

**January 6, 2019**

**Mike Wnek  
Wnek Engineering  
P.O. Box 776  
Tracyton, WA 98393**

**GEOLOGICAL ASSESSMENT  
SINGLE FAMILY RESIDENCE SITE  
1665 NW SHERWOOD ST. / 1719 STANTON WAY NW  
KITSAP COUNTY PARCEL NUMBER 4973-000-008-0106  
BREMERTON WASHINGTON**

**Dear Mr. Wnek:**

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 and general condition of the site and properties near the site. Resolve understands that the reconnaissance is related to permitting for placement of a Home-Based Business in an accessory structure for the Single-Family Residence (SFR) on the site.

The subject site is located adjacent and to the south of 1665 NW Sherwood Street, Bremerton, Kitsap County, Washington. The latitude is approximately 47 degrees, 37 minutes, 40.6 seconds north, and the longitude is approximately -122 degrees, 40 minutes 32.7 seconds west. The site is surrounded by rural residential properties with Single Family Residences (SFRs), wooded areas, and Dyes Inlet to the west. The proposed SFR site is located generally in the southern portion of the subject property. A driveway off Stanton Road currently provides the primary access to the site. A site Vicinity Map is attached to this report.

The subject site area has previously been developed with an existing SFR to the north and a mobile home and some sheds/outbuildings to the south. The mobile home will be removed from the parcel and an accessory structure constructed in the same general area. The proposed building location is previous impervious area of the mobile home and associated gravel parking area. There is a shoreline slope to Dyes Inlet within 150-ft of the construction that is vegetated. The building location is accessed by a long gravel single-lane driveway from Tracyton Boulevard.

Large diameter conifers, deciduous trees, and common shrubbery occupy some of the surrounding terrain; all adjacent parcels are SFR. A Washington State-Licensed Geologist from Resolve (Ronald P. Nance, P.G.) performed the limited site reconnaissance on January 6, 2019. Our observations were preceded by a review of local geologic databases, local geology, and area slope evaluations of the immediate vicinity.

For the purposes of this report the geology is divided into two categories:

- Upland Area: comprises the construction area for the proposed accessory structure.
- Shoreline Slope: The shoreline slope to Dyes inlet which is within 200-ft of the construction area. The top-of-slope and slope are on a separate parcel to the west.

**Soils and Slope Research**

The following information provides a basis for a general understanding of the project soils and geologic conditions:

Kitsap County Maps:

*Assessors GIS Critical Areas Map:* Indicates slope hazards & shoreline with FEMA Flood Hazard. No streams or wetlands.

*Landslide Hazards Map:* The shoreline slope is mapped as a High Landslide Hazard.

*Erosion Hazard Map:* The shoreline is mapped as a High Erosion Hazard.

*Seismic Hazards Map:* There shoreline slope is mapped as Moderate Seismic Hazard.

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:

- #1, Alderwood gravelly sandy loam, 0 to 8 percent slopes (Upland Area)
- #21, Indianola-Kitsap complex, 45 to 70 percent slopes (Shoreline Slope)

NRCS Erodible Land Class:

#1 Alderwood = 3, Not highly erodible

#21 Indianola = 2, Potentially Highly Erodible

#21 Kitsap = 1, Highly Erodible Land

The NRCS rating is herein listed since it is directly referred to in the Kitsap County Critical Areas Ordinance. However, the NRCS class is specifically for agricultural tilling, and not necessarily for construction & erosion control issues. The USDA rating for “K Factor, Whole Soil” is a more appropriate indicator of erosion potential for the practical nature of this report.

K Factor, Whole Soil (USDA):

- #1, Alderwood = 0.10 Low
- #21, Indianola-Kitsap complex= 0.20 Moderate

DNR Geologic Maps:

*Geologic Map:* The 24,000-scale geologic mapping indicates upland area is Vashon ice-contact deposits (Q<sub>gic</sub>); the shoreline slope is Landslide deposit (Q<sub>ls</sub>).

*Earthquake Map:* Classifies the upland area as ‘very low to low’ for liquefaction susceptibility, and the shoreline slope as ‘low to moderate’. There is an ‘inferred fault trace’ that runs east-west approximately 0.25 mile to the south of the project.

*Landslide Map:* Indicates geologic mapping landslide along the shoreline slope, and continuing along the shoreline to the north.

Coastal Zone Access:

Indicates the upland areas as “Stable”, and the shoreline slope as “Intermediate”. Shoreline slopes further to the north are listed as “Unstable Recent Slide”.

Shoreline photos from 1977 and 2006 were reviewed. There are no indications of landslides or unstable shoreline slopes in the 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.

### **Site Review**

Slopes within the upland area are generally 5% to 10%, draining westerly. Slopes along the shoreline slope range from 25% to 50%, with some localized slopes up to 100%. The main area of concern is the shoreline slopes.

There are no indicators of high landslide or erosion hazards observed on the shoreline slope. There are no fissure cracks and no indications of previous landslides or soil movement. There is no surface erosion or bared soils.

### **Drainage**

Drainage from the access road is collected in a roadside ditch that eventually flows along the northern portion of the parking area and immediately disperses once it enters the lawn area to the west of the building site. The runoff is fully dispersed before reaching the top-of-slope of the shoreline slope.

The proposed construction replaces areas that were already impervious and successfully mitigated by the dispersion mentioned previously. The construction will not alter the existing drainage patterns. There does not appear to be any merit to alter the current runoff patterns.

### **Erosion Control**

The clearing & disturbed area will be less than 7,000-sf, basic erosion control measures will be adequate to mitigate erosion concerns from the construction site. A Stormwater Pollution Prevention Plan (SWPPP) is not necessary. All bare soils shall be revegetated when construction is complete.

### **Code Review**

The requirements of KCC 19.400, "Geologically Hazardous Areas" were reviewed to determine the classification of the geologic hazards on the site.

- Per 19.400.420, Erosion Hazard Areas: The shoreline slope qualifies as a "Moderate Erosion Hazard Area" due to the NCRS classification and the presence of slopes steeper than 15%. There are no indicators that classify the slope as a high erosion hazard.
- Per 19.400.425, Landslide Hazard: The shoreline slope qualifies as a "Moderate Landslide Hazard Area" due to the presence of slopes greater than 40%. There are no indicators that classify the slope as a high landslide hazard.
- Per 19.400.430, Seismic Hazard: The shoreline slope qualifies as a "Moderate Seismic Hazard Area" due to the designation as Seismic site class D. There are no indicators that classify the slope as a high seismic hazard.

### **Conclusions and Recommendations**

There are no indicators of high hazard geologic areas within the project area, and there is no proposed construction that warrants engineering design recommendations or other mitigation measures necessary in order to construct or develop within 200-ft of the geologically hazardous area. This geologic assessment report satisfies the intent of the Kitsap County critical areas ordinance for geologically hazardous areas, KCC 19.400.440, for this proposed project and is provided to comply with KCC 19.400.440.D.2 "Geologic Report". It is Resolve's opinion that a full geotechnical engineering investigation does not appear to be warranted.

The standard top-of-slope buffer of 25-ft plus a 15-foot building setback is adequate protection for the shoreline slope. There is no proposed work on the shoreline slope, all proposed construction will take place at least 150-ft away from the top-of-slope.

The upland area consists of Alderwood soils, generally 2+ feet of sandy loam over glacial till, typically an excellent substrate for building construction.

