

Storm Drainage Report

For

Hu Residence

At 30XX 69th Avenue SE

Mercer Island, WA



12/28/2020

December, 2020

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1.0 Project Overview

This proposed single-family resident development is a 0.190 acres lot project located in City of Mercer Island, King County, Washington. See Figure 1 for project Vicinity Map.

The subject property address is at 30xx 69th Avenue SE in Mercer Island, Washington. The new single-family house will be a two-story wood framed structure in the central portion of the site, accessible from 69th Avenue SE.

A primary component of the new development project plans is the satisfaction of current stormwater management requirements commensurate with Department of Ecology 2014 Stormwater Management manual for Western Washington (SWWMM) and/or City of Mercer Island Storm Management Standards. This stormwater report describes the existing drainage characteristics in the project area and presents the proposed On-Site stormwater management within the project to mitigate for the project impacts.

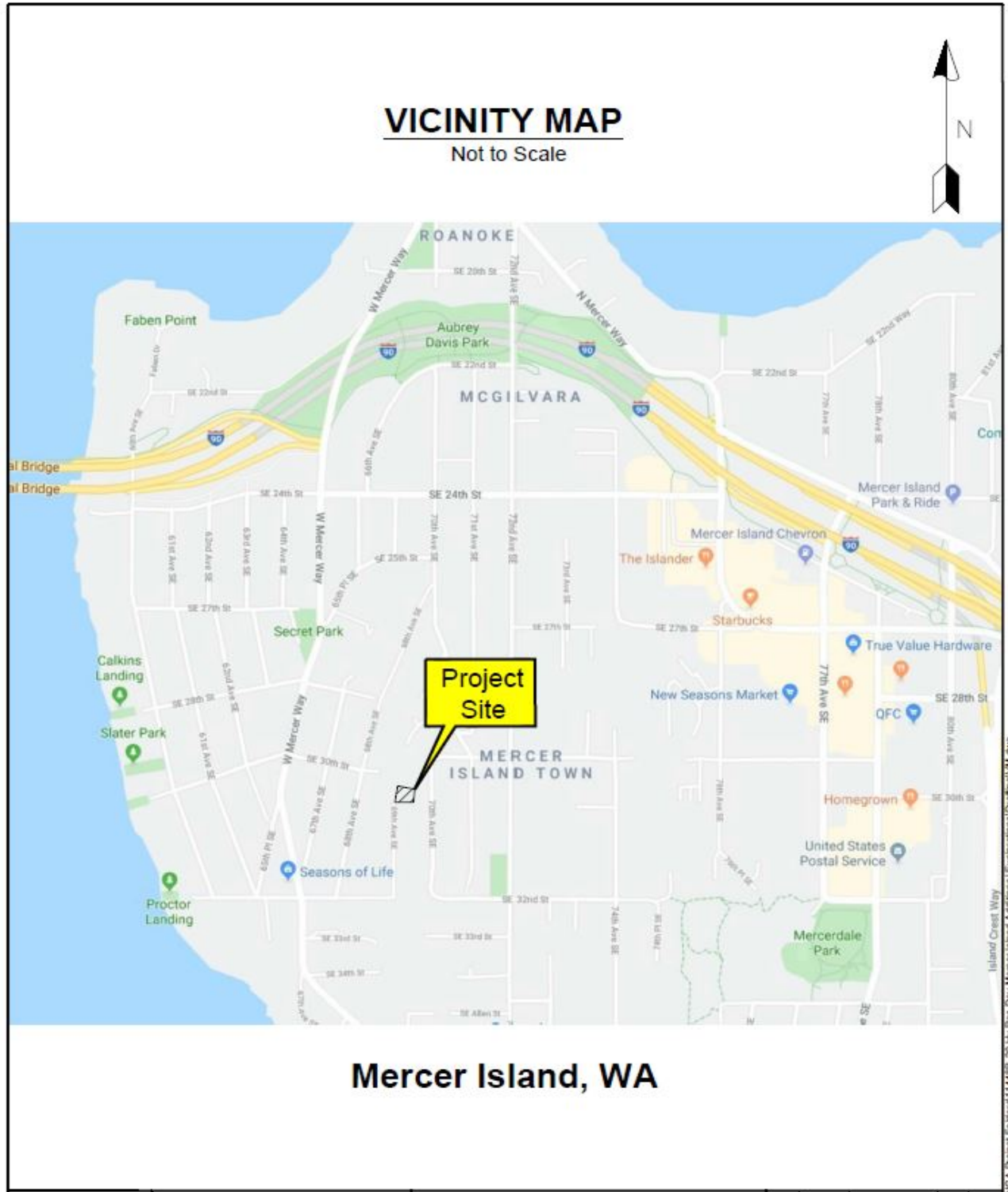


Figure 1: Vicinity Map

2.0 Site Conditions

2.1 Existing Site Conditions

The existing parcel is a irregularly shaped lot located at 30xx 69th Avenue SE Mercer Island, WA. The property is bounded by 69th Avenue SE to west, single-family residents to north and east, vacant lot to the south.

The project site covers an area of approximately 0.19 acres and is currently vacant. The ground surface within the site slopes gently to steeply down from the upper eastern portion of the site to the western portion of the site. Vegetation within the site consists of grass yard areas and a few trees. A small concrete slab about 570 sf from an old basketball court occupies the south central portion of the site.

See Appendix A for existing site conditions and photo.

There is currently no stormwater management facilities located on the property. The existing stormwater runoff for the site disposal by infiltration or surface dispersion. The existing land cover is outlined in the Table 1.0.

Table 1.0: Existing Land Cover

Summary of Existing Site Conditions			
Surface Type	Area	Units	Notes
Total Lot	8,277	SF	
Concrete Area	570	SF	
Impervious Subtotal	570	SF	
Trees	180	SF	
Lawn/Landscape	7,527	SF	
Pervious Total	7,707	SF	

2.2 Existing Hydraulic Features

At this time, there is no stormwater drainage system on the site to collect stormwater runoff. The site stormwater disperse across the site from east to west direction. No wetlands or stream has been identified on or adjacent to the site.

2.3 Soils Information

The Geologic Map of Mercer Island, WA, by Kathy G Troost & Aaron P. Wisher, et al (USGS, October 2006) was reviewed for the parcel. The parcel is mapped as Vashon Advance Outwash (Qva) with Lawton Clay (Qvlc) mapped in the immediate vicinity downslope of the property. The Advance Outwash is described as well-sorted sand and gravel deposits with local silt lenses, and grades downward into the Lawton Clay with increasing silt content towards the contact. The Lawton Clay is describes as laminated to massive silt, clayey silt, and silty clay with scattered gravel dropstones. In general, we encountered a layer of surficial undocumented fill of varying depths in each of our explorations underlain by oxidized silty fine to medium sand and gravel which we interpreted as native glacial Advance Outwash deposits, slowly grading into a brownish gray to blue silt with fine sand and trace gravel at depth, which we interpreted as native Lawton Clay deposits.

See Appendix F for Geotechnical Engineering Evaluation Report.

3.0 Developed Conditons

3.1 Design References

The following design references were utilized in development of the stormwater design:

- * Department of Ecology Stormwater Management Manual for Western Washington (SWWMM) 2019

3.2 Minimum Requirements

Summary of project information for determining minimum stormwater requirements			
Key	Component	Value	Notes
A	Project Site Area	8,277 SF	
B	Existing Impervious Area	570 SF	
C	Existing Impervious Area Coverage	0.60%	Calculated as B/A100%
D	New Impervious Area	2,330 SF	New roof area – New driveway
E	Replaced Impervious Area	570 SF	Existing concrete pad
F	New Plus Replaced Impervious Area	2,900 SF	Calculated as D+E
G	Proposed Impervious Area	2,900 SF	Existing + Replaced Areas
H	Converted pervious: Native vegetation converted to lawn or landscape	0.00 SF	N/A
I	Converted Pervious: Native vegetation converted to pasture	0.00 SF	N/A
J	Total Area of Land Disturbing Activity	3,337 SF	

