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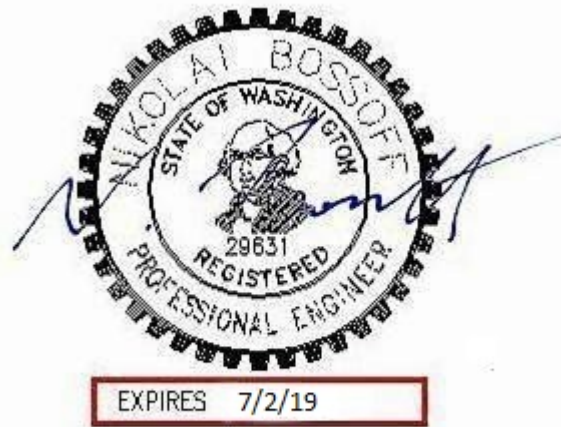
# WEN HU RESIDENCE

8251 West Mercer Way

## Storm Drainage Report

Mercer Island, Washington  
September 21, 2018

Prepared for  
PB Architects, P.S.  
5506 6<sup>th</sup> Avenue S  
Seattle, WA 98108



191 NE Tari Lane  
Stevenson, WA 98648

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PBAR-1801

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## **PROJECT OVERVIEW**

The project is a single-family residential development on an 18,616 square-foot property. A new residence and driveway will be constructed on a mostly undeveloped lot. The new impervious area on the property will be 4,838 square feet. The total new and existing impervious area will be 8,498 square feet.

