Technical Memorandum

To: Randall Perry – U.S. Army Corps of Engineers, Seattle District

From: Kevin Fetherston, Ph.D., PWS – WSP Environment & Energy

Date: July 20, 2009

Re: An Analysis of the Geographic Extent of Waters of the United States, Including Wetlands, at Kulshan Creek, Skagit County, Washington

I. Introduction

The City of Mount Vernon, Washington manages a waters/wetlands reserve system as part of their Critical Areas Ordinance (CAO) program. In 2007, the City identified waters/wetlands within the Kulshan Creek watershed as a priority location for restoration activities. The Kulshan Creek waters/wetlands (Project Area) are located on city-owned property off of Williams Way (Parcel numbers P80433-P80438 and P80447-P80454) (Figure 1). Recently, and in cooperation with the Seattle District of the U.S. Army Corps of Engineers, it has become possible to direct a combination of CAO funds towards restoring 7.1 acres of riverine wetlands along Kulshan Creek. This restoration will be accomplished by conducting weed control, installing large wood, and planting a mix of native forest and scrub/shrub plant communities. In order to complete the Joint Aquatic Resource Permits Application (JARPA) associated with this project, it is necessary to delineate the location and geographic extent of waters of waters/wetlands at the Kulshan Creek restoration site.

This technical memorandum is a summary of WSP findings of fact and judgments concerning the geographic extent of waters/wetlands at Kulshan Creek. The information offered in this report is arranged to: (1) introduce the project and the project area, (2) articulate the delineation objectives, (3) explain the methodology used in the delineation, (4) provide technical results, and (5) discuss the pertinent regulatory issues at the federal, state, and local levels of jurisdiction.

II. Objectives

The project objective is to delineate the geographic extent of waters/wetlands within the project area consistent with definitions provided in CFR 33 328.3 (a)(1-8), 328.3 (b, c, and e), and procedures detailed in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (WMVC Supplement)* (ACOE 2008), supplementing the *1987 Manual* (Environmental Laboratory 1987) as implemented with pertinent regulatory guidance letters, memoranda, and public notices.

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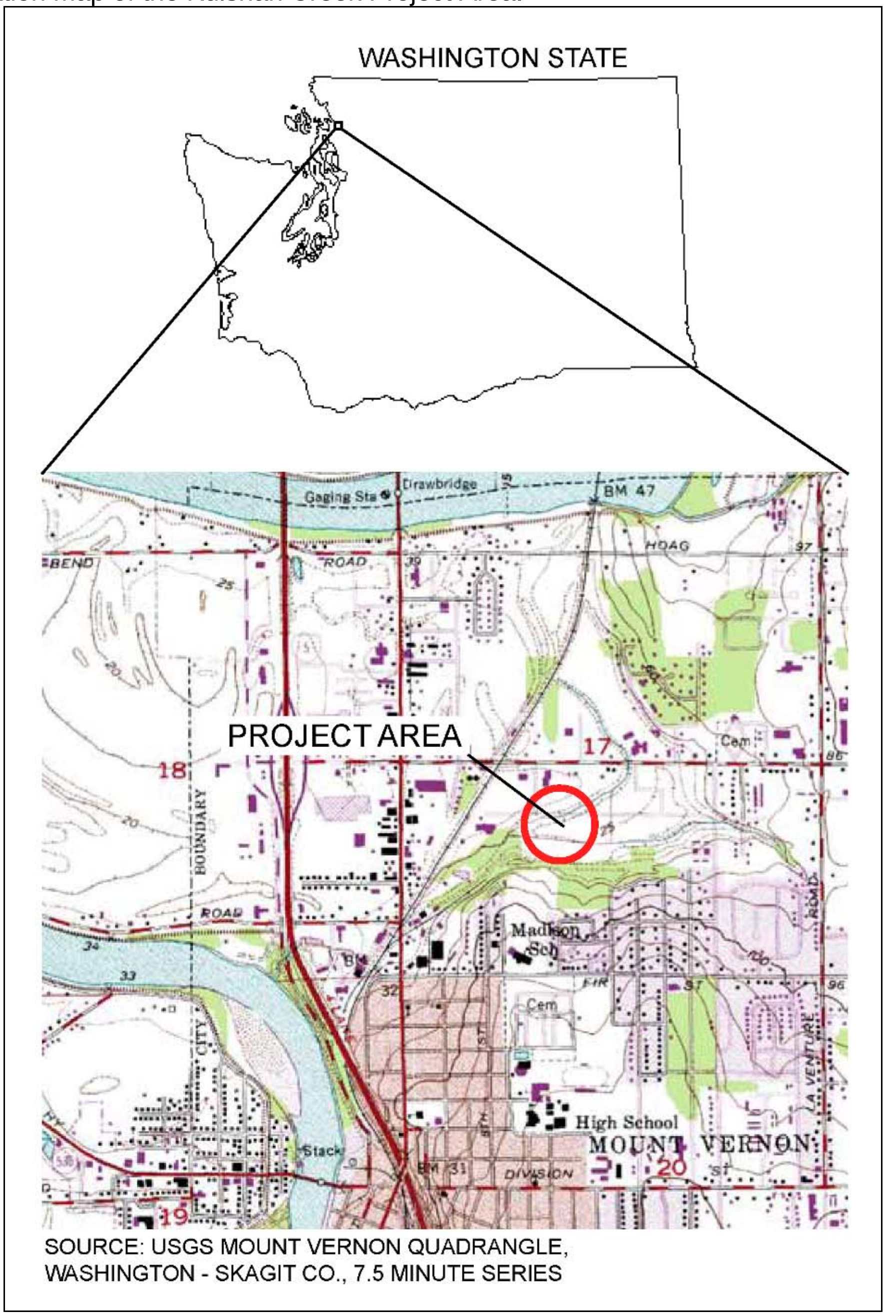
Figure 1. Location map of the Kulshan Creek Project Area.



