STORM WATER DRAINAGE

DESIGN REPORT

BRAATEN 2 LOT SHORT PLAT

IN THE CITY OF ARLINGTON

CITY OF ARLINGTON PROJECT FILE #: _____

EXECUTIVE SUMMARY

Introduction

The project is located at 7817 190th Place NE. This project involves the subdivision of a 5-acre parcel into 2 lots. The project is zoned Residential R-9600. The property is located in the Arlington Terrace neighborhood.

The Arlington Terrace is served with private roads, a community water system and individual on site drainfield systems. The city allows a subdivision of the 5-acre parcels using a maximum of 2 dwelling units per 5-acre parcel. Each parcel needs to comply with health district requirements for water and septic system.

The short plat application will include one lot with existing home on 1 acre. A second lot of 4 acres. The 4-acre lot includes 2.2 acres of area west of electric distribution easement.

A full dispersion drainage method is recommended based on the large lot sizes and available native growth dispersion areas.

This report will provide the necessary information to support the intended method of storm drainage management.

Existing Conditions

The parcel is 5 acres in size and has a single-family dwelling in the southeast corner. It is a sparsely wooded parcel. The property moderately slopes to west northwest. The slopes are less then 6%. The drainage basin is formed by a ridge along the east property line and private roads along the north, south and west (see attached drainage basin map). An electric distribution line is located in the west half of parcel. The adjoining parcels are 5 acres or larger. The private roads have roadside ditches and driveway crossing culverts.

Based on the USDA- NCRS soils study the soils have been determined to be Tokul gravelly medial loam, moderately well-draining soils. There are no historic drainage or erosion concerns within the parcel or immediate vicinity.

Proposed Condition

The proposed development includes construction of a new residential home. The existing access driveways will remain. The development will include a site disturbance area of 19,000 sq. ft. for house and drainfield. The house and garage will add 4000 sq. ft. of non-pollution generating hard surface.

Stormwater management for the proposal will include full dispersion for new hard surfaces. The proposed rooftop will utilize Downspout Full dispersion.

CONDITIONS AND REQUIREMENTS

This project is subject to the provisions and requirements of the 2012 Washington State Department of Ecology Stormwater Management Manual for Western Washington, as amended in 2014 ("Stormwater Manual").

Minimum Requirement #1

Stormwater Site Plan Narrative

Stormwater design elements are as shown on preliminary short plat map. No detention is proposed for the site since the runoff from the new residential home will be addressed using Full Dispersion.

