Stormwater Site Plan
510 37th Street
Tax Parcel Number:
370306 452486

Prepared For:
Windermere Real Estate Inc.
1200 Old Fairhaven Pkwy
Bellingham, WA 98225

Prepared By:
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February 2025

FREELAND & ASSOCIATES
CIVIL ENGINEERS

Table of Contents

ENGINEER'S DECLARATION

"I, Harvill Freeland, a Professional Engineer registered in the State of Washington as a Civil Engineer, do hereby declare that the 510 37th Street Site Plan dated February 2025 was prepared by, or under my personal supervision, and that said Report was prepared in accordance with generally accepted engineering practices. I hereby affirm that, to the best of my knowledge, information and belief, subject Report was prepared in full compliance with the 2024 Washington State Department of Ecology Stormwater Management Manual for Western Washington (2024 DOE Manual), City of Bellingham Municipal Code 15.42.060, and all Technical Standards adopted there under.

Harvill A. Freeland
WA P.E. #28519

This report is not intended to be a final site plan for this project or any individual proposed improvements, and is not intended for use as part of any review of critical area. Existing drainage and site conditions or improvements not mentioned are beyond the scope of this report.

STORMWATER SITE PLAN

The Stormwater Site Plan (SSP) is a comprehensive report containing all of the technical information and analysis necessary for regulatory agencies to evaluate the proposed development for compliance with stormwater requirements.

Existing Conditions Summary

The proposed project, 510 37th Street, is located near the north termination of 37th Street in Bellingham, Washington. The existing lot is 0.17-acres in size. Adjacent to the parcel are single family residences. North of the site is an undeveloped lot. Per Bellingham City IQ, the property is in the Samish Neighborhood zoned Residential single. Existing topography is generally sloping down to the northwest with a grade of 10% covered in unmaintained vegetation. A vicinity map and aerial image of the site are included in the *Figures* section of this report for reference.

Currently, stormwater runoff appears to collect in ditches on the east and west sides of the property conveying to a storm main in Fielding Ave eventually leading to Bellingham Bay. No stormwater flow control or treatment facilities have been identified on site. See the *Offsite Analysis* section of this report for a detailed description of the existing drainage system downstream from the project.

Project Overview

The proposed project will consist of a single-family house located at the north end of 37th Street. Access road, parking, turnaround, and utility extensions will be constructed in support of the building.

Stormwater will be managed on site and in the public right of way, with collection and conveyance. Stormwater treatment is not required. Flow control is not required. Refer to *Minimum Requirement #6 Runoff Treatment* and *Minimum Requirement #7 Flow Control* within this report for further discussion about the applicable stormwater management requirements.

Stormwater runoff leaving the site is collected and conveyed to the southwest in a manmade conveyance system to the 30th Street outfall. According to the 2007 Surface and Stormwater Comprehensive Plan for the City of Bellingham, capacity issues have been identified in this downstream conveyance system. Since the project is expected to provide a similar amount of

runoff from the site as the existing basin, no additional capacity is needed for this project within the downstream conveyance system. See the *Offsite Analysis* section for a detailed description of the identified capacity issues.

Onsite Soils Analysis

According to the Natural Resource Conservation System Online Soil Survey, soils on site are mapped as Squalicum gravelly loam. Squalicum gravelly loam is listed as hydrologic soil group 'B'. Group 'B' soils have unimpeded infiltration rates and low runoff potential. The site-specific geotechnical investigation found fill soils, which are not suitable for infiltration. See the *Figures* section of the report for regional soil mapping and the *Appendix* for project Geotechnical report.

Offsite Analysis

Downstream from the project site, an existing 12-inch storm drain conveys stormwater northwest under I-5. Stormwater flows southwest along 36th Ave in an existing storm ditch and 24-inch storm drain. At the intersection of 36th Street and Fielding Avenue, stormwater heads west in a 30-inch diameter concrete pipe crossing south under Fielding Avenue and continuing south into a 48-inch diameter CMP pipe for approximately 650 feet. Conveyance pipes then direct runoff south along 32nd St in 42-inch diameter storm drains to 30th St in a 48-inch diameter storm drain. The 30th Street storm main leads to 30th St. Creek which feeds into Padden Creek and ultimately, stormwater runoff will discharge to Padden Lagoon, a tidally influenced body of water connected to Bellingham Bay which is located approximately 8,000 feet to the southwest of the project site as the crow flies. The existing municipal drainage system between the site and the 32nd Street outfall was investigated.

Downstream from the project site, the entire drainage system is owned and maintained by the City of Bellingham. In analysis of the downstream impacts a combination of the 2007 and 2020 Stormwater Comprehensive Plan (SWCP), Citi IQ, and project survey were considered. The 2007 SWCP concluded that a few pipes along 36th Street and Fielding Avenue need improvement. As discussed later in the *Minimum Requirement #7*, an insignificant increase of runoff is created from the project, so no flow control or conveyance improvement is proposed. See the *Figures* section of the report for the downstream flow pathway.

Receiving Water Analysis

Stormwater runoff from the project site eventually drains to 30th Street Creek and later into Padden Creek and Padden Lagoon which flows into Bellingham Bay. 30th Street Creek is listed as an impaired waterbody in Department of Ecology's Water Quality Assessment 303(d) list for Washington. According to the department's online Assessment tool, Padden Creek is listed for bacteria (category 5), and dissolved oxygen (category 5).

This development is not expected to increase the bacteria or dissolved oxygen levels within stormwater runoff. No sources of bacteria are known to exist on site, and none are proposed. The new buildings will connect to the city sewer and any pet waste will be required to be collected and disposed of. Any chemicals for grounds maintenance, including detergents, cleaning products, and fertilizers, will be stored indoors to prevent contact with stormwater.

DOE AND CITY OF BELLINGHAM MINIMUM REQUIREMENTS

Minimum stormwater management requirements for this project have been determined using BMC 15.42.060 and the 2024 Department of Ecology Stormwater Management Manual for Western Washington (2024 DOE SWMM or DOE Manual). With more than 5,000 square feet new plus replaced hard surface area, the project is subject to Minimum Requirements 1 through 9 in BMC 15.42.060.

MINIMUM REQUIREMENT SUMMARY NEW DEVELOPMENT					
Minimum Requirement		**Not Applicable**	**Variance Requested**	**Standard Requirements Incorporated**	**Comments (Report Section Reference or BMP Identifier)**
#	Description				
1	Preparation of Stormwater Site Plans			✓	
2	Construction Stormwater Pollution Prevention Plan			✓	See "Additional Comments"
3	Source Control of Pollution			✓	
4	Preservation of Natural Drainage Systems and Outfalls			✓	
5	On-Site Stormwater Management			✓	
6	Runoff Treatment			✓	
7	Flow Control			✓	
8	Wetlands Protection			✓	
9	Operation and Maintenance			✓	
#	**Additional Comments**				
2	The Construction SWPPP is included in the civil construction drawings.				

Minimum Requirement #1 - Preparation of Stormwater Site Plans ("SSP")

This report serves as a Stormwater Site Plan (SSP). All stormwater management systems have been designed according Department of Ecology (DOE) and City of Bellingham standards. A construction Stormwater Pollution Prevention Plan (SWPPP) has also been prepared and is incorporated in the construction documents.

Minimum Requirement #2 - Construction Stormwater Pollution Prevention Plan (SWPPP)

A SWPPP narrative is provided within the civil site plan drawings to ensure that the SWPPP is on site during construction. Each of the thirteen elements of a SWPPP (as identified in BMC 15.42.060(F)(2)(e)) must be considered and included in a Construction SWPPP unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the narrative of the SWPPP. The SWPPP shall include, at a minimum, the narrative and copies of Best Management Practice detail sheets that will be utilized as a part of the SWPPP.

During construction, the contractor shall maintain a copy of the SWPPP on site and shall update or modify the SWPPP as necessary for the current conditions on site. The contractor's schedule and available crew, equipment, and materials will be determined after the project is submitted for permits, but prior to the start of construction. Accordingly, some BMPs that have been specified may not be necessary, while other additional BMPs may be required.

The project doesn't require a Certified Erosion and Sediment Control Lead (CESCL) but is recommended. The CESCL is recommended to determine which BMPs are necessary as site conditions change during construction. The contractor and/or CESCL shall add any BMP specifications that have not already been included in the SWPPP prepared by Freeland & Associates, Inc.

Minimum Requirement #3 - Source Control of Pollution

Pollutant sources for commercial projects include vehicular traffic, fertilizers, and other detergents or chemicals typical to building maintenance activities. Pollution will be controlled at the source to the maximum extent possible. All known, available and reasonable source control BMPs have been applied to the design and layout of the site and stormwater plans.

Vehicular traffic is anticipated to be a primary source of potential pollutants. Secondary sources of pollutants include garbage and recycling enclosures and landscape areas. Garbage and

recycling will be collected in central locations in covered bins. To minimize landscaping maintenance and to reduce potential erosion, selected plant types that are native and/or drought resistant and specified appropriate quantities for sufficient ground cover.

Minimum Requirement #4 - Preservation of Natural Drainage Systems and Outfalls

The entire project site is contained within the Padden Creek watershed. No significant stormwater diversions are proposed as a part of this project. Natural drainage patterns will be maintained by discharging stormwater to Padden Lagoon/Bellingham Bay.

Minimum Requirement #5 - On-site Stormwater Management

Minimum Requirement #5 in Volume I of the 2024 DOE Manual states, "Projects shall employ On-site Stormwater Management BMPs in accordance with the following projects thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on-site to the extent feasible without causing flooding or erosion impacts." As a project triggering Minimum Requirements #1 through #9, this project must apply the LID BMPs from List #2 for all surfaces within each type of surface within List #2 in accordance with Volume I, Section 3.4.5 of the 2024 DOE Manual.

Projects choosing to utilize List #2 of the 2024 DOE Manual to meet the requirements for Minimum Requirement #5 - On-site Stormwater Management must consider the BMPs in the order listed for each type of surface. The first BMP that is considered feasible must be used on the site. No other On-site Stormwater Management BMPs are necessary for that surface. The following table identifies all the required BMPs in List #2 and if they are feasible or infeasible. Additional discussion of the feasibility criteria is outlined following the table.

