

**April 30, 2019**

**Attention: Mr. Wheeler and Ms. Fink**  
[drew.wheeler.369@gmail.com](mailto:drew.wheeler.369@gmail.com); [afink314@gmail.com](mailto:afink314@gmail.com)  
**C/O Mr. Kurt Russell**  
**AC Site Management**

**LIMITED GEOLOGICAL RECONNAISSANCE  
SINGLE FAMILY RESIDENCE SITE and DRIVEWAY  
KITSAP COUNTY PARCEL NUMBER 312402-4-002-1001  
W. LUDVICK LAKE DRIVE  
SEABECK, WASHINGTON**

**Dear Mr. Wheeler and Ms. Fink:**

Resolve Environmental and Geotechnical, Incorporated (Resolve) is pleased to provide this letter report for the limited site reconnaissance at the above-referenced property. Resolve understands that the object of the investigation was to perform a limited visual inspection of the geologic conditions wherein construction of a Single-Family Residence (SFR) will be undertaken, and the general condition of the properties near the site.

The subject site is located near W. Ludvick Lake Drive, Seabeck, Kitsap County, Washington. The latitude is approximately 47 degrees, 31 minutes, 34 seconds north, and the longitude is approximately 122 degrees, 38 minutes 80 seconds west. The Kitsap County Parcel Number is 312402-4-002-1001. The site is surrounded by wooded areas, with sporadic rural residential properties and SFRs. The proposed SFR site is located generally in the eastern portion of the subject property. A driveway off of Ludvick Lake Drive provides the primary access to the site. A site Vicinity Map is attached to this report.

The subject site is currently undeveloped except for a partially developed roadway, apparently along a relict logging roadway. Large diameter conifers, deciduous trees, and common shrubberies occupy much of the surrounding terrain. There are moderate slopes to the west and southwest of the construction site, and, in places, to both sides of the existing driveway. All of the soils observed on the proposed site, along the driveway, and on slopes were very dense glacial outwash and alluvium.

A Washington State-Licensed Geologist from Resolve (Ronald P. Nance, P.G.) performed the limited site reconnaissance on December 7th, 2019 with a focus on the proposed SFR construction area, and again on April 27, 2020, with a brief review of our previous findings and a primary focus being the driveway into the site. Our observations were preceded by a review of local geologic databases, local geology, and area slope evaluations of the immediate vicinity.

**Soil and Slope Research**

The following information provides a basis for a general understanding of the subject soils and geologic conditions. Further information is provided in the Conclusions and Recommendations section of this Reconnaissance Report.

--Kitsap County Maps:

- Assessors GIS Critical Areas Map: Indicates the subject site is in a Moderate Critical Area in the central portion of the site.
- Landslide Hazards Map: Does not indicate that the subject site is in a potential Landslide Hazard area.
- Erosion Hazard Map: Indicates the subject site is in a Moderate Erosion Zone in the central portion of the site.

- Seismic Hazards Map: Does not indicate the subject site is in a Seismic Hazard Area. Also, no Liquefaction Hazards were noted for the subject site.
- The WA DOE Coastal Atlas does not extend to the subject site.

#### **--USDA Soils**

The United States Department of Agriculture (USDA) Soil Survey of Kitsap County Area, Washington, information indicates the following soil types exist on the project site:

- #57; Shelton very gravelly sandy loam (30 to 45 percent slopes)
- #56; Shelton extremely gravelly sandy loam (6 to 15 percent slopes)

A soils map and the soil survey descriptions of these soil types are attached to this report.

The soils actually observed in the immediate vicinity of the site indicated that the soils listed by the USDA soil map profile were apparently accurate. Soils were probed with a ½-inch aluminum alloy T-Probe. Beneath one to three inches of fill or gravel surface, the soils on the site and surrounding areas, including many denuded road cuts, were observed as being the very dense and very gravelly Shelton unit soils. The soils in the areas probed appeared to be mostly ubiquitous, with some minor variation in density with localized fill and forested areas. Soils observed for the subsurface were described in the field as brown, dry to damp, very dense, very gravelly sand with minor to varying silt (USCS SM). They were interpreted in the field as overridden, proximal glacial outwash.

On the vegetated slopes near the specific construction site, probing indicates up to 9 inches of forest duff. There were some minor areas of fill materials, apparently derived from the cut of the driveway to the construction site. The slopes surrounding the driveway were largely graded back, or naturally low angle, with the exception of some heavily wooded slopes near the western-central portion of the driveway. None of the slopes appeared to be in jeopardy of sliding or slumping.

All of these materials are subject to common weathering and erosion. Resolve notes that fill materials and plant trimmings may become saturated and add significant weight to hillsides, and placement of fill or debris along slopes or crests of slopes should be avoided. The overall topography onto which the subject driveway has been cut has varied slope angles, with the steepest area being approximately 14 to 16 percent. Slopes off the driveway also vary, with a portion of the central/western slope being up to 55 percent in places.

