C-14 Appeal Documents -
Critical Areas Report

CRITICAL AREAS ASSESSMENT REPORT FOR PARCEL P39374 – MCGARIGLE RD SEDRO-WOOLLEY, WASHINGTON 98284

PREPARED FOR:

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P.O. BOX 619
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PREPARED BY:

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Essency ENVIRONMENTAL

September 17, 2019

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Introduction

Background

BYK Construction retained Essency Environmental, LLC to complete a Critical Areas Assessment on Parcel P39374. Parcel P39374 is located in the southwest quarter of Section 18, Township 35N, Range 5E, adjacent to McGarigle Road in Sedro-Woolley, Washington. The project location is shown in Figure 1 (Appendix A).

Project contacts are shown in Table 1.

Table 1. Project Contacts

Organization	Role	Representative	Title	Email\Phone
Essency Environmental, LLC	Critical Areas Assessment	Mary Harenda	Professional Wetland Scientist, Fisheries Biologist	mharenda@cablespeed.com (425) 761-5903
BYK Construction, Inc.	Client	Tim Woodmansee	Vice-president	tim@bykconstruction.com (360) 421-1221

Qualifications

This critical areas assessment was completed by Andrew Wones and Mary Harenda of Essency Environmental, LLC. Essency Environmental, LLC provides environmental consulting services and has conducted many critical areas studies in Washington State.

Andrew Wones has over 30 years of experience in marine and freshwater ecology research and environmental consulting. He has extensive experience with aquatic resources permitting, natural resource inventories, impact assessment, endangered species, mitigation planning and monitoring, and construction monitoring for environmental compliance. Mr. Wones has contributed to numerous environmental impact statements, natural resource studies, provided compliance monitoring services, and written biological assessments for several ports, marinas, and utility agencies. He has authored natural resources technical reports and chapters for NEPA/SEPA documents evaluating a variety of projects including transportation, mining, residential, and recreational developments. Andrew is also a Certified Erosion and Sedimentation Control Lead (CESCL).

Mary Harenda is a Professional Wetland Scientist with over 30 years of diverse experience in biological sciences, project planning and design. She possesses a thorough working knowledge of local, state, and federal permitting and plan requirements, including the Washington SEPA and federal NEPA processes (BAs/BEs/EISs). Mary's extensive technical experience includes wetland inventories, delineations and functional assessments, stream assessments and evaluations, and assessments for wildlife and threatened and endangered species. Her expertise also includes construction oversight on wetland and stream mitigation projects and follow-up

monitoring to meet permit requirements. She has completed long-term, multiparameter monitoring on numerous mitigation banks in Washington State. She has worked in both the public and private sectors and has experience across a broad client base including small and large development firms, private home and property owners, small and large businesses, local, state and federal governments and agencies, and public and private utilities.

Methods

This critical areas assessment was completed following guidelines in Sedro-Woolley Municipal Code (SWMC 17.65 Regulations for Critical Areas). Background research included review of the following sources:

- Federal Emergency Management Agency National Flood Hazard Maps (FEMA 1989)
- Skagit County iMap (Skagit County 2019)
- City of Sedro-Woolley online documents and maps (available at: https://www.ci.sedro-woolley.wa.us/)
- Washington State Department of Ecology 303d list, interactive map (Ecology 2019)
- Washington State Department of Fish and Wildlife (WDFW) Priority Habitats and Species database (WDFW 2019a)
- Washington State Department of Fish and Wildlife Salmonscape (WDFW 2019b)
- USFWS National Wetlands Inventory Mapper (USFWS 2019).
- USDA NRCS Web Soil Survey (NRCS 2019).
- Aerial photography of the site from Google Earth and Skagit County iMap.
- City of Sedro-Woolley Municipal Code

Essency Environmental staff completed a site visit and field work on Parcel P39374 on September 11th, 2019. We walked the parcel to assess the presence of any streams or wetlands and sampled locations that appeared most likely to support wetland conditions. Sample plots were flagged, and plot locations were mapped using a mapping grade Juniper Systems Geode GPS and Effigis data collection and post-processing software. In addition, we evaluated areas within 200 feet of the parcel boundaries for the potential presence of critical areas using published information sources including maps and aerial images, and from what could be seen from the project parcel, public roads and other publicly accessible areas. Wetland determinations followed US Army Corps of Engineers wetland delineation guidelines (USACE 2010).