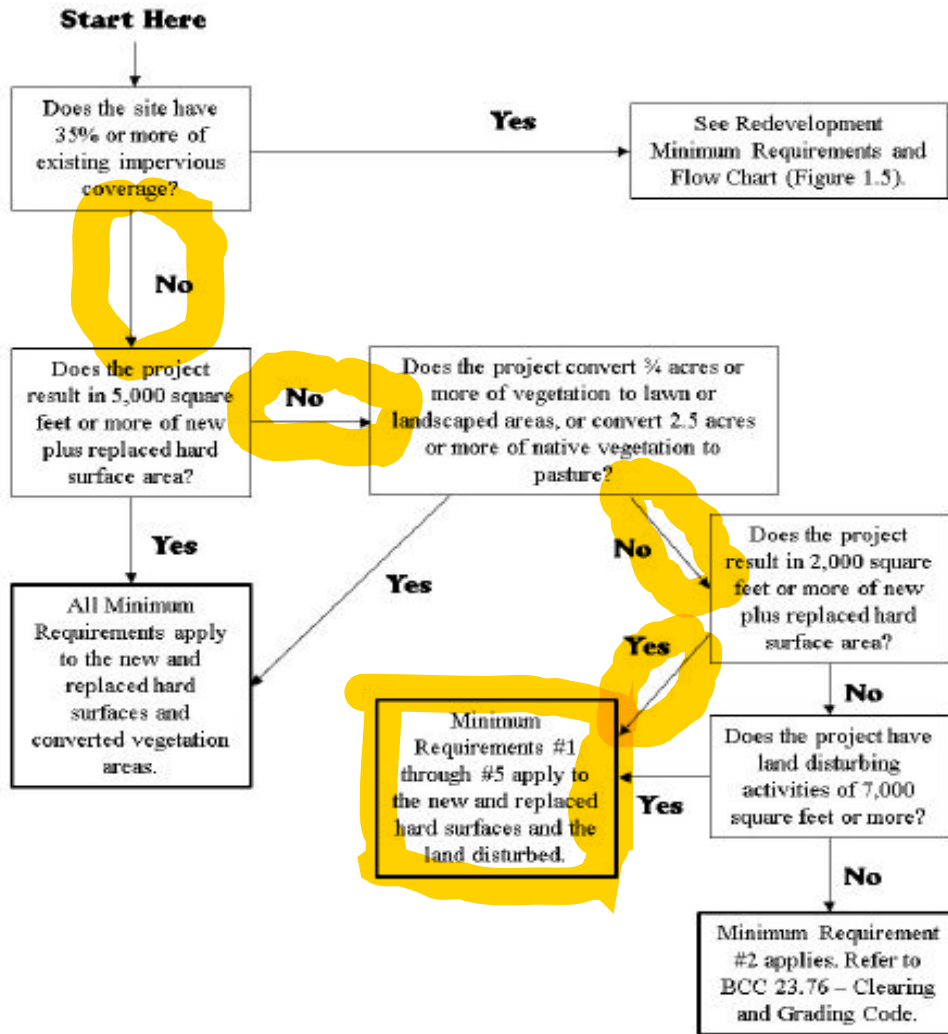


Figure 1.4 - Flow Chart for Determining Minimum Requirements for New Development Projects

Source: Adapted from Figure 2.4.1 of Volume I of the DOE Manual.

According to the above Flow Chart for determining requirements for New Development project, Minimum Requirements #1 - #5 SWWMM 2019 apply to the new and replaced impervious surfaces and the land disturbed.

3.3 Proposed Development and On-Site Stormwater Management

The new development proposed to construct a single-family residence on the site. The new residence will be multi-level and utilize a daylight basement deep foundation design, with an underground level and garage. Retaining walls are proposed for the residence foundations and along the driveway for access to the underground garage. A new deck will also be construct for the new residence and associate landscape and front yard improvements.

See Appendix B for the proposed site conditions. The proposed land cover is outlined in Table 2.0.

Table 2.0: Developed Land Cover

Summary of Proposed Site Conditions			
Surface Type	Area	Units	Notes
Total Lot	8,277	SF	
New Roof	1,915	SF	
Conc. Driveway	423	SF	
Impervious Subtotal	2,338	SF	
Trees	180	SF	
Existing Lawn/Landscape	5,518	SF	
Pervious Total	5,939	SF	

3.4 Design Satisfaction of SMMWW Minimum Requirements

The following sections outline how the new single-family residential new development project design satisfies the #1 – 5 minimum SMMWW requirements.

MR #1 – Stormwater Site Plans

Stormwater Site Plans will be prepared for the single- family residential new development. This report and other supporting studies and drawings will comprise the component Stormwater Site Plan.

MR #2 – Construction Stormwater Pollution Prevention

The single-family residential new development project will include in the contract plans, the TESC plan sheets to address erosion. The SPCC will be a stand alone document prepared by the contractor to address potential mechanical or construction related spills that could potentially contaminate stormwater or soils.

MR #3 – Source Control of Pollutants

Pollutants will be prevented from coming in contact and mixing with stormwater by using silt fence along the property line to keep stormwater within construction site. Construction entrance will be implemented prior to construction to prevent wheel tracking pollutant from construction site into the roadway.

MR #4 – Maintaining the Natural drainage System

Drainage patterns will be maintained as a result of the Single-family residential new development project.

MR #5 – On-Site Stormwater Management

This new developed project does not required to provide flow control due the total new plus replaced surfaces are below the threshold of 5,000 sf. But this project required to install On-Site Stormwater Management due to the new plus replaced surfaces is above the 2,000 SF threshold. This project will utilize List Approach to meet the Minimum Requirement #5 compliance. The project will uses BMPs from List #3 to meet the minimum requirement #5 for the new development project. Lawn and Landscaped Areas will utilize Post-Construction Soil Quality and Depth. The new roof surface of 3,401 sf will mitigate by Perforated Stub-out Connection with 2' x 10' trench with perforated pipe and connect to the existing drainage system under the 14th Place. According to the Geotechnical Report, infiltration is not feasible for this site. So Downspout Full Infiltration is not feasible and Downspout Dispersion Systems is not practicable due the lack of land for dispersion area required. The driveway will sheet flow to a 2' gravel trench and convey to a catchbasin with oil water separator before tide into the existing drainage system under 69th Ave. SE. See drainage plan for perforated stub out connection and driveway trench locations, cross-sections and details. See Appendix D for perforated stub-out connection design guidelines, standard maintenance and List Approach

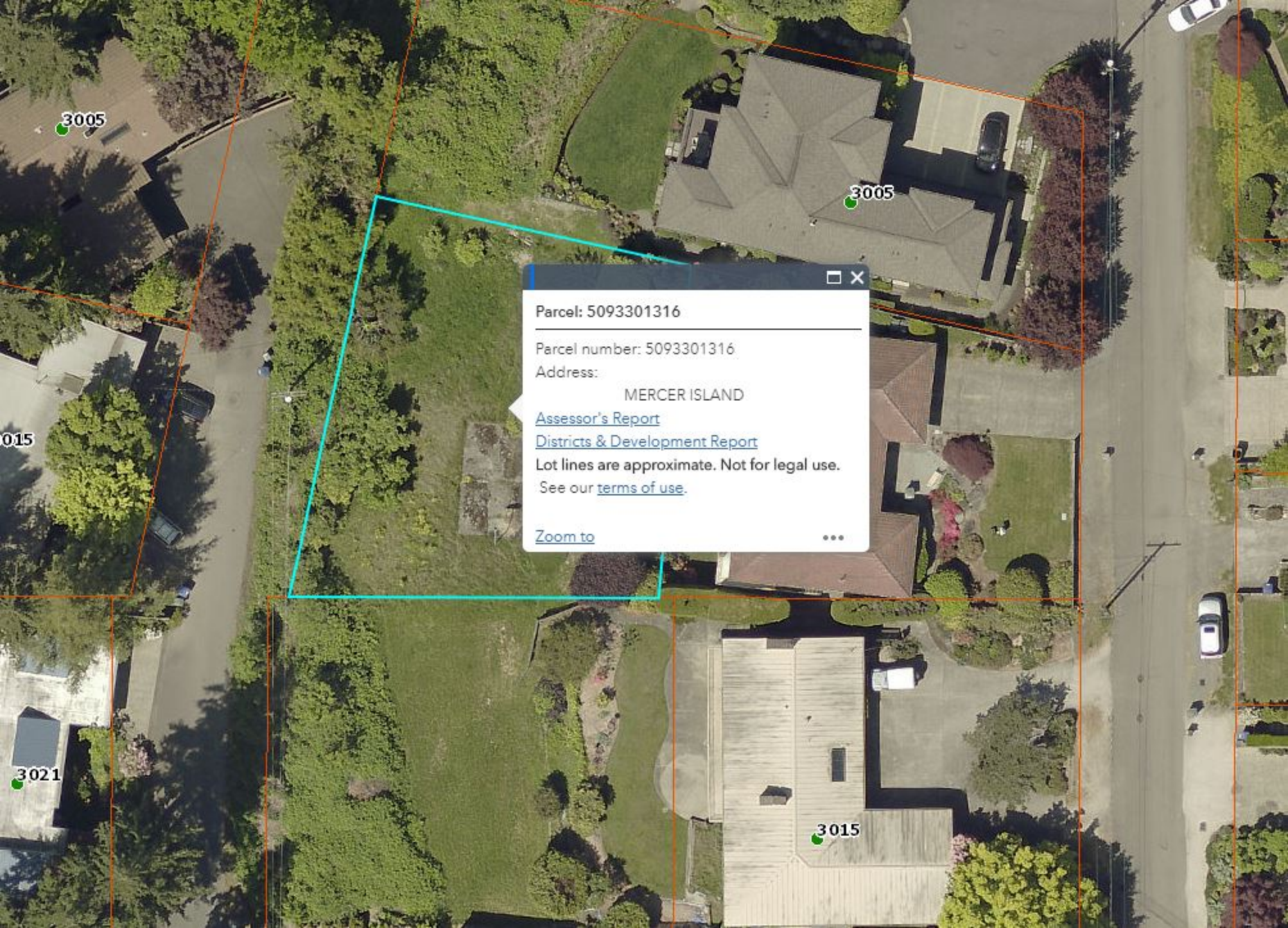
Table.

4.0 Operations and Maintenance

The owner will need to perform appropriate preventive maintenance steps to ensure that on-site stormwater management facilities are adequately maintained and allow for continued operations according to the maintenance section of the SMMWW 2019.