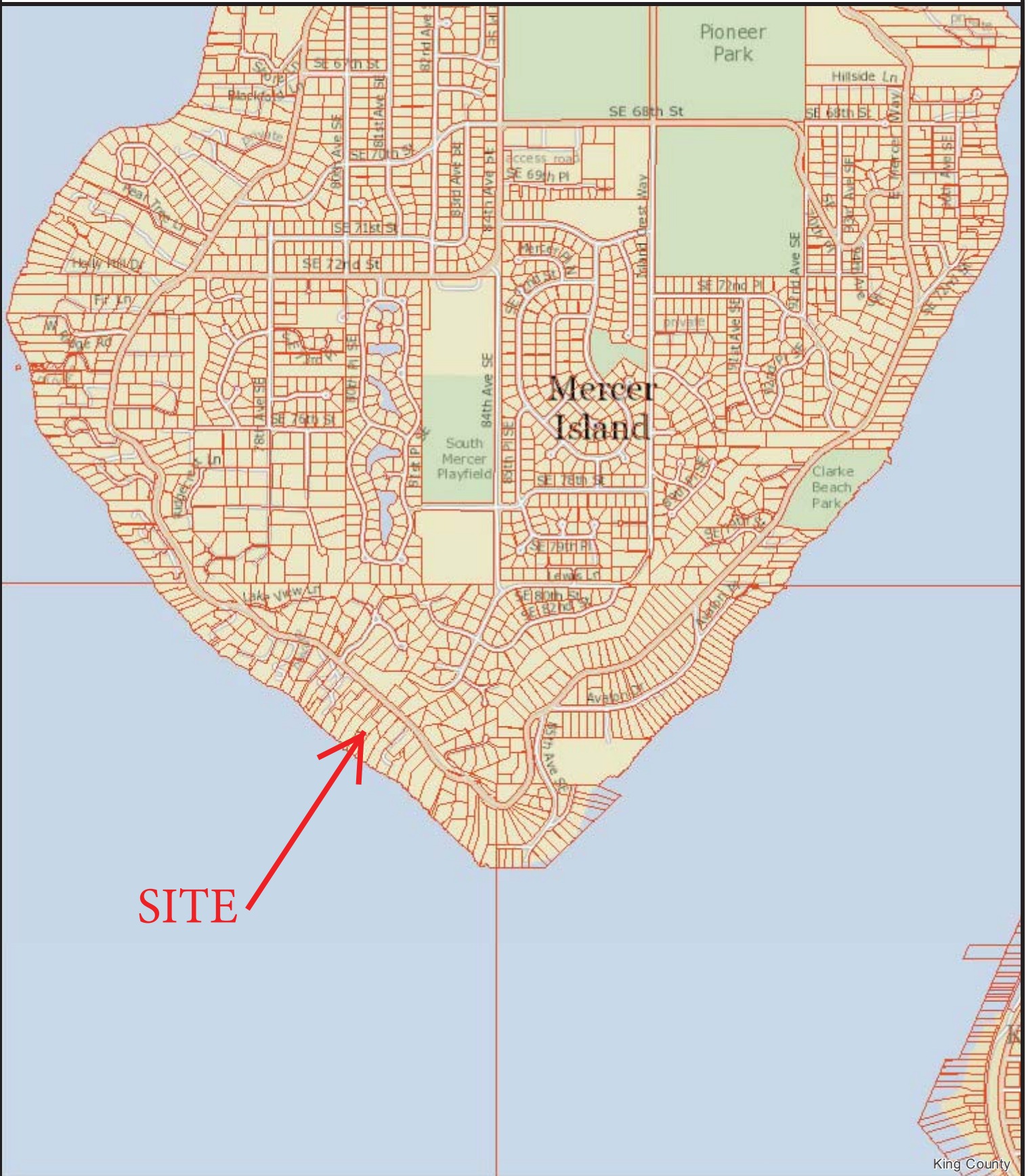
## **EXISTING CONDITIONS**

The property is a flag lot that fronts onto West Mercer Way. Existing improvements include part of a shared concrete driveway that extends along the north property line from West Mercer Way and passes through the property to serve adjacent properties to the north and west. The existing driveway is also present adjacent to west property line. There are no other existing onsite improvements. The remainder of the property is covered in trees and underbrush.

About 35 trees exist on the main part of the lot and an additional 12 adjacent the driveway. The trees vary in size from 6-inches to 31-inches in diameter. The terrain slope is down to the west at moderate to steep grades, varying from 14 percent to about 50 percent. Soil borings analyzed by PanGeo, February 2018, exhibited 6 to 12 inches of topsoil over predominantly silt/clay materials.

Stormwater runoff from the site flows overland to collect on the paved driveway along the west property line. Drainage on the driveway is collected into offsite area drains and then piped directly to Lake Washington.

# Vicinity Map



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Date: 9/14/2018

Notes:



 **King County**  
GIS CENTER

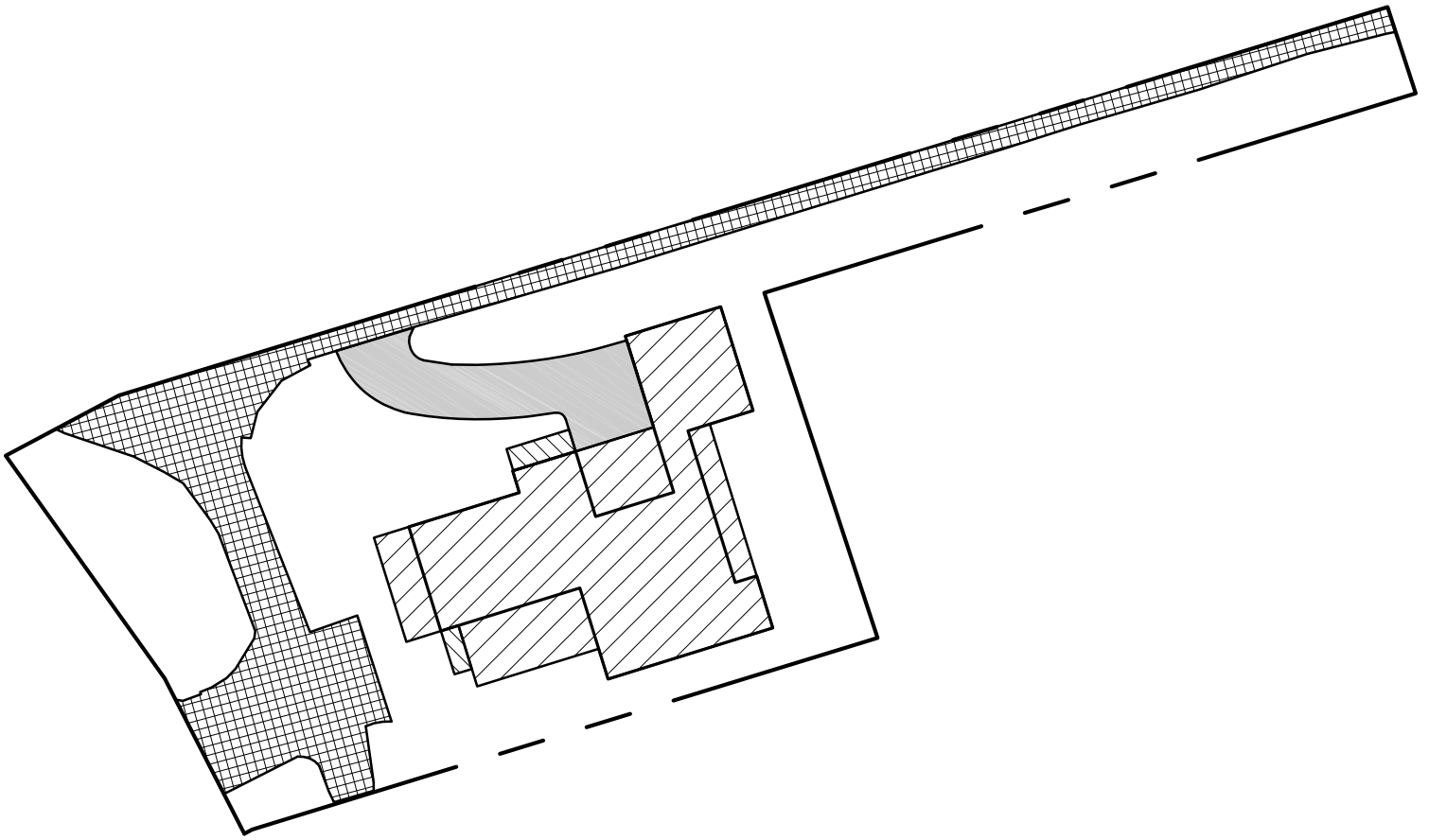
## PROPOSED CONDITIONS





Proposed improvements will include a new residence, concrete driveway, and covered patio. The new three-level house will be built into the sloped terrain such that the lower two floors will be partially below grade and the garage will completely be buried. The garage will be constructed using shoring and then backfilled. The backfill will extend over the garage roof.

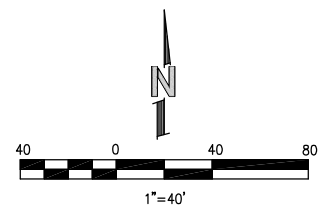
Drainage will be collected onsite by roof gutters and a catchbasin in the driveway and directed to a buried pipe system. The pipe system will be tight-lined through the adjacent property to the west, which is under the same ownership, to an outfall into Lake Washington. Onsite stormwater management by Low Impact Development mitigations is infeasible due to incompatible soil and slope conditions.

### Proposed Condition Areas:

Building roof:	3,777 sf
Uncovered driveway:	949 sf
Uncovered patio:	112 sf
Existing driveway:	3,660 sf
Total impervious area:	8,498 sf (46%)
Landscaped:	10,118 sf (54%)
Total site:	18,616 sf



	UNCOVERED PATIO	112 SF
	ROOF	3,777 SF
	UNCOVERED DRIVEWAY	949 SF
	EXISTING	3,660 SF
	TOTAL	8,582 SF



# DEVELOPED IMPERVIOUS AREAS

## MINIMUM STORMWATER REQUIREMENTS

The project is a new development project with 4,838 square feet of new and replaced impervious surface. The quantity of new plus replaced hard surface is more than 2,000 square feet and less than 5,000 square feet. The project therefore is required to comply with Minimum Requirements 1 through 5 per The Department of Ecology 2014 Stormwater Management Manual.

**1. Preparation of Stormwater Site Plans.** A stormwater site plan has been prepared as part of the building permit plans and details the collection, conveyance and mitigation of stormwater. The stormwater site plan was prepared in accordance with the City Standards. Infiltration testing is not required as the projects lies within an area where infiltration LID facilities are not permitted per the City's Infiltration Infeasibility Map.

**2. Construction Stormwater Pollution Prevention Plan.** A TESC has been prepared as part of the building permit application. The plan includes guidance for pollution prevention and spill control.

**3. Source Control of Pollution.** Pollutant sources in single-family residential lots are typically those associated with vehicles and landscaping maintenance. Source control BMPs include covered parking (garage and carport) and an oil-water separator to treat runoff from the driveway. Amended soil will assist in absorbing and binding fertilizers and pesticides. Source control during construction is addressed by the TESC Plan.

**4. Preservation of Natural Drainage Systems and Outfalls.** The natural drainage direction for site runoff is westward into nearby Lake Washington. Existing site runoff collects into area drains located in the driveways of adjacent properties and is piped to the lake. The proposed site drainage outfalls directly to Lake Washington thereby preserving the existing drainage regime.