TABLE 3 - MINIMUM REQUIREMENT #5 LIST #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)				
Minimum Requirement		**Feasible**	**Infeasible**	**Criteria Comments**
#	**Lawn & Landscaped Area**			
1	Post-Construction Soil Quality and Depth - BMP T5.13	✓		This BMP will be applied to all areas in the public right of way outside of hard surfaces and areas around the proposed house.
#	**Roofs**			
1	Full Dispersion BMPT5.30 Downspout Full Infiltration BMP T5.10A		✓	Infeasible due to fill soils.
2	Bioretention BMP T7.30		✓	Infeasible due to impervious surface coverage.
3	Down Spout Dispersion BMP T5.10B		✓	Infeasible due to flow path lengths.
4	Perforated Stub-out Connection BMP T5.10C		✓	Infeasible due to site layout and proximity to structures.
#	**Other Hard Surfaces**			
1	Full Dispersion BMP T5.30		✓	Infeasible due to flow path lengths.
2	Permeable Pavement BMP T5.15		✓	Infeasible due to impervious surface coverage.
3	Bioretention BMP T7.30		✓	Infeasible due to imperious surface coverage.
4	Sheet Flow Dispersion BMP T5.12 Concentrated Flow Dispersion BMP T5.11	✓		The roads and driveway will sheet flow to the northwest, similar to original drainage.
#	**Additional Comments**			
-				

Fully dispersing stormwater runoff from the improvements is infeasible due to the high ratio of proposed impervious surfaces to landscape areas and limited flow dispersion pathways. Infiltration potential of the site was also considered; however, the existing fill soils render infiltration infeasible.

Minimum Requirement #6 - Runoff Treatment

Proposed pollution-generating hard surfaces include the extension of 37th Street, the driveway for accessing the residence, and turnaround. These areas will create less than 5,000 square feet of pollution-generating hard surfaces (PGHS) and will not require treatment.

Minimum Requirement #7 - Flow Control

Stormwater flow control is not required for development on this parcel because the project will produce less than 10,000 square feet of impervious surface and increase 100-year runoff by less than 0.15 cubic feet per second. See *Figures* section of the report for the water quality basin map. See *Calculations* section of the report for WWHM analysis.

Minimum Requirement #8 - Wetlands Protection

No wetlands exist on or adjacent to the project site.

Minimum Requirement #9 - Operation & Maintenance

An operations and maintenance manual is not required for any proposed facilities on the project site.

