



Sather Farms LLC  
2226 172nd St NE, Marysville, WA 98271

PN -

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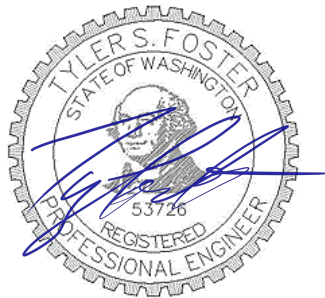
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**Stormwater Site Plan  
Report  
for  
Sather - Vaness Sewer  
Main**

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## 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

Huseby Homes is proposing to construct a sewer main extension across Sather Dairy Family LLC's properties and Sather Farms LLC property. The site is 41.35-acres of land in northwest Marysville, WA off of 172nd Street NE. A 30 foot sewer construction easement is provided from the property owners for the construction of the sewer main.

The project consists of connecting to an existing manhole, installing manholes, sewer pipes with pipe bedding and native backfill above pipe zone. The existing manhole is located within 164<sup>th</sup> St NE ROW. The sewer trunkline is from the existing manhole along to the Sather Farm Plat and Vaness Phase II Plat. Dewatering will likely be required during the installation of sewer main.

The site is currently vacant. No wetlands are found onsite.

The disturbed areas will utilize amended soils meeting BMP T5.13 to manage on-site stormwater.

The 2019 DOE Stormwater Management Manual for Western Washington will be used for stormwater management.

Per NRCS mappings, type "C/D" Custer fine sandy loam soils and Type C Terric Medisaprists soils are found throughout the site. Sandy soils are found at depth.

The entire developable project area is in a single natural discharge area with a single discharge location to a ditch. 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**

<b>Project Data:</b>	
Applicant	Huseby Homes
Site Owner	Sather Dairy Family LLC / Sather Farms LLC
Project Name	Sather - Vaness Sewer Main
Project T.S.R. Location	TwN 31 N, Rng 5 E, Sec 29, Qtr-NW
Project Address	2226 172nd St NE, Marysville, WA 98271
Parcel ID	310529-002-013-00,310529-002-014-01 & 310529-002-005-00
Watershed	Snohomish
Basin	Snohomish
Sub-Basin	Quilceda Creek
WRIA Number	7
Analysis Standard	2019 DOE SMMWW

**Table 2 - Project Area Analysis & Activities Summary**

<b>Existing Conditions:</b>		
Total Site Area	1,801,392	sf (41.35 ac)
Existing Impervious Area	0	sf ( 0.00 ac) 0.0%
<b>Proposed Activity:</b>		
Proposed Activity	Sewer Main Extension	
Total Proposed Disturbance Area	51,763	sf (1.19 ac)
Proposed Grading Area	0	sf (0.00 ac)
Proposed New NPGIS	0	sf (0.00 ac)
Proposed New PGIS	0	sf (0.00 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	0	sf (0.00 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 5,000 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 5. A full construction SWPPP is also required.

Minimum Requirements per the SCMD:

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)

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 NW quarter of Section 29 of Township 31 North, Range 5 East. The street address is 2226 172nd St NE, Marysville, WA 98271 and the parcel is located on the north side of 156<sup>th</sup> St NE. See Figure 1 for a vicinity map.

### **2.2.2 Site Description, Existing Conditions**

The project is 41.35 acres made up from three parcels. Those parcels are owned by Sather Dairy Family LLC and Sather Farms LLC. The Snohomish County parcel numbers is 310529-002-013-00,310529-002-014-01 & 310529-002-005-00. They are zoned R12 Multi-Family Low and are located in Snohomish County.

The site is vacant. The existing drainage system(s) are undetermined but largely surface runoff to an existing agriculture ditch over the top silt layer and some infiltration. Surface runoff overall flows southwest and it all flows west and then ultimately south.

The majority of the site is pasture.

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 2.

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 parcels. 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**

No critical areas are known to occur onsite or directly offsite.

### **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 103 *feet* MSL in the north of the site. The low point is in the location of the agriculture ditch. A high point of 121 ft is located in the east of the site. The site slopes down from the east to ditches along the west and south property boundaries.