Exhibit A Downstream Drainage Basin

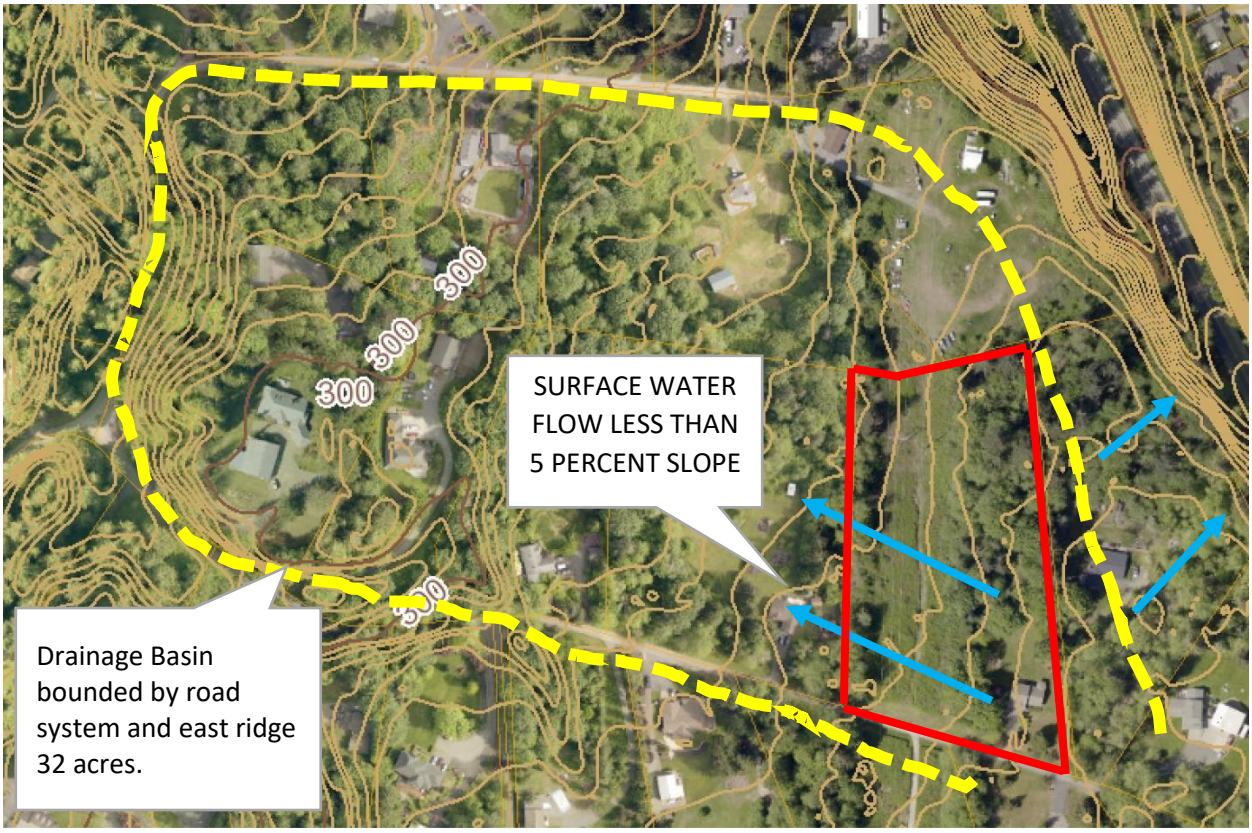
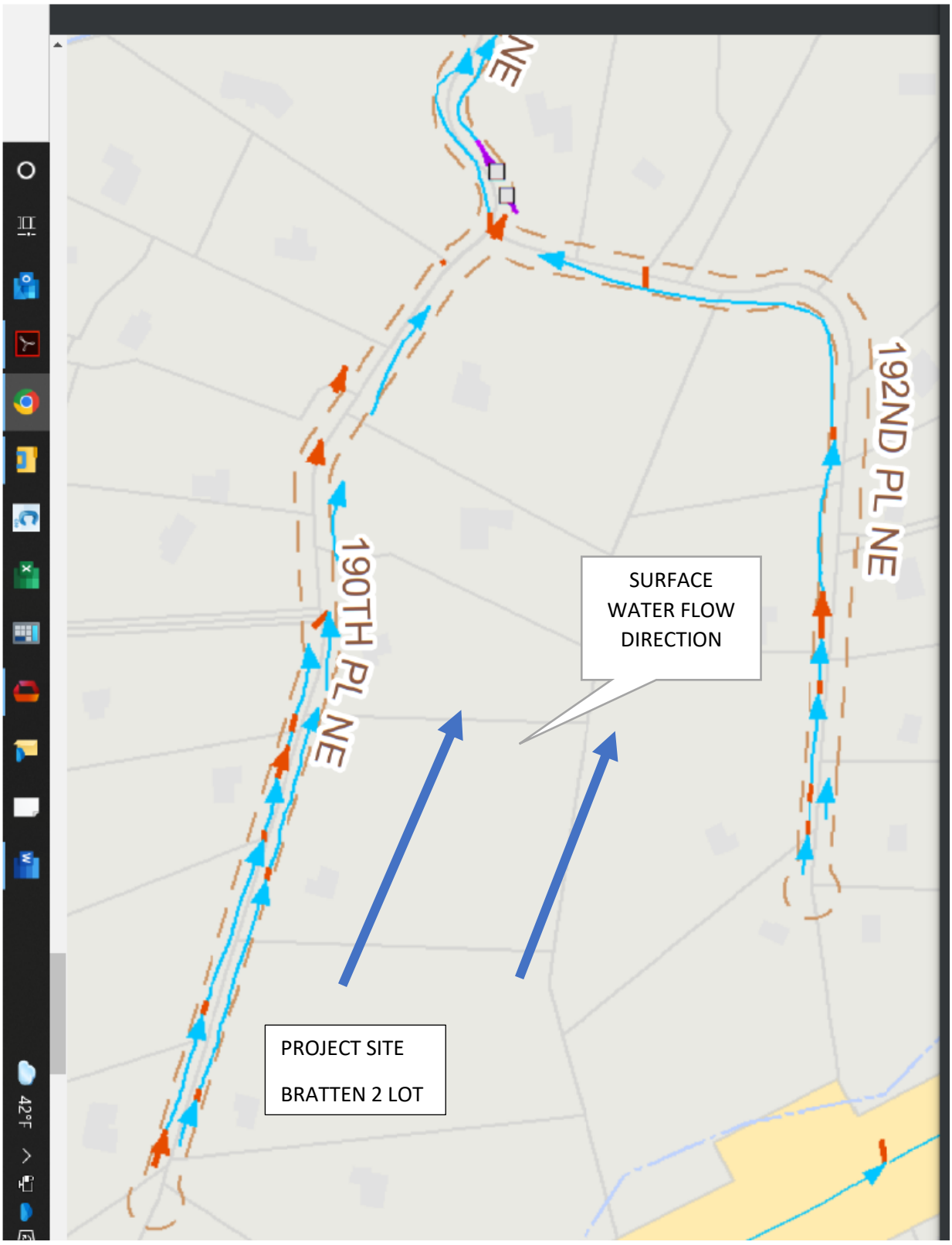