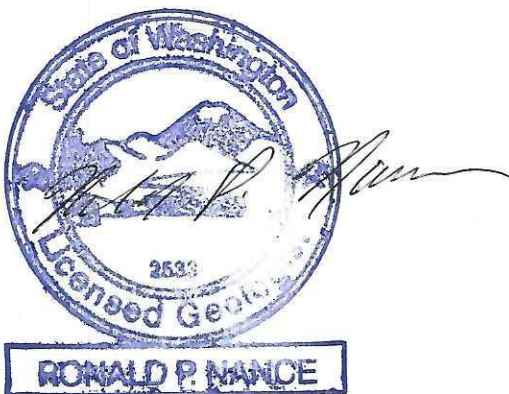
As mentioned, it is Resolve's opinion that a full-scale Geotechnical Engineering Investigation should not be necessary for the project. If appropriate buffers from crests of slope are maintained, it is Resolve's opinion that the placement of the proposed building will have no effect on the shoreline slope.

### **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.

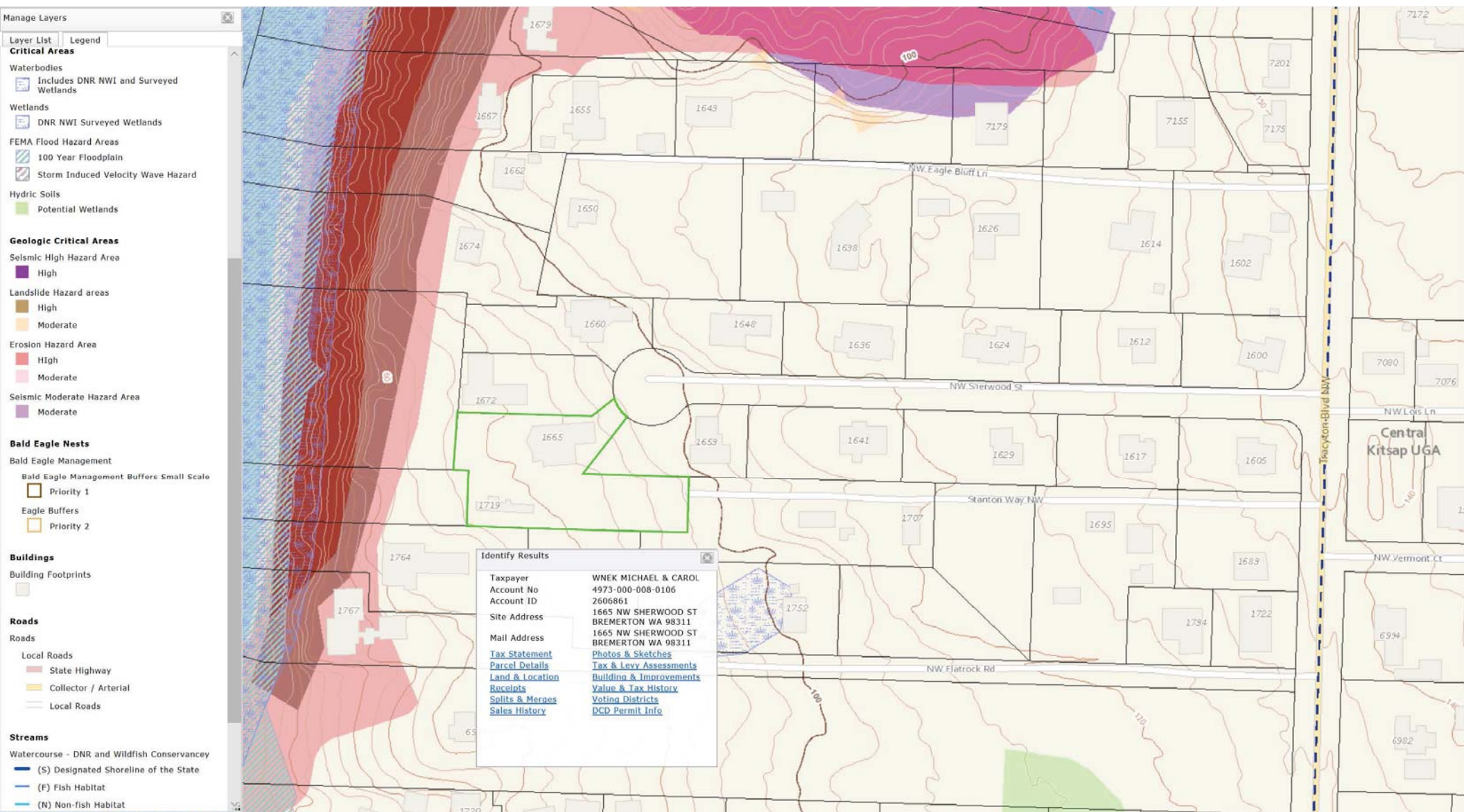


Ronald P. Nance, P.G.  
Senior Geologist and Environmental Professional  
WA License No. 2533