III. Methods

The WSP Senior Ecologist, Kevin Fetherston, Ph.D., PWS, conducted the field delineation on April 15, 2009. Dr. Fetherston's resume is included in Appendix A. Prior to field delineation, WSP reviewed topographic maps, regional soil data, and available aerial photography (Google Earth), and National Wetlands Inventory maps. In the field, hydrology, soils and vegetation data were collected to assess whether jurisdictional wetland criteria were met. Three soil pits were excavated and three vegetation plots were sampled (Photographs 1-3; Appendix B - Datasheets).

A. Hydrology

Wetland hydrology was determined by evaluating a variety of direct and indirect indicators, consistent with the *1987 Manual* (Environmental Laboratory 1987), current regulatory guidance (COE 3-92 Memorandum), and the *WMVC Supplement* (ACOE 2008). Direct indicators, such as local knowledge of ponding, stream/lake gauge data, flood predictions (*i.e.,* FEMA maps), and historic records pertaining to the study may also be used to satisfy the wetland hydrology parameter (Environmental Laboratory 1987).

Wetland hydrology is considered to be present at a location if field observations indicate the area has a high probability of being periodically inundated or saturated to the soil surface for a sufficient duration of the growing season to develop anaerobic conditions in the surface soil environment (*i.e.*, root zone) (Environmental Laboratory 1987). According to guidance in the *WMVC Supplement* (ACOE 2008), if at least one primary indicator or at least two secondary indicators are present at a sample point, the wetland hydrology criterion is met.

B. Soils

The presence of hydric soils was determined consistent with criteria articulated in the *1987 Manual,* current regulatory guidance, and *Field Indicators of Hydric Soils in the United States, Version 6.0.* (NRCS 2006a). A hydric soil is defined as "…a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (USDA National Technical Committee for Hydric Soils (NTCHS) 1994). The determination of whether or not a soil is hydric is based on the fulfilment of at least one of four technical criteria (Federal Register 2002; Table 1). The technical criteria can be satisfied using a combination of published soils information and field indicators. Field indicators for determining whether a soil satisfies the hydric soil definition and the technical criteria for hydric soils are listed in the *Field Indicators of Hydric Soils in the United States* (NRCS 2006a) and the *WMVC Supplement* (ACOE 2008). Field indicators published in the above-referenced documents are intended to supersede guidance provided in the *1987 Manual*.

Table 1. Criteria for Hydric Soils of the United States (Federal Register 2002).