Appendix A

Existing Site Conditions and Photos



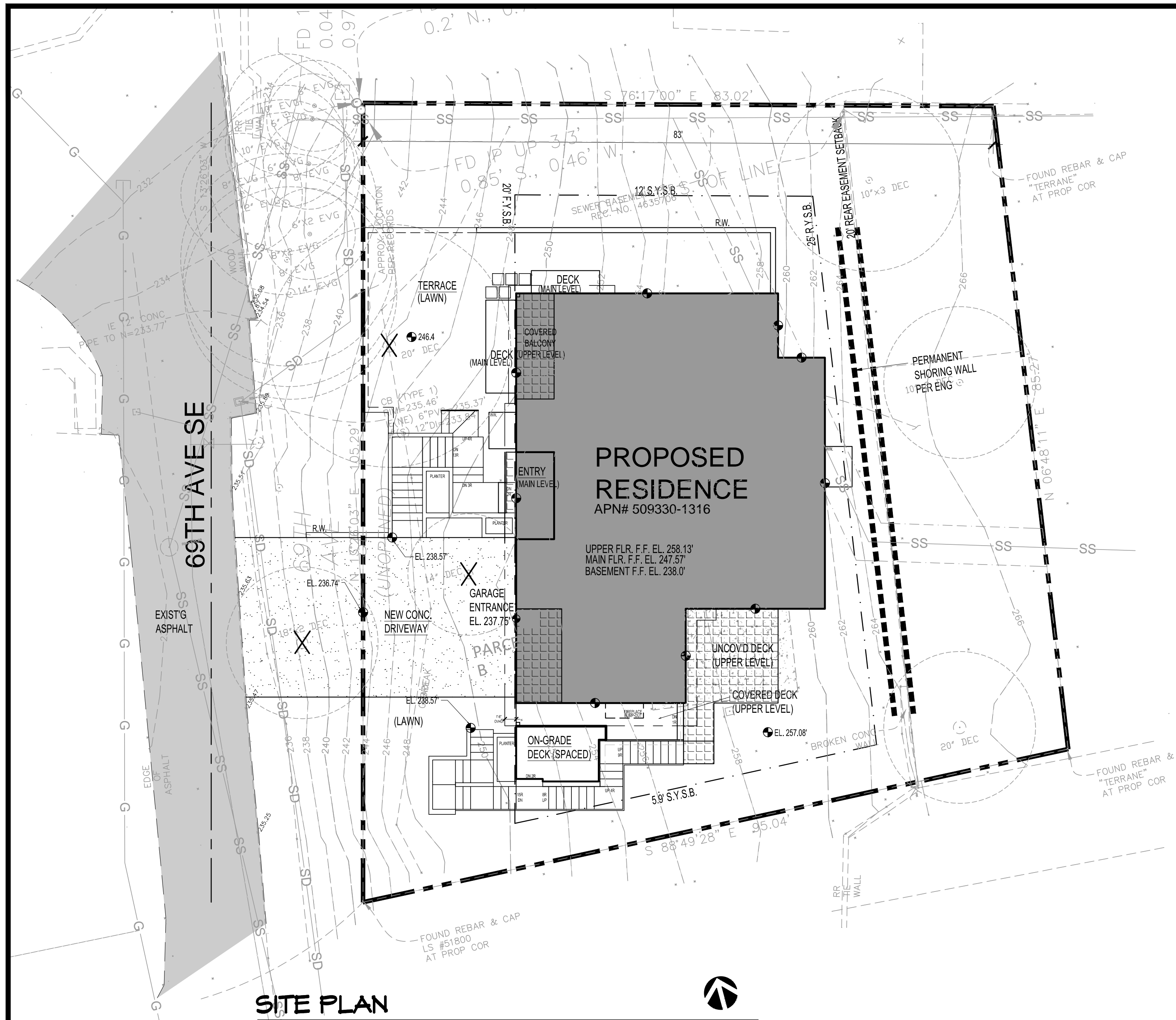
Parcel: 5093301316

Parcel number: 5093301316
Address:
MERCER ISLAND

[Assessor's Report](#)
[Districts & Development Report](#)

Lot lines are approximate. Not for legal use.
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[Zoom to](#) ⋮



SITE PLAN

FULL SIZE SCALE 1" = 40'

PROJECT TEAM

OWNER
 HUI HOME LLC
 ADDRESS
 ADDRESS
 PH:
 EMAIL

APPLICANT/CONTACT
 James Ma

ARCHITECT
 ATLAS ARCHITECTS
 5280 HIGHLAND DRIVE
 BELLEVUE WA 98006

CONTACT: GENG TAN
 CONTRACTORS

STRUCTURAL ENGINEER
 DIHONG SHAO, S.E.

CIVIL ENGINEER
 TANDEM ENGINEERING

GEOTECHNICAL ENGINEER
 NELSON GEOTECH
 KHALED M. SHAWISH, PE

SURVEYOR
 TERRANE

ARBORIST

LANDSCAPE

PROPERTY INFO

PROPERTY ADDRESS
 XXX

JURISDICTION
 XXX

PARCEL NUMBER

LOT AREA
 8,403 SF

LEGAL DESCRIPTION
 MAPLE GROVE PARK SUBDIV E
 SEATTLE PARCEL "B" MERCER
 ISLAND LLA #SUB17-005 REC
 #20171019900001 SD LLA BEING POR
 OF LOTS 1-3 & 8-9 OF BLK 9 OF SD
 ADD
 Plat Block: 9
 Plat Lot: 1-3

AREA TABULATION

CONDITIONED AREA	
BASEMENT FLOOR	656 SF
MAIN FLOOR	1855 SF
UPPER FLOOR	1914 SF
TOTAL CONDITIONED AREA	4425 SF

UNCONDITIONED AREA
 GARAGE
 DECK

LAND USE DATA

ZONING
 R-8.4

SETBACKS
 FRONT YARD SETBACK: 20 FT
 REAR YARD SETBACKS: 25 FT

SIDE YARD SETBACKS:
 105.29 * 17% = 17.9 FEET TOTAL
 17.9' x 33% = 5.9' MIN. SIDE YARD S.B.

NORTH SIDE YARD S.B. = 12 FT
SOUTH SIDE YARD S.B. = 5.9 FT

GROSS FLOOR AREA
NET LOT AREA
 8403 * 40% = 3361 SF ALLOWABLE G.F.A

STRUCTURAL HEIGHT LIMIT

LOT SLOPE
 266.5 - 239.5 = 27.0' = 32.6% SLOPE
 --> 30% LOT COVERAGE

STRUCTURAL HEIGHT LIMIT

LOT COVERAGE
(IMPERVIOUS SURFACES LIMIT)
 8403 * 0.3 = 2521 SF OF LOT COVERAGE

GROSS FLOOR AREA
 8403 * 0.4 = 3361 SF

BASEMENT LEVEL
MAIN FLOOR LEVEL
UPPER FLOOR LEVEL 1914 SF

SCHEMATIC 1

06.24.18

A RESIDENTIAL NEW CONSTRUCTION
HUI RESIDENCE

DATE	DESCRIPTION	REV

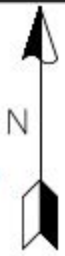
Drawn By: M018-014

Drawing Title:

