



MAKING A "WAY" OUT OF "NO WAY"

KETAB1221011, LLC
15223 Smokey Point BLVD, Marysville, WA 98271

PN SPA 22-_____

Site Plan Approval 1st: February 2022

**Stormwater Site Plan
Report
for
Quality Auto Center**

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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

KETAB1221011, LLC is proposing a high-end auto dealership building and site for the future home of Quality Auto Center (QAC). The proposed site plan approval and subsequent grading permit will be on 2.97-acres of land in northern Marysville, WA off of Smokey Point Blvd.

The parcel is currently vacant and vegetated with pasture. No critical areas are known to occur onsite or immediately offsite.

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 2022 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 along the west boundary at Smokey Point Blvd. The driveway access point is located at the northern edge of the property to permit shallower grades for vehicles turning from Smokey Point Blvd and separation to 152nd St to the South.

The dealership building will be centrally located in the parcel with a large parking area to the west and to the east. Parking spaces will also be located through the perimeter of the site for inventory. The auto dealership will have garage bays for maintenance and washing. Floor drains for these bays will be directed to an oil/water separator and connected to the City's sewer system.

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 2014 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 Hayho Creek. 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 2014 SMMWW Vol-1, Ch-2, Section 2.4 are summarized in the following tables.

Table 1 - Project Parcel Summary

Project Data:	
Applicant	KETAB1221011, LLC
Site Owner	KETAB1221011, LLC
Project Name	Quality Auto Center
Project T.S.R. Location	TwN 31 N, Rng 5 E, Sec 33, Qtr-NW
Project Address	15223 Smokey Point BLVD, Marysville, WA 98271
Parcel ID(s)	310533-002-053-00, 310533-002-052-00
Watershed	Snohomish
Basin	Snohomish
Sub-Basin	Quilceda Creek
WRIA Number	7
Analysis Standard	2014 DOE SMMWW

Table 2 - Project Area Analysis & Activities Summary

Existing Conditions:		
Total Site Area	129,163	sf (2.97 ac)
Existing Impervious Area	0	sf (0.00 ac) 0%
Proposed Activity:		
Proposed Activity	Automobile Dealership	
Total Proposed Disturbance Area	129,163	sf (2.97 ac)
Proposed Grading Area	129,163	sf (2.97 ac)
Proposed New NPGIS	22,931	sf (0.53 ac)
Proposed New PGIS	78,954	sf (1.81 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	101,885	sf (2.34 ac)
Total Site Impervious Area (new+exist)	101,885	sf (2.34 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 NW quarter of Section 33 of Township 31 North, Range 5 East. The street address is 15223 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 2.97-acres parcel. The parcels are owned by KETAB1221011, LLC. The Snohomish County parcel numbers are 310533-002-053-00, 310533-002-052-00. They are zoned General Commercial and are located within City of Marysville inside Snohomish County.

The site is vacant. 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 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 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

No critical areas are known to occur onsite or immediately 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. Site survey was conducted by North Peak and augments the 3D surface model within the site.

The site has mostly moderate slopes with a low point around 107 *feet* MSL along the east property boundary. The site slopes up from the east to a high point of 109 *feet* along the west 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 1.0%.

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.

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

The upstream is comprised of a small portion of pasture, driveway and road. Smokey Point Blvd has a storm system within its ROW. Stormwater generated from the adjacent north parcel is likely to be captured and conveyed to stormwater facilities. Two storm stub-outs are noted in the Snohomish County 1995 As-Built drawings for the widening of Smokey Point Blvd to extend in to the site to provide a stormwater connection. These storm stubs are not immediately identified and not currently intended to be used.

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 south between property lines before reaching an existing ditch along the east boundary of the site. Stormwater along the ditch flows south and crosses 152nd NE via a 24" CMP Metal culvert. Stormwater flows south and then discharges to Hayho Creek. Hayho Creek travels south before reaching the Quilceda Creek. Quilceda Creek drains to the Puget Sound.

Stormwater generated from the project site is to be infiltrated to the maximum extent feasible by accessing the clean, native sands of the Marysville sand member.

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 2014 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 Quality Auto Center**”, dated February 2022. 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 auto dealerships, 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 2014 SMMWW.

Natural drainage patterns as they once existed shall be retained. Existing conditions experience a sheet drainage pattern to the site's east property boundary. Pre-developed conditions experience surface runoff. Stormwater generated onsite reaches the property boundary through surface runoff. Surface runoff reaches the offsite ditch and is conveyed offsite.

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 2014 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 low-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.

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 receiving less than 5,000sf of PGIS require a 1-ft separation to groundwater. No cells accept stormwater from an area greater than 5,000sf.

