0448	0.0135	0.0705	0.0705
0.6868	0.0448	0.0141	0.0780	0.0780
0.7143	0.0448	0.0146	0.0859	0.0859
0.7418	0.0448	0.0152	0.0943	0.0943
0.7692	0.0448	0.0157	0.1031	0.1031
0.7967	0.0448	0.0163	0.1124	0.1124
0.8242	0.0448	0.0169	0.1222	0.1222
0.8516	0.0448	0.0174	0.1325	0.1325
0.8791	0.0448	0.0180	0.1433	0.1433
0.9066	0.0448	0.0186	0.1547	0.1547
0.9341	0.0448	0.0191	0.1665	0.1665
0.9615	0.0448	0.0197	0.1789	0.1789
0.9890	0.0448	0.0202	0.1806	0.1806
1.0165	0.0448	0.0208	0.1806	0.1806
1.0440	0.0448	0.0214	0.1806	0.1806
1.0714	0.0448	0.0219	0.1806	0.1806
1.0989	0.0448	0.0225	0.1806	0.1806
1.1264	0.0448	0.0231	0.1806	0.1806
1.1538	0.0448	0.0236	0.1806	0.1806
1.1813	0.0448	0.0242	0.1806	0.1806
1.2088	0.0448	0.0247	0.1806	0.1806
1.2363	0.0448	0.0253	0.1806	0.1806
1.2637	0.0448	0.0259	0.1806	0.1806
1.2912	0.0448	0.0264	0.1806	0.1806
1.3187	0.0448	0.0270	0.1806	0.1806
1.3462	0.0448	0.0276	0.1806	0.1806
1.3736	0.0448	0.0281	0.1806	0.1806
1.4011	0.0448	0.0287	0.1806	0.1806
1.4286	0.0448	0.0292	0.1806	0.1806

1.4560	0.0448	0.0298	0.1806	0.1806
1.4835	0.0448	0.0304	0.1806	0.1806
1.5000	0.0448	0.0307	0.1806	0.1806

Surface ention West Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
1.5000	0.0448	0.0307	0.0000	0.5417	0.0000
1.5275	0.0455	0.0319	0.0000	0.5417	0.0000
1.5549	0.0463	0.0332	0.0000	0.5615	0.0000
1.5824	0.0471	0.0345	0.0000	0.5714	0.0000
1.6099	0.0479	0.0358	0.0000	0.5813	0.0000
1.6374	0.0487	0.0371	0.0000	0.5913	0.0000
1.6648	0.0494	0.0385	0.0000	0.6012	0.0000
1.6923	0.0502	0.0398	0.0000	0.6111	0.0000
1.7198	0.0510	0.0412	0.0000	0.6210	0.0000
1.7473	0.0518	0.0426	0.0000	0.6310	0.0000
1.7747	0.0526	0.0441	0.0000	0.6409	0.0000
1.8022	0.0534	0.0455	0.0000	0.6508	0.0000
1.8297	0.0542	0.0470	0.0000	0.6607	0.0000
1.8571	0.0550	0.0485	0.0000	0.6706	0.0000
1.8846	0.0557	0.0500	0.0000	0.6806	0.0000
1.9121	0.0565	0.0516	0.0000	0.6905	0.0000
1.9396	0.0573	0.0531	0.0000	0.7004	0.0000
1.9670	0.0581	0.0547	0.0000	0.7103	0.0000
1.9945	0.0589	0.0563	0.0000	0.7202	0.0000
2.0220	0.0597	0.0580	0.0000	0.7222	0.0000
2.0495	0.0605	0.0596	0.0000	0.7222	0.0000
2.0769	0.0613	0.0613	0.0000	0.7222	0.0000
2.1044	0.0621	0.0630	0.0000	0.7222	0.0000
2.1319	0.0629	0.0647	0.0000	0.7222	0.0000
2.1593	0.0637	0.0664	0.0000	0.7222	0.0000
2.1868	0.0645	0.0682	0.0000	0.7222	0.0000
2.2143	0.0654	0.0700	0.0000	0.7222	0.0000
2.2418	0.0662	0.0718	0.0000	0.7222	0.0000
2.2692	0.0670	0.0736	0.0000	0.7222	0.0000
2.2967	0.0678	0.0755	0.0000	0.7222	0.0000
2.3242	0.0686	0.0773	0.0000	0.7222	0.0000
2.3516	0.0694	0.0792	0.0000	0.7222	0.0000
2.3791	0.0702	0.0812	0.0000	0.7222	0.0000
2.4066	0.0710	0.0831	0.0000	0.7222	0.0000
2.4341	0.0719	0.0851	0.0000	0.7222	0.0000
2.4615	0.0727	0.0870	0.0000	0.7222	0.0000
2.4890	0.0735	0.0891	0.0000	0.7222	0.0000
2.5000	0.0738	0.0899	0.0000	0.7222	0.0000