Results

Sedro-Woolley Municipal Code 17.65.020 states the following shall constitute critical areas regulated by code: Wetland and Riparian Corridors, Areas with a Critical Recharging Effect on Aquifers Used for Potable Water, Fish and Wildlife Habitat Conservation Areas, Frequently Flooded Areas, and Geologically Hazardous Areas. Critical area buffers are also regulated as described in SWMC 17.65. This section describes whether any critical areas or buffers regulated by the SWMC are present on or near the subject property. Other regulatory and resource categories of interest are also discussed.

General Site Description

Parcel P39374 is 12.7 acres in size and is currently vacant. The property abuts McGarigle Road to the north. The parcel is zoned Mixed Commercial (City of Sedro-Woolley Zoning Map (available at: https://www.ci.sedro-woolley.wa.us/Departments/Planning/Comprehensive%20Plan/Comp_Plan_Land_Use_Map.pdf). Existing residences are present to the east and west and north of McGarigle Road. An existing vacant parcel is present to the south which is also zoned Mixed Commercial.

The parcel was in agricultural use for many years. Vegetation is dominated grasses and weedy forbs typical of agricultural fields. Plants species observed on the parcel include: creeping bentgrass (*Agrostis stolonifera*), English plantain (*Plantago lanceolata*), red sorrel, (*Rumex acetosella*), orchardgrass (*Dactylis glomerata*), Canada thistle (*Cirsium arvense*), reed canarygrass (*Phalaris arundinacea*), cat's ear (*Hypochaeris radicata*), tall buttercup (*Ranunculus acris*), field horsetail (*Equisetum arvense*), sweet vernal grass (*Anthoxanthum odoratum*), snowberry (*Symphoricarpos albus*) and blackberry (*Rubus armeniacus*) along fence lines.

Shoreline Jurisdiction

Parcel P39374 is not within Shoreline jurisdiction (City of Sedro-Woolley 2016).

Streams

There are no streams or stream buffers on the project parcel and no streams or buffers are shown on any map resources (WDFW 2019a, WDFW 2019b, WDNR 2019, USGS 2019). Brickyard Creek (Type 2 water with 200-foot standard buffer per Sedro-Woolley Municipal Code section 17.65.530) is present on the north side of McGarigle Road. The standard buffer for Brickyard Creek does not extend onto Parcel 39374 and the effective buffer stops at the McGarigle Road.

Priority Habitats and Species (PHS)

PHS resources identify the presence of coho salmon (*Oncorhynchus kisutch*) and resident coastal cutthroat (*Oncorhynchus clarki*) in Brickyard Creek and the presence of three bat species, *Myotis yumanensis and lucifugus, and Corynorhinus townsendii* in the parcel township

(WDFW 2019a).

Wetlands and Riparian Corridors

The National Wetland Inventory (NWI) does not show any wetlands on or within 200 feet of the project parcel (USFWS 2019). The Natural Resource Conservation Service (2019) maps the parcel soil as Nargar loam, which is not classified as a hydric soil (Figure 2 and Appendix D).

We sampled locations on the parcel that appeared most likely to support wetland conditions (Figure 2 and Appendix C). There were no indicators of either hydric soils or wetland hydrology in the five plots we sampled. No Wetlands or Riparian Corridors are present on the project parcel. In addition, we evaluated adjacent areas up to roads or other development that would mark the end of any effective buffer within 200 feet of the project parcel boundaries and determined that no wetland buffers are present on the project parcel.

Areas with a Critical Recharging Effect on Aquifers Used for Potable Water

The Skagit County Aquifer Recharge Area Category 1 Areas Map (Skagit County 2010) does not show any aquifer recharge areas on or within 200 feet of the project parcel.

Fish and Wildlife Conservation Areas

There are no known Fish and Wildlife Conservation Areas or habitats for species of local significance as defined in SWMC 17.65.500 on the project parcel. Brickyard Creek, a Type 2 water, is located over 200 feet from the parcel boundaries on the north side of McGarigle Road (Figure 2).