FIGURES

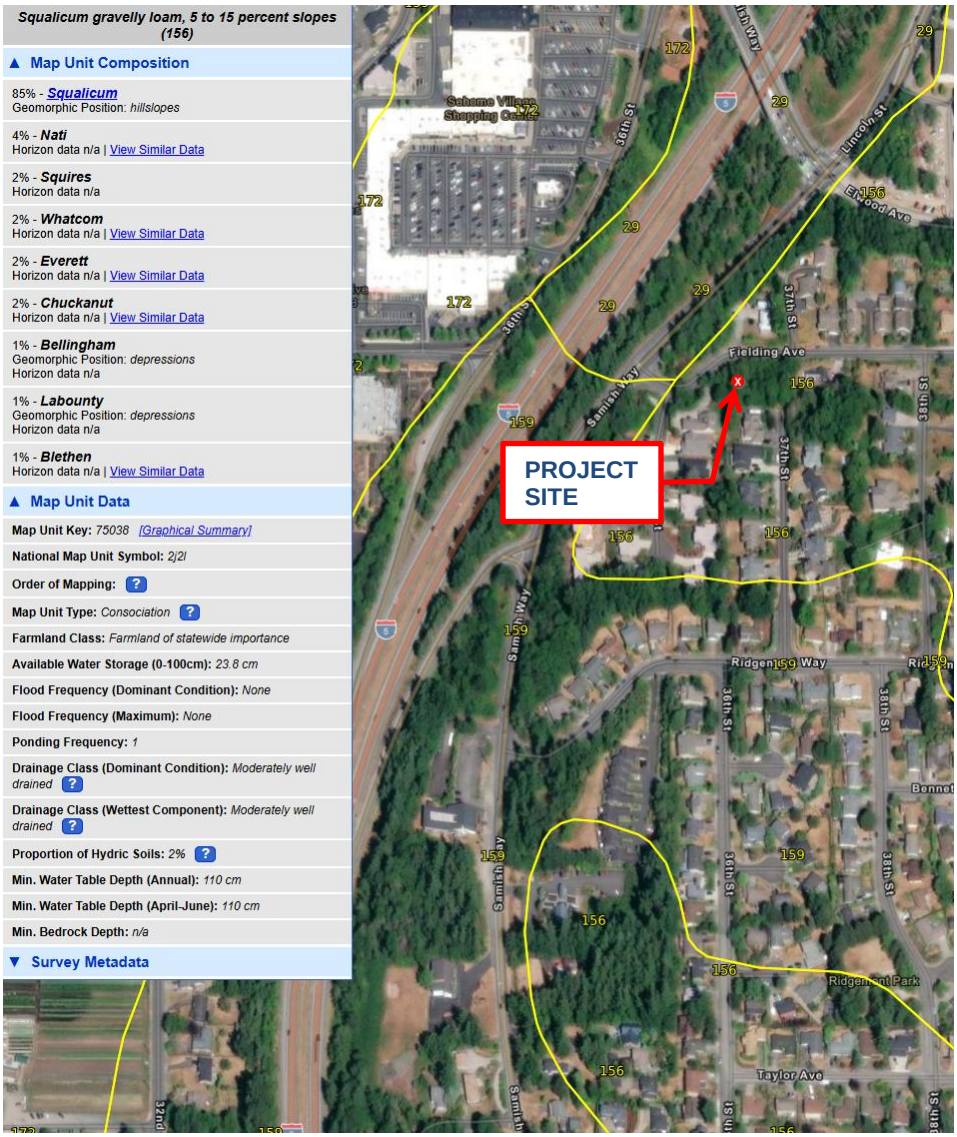
Image courtesy of Google Maps

	Vicinity Map	**Figure 1**

North

Aerial Imagery

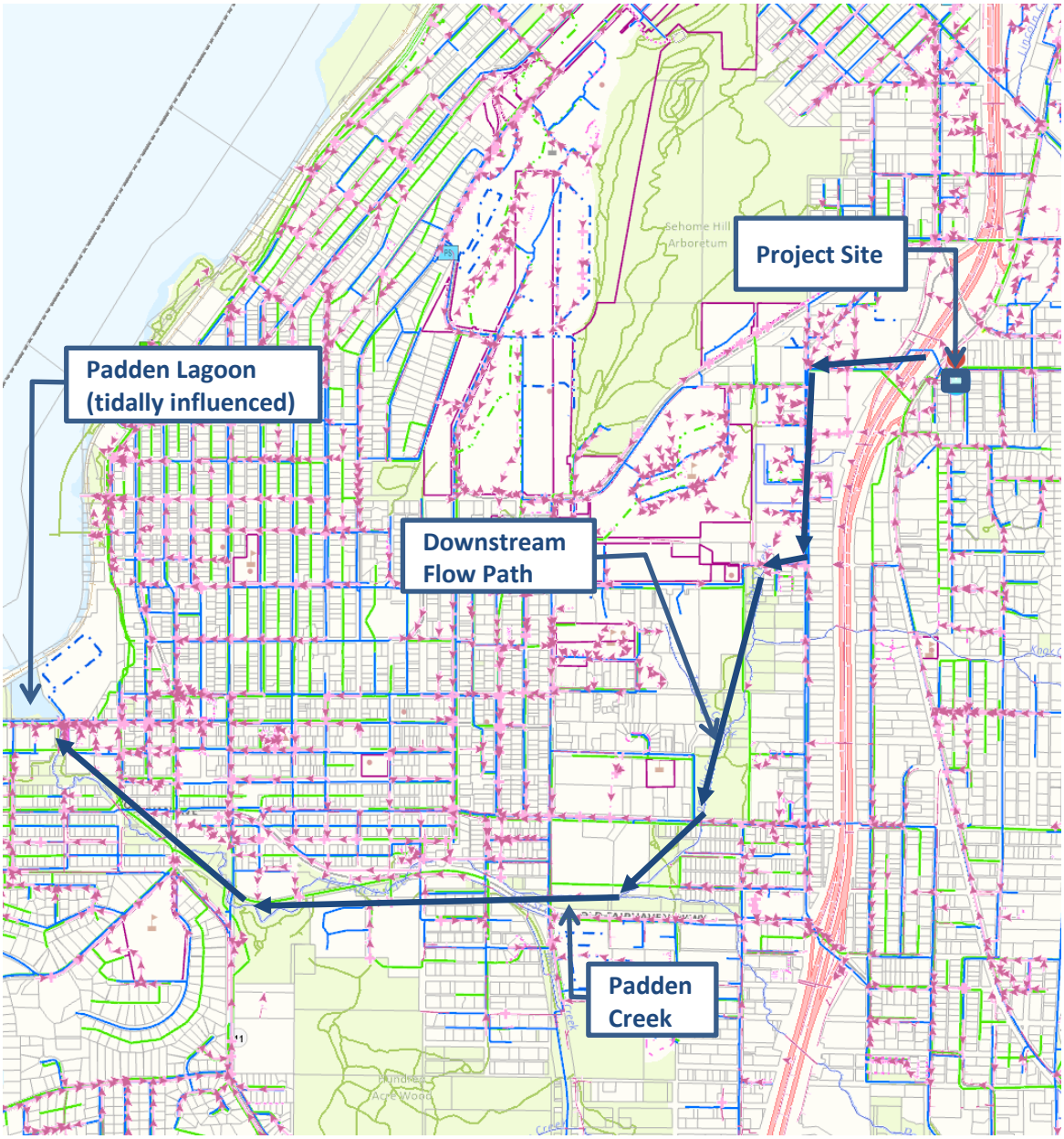
Figure 2



North

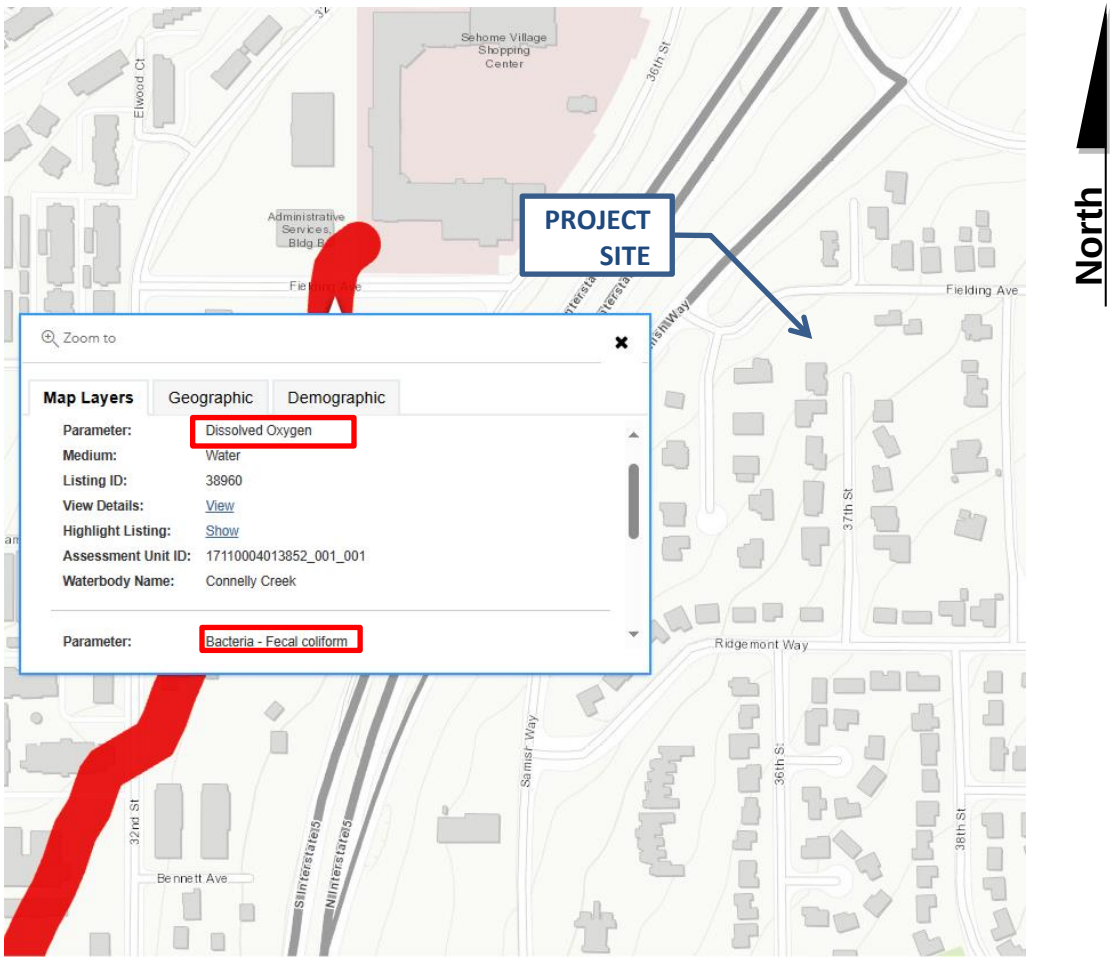
NRCS Soil Survey Map

Figure 3



Downstream Drainage Map

Figure 4

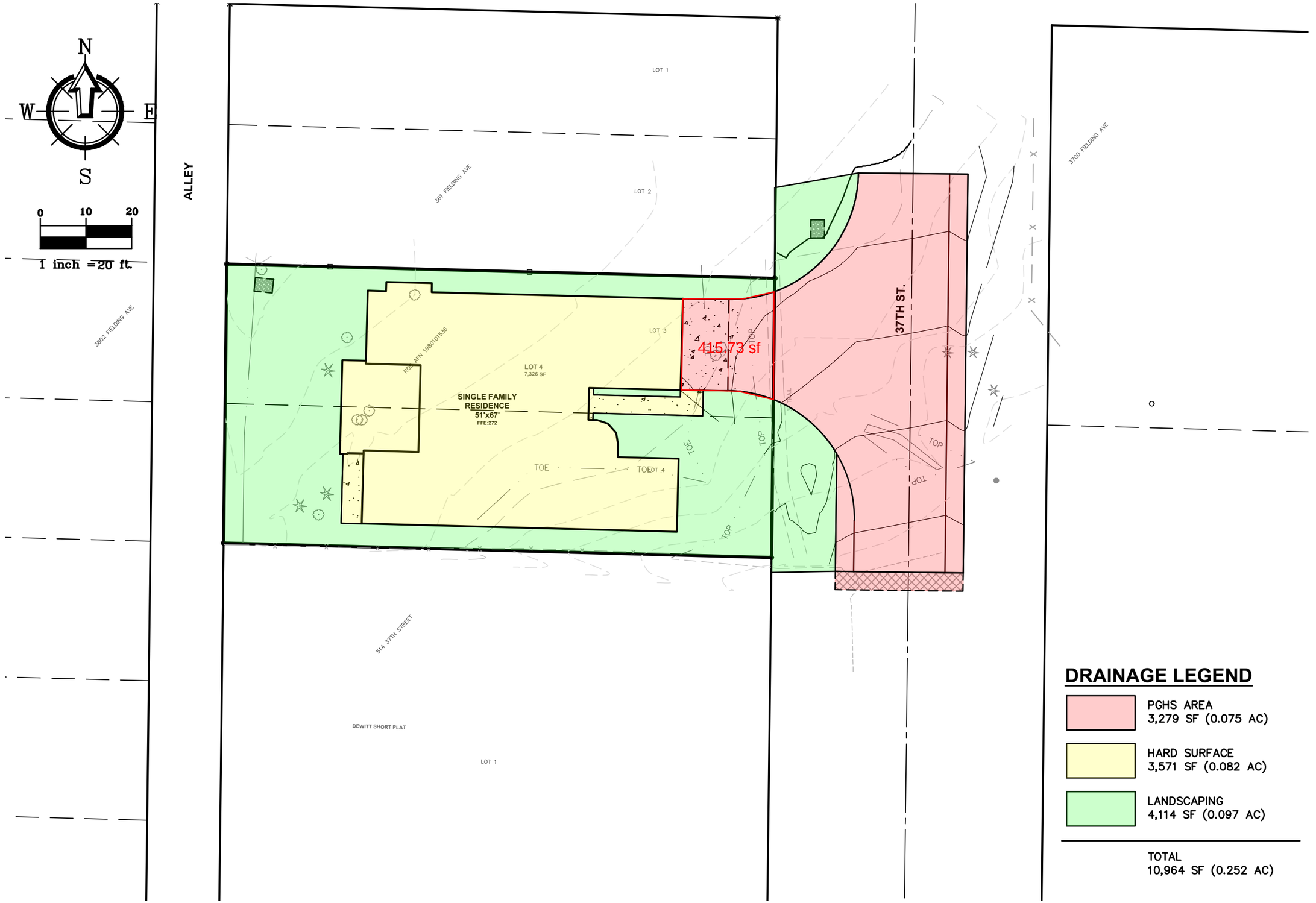


North

Water Quality Assessment Map

Figure 5

Figure 6 – Post-developed Basin Map



DRAINAGE LEGEND

PGHS AREA	3,279 SF (0.075 AC)
HARD SURFACE	3,571 SF (0.082 AC)
LANDSCAPING	4,114 SF (0.097 AC)
TOTAL	10,964 SF (0.252 AC)

DATE 02-12-2025

SHEET NAME **FIG 6**

JOB # 24158

DRAWING # 24158SP1.DWG

SHEET CONTENTS

POST DEVELOPED BASIN MAP

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CALCULATIONS

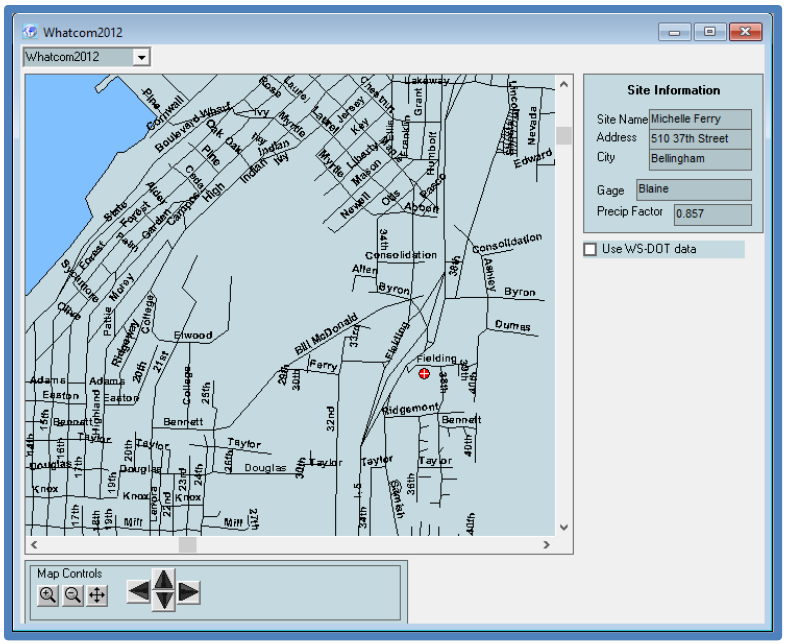
Stormwater Modeling Overview

In accordance with Bellingham Stormwater requirements, the Western Washington Hydrology Model v2012 (WWHM2012) software was used to model the anticipated stormwater flows and durations from the site. WWHM2012 software uses HSPF continuous simulation methodology to model site hydrology over 60-years of historical data.

WWHM2012 has three categories for slopes: 0-5% flat, 5%-15% moderate, 15%+ steep. Site areas have been delineated specifically by slopes. Soils on the site are modeled as type C due to fill soils on site.

A 15-minute timestep was used for the analysis. Precipitation data for the design uses the rain gage from the City of Burlington. Figure C1 below identifies the location of the project and WWHM2012 calculates the difference in rainfall with a precipitation scaling factor of 0.857.

Figure C1 – Rain Gage Scaling



The predeveloped site is modeled as moderate forest as the site generally slopes northwest at 10% and the site and right of way are both currently undeveloped. The post-developed basin is modeled off the areas depicted in *Figure 6.*