Name : Surface ention West

Element Flows To:

Outlet 1	Outlet 2
Lateral Basin 1	Bioretention West

Name : East Basin
Bypass: No

GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
DRIVEWAYS FLAT	2.954
Impervious Total	2.954
Basin Total	2.954

Element Flows To:

Surface	Interflow	Groundwater
Surface tention East	Surface tention East	

Name : Bioretention East
Bottom Length: 634.00 ft.
Bottom Width: 10.00 ft.
Material thickness of first layer: 1.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 0.5
Material type for second layer: Sand
Material thickness of third layer: 2
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 4
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 587.047
Total Volume Through Riser (ac-ft.): 0.026
Total Volume Through Facility (ac-ft.): 587.073
Percent Infiltrated: 100
Total Precip Applied to Facility: 30.968
Total Evap From Facility: 16.222
Underdrain not used
Discharge Structure
Riser Height: 0.5 ft.
Riser Diameter: 6 in.

Element Flows To:

Outlet 1	Outlet 2
Lateral Basin 1	Lateral Basin 1

Bioretention East Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.1455	0.0000	0.0000	0.0000
0.0549	0.1455	0.0037	0.0000	0.0000
0.1099	0.1455	0.0073	0.0000	0.0000
0.1648	0.1455	0.0110	0.0000	0.0000
0.2198	0.1455	0.0146	0.0000	0.0000

0.2747	0.1455	0.0183	0.0000	0.0000
0.3297	0.1455	0.0219	0.0119	0.0119
0.3846	0.1455	0.0256	0.0172	0.0172
0.4396	0.1455	0.0293	0.0208	0.0208
0.4945	0.1455	0.0329	0.0330	0.0330
0.5495	0.1455	0.0366	0.0490	0.0490
0.6044	0.1455	0.0402	0.0498	0.0498
0.6593	0.1455	0.0439	0.0690	0.0690
0.7143	0.1455	0.0475	0.0727	0.0727
0.7692	0.1455	0.0512	0.0935	0.0935
0.8242	0.1455	0.0549	0.1124	0.1124
0.8791	0.1455	0.0585	0.1227	0.1227
0.9341	0.1455	0.0622	0.1570	0.1570
0.9890	0.1455	0.0658	0.1790	0.1790
1.0440	0.1455	0.0695	0.1965	0.1965
1.0989	0.1455	0.0731	0.2094	0.2094
1.1538	0.1455	0.0768	0.2416	0.2416
1.2088	0.1455	0.0805	0.2925	0.2925
1.2637	0.1455	0.0841	0.3459	0.3459
1.3187	0.1455	0.0878	0.3465	0.3465
1.3736	0.1455	0.0914	0.3494	0.3494
1.4286	0.1455	0.0951	0.4126	0.4126
1.4835	0.1455	0.0987	0.4822	0.4822
1.5385	0.1455	0.1019	0.5261	0.5261
1.5934	0.1455	0.1051	0.5585	0.5585
1.6484	0.1455	0.1083	0.5840	0.5840
1.7033	0.1455	0.1115	0.5870	0.5870
1.7582	0.1455	0.1147	0.5870	0.5870
1.8132	0.1455	0.1179	0.5870	0.5870
1.8681	0.1455	0.1211	0.5870	0.5870
1.9231	0.1455	0.1243	0.5870	0.5870
1.9780	0.1455	0.1275	0.5870	0.5870
2.0330	0.1455	0.1308	0.5870	0.5870
2.0879	0.1455	0.1342	0.5870	0.5870
2.1429	0.1455	0.1375	0.5870	0.5870
2.1978	0.1455	0.1408	0.5870	0.5870
2.2527	0.1455	0.1441	0.5870	0.5870
2.3077	0.1455	0.1474	0.5870	0.5870
2.3626	0.1455	0.1508	0.5870	0.5870
2.4176	0.1455	0.1541	0.5870	0.5870
2.4725	0.1455	0.1574	0.5870	0.5870
2.5275	0.1455	0.1607	0.5870	0.5870
2.5824	0.1455	0.1640	0.5870	0.5870
2.6374	0.1455	0.1674	0.5870	0.5870
2.6923	0.1455	0.1707	0.5870	0.5870
2.7473	0.1455	0.1740	0.5870	0.5870
2.8022	0.1455	0.1773	0.5870	0.5870
2.8571	0.1455	0.1806	0.5870	0.5870
2.9121	0.1455	0.1839	0.5870	0.5870
2.9670	0.1455	0.1873	0.5870	0.5870
3.0220	0.1455	0.1906	0.5870	0.5870
3.0769	0.1455	0.1939	0.5870	0.5870
3.1319	0.1455	0.1972	0.5870	0.5870
3.1868	0.1455	0.2005	0.5870	0.5870
3.2418	0.1455	0.2039	0.5870	0.5870
3.2967	0.1455	0.2072	0.5870	0.5870
3.3516	0.1455	0.2105	0.5870	0.5870
3.4066	0.1455	0.2138	0.5870	0.5870