The construction site vicinity has some relatively low angle slopes, and none were observed to show signs of sliding or slumping on steep and high slopes. Most of the slopes on and surrounding the site are considered stable at this time. No large-scale cracks or lineations were noted across the observed site or vicinity.

#### **--Other**

Local sheetflow and stormwater naturally flows down-dip in several directions, mostly westward and southward along the driveway, and toward various topographic lows of the overall site. A stormwater drainage system will obviously be developed on the site. The permeability of the near-surface soils over the very dense subsurface soils suggests an infiltration system may be possible on the site. Splashblocks or other distribution systems would also likely be feasible, since the site offers a large area that could potentially receive stormwater drainage. There is a possibility that some "Wagon Wheel" or localized driveway cuts may be necessary for driveway drainage. The angles and soils of the driveway suggest drainage issues may not be significant, or may be limited to topographic lows on the driveway.

Any stormwater from the site that does not flow into the developed systems, infiltrate into the near-surface soils on the site, or is not taken up by vegetation, would flow to the lower elevations. No standing

or running water was noted on the site at the time of our visit. No weather-driven erosion channels or incised drainage pathways were observed on the subject site or vicinity.

### **--Geologic Setting**

The subject site lies within the central Puget Lowland. The lowland is part of a regional north-south trending trough that extends from southwestern British Columbia to near Eugene, Oregon. North of Olympia, Washington, this lowland is glacially carved with a depositional and erosional history including at least four separate glacial advances and retreats. The Puget Lowland is bounded on the west by the Olympic Mountains and on the east by the Cascade Range. The lowland is filled with glacial and non-glacial sediments consisting of interbedded gravel, sand, silt, clay, till, and peat lenses.

### **Conclusions and Recommendations**

If proper erosion/drainage controls are utilized and maintained, the subject site appears unlikely to be affected by nearby slope conditions. A 'geologic report' per KCC 19.400.440.D.2 is presented in this letter report, and appears to be applicable for this site since geologic hazards are mapped for the subject site and the vicinity. This being so, there does not appear to be any imminent geological risk to health and human safety on the subject site, as explained below for each of the hazards.

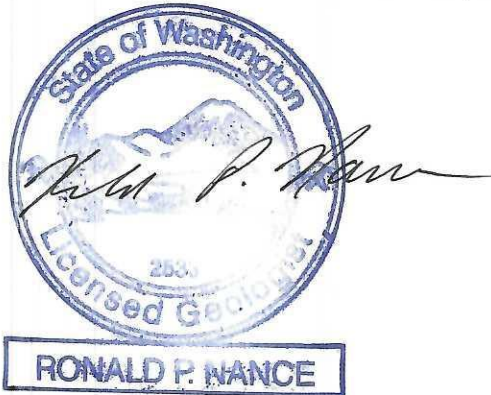
- Per 19.400.420, the central portion of the parcel is mapped as a Moderate Critical Hazard area. However, all observed slopes appeared stable. No slopes were observed to be imminently hazardous or dangerous to public safety on the site.
- Per 19.400.425, the parcel is not mapped as having a potential for Landslide Hazards. It is considered likely that some of the surface materials on the site will undergo weathering, as most other areas in the Puget Sound glacial deposit region. Common weathering is likely to be greater along the steeper portions of slopes farther to the west of the construction site. No recent major slumping or landslide issues were noted on the site or the vicinity. All slopes in the region will tend, often over great, long periods of time, to weather back to an angle of natural repose (approximately 33 degrees). The very dense till is likely to be stable for the foreseeable future.
- Per 19.400.430, no Seismic or Liquefaction Hazards are noted for the site. The faults that are mapped in the vicinity of the site (to the north and east) are at a considerable distance from the subject site, and are considered likely to be splays in the Seattle Fault zone (per Lamb and Polenz, 2012). According to carbon dating, most of the faults in the area have apparently not been active since A.D. 900 to 930 (Atwater, 1999). Persons living on (or building on) or around slopes are likely to be aware that it is always considered possible in the Puget Sound region that major seismic events can trigger landslides or geological incidents, as the overall region is known for tectonic movement.
- The parcel is mapped as a potential Moderate Erosion Hazard area in the central margin. However, no erosion rills or established erosion pathways from sheetflow or stormwater were noted on the site. Stormwater drainage systems will be established on the site. Erosion of surficial materials is likely to occur over time, although the very dense nature of the soils largely mitigates erosion.

The soils are very dense on the subject site, so that there is no indication that, provided adequate drainage is maintained, the slopes will affect the proposed SFR construction on the site, or the driveway if it is properly drained. It is our opinion that this geological reconnaissance report satisfies the intent of the Kitsap County Critical Areas ordinance for geologically hazardous areas, KCC 19.400, for the subject site, and provides a prudent, current overview of geologic conditions on the site.