Slopes average in the range of 0 to 5 percent for the majority of the developable area. The site has an average slope of 2.3%.

### **2.2.7 Soils**

The majority of the site is situated on Terric Medisaprists, a hydrologic Type-C soil per the NRCS mapping, and Custer fine sandy loam, a Type-C/D soil. Terric Medisaprists soils have a 0-28 *inch* first layer of muck with the remaining profile being sandy loam. Custer fine sandy loam soils have a 0-9 *inch* first layer of fine sandy loam with the remaining profile being sand.

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, but driven adjacent to daily by Land Technologies staff.

### **2.2.9 Upstream Analysis**

There is a ditch along the east site and no upstream flows 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 the west before reaching the Burlington Norther RR ROW. Stormwater turns at the ROW and flows south along the east side of tracks within a man-made agricultural drainage ditch. The ditch is a Municipal Separated Storm Sewer System (MS4). A fish screen is located at the southwest corner of the site and is considered as the end of a natural stream channel. The ditch becomes the West Fork of Quilceda at the fish screens. Stormwater flows along the east side of the tracks for 580 feet downstream of the project site before flowing through a 36 *inch* culvert underneath the RR tracks. The culvert leads stormwater to the Middle West Fork of Quilceda Creek. The creek parallels the Burlington Norther RR ROW.

No drainage issues are known to exist downstream of the site to the best of our knowledge at the time of this report.

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 disturbs more than 7,000 *square feet* of 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 Huseby Homes**”, dated 1 June 2023. 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 sewer extension construction, 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. The site has a very slight slope to the southwest and east. Any rain heavy enough to create runoff and not infiltrate will sheet flow to ditches along the site boundaries.

The proposal is to construct sewer mains and will not change the natural flow characteristic of the parcel and surrounding area.

Natural drainage systems and outfalls will be preserved.

## 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 trigger MR's 1-5. This project is within the City's UGA. This project is required to adhere to List #1 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).

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.

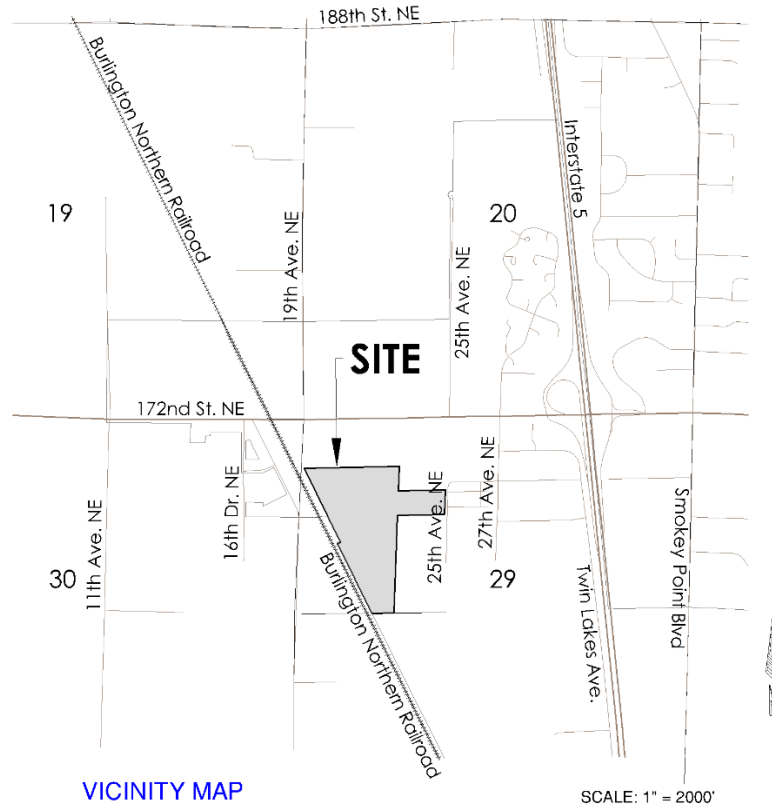
Lawn/Landscape and disturbed areas are required to utilize BMP T5.13, Post-Construction Soil Quality and Depth. Once the sewer main is constructed, amended soils meeting BMP T5.13 will be placed along with seed to formalize the permanent stormwater control.