3.4615	0.1455	0.2171	0.5870	0.5870
3.5165	0.1455	0.2205	0.5870	0.5870
3.5714	0.1455	0.2238	0.5870	0.5870
3.6264	0.1455	0.2271	0.5870	0.5870
3.6813	0.1455	0.2304	0.5870	0.5870
3.7363	0.1455	0.2337	0.5870	0.5870
3.7912	0.1455	0.2370	0.5870	0.5870
3.8462	0.1455	0.2404	0.5870	0.5870
3.9011	0.1455	0.2437	0.5870	0.5870
3.9560	0.1455	0.2470	0.5870	0.5870
4.0000	0.1455	0.2497	0.5870	0.5870

Surface tention East Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
4.0000	0.1455	0.2497	0.0000	1.7611	0.0000
4.0549	0.1488	0.2577	0.0000	1.7611	0.0000
4.1099	0.1520	0.2660	0.0000	1.8901	0.0000
4.1648	0.1553	0.2745	0.0000	1.9546	0.0000
4.2198	0.1586	0.2831	0.0000	2.0192	0.0000
4.2747	0.1618	0.2919	0.0000	2.0837	0.0000
4.3297	0.1651	0.3009	0.0000	2.1482	0.0000
4.3846	0.1683	0.3100	0.0000	2.2127	0.0000
4.4396	0.1716	0.3194	0.0000	2.2772	0.0000
4.4945	0.1749	0.3289	0.0000	2.3417	0.0000
4.5495	0.1782	0.3386	0.0000	2.4062	0.0000
4.6044	0.1814	0.3485	0.0000	2.4707	0.0000
4.6593	0.1847	0.3585	0.0000	2.5352	0.0000
4.7143	0.1880	0.3688	0.0000	2.5997	0.0000
4.7692	0.1913	0.3792	0.0000	2.6642	0.0000
4.8242	0.1945	0.3898	0.0000	2.7288	0.0000
4.8791	0.1978	0.4005	0.0000	2.7933	0.0000
4.9341	0.2011	0.4115	0.0000	2.8578	0.0000
4.9890	0.2044	0.4226	0.0000	2.9223	0.0000
5.0000	0.2051	0.4249	0.0000	2.9352	0.0000

Name : Surface tention East

Element Flows To:

Outlet 1	Outlet 2
Lateral Basin 1	Bioretention East

Name : Lateral Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Forest, Flat	.672

