

June 26, 2025
Updated July 21, 2025
ES-10595

Weaver Construction, LLC
13036 Southeast Kent Kangley Road, PMB 533
Kent, Washington 98030

Attention: Melissa Dow

**Subject: Infiltration Evaluation
Toda Residence
2262 – 78th Avenue Southeast
Mercer Island, Washington**

Greetings:

As requested, Earth Solutions NW, LLC (ESNW) has prepared this letter regarding the proposed project. The letter was prepared in general accordance with the scope of services outlined in our proposal dated and authorized by you on May 1, 2025. A summary of the subsurface exploration, laboratory analyses, and recommendations with respect to infiltration feasibility are provided in this letter. This update includes a geologic hazard assessment.

Project & Site Description

The subject site is located at the northeastern terminus of a private roadway off of 78th Avenue Southeast, located approximately 370 feet north of the intersection with Southeast 24th Street, in Mercer Island, Washington. The approximate location of the property is illustrated on Plate 1 (Vicinity Map). The site consists of one tax parcel (King County Parcel No. 531510-1697), totaling about 0.28 acres. Per King County GIS, the existing topography is essentially flat, with less than five feet of elevation change across the parcel.

We understand, according to the referenced site plan, that a new addition off the back of the existing single-family residence will be constructed.

Subsurface Conditions

An ESNW representative observed, logged, and sampled two test pits on May 13, 2025. The test pits were excavated within accessible site areas using a trackhoe and operator provided by the client. The test pits were completed to evaluate and classify site soil and groundwater conditions. The approximate locations of the test pits are depicted on Plate 2 (Subsurface Exploration Plan). Test pit locations were largely controlled by existing obstructions and utility alignments. Please refer to the attached subsurface exploration logs for a more detailed description of the subsurface conditions.

Representative soil samples collected at the test pit locations were analyzed in general accordance with both Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) methods and procedures. Samples were analyzed in our laboratory for moisture content and grain size distribution in general accordance with ASTM procedures. Laboratory test results are attached to this letter.

Topsoil and Fill

Topsoil was generally encountered in the upper six inches of existing grades at the test pit locations. The topsoil was characterized by a dark brown color, minor root intrusions, and trace organic matter.

Fill was encountered in both test pits excavated during the May 2025 subsurface exploration to depths of about four to seven feet below the existing ground surface (bgs). The fill was characterized primarily as silty sand and sandy silt (USCS: SM and ML, respectively) in a dense and damp to wet condition. Small to large pieces of asphalt were observed within the fill. The excavator was unable to fully penetrate the fill at test pit TP-2.

Native Soil

Underlying the topsoil and fill, native soil consisting primarily of silt with sand (USCS: ML) was observed, consistent with the typical makeup of glacial till deposits. The in-situ density of the native soil was characterized primarily as “dense to very dense”, and the in-situ moisture content was chiefly described as moist to wet at the time of exploration. The maximum exploration depth was approximately eight-and-one-half feet bgs.

Geologic Setting

The referenced geologic map identifies Vashon till deposits (Qvt) across the site and surrounding area. Vashon glacial till deposits typically consist of unstratified and compact clay, silt, sand, and gravels that are glacially transported and deposited. The referenced WSS resource identifies Kitsap silt loam (2 to 8 percent slopes) as the primary soil unit underlying the subject development area. The Kitsap series originate from glacial lacustrine sediments and are associated with glacial plains and terraces. Based on our field observations, the on-site native soil is consistent with Vashon glacial till deposits as locally mapped.

Groundwater

Slight to moderate perched groundwater seepage was encountered in both test pits at depths ranging between roughly five to six feet bgs during the May 2025 fieldwork. Zones of perched groundwater seepage are common within glacial till deposits, and in our opinion, seepage zones should be anticipated depending on the time of year earthwork activities occur. Groundwater seepage rates and elevations fluctuate depending on many factors, including precipitation duration and intensity, the time of year, and soil conditions. In general, groundwater flow rates are higher during the winter, spring, and early summer months.

Geologic Hazards

ESNW reviewed the Mercer Island GIS map portal for geologic hazard areas in the area. Based on review, there are no geologic hazards mapped on the site; however, various geologic hazards are mapped on lots surrounding the site. No regulated geologic hazards are present on this site that would require additional evaluation.