SITE PLAN

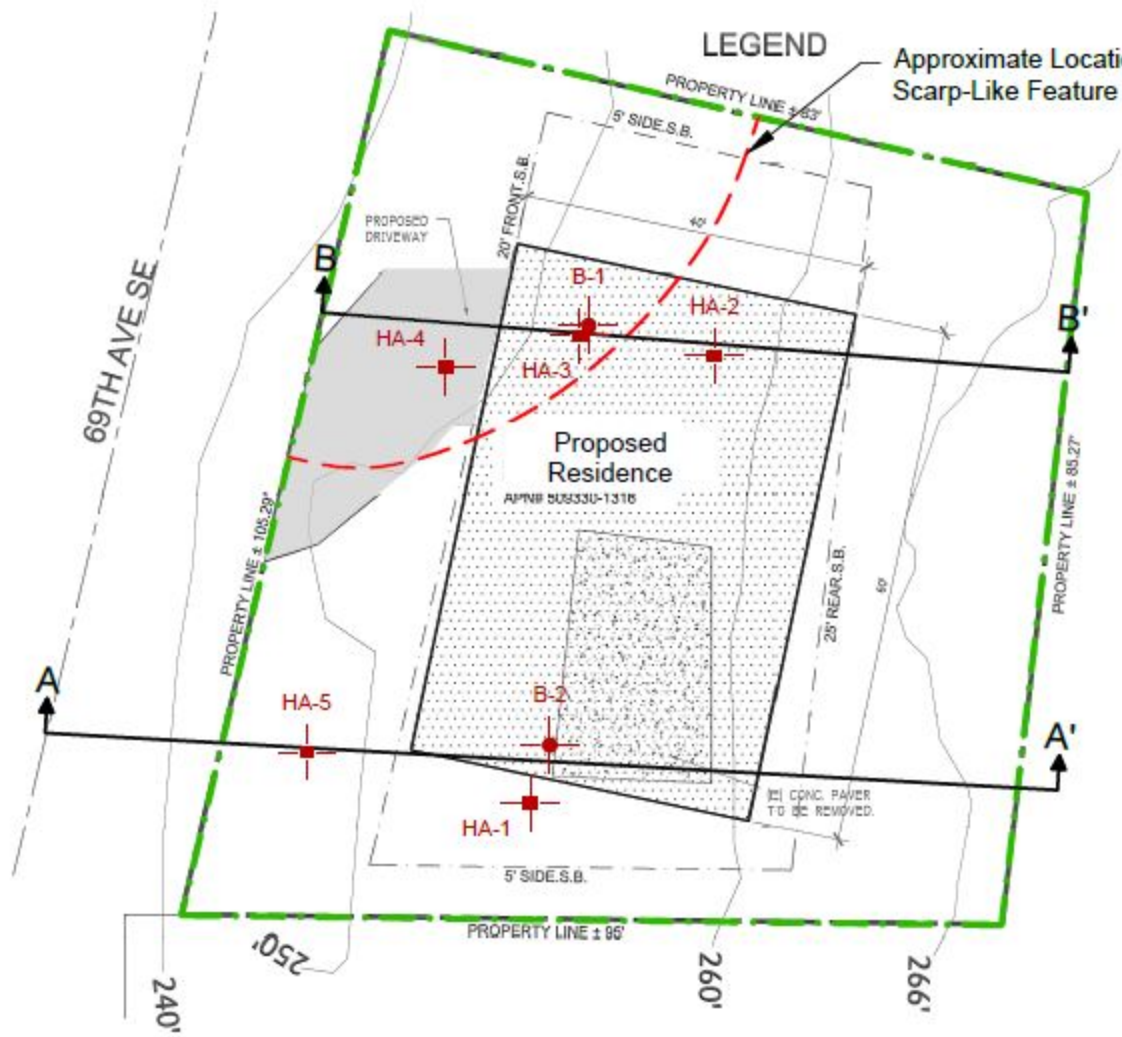
Sheet **C1.0**

Site Plan










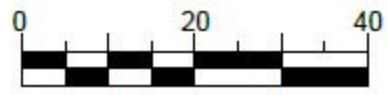
LEGEND

Approximate Location of Scarp-Like Feature



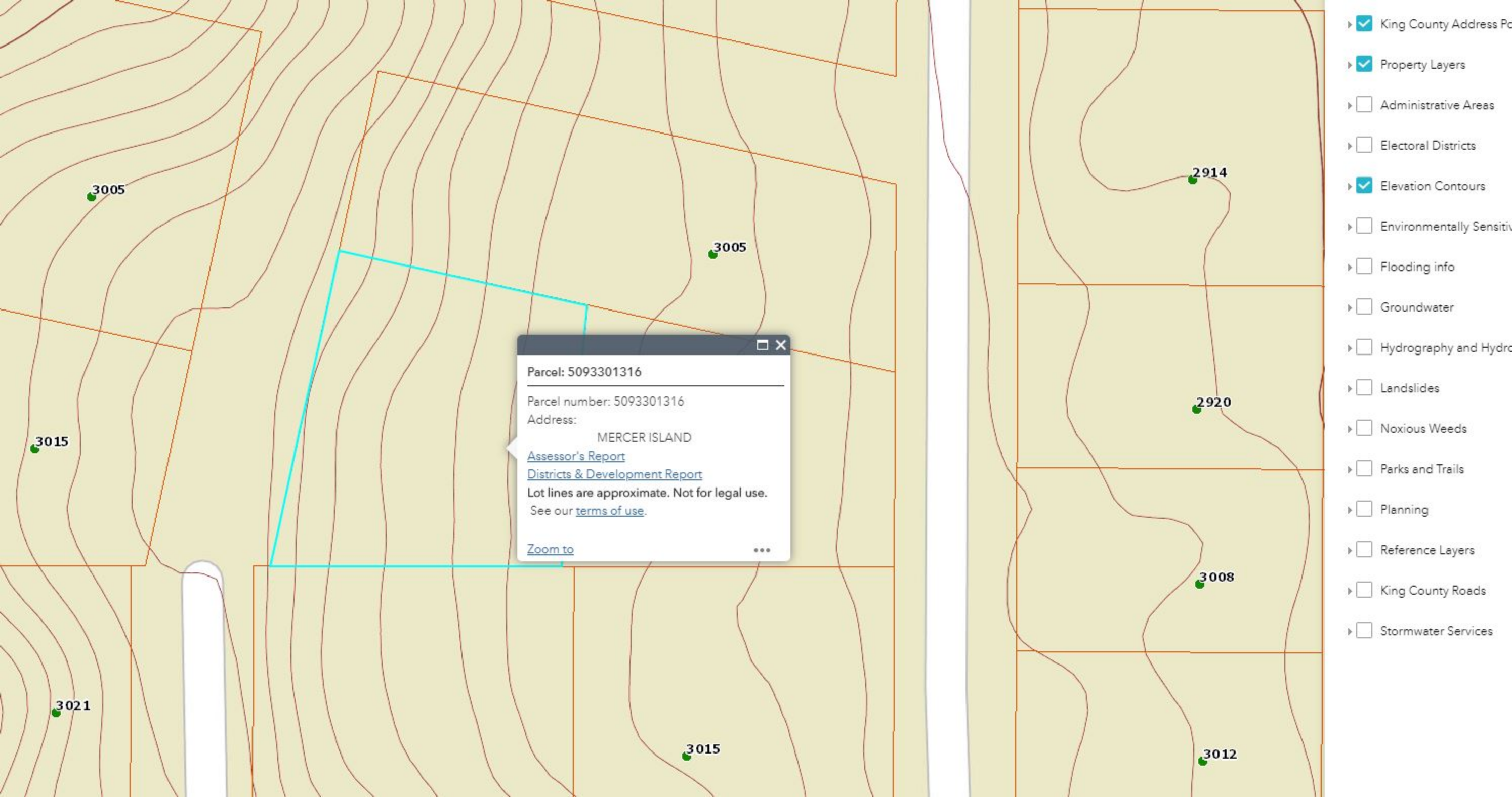
LEGEND

-  Property line
-  B-1
-  Number and approximate location of boring
-  HA-1
-  Number and approximate location of hand auger
-  A A'
-  Approximate location of cross-section



Scale: 1 inch = 20 feet

Reference: Site Plan based on a plan dated June 24, 2018 titled "Site Plan"



Parcel: 5093301316

Parcel number: 5093301316
Address:
MERCER ISLAND

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[Districts & Development Report](#)

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- King County Address Po
- Property Layers
- Administrative Areas
- Electoral Districts
- Elevation Contours
- Environmentally Sensitiv
- Flooding info
- Groundwater
- Hydrography and Hydro
- Landslides
- Noxious Weeds
- Parks and Trails
- Planning
- Reference Layers
- King County Roads
- Stormwater Services

Appendix B

Developed Site
Conditions and Drainage
plan & Detail

4" PVC ROOF DRAIN

POINT	INVERT	LENGTH	S
A	237.0	48	1%
B	236.52	41	1%
C	236.11	12	1%
F	235.99		
G	235.20	20	2%
H	234.8	16	2%
EXISTING CB	234.48		
A	237.0	30	1%
D	236.7	24	1%
E	236.46	50	0.7%
C	236.11		

4" PERFORATED FOOTING DRAIN

POINT	INVERT	LENGTH	S
D-4	237.00	48	2%
D-3	236.04		
D1	250.00	44	30.00%
D2	236.80	38	2.00%
D-3	236.04		
D-4	235.20		
D-5	235.00	10	2.00%
H	234.80		

Post Construction 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 structure fill or slope shall, at project completion, demonstrate the following:

- A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the 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.
- Mulch planting beds with 2 inches of organic material
- Use compost and other materials that meet these organic content requirements:
 - The organic content for "pre-approved" amendment rates can be met only using compost meeting the compost specification for BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959), with the exception- that the compost may have up to 35% biosolids or manure. The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1. The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.
 - Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

Maintenance

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant vegetation and mulch the amended soil area after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