**5. On-Site Stormwater Management.** On-site stormwater management BMPs, or Low Impact Development (LIDs), have been incorporated into the drainage plan to the maximum extent feasible. The soil, per the report by PanGeo, consists of silt and clay soils with low infiltration potential and therefore there is not an opportunity to include infiltration LIDs. Also, the City's maps show the site to be in an area where infiltration is not permitted and also where there is an erosion hazard potential. The site is too steep to allow dispersion. BMPs employed are tree retention and soil amendment. LIDs are discussed in more detail in the following section.

## ON-SITE STORMWATER MANAGEMENT

The project, in accordance with Minimum Requirement 5, is required to manage stormwater onsite to the maximum extent feasible. This section concerns the process for the selection or exclusion of Low Impact Development BMPs.

### **Roofs**

#### *1. Full Dispersion or Downspout Full Infiltration*

Full dispersion is not feasible because the site is too small to achieve the required 100-foot flow path length and is too steep. The only parts of the site that are below 20% grade are the lower paved areas. The City's mapping has the site in an area that is infeasible for infiltration. The soils investigation by PanGeo found the site soils to be silts and clay. Full infiltration is typically only possible in soils that are clean gravel or sand.

#### *2. Rain Garden or Bioretention*

The City's mapping has the site in an area that is infeasible for infiltration. Also, site soils per the geotechnical report are silts and clays with low infiltration potential. Infiltrating facilities such as rain gardens and bioretention are therefore infeasible.

#### *3. Downspout Dispersion*

Downspout dispersion is not feasible because the terrain is too steep. The pervious area downslope of the development is over 15% grade. The site is also in an area mapped by the City as a potential erosion hazard and therefore not compatible with dispersion.

#### *4. Perforated Stub-out Connections*

The City's mapping has the site in an area that is infeasible for infiltration. Also, the geotechnical report determined that site soils are silts and clays with low infiltration potential.



## **Other Hard Surfaces**

Other hard surfaces consist of the driveway, and small areas of uncovered patio.

1. *Full dispersion*

Full dispersion is not feasible because the site is too small to achieve the required 100-foot flow path length.

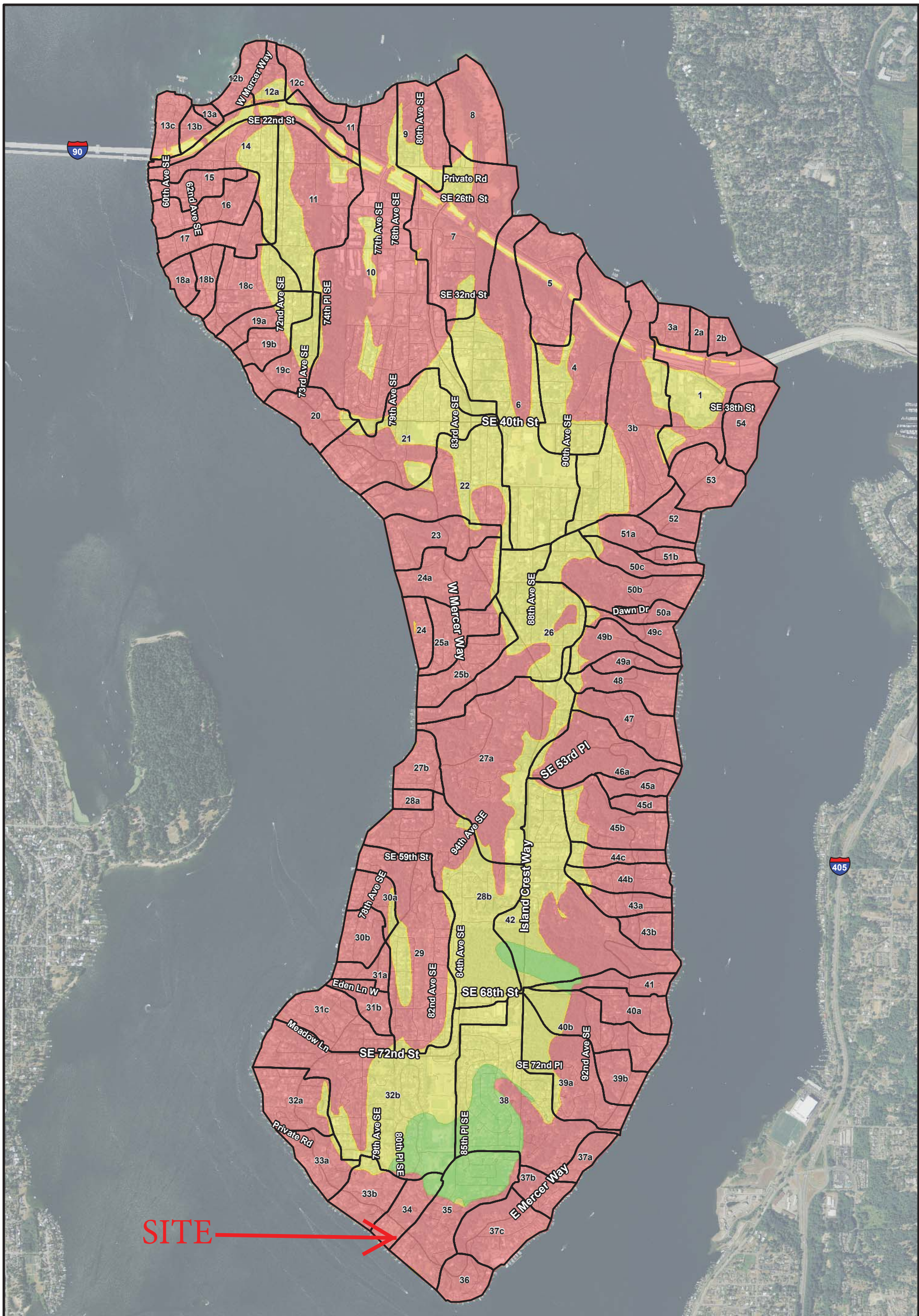
2. *Permeable pavement, rain gardens, or bioretention*

The City's mapping has the site in an area that is infeasible for infiltration. Also, the geotechnical report determined that site soils are silts and clays with low infiltration potential. Infiltrating facilities such as permeable pavement, rain gardens and bioretention are therefore infeasible. The driveway is also too steep for permeable pavement being over 9% grade except for the lower parking area. The parking is an area that will be excavated to 6 feet below existing grade so is unlikely to offer any infiltration capacity.

3. *Sheet flow dispersion or concentrated flow dispersion.*

Sheet flow dispersion for the driveway is not feasible because the adjacent terrain is well over 15% slope.





**Legend**

- Infiltrating LID facilities may be feasible, and soil has high infiltration potential
- Infiltrating LID facilities may be feasible, and soil has moderate infiltration potential
- Infiltrating LID facilities are not permitted
- Storm drainage basin

\* Map is intended to be used for planning purposes only. Site-specific analysis is required prior to design and construction of LID facilities.

**Figure 3. Low impact development infiltration feasibility on Mercer Island.**



Aerial photography: USDA (2009)  
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# Erosion Hazard

Geologic Hazards  
Map Series  
1:24,000

This map was created to help City staff determine the hazard risk as part of City development regulations. Other users are cautioned to utilize their own appropriate professionals when a geologic hazard is suspected.

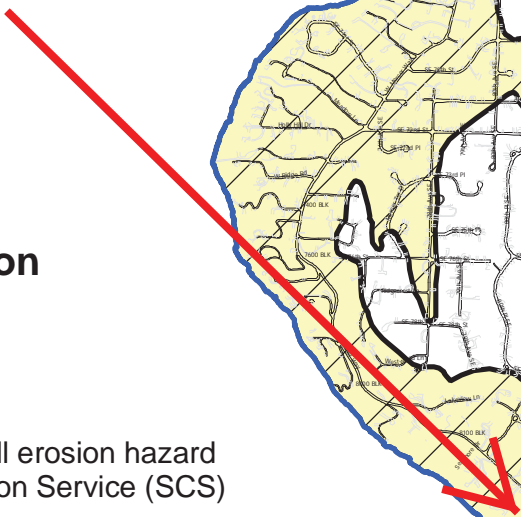
 Erosion Hazard

## Notes:

Risk in unmarked areas is either unknown or low risk. Compilation of maps is the result of a geologic study using Best Available Science, May 2002.

Further information about the study is available on request.

**SITE**



## Geologic Hazard Definition

### Erosion Hazard

>15% slope; and soils having "severe" rill and inter-rill erosion hazard according to USDA Soil Conservation Service (SCS)

A Lidar survey from 2001 was used to determine slope. For more info on Lidar see <http://www.pugetsoundlidar.org>



City of  
Mercer  
Island

Geographic  
Information  
Systems

VersionDate: Aug 27, 2002