Exhibit B City of Arlington Storm Water Infrastructure



Task 2-Resource Review

The following resources were review and findings incorporate into the herein described report and plan.

FEMA Flood Maps

NRCS Soils Study

City of Arlington Storm Water Infrastructure Inventory Maps

Department of Ecology Storm Water Management Manual for Western Washington

National Wetland Inventory Maps

Task 3-Field Investigation

The author conducted a field investigation after a review of the herein described resources. The upstream and downstream conditions were investigated, and the following conditions exist as of the date of the field review.

Task 4-Upstream and Downstream Conditions

Upstream Drainage Conditions

The project is located at a topographical ridge along the east property line. The upstream drainage is directed to the east toward a separate drainage basin. There is no direct upstream impact. The conditions are as shown on Exhibit A and B.

Downstream Drainage Conditions

The project is located at the highest elevation of the 32-acre downstream drainage basin. The basin is limited by existing private roads. The private roads have a system of roadside ditches, driveway culverts and conveyance culverts. The field investigation did not find any inadequate drainage conditions. The surrounding parcels are 5 acres and have ample area to manage surface water.

Task 5-Level 1 Mitigation of Proposed Impervious Area Drainage Impacts

Minimum Requirement #2

SWPPP Narrative

The topography of the site slopes to the west at a grade of 5 percent. This includes the electric transmission easement area. The easement area is heavy vegetated and the area west of easement is partially forested. There is a 300 feet of vegetated flow path for water quality treatment. The storm water discharge of the new single-family dwelling is less than 3000 sq. ft.

With minimal disturbance and standard erosion control measures such as silt fence, straw mulching and hydro-seeding, the risk of erosion can be minimized. The limits of clearing will be restricted to the building site and lot. Greater source control measures would have to be taken during winter construction such as mulching or plastic sheeting. Good construction practices will prevent any sediment from leaving the site.

The following are BMP measures to limit adverse impact upon the off-site drainage system:

- Filter fabric fences, as required
- Limited clearing area
- Rock construction entrance pad
- Seeding/ landscaping of any bare areas
- Limited months of construction
- Concrete Wash-out (per BMP C-151)

THE 13 ELEMENTS OF A CONSTRUCTION SWPPP

1. Preserve Vegetation/Mark Clearing Limits: The clearing limits are indicated on the plan sheet. Furthermore, clearing and grading will be limited to only areas that need to be disturbed for grading/construction of the road surface to preserve as much natural vegetation as possible. Field marking the clearing limits shall be completed prior to clearing and grubbing activities.

    - BMP's: Preserve Natural Vegetation (VEG)
    - Field Marking Clearing Limits (CL)
2. Establish Construction Access: Access to the construction site shall be limited to the rock construction entrance. The construction entrance shall be extended to provide access to the construction vehicle/equipment staging and employee parking areas.
   BMP's: Stabilized Construction Entrance (CE)
3. Control of Flow Rates: Storm water detention: No detention is proposed for the site since the increase in volume is less minimal
4. Installation of Sediment Controls: Sediment control will be provided through a combination of filtration through the surround on-site vegetation, filter fence, straw bales,

   BMP's: Silt Fence (FF) If required

5. Soils Stabilization: Temporary and permanent soil stabilization will be provided. Temporary stabilization will be provided through the application of straw and/or plastic sheeting to exposed, worked earth. From October 1 until April 30, no exposed soil may remain exposed and unworked for more than two days; after May 1, no exposed soil may remain exposed and unworked for more than seven days.

BMP's: Plastic Sheeting,

6. Slope Protection: Slopes shall be protected from erosion through cover and prevention of concentrated surface runoff flows.