Figure C2 – Predeveloped Basin

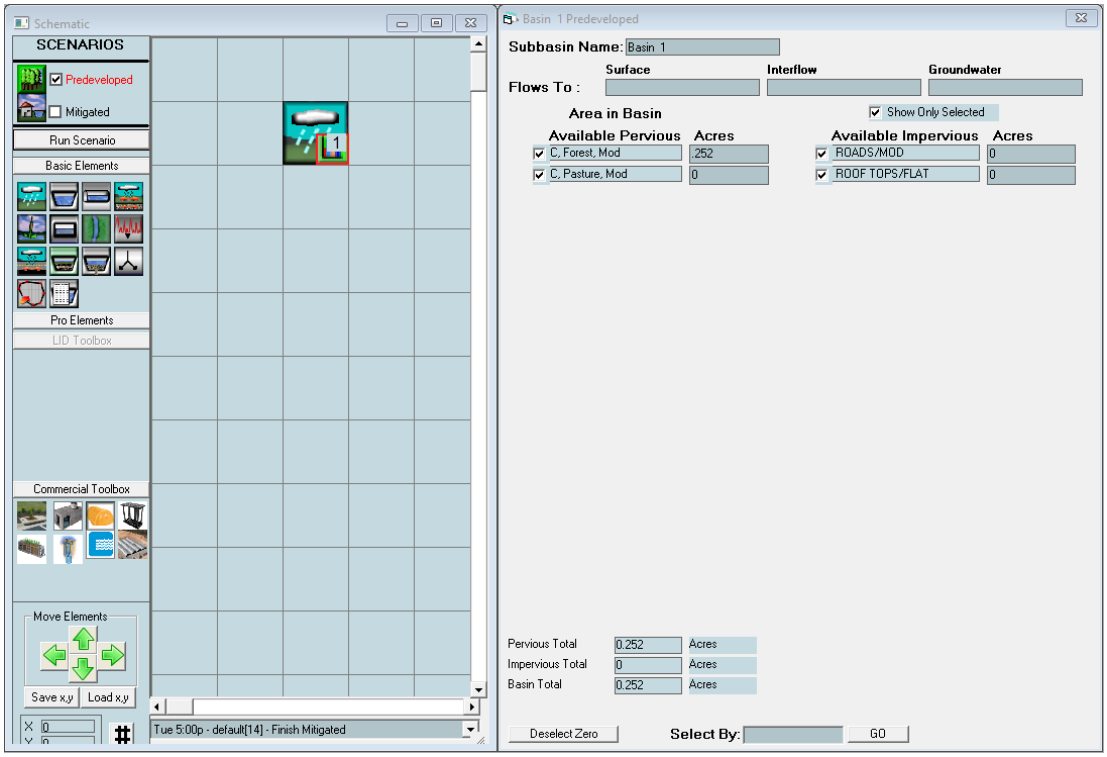


Figure C3 – Post-developed Basin

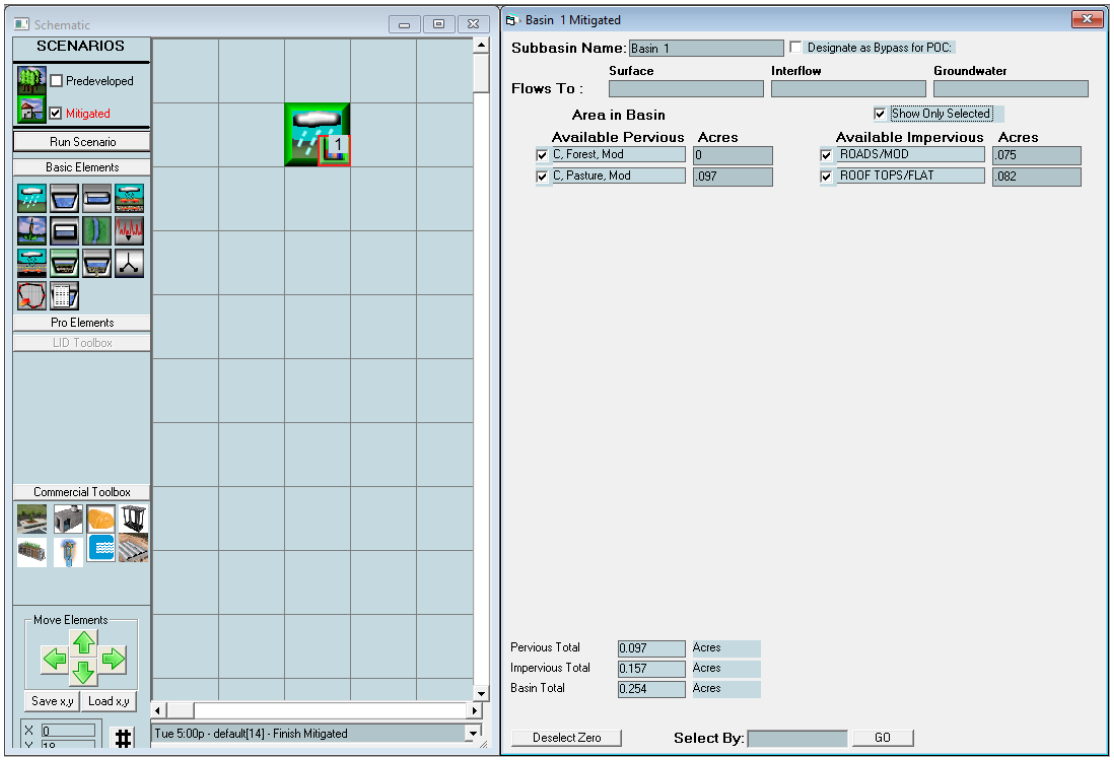
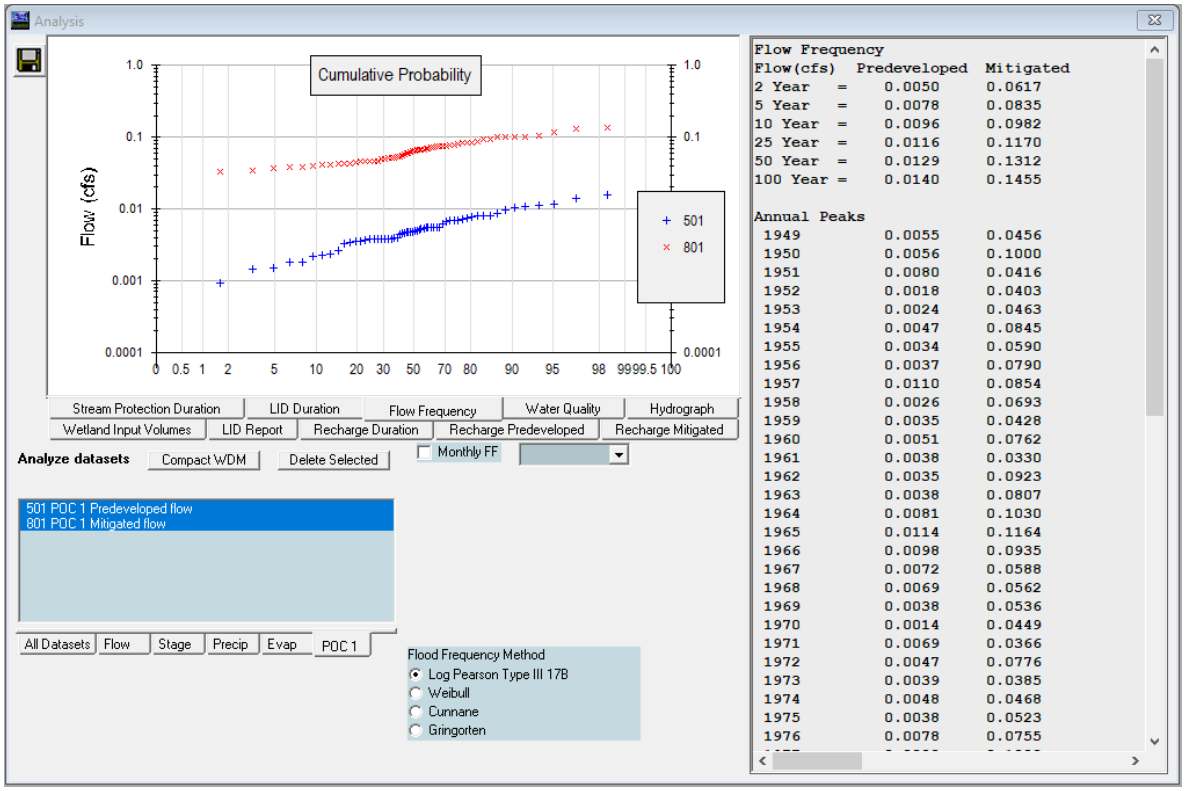


Figure C4 – Flow Frequency Analysis



According to WWHM2012 modeling, the pre-developed basin produces 0.014 cubic feet per second of stormwater runoff during a 100-year storm event. The post-developed basin would produce 0.146 cubic feet per second during the same event. Therefore, this project is only expected to increase runoff flows by 0.132 cubic feet per second and does not exceed the flow control threshold of 0.15 cubic feet per second.

APPENDIX

September 24, 2024

Michelle Ferry
P.O. Box 30016
Bellingham, WA 98228

SUBJECT: Soil Infiltration Evaluation for a New Single-Family Residence
510 37th Street (Parcel 370306 452486)
Bellingham, Washington

Dear Michelle Ferry:

This report presents the results of our soil infiltration evaluation for the proposed improvements to be located at the above-referenced address. Our services were completed in general accordance with our proposal dated July 24, 2024.

PURPOSE

We understand that there are plans to build a new single-family residence and associated improvements on a 0.15 acre residential lot located at 510 37th Street in Bellingham, Washington. The project also includes extending 37th Street northward in front of the subject property. Please refer to the Vicinity Map (Figure 1) for the approximate location of the project site.

The purpose of this evaluation is to determine if on-site stormwater management using infiltration methods appears feasible based on the *2024 Department of Ecology's Stormwater Management Manual for Western Washington*.

LOCAL GEOLOGY AND USDA SOIL SURVEY INFORMATION

According to the *Geologic Map of Western Whatcom County, Washington* (Easterbrook, 1976), the project area is mapped as Undifferentiated Glacial Deposits (Qf) of the Fraser glaciation. This soil unit is described as poorly exposed glacial till and gravel that occurs on lower slopes of the Cascade foothills.

The *Geomorphic Map of Western Whatcom County, Washington* (Kovanen, Haugerud and Easterbrook, 2020) maps the project site as an Older marine-modified surface (Qmo) of the Pleistocene. This surface was smoothed and modified by marine deposition, tidal current scour, and wave erosion and deposition, and is punctuated by fossil shorelines.

The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soil Survey website maps the soils within the project area as Squalicum gravelly loam with 5 to 15 percent slopes. Squalicum gravelly loam is described as volcanic ash, loess and slope alluvium over glacial drift, and is listed as hydrologic soil group B. Hydrologic soil group B includes soils that have a moderate infiltration rate when thoroughly wet.

CRITICAL AQUIFER RECHARGE AREAS

The project site does not appear to lie within a wellhead protection zone according to the - *Whatcom County Critical Areas Ordinance Article V - Critical Aquifer Recharge Areas* map. The site is located

within an area that was not assessed for aquifer susceptibility. Moderate to high aquifer susceptibility means that the groundwater is more susceptible to contaminants.

SURFACE AND SUBSURFACE OBSERVATIONS

At the time of our field investigation on August 13, 2024, the subject property was undeveloped. Two large pieces of broken concrete were observed within the southeastern corner of the lot. The portion of the 37th Street right-of-way that fronts the subject property was also undeveloped except for a buried sewer utility line and existing stormwater ditches. The adjacent lot to the north was undeveloped and the other adjacent lots included single-family residences. Vegetation within the project area included occasional trees, shrubs, blackberries and grass. The topography at the site appeared to slope down generally to the northwest at grades estimated to range from approximately 5 to 15 percent. A small area of muddy soil was observed near the west-central portion of the southern property line. Surface water was not observed within the areas explored during our fieldwork.

The subsurface conditions were explored by advancing seven test pits (TP-1 through TP-7) using hand equipment at the approximate locations shown on the Site and Exploration Map (Figure 2). The test pits were extended to depths ranging from approximately 2.3 to 3.5 feet below the existing ground surface (BGS). Soils were visually identified in the field based on both the Unified Soil Classification System (USCS) and the USDA Textural Triangle. We also completed three grain size tests performed in general accordance with ASTM D422 to help classify the native soil.

Soil

At the surface of explorations TP-1 through TP-4, we encountered a layer of soft, brown to dark brown, damp, organic, gravelly, very sandy silt with occasional roots (topsoil) ranging from approximately 1.2 to 1.5 feet in thickness. At the surface of explorations TP-5 through TP-7, we encountered a layer of loose to medium dense, gray-brown, damp, gravelly, silty sand with occasional cobbles and organics (fill) ranging from approximately 1.0 foot to over 2.5 feet in thickness. A layer of topsoil was encountered below the fill at exploration TP-6 that was approximately 0.7 feet in thickness. Below the topsoil at explorations TP-1 through TP-4, and TP-6, we encountered loose to medium dense, gray-brown to gray-tan, damp, slightly gravelly to very gravelly, slightly silty to silty sand with occasional cobbles (weathered glacial drift). Explorations TP-1 through TP-4, and TP-6, were terminated in weathered glacial drift on relatively dense soil deposits or cobbles. Explorations TP-5 and TP-7 were terminated in apparent fill on cobbles.