FIELD BOOK: _____
 SURVEYED: _____
 SURVEY BASE MAP: _____
 DESIGN ENTERED: **J.W**
 DESIGNED: **S.W**
 CHECKED: **S.W**



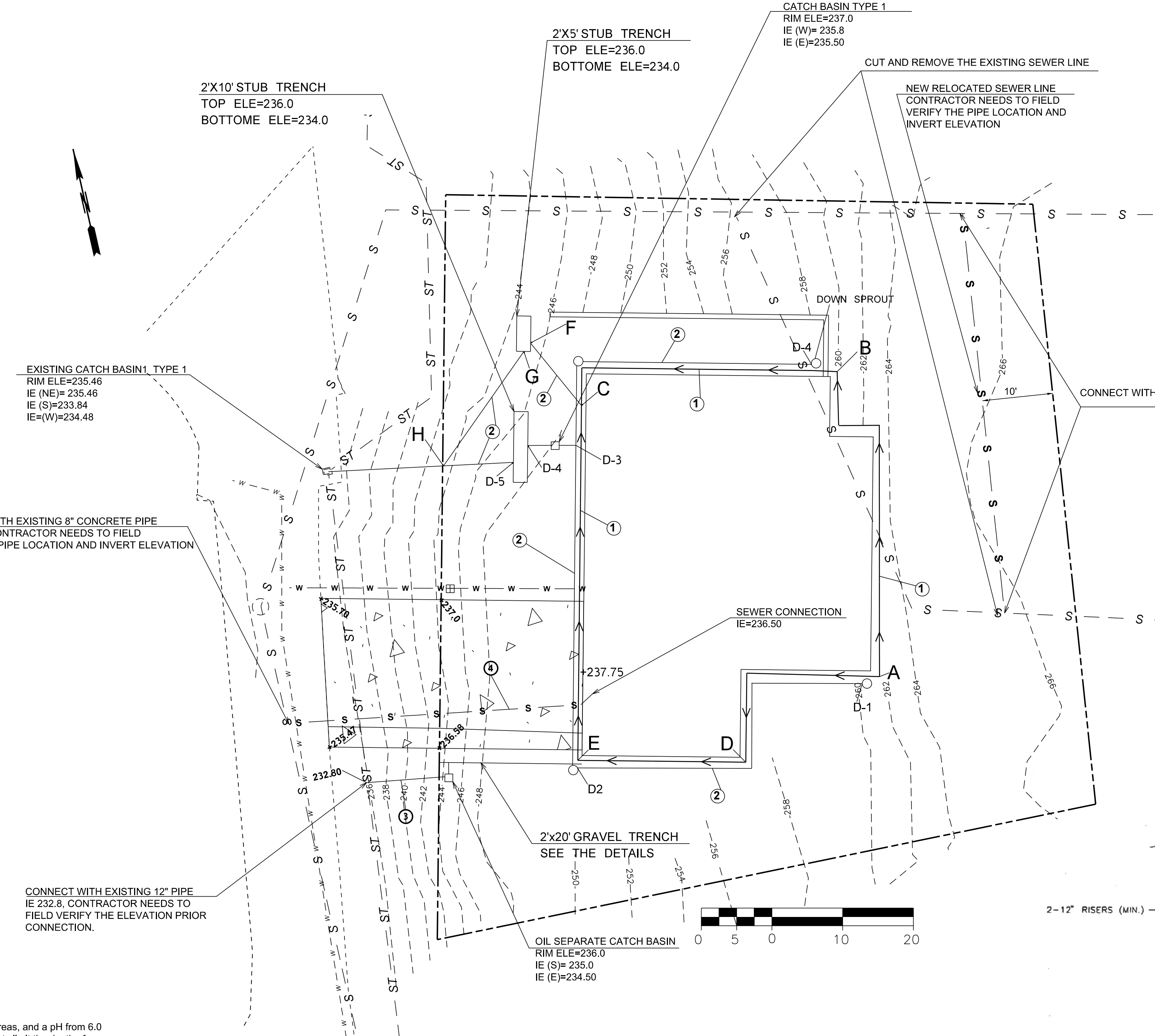
TANDEM ENGINEERING CONSULTANT INC
 8822 NE 178TH ST
 BOTHELL, WA 98011
 (206) 795-5674

DRAINAGE & GRADATION PLAN

HU'S RESIDENCE
 30XX 69TH AVE SE
 MERCER ISLAND WA 98040

SHEET
3
 OF
4
 SHEETS

C-3.00

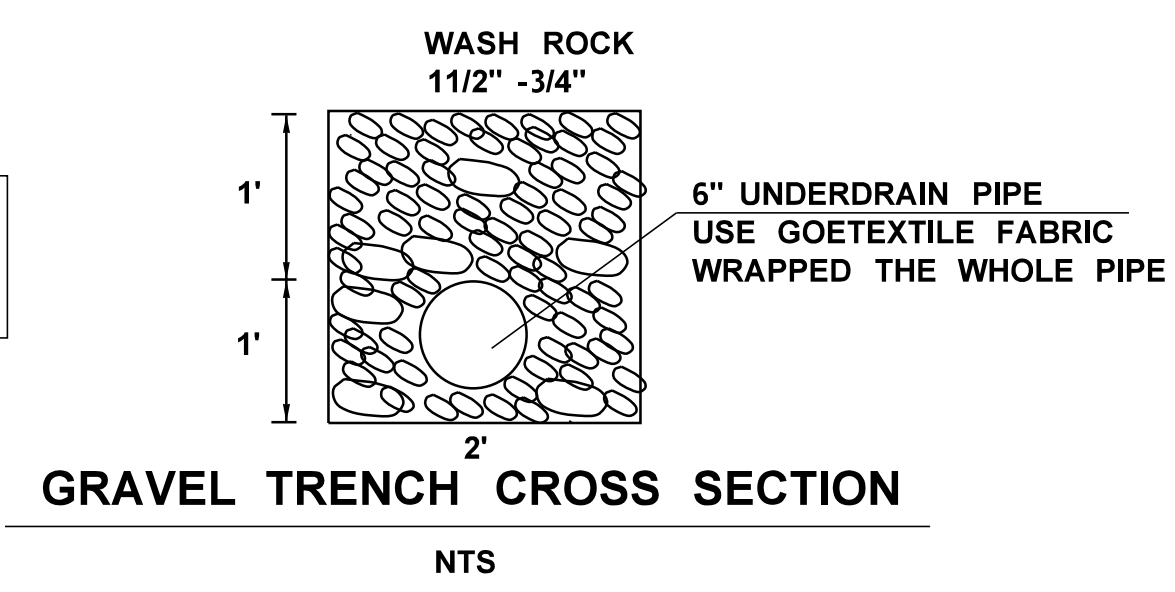
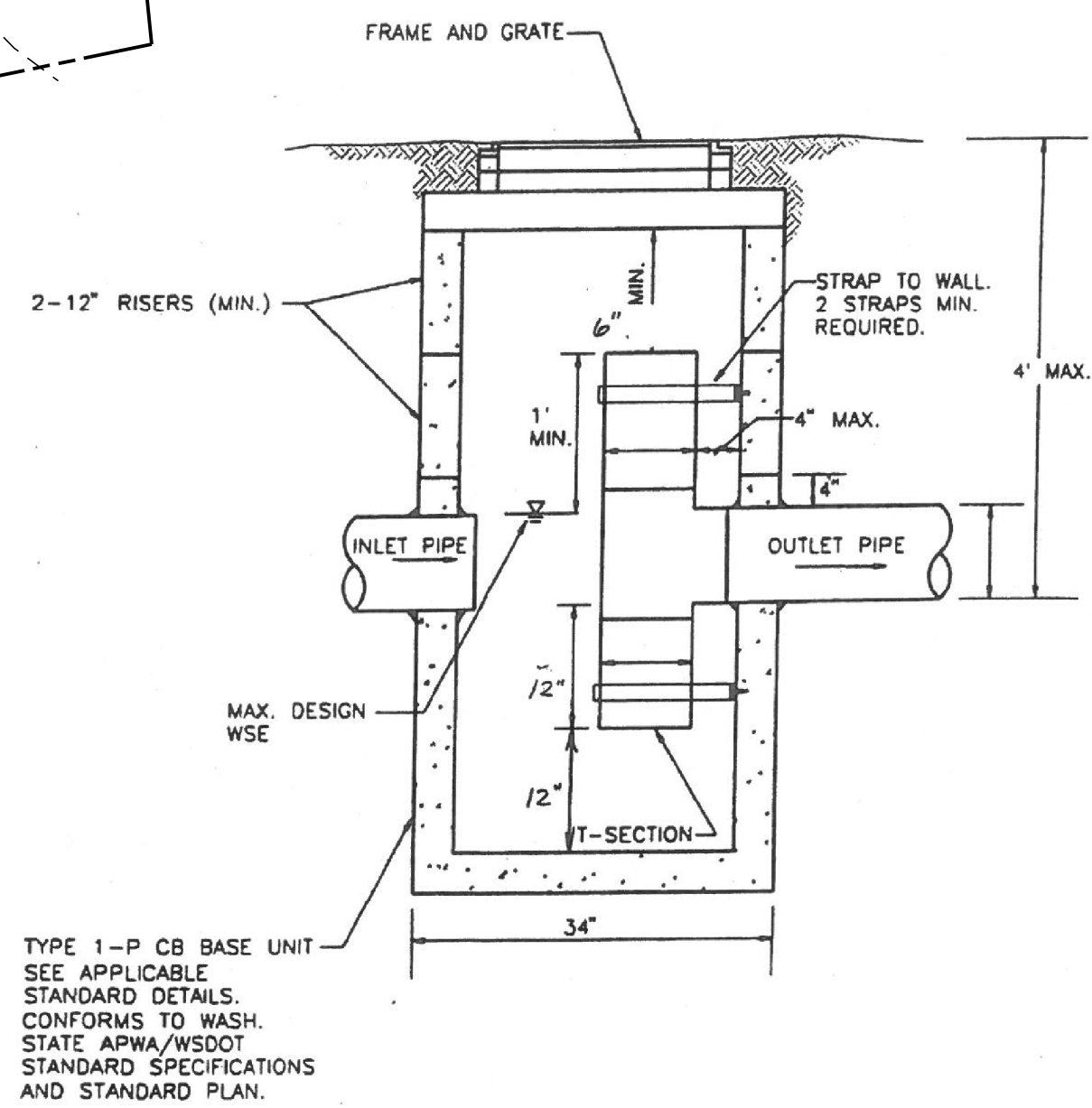


LEGEND

- PROPOSED SIDE SEWER - s - s - s -
- EXISTING SEWER LINE - S - S -
- EXISTING EDGE OF PAVEMENT - - - - -
- SPOT ELEVATION - +236
- EXISTING STORM LINE - - ST - - ST - -
- EXISTING WATER LINE - - w - - w - - w - - w - -
- PROPOSED WATER IINE - - w - w - w - w - w - w - w - w -
- PROPOSED WATER METER - [Symbol]
- TREE FENCE - [Symbol]
- EXISTING TREES - [Symbol]
- TREE DRIP LINES - [Symbol]
- PROPOSED FOOTING DRAIN - [Symbol]
- EXISTING LOT LINE - - - - -