BMP's: Plastic Sheeting,

7. Protection of Permanent Drain Inlets: Inlet protection will pe provided for all catch basins.

BMP’s: N/A

8. Stabilization of Channels and Outlets: All channel slopes shall be constructed and protected against erosion in accordance with City of Arlington Drainage Standards.

BMP’s: None Required

9. Pollutant Control: Pollutants shall be controlled as described in the Potential Pollutants section of this SWPPP.

10. Dewatering Control: De-watering: Interception of the water table is not expected to occur, even if there is an increase in precipitation. However, should ground water flows be encountered, the flows can be directed to on site native vegetation for cleanup.

BMP's: Native vegetation (As Required)

11. BMP Maintenance: All BMP's and SWPPP elements shall be inspected daily and maintained as required.

12. Project Management: The project shall be managed in a cooperative effort by the project manager, contractor, engineer, and the city inspector. During the construction process, if unforeseen issues arise that cannot be resolved on site, construction activity (other than SWPPP maintenance) shall be halted, and the city inspector and the project engineer are to be contacted and informed of the situation.

13. Protect On-Site Stormwater Management BMPs For Runoff from Roofs and Other Hard Surface On-site stormwater management BMPs used for runoff from roofs and other hard surfaces include full dispersion, roof downspout full infiltration or dispersion systems, perforated stubout connections, rain gardens, bioretention systems, permeable pavement, sheet flow dispersion, and concentrated flow dispersion. The areas on the site to be used for these BMPs shall be protected from siltation and compaction during construction by sequencing the construction in a fashion to install these BMPs at the latter part of the construction grading operations, by excluding equipment from the BMPS and the associated areas, and by using the erosion and sedimentation control BMPs.

BMP C102: Buffer Zone

Minimum Requirement # 3 Water Pollution Source Control

Since the project is for residential lots, under SCC 30.63 A.530, (2) the project does not fall under the “High Use Sites” covering commercial or industrial sites.

BMP C-151: Concrete Handling (Design and Installation Specifications)

Concrete truck chutes, pumps, and internals shall be washed out only into formed areas awaiting installation of concrete or asphalt. Unused concrete remaining in the truck and pump shall be returned to the originating batch plant for recycling.

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

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

Washdown from areas such as concrete aggregate driveways shall not drain directly to natural or constructed stormwater conveyances.

When no formed areas are available, wash water and leftover product shall be contained in a lined container. Contained concrete shall be disposed of in a manner that does not violate groundwater or surface water quality standards

Maintenance Standards

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

Minimum Requirement # 4 Preservation of Natural Drainage Systems and Outfalls

All runoff currently leaves the site along the northwest side of the property. All proposed runoffs will continue to discharge at the same location, maintaining the site's natural discharge location and preserve the natural drainage system and outfall

Minimum Requirement #5 On-Site Stormwater Management

As discussed above, stormwater will be managed through the use of On-Site Stormwater Management Requirements" using "Low Impact Development Performance Standards."

Under Minimum Requirement 5, requires the use of various on-site stormwater management BMPs provided they are not infeasible according to criteria set forth in this manual.

TABLE 1.1 LIST #1 BMP FEASIBILITY

Lawn and landscaped areas:

1. Post-Construction Soil Quality and Depth in accordance with BMP T5.13 in Volume V, Chapter 5 of this manual (Will be used)

Roofs:

1. Full Dispersion in accordance with BMP T5.30 and BMP T5.10B in Volume V, Chapter 5 of this manual.

Other Hard Surfaces:

Full Dispersion in accordance with BMP T5.30 in Volume V, Chapter 5 of this manual. Infiltration Capacity: The USDA-NRCS soils study indicate moderately drained Tokul Loam soils. These soils have limited infiltration capabilities.

The project proposes to use full dispersion as outlined in section MR-7 Flow control.

BMP T5.13 “Post Construction Soil Quality and Depth”

The topsoil’s will be stockpile on-site and reused per “Implementation Options #3 per Volume V, Chapter 5, BMP T5.13 “Post Construction Soil Quality and Depth” which requires “Stockpile existing topsoil is during grading and replace it prior to planting…” (See work sheets “List of Figures”)

Minimum Requirement #6 Runoff Treatment Requirements

DRIVEWAYS AND PARKING PGHS AREA

The combined new PGHS area is over the 5,000 sf the threshold. Therefore, the PGHS areas will use 100-ft flow paths

Minimum Requirement #7 Flow Control

As discussed above, stormwater will be managed through the use of full dispersion methods using the BMP applications as outlined in SMMWW Volume 5 Chapter 3.