Frequently Flooded Areas

The project is mapped as outside the 500-year floodplain (Zone X) by the Federal Emergency Management Agency (Skagit County 2019b). Zone X is not regulated.

Geologically Hazardous Areas

There are no potential landslide or erosion hazard areas or steep slopes mapped by Skagit County (2016). A geotechnical study may be required to assess the presence of Geologically Hazardous Areas (SWMC 17.54.420) as part of the development review process.

Other

Section 17.65.070[A][4] of the SWMC states that a survey showing locations, descriptions, and species of all trees over 6 inches in diameter, as measured five feet above the base of the trunk, and shrubs over eight feet tall or six feet wide, may be required to be submitted with any development application. There are no trees located on the parcel.

Citations

City of Sedro-Wooley. 2016. City of Sedro-Woolley Shoreline Management Program Update. . Effective June 14, 2016.

Skagit County. 2010. Aquifer Recharge Area Map. Category 1 Areas. (Skagit County Code 14.24.310). Available at: https://www.skagitcounty.net/GIS/Documents/Critical_Areas/Category%201%20Areas%20Aquifer%20Recharge%20Map.pdf . Accessed: May 1, 2019.

Skagit County. 2016. Potential Landslide and Erosion Hazard Areas. Available at: https://www.skagitcounty.net/GIS/Documents/GeoHazard/cw103-53.pdf . Accessed: May 1, 2019

Skagit County. 2019a. iMap. Skagit County interactive maps. Available at: https://www.skagitcounty.net/Maps/iMap/ . Accessed: May 1, 2019.

Skagit County 2019b. FEMA Q3 100 Year Floodplain. Map. Available at: https://www.skagitcounty.net/GIS/Documents/Flood/FEMA%20Q3%20100%20Year%20Floodplain%20Map.pdf . Accessed: May 1, 2019.

U.S. Army Corps of Engineers. May 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region, Version 2.0.

U.S. Department of Agriculture (USDA). Natural Resources Conservation Service (NRCS). 2019. Custom Soil Report for Snohomish County Area, WA. Parcel P107812. Downloaded from websoilsurvel.sc.egov.usda.gov. May 1, 2019.

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U.S. Geological Survey (USGS). 2019. The National Map. National Hydrography Layer. Available at: viewer.nationalmap.gov/viewer/. Accessed: May 1, 2019.

Washington State Department of Ecology. 2019. Water Quality Assessment for Washington. On-line interactive map. Available at: https://fortress.wa.gov/ecy/wqamapviewer/map.aspx. Accessed: May 1, 2019.

Washington Department of Natural Resources (WDNR). 2019. Forest Practices Application Mapping Tool. Available at: https://fortress.wa.gov/dnr/protectiongis/fpamt/default.aspx . Accessed: May 1, 2019.

Washington State Department of Fish and Wildlife (WDFW). 2019a. PHS on the Web. Priority Habitats and Species database. Available at: http://apps.wdfw.wa.gov/phsontheweb/. Accessed: May 1, 2019.

WDFW. 2019b. Salmonscape online fish distribution maps. Available at: http://apps.wdfw.wa.gov/salmonscape/map.html . Accessed: May 1, 2019.