Groundwater

Groundwater was not encountered in any of our explorations. Soil mottling observed within the weathered glacial drift deposits suggests seasonal high groundwater may range from approximately 1.3 to 2.3 feet BGS at the site. Our groundwater observations were made during the dry season when groundwater elevations, seepage rates and soil moisture contents are typically below seasonal high.

Based on the subsurface conditions observed and interpreted to underlie the site, we anticipate that water would perch above relatively dense and/or finer-grained portions of the weathered glacial drift deposits (a restrictive layer of low permeability), particularly during the wet season when the upper portion of this soil unit is expected to become saturated. We estimate that perched groundwater flows down generally to the northwest at gradients that typically follow the natural topography.

Please be aware that groundwater elevations, seepage rates, and moisture contents are not constant and can be significantly affected by changes in season, precipitation, runoff, site use, removal of vegetation and other factors. Please refer to the test pit logs (Figures 4-7) for more specific detail at each location.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our evaluation, the existing subsurface conditions encountered at the site do not appear suitable for stormwater facilities that are designed to infiltrate into the native soil in accordance with the *2024 Department of Ecology's Stormwater Management Manual for Western Washington*.

A layer of fill was encountered at the surface of explorations TP-5 through TP-7, ranging from approximately 1.0 foot to over 2.5 feet in thickness. The fill and topsoil appear to be of variable composition and density/consistency and are not recommended for infiltration purposes.

Soil mottling observed within the weathered glacial drift deposits suggests that seasonal high groundwater is relatively shallow and may range from approximately 1.3 to 2.3 feet BGS at the site.

Permeable pavement and other on-site stormwater management infiltration facilities should be based on suitable native soil and maintain a minimum of 1.0 foot of vertical separation to seasonal high groundwater or a restrictive layer from the base course of the permeable pavement or the bottom of the infiltration facility. Therefore, considering the relatively shallow depth to soil mottling, it does not appear feasible to maintain the minimum separation requirements to seasonal groundwater from the base of permeable pavement or other on-site stormwater infiltration facilities that are based on the native soil at the site.

LIMITATIONS

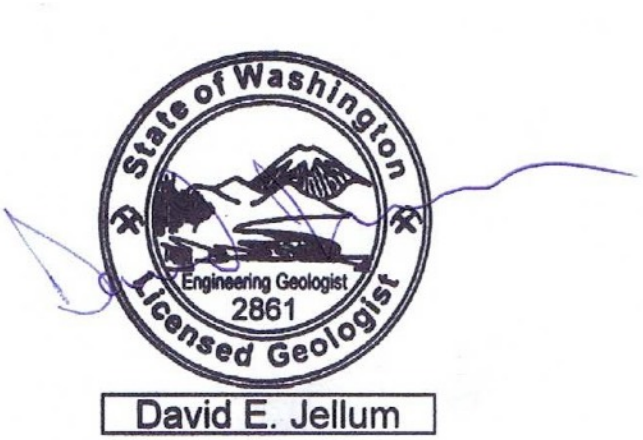
This report was prepared for the sole use of Michelle Ferry and her authorized agents for the proposed single-family residence and associated improvements to be located at 510 37th Street in Bellingham, Washington. The conclusions and recommendations contained in this report are based on the results of our exploration program conducted in August of 2024, lab tests, review of references, and our experience working on similar projects.

Please be aware that subsurface conditions can vary with time, changes in site use, and between explorations. In the event that unanticipated subsurface conditions are encountered during construction or the project is modified, we should be contacted to reevaluate our recommendations accordingly.

Our services were accomplished within the generally accepted practices of the geologic profession at the time this report was prepared under the limitations of scope, budget and schedule. It should be understood that no guarantee or warranty, suggested or expressed, is included with the professional opinions or recommendations contained in this report.

Thank you for the opportunity to work on your project. Please contact us at (360) 306-6171 or soundgeology@gmail.com if you have any questions regarding this report or if we can be of further assistance.

Sincerely,
Sound Geology, LLC



David Jellum, LEG
Licensed Engineering Geologist

Attachments

Figure 1	Vicinity Map
Figure 2	Site and Exploration Map
Figure 3	Soil Classification and Legend
Figures 4-7	Test Pit Logs 1 through 7
	USCS Grain Size Test Data (3 pages)

References

Easterbrook, D.J. 1976. *Geologic Map of Western Whatcom County, Washington*. United States Geological Survey. Map I-854-B.

Kovanen, D.J., Haugerud, R.A., and Easterbrook, D.J. 2020. *Geomorphic Map of Western Whatcom County, Washington* (ver. 1.1, November 2021): U.S. Geological Survey Scientific Investigations Map 3406, pamphlet 42 p., scale 1:50,000, https://doi.org/10.3133/sim3406.

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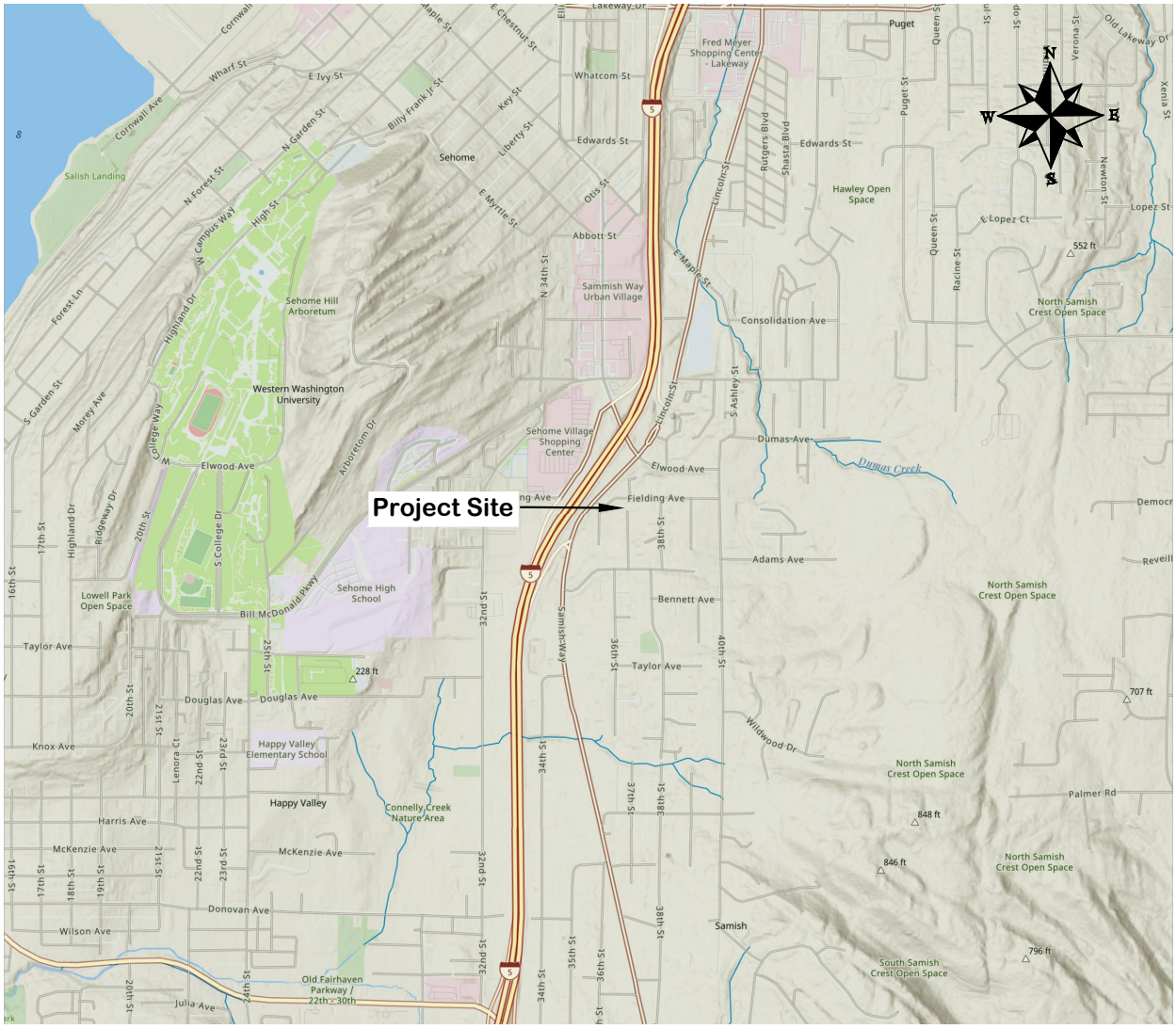
Washington State Department of Ecology Water Quality Program. July 2024. *Stormwater Management Manual for Western Washington.* Publication Number 24-10-013.



Reference: Washington State Department of Natural Resources - Washington Geologic Information Portal

SOUND GEOLOGY 360.306.6171 www.soundgeology.com	**Date** 8-19-2024 **File No.** 24046 **Drawn By** DEJ **Scale** None	**Vicinity Map** Proposed Single-Family Residence 510 37th Street (Parcel 370306 452486) Bellingham, Washington	FIGURE **1 of 7**

◓ = Approximate Test Pit Location

40 0 20 40

1 inch = 40 feet

Reference: COB's CityIQ Online Map Viewer. 2022 Aerial Imagery. 5-foot Contours.