### **Limitations**

Our conclusions are based on the information obtained from available databases, limited field observation of the subject site, and on our interpretation of the visible surface conditions only. No subsurface evaluation or geotechnical engineering report was conducted per the client-requested scope of work. We make no other warranty, either expressed or implied. If conditions are encountered that appear to be different than those described in this report, we should be notified so that we may review and verify or modify our recommendations. Resolve appreciates the opportunity to provide these services, and hopes the information presented in this report provides for your needs and requirements. Please feel free to call with any comments or questions regarding this letter report. Our telephone number is (360) 865-1843.

Sincerely,  
Resolve Environmental & Geotechnical, Inc.



Ronald P. Nance, P.G.  
Senior Geologist and Environmental Professional  
WA License No. 2533



## Wheeler & Fink Site Vicinity Map

23361 W. Ludvick is across from the site to the Northeast.

### Legend

- 23361 W Ludvick Lake Dr
- Holly

Hintzville Beaver Ponds

**SITE**

Ludvick Lake

23361 W Ludvick Lake Dr

Dewatto Rd W

Dewatto Bay Rd

Erickson Lake

N

1 mi

Google Earth

© 2018 Google

**Resolve Environmental  
& Geotechnical, Inc.**

(360) 865-1843  
resolveeg@comcast.net

Figure 1 :

**Vicinity Map**

Project No. 20-076  
December 2019 and April 2020

Permit Number: 20-01497

**PROJECT:**

**Limited Geological Reconnaissance  
Kitsap County Parcel No. 312402-4-002-1001  
W. Ludvick Lake Drive  
Seabeck, Washington**

**Prepared for: Mr. Wheeler and Ms. Fink**

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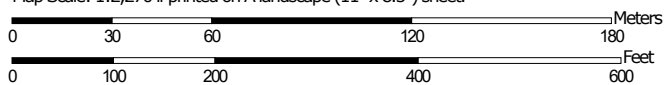
## **USDA INFORMATION**



# Soil Map—Kitsap County Area, Washington (Wheeler Site Soils Description)



Map Scale: 1:2,270 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey  
**Permit Number: 20-01497**

4/29/2020  
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Soil Map—Kitsap County Area, Washington  
(Wheeler Site Soils Description)


## 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: Kitsap County Area, Washington

Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Mar 29, 2016—Sep 27, 2016

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
56	Shelton extremely gravelly sandy loam, 6 to 15 percent slopes	18.2	70.6%
57	Shelton extremely gravelly sandy loam, 15 to 30 percent slopes	7.6	29.4%
<b>Totals for Area of Interest</b>		<b>25.7</b>	<b>100.0%</b>

## Kitsap County Area, Washington

### 56—Shelton extremely gravelly sandy loam, 6 to 15 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2y5tn

*Elevation:* 100 to 800 feet

*Mean annual precipitation:* 50 to 70 inches

*Mean annual air temperature:* 48 to 50 degrees F

*Frost-free period:* 150 to 180 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Shelton and similar soils:* 95 percent

*Minor components:* 5 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Shelton

##### Setting

*Landform:* Moraines, till plains

*Parent material:* Basal till

##### Typical profile

*H1 - 0 to 3 inches:* very gravelly medial sandy loam

*H2 - 3 to 22 inches:* very gravelly medial sandy loam

*H3 - 22 to 60 inches:* very gravelly sandy loam

##### Properties and qualities

*Slope:* 6 to 15 percent

*Depth to restrictive feature:* 20 to 35 inches to densic material

*Natural drainage class:* Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)

*Depth to water table:* About 18 to 33 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Very low (about 1.8 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* D

*Forage suitability group:* Limited Depth Soils (G002XN302WA)

*Hydric soil rating:* No

#### Minor Components

##### Mckenna

*Percent of map unit:* 5 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: Kitsap County Area, Washington  
Survey Area Data: Version 15, Sep 16, 2019



## Kitsap County Area, Washington

### 57—Shelton extremely gravelly sandy loam, 15 to 30 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2h7j  
*Elevation:* 100 to 800 feet  
*Mean annual precipitation:* 50 to 70 inches  
*Mean annual air temperature:* 48 to 50 degrees F  
*Frost-free period:* 150 to 180 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Shelton and similar soils:* 100 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Shelton

##### Setting

*Landform:* Moraines, till plains  
*Parent material:* Basal till

##### Typical profile

*H1 - 0 to 3 inches:* very gravelly medial sandy loam  
*H2 - 3 to 22 inches:* very gravelly medial sandy loam  
*H3 - 22 to 60 inches:* very gravelly sandy loam

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*Slope:* 15 to 30 percent  
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*Natural drainage class:* Moderately well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)  
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