Appendix A: Figures

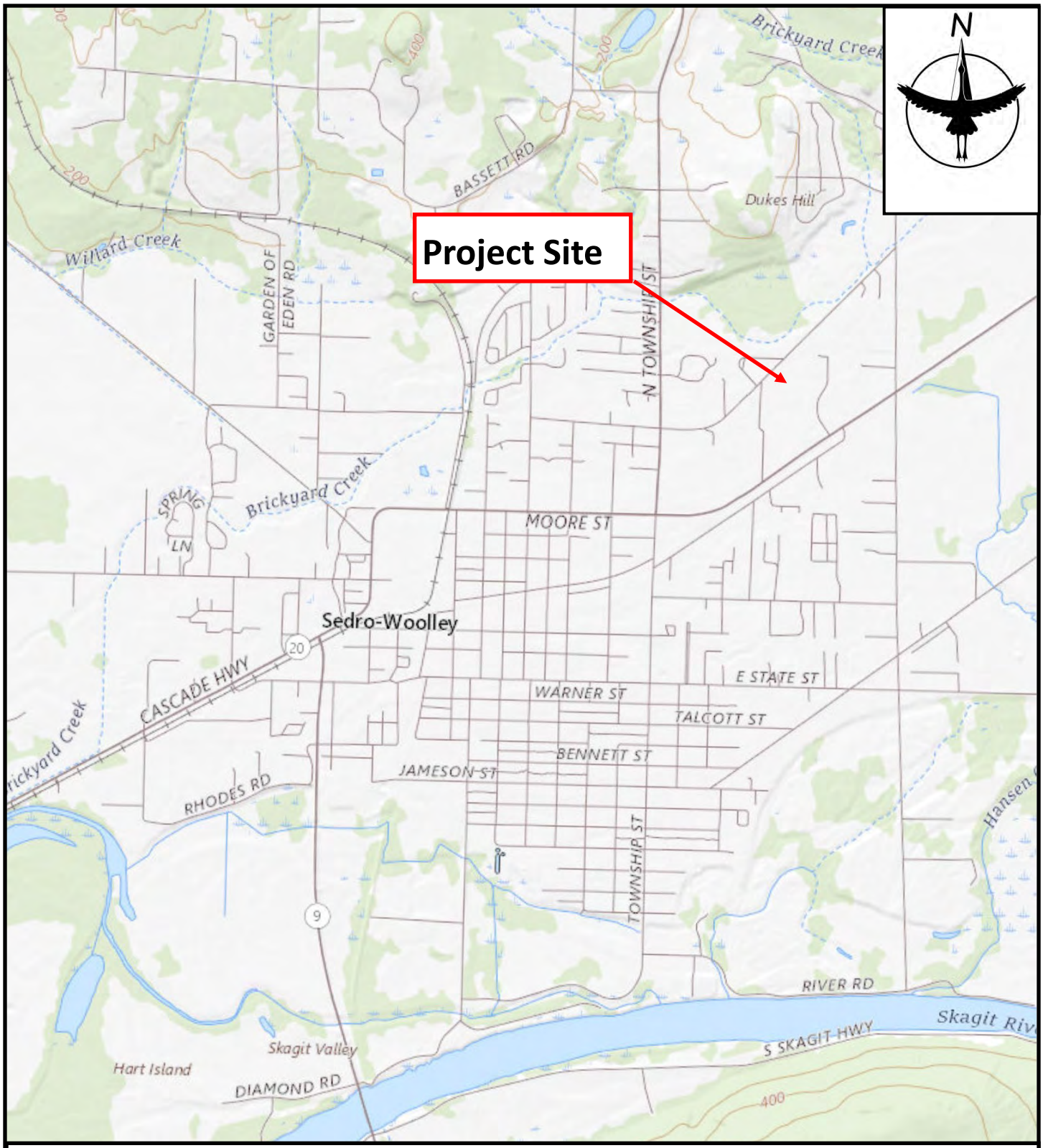

Image Source: WDNR 2019. https://geologyportal.dnr.wa.gov/

Figure 1. Vicinity Map.

Critical Areas Assessment Report for Parcel P39374 in Sedro-Woolley, WA

Client: BYK Construction, Inc.