STORM DRAIN AND SIDE SEWER NOTES

- 4" FOOTING DRAIN MIN 2% GRADE (ASTM D-3034 PVC)
- 4" ROOF DRAIN MIN 2% GRADE (ASTM D-3034 PVC)
- 4" PVC, L=11.0', S=15.5%, (ASTM D-3034 PVC)
- 6" PVC SEWER, L=42.0', S=21.7.0%, (ASTM D-3034 PVC)



NOTE
 NO EXCAVATION ENCROACHMENT INTO TREE DRIP LINE

311
 Know what's below.
 Call before you dig.

Appendix C

TESC Plan and Details

GENERAL TESC NOTES

Temporary erosion and sedimentation control facilities (TESC) (including but not limited to temporary construction entrance, catch basin protection, silt fence installation, interceptor ditches, sedimentation ponds and straw bales) must be in place and inspected by the City of Mercer Island prior to demolition, clearing/grading, etc. Spoil piles shall be kept covered. All City streets shall be kept free of mud and construction debris. TESC facilities shall be maintained until final landscaping is completed. No sediment-laden water shall enter Lake Washington, the public storm drain system, water courses, sensitive areas or the adjacent properties. Not all of these facilities may be identified on this plan but may be required during construction. Contractor will adhere to additional requirements as conditions warrant and the project progresses, including cleaning of downstream catch basins and drainage facilities of sediment from this project.

PLAN NOTES

- Approval of this temporary erosion and sedimentation control (TESC) plan does not constitute an approval of permanent road or drainage design.
- The implementation of these TESC plans and the construction, maintenance, replacement, and upgrading of these TESC facilities is the responsibility of the owner/agent and/or their contractor until all construction is approved.
- The boundaries of the clearing limits shown on this plan shall be clearly flagged by a continuous length of survey tape (or fencing, if required) prior to construction. During the construction period, no disturbance beyond the clearing limits shall be permitted. The clearing limits shall be maintained by the owner/agent and/or their contractor for the duration of construction.
- The TESC facilities shown on this plan must be constructed prior to or in conjunction with all clearing and grading so as to ensure that the transport of sediment to surface waters, drainage systems, and adjacent properties is minimized.
- The TESC facilities shown on this plan are the minimum requirements for anticipated site conditions. During the construction period, these TESC facilities shall be upgraded as needed for unexpected storm events and modified to account for changing site conditions (e.g., additional sump pumps, relocation of ditches, hay bales and silt fences, etc.).
- The TESC facilities shall be inspected daily by the owner/agent and/or their contractor and maintained to ensure continued proper functioning. Written records shall be kept of weekly reviews of the TESC facilities during the wet season (Oct. 1 to April 30) and of monthly reviews during the dry season (May 1 to Sept. 30).
- Any areas of exposed soils, including roadway embankments, that will not be disturbed for two days during the wet season (Oct. 1 to April 30) or seven days during the dry season (May 1 to Sept. 30), shall be immediately stabilized with approved TESC methods (e.g., seeding, mulching, plastic covering, etc.).
- Any area needing TESC measures that do not require immediate attention shall be addressed within fifteen (15) days.
- The TESC facilities on inactive sites shall be inspected and maintained a minimum of once a month or within forty-eight (48) hours following a storm event.
- At no time shall more than one (1) foot of sediment be allowed to accumulate within a catch basin. All catch basins and conveyance lines shall be cleaned prior to final grading and/or paving. The cleaning operation shall not flush sediment-laden water into the downstream system.
- Stabilized construction entrances and roads shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures, such as wash pads and sediment traps, may be required to ensure that all paved areas are kept clean for the duration of the project.
- Any permanent flow control facility used as a temporary settling basin shall be modified with the necessary temporary erosion control measures and shall provide adequate storage capacity.
- Where straw mulch for temporary erosion control is required, it shall be applied at a minimum thickness of 2 to 3 inches.
- Prior to the beginning of the wet season (Oct. 1), all disturbed areas shall be reviewed to identify which ones can be seeded in preparation for the winter rains. Disturbed areas shall be seeded within one week of the beginning of the wet season. The City can require seeding of additional areas in order to protect surface waters, adjacent properties, or drainage facilities.

Construction Sequence:

- Hold an onsite pre-construction meeting.
- Flag or fence clearing limits.
- Install catch basin protection, if required.
- Grade and install construction entrance(s).
- Install perimeter protection (silt fence, brush barrier, etc.).
- Construct sediment pond(s) and/or trap(s).
- Construct surface water controls (interceptor dikes, pipe slope drains, etc.) simultaneously with clearing and grading for project development.
- Maintain TESC measures in accordance with City standards and manufacturer's recommendations.
- Relocate surface water controls or TESC measures, or install new measures so that as site conditions change, the TESC is always in accordance with the City of Mercer Island Temporary Erosion and Sedimentation Control Requirements.
- Cover all areas that will be un-worked for more than two days during the wet season (Oct. 1 to April 30) or seven days during the dry season (May 1 to Sept. 30) with straw, wood fiber mulch, compost, plastic sheeting, or equivalent.
- Stabilize all areas within seven days of reaching final grade.
- Seed or sod any areas to remain un-worked for more than 30 days.
- Upon completion of the project, stabilize all disturbed areas and remove TESC measures if appropriate.

Reference: King County Surface Water Design Manual Appendix D - 10.3

LEGEND

- EXISTING ROCK WALL
- SILT FENCE - SF
- EDGE EXISTING PAVEMENT
- EXISTING PROPERTY LINE
- SITE DISTURBANCE LIMIT
- TREE DRIP LINES



EXPOSED & STOCKPILES SOIL BMP'S

All exposed and unworked soils shall be stabilized per the following criteria:
 From October 1 to April 30, no exposed and unworked soils shall remain unstabilized (exposed) for more than two days. Non-erodible, clean, granular base materials shall be applied to stabilize all trafficked areas.
 From May 1 to September 30, no exposed and unworked soils on slopes shall remain unstabilized (exposed) for more than seven days.
 Exposed and unworked soils will be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs will be used on this project include:

- Preserving natural vegetation
- Sodding
- Topsoil
- Mulching
- Check dam
- Soil binding using polyacrylamide
- Wattles
- Biodegradable erosion control blanket
- Compost blanket
- Stabilized construction entrance
- Plastic covering
- Construction road stabilization
- Seeding and planting
- Dust Control
- Bonded Fiber Matrix
- Mechanically Bonded Fiber Matrix

Seeding and mulching will be used to stabilize soils throughout the project following excavation and grading as well as other disturbed areas. During dry weather construction periods, the contractor will provide project specific dust control measures, as needed. Cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting to prevent short-term erosion. All stockpiled soils will be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.



FIELD BOOK: _____
 SURVEYED: _____
 SURVEY BASE MAP: _____
 DESIGN ENTERED: **J.W**
 DESIGNED: **S.W**
 CHECKED: **S.W**

TANDEM ENGINEERING CONSULTANT INC
 8822 NE 178TH ST
 BOTHELL, WA 98011
 (206) 795-5674

TESC PLAN

HU'S RESIDENCE
 30XX 69TH AVE SE
 MERCER ISLAND WA 98040

SHEET **2** OF **4** SHEETS
C-2.00

Appendix D

Perforated Stub-Out Connection Design Guidelines and Maintenance Standards

Runoff Model Representation

The designer has the following options to model the amount of Flow Control presumed to be provided by this BMP:

- When splashblocks or dispersion trenches are used per the guidance above, and the length of the vegetated flow path is at least 50 feet:
 - When modeling in an approved continuous runoff model, the connected roof area should be modeled as a lateral flow impervious area. Do this in WWHM on the Mitigated Scenario screen by connecting the dispersed impervious area (the roof area) to the lawn/landscape lateral flow soil basin element representing the area that will be used for dispersion (the vegetated flow path).

In situations where multiple downspout dispersions will occur, Ecology allows the roof area to be modeled as a landscaped area (grass) so that the project schematic in the approved continuous runoff model becomes manageable.
 - When calculating the runoff curve number to include in calculations described in [III-2.3 Single Event Hydrograph Method](#), the curve number may be determined by considering the roof area as landscaped area (grass).
- When dispersion trenches are used per the guidance above, and the length of the vegetated flow path is 25 - 50 feet:
 - When modeling in an approved continuous runoff model, the connected roof area should be modeled as a lateral flow impervious area. Do this in WWHM on the Mitigated Scenario screen by connecting the dispersed impervious area (the roof area) to the lawn/landscape lateral flow soil basin element representing the area that will be used for dispersion (the vegetated flow path).

In situations where multiple downspout dispersions will occur, Ecology allows the roof area to be modeled as 50%landscaped / 50%impervious so that the project schematic in the approved continuous runoff model becomes manageable.
 - When calculating the runoff curve number to include in calculations described in [III-2.3 Single Event Hydrograph Method](#), the curve number may be determined by considering the roof area as 50%landscaped / 50%impervious.

BMP T5.10C: Perforated Stub-out Connections

A perforated stub out connection is a length of perforated pipe within a gravel filled trench that is placed between roof downspouts and a stub out to the local drainage system. [Figure V-4.7: Perforated Stub-Out Connection](#) illustrates a perforated stub out connection. These systems are intended to provide some infiltration during drier months. During the wet winter months, they may provide little or no Flow Control.