Infiltration Evaluation

We understand on-site infiltration of stormwater runoff generated by new impervious surfaces is a desirable project objective. One small-scale Pilot Infiltration Test was conducted in general accordance with the requirements of the 2019 Stormwater Management Manual for Western Washington (2019 SWMMWW), which is adopted by the City of Mercer Island, during the fieldwork. The PIT was completed within fill at TP-2 and at a depth of roughly two feet bgs. The test pit was advanced further upon completion of the PIT; native soils were not encountered in the test pit, which had a maximum exploration depth of approximately seven feet bgs.

Based primarily on our subsurface observations and laboratory analyses, the relatively dense, fine-grained, and glacially consolidated native soils encountered to a max depth of eight-and-one-half feet bgs should be considered impermeable for design purposes. With a measured infiltration rate of 1-inch/hour observed during the PIT (located within fill) conducted at the time of the May 2025 fieldwork being less than the 8-inch/hour minimum, specifically for infiltration trenches placed in fill material as required by the 2019 SMMWW, infiltration in the fill is not considered feasible. Full-scale or large-scale infiltration stormwater management systems are not recommended for this project.

ESNW can provide further evaluation and recommendations for site BMPs as plans develop. ESNW should be contacted to review stormwater management plans as they become available.

Limitations

This letter has been prepared for the exclusive use of Weaver Construction and its representatives. No warranty, express or implied, is made. The recommendations and conclusions provided in this letter are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. Variations in the soil and groundwater conditions encountered at the test pit locations may exist and may not become evident until construction. ESNW should reevaluate the contents of this letter if variations are encountered.

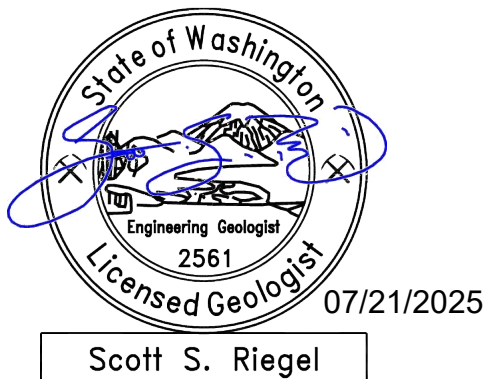
We trust this letter meets your current needs. Please call if you have any questions about this letter or if we can be of further assistance.

Sincerely,

EARTH SOLUTIONS NW, LLC



Steven K. Hartwig, L.G.
Senior Staff Geologist

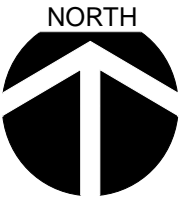


Scott S. Riegel, L.G., L.E.G.
Associate Principal Geologist

Attachments: Plate 1 – Vicinity Map
Plate 2 – Subsurface Exploration Plan
Subsurface Exploration Logs
Laboratory Test Results

References:

- 2019 Stormwater Management Manual for Western Washington (2019 SMMWW)
- Geologic map of surficial deposits in the Seattle 30' by 60' quadrangle, Washington, compiled by J.C. Yount et al., dated 1993
- Site Plan Proposed Conditions, prepared by Lure Design Solutions, dated June 2024
- Web Soil Survey (WSS), provided by the Natural Resources Conservation Service (NRCS) under the United States Department of Agriculture (USDA)



