# Appendix J: Typha Solar Project Site Reports and Permit Applications

**J-1: Typha Solar Project Critical Areas Report**

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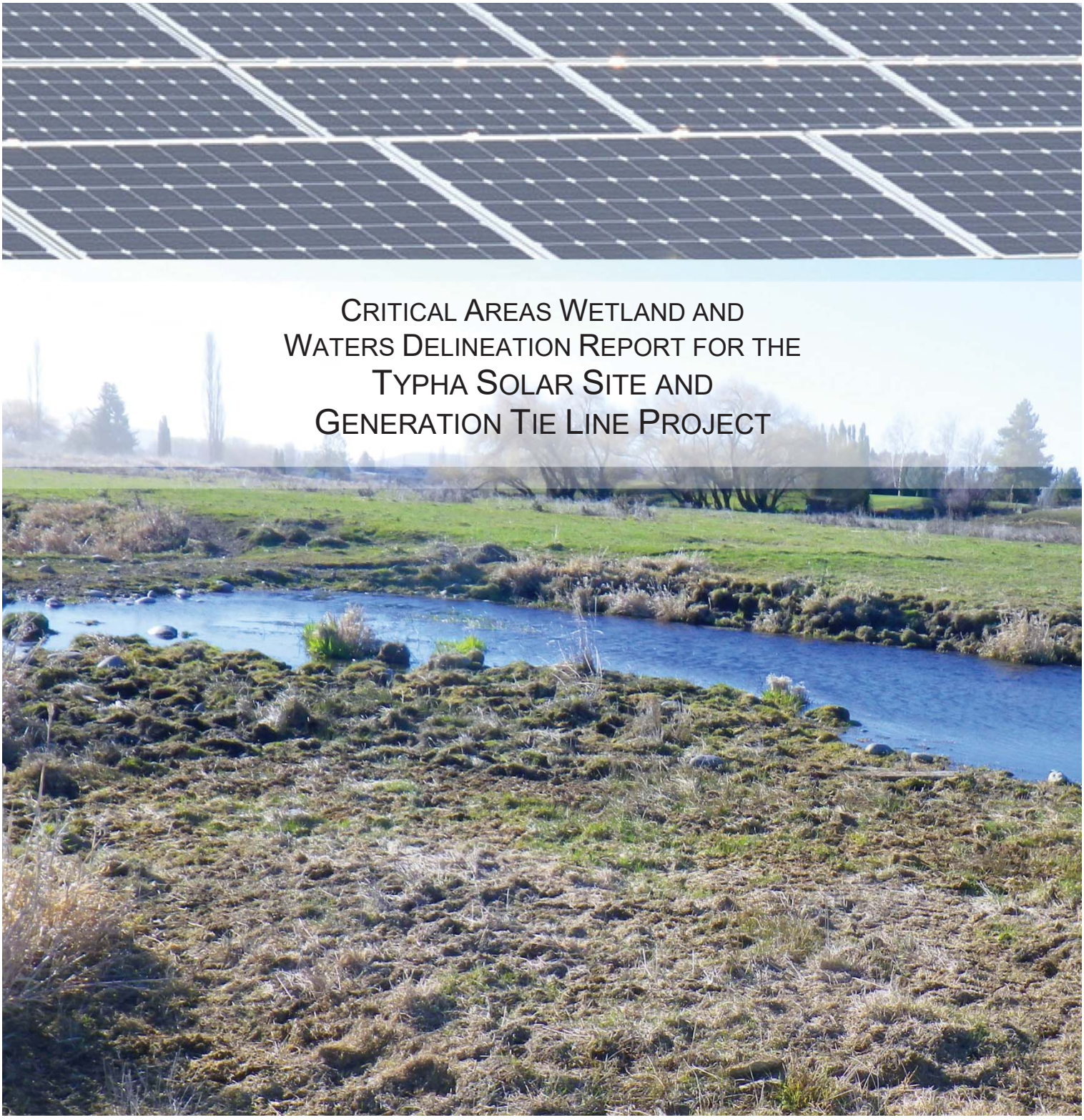
# Appendix J-1: Typha Solar Project Critical Areas Report



# CRITICAL AREAS WETLAND AND WATERS DELINEATION REPORT FOR THE TYPHA SOLAR SITE AND GENERATION TIE LINE PROJECT

July 10, 2017

SWCA ENVIRONMENTAL CONSULTANTS
SEATTLE, WASHINGTON

# CRITICAL AREAS WETLAND AND WATERS DELINEATION REPORT FOR THE TYPHA SOLAR SITE AND GENERATION TIE LINE PROJECT KITTITAS COUNTY, WASHINGTON

Section 30, Township 18 North, Range 18 East
Parcel Numbers 712633, 752633, 802633, and 832633

Report Prepared for

TUUSSO Energy, LLC

By
Evan Dulin

July 10, 2017

Project Number 38727.05

SWCA Environmental Consultants
221 1st Ave W, Suite 205
Seattle, Washington 98119

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# 1 INTRODUCTION

This report describes the methods and findings of wetland, stream, and other critical areas delineation for the proposed Typha Solar Site and Transmission Line Project (Typha Solar Project). The report was prepared by SWCA Environmental Consultants (SWCA), and is intended to address permitting requirements under Energy Facility Site Evaluation Council (EFSEC) Washington Administrative Code (WAC) 463-60-322, -332, and -333, and to show compliance of the proposed project with Kittitas County's Code for Critical Areas Ordinance (KCC Chapter 17A).

## 1.1 Background

TUUSSO Energy, LLC (TUUSSO) is proposing to construct a new photovoltaic solar facility installation on approximately 49.7 acres of private agricultural land, including the construction of a switchyard with a short (0.45-mile-long, 4.4-acre) generation tie line into an existing Puget Sound Energy (PSE) distribution transmission line, located northwest of Ellensburg, Kittitas County, Washington. The project is intended to provide up to 5 MW of solar energy to PSE for use within their service area.

## 1.2 Project Setting

The Typha Solar Project site primarily consists of fallow agricultural land located just west of the Yakima River and north of Thorp Highway, west of Ellensburg in unincorporated Kittitas County, Washington. The Typha Solar