Applications & Limitations

Perforated stub-outs are not appropriate when the seasonal water table is less than one foot below the trench bottom.

Select the location of the connection to allow a maximum amount of runoff to infiltrate into the ground (ideally a dry, relatively well drained, location). To facilitate maintenance, do not locate the perforated pipe portion of the system under impervious or heavily compacted (e.g., driveways and parking areas) surfaces. Use the same setbacks as for infiltration trenches in [BMP T5.10A: Downspout Full Infiltration](#).

Have a licensed geologist, hydrogeologist, or engineering geologist evaluate potential runoff discharges towards landslide hazard areas. Do not place the perforated portion of the pipe on or above slopes greater than 20% or above erosion hazard areas without evaluation by a licensed engineer in the state of Washington with geotechnical expertise or qualified geologist and jurisdiction approval.

For sites with septic systems, the perforated portion of the pipe must be downgradient of the drainfield primary and reserve areas. This requirement can be waived if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.

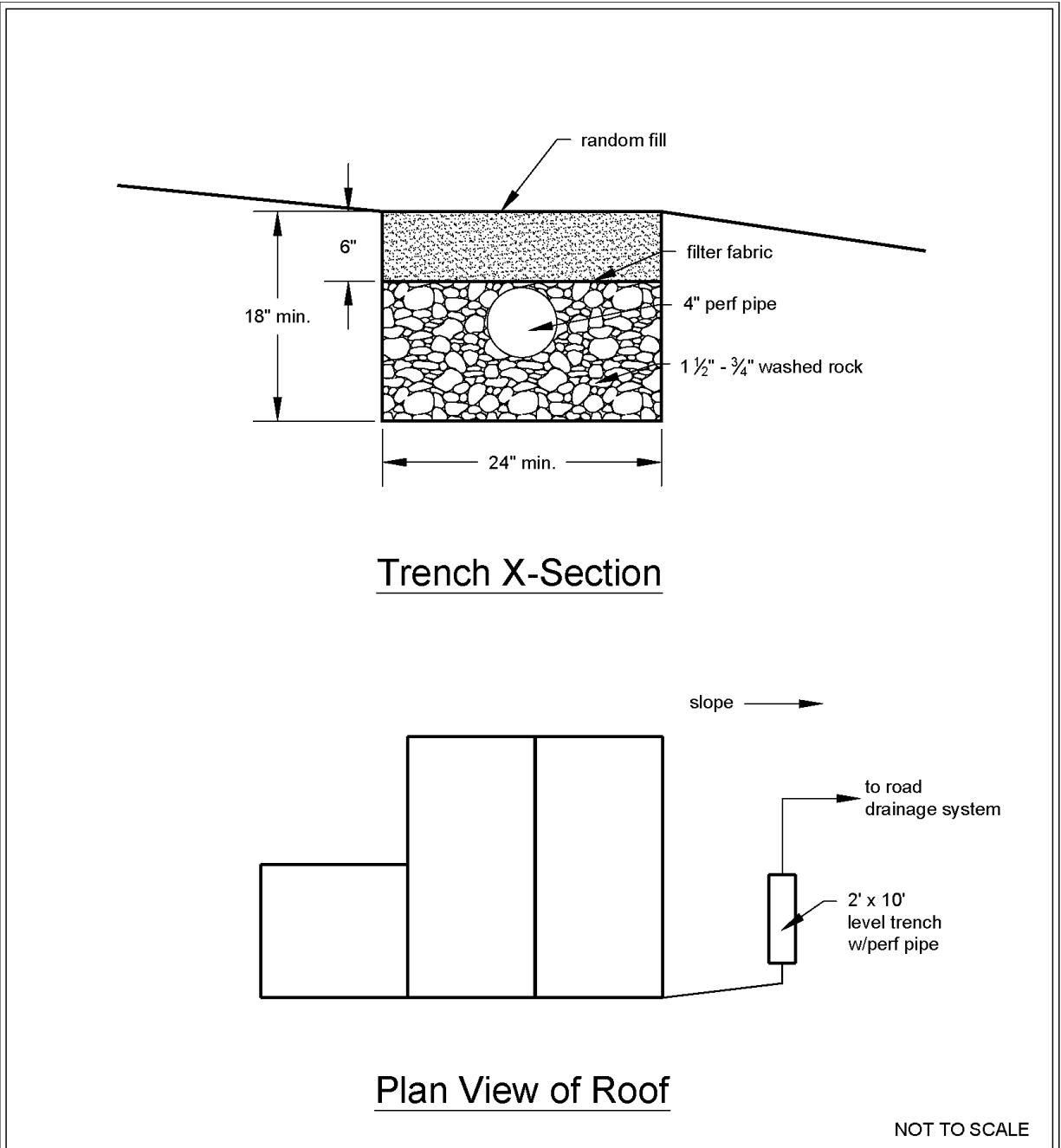
Design Criteria

Perforated stub out connections consist of at least 10 feet of perforated pipe per 5,000 square feet of roof area laid in a level, 2 foot wide trench backfilled with washed drain rock. Extend the drain rock to a depth of at least 8 inches below the bottom of the pipe and cover the pipe. Lay the pipe level and cover the rock trench with filter fabric and 6 inches of fill (see [Figure V-4.7: Perforated Stub-Out Connection](#)).

Runoff Model Representation

Any flow reduction is variable and unpredictable. No computer modeling techniques are allowed that would predict any reduction in flow rates and volumes from the connected area.

Figure V-4.7: Perforated Stub-Out Connection



Perforated Stub-Out Connection

Revised June 2016

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Compliance Methods

LID Performance Standard

The LID Performance Standard compliance method for Minimum Requirement #5 requires modeling the proposed Flow Control BMPs to demonstrate the flow reduction as described below. Note that in order to meet the LID Performance Standard, the chosen Flow Control BMPs will most likely need to include infiltration.

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow. Refer to the [Flow Control Performance Standard](#) section in [I-3.4.7 MR7: Flow Control](#) for information about the assignment of the pre-developed condition. Project sites that must also meet [I-3.4.7 MR7: Flow Control](#) must match flow durations between 8% of the 2-year flow through the full 50-year flow.

Designers selecting this option cannot use [BMP T5.14: Rain Gardens](#) to achieve the LID Performance Standard. They may choose to use [BMP T7.30: Bioretention](#) to achieve the LID Performance Standard.



The text in this box originates from one or more of the following Permits:
*Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit*

The List Approach

The List Approach compliance method for Minimum Requirement #5 requires evaluating the BMPs in [Table I-3.2: The List Approach for MR5 Compliance](#).

For each surface, evaluate the feasibility of the BMPs in the order listed, and use the first BMP that is considered feasible. The designer must document the site conditions and infeasibility criteria used to deem BMPs infeasible. Once a BMP is deemed feasible and used for a surface, no other BMP from the list is necessary for that surface.

If all BMPs in the list are infeasible, then the designer must document the site conditions and infeasibility criteria used to deem each BMP infeasible. This documentation will demonstrate compliance with Minimum Requirement #5.

Feasibility shall be determined by evaluation against:

- Design criteria, limitations, and infeasibility criteria identified for each BMP in this manual; and
- Competing Needs Criteria as listed below.



The text in this box originates from one or more of the following Permits:
*Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit*

Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
Surface Type: Roofs		
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	4. BMP T5.10C: Perforated Stub-out Connections	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention 4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	
Notes for using the List Approach: 1. Size BMP T5.14: Rain Gardens and BMP T7.30: Bioretention used in the List Approach to have a minimum horizontal projected surface area below the overflow which is at least 5% of the area drain-		

Table I-3.2: The List Approach for MR5 Compliance (continued)

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
<p>ing to it.</p> <p>2. When the designer encounters BMP T5.15: Permeable Pavements in the List Approach, it is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless BMP T5.30: Full Dispersion is employed.</p>		

Objective

The objective of On-Site Stormwater Management is to use practices distributed across a development that reduce the amount of disruption of the natural hydrologic characteristics of the site.