Element Flows To:

Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:4.128
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.703
Total Impervious Area:3.138

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.000771
5 year	0.001673
10 year	0.002683
25 year	0.004687
50 year	0.006926
100 year	0.010046

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.000771
5 year	0.001673
10 year	0.002684
25 year	0.004688
50 year	0.006928
100 year	0.01005

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0004	2368	2370	100	Pass
0.0005	1335	1343	100	Pass
0.0005	445	445	100	Pass
0.0006	112	112	100	Pass
0.0006	103	103	100	Pass
0.0007	89	89	100	Pass
0.0008	77	77	100	Pass
0.0008	66	66	100	Pass
0.0009	61	61	100	Pass
0.0010	58	58	100	Pass
0.0010	54	54	100	Pass
0.0011	50	50	100	Pass
0.0012	49	49	100	Pass
0.0012	47	47	100	Pass
0.0013	43	43	100	Pass

0.0014	40	41	102	Pass
0.0014	36	36	100	Pass
0.0015	36	36	100	Pass
0.0016	32	32	100	Pass
0.0016	31	31	100	Pass
0.0017	31	31	100	Pass
0.0018	29	29	100	Pass
0.0018	29	29	100	Pass
0.0019	27	27	100	Pass
0.0020	26	26	100	Pass
0.0020	26	26	100	Pass
0.0021	26	26	100	Pass
0.0022	25	25	100	Pass
0.0022	23	24	104	Pass
0.0023	23	23	100	Pass
0.0024	23	23	100	Pass
0.0024	23	23	100	Pass
0.0025	23	23	100	Pass
0.0026	21	21	100	Pass
0.0026	19	19	100	Pass
0.0027	18	18	100	Pass
0.0028	17	17	100	Pass
0.0028	16	16	100	Pass
0.0029	16	16	100	Pass
0.0030	15	15	100	Pass
0.0030	15	15	100	Pass
0.0031	14	14	100	Pass
0.0032	13	13	100	Pass
0.0032	13	13	100	Pass
0.0033	13	13	100	Pass
0.0034	13	13	100	Pass
0.0034	13	13	100	Pass
0.0035	13	13	100	Pass
0.0036	13	13	100	Pass
0.0036	13	13	100	Pass
0.0037	13	13	100	Pass
0.0038	11	11	100	Pass
0.0038	11	11	100	Pass
0.0039	11	11	100	Pass
0.0040	11	11	100	Pass
0.0040	11	11	100	Pass
0.0041	11	11	100	Pass
0.0042	11	11	100	Pass
0.0042	11	11	100	Pass
0.0043	11	11	100	Pass
0.0043	11	11	100	Pass
0.0044	11	11	100	Pass
0.0045	11	11	100	Pass
0.0045	11	11	100	Pass
0.0046	10	10	100	Pass
0.0047	10	10	100	Pass
0.0047	9	9	100	Pass
0.0048	9	9	100	Pass
0.0049	8	8	100	Pass
0.0049	8	8	100	Pass
0.0050	8	8	100	Pass
0.0051	8	8	100	Pass
0.0051	8	8	100	Pass

0.0052	8	8	100	Pass
0.0053	8	8	100	Pass
0.0053	8	8	100	Pass
0.0054	8	8	100	Pass
0.0055	8	8	100	Pass
0.0055	8	8	100	Pass
0.0056	8	8	100	Pass
0.0057	8	8	100	Pass
0.0057	8	8	100	Pass
0.0058	8	8	100	Pass
0.0059	7	7	100	Pass
0.0059	7	7	100	Pass
0.0060	7	7	100	Pass
0.0061	7	7	100	Pass
0.0061	6	6	100	Pass
0.0062	6	6	100	Pass
0.0063	6	6	100	Pass
0.0063	6	6	100	Pass
0.0064	6	6	100	Pass
0.0065	6	6	100	Pass
0.0065	6	6	100	Pass
0.0066	6	6	100	Pass
0.0067	6	6	100	Pass
0.0067	6	6	100	Pass
0.0068	6	6	100	Pass
0.0069	5	5	100	Pass
0.0069	5	5	100	Pass