Bioretention cells in accordance with BMP T5.14B are sized with a floor area of 5% of the impervious area draining to them.

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

Table 3 - Bioretention Cell Contributing Area and Floor Area requirement

Contributing Drainage Basin	Cont. Drainage Basin Area, sf	req'd Bioretention Area
A	4058	213
B	4069	213
C	3555	186
D	4841	254
E	3358	176
F	4941	259
G	4869	255
H	4924	258
I	3955	207
J	1568	82
K	4357	229
L	2440	128
M	3793	199
N	2471	130
O	2637	138
P	2768	145
Q	3396	178
R	4944	259
S	4673	245
T	4207	221
U	3674	193

Permeable pavement will not be used as the site will be an auto dealership 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 $\frac{3}{4}$ of an acre of PGPS (Pollution Generating Pervious Surface).

This project is expected to generate 78,954 *square feet* (1.81 *acres*) of PGIS based on aisle, driveway, 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 2014 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 2014 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 2014 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 2014 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*. 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 $\frac{3}{4}$ 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. This area is less than 1,000 square feet and flows immediately to the Smokey Point Blvd's stormwater system and into the neighboring stormwater infiltration pond constructed by the County. (A portion of this site was counted as contribution to this facility, therefore capacity exists.)

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 bio-cells are comprised of 1.5 *feet* of amended soils, 0.5 *feet* of clean chip filter. The bio-cell utilizes a 0.25 *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 gravelly sand were found during site investigations by ESNW. Infiltration trench size (length) is based on soil type and amount of contributing rooftop area. Medium sand soils relate to 30lf per 1,000sf of rooftop. A total of 688 lf of 2-ft wide trench is required. Downspouts will be spaced at intervals not to exceed 100lf but exact locations are not yet determined from the Architects design drawings. Trenches will be placed around the perimeter of the building to readily accept stormwater for the future downspout roof design. Trenches that parallel have a 6ft separation and all trenches are placed 15ft from the buildings foundation.

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

MMC 14.15.050 (8) specifies requirements for discharge of stormwater in wetlands and wetland buffers as well as discharge of stormwater to a stream.

Since there is no detention or treatment in any 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 2014 SMMWW. The 2014 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 Quality Auto Center**”, dated **11 February 2022**. This document will be provided with the construction plan submittal.