Hydric soil criteria:

1. All Histels except for Folistels, and Histosols except for Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Historthels, and Histoturbels great groups, and Cumulic or Pachic subgroups that:
    a. are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
    b. are poorly drained or very poorly drained and have either:
        (1) a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
        (2) a water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
        (3) a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches, or
3. Soils that are frequently ponded for periods of long or very long duration during the growing season or,
4. Soils that are frequently flooded for periods of long or very long duration during the growing season.

C. Vegetation

The presence of hydrophytic vegetation was determined using the criteria and procedures outlined in the *WMCV Supplement* and *1987 Manual*. Species identifications and taxonomic nomenclature follow *Vascular Plants of the Pacific Northwest* (Hitchcock and Cronquist 1990). Each species' indicator status was assigned using the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed 1988) (hereafter cited as *The National List*). According to the *WMVC Supplement* (ACOE 2008), only the five basic levels of wetland indicator status (i.e. OBL, FACW, FAC, FACU, and UPL) should be used. For species listed with no indicator status (NI) or those that are not known to occur in the region, the indicator status assigned to the species in the nearest adjacent region should be applied. Species that are not listed, (NL) are assumed to be upland.

The *WMVC Supplement* (ACOE 2008) recommends that the presence of dominant species is determined using the 50/20 rule. Dominant species are those species that individually or collectively cover more than 50% of the total vegetative cover within each stratum, in addition to those species that by themselves cover 20% or more of the total cover within each vegetation stratum. The hydrophytic vegetation parameter for wetlands is met when, under normal circumstances, more than 50% of the dominant species from each stratum are obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC) species.

IV. Results – Geographic Extent of Water of the U.S., Including Wetlands

The WSP field team identified and delineated waters of the U.S., including wetlands at the Kulshan Creek project area (Exhibit 1). Waters/wetlands cover almost the entire project area occupying 7.1 acres (310,274 ft^2). The entire project area but for a small area (18,840 ft^2) in the northeast corner of the project area exhibited characteristics of waters/wetlands. The following hydrology, soils, and vegetation data are presented to confirm jurisdictional waters/wetland criteria.

A. Hydrology

1. Watershed Context – Connection to Navigable Waters

The primary source of water to the project area is Kulshan Creek and its small ephemeral to intermittent tributaries. Additional sources of water are precipitation, surface flow, and shallow subsurface flow. Wetlands within the project area are “adjacent” (i.e. bordering, neighboring, or contiguous) to Kulshan Creek. Kulshan Creek is a perennial tributary to the Skagit River (a navigable water in fact). Therefore, a direct hydrologic connection exists between the wetland within the project area and the Skagit River.

2. Wetland Hydrology Parameter

Observations of wetland hydrology were made during a period of normal precipitation in the spring growing season. Water stained leaves, a primary indicator of wetland hydrology, were observed at sample Plots 1 and 2 (Appendix B; Photographs 1 and 2). In addition, drainage patterns, a secondary indicator, were observed at Plot 1. At least one primary indicator was observed at each of the two wetland plots (Plots 1 and 2, Appendix B), thus meeting the wetland hydrology parameter.

B. Soils

The soils within the project area are mapped by the Natural Resource Conservation Service (NRCS 2006b) as Bow-Urban land complex (map unit symbol 20, Figure 2) and Hoogdal silt loam (map unit symbol 67). According to the NRCS (2006b) Bow-Urban land complex is a hydric soil, which includes 60% Bow and similar soils and 35% Urban land. Bow soils are found on hillslopes and terraces with 0 to 8 percent slopes from 0 to 150 feet elevation. Its parent material is volcanic ash, glaciolacustrine deposits, and glacial drift. Bow soils are somewhat poorly drained with a depth to water table of about 6 to 18 inches. A typical profile of Bow soil is gravely loam from 0 to 7 inches, very gravely loam from 7 to 17 inches, clay loam from 17 to 31 inches, and silty clay from 31 to 60 inches (NRCS 2006b).

Hoogdal silt loam is not a hydric soil. According to the NRCS, (2006b) Hoogdal silt loam is found on terraces with 8 to 15 percent slopes from 100 to 300 feet elevation. Its parent material is loess and glaciolacustrine deposits. Hoogdal silt loam is moderately well drained with a depth to water table of about 18 to 24 inches. A typical profile of Hoogdal silt loam is silt loam from 0 to 6 inches, silty clay loam from 6 to 17 inches, and silty clay from 17 to 60 inches (NRCS 2006b). Field investigation revealed the soil to have consistent texture of silt loam to loam. Wetland soils had a depleted matrix (Plots 1 and 2; Appendix B; Hydric soil indicator F3, ACOE 2008).