SOUND GEOLOGY 360.306.6171 www.soundgeology.com	**Date** 8-19-2024 **File No.** 24046 **Drawn By** DEJ **Scale** 1" = 40'	**Site and Exploration Map** Proposed Single-Family Residence 510 37th Street (Parcel 370306 452486) Bellingham, Washington	FIGURE **2 of 7**

Unified Soil Classification System (USCS)

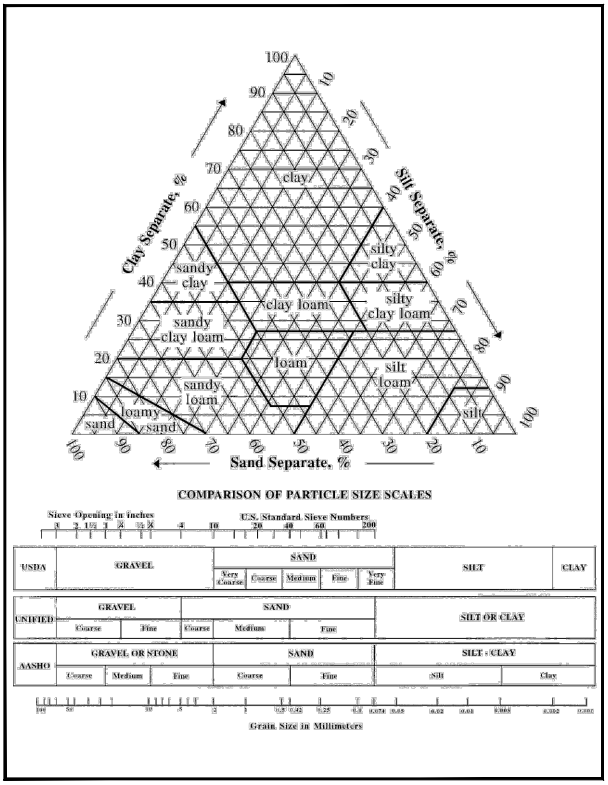
Material	Major Division Criteria		Symbol	Description
COARSE GRAINED SOIL More than 50% of material retained on No. 200 sieve	GRAVEL More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
		GRAVEL WITH FINES more than 12% fines	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	SAND More than 50% of coarse fraction passes through No. 4 sieve	CLEAN SANDS less than 5% fines	SW	Well-graded SAND
			SP	Poorly-graded SAND
		SAND WITH FINES more than 12% fines	SM	Silty SAND
			SC	Clayey SAND
FINE GRAINED SOIL More than 50% of material passes the No. 200 sieve	SILT AND CLAY Liquid Limit (LL) less than 50	INORGANIC	ML	SILT (low plasticity)
			CL	Lean CLAY (low plasticity)
		ORGANIC	OL	Organic SILT (low plasticity)
	SILT AND CLAY Liquid Limit (LL) greater than 50	INORGANIC	MH	SILT (elastic, moderate to high plasticity)
			CH	Fat CLAY (moderate to high plasticity)
		ORGANIC	OH	Organic SILT or CLAY (M to H plasticity)
HIGHLY ORGANIC SOIL			PT	PEAT (soil with a high organic content)

PLEASE NOTE: "/" and "-" symbols are used to represent borderline or dual classification

Other Material Symbols

Symbol	Description
AP	Asphalt Pavement
BR	Bedrock
CB	Cobbles and Boulders
CC	Portland Cement Concrete
DB	Debris (garbage)
QS	Quarry Spalls
TS	Topsoil, sod or duff
WD	Wood (logs and chips)

USDA Textural Triangle



SOURCE: United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), Texture Triangle and Particle-Size Limits of AASHTO, USDA and Unified Classification Systems, Exhibit 618-8.

Legend

AL	Atterberg Limits
CEC	Cation Exchange Capacity
OC	Organic Content
PP	Pocket Penetrometer (tsf)
SA	Sieve Analysis
W	Water Content (%)
Slight	Water Level Elevation and Description
S-1	Grab Sample Number
– – –	Approximate transition between geologic unit or soil strata
———	Distinct contact between geologic unit or soil strata

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Date 8-19-2024

File No. 24046

Drawn By DEJ

Scale None

Soil Classification and Legend

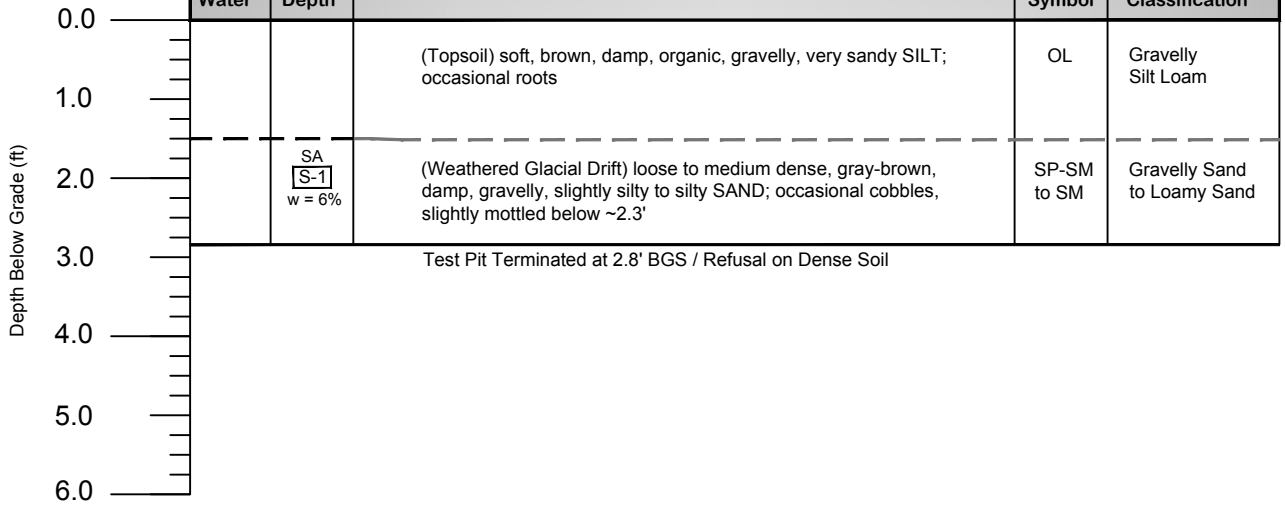
Proposed Single-Family Residence
510 37th Street (Parcel 370306 452486)
Bellingham, Washington

FIGURE

3 of 7

TP-1

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*

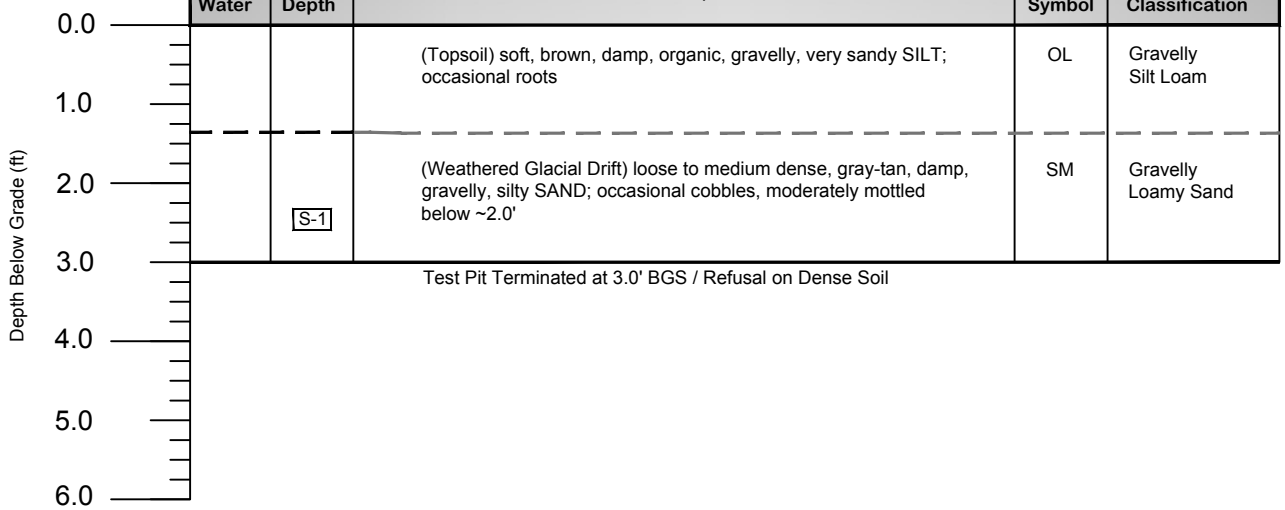


Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Topsoil) soft, brown, damp, organic, gravelly, very sandy SILT; occasional roots	OL	Gravelly Silt Loam
	SA S-1 w = 6%	(Weathered Glacial Drift) loose to medium dense, gray-brown, damp, gravelly, slightly silty to silty SAND; occasional cobbles, slightly mottled below ~2.3'	SP-SM to SM	Gravelly Sand to Loamy Sand

Test Pit Terminated at 2.8' BGS / Refusal on Dense Soil

TP-2

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*



Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Topsoil) soft, brown, damp, organic, gravelly, very sandy SILT; occasional roots	OL	Gravelly Silt Loam
	S-1	(Weathered Glacial Drift) loose to medium dense, gray-tan, damp, gravelly, silty SAND; occasional cobbles, moderately mottled below ~2.0'	SM	Gravelly Loamy Sand

Test Pit Terminated at 3.0' BGS / Refusal on Dense Soil

Notes: Exploration locations are shown on the Site and Exploration Map. Please refer to the Soil Classification and Legend for an explanation of symbols. Except where indicated by a sieve analysis (SA), soils were visually classified in the field.

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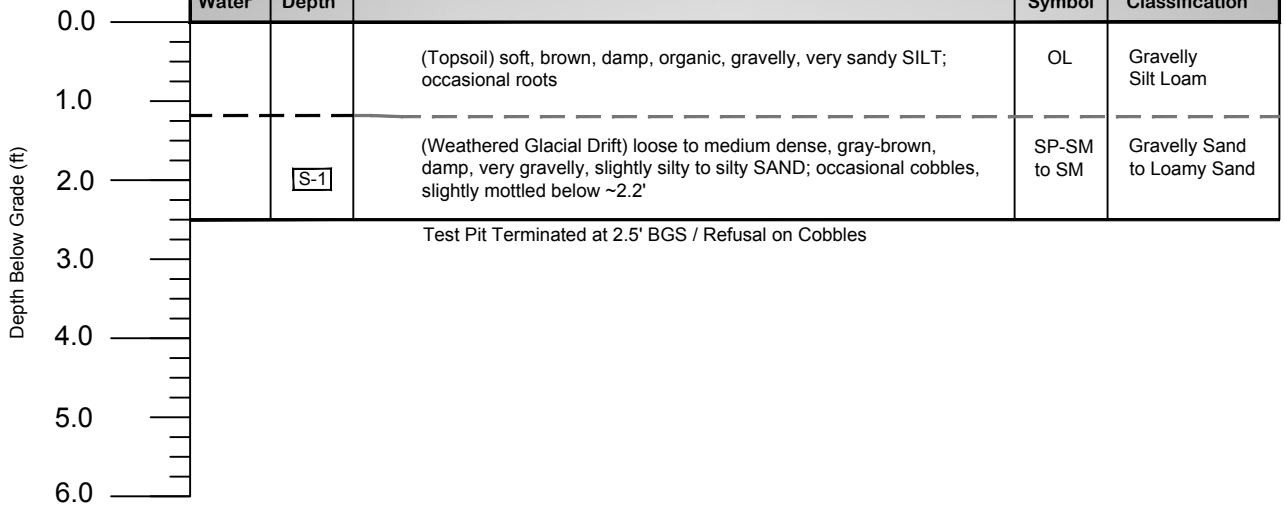
Test Pit Logs 1 and 2
Proposed Single-Family Residence
510 37th Street (Parcel 370306 452486)
Bellingham, Washington