Section 3 - Maps & Figures

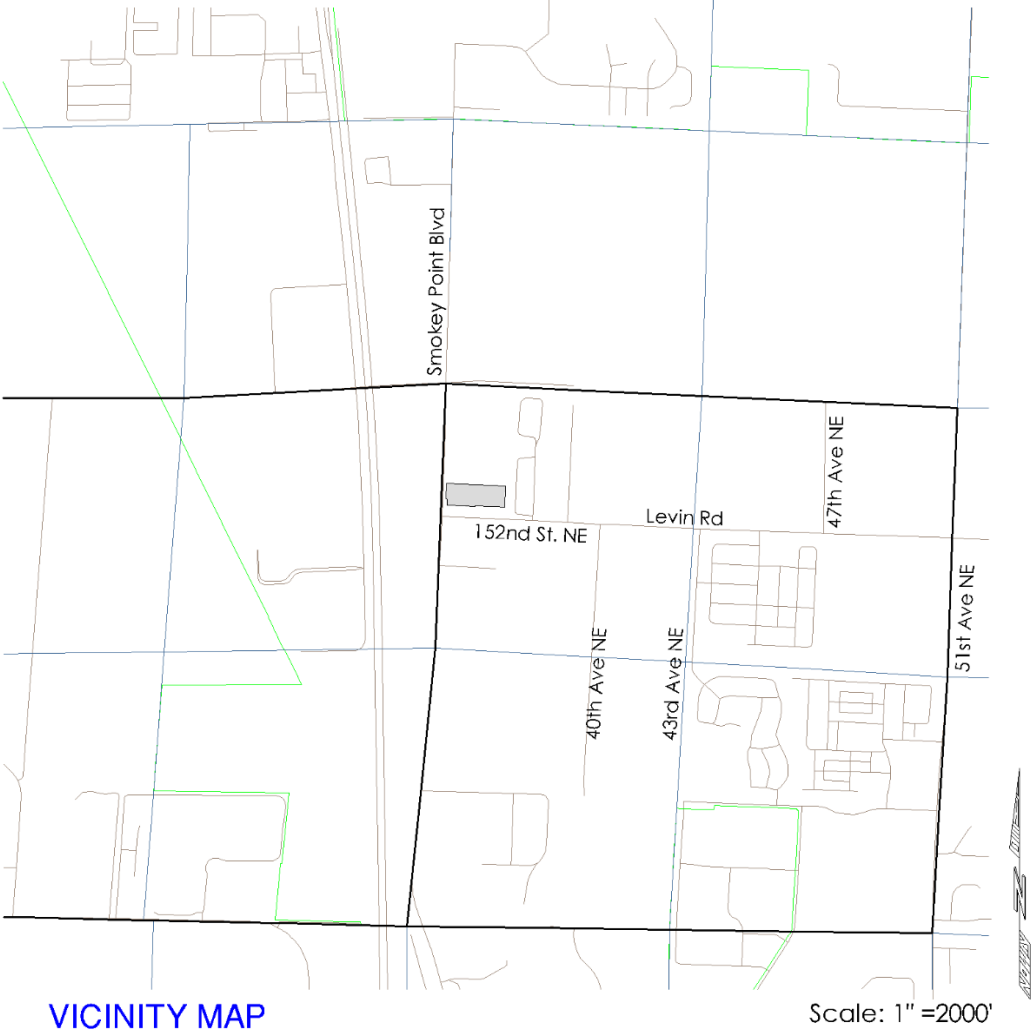


Figure 1 - Vicinity Map



Figure 2 - Existing Conditions (not to scale)