Competing Needs Criteria

LID BMPs can be superseded or restricted where they are in conflict with:

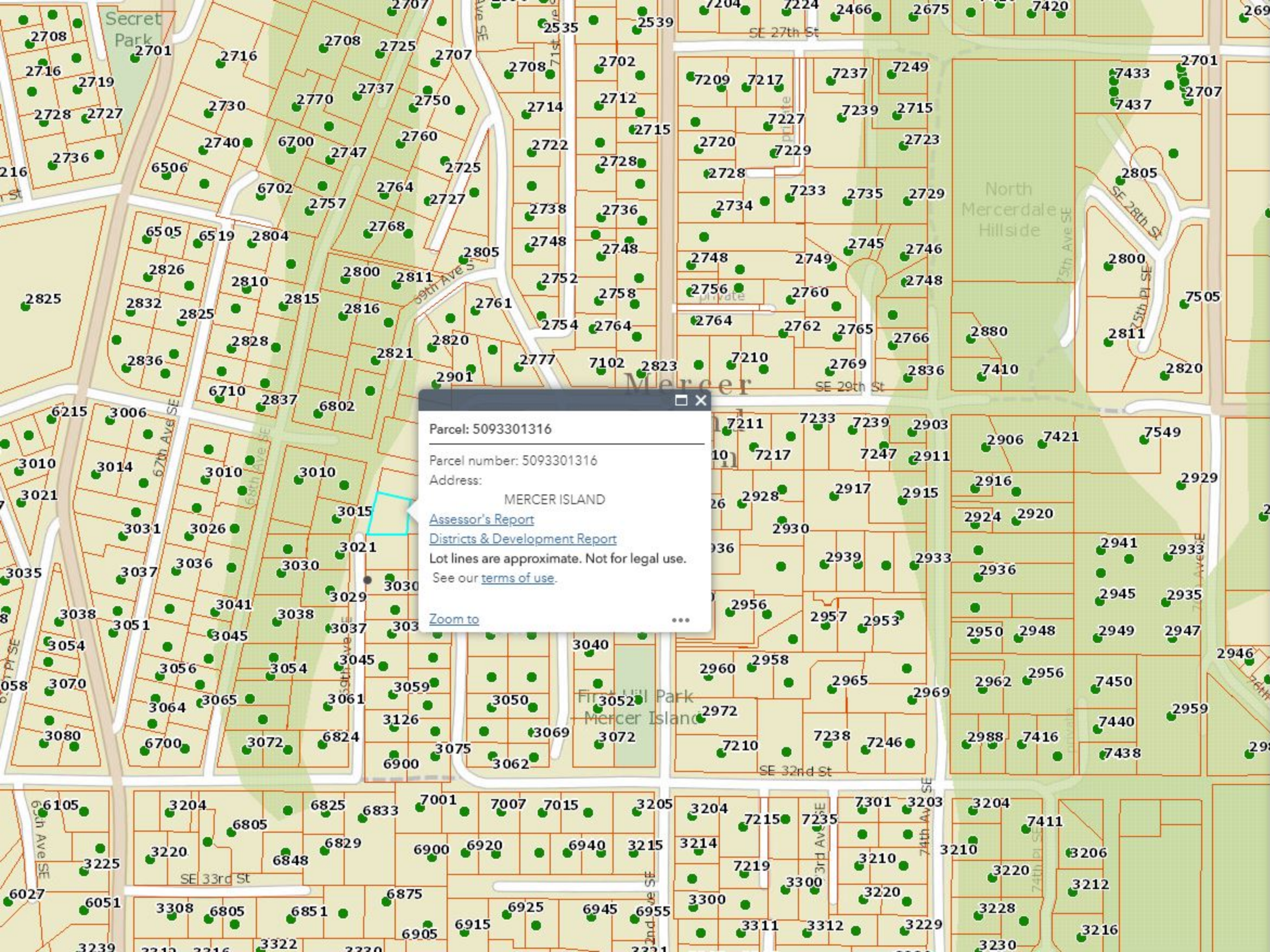
- Requirements of the following federal or state laws, rules, and standards:
 - Historic Preservation Laws and Archaeology Laws as listed at <https://dahp.wa.gov/project-review/preservation-laws>,
 - Federal Superfund or Washington State Model Toxics Control Act,
 - Federal Aviation Administration requirements for airports,
 - Americans with Disabilities Act.
- When an LID requirement has been found to be in conflict with special zoning district design criteria adopted and being implemented pursuant to a community planning process. The existing local codes may supersede or reduce the LID requirement.
- Public health and safety standards (e.g. active zone of a skate park, bike park, or sport court where permeable pavement violates safety standards).
- Transportation regulations to maintain the option for future expansion or multi-modal use of public rights-of-way.
- A local Critical Area Ordinance that provides protection of tree species.
- A local code or rule adopted as part of a Wellhead Protection Program established under the Federal Safe Drinking Water Act; or adopted to protect a Critical Aquifer Recharge Area established under the State Growth Management Act.

Supplemental Guidelines

In order to meet the LID Performance Standard, designers may use any Flow Control BMP in the SWMMWW. There are no specific Flow Control BMPs that must be used to meet the LID Performance Standard.

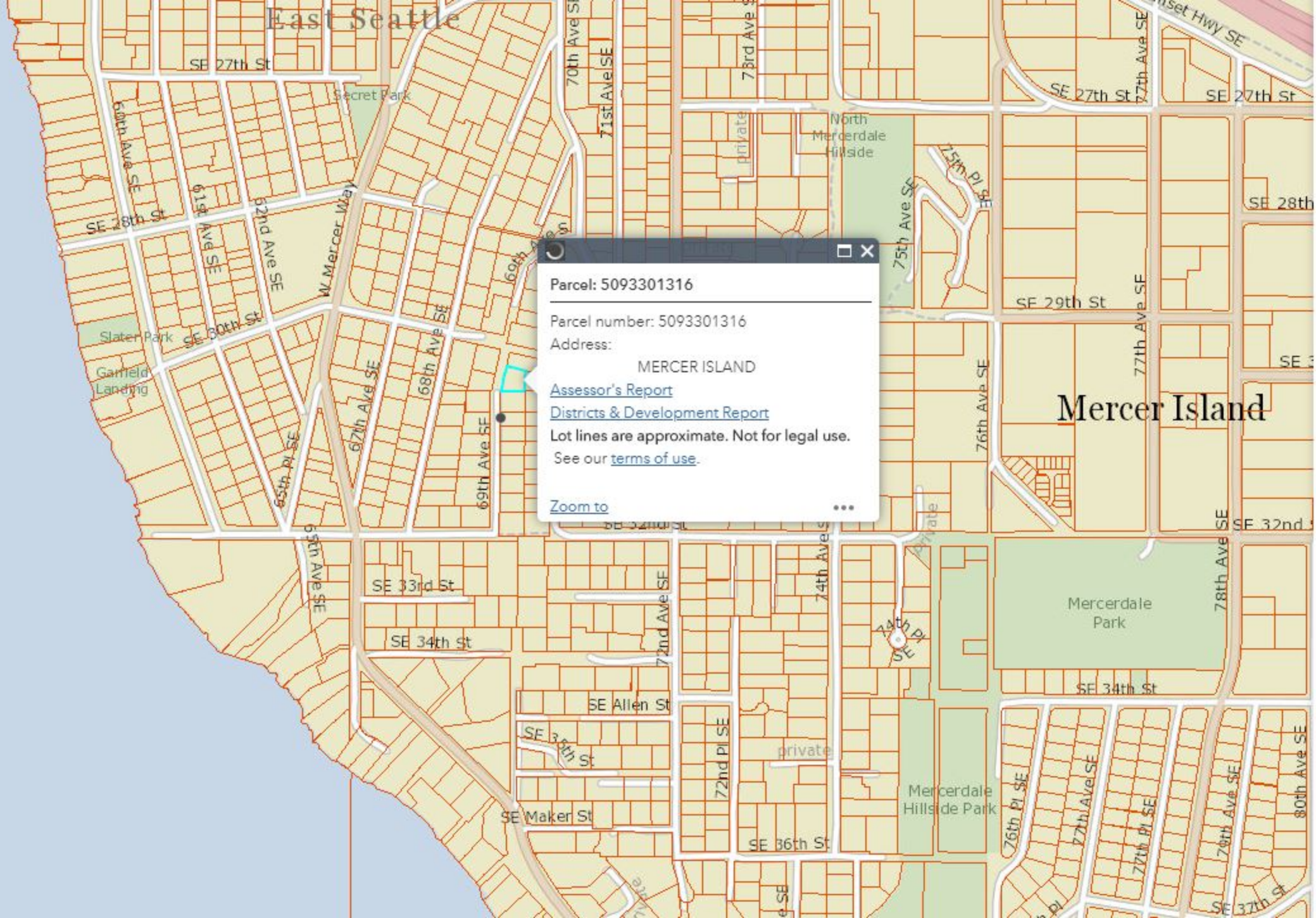
Appendix E

Sensitive Areas Map



Layer List

- Elevation Contours ...
- Environmentally Sensitive Areas ...
- Tributary basins (2005 CAO) ...
- Potential landslide hazard areas (2016, see explanation---->) ...
- Potential landslide hazard areas 50-foot buffer (2016) ...
- Landslide hazards, incorporated KC (1990) ...
- Potential steep slope hazard areas (2016, see explanation---->) ...
- Basin condition (2005 CAO) ...
- Shoreline condition (2005 CAO) ...
- Erosion hazard (1990 SAO) ...
- Seismic hazard (1990 SAO) ...
- Coal mine hazard (1990 SAO) ...
- Stream (1990 SAO) ...
- class 1
- class 2 perennial
- class 2 salmonid
- class 3
- unclassified
- Wetland (1990 SAO) ...
- Sensitive area notice on title ...
- Chinook distribution ...



Parcel: 5093301316

Parcel number: 5093301316
Address: MERCER ISLAND

[Assessor's Report](#)
[Districts & Development Report](#)

Lot lines are approximate. Not for legal use.
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[Zoom to](#) ...

- Administrative Areas
- Electoral Districts
- Elevation Contours
- Environmentally Sensitive Areas
- Flooding info
 - River gages
 - Flood photos
 - River facilities
 - Flood phases
 - Elevation certificates
 - Letter of Map Amendment and Revisions
 - FEMA cross-sections
 - FEMA FIRM panels
 - FEMA floodway
 - FEMA 100 year floodplain
 - FEMA 500 year floodplain
 - FEMA area with reduced risk due to levee
- Groundwater

Appendix F

Geotechnical Report