FIGURE
4 of 7

TP-3

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*

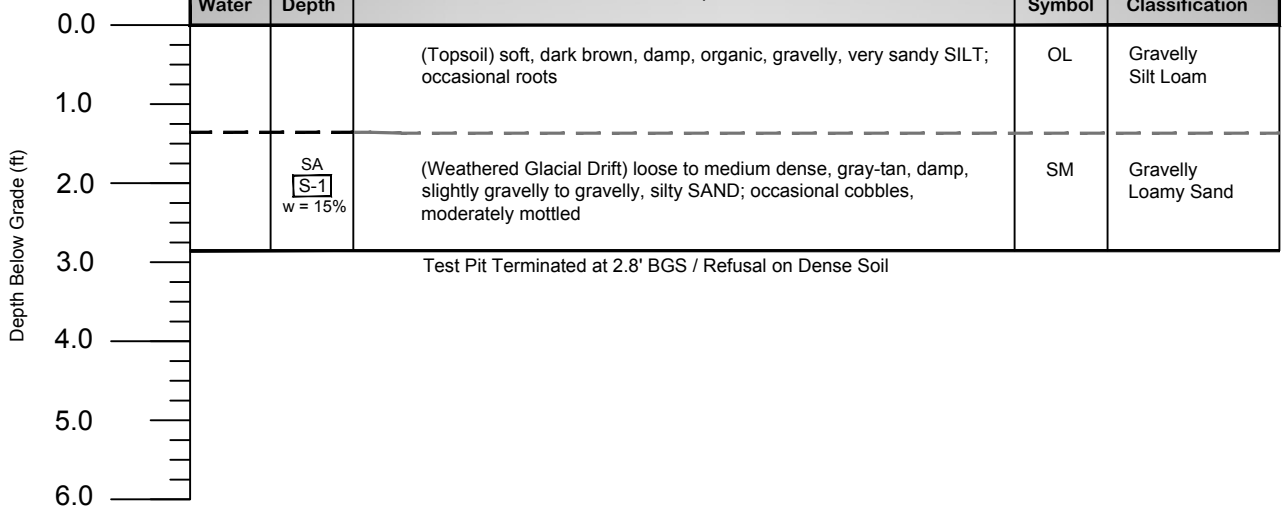


Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Topsoil) soft, brown, damp, organic, gravelly, very sandy SILT; occasional roots	OL	Gravelly Silt Loam
	S-1	(Weathered Glacial Drift) loose to medium dense, gray-brown, damp, very gravelly, slightly silty to silty SAND; occasional cobbles, slightly mottled below ~2.2'	SP-SM to SM	Gravelly Sand to Loamy Sand

Test Pit Terminated at 2.5' BGS / Refusal on Cobbles

TP-4

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*



Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Topsoil) soft, dark brown, damp, organic, gravelly, very sandy SILT; occasional roots	OL	Gravelly Silt Loam
	SA S-1 w = 15%	(Weathered Glacial Drift) loose to medium dense, gray-tan, damp, slightly gravelly to gravelly, silty SAND; occasional cobbles, moderately mottled	SM	Gravelly Loamy Sand

Test Pit Terminated at 2.8' BGS / Refusal on Dense Soil

Notes: Exploration locations are shown on the Site and Exploration Map. Please refer to the Soil Classification and Legend for an explanation of symbols. Except where indicated by a sieve analysis (SA), soils were visually classified in the field.

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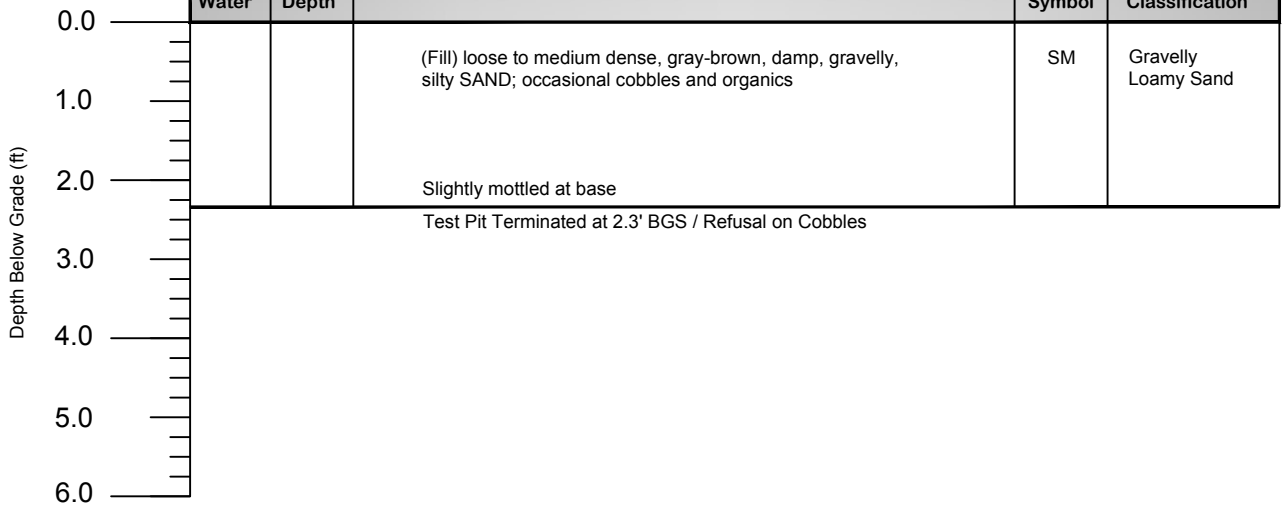
Test Pit Logs 3 and 4
Proposed Single-Family Residence
510 37th Street (Parcel 370306 452486)
Bellingham, Washington

FIGURE
5 of 7

TP-5

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*

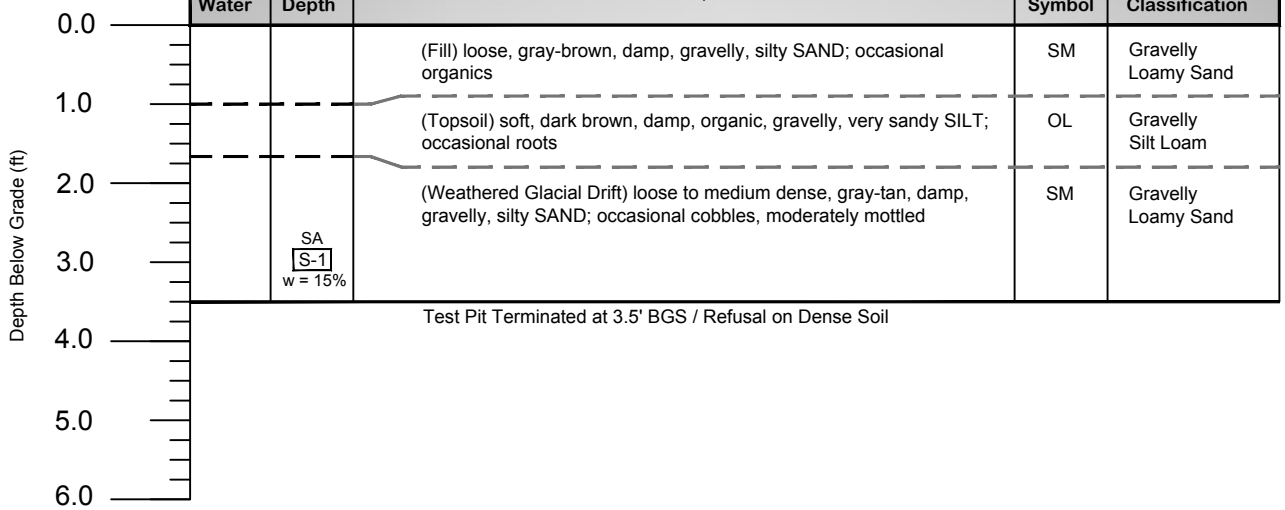


Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Fill) loose to medium dense, gray-brown, damp, gravelly, silty SAND; occasional cobbles and organics	SM	Gravelly Loamy Sand
		Slightly mottled at base		

Test Pit Terminated at 2.3' BGS / Refusal on Cobbles

TP-6

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*



Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Fill) loose, gray-brown, damp, gravelly, silty SAND; occasional organics	SM	Gravelly Loamy Sand
		(Topsoil) soft, dark brown, damp, organic, gravelly, very sandy SILT; occasional roots	OL	Gravelly Silt Loam
	SA S-1 w = 15%	(Weathered Glacial Drift) loose to medium dense, gray-tan, damp, gravelly, silty SAND; occasional cobbles, moderately mottled	SM	Gravelly Loamy Sand

Test Pit Terminated at 3.5' BGS / Refusal on Dense Soil

Notes: Exploration locations are shown on the Site and Exploration Map. Please refer to the Soil Classification and Legend for an explanation of symbols. Except where indicated by a sieve analysis (SA), soils were visually classified in the field.

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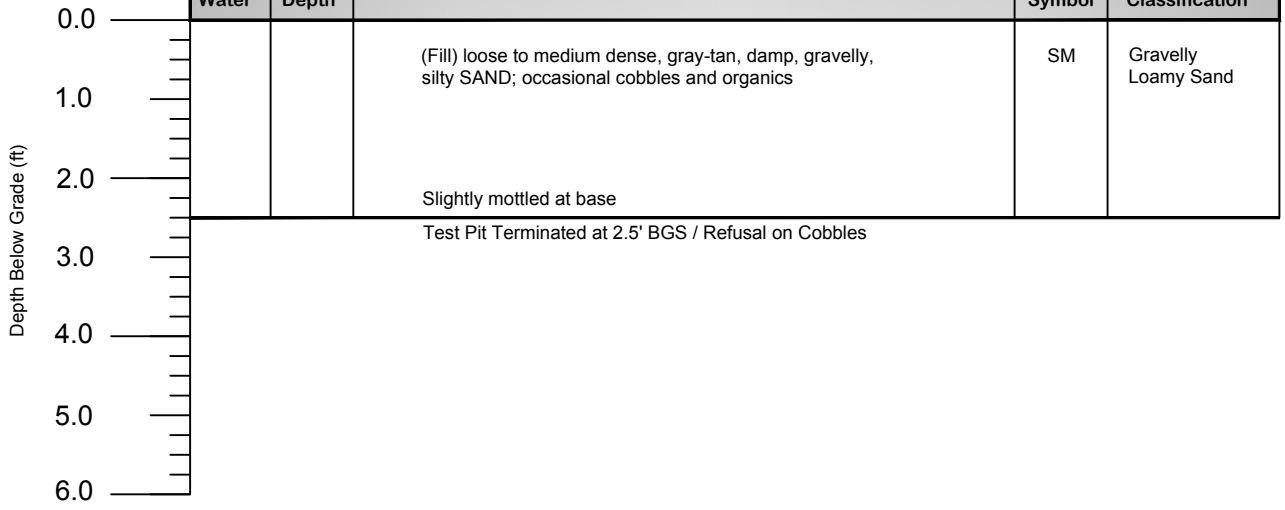
Scale As Shown

Test Pit Logs 5 and 6
Proposed Single-Family Residence
510 37th Street (Parcel 370306 452486)
Bellingham, Washington

FIGURE
6 of 7

TP-7

Date Completed: 8-13-2024 *Equipment Used: Hand Tools* *Geologist: DJ*
Weather Condition: Fair *Ground Elevation: Not Determined*



Ground Water	Sample Depth	Soil Unit and Description	USCS Symbol	USDA Classification
		(Fill) loose to medium dense, gray-tan, damp, gravelly, silty SAND; occasional cobbles and organics	SM	Gravelly Loamy Sand
		Slightly mottled at base		

Test Pit Terminated at 2.5' BGS / Refusal on Cobbles

Notes: Exploration locations are shown on the Site and Exploration Map. Please refer to the Soil Classification and Legend for an explanation of symbols. Except where indicated by a sieve analysis (SA), soils were visually classified in the field.