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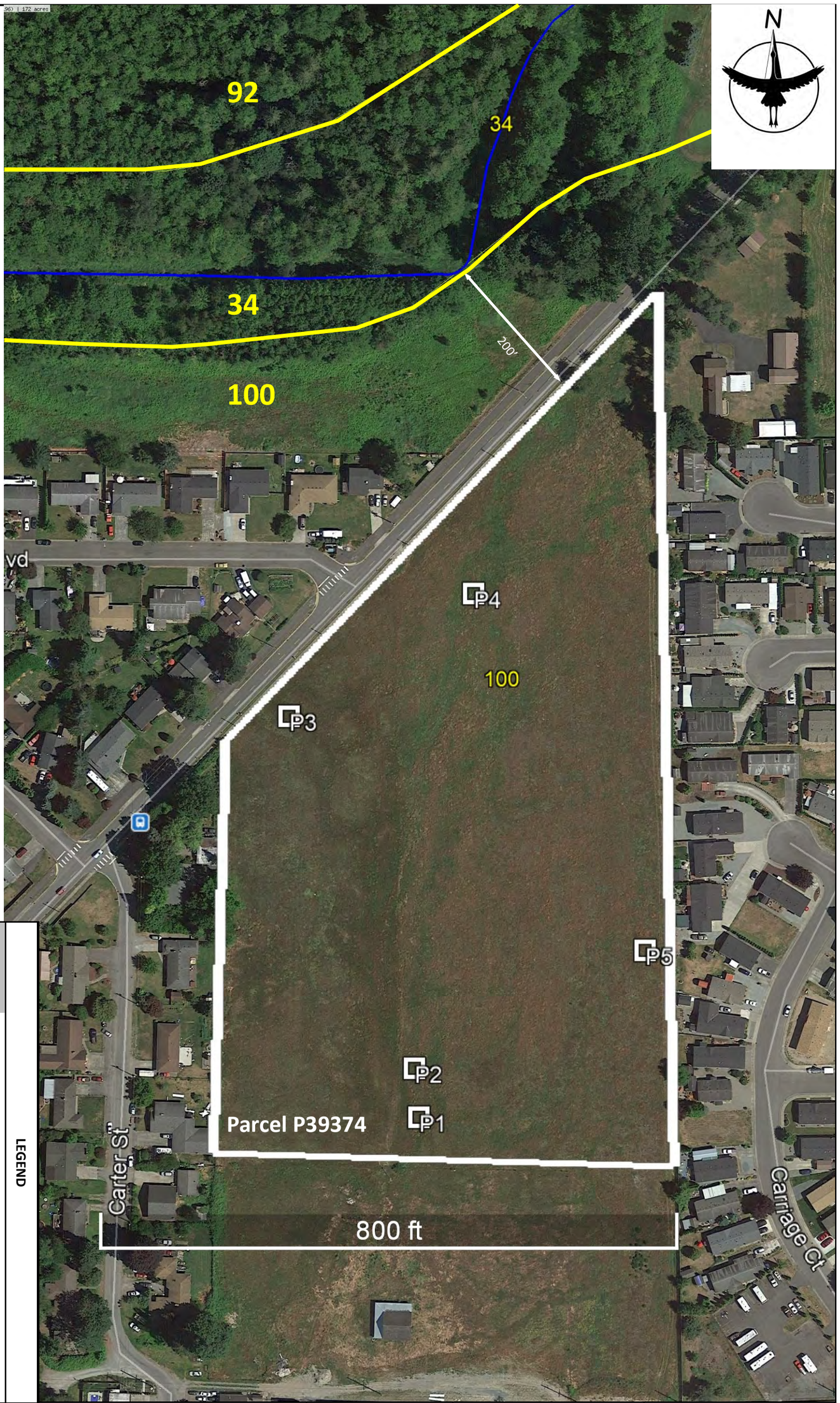

Image Source: Google Earth Pro dated 7/15/2018.

Soil series obtained from Google Earth Soil Web interface to USDA-NCSS SSURGO and STATSGO soil survey products.

Figure 2. Aerial Image of Parcel P39374

Critical Areas Report for Parcel P39374– McGarigle Road, Sedro -Woolley, WA.
Client: BYK Construction, Inc.

Essency Environmental LLC
11104 320th Ave NE
Carnation, WA 98014

425 269-3119
425 761-5903
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Date: 9/18/2019

Appendix B: Site Photographs

Photo 1. Panorama from northwest corner of Parcel P39374, facing southeast. 9/11/19.

Photo 3. Panorama from northeast corner of Parcel P39374, facing southwest. 9/11/19.

Photo 4. Panorama from southwest corner of Parcel P39374, facing northeast. 9/11/19.

Photo 9. Panorama from southwest corner of Parcel P39374, facing northwest. 9/11/19.