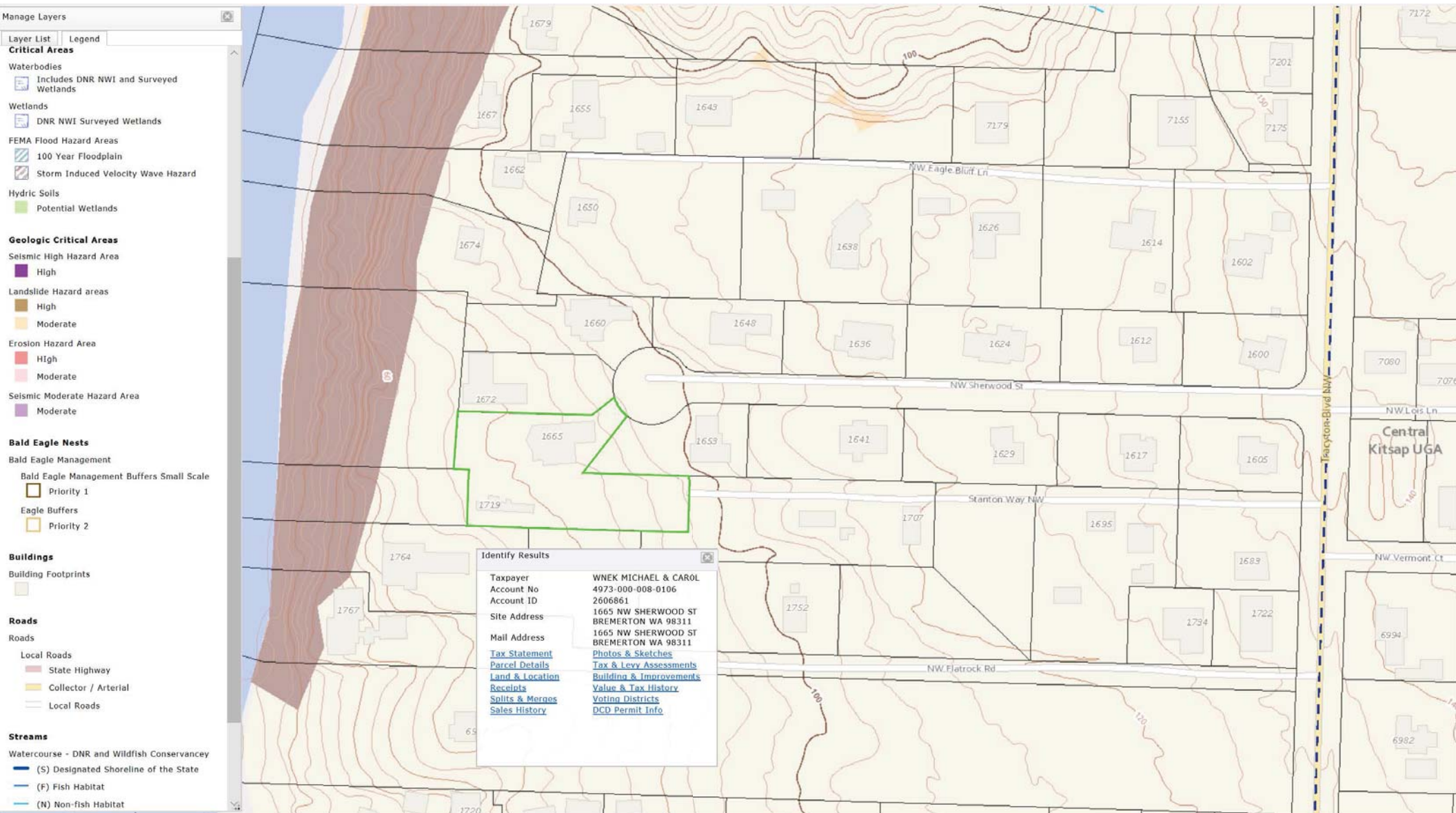
# **BINDER AND USDA INFORMATION**





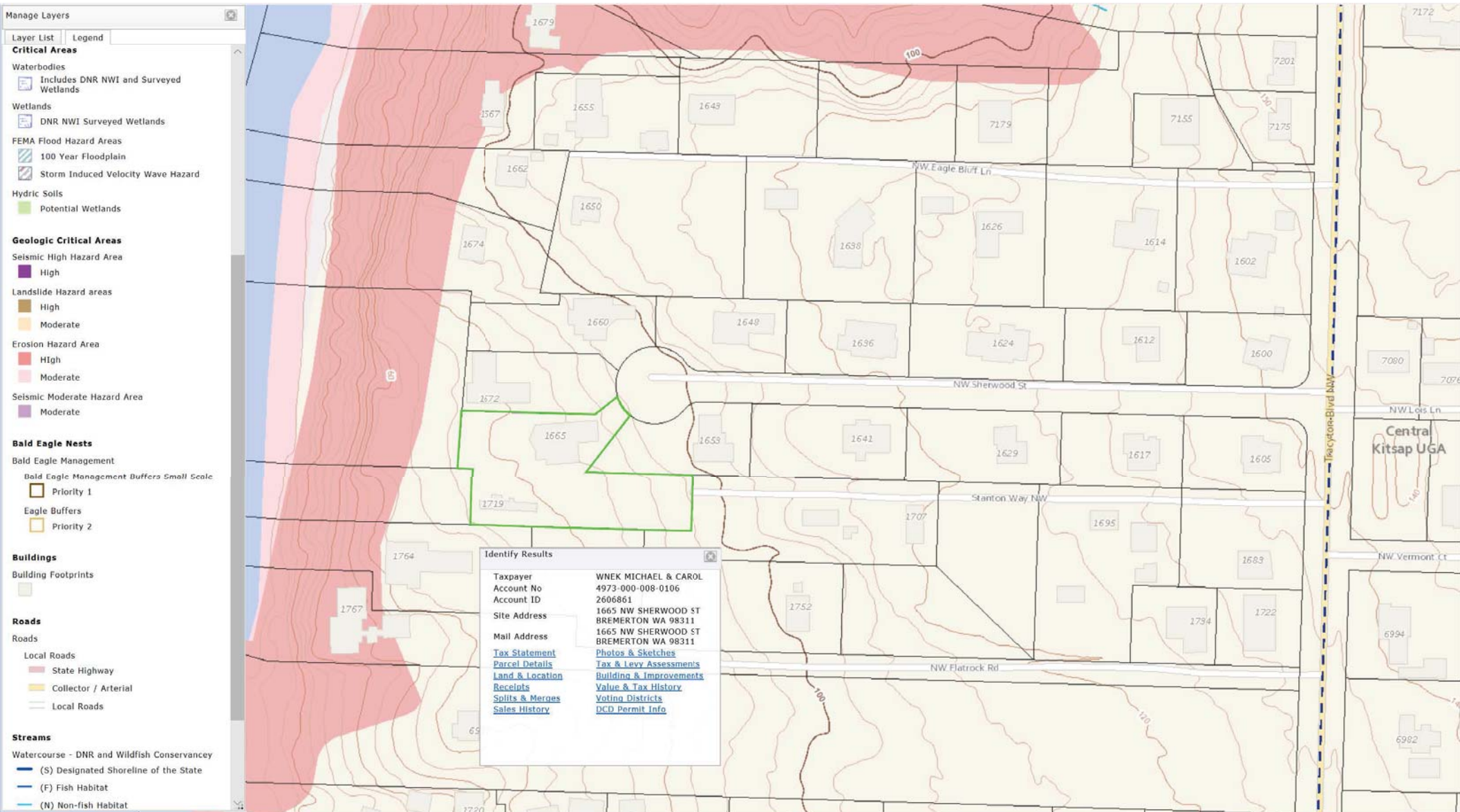


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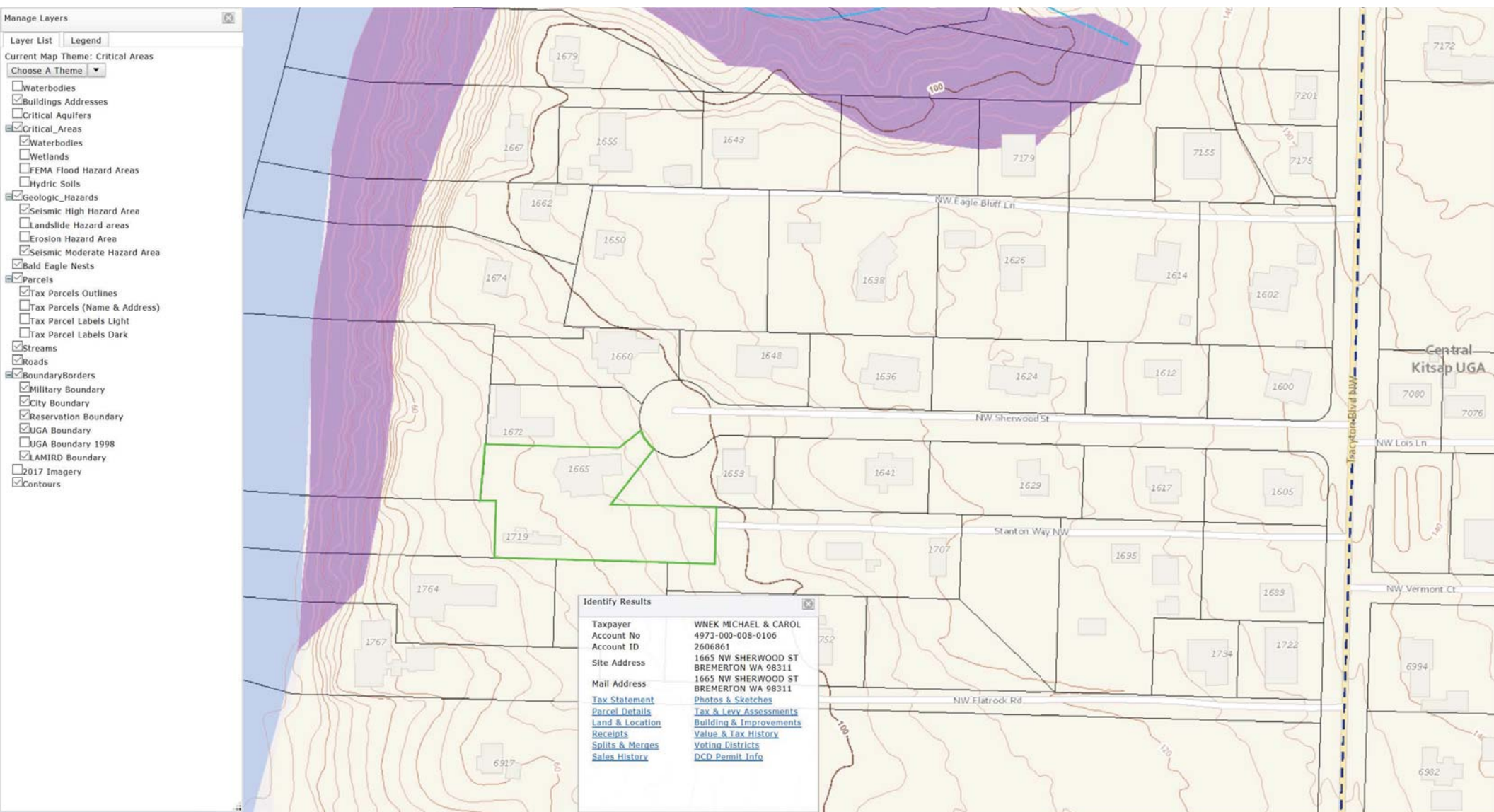