BMP T5.30 Full Dispersion

Minimum Design Requirements for Residential Projects

Developments that preserve 6.5 times of the proposed impervious area in a forested or native condition, can disperse runoff from the developed portion of the site into the native vegetation area as long as the developed areas draining to the native vegetation do not have impervious areas that exceed 10% of the entire site.

Allowable Developed Areas:

Total Site Area: 5 acres

Allowable Impervious Area: 5 x 10% = 0.5 acres

Allowable Pervious Area: 5 x 25% = 1.25 acres

Proposed Lot Impervious Roof Areas: 4000 SF

Proposed Lot Driveway Areas: 1100 SF

Total Impervious Area: 5100 sf < 0.5 acres allowed

Proposed Pervious Areas: 43,560 sf < 1.25 acres allowed

Required Native Growth Area: 0.8 acres

Proposed Native Growth Area: 2.2 acres

Dispersion Provided:

Roof Downspouts:

- Comply with the Downspout Dispersion requirements of BMP T5.10B, with vegetated flow paths of 100 feet or more through the native vegetation preserved area.

Driveway Dispersion:

- Comply with BMP 5.11 for concentrated flow and BMP T5.12 for sheet flow- with flow paths of 100 feet or more through native vegetation

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

The topsoil's will be stockpile on-site and reused per "Implementation Options #3 per Volume V, Chapter 5, BMP T5.13 "Post Construction Soil Quality and Depth" which requires "Stockpile existing topsoil is during grading and replace it prior to planting…" In addition, the soils will be required to be evaluated for organic compliance. See the following requirements.

BMP T5.13 Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution- generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is different from preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is

important that the materials used to meet the soil quality and depth BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoil's improve soil conditions and do not have an excessive percent of clay fines.

Design Guidelines

Soil retention. The duff layer and native topsoil should be retained in an undisturbed state to the maximum extent practicable. In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil quality. All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility, or engineered as structural fill or slope shall, at project completion, demonstrate the following:

A topsoil layer with a minimum organic matter content of ten percent dry weight in planting beds, and 5% organic matter content (based on a loss-on-ignition test) in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the original undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

2. Planting beds must be mulched with 2 inches of organic material

3. Quality of compost and other materials used to meet the organic content requirements:

Compost used in bioretention areas should be stable, mature, and derived from yard debris, wood waste, or other organic materials that meet the intent of the organic soil amendment specification. Biosolids and manure composts can be higher in bio-available phosphorus than compost derived from yard or plant waste and therefore are not allowed in bioretention areas due to the possibility of exporting bio-available phosphorus in effluent. The compost must also have an organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25:I.

The carbon to nitrogen ratio may be as high as 35:I for plantings composed entirely of plants native to the Puget Sound Lowlands region.

Calculated amendment rates may be met through use of composted materials as defined above; or other organic materials amended to meet the carbon to nitrogen ratio requirements and meeting the contaminant standards of Grade A Compost.

The resulting soil should be conducive to the type of vegetation to be established. Implementation Options: The soil quality design guidelines listed above can be met by using one of the methods listed below.

I. Leave undisturbed native vegetation and soil and protect from compaction during construction.
II. Amend disturbed soil according to the following procedures:
III. Scarify subsoil to a depth of one foot
IV. In planting beds, place three inches of compost and till in to an eight-inch depth.
V. In turf areas, place two inches of compost and till in to an eight-inch depth.
VI. Apply two to four inches of arborist wood chip, coarse bark mulch, or compost mulch to planting beds after final planting.

Alternatively, disturbed soil can be amended on a site-customized manner so that it meets the soil quality criteria set forth above, as determined by a licensed engineer, geologist, landscape architect, or other person as approved by Snohomish County.

3. Stockpile existing topsoil during grading and replace it prior to planting. Stockpiled topsoil must be amended if needed to meet the organic matter and depth requirements by following the procedures in method (2) above).

4. Import topsoil mix of sufficient organic content and depth to meet the organic matter and depth requirements.

5. More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Maintenance

Soil quality and depth should be established toward the end of construction and once established, should be protected from compaction, such as from large machinery use, and from erosion.

Soil should be planted and mulched after installation.

Plant debris or its equivalent should be left on the soil surface to replenish organic matter.

Minimum Requirement #8 Wetlands Protection

There are no wetland areas present within this project site.

Minimum Requirement #9 Operations and Maintenance

Stormwater runoff is to be dispersed, therefore there is no elements requiring O&M.

This report was compiled using existing public record information and public record data.

Report Compiled by Thomas Barry, Professional Land Surveyor PLS 28067