Figure 2. NRCS soil map, which depicts Bow-Urban land complex, 0 to 8 percent slopes (map unit symbol 20) on the north side of Kulshan Creek and Hoogdal silt loam, 8 to 15 percent slopes (map unit symbol 67) to the south (NRCS 2006).

C. Vegetation

The existing vegetation community is a deciduous forest, wet meadow mosaic. Dominant plant species include black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), red alder (*Alnus rubra*), reed canarygrass (*Phalaris arundinaceae*), and Himalayan blackberry (*Rubus discolor*). A list of plant species observed within the project area can be found in Table 3.

The vegetation communities within Plot 1 and 2 (Photographs 1 and 2; Appendix B) were hydrophytic based on the 50/20 rule. Plot 1 was dominated by *Phalaris arundinaceae* (90% coverage) (Photograph 1), a facultative wetland (FACW) species. Plot 2 was dominated by *Populus balsamifera* spp. *trichocharpa* (80% coverage, FAC) in the tree stratum, *Rubus spectabilis* (80% coverage, FAC) in the sapling/shrub statum, and *Phalaris arundinaceae* (70% coverage, FACW) in the herb stratum (Photograph 2).

Table 3. Partial listing of vascular plant species observed at the Kulshan Creek Project Area

Scientific Name	Common Name	Wetland Indicator Status
Trees		
Populus balsamifera spp. trichocarpa	Black cottonwood	FAC
Alnus rubra	Red alder	FAC
Betula papyrifera	Paper birch	FAC
Shrubs		
Rubus spectabilis	Salmonberry	FAC
Rubus discolor	Himalayan blackberry	FACU
Lonicera involucrata	Black twinberry	FAC
Rosa pisocarpa	Clustered wild rose	FAC
Salix sp.	Willow	FACW
Symphoricarpos albus	Snowberry	FACU
Rhamnus purshiana	Cascara	FAC
Sambucus racemosa	Red elderberry	FACU
Spiraea douglasii	Douglas spirea	FACW
Oemlaria cerasiformis	Indian plum	FACU
Cornus sericea	Redosier dogwood	FACW
Herbs		
Phalaris arundinaceae	Reed canarygrass	FACW
Lysichiton americanus	Skunk cabbage	OBL
Urtica dioica	Stinging nettle	FAC

V. Regulatory Context

Three levels of government have jurisdiction over the waters/wetlands at the project area in the project area. These jurisdictions include the U.S. Federal Government, the State of Washington, and the City of Mount Vernon. A summary of each level of jurisdiction is presented below.

A. Federal Jurisdiction

1. Clean Water Act (CWA), Section 404

Waters/wetlands at the project area are hydrologically connected and adjacent to Kulshan Creek, a perennial tributary of the Skagit River (a navigable water in fact). Therefore, consistent with current guidance (USEPA and ACOE 2008), project area waters/wetlands are regulated at the federal level by the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency through the CWA. Written acceptance of this WSP delineation is required from the Corps to confirm the current geographic extent of federal waters/wetlands presented in this report.

2. CWA Section 401

Section 401 of the CWA addresses water quality in the nation's waters, including wetlands. The State of Washington administers Section 401. See section V.B.1. below.

3. Endangered Species Act, Section 7 (U.S. Fish and Wildlife Services)

There are no known federal listed threatened or endangered species in the project area.

4. Section 106 of Historic Preservation Act

As part of the CWA Section 404 permit review process, the project proponent is obligated to review records to determine if the project will (or is likely to) impact cultural resources. In addition, the National Historic Preservation Act requires that, if cultural resources are encountered during construction, the appropriate state agencies be notified. As of this writing, there are no known cultural resources at the project area.

B. Washington State

1. Clean Water Act (Water Quality Certification) Section 401

Any work involving discharges of pollutants to waters/wetlands needs to be reviewed by the State of Washington Department of Ecology in the context of the Clean Water Act 401 Water Quality Certification Program.

2. Hydraulic Project Approval (HPA)

Any form of work that uses, diverts, obstructs, or changes the natural flow or bed of any fresh water of the state requires a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife (WDFW).