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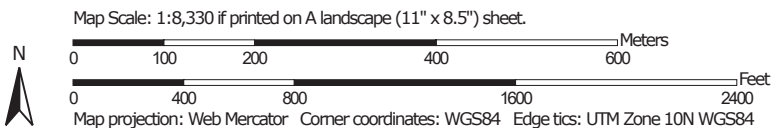
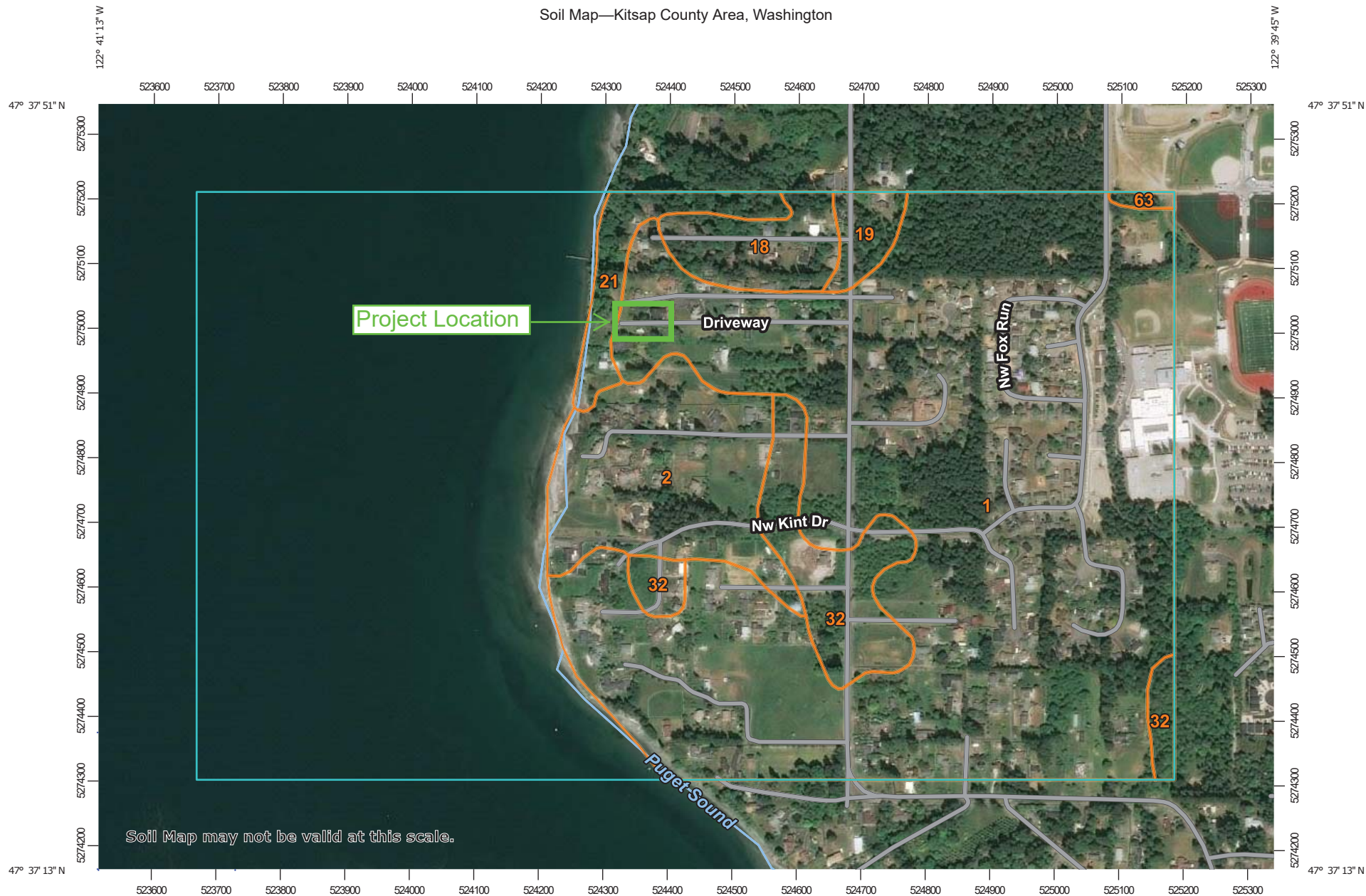
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# Soil Map—Kitsap County Area, Washington




Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey  
Permit Number: 20-00064

1/6/2020  
Page 1 of 3

## 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: Aug 9, 2018—May 23, 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
1	Alderwood gravelly sandy loam, 0 to 8 percent slopes	152.4	44.6%
2	Alderwood gravelly sandy loam, 8 to 15 percent slopes	23.0	6.7%
18	Indianola loamy sand, 0 to 5 percent slopes	7.7	2.3%
19	Indianola loamy sand, 5 to 15 percent slopes	3.2	0.9%
21	Indianola-Kitsap complex, 45 to 70 percent slopes	6.3	1.8%
32	McKenna gravelly loam	14.8	4.3%
63	Urban land-Alderwood complex, 0 to 8 percent slopes	0.6	0.2%
<b>Totals for Area of Interest</b>		<b>342.0</b>	<b>100.0%</b>

## Kitsap County Area, Washington

### 1—Alderwood gravelly sandy loam, 0 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2t625

*Elevation:* 50 to 800 feet

*Mean annual precipitation:* 25 to 60 inches

*Mean annual air temperature:* 48 to 52 degrees F

*Frost-free period:* 160 to 240 days

*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

*Alderwood and similar soils:* 85 percent

*Minor components:* 15 percent

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

#### Description of Alderwood

##### Setting

*Landform:* Ridges, hills

*Landform position (two-dimensional):* Summit

*Landform position (three-dimensional):* Crest, talf

*Down-slope shape:* Linear, convex

*Across-slope shape:* Convex

*Parent material:* Glacial drift and/or glacial outwash over dense glaciomarine deposits