No roofs are proposed.

No driveways are proposed.

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

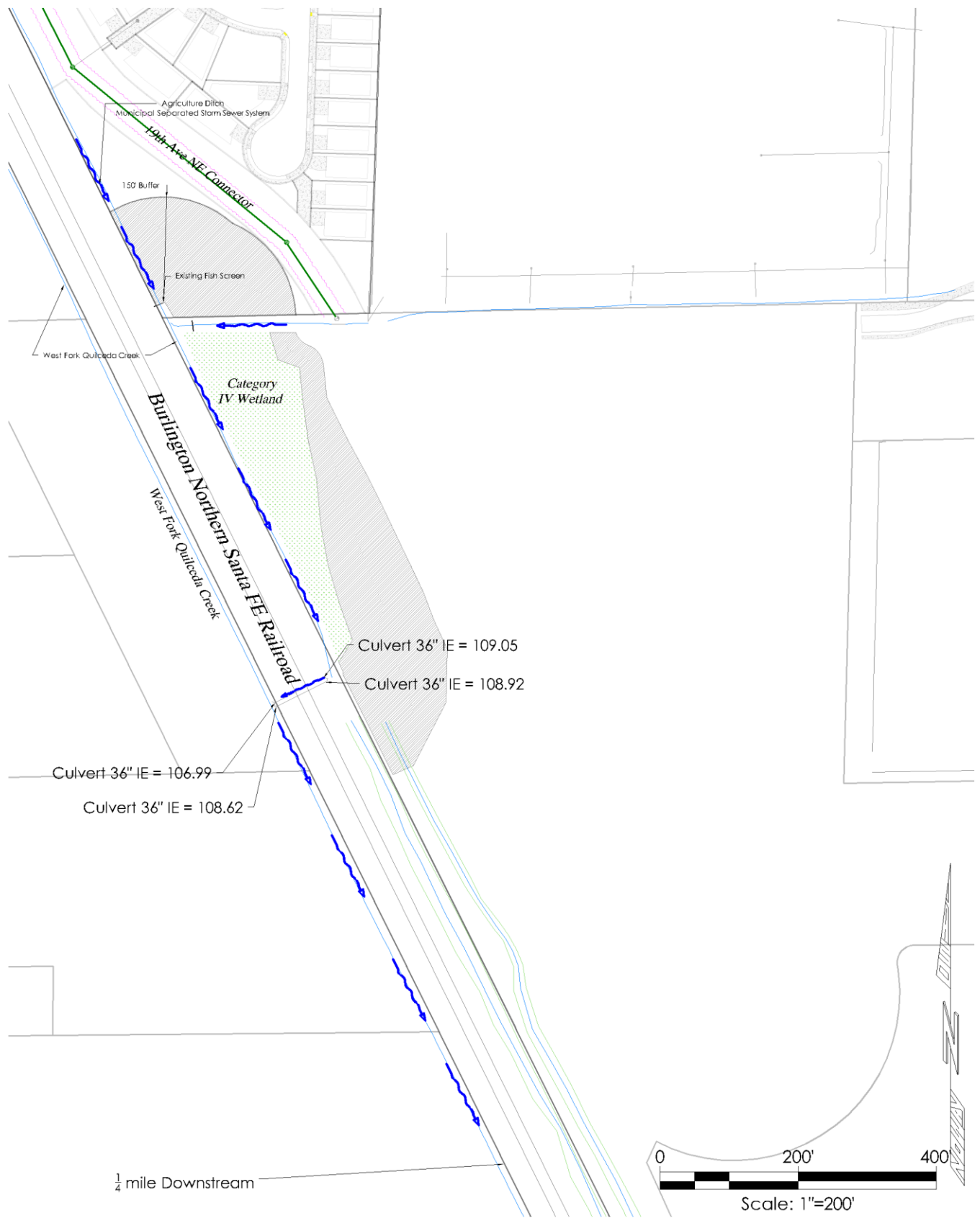
# Section 3 - Maps & Figures



**Figure 1 - Vicinity Map**

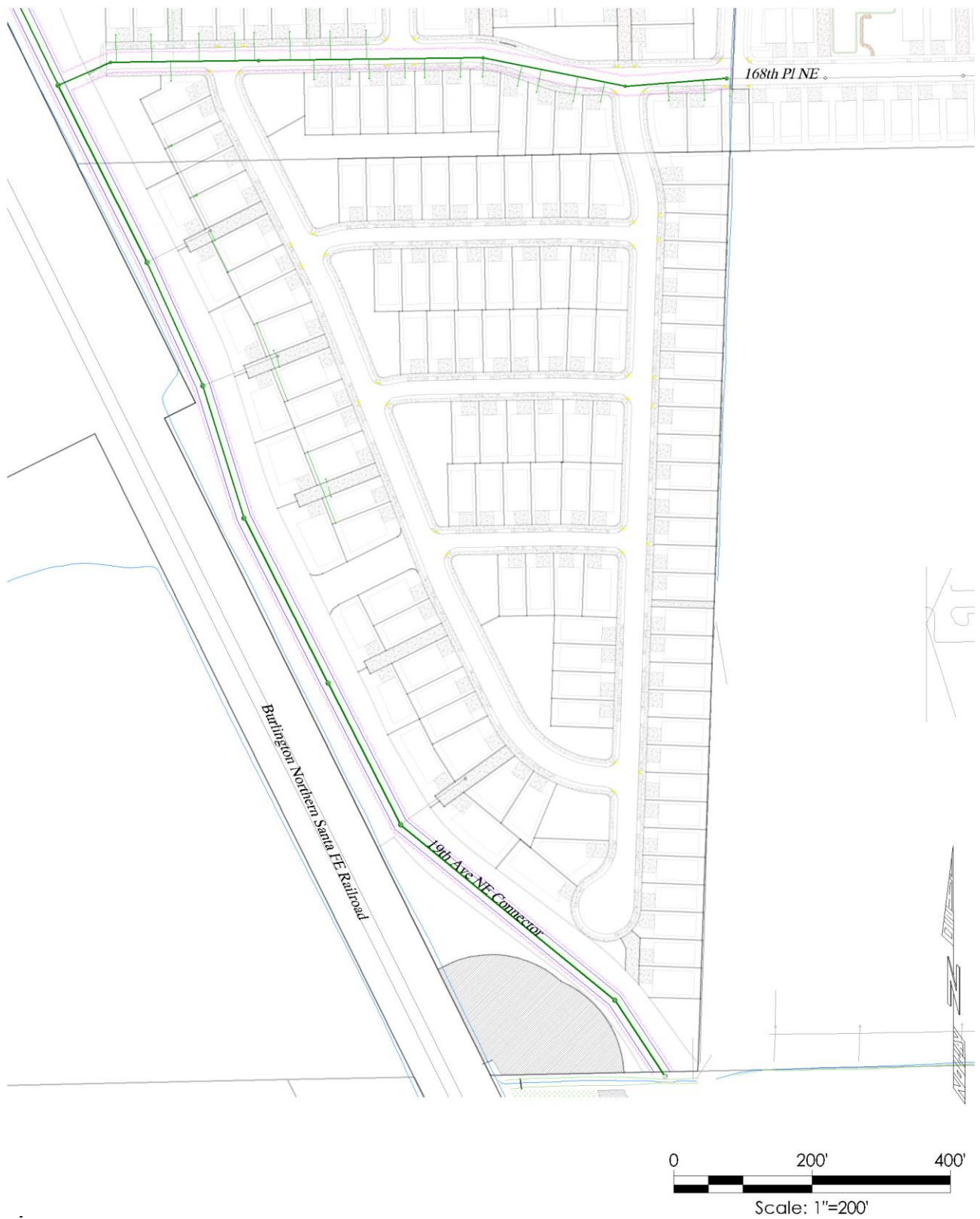


**Figure 2 - Existing Conditions (not to scale)**

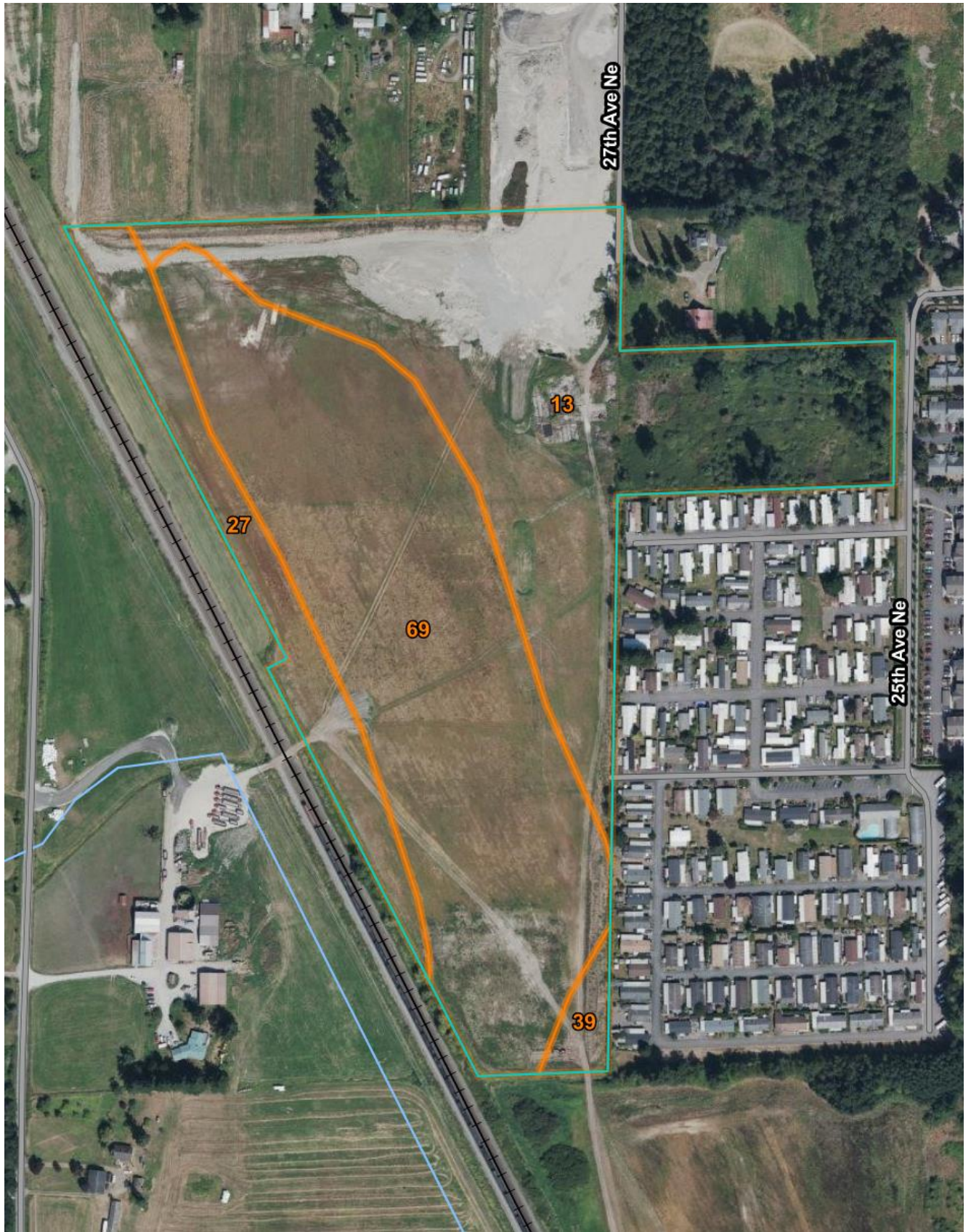


**Figure 3 – Downstream Flow Path**





**Figure 4 - Site Plan**



**Figure 5 – Soil Map (Not to Scale)**

## 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*

**27—Kitsap silt loam, 0 to 8 percent slopes**

**Map Unit Setting**

*National map unit symbol: 2hyh*

*Elevation: 0 to 490 feet*

*Mean annual precipitation: 37 inches*

*Mean annual air temperature: 50 degrees F*

*Frost-free period: 160 to 200 days*

*Farmland classification: All areas are prime farmland*

**Map Unit Composition**

*Kitsap and similar soils:85 percent*

*Minor components:5 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Kitsap**