C. Local Jurisdiction

1. City of Mount Vernon

The proposed project is part of the City of Mount Vernon’s “wetland reserve” program. The project purpose is to restore the waters/wetland ecosystem for Kulshan Creek basin. Within the City of Mount Vernon, any work that alters waters/wetlands and their buffers must follow the provisions of the *Mount Vernon Municipal Code* (CMV 1994) and the *City of Mount Vernon Critical Area Ordinance Update* (CAO) (CMV 2007). The CAO update regulates the use of land on and around environmentally sensitive areas, including waters/wetlands.

VI. Photographs

Photograph 1. Plot 1 is situated within the reed canarygrass dominated meadow in the foreground.

Photograph 2. A representative photo of Plot 2. Note the black cottonwood, salmonberry, and reed canarygrass.

Photograph 3. Facing west, Plot 3 is located within the reed canarygrass dominated meadow south of the rock wall.

VII. References

City of Mount Vernon (CMV). 1994. Mount Vernon Municipal Code.

City of Mount Vernon (CMV). 2007. City of Mount Vernon Critical Areas Ordinance Update.

Environmental Laboratory. 1987. U.S. Army Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

Federal Register. September 18, 2002. Hydric Soils of the United States. Washington, D.C. (Hydric Soil Criteria).

Hitchcock, C. L., A. Cronquist, M. Ownbey, J. W. Thompson. 1990. Vascular Plants of the Pacific Northwest. University of Washington Press.

Natural Resources Conservation Service (NRCS). 2006a. Field Indicators of Hydric Soils in the United States, Version 6.0. G.W. Hurt, L.M. Vasilas, editors. United States Department of Agriculture (USDA), NRCS, in cooperation with the National Technical Committee for Hydric Soils, Fort Worth, TX.

Natural Resource Conservation Service (NRCS). 2006b. Custom soil resource report for Skagit County Area, Washington. United States Department of Agriculture, NRCS. Survey Area Data: Version 4, Dec 4, 2006. Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov. Accessed May 2009.

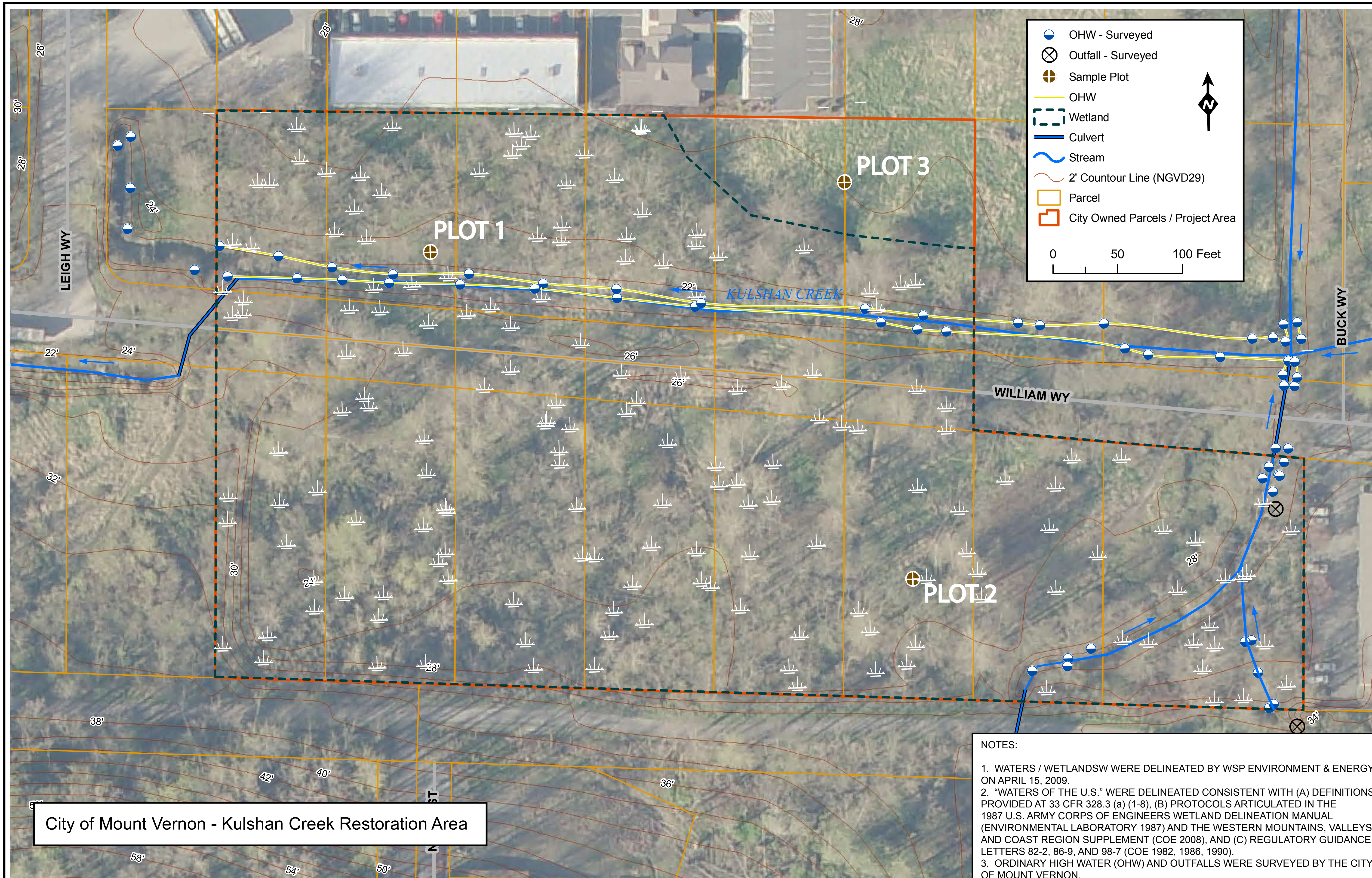
Reed, P. 1988. *National List of Plant Species that Occur in Wetlands: Northwest Region 9*. U.S. Fish and Wildlife Service, Biological Report 88 (26.9).