##### Typical profile

*A - 0 to 7 inches:* gravelly sandy loam

*Bw1 - 7 to 21 inches:* very gravelly sandy loam

*Bw2 - 21 to 30 inches:* very gravelly sandy loam

*Bg - 30 to 35 inches:* very gravelly sandy loam

*2Cd1 - 35 to 43 inches:* very gravelly sandy loam

*2Cd2 - 43 to 59 inches:* very gravelly sandy loam

##### Properties and qualities

*Slope:* 0 to 8 percent

*Depth to restrictive feature:* 20 to 39 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 37 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Very low (about 2.7 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4s

*Hydrologic Soil Group:* B

*Forage suitability group:* Limited Depth Soils (G002XN302WA),  
Limited Depth Soils (G002XF303WA), Limited Depth Soils  
(G002XS301WA)  
*Hydric soil rating:* No

### Minor Components

#### Everett

*Percent of map unit:* 5 percent  
*Landform:* Kames, eskers, moraines  
*Landform position (two-dimensional):* Summit, shoulder  
*Landform position (three-dimensional):* Interflue, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

#### Mckenna

*Percent of map unit:* 5 percent  
*Landform:* Depressions, drainageways  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Concave, linear  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

#### Shalcar

*Percent of map unit:* 3 percent  
*Landform:* Depressions  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

#### Norma

*Percent of map unit:* 2 percent  
*Landform:* Depressions, drainageways  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Concave, linear  
*Across-slope shape:* Concave  
*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

### 21—Indianola-Kitsap complex, 45 to 70 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2h68

*Elevation:* 0 to 490 feet

*Mean annual precipitation:* 30 to 55 inches

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

*Frost-free period:* 160 to 200 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Indianola and similar soils:* 50 percent

*Kitsap and similar soils:* 35 percent

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

#### Description of Indianola

##### Setting

*Landform:* Kames, escarpments

*Parent material:* Glacial outwash

##### Typical profile

*H1 - 0 to 7 inches:* loamy sand

*H2 - 7 to 29 inches:* loamy sand

*H3 - 29 to 60 inches:* sand

##### Properties and qualities

*Slope:* 45 to 70 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Somewhat excessively drained

*Capacity of the most limiting layer to transmit water (Ksat):* High  
(1.98 to 5.95 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Low (about 5.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* A

*Hydric soil rating:* No

#### Description of Kitsap

##### Setting

*Landform:* Terraces

*Parent material:* Lacustrine deposits with volcanic ash in the upper part



### **Typical profile**

*H1 - 0 to 5 inches:* ashy silt loam

*H2 - 5 to 35 inches:* silty clay loam

*H3 - 35 to 60 inches:* stratified silt to silty clay loam

### **Properties and qualities**

*Slope:* 45 to 70 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):*

Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* About 18 to 30 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* High (about 11.4 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* C