Appendix C: Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Parcel P39374 City/County: Sedro-Woolley/Skagit Sampling Date: 9/11/2019
Applicant/Owner: BYK Construction State: WA Sampling Point: P1
Investigator(s): M. Harenda/A. Wones Section, Township, Range: S18, T35N, R5E
Landform (hillslope, terrace, etc.): Historic floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): MLRA2 Lat: 48.515572° Long: -122.217526° Datum: WGS 84
Soil Map Unit Name: Nargar loam, 0-8 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil X , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?**	**Yes ___ No X**
Hydric Soil Present?	Yes ___	No X		
Wetland Hydrology Present?	Yes ___	No X		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20 ft dm)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 10 ft dm)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb (Plot size: 6 ft dm)			
1. *Agrostis stolonifera*	65	yes	FAC
2. *Dactylis glomerata*	25	yes	FACU
3. *Plantago lanceolata*	10	no	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:

SOIL

Sampling Point: P1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 4/3	100					fine sandy loam	
6-14	10YR 4/3	100					loamy fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Parcel P39374 City/County: Sedro-Woolley/Skagit Sampling Date: 9/11/2019
Applicant/Owner: BYK Construction State: WA Sampling Point: P2
Investigator(s): M. Harenda/A. Wones Section, Township, Range: S18, T35N, R5E
Landform (hillslope, terrace, etc.): Historic floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): MLRA2 Lat: 48.515572° Long: -122.217526° Datum: WGS 84
Soil Map Unit Name: Nargar loam, 0-8 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil X , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20 ft dm)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 10 ft dm)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb (Plot size: 6 ft dm)			
1. *Agrostis stolonifera*	70	yes	FAC
2. *Dactylis glomerata*	15	no	FACU
3. *Plantago lanceolata*	10	no	FACU
4. *Ranunculus acris*	5	no	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: P2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 4/3	100					fine sandy loam	
6-14	10YR 5/3	100					loamy fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Parcel P39374 City/County: Sedro-Woolley/Skagit Sampling Date: 9/11/2019
Applicant/Owner: BYK Construction State: WA Sampling Point: P3
Investigator(s): M. Harenda/A. Wones Section, Township, Range: S18, T35N, R5E
Landform (hillslope, terrace, etc.): Historic floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): MLRA2 Lat: 48.515572° Long: -122.217526° Datum: WGS 84
Soil Map Unit Name: Nargar loam, 0-8 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil X , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20 ft dm)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 10 ft dm)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb (Plot size: 6 ft dm)			
1. *Agrostis stolonifera*	60	yes	FAC
2. *Dactylis glomerata*	5	no	FACU
3. *Plantago lanceolata*	15	no	FACU
4. *Ranunculus acris*	15	no	FAC
5. *Anthoxanthum odoratum*	2	no	FACU
6. *Equisetum arvense*	3	no	FAC
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: ___)		
1.		
2.		
	= Total Cover	

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: P3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 4/3	100					loamy fine sand	
8-14	10YR 4/4	100					loamy fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Parcel P39374 City/County: Sedro-Woolley/Skagit Sampling Date: 9/11/2019
Applicant/Owner: BYK Construction State: WA Sampling Point: P4
Investigator(s): M. Harenda/A. Wones Section, Township, Range: S18, T35N, R5E
Landform (hillslope, terrace, etc.): Historic floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): MLRA2 Lat: 48.515572° Long: -122.217526° Datum: WGS 84
Soil Map Unit Name: Nargar loam, 0-8 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil X , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20 ft dm)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 10 ft dm)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb (Plot size: 6 ft dm)			
1. *Agrostis stolonifera*	70	yes	FAC
2. *Dactylis glomerata*	10	no	FACU
3. *Plantago lanceolata*	10	no	FACU
4. *Ranunculus acris*	10	no	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: P4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 4/3	100					fine sandy loam	
6-14	10YR 4/4	100					loamy fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Parcel P39374 City/County: Sedro-Woolley/Skagit Sampling Date: 9/11/2019
Applicant/Owner: BYK Construction State: WA Sampling Point: P5
Investigator(s): M. Harenda/A. Wones Section, Township, Range: S18, T35N, R5E
Landform (hillslope, terrace, etc.): Historic floodplain Local relief (concave, convex, none): none Slope (%): 1%
Subregion (LRR): MLRA2 Lat: 48.515572° Long: -122.217526° Datum: WGS 84
Soil Map Unit Name: Nargar loam, 0-8 percent slopes NWI classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil X , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20 ft dm)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 10 ft dm)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb (Plot size: 6 ft dm)			
1. *Agrostis stolonifera*	100	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: ___)		
1.		
2.		
	= Total Cover	

