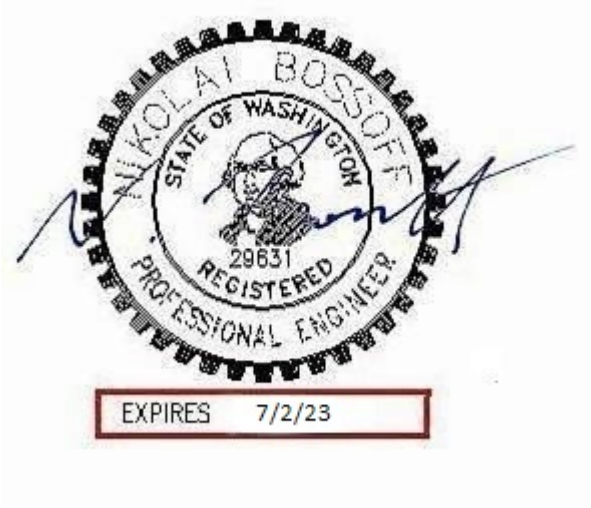
MOUNGER RESIDENCE

4006 East Mercer Way

Storm Drainage Report

Mercer Island, Washington
April 29, 2022

Prepared for
Sturman Architects
9 103rd Avenue NE
Bellevue, WA 98004



Nick Bossoff Engineering, Inc.

191 NE Tari Lane
Stevenson, WA 98648

SARC-2002

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PROJECT OVERVIEW

The project is a residential redevelopment of a 36,116 square-foot waterfront property. An existing residence will be removed and replaced with a new house and driveway. Some existing paving in an adjacent right-of-way, SE 40th Street, will be replaced.

The existing property is 13 percent impervious. Impervious areas include the building roof, concrete driveway, patios and footpaths. There is also a boat dock with awning. Existing lawn and landscaping east of the house slopes down to the water's edge. There is no bulkhead. The area west of the house is wooded.

Roof drainage either discharges to grade or into drywells. Runoff from the driveway flows towards SE 40th Street to collect in a catchbasin that is located on the property line. Runoff inside SE 40th Street flows to the same catchbasin and another catchbasin that is about 100 feet further west.

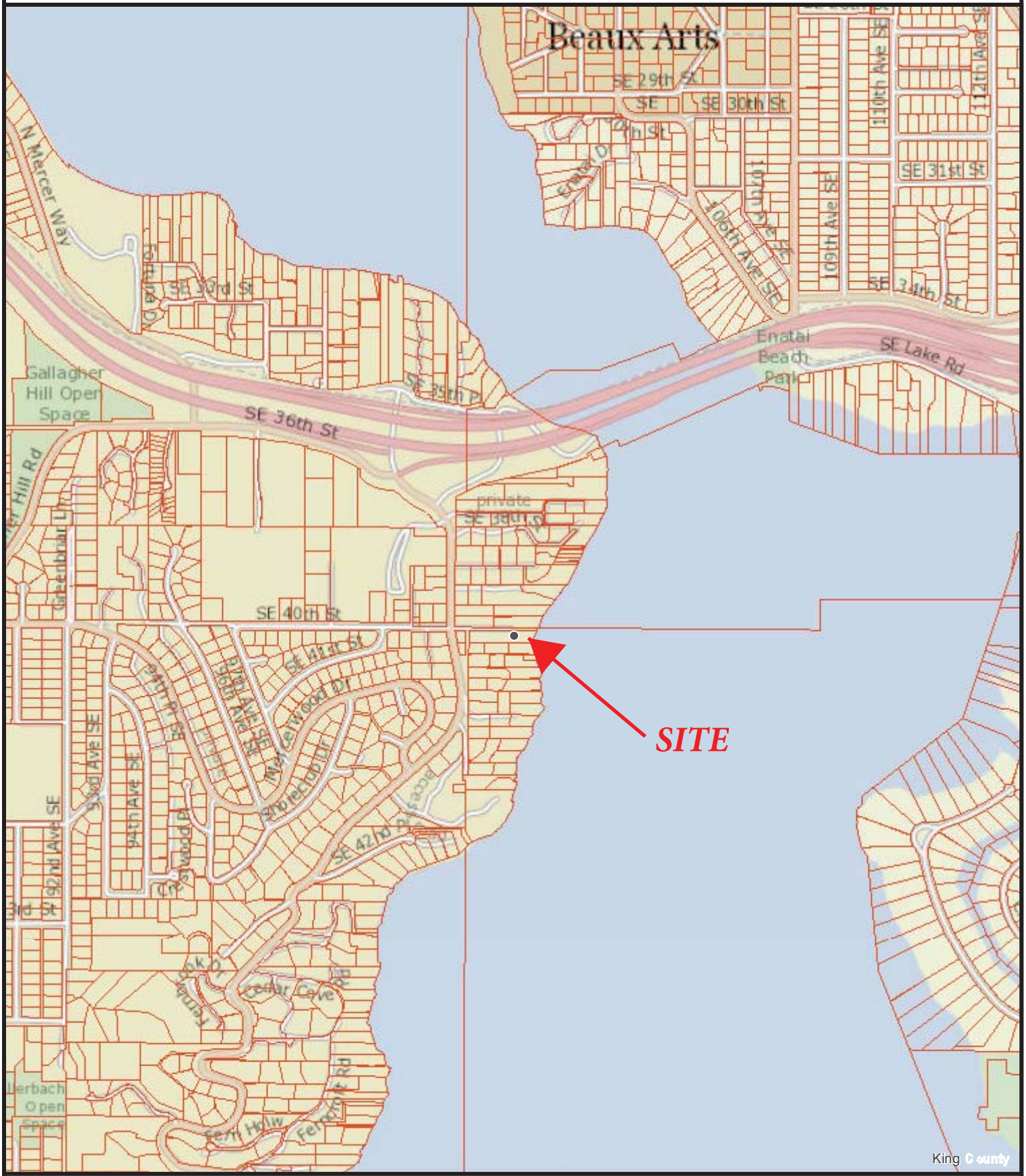
The existing terrain west of the house slopes down to the east at about 20%, steepening as it approaches the house pad. The landscaped area between the house and the lake also slopes at an average of 20%. Soil type is Kitsap Loam according the NRCS. The site is in an area mapped as Infiltrating LID Facilities Not Permitted on the City's map.