*Hydric soil rating:* No

## **Data Source Information**

Soil Survey Area: Kitsap County Area, Washington

Survey Area Data: Version 15, Sep 16, 2019

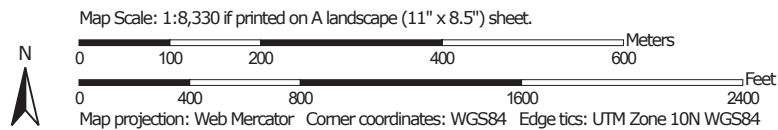
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Map Muid	Map Symbol	Soil Name	Crop	Eq.	HEL	HEL	Seq	%	Acres	C	I	R Min	R Max	K	T	Slope Percent		Slope Length		LS-Value		8T/RK		EI	
					Wind	Water										Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
635001	1	ALDERWOOD	Y	2	3	3	1	100	18040	16		56	97	0.15	2	0	4	75	200	0.065	0.527	1.905	1.100	0.273	3.834
635002	2	ALDERWOOD	Y	2	3	2	1	100	17600	16		56	97	0.15	2	6	15	75	165	0.582	3.035	1.905	1.100	2.444	22.080
635003	3	ALDERWOOD	Y	2	3	1	1	100	8080	16		56	97	0.15	2	15	30	75	250	2.046	9.277	1.905	1.100	8.593	67.490
635004	4	BEACHES	N	2	3	3	1	100	640	0		56	97					75		ERROR	ERROR	ERROR	ERROR	0.000	0.000
635005	5	BELFAST	Y	2	3	3	1	100	530	40		85	165	0.32	5	0	2	75	300	0.065	0.279	1.471	0.758	0.354	2.946
635006	6	BELLINGHAM	Y	2	3	3	1	100	880	40		27	122	0.28	5	0	2	75	200	0.065	0.247	5.291	1.171	0.098	1.688
635007	7	CATHCART	Y	2	3	2	1	100	880	40		56	85	0.28	5	2	8	75	400	0.184	1.979	2.551	1.681	0.577	9.420
635008	8	CATHCART	Y	2	3	2	1	100	440	40		56	85	0.28	5	8	15	75	400	0.857	4.725	2.551	1.681	2.688	22.491
635009	9	CATHCART	Y	2	3	2	1	100	370	40		56	85	0.28	5	15	30	75	300	2.046	10.162	2.551	1.681	6.416	48.371
635010	10	DYSTRIC XERORTHENTS	N	2	3	1	1	100	12300	8		40	165	0.1	1	45	70	75	370	8.165	27.462	2.000	0.485	32.660	453.123
635011	11	GROVE	Y	2	3	3	1	100	1510	16		97	165	0.05	2	0	3	75	400	0.065	0.435	3.299	1.939	0.158	1.794
635012	12	GROVE	Y	2	3	2	1	100	980	16		97	165	0.05	2	3	15	75	300	0.263	4.092	3.299	1.939	0.638	16.880
635013	13	GROVE	Y	2	3	2	1	100	570	16		97	165	0.05	2	15	30	75	200	2.046	8.297	3.299	1.939	4.962	34.225
635014	14	HARSTLINE	Y	2	3	3	1	100	13960	16		40	97	0.15	2	0	4	75	200	0.065	0.527	2.667	1.100	0.195	3.834
635015	15	HARSTLINE	Y	2	3	2	1	100	10610	16		40	97	0.15	2	6	15	75	200	0.532	3.341	2.667	1.100	1.746	24.306
635016	16	HARSTLINE	Y	2	3	2	1	100	6600	16		40	97	0.15	2	15	30	75	300	2.046	10.162	2.667	1.100	6.138	73.929
635017	17	HARSTLINE	N	2	3	1	1	100	1990	16		56	85	0.15	2	30	45	75	225	5.081	14.142	1.905	1.255	21.340	90.155
635018	18	INDIANOLA	Y	2	3	3	1	100	43004	40		27	97	0.15	5	0	6	75	200	0.065	0.950	9.877	2.749	0.053	2.764
635019	19	INDIANOLA	Y	2	3	2	1	100	2710	40		27	97	0.15	5	6	15	75	200	0.582	3.341	9.877	2.749	0.471	9.722
635020	20	INDIANOLA	Y	2	3	2	1	100	16400	40		27	97	0.15	5	15	30	75	200	2.046	9.818	9.877	2.749	1.657	28.570
635021	21	INDIANOLA	N	2	3	2	1	50.4	3775	40		27	97	0.15	5	45	70	75	300	8.165	24.728	9.877	2.749	6.614	71.959
635021	21	KITSAP	Y	2	3	1	2	35	2642.5	40		27	97	0.32	5	45	70	75	100	8.165	14.277	4.630	1.289	14.109	88.632
635022	22	KAPOWSIN	Y	2	3	3	1	100	11030	16		27	65	0.2	2	0	4	75	100	0.065	0.400	2.963	1.231	0.175	2.600
635023	23	KAPOWSIN	Y	2	3	2	1	100	5700	16		27	65	0.2	2	6	15	75	150	0.582	2.893	2.963	1.231	1.571	18.805
635024	24	KAPOWSIN VARIANT	Y	2	3	3	1	100	1090	16		56	85	0.24	2	0	5	75	100	0.065	0.535	1.190	0.784	0.437	5.457
635025	25	KILCHIS	Y	2	3	1	1	100	1890	8		149	181	0.1	1	15	30	75	500	2.046	13.119	0.537	0.442	30.485	237.454
635026	26	KILCHIS	N	2	3	1	1	100	5100	8		149	181	0.1	1	50	70	75	100	9.121	14.277	0.537	0.442	135.903	258.414
635027	27	KILCHIS	N	2	3	1	1	50	1195	8		149	181	0.1	1	30	50	75	300	5.081	18.242	0.537	0.442	75.707	330.180
635027	27	SHELTON	N	2	3	1	2	35	836.5	16		149	181	0.1	2	30	50	75	200	5.081	14.894	1.074	0.884	37.853	134.791
635028	28	KITSAP	Y	2	3	3	1	100	2310	40		27	56	0.32	5	2	8	75	300	0.184	1.714	4.630	2.232	0.318	6.143
635029	29	KITSAP	Y	2	3	2	1	100	1990	40		27	56	0.32	5	8	15	75	260	0.857	3.809	4.630	2.232	1.481	13.652
635030	30	KITSAP	Y	2	3	2	1	100	1670	40		27	56	0.32	5	15	30	75	600	2.046	14.372	4.630	2.232	3.535	51.509
635031	31	KITSAP	N	2	3	1	1	100	540	40		27	56	0.32	5	30	45	75	300	5.081	16.330	4.630	2.232	8.780	58.527
635032	32	MCKENNA	Y	2	3	3	1	100	5100	24		40	85	0.24	3	0	6	75	200	0.065	0.950	2.500	1.176	0.208	6.460
635033	33	MUKILTEO	Y	2	3	3	1	100	1320	0		56	181			0	1	75	100	0.065	0.129	ERROR	ERROR	0.000	0.000
635034	34	NEILTON	Y	2	3	3	1	100	3640	16		27	97	0.15	2	0	3	75	300	0.065	0.399	3.951	1.100	0.132	2.903
635035	35	NEILTON	Y	2	3	2	1	100	1410	16		27	97	0.15	2	3	15	75	200	0.263	3.341	3.951	1.100	0.533	24.306
635036	36	NEILTON	Y	2	3	2	1	100	1470	16		27	97	0.15	2	15	30	75	100	2.046	5.867	3.951	1.100	4.143	42.682
635037	37	NORMA	Y	2	3	3	1	100	7700	40		40	122	0.32	5	0	3	75	200	0.065	0.353	3.125	1.025	0.166	2.756
635038	38	PITS	N	2	3	3	1	100	650	0		0	0					75		ERROR	ERROR	ERROR	ERROR	0.000	0.000
635039	39	POULSBO	Y	2	3	3	1	100	8940	16		27	56	0.15	2	0	4	75	500	0.065	0.761	3.951	1.905	0.132	3.196
635040	40	POULSBO	Y	2	3	2	1	100	3980	16		27	56	0.15	2	6	15	75	400	0.582	4.725	3.951	1.905	1.179	19.845
635041	41	POULSBO	Y	2	3	2	1	100	2170	16		27	56	0.15	2	15	30	75	300	2.046	10.162	3.951	1.905	4.143	42.680
635042	42	POULSBO	Y	2	3	3	1	40	1316	16		27	56	0.15	2	0	6	75	500	0.065	1.502	3.951	1.905	0.132	6.308
635042	42	RAGNAR	Y	2	3	2	2	30	987	24		27	56	0.32	3	0	6	75	500	0.065	1.502	2.778	1.339	0.187	8.972

# K Factor, Whole Soil—Kitsap County Area, Washington



Soil Map may not be valid at this scale.




**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey  
**Permit Number: 20-00064**

1/6/2020  
Page 1 of 3
















## MAP LEGEND

### Area of Interest (AOI)







 Area of Interest (AOI)










### Soils

#### Soil Rating Polygons
















	.02
	.05
	.10
	.15
	.17
	.20
	.24
	.28
	.32
	.37
	.43
	.49
	.55
	.64
	Not rated or not available

#### Soil Rating Lines









	.02
	.05
	.10
	.15
	.17
	.20

	.24
	.28
	.32
	.37
	.43
	.49
	.55
	.64
	Not rated or not available

#### Soil Rating Points

	.02
	.05
	.10
	.15
	.17
	.20
	.24
	.28
	.32
	.37
	.43
	.49
	.55
	.64
	Not rated or not available

#### Water Features

	Streams and Canals
	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: Aug 9, 2018—May 23, 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.



## K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Alderwood gravelly sandy loam, 0 to 8 percent slopes	.10	152.4	44.6%
2	Alderwood gravelly sandy loam, 8 to 15 percent slopes	.10	23.0	6.7%
18	Indianola loamy sand, 0 to 5 percent slopes		7.7	2.3%
19	Indianola loamy sand, 5 to 15 percent slopes		3.2	0.9%
21	Indianola-Kitsap complex, 45 to 70 percent slopes	.20	6.3	1.8%
32	McKenna gravelly loam	.15	14.8	4.3%
63	Urban land-Alderwood complex, 0 to 8 percent slopes		0.6	0.2%
<b>Totals for Area of Interest</b>			<b>342.0</b>	<b>100.0%</b>

## Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

*Layer Options (Horizon Aggregation Method):* Surface Layer (Not applicable)



## LATEST PLEISTOCENE TO HOLOCENE NONGLACIAL DEPOSITS

Qp	<b>Peat</b> —Organic and organic-rich sediment; includes peat, gyttja, muck, silt, and clay; typically in closed depressions.
Qls	<b>Landslide deposits</b> —Cobbles, pebbles, sand, silt, clay, boulders, and diamicton in slide bodies and toes; clasts and grains angular to rounded; unsorted; generally loose, jumbled, and unstratified.
Qmw	<b>Mass wasting deposits</b> —Cobbles, pebbles, sand, silt, clay, boulders, and diamicton; loose; generally unsorted, but locally stratified; shown along potentially or demonstrably unstable slopes.
Qoa	<b>Alluvium</b> —Pebbles and sand, some silt, clay, locally cobbles and peat; moderately to well sorted; stratified to massive; deposited in flood plains and on terraces. Unit Qoa where relict.
Qoaf	<b>Alluvial fan deposits</b> —Pebbles, sand, cobbles, boulders, and silt; loose; moderately to poorly sorted; stratified; forms concentric lobes where streams emerge from valleys; unit Qoaf where relict.