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Date 8-19-2024
File No. 24046
Drawn By DEJ
Scale As Shown

Test Pit Log 7
Proposed Single-Family Residence
510 37th Street (Parcel 370306 452486)
Bellingham, Washington

FIGURE
7 of 7

USCS Grain Size Test Data

Project Information	
Date Started: 8-13-2024	File No.: 24046
Project Name: 510 37th Street	Client: Ferry

Test Results		
Exploration No.: TP-1	Sample Depth: 2.0’	Lab Tech: DJ

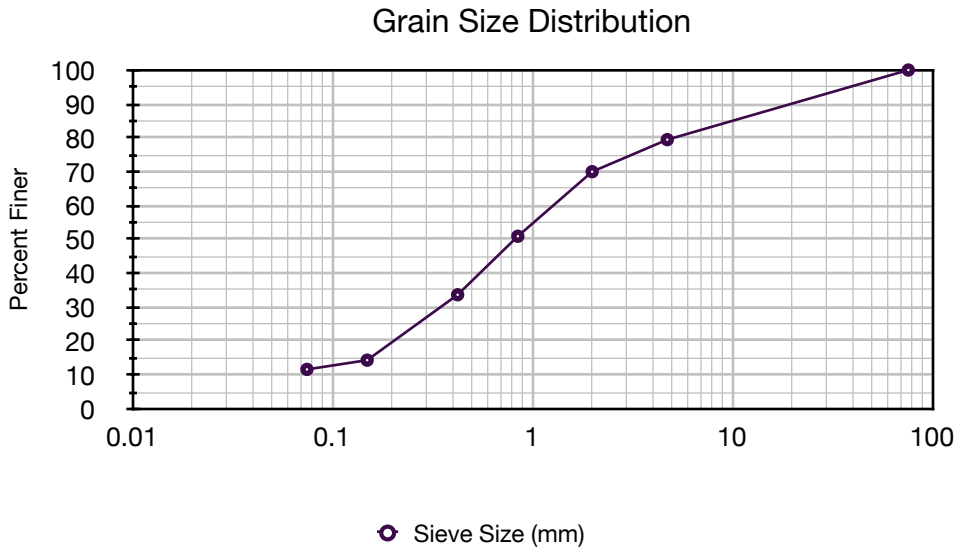
Sieve Analysis

Pan I.D. = B-1	Moist Soil + Pan Weight (g) = 248.01
Pan Weight (g) = 104.49	Dry Soil + Pan Weight (g) = 240.25
Water Content (%) = 5.72	Dry Soil Weight (g) = 135.76
	Washed Soil Weight (g) = 122.78

Sieve Number	Size (mm)	Cum. % Finer	Weight Retained (g)	Cum. Wt. Retained (g)	Percent Retained	Cum. % Retained
3-inch	76.2	100.00	0.00	0.00	0.00	0.00
4	4.75	79.44	27.91	27.91	20.56	20.56
10	2	69.98	12.84	40.75	9.46	30.02
20	0.85	50.92	25.88	66.63	19.06	49.08
40	0.425	33.64	23.46	90.09	17.28	66.36
100	0.15	14.33	26.21	116.30	19.31	85.67
200	0.075	11.60	3.71	120.01	2.73	88.40
Pan				122.73		

USCS Classification	
Gravel = 20.56%	Fine Sand = 22.04%
Coarse Sand = 9.46%	Fines (Passes U.S. No. 200) = 11.60%
Medium Sand = 36.34%	

USCS Soil Description: gravelly, slightly silty, fine to coarse SAND (SP-SM)



References: ASTM D422, ASTM D2216 and ASTM D2487
USCS (Unified Soil Classification System)

USCS Grain Size Test Data

Project Information		
Date Started: 8-13-2024	File No.: 24046	
Project Name: 510 37th Street	Client: Ferry	
Test Results		
Exploration No.: TP-4	Sample Depth: 2.0’	Lab Tech: DJ

Sieve Analysis

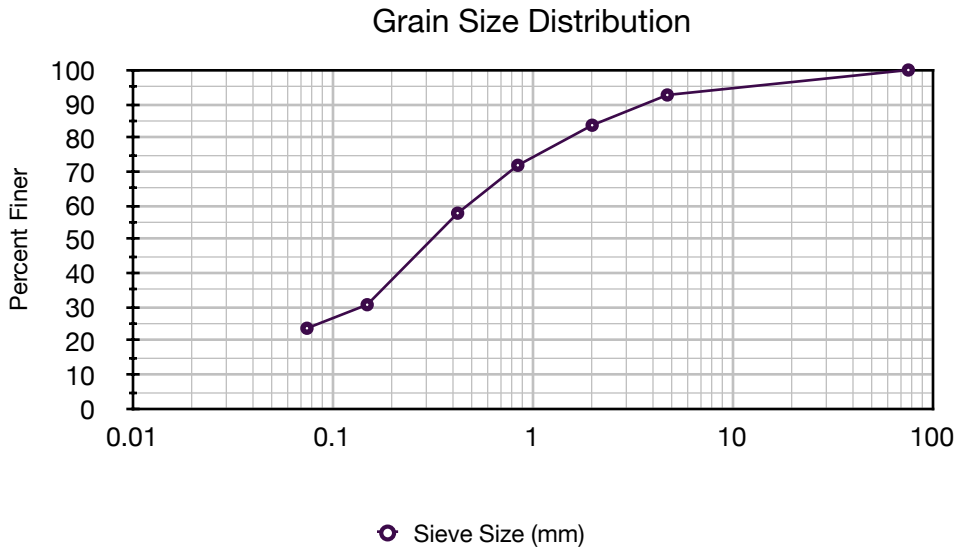
Pan I.D. = B-2	Moist Soil + Pan Weight (g) = 261.60
Pan Weight (g) = 105.52	Dry Soil + Pan Weight (g) = 240.85
Water Content (%) = 15.33	Dry Soil Weight (g) = 135.33
	Washed Soil Weight (g) = 105.99

Sieve Number	Size (mm)	Cum. % Finer	Weight Retained (g)	Cum. Wt. Retained (g)	Percent Retained	Cum. % Retained
3-inch	76.2	100.00	0.00	0.00	0.00	0.00
4	4.75	92.63	9.97	9.97	7.37	7.37
10	2	83.70	12.09	22.06	8.93	16.30
20	0.85	71.87	16.01	38.07	11.83	28.13
40	0.425	57.73	19.14	57.21	14.14	42.27
100	0.15	30.70	36.58	93.79	27.03	69.30
200	0.075	23.75	9.40	103.19	6.95	76.25
Pan				106.01		

USCS Classification

Gravel = 7.37%	Fine Sand = 33.98%
Coarse Sand = 8.93%	Fines (Passes U.S. No. 200) = 23.75%
Medium Sand = 25.97%	

USCS Soil Description: slightly gravelly, silty, fine to coarse SAND (SM)



References: ASTM D422, ASTM D2216 and ASTM D2487
USCS (Unified Soil Classification System)

USCS Grain Size Test Data

Project Information	
Date Started: 8-13-2024	File No.: 24046
Project Name: 510 37th Street	Client: Ferry

Test Results		
Exploration No.: TP-6	Sample Depth: 3.0’	Lab Tech: DJ

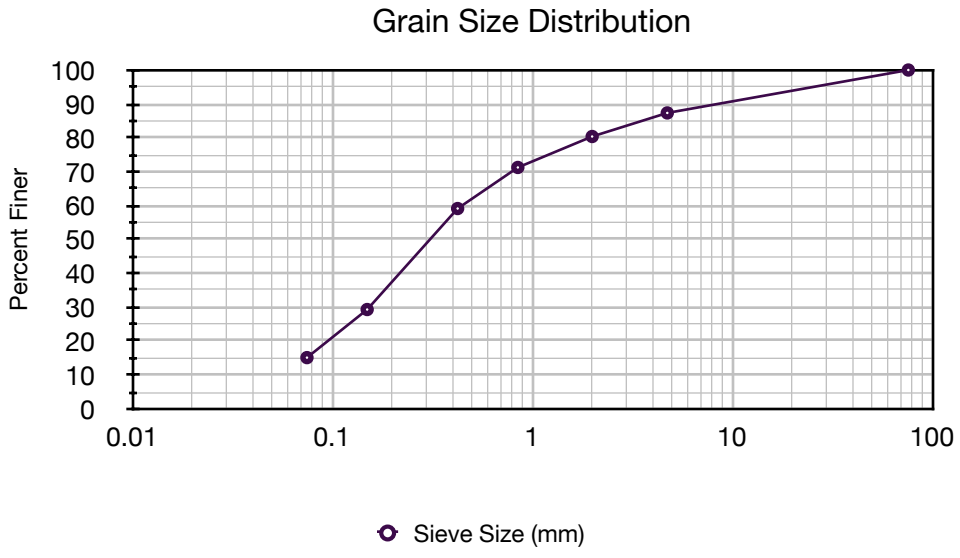
Sieve Analysis

Pan I.D. = B-3	Moist Soil + Pan Weight (g) = 252.31
Pan Weight (g) = 103.78	Dry Soil + Pan Weight (g) = 232.79
Water Content (%) = 15.13	Dry Soil Weight (g) = 129.01
	Washed Soil Weight (g) = 114.23

Sieve Number	Size (mm)	Cum. % Finer	Weight Retained (g)	Cum. Wt. Retained (g)	Percent Retained	Cum. % Retained
3-inch	76.2	100.00	0.00	0.00	0.00	0.00
4	4.75	87.33	16.34	16.34	12.67	12.67
10	2	80.37	8.99	25.33	6.97	19.63
20	0.85	71.23	11.79	37.12	9.14	28.77
40	0.425	59.10	15.64	52.76	12.12	40.90
100	0.15	29.28	38.47	91.23	29.82	70.72
200	0.075	15.08	18.32	109.55	14.20	84.92
Pan				114.11		

USCS Classification	
Gravel = 12.67%	Fine Sand = 44.02%
Coarse Sand = 6.97%	Fines (Passes U.S. No. 200) = 15.08%
Medium Sand = 21.26%	

USCS Soil Description: gravelly, silty, fine to coarse SAND (SM)



References: ASTM D422, ASTM D2216 and ASTM D2487
USCS (Unified Soil Classification System)