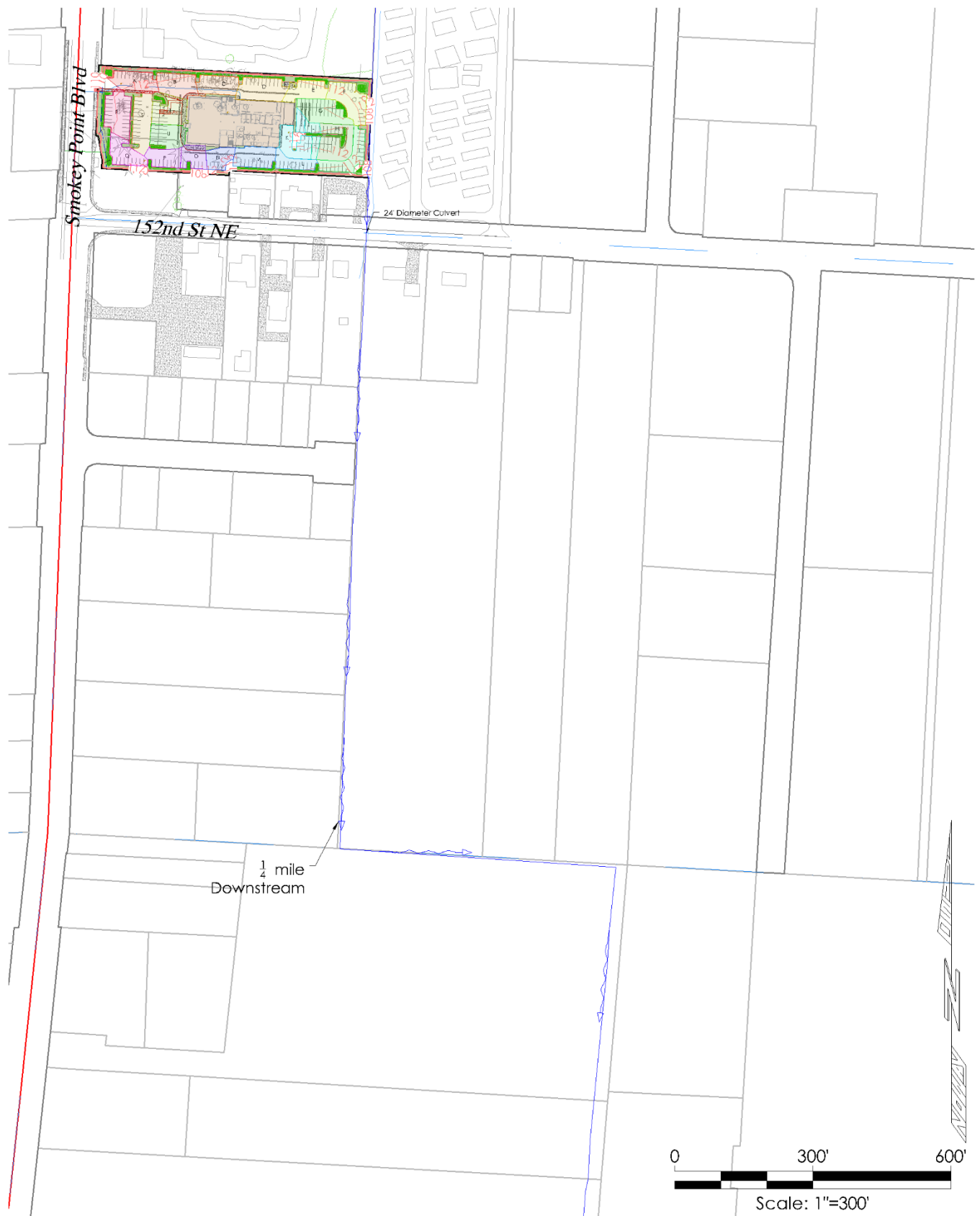


Figure 3 – Downstream Flow Path

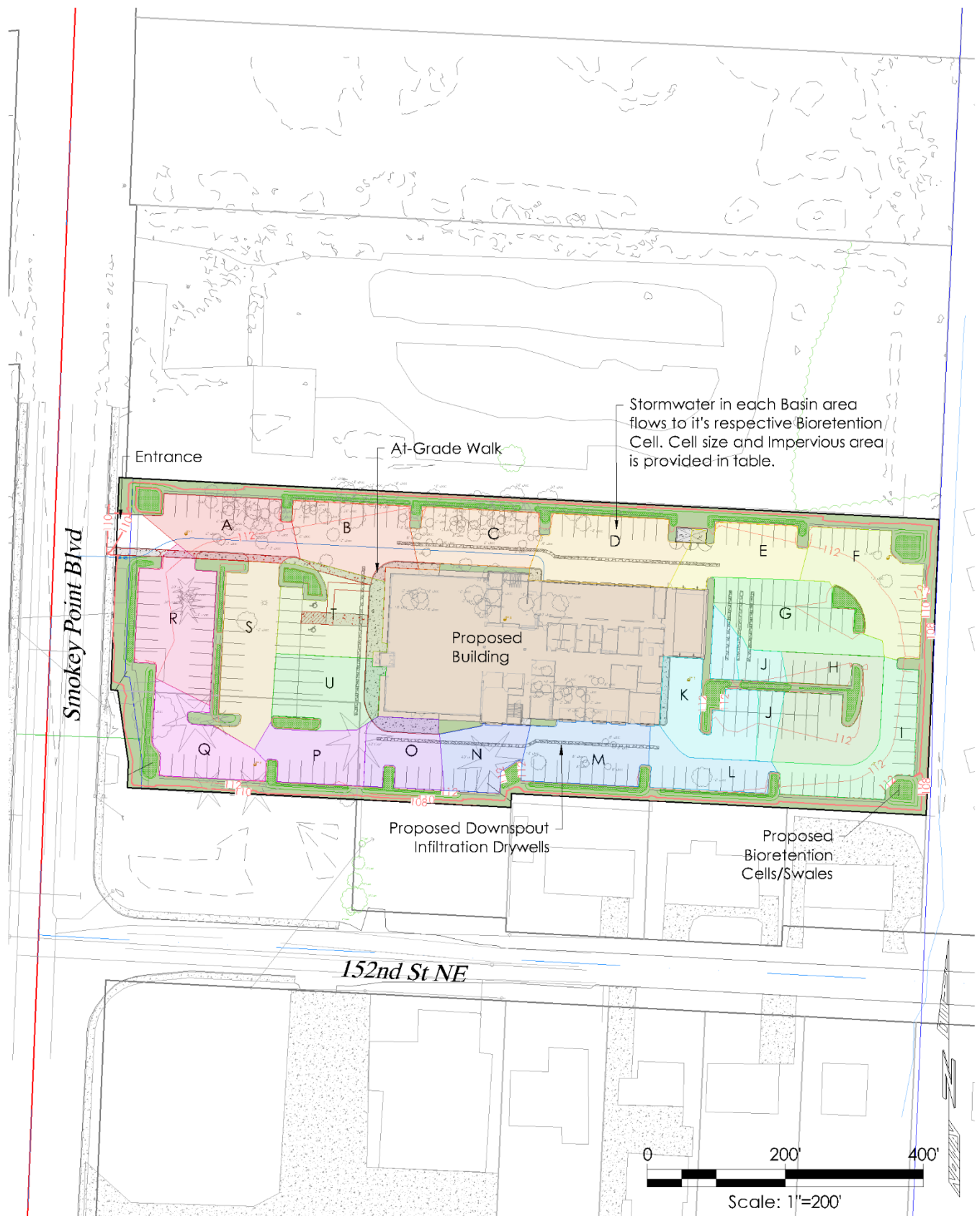


Figure 4 - Site Plan



Figure 5 – Soil Map (Not to Scale)

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

Natural 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

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: C/D

Forage suitability group: Wet Soils (G002XN102WA)

Hydric soil rating: Yes

Minor Components

Custer, drained

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Indianola

Percent of map unit: 5 percent

Hydric soil rating: No

Norma, undrained

Percent of map unit: 5 percent

Landform: Depressions

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. q47121h24be.e00. 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

- 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