## PLEISTOCENE GLACIAL AND NONGLACIAL DEPOSITS

### Vashon Drift

Qgo	<b>Vashon recessional outwash</b> —Sand, pebble, and cobble gravel, some silt and clay; moderately fresh; clasts subrounded; moderately sorted and stratified. Subdivided into:
Qgoaf	<b>Vashon recessional alluvial and delta fan deposits</b> —Pebble gravel, sand, silt, and boulders; loose; moderately to poorly sorted and stratified; forms concentric lobes where streams once emerged from valleys.
Qgos	<b>Vashon recessional outwash, sand facies</b> —Sand, some beds and lenses of pebbles, silt, and clay; gray to tan; loose; clasts moderately to well rounded; moderately to well sorted.
Qgof	<b>Vashon recessional glacial lake deposits</b> —Silt, sand, clay, and rare dropstones; gray; loose, locally moderately stiff; moderately to well sorted, laminated or massive.
Qgic	<b>Vashon ice-contact deposits</b> —Cobble and pebble gravel, sand, ablation till, flow till, lodgment till, lacustrine mud, and rare boulders; tan to gray; loose to compact; variously sorted; massive to well stratified; includes sub-ice flow and collapse features. Subdivided into:
Qge	<b>Vashon esker</b> —Pebble to cobble gravel and sand; tan to brown; loose; clasts moderately to well rounded; mostly well sorted; mostly basaltic; forms sinuous hills.
Qgt	<b>Vashon lodgment till</b> —Diamicton of clay, silt, sand, pebbles, cobbles, and isolated boulders; brown to gray; lightly weathered or unweathered; compact, commonly resembling concrete; unsorted; unstratified.
Qga	<b>Vashon advance outwash</b> —Pebble and cobble gravel, sand, silt, and clay; clean; gray to tan; compact; clasts well rounded and well sorted; thinly to thickly bedded. Subdivided into:
Qgas	<b>Vashon advance outwash sand</b> —Sand, clay, pebbles, cobbles, or diamicton; gray to brown; compact; subrounded to well rounded and well sorted; thinly to thickly bedded.
Qgaf	<b>Vashon advance lacustrine mud</b> —Silt and clay, interbeds of sand, pebbles, and diamicton, with rare dropstones; gray; compact; well sorted; laminated to massive.

	Thrust fault—Dotted where concealed; sawteeth on upper (tectonically higher) block; queried where identity or existence questionable
	High-angle dip-slip fault—Dotted where concealed, queried where identity or existence questionable; relative motion shown by U and D
	Right-lateral strike-slip fault—Short-dashed where inferred, dotted where concealed, queried where identity or existence questionable; arrows show relative motion
	Oblique-slip fault, reverse right-lateral offset—Long-dashed where location approximate, short-dashed where inferred, dotted where concealed, queried where identity or existence questionable; arrows show relative motion; rectangles on upthrown block
	Oblique-slip fault, high-angle right-lateral offset—Dotted where concealed, queried where identity or existence questionable; arrows and U and D show relative motion
	Anticline—Solid where location accurate, long-dashed where location approximate, dotted where concealed, queried where identity or existence questionable
	Syncline—Solid where location accurate, short-dashed where inferred, dotted where concealed, queried where identity or existence questionable
	Geologic unit too thin to show at map scale—Solid where location accurate, dashed where inferred, queried where identity or existence questionable
	Naval base boundary—Base not accessed; geology compiled from prior mapping, analysis of remote sensing data, and subsurface boring records
	Geophysical data collection line—Accurately located
	Cross section line
	Fluvial terrace scarp—Identity and existence certain, location accurate, hachures point downscarp
	Landslide scarp—Identity and existence certain, location accurate; hachures point downslope
	Strand line (former shoreline)—Identity and existence certain, location accurate
	Incipient landslide scarp—Identity and existence certain, location accurate; hachures point downslope
	Bedding—Showing strike and dip
	Bedding—Showing strike and dip; top direction of beds known
	Vertical bedding—Showing strike
	Horizontal bedding
	Bedding in unconsolidated sedimentary deposits—Showing strike and dip



Table of Contents

Search layers: Search by name and tags

Clear



Earthquake

Active Faults & Folds

Fault Trenches

Historical Earthquake Damage

Seismogenic Folds

Seismogenic Faults

Relocated Earthquakes >1M

Earthquakes >1M

Liquefaction & Seismic Site Class

Liquefaction Susceptibility

NEHRP Seismic Site Class

Seismic Design Categories (Assuming Site Class D)

Seismic Design Categories (Using Site Class Mapping)

Landslide

Tsunami

Volcanoes

Minerals

Coal

Seismic Scenarios

Base Layers

My Data

Project Location



Legend

Historical Earthquake Damage

28-Feb-01

Seismogenic Faults

Inferred fault trace

Liquefaction Susceptibility

High

Moderate to high

Low to moderate

Low

Very low to low

Very low

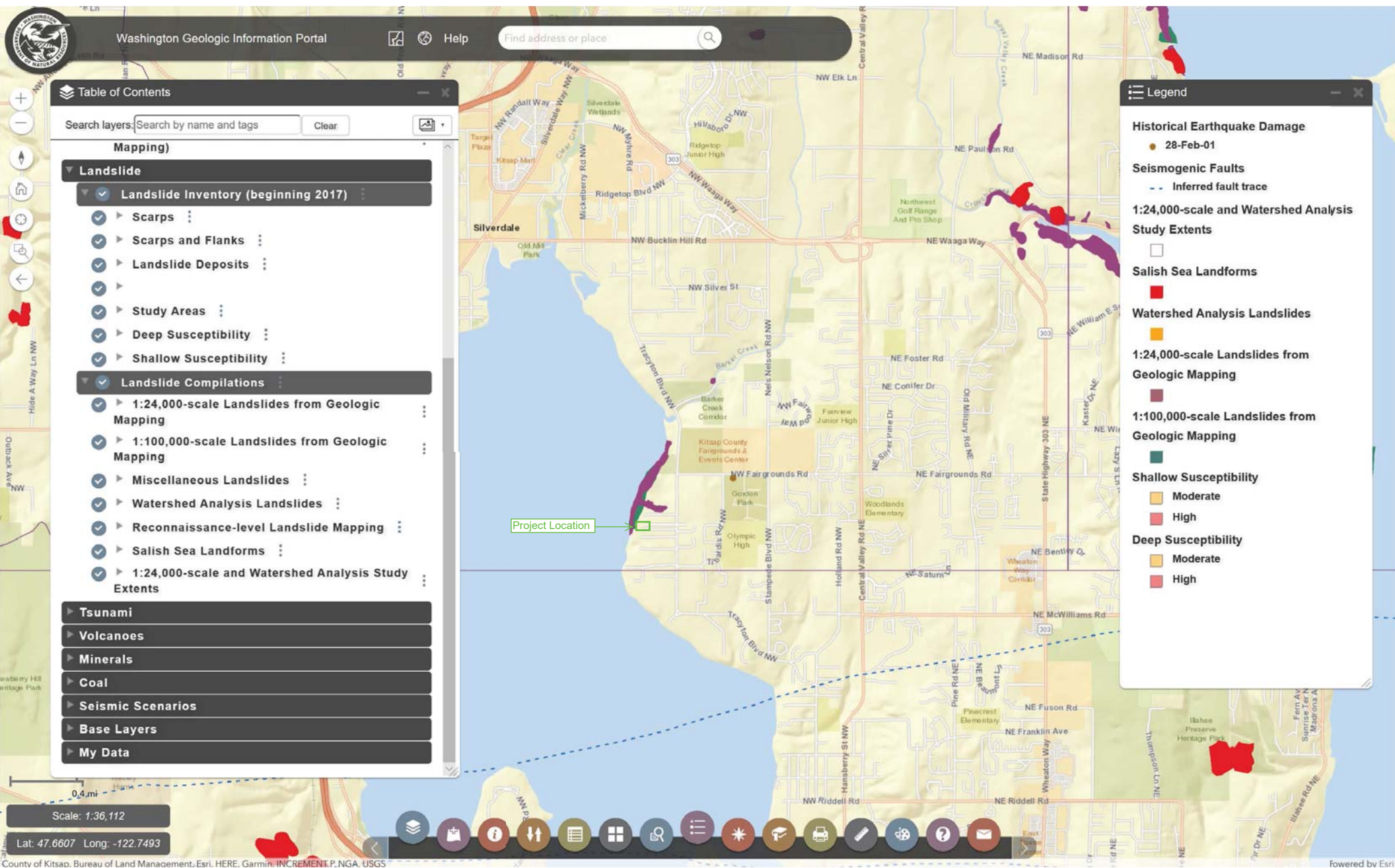
Bedrock

Water

Scale: 1:36,112

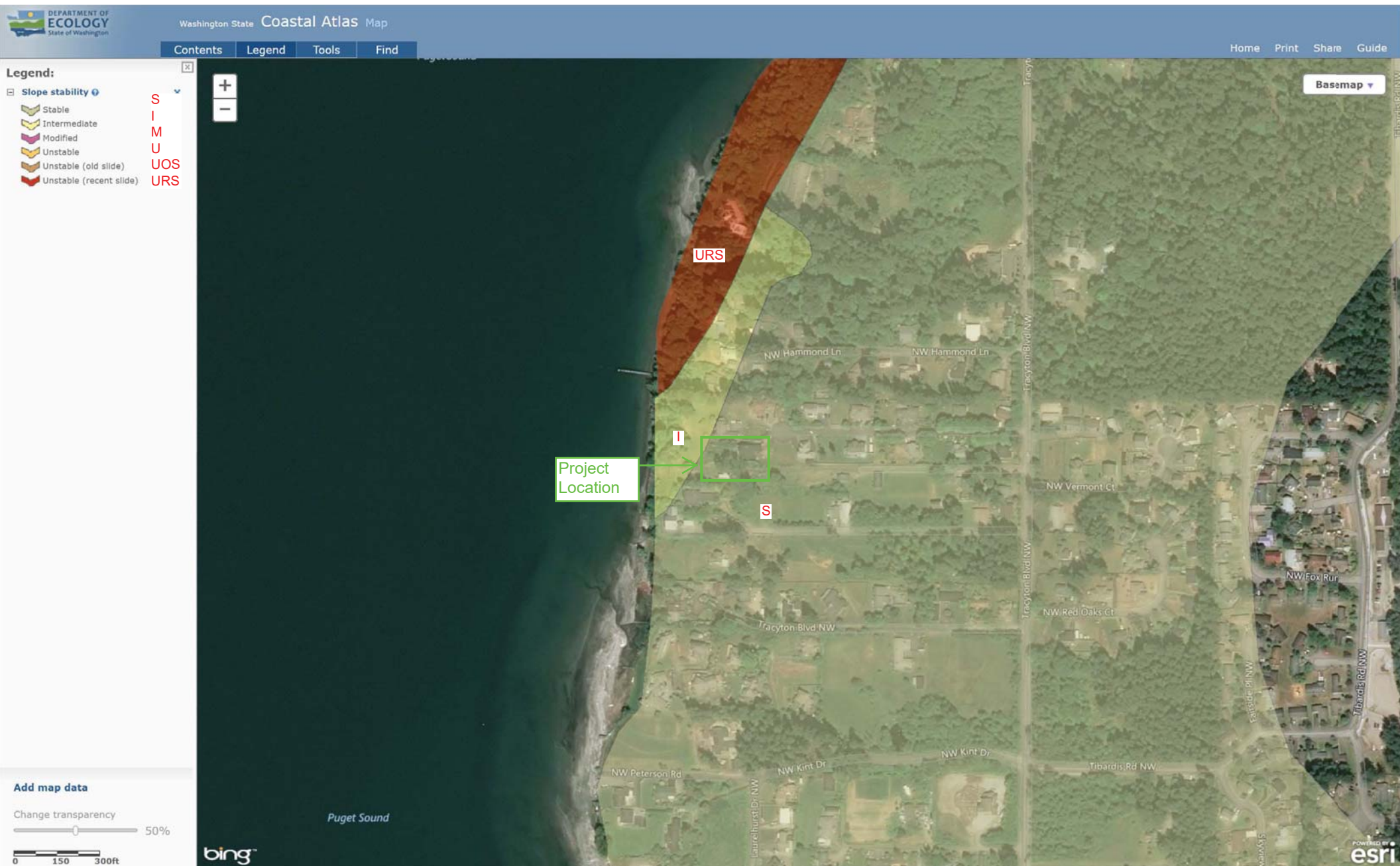
Lat: 47.6228 Long: -122.7480





Permit Number: 20-00064





Permit Number: 20-00064



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12-35

D.O.E. KITSAP

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136







7/24/2016 3:33 PM

Project Location

Permit Number: 20-00064



## 1719 Stanton Way NW, Bremerton, WA 98311, USA

Latitude, Longitude: 47.6279355, -122.67567080000003



<b>Date</b>	1/6/2020, 9:14:09 AM
<b>Design Code Reference Document</b>	ASCE7-10
<b>Risk Category</b>	II
<b>Site Class</b>	D - Stiff Soil

Type	Value	Description
$S_S$	1.444	$MCE_R$ ground motion. (for 0.2 second period)
$S_1$	0.575	$MCE_R$ ground motion. (for 1.0s period)
$S_{MS}$	1.444	Site-modified spectral acceleration value
$S_{M1}$	0.863	Site-modified spectral acceleration value
$S_{DS}$	0.963	Numeric seismic design value at 0.2 second SA
$S_{D1}$	0.575	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
$F_a$	1	Site amplification factor at 0.2 second
$F_v$	1.5	Site amplification factor at 1.0 second
PGA	0.599	$MCE_G$ peak ground acceleration
$F_{PGA}$	1	Site amplification factor at PGA
$PGA_M$	0.599	Site modified peak ground acceleration
$T_L$	6	Long-period transition period in seconds
$S_{sRT}$	1.444	Probabilistic risk-targeted ground motion. (0.2 second)
$S_{sUH}$	1.493	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
$S_{sD}$	2.4	Factored deterministic acceleration value. (0.2 second)
$S_{1RT}$	0.575	Probabilistic risk-targeted ground motion. (1.0 second)
$S_{1UH}$	0.616	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S_{1D}$	0.981	Factored deterministic acceleration value. (1.0 second)
PGAd	0.914	Factored deterministic acceleration value. (Peak Ground Acceleration)
	0.967	Mapped value of the risk coefficient at short periods

Permit Number: 20-00064

Type	Value	Description
C <sub>RS</sub>		
C <sub>R1</sub>	0.933	Mapped value of the risk coefficient at a period of 1 s



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# **SITE PLAN**