U.S. Army Corps of Engineers (ACOE). 1992. “Clarification and Interpretation of the *1987 Manual*.” 3-92 Memorandum.

U.S. Army Corps of Engineers (ACOE). 2008. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*, ed. J.S. Wakely, R. W. Lichvar, and C.V. Noble. ERDC/EL TR-08-13. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers (USEPA and ACOE). December 02, 2008. Clean Water Act Jurisdiction Following the U.S. Supreme Court’s Decision in Rapanos v. United States & Carabell v. United States. Joint memorandum issued December 02, 2008. Washington, D.C.

USDA National Technical Committee for Hydric Soils (NTCHS). 1994. Changes in hydric soils of the United States. Federal Register 59(133): 35680-35681, July 13, 1994.



City of Mount Vernon - Kulshan Creek Restoration Area

NOTES:

1. WATERS / WETLANDSW WERE DELINEATED BY WSP ENVIRONMENT & ENERGY ON APRIL 15, 2009.
2. "WATERS OF THE U.S." WERE DELINEATED CONSISTENT WITH (A) DEFINITIONS PROVIDED AT 33 CFR 328.3 (a) (1-8), (B) PROTOCOLS ARTICULATED IN THE 1987 U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL (ENVIRONMENTAL LABORATORY 1987) AND THE WESTERN MOUNTAINS, VALLEYS, AND COAST REGION SUPPLEMENT (COE 2008), AND (C) REGULATORY GUIDANCE LETTERS 82-2, 86-9, AND 98-7 (COE 1982, 1986, 1990).
3. ORDINARY HIGH WATER (OHW) AND OUTFALLS WERE SURVEYED BY THE CITY OF MOUNT VERNON.

4/15/09

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region 4/15/09

Project/Site: KULSHAN CRK City/County: MT. VERNON Sampling Date: PLOT 1

Applicant/Owner: CITY MT. VERNON State: WA Sampling Point: Plot 1

Investigator(s): K. FETHERSTON Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Bow - Urban Land complex NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (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 ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks: REED CANARY GRASS MEADOW IN KULSHAN CREEK FLOODPLAIN

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1. N/A			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: ___)			
1. PHALARIS ARUNDINACEA	90	YES	FACW
2. RANUNCULUS REPENS	10	YES	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	___ = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1. N/A			
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 2	x 2 = 4
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 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: 1