Development of the site and right-of-way will create an additional 907 square feet of impervious area. The onsite impervious area will increase to 17%. Impervious area will include the house roof, driveway, walkways and uncovered patio.

Drainage from the site will be collected by roof gutters and a trench drain in the driveway and piped to the lake edge. The existing catchbasin in the right-of-way will be replaced with a new spill control catchbasin. All collected drainage will pass through a sedimentation catchbasin prior to discharge to the Lake.

Per Figure I-2.4.1 of the 2014 DOE Stormwater Management Manual for Western Washington, the project is required to meet all Minimum Requirements.

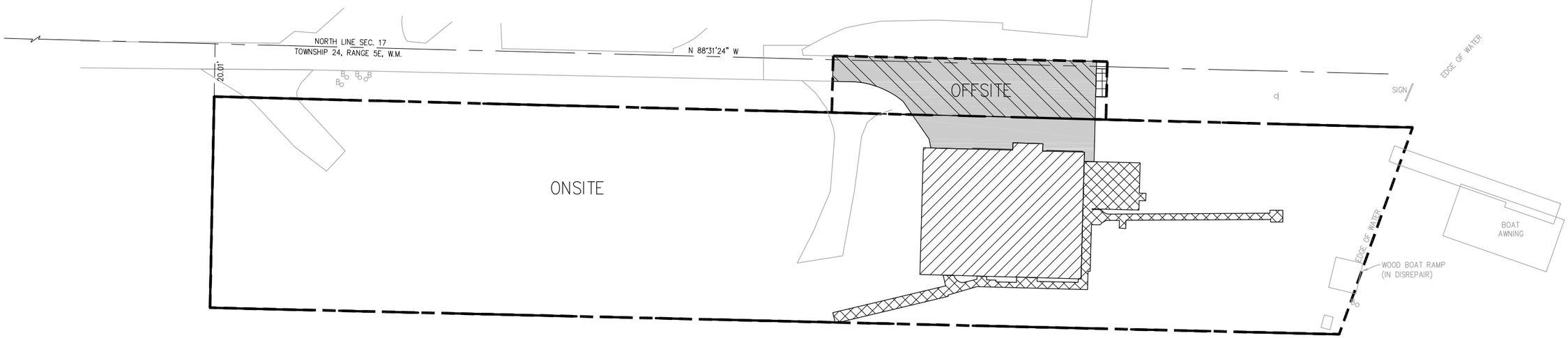
Vicinity Map



N

King County

Date: 9/17/2020 Notes:



AREAS

ONSITE

STRUCTURE AND ROOF: 2,960 SF

DRIVEWAY: 784 SF

WALKS, DECK AND PATIOS: 1,041 SF

TOTAL ONSITE IMPERVIOUS: 4,785 SF

ONSITE PERVIOUS: 31,331 SF

ONSITE TOTAL AREA: 36,116 SF

OFFSITE

DRIVEWAY: 1,880 SF

WALKS, DECK AND PATIOS: 44 SF

TOTAL OFFSITE IMPERVIOUS: 1,924 SF

OFFSITE PERVIOUS: 330 SF

OFFSITE TOTAL AREA: 2,254 SF

TOTAL

TOTAL IMPERVIOUS: 6,709 SF

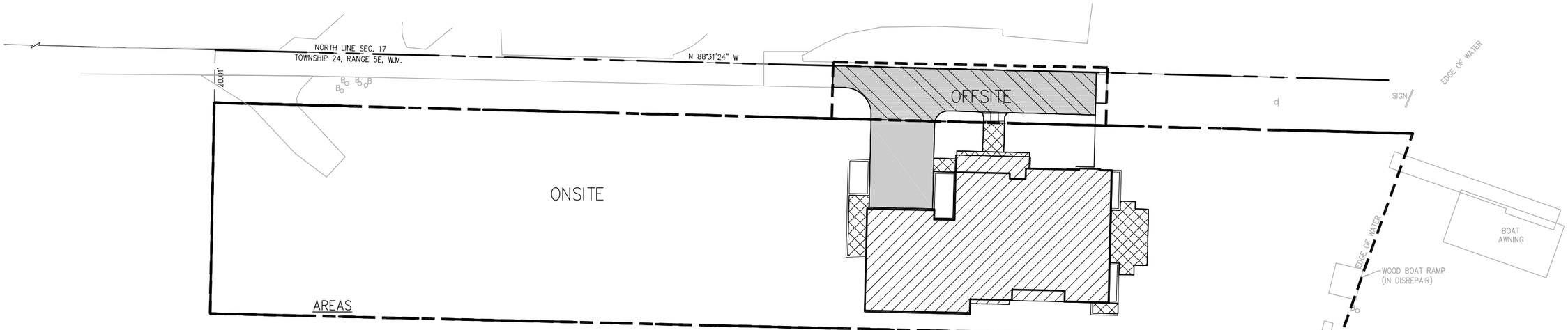
TOTAL PERVIOUS: 31,661 SF

TOTAL AREA: 38,370 SF

N

1"=40'