**Setting**

*Landform:Terraces*

*Parent material:Lacustrine deposits*

**Typical profile**

*H1 - 0 to 6 inches: ashy silt loam*

*H2 - 6 to 33 inches: silt loam*

*H3 - 33 to 60 inches: stratified silt to silty clay loam*

**Properties and qualities**

*Slope:0 to 8 percent*

*Depth to restrictive feature:More than 80 inches*

*Drainage class:Moderately well drained*

*Capacity of the most limiting layer to transmit water (Ksat):Moderately low to moderately high (0.06 to 0.20 in/hr)*

*Depth to water table:About 18 to 30 inches*

*Frequency of flooding:None*

*Frequency of ponding:None*

*Available water supply, 0 to 60 inches: High (about 11.4 inches)*

**Interpretive groups**

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 3w*

Hydrologic Soil Group: C  
Ecological site: F002XA004WA - Puget Lowlands Forest  
Forage suitability group: Soils with Few Limitations (G002XF503WA)  
Other vegetative classification: Soils with Few Limitations (G002XF503WA)  
Hydric soil rating: No  
**Minor Components**  
**Bellingham, undrained**  
Percent of map unit: 5 percent  
Landform: Depressions  
Other vegetative classification: Wet Soils (G002XN102WA)  
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 map unit.

#### **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)  
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**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

**69—Terric Medisaprists, nearly level****Map Unit Setting**

*National map unit symbol:* 2hzz

*Elevation:* 0 to 1,150 feet

*Mean annual precipitation:* 35 to 70 inches

*Mean annual air temperature:* 50 degrees F

*Frost-free period:* 170 days

*Farmland classification:* Prime farmland if drained

**Map Unit Composition**

*Terric medisaprists, drained, and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Terric Medisaprists, Drained****Setting**

*Landform:* Depressions, flood plains, till plains

*Parent material:* Organic material over alluvium

**Typical profile**

*Oa - 0 to 28 inches:* muck

*H2 - 28 to 60 inches:* sandy loam

**Properties and qualities**

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Very 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 12 to 35 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Very high (about 16.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3w

*Hydrologic Soil Group:* C

*Forage suitability group:* Soils with Few Limitations (G002XN502WA)

*Other vegetative classification:* Soils with Few Limitations (G002XN502WA)

*Hydric soil rating:* Yes

**Minor Components**

**Terric medisaprists, undrained**

*Percent of map unit:*5 percent

*Other vegetative classification:*Wet Soils (G002XN102WA)

*Hydric soil rating:* Yes

**Snohomish, undrained**

*Percent of map unit:*4 percent

*Landform:*Flood plains

*Other vegetative classification:*Wet Soils (G002XN102WA)

*Hydric soil rating:* Yes

**Mukilteo, undrained**

*Percent of map unit:*3 percent

*Landform:*Depressions

*Other vegetative classification:*Wet Soils (G002XN102WA)

*Hydric soil rating:* Yes

**Orcas**

*Percent of map unit:*3 percent

*Landform:*Depressions

*Other vegetative classification:*Wet Soils (G002XN102WA)

*Hydric soil rating:* Yes

## Section 5 Works Cited

Puget Sound Action Team. (2005, January). Low Impact Development Technical Guidance Manual for Puget Sound. *Publication No. PSAT 05-03*. Washington: Washington State University - Pierce County Extension.

Puget Sound LIDAR Consortium. (2003, April). LIDAR Bare Earth DEM File. Snohomish County, Washington. Retrieved May 2013, from <http://pugetsoundlidar.ess.washington.edu/index.htm>

Snohomish County Planning and Development Services. (2007, October 1). Aquifer Recharge/Wellhead Protection. Everett, WA.

Snohomish County Surface Water Management Division. (2002, December). Snohomish UGA Drainage Needs Report. Everett, Washington.

### 5.1 Topographic Data

- 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