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 %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR3/3		NONE				SILT LOAM	
7-16	10YR4/2	80	7.5YR5/8	20	C	M	LOAM	

[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)
- X 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)
- __ 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 X No ____

Remarks: MOTTLES: COMMON
MEDIUM
BOUNDARY: CLEAR & WAVY

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)
- X 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)

- X Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- X 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 X Depth (inches): ______

Water Table Present? Yes ____ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ____

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region 4/15/09

Project/Site: KULSHAN CRK City/County: Mount Vernon, Skagit Sampling Date: PLOT 2

Applicant/Owner: City of Mount Vernon State: WA Sampling Point: Plot 2

Investigator(s): Kevin Fetherston Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Flood Plain Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Hoogdal silt loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? NO (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 ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus trichocarpa	80	Y	FAC
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1. Rubus spectabilis	80	Y	FAC+
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. Phalaris arundinacea	70%	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1. N/A			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (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	1	x 2 = 2
FAC species	2	x 3 = 6
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	3 (A)	8 (B)

Prevalence Index = B/A = 2.7

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 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: ___________

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 %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR4/2	100	NONE				SILTLOAM	BOUNDARY
9-16	10YR4/1	90 *	7.5YR5/8	10	C	M	SILTLOAM	GRADUAL WAVY

[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)
- X 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)
- ___ 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 X No ______

Remarks: DEPLETED MATRIX. MOTTLES: COMMON, MEDIUM, DISTINCT

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)
- X 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 X Depth (inches): ___________

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

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

Wetland Hydrology Present? Yes X No _____

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

Remarks: ADJACENT STREAM 20 ft, FLOODPLAIN

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region 4/15/09

Project/Site: KULSHAN CRK City/County: Mount Vernon, Skagit Sampling Date: 5

Applicant/Owner: City of Mount Vernon State: WA Sampling Point: Plot 3

Investigator(s): Kevin Fetherston Section, Township, Range: ______

Landform (hillslope, terrace, etc.): / Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Bow-Urban Land complex NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? NO (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 ______	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: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3. N/A			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. URTICA DIOICA	35	Y	FAC+
2. PHALARIS ARUNDINACEA	65%	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	100		
Woody Vine Stratum (Plot size: ______)			
1. N/A			
2.			
= Total Cover			
% Bare Ground in Herb Stratum Ø			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (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	1	x 2 = 2
FAC species	1	x 3 = 3
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	2 (A)	5 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ 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: 3

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 %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	100					SILT LOAM	
9-16	10YR 2/1	100					SILT LOAM	

[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.)

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- ___ 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)
- ___ 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: SOIL MOIST TO TOUCH. NOT SATURATED

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)
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- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
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- ___ 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: NO HYDROLOGY INDICATORS

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Kevin L. Fetherston, Ph.D., PWS

Senior Ecologist
Ecosystem Science & Restoration Services

Kevin L. Fetherston is Senior Ecologist in the Ecosystem Science & Restoration Services (ESR) group of WSP Environment & Energy (WSP). ESR focuses on the assessment, management, and restoration of natural ecosystems, specializing in wetlands, rivers, and watersheds. ESR includes several internationally recognized scientists with direct and applied national and international experience with restoration of many types of terrestrial and aquatic ecosystems including forests, grasslands, waters/wetlands, rivers and streams, riparian ecosystems, urban landscapes, and brownfields.

Prior to joining WSP in February of 2007, Kevin worked as Senior Ecologist for Entrix, Inc. (2006), Senior Ecologist for Herrera Environmental Consultants (2005-2006), Principal of Wetland and River Ecology, Inc. (2000-2005), Senior Wetland Ecologist for L.C. Lee & Associates, Inc. (1990-2000) and Senior Wetland Ecologist for Environmental Concern, Inc. (1987-1990). Currently his research interests are focused on (a) identification and assessment of ecological processes that generate and maintain whole ecosystems and communities, (b) assembly of wetland, river, and forested ecosystems, (c) design and construction of waters/wetlands ecosystem restorations, and (d) development of landscape scale ecosystem restoration strategies.