Reference:
King County, Washington
OpenStreetMap.org

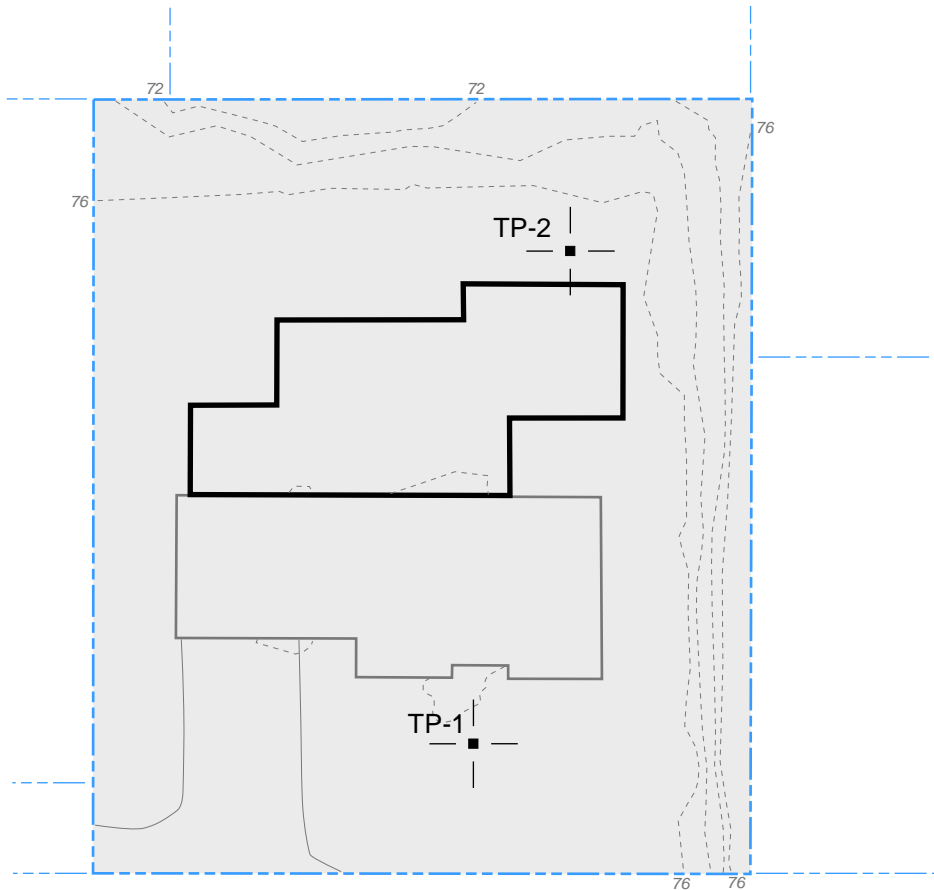
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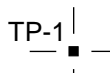



Geotechnical Engineering
Environmental Services
Earthwork Observation & Testing
CESCL & Stormwater Services

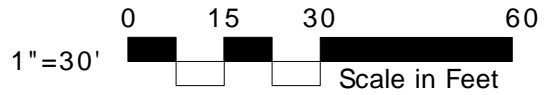
Vicinity Map
Toda Residence
Mercer Island, Washington

Drawn MRS	Date 06/20/2025	Proj. No. 10595
Checked SSR	Date June 2025	Plate 1



LEGEND

- 
 Approximate Location of ESNW Test Pit, Proj. No. ES-10595, May 2025
- 
 Subject Site
- 
 Proposed Area of New Landscaping
- 
 Existing Building



NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

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Geotechnical Engineering
 Environmental Services
 Earthwork Observation & Testing
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**Subsurface Exploration Plan
 Toda Residence
 Mercer Island, Washington**

Drawn MRS	Date 06/26/2025	Proj. No. 10595
Checked SSR	Date June 2025	Plate 2

Coarse-Grained Soils - More Than 50% Retained on No. 200 Sieve		Moisture Content		Symbols																											
Gravels - More Than 50% of Coarse Fraction Retained on No. 4 Sieve		GW	Well-graded gravel with or without sand, little to no fines	Dry - Absence of moisture, dusty, dry to the touch																											
		GP	Poorly graded gravel with or without sand, little to no fines	Damp - Perceptible moisture, likely below optimum MC																											
		GM	Silty gravel with or without sand	Moist - Damp but no visible water, likely at/near optimum MC																											
		GC	Clayey gravel with or without sand	Wet - Water visible but not free draining, likely above optimum MC																											
	Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve		SW	Well-graded sand with or without gravel, little to no fines		Saturated/Water Bearing - Visible free water, typically below groundwater table																									
			SP	Poorly graded sand with or without gravel, little to no fines																											
Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve		SM	Silty sand with or without gravel																												
			SC	Clayey sand with or without gravel																											
			ML	Silt with or without sand or gravel; sandy or gravelly silt																											
Fine-Grained Soils - 50% or More Passes No. 200 Sieve	Sils and Clays Liquid Limit Less Than 50	CL	Clay of low to medium plasticity; lean clay with or without sand or gravel; sandy or gravelly lean clay																												
		OL	Organic clay or silt of low plasticity																												
	Sils and Clays Liquid Limit 50 or More	MH	Elastic silt with or without sand or gravel; sandy or gravelly elastic silt																												
		CH	Clay of high plasticity; fat clay with or without sand or gravel; sandy or gravelly fat clay																												
		OH	Organic clay or silt of medium to high plasticity																												
Highly Organic Soils		PT	Peat, muck, and other highly organic soils																												
Fill		FILL	Made Ground																												
				Terms Describing Relative Density and Consistency Coarse-Grained Soils: <table border="1"> <thead> <tr> <th>Density</th> <th>SPT blows/foot</th> </tr> </thead> <tbody> <tr> <td>Very Loose</td> <td>< 4</td> </tr> <tr> <td>Loose</td> <td>4 to 9</td> </tr> <tr> <td>Medium Dense</td> <td>10 to 29</td> </tr> <tr> <td>Dense</td> <td>30 to 49</td> </tr> <tr> <td>Very Dense</td> <td>≥ 50</td> </tr> </tbody> </table> Fine-Grained Soils: <table border="1"> <thead> <tr> <th>Consistency</th> <th>SPT blows/foot</th> </tr> </thead> <tbody> <tr> <td>Very Soft</td> <td>< 2</td> </tr> <tr> <td>Soft</td> <td>2 to 3</td> </tr> <tr> <td>Medium Stiff</td> <td>4 to 7</td> </tr> <tr> <td>Stiff</td> <td>8 to 14</td> </tr> <tr> <td>Very Stiff</td> <td>15 to 29</td> </tr> <tr> <td>Hard</td> <td>≥ 30</td> </tr> </tbody> </table> Test Symbols & Units Fines = Fines Content (%) MC = Moisture Content (%) DD = Dry Density (pcf) Str = Shear Strength (tsf) PID = Photoionization Detector (ppm) OC = Organic Content (%) CEC = Cation Exchange Capacity (meq/100 g) LL = Liquid Limit (%) PL = Plastic Limit (%) PI = Plasticity Index (%)		Density	SPT blows/foot	Very Loose	< 4	Loose	4 to 9	Medium Dense	10 to 29	Dense	30 to 49	Very Dense	≥ 50	Consistency	SPT blows/foot	Very Soft	< 2	Soft	2 to 3	Medium Stiff	4 to 7	Stiff	8 to 14	Very Stiff	15 to 29	Hard	≥ 30
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				Classifications of soils in this geotechnical report and as shown on the exploration logs are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D2487 and D2488 were used as an identification guide for the Unified Soil Classification System.																											