EXISTING IMPERVIOUS AREA



AREAS

ONSITE

STRUCTURE AND/OR ROOF: 4,475 SF

DRIVEWAY: 800 SF

WALKS, DECK AND PATIOS: 702 SF

TOTAL ONSITE NEW/REPLACED IMPERVIOUS: 5,977 SF

ONSITE PERVIOUS: 30,139 SF

ONSITE TOTAL AREA: 36,116 SF

OFFSITE

DRIVEWAY: 1,605 SF

WALKWAY: 34 SF

TOTAL OFFSITE NEW/REPLACED IMPERVIOUS: 1,639 SF

OFFSITE PERVIOUS: 615 SF

OFFSITE TOTAL AREA: 2,254 SF

TOTAL

TOTAL NEW/REPLACED IMPERVIOUS: 7,616 SF

TOTAL EXISTING IMPERVIOUS TO REMAIN: 0 SF

TOTAL IMPERVIOUS: 7,616 SF

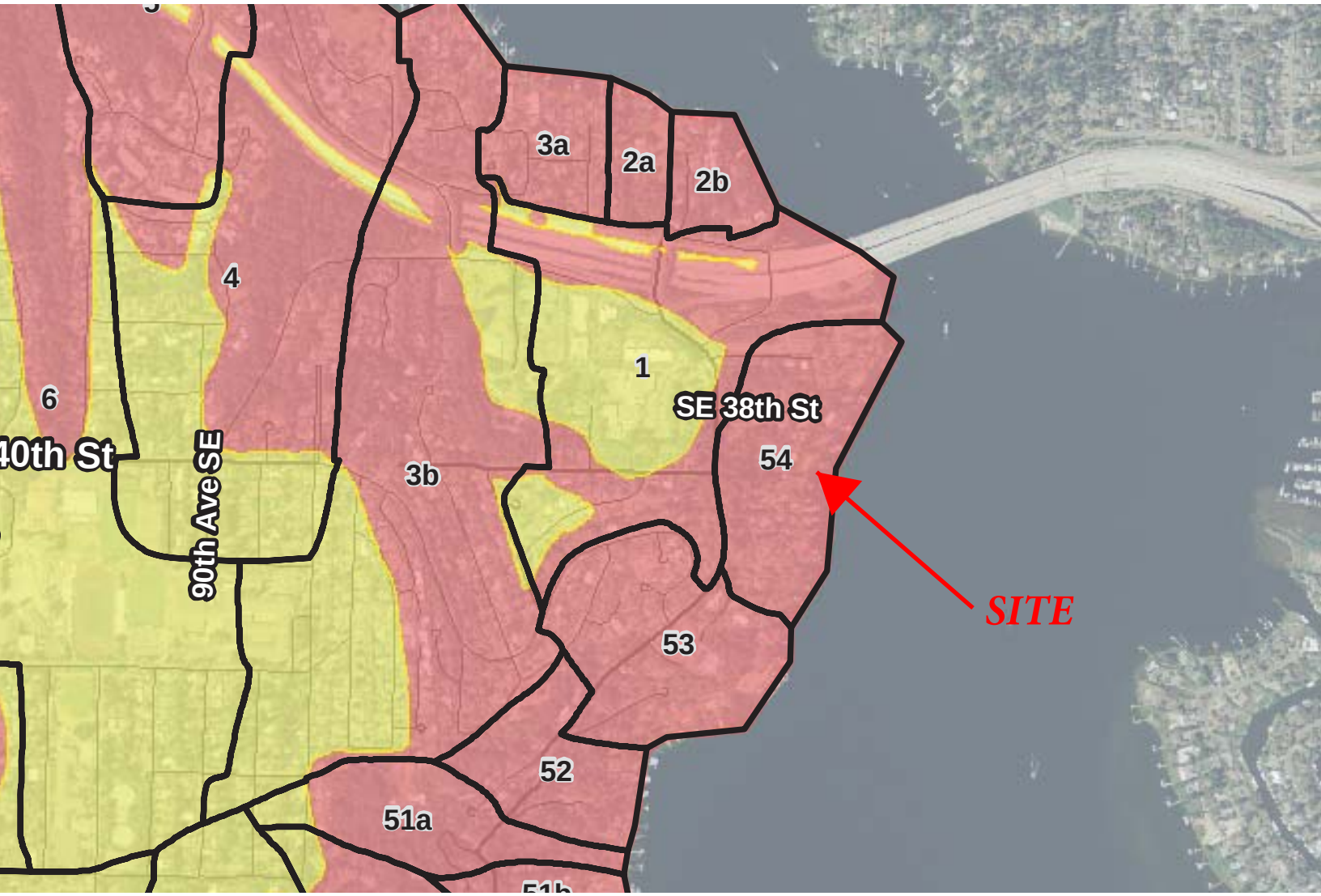
TOTAL PERVIOUS: 30,754 SF

TOTAL AREA: 38,370 SF

N

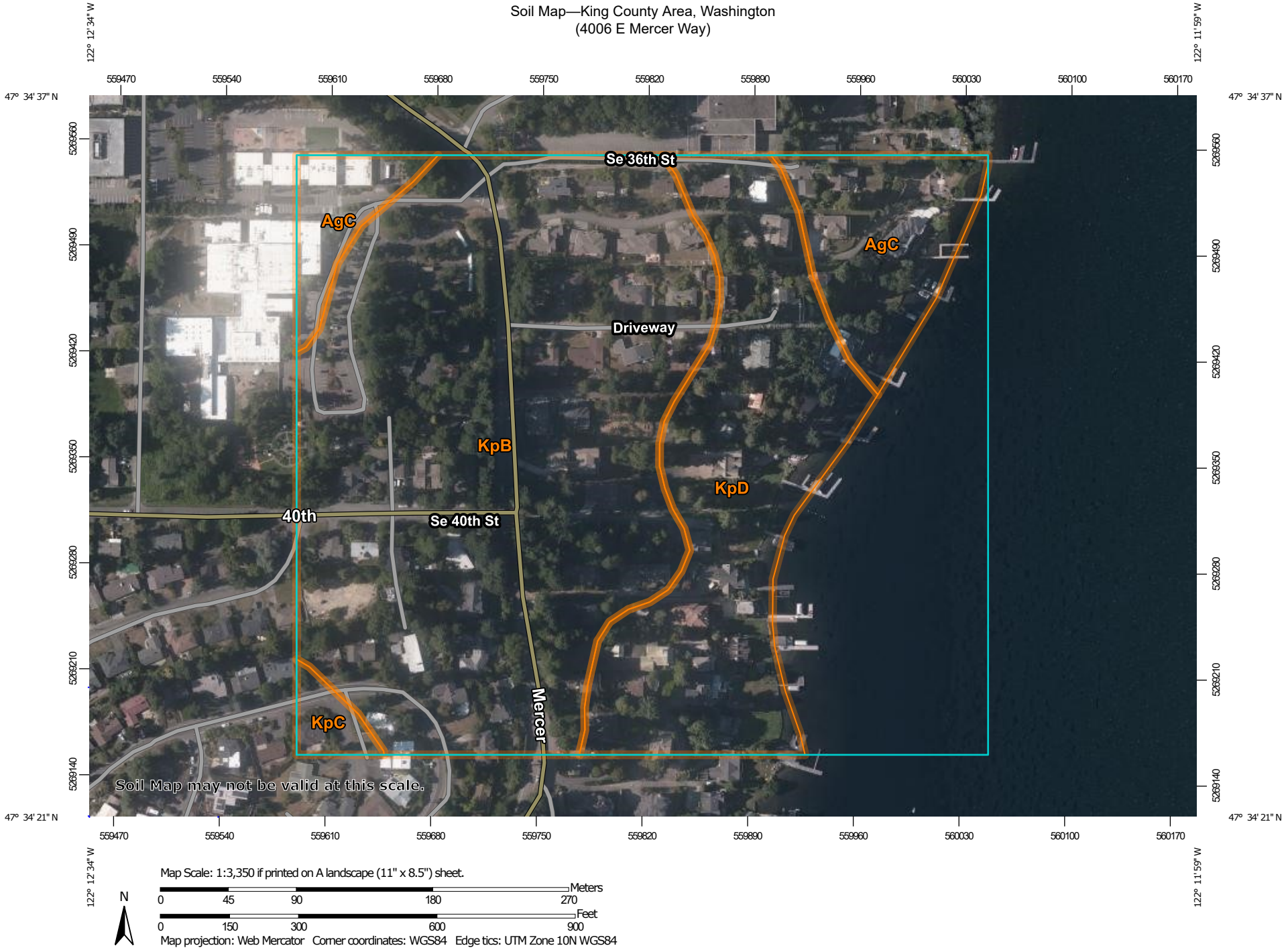
1"=40'

DEVELOPED IMPERVIOUS AREA



LID Infeasibility Map

Soil Map—King County Area, Washington
(4006 E Mercer Way)



Map Scale: 1:3,350 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 45 90 180 270

Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 16, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2019—Jul 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgC	Alderwood gravelly sandy loam, 8 to 15 percent slopes	4.5	10.0%
KpB	Kitsap silt loam, 2 to 8 percent slopes	22.1	49.0%
KpC	Kitsap silt loam, 8 to 15 percent slopes	0.5	1.2%
KpD	Kitsap silt loam, 15 to 30 percent slopes	9.4	20.9%
Totals for Area of Interest		**45.0**	**100.0%**

MINIMUM STORMWATER REQUIREMENTS

The project is classified as a New Development project (existing impervious area is 17%, inclusive of site and disturbed offsite area) with 907 square feet of new impervious area and 6,709 square feet of replaced impervious area. The quantity of new plus replaced hard surface (7,616 square feet) is more than 5,000 square feet. The project therefore is required to comply with Minimum Requirements #1 through #9 of the 2014 DOE manual.

Project Area:	38,370 sf
Existing Impervious Area:	6,709 sf
Existing Impervious Coverage:	17 %
New Impervious Area:	907 sf
Replaced Impervious Area:	6,709 sf
New plus Replaced Impervious Area	7,616 sf
Existing Impervious Area to Remain	0 sf
Proposed Impervious Area:	7,616 sf
Converted Pervious Area (Native Vegetation converted to landscape):	0 sf
Converted Pervious Area (Native Vegetation converted to pasture):	0 sf
Total Disturbed Area:	38,370 sf

MR#1. Preparation of Stormwater Site Plans. A stormwater site plan has been prepared as part of the building permit plans and details the collection and conveyance of stormwater.

MR#2. Construction Stormwater Pollution Prevention Plan. A TESC plan has been prepared as part of the building permit application. Notes for pollution prevention have been added to the plan.

MR#3. Source Control of Pollution. Source controls BMPs have been included on the TESC plan including covering practices and silt retention. Operational source control BMPs are not applicable to single-family development.

MR#4. Preservation of Natural Drainage Systems and Outfalls. Existing drainage from the site flows east into Lake Washington. The proposed drainage will connect to a pipe that flows to the lake shore thereby preserving the existing flow direction.

MR#5. On-Site Stormwater Management. On-site stormwater management BMPs have been incorporated into the drainage plan to the maximum extent feasible. Please refer to the following section.

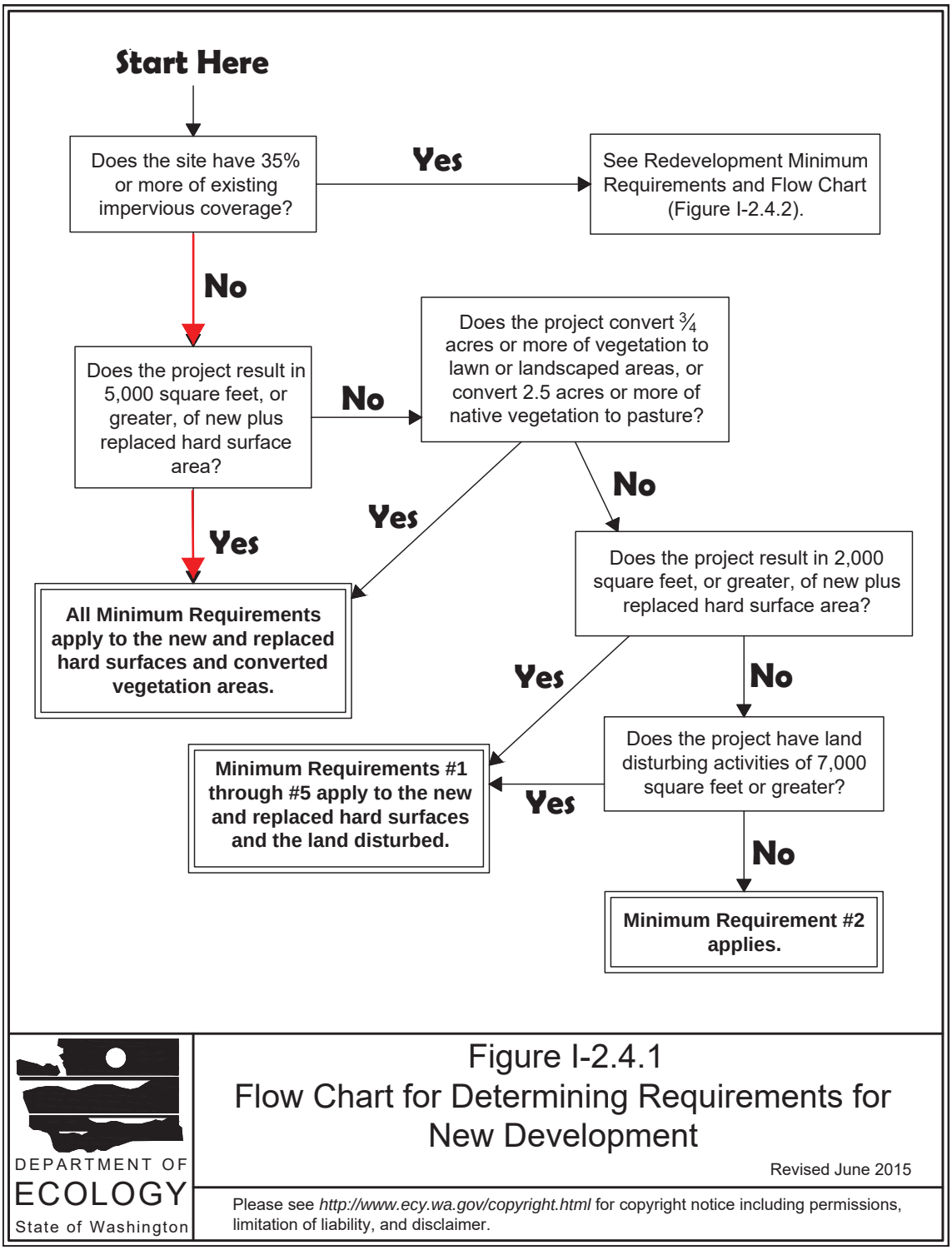
MR#6. Runoff Treatment.
The project is exempt from providing runoff treatment facilities as the total of pollution-generating hard surface (PGHS) is less than 5,000 square feet (2,405 sf proposed) and the total of pollution-generating pervious surfaces (PGPS) is less than three quarters of an acre.