While a graduate student in forest ecology at Harvard University, Kevin assisted in developing the first geographic information system (GIS) for the Harvard Forest, an experimental forest in western Massachusetts. His master's degree research focused on the effects of hurricanes on the composition and structure of forests in Central New England. Following his masters program, Kevin apprenticed to Dr. Edgar Garbisch at Environmental Concern, Inc. (EC), St. Michaels, Maryland. Dr. Garbisch pioneered tidal marsh restoration techniques along the Atlantic seaboard during the 1970's, 80's, and 90's. In his position at EC, Kevin studied and practiced all aspects of waters/wetlands restoration including ecosystem analysis, restoration design, supervision of restoration construction and planting operations, operation of earth-moving equipment, native plant propagation, restoration site monitoring, jurisdictional waters/wetlands delineation, and restoration environmental permitting. Kevin's projects included estuarine tidal marsh and bottomland

Dr. Kevin L. Fetherston came to WSP after working in wetland, river, and forested ecosystems for 24 years. Currently, his interests are focused on identifying and assessing ecological processes that generate whole ecosystems and communities and applying these findings to the restoration of degraded landscapes; design and construction of waters/wetlands ecosystem restorations; and wildland conservation.

Education

- Ph.D. Ecosystem Analysis & Conservation, 2005, University of Washington
- M.F.S. Forest Ecology, 1987, Harvard University
- B.A. Biology, 1984, Boston University

Certifications & Registrations

- Professional Wetland Scientist (certification #1800), Society of Wetland Scientists
- HAZWOPER (certification # 06-1759)
- Sediment and Erosion Control Lead (certification # UW076-755429)

forest restoration projects along the Atlantic coast from Maine to Virginia. Two notable projects were a 63-acre intertidal marsh restoration in the Hackensack Meadowlands, New Jersey and restoration of 34-acres of freshwater intertidal marsh at the Kenilworth Marsh US National Park on the Anacostia River, Washington D.C.

As Senior Wetland Ecologist at L.C. Lee & Associates, Inc. (LCLA), Seattle, Washington, Kevin continued his ecological restoration practice, participating in a number of complex large-scale projects. These included the 57-acre, 7.2 million dollar North Creek riverine ecosystem restoration at the University of Washington Bothell/Cascadia Community College campus, and the restoration of 10-acres of tidally influenced freshwater emergent, scrub-shrub and forested wetland and secondary channel along lower Newskah Creek, a tributary to Grays Harbor, Aberdeen, Washington. While at LCLA, Kevin participated in the development of a number of the first hydrogeomorphic (HGM) wetland functional analyses. The HGM approach to waters/wetlands functional assessment has since become the national standard for the analysis of waters/wetlands functions for environmental regulatory purposes. At LCLA, Kevin also taught in number of professional wetland science courses for the National Wetland Science Training Cooperative, a division of LCLA. These included wetland functional analysis, jurisdictional wetland delineation, and constructed wetlands for stormwater management.

Following his tenure at LCLA, Kevin earned a doctorate in ecosystem analysis and conservation in the College of Forest Resources, University of Washington. His doctoral research concerned the development of forested mountain valley ecosystems of the coastal Pacific Northwest. Specifically, the work focused on the role of channel processes, large wood, and floodplain forests in generating and maintaining the structure and biodiversity of forested riverine ecosystems. Based upon his research findings, Kevin has developed new silvicultural approaches to the restoration of floodplain forests. These techniques are currently being applied to the silvicultural restoration of forested wetlands and river valleys throughout the Pacific Northwest, most notably the Quinault River Salmon Habitat Restoration for the Quinault Indian Nation; the University of Washington/Cascadia Community College North Creek riverine ecosystem restoration, Seattle, Washington; the Earth Sanctuary wetland and stream restoration on South Whidbey Island, Washington; and Benewah Creek riverine and riparian restoration for the Coeur d'Alene Tribe in northern Idaho. Kevin has coauthored a number of peer-reviewed papers and book chapters pertaining to riparian forest ecology, conservation of riverine/riparian ecosytems, and restoration of river valley ecosystems. While a graduate student at University of Washington, Kevin taught as a guest lecturer in graduate and undergraduate courses in introductory forestry, forest ecosystem science, old growth forest ecology, and river ecology.

Kevin is an active member of the scientific community presenting his research findings at national and regional meetings. He also serves as an on-going thesis advisor to graduate students at the University of Washington, and as an advisor for long-term restoration projects for the Quinault Indian Nation, Coeur d'Alene Tribe and the Earth Sanctuary, a private nature reserve.