PROJECT NUMBER ES-10595 PROJECT NAME Toda Residence
 DATE STARTED 5/13/25 COMPLETED 5/13/25 GROUND ELEVATION 78 ft
 EXCAVATION CONTRACTOR Client Provided LATITUDE 47.59023 LONGITUDE -122.23246
 LOGGED BY SKH CHECKED BY SSR GROUND WATER LEVEL:
 NOTES _____ ∇ AT TIME OF EXCAVATION _____
 SURFACE CONDITIONS Grass AFTER EXCAVATION _____

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0						
			TPSL	0.5	Dark brown TOPSOIL, roots to 6" (Fill)	77.5
				0.5	Brown silty SAND, dense, damp (Fill)	
	GB	MC = 20.5		0.5	-probed 3"	
2.5			SM	0.5	-becomes weakly cemented	
				0.5	-asphalt debris	
				0.5		
				0.5		
				0.5		
				0.5		
4.0				0.5		74.0
				0.5	Gray SILT with sand, dense to very dense, moist	
5.0	GB	MC = 16.4		0.5	-relic root cluster, moderate perched groundwater seepage	
			ML	0.5	-becomes wet	
7.5				0.5		
	GB	MC = 26.4 Fines = 77.2		0.5	[USDA Classification: slightly gravelly silt LOAM]	69.5

Test pit terminated at 8.5 feet below existing grade refusal due to groundwater seepage. Groundwater encountered at 5.0 feet during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

PROJECT NUMBER ES-10595 PROJECT NAME Toda Residence
 DATE STARTED 5/13/25 COMPLETED 5/13/25 GROUND ELEVATION 76 ft
 EXCAVATION CONTRACTOR Client Provided LATITUDE 47.59044 LONGITUDE -122.23238
 LOGGED BY SKH CHECKED BY SSR GROUND WATER LEVEL:
 NOTES AT TIME OF EXCAVATION
 SURFACE CONDITIONS Grass AFTER EXCAVATION

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0						
			TPSL	0.5	Dark brown TOPSOIL, roots to 6" (Fill)	75.5
					Brown sandy SILT, dense, moist (Fill)	
					-probed 2"	
2.5	GB	MC = 16.7 Fines = 61.6			-small-scale Pilot Infiltration Test [USDA Classification: slightly gravelly silt LOAM]	
					-probed 2.5"	
			ML	5.0	-becomes gray	
5.0	GB	MC = 19.1				
					-slight perched groundwater seepage, becomes wet	
					-asphalt debris	
	GB	MC = 24.3 Fines = 53.4		7.0	[USDA Classification: slightly gravelly silt LOAM]	69.0

Test pit terminated at 7.0 feet below existing grade. Groundwater seepage encountered at 6.0 feet during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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