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: P5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 4/3	100					fine sandy loam	
12-14	10YR 5/6	100					fine sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix D: Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Skagit County Area, Washington

Parcel P39374, Sedro-Woolley WA

September 18, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:5,060 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Skagit County Area, Washington
Survey Area Data: Version 18, Sep 10, 2018

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

Date(s) aerial images were photographed: Jul 9, 2010—Aug 28, 2011

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
34	Cokedale silt loam	4.3	3.7%
92	Minkler silt loam	5.3	4.5%
100	Nargar loam, 0 to 8 percent slopes	101.1	86.6%
152	Urban land-Mt. Vernon-Field complex	6.1	5.2%
Totals for Area of Interest		**116.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Skagit County Area, Washington

34—Cokedale silt loam

Map Unit Setting

National map unit symbol: 2hvj
Elevation: 120 to 1,200 feet
Mean annual precipitation: 45 to 80 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 160 to 220 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Cokedale and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cokedale

Setting

Landform: Flood plains
Parent material: Alluvium derived from phyllite

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 27 inches: silt loam
H3 - 27 to 45 inches: sand
H4 - 45 to 60 inches: stratified loamy sand to very channery loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Seasonally Wet Soils (G002XN202WA)
Hydric soil rating: No

Minor Components

Sumas, undrained

Percent of map unit: 5 percent
Landform: Tidal flats
Hydric soil rating: Yes

92—Minkler silt loam

Map Unit Setting

National map unit symbol: 2hxl
Elevation: 50 to 80 feet
Mean annual precipitation: 50 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition

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

Description of Minkler

Setting

Landform: Terraces
Parent material: Alluvium andglaciolacustrine deposits

Typical profile

H1 - 0 to 12 inches: medial silt loam
H2 - 12 to 15 inches: medial silt loam
H3 - 15 to 60 inches: stratified fine sand to very fine sandy loam

Properties and qualities

Slope: 0 to 3 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 high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Forage suitability group: Wet Soils (G002XN102WA)
Hydric soil rating: No

100—Nargar loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2hrl
Elevation: 400 to 1,100 feet
Mean annual precipitation: 50 to 75 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Nargar

Setting

Landform: Terraces
Parent material: Alluvium, loess, volcanic ash

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 33 inches: loam
H3 - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Forage suitability group: Soils with Few Limitations (G002XN502WA)
Hydric soil rating: No

152—Urban land-Mt. Vernon-Field complex

Map Unit Setting

National map unit symbol: 2htf
Elevation: 10 to 50 feet
Mean annual precipitation: 32 to 40 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 40 percent
Mt. vernon and similar soils: 30 percent
Field and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Mt. Vernon

Setting

Landform: Natural levees, flood plains
Parent material: Alluvium and volcanic ash

Typical profile

H1 - 0 to 10 inches: ashy very fine sandy loam
H2 - 10 to 29 inches: stratified ashy sand to very fine sandy loam
H3 - 29 to 60 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 0 to 3 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 high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C

Forage suitability group: Soils with Few Limitations (G002XN502WA)
Hydric soil rating: No

Description of Field

Setting

Landform: Flood plains, natural levees
Parent material: Alluvium and volcanic ash

Typical profile

H1 - 0 to 13 inches: silt loam
H2 - 13 to 21 inches: silt loam
H3 - 21 to 40 inches: stratified sand to loamy fine sand
H4 - 40 to 60 inches: stratified sand to very fine sandy loam

Properties and qualities

Slope: 0 to 3 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 high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Forage suitability group: Seasonally Wet Soils (G002XN202WA)
Hydric soil rating: No

Minor Components

Mt. vernon

Percent of map unit:
Hydric soil rating: No

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