MR#7. Flow Control.
The project is exempt from providing runoff flow control as the project incorporates a direct discharge to an exempt receiving water.

MR#8. Wetlands Protection.
The project will not alter the hydrological regime of the wetland that exists at the lake shore as the wetland is supplied by water from the Lake rather than direct inflow from the site.

MR#9. Operation and Maintenance.
An operation and maintenance manual is included in this report.

Figure I-2.4.1 Flow Chart for Determining Requirements for New Development



ON-SITE STORMWATER MANAGEMENT

The project, in accordance with Minimum Requirement #5, is required to manage stormwater on-site to the maximum extent feasible. This section concerns the process for selection of BMPs.

Lawn and Landscaped Areas

Post Construction Soil Quality and Depth
Soil amendment is proposed and notes for its implementation are included in the plan set.

Roofs

Full Dispersion
Full dispersion is not feasible for the site because there is no natural vegetation, and the site is too small to achieve the required 100-foot flow path length.

Full Infiltration
The site is in an area mapped as Infiltrating LID Facilities Not Permitted on the City's map.

Bioretention and Rain Gardens
The site is in an area mapped as Infiltrating LID Facilities Not Permitted on the City's map.

Downspout Dispersion Systems
Dispersion from trenches or splash-blocks is not feasible because the slope towards the lake is over 15% (about 20 to 25%).

Perforated stub-out
The site is in an area mapped as Infiltrating LID Facilities Not Permitted on the City's map.

Other Hard Surfaces

Full dispersion, Full Infiltration, Bioretention and Rain Gardens are discussed above. All are infeasible for hard surfaces for the same reasons as described for roofs.

Permeable Pavement
The driveway and patio are located within 50 feet from the top of slopes that are greater than 20%. The driveway slopes generally exceed 15% which is too steep for permeable pavement.

Bioretention

The site is in an area mapped as Infiltrating LID Facilities Not Permitted on the City's map.

Sheet flow dispersion or concentrated flow dispersion

There is insufficient vegetated area adjacent the driveway to facilitate concentrated or sheet flow dispersion. The grade slope downslope of the improvements is about 20 to 25%, which is too steep for dispersion.

APPENDICES

Appendix A – Operation and Maintenance

Operation and Maintenance.

The drainage system consists of catchbasins and pipes. Maintenance procedures are listed below.

M2-05 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.

M2-05 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

NO. 10 - CONVEYANCE SYSTEMS (PIPES & DITCHES)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & Debris	Accumulated sediment that exceeds 20% of the diameter of the pipe.	Pipe cleaned of all sediment and debris.
	Vegetation	Vegetation that reduces free movement of water through pipes.	All vegetation removed so water flows freely through pipes.
	Damaged	Protective coating is damaged; rust is causing more than 50% deterioration to any part of pipe.	Pipe repaired or replaced.
		Any dent that decreases the cross section area of pipe by more than 20%.	Pipe repaired or replaced.
Open Ditches	Trash & Debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment	Accumulated sediment that exceeds 20 % of the design depth.	Ditch cleaned/ flushed of all sediment and debris so that it matches design.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion Damage to Slopes	See “Ponds” Standard No. 1	See “Ponds” Standard No. 1
	Rock Lining Out of Place or Missing (If Applicable).	Maintenance person can see native soil beneath the rock lining.	Replace rocks to design standards.
Catch Basins		See “Catch Basins: Standard No. 5	See “Catch Basins” Standard No. 5
Debris Barriers (e.g., Trash Rack)		See “Debris Barriers” Standard No.6	See “Debris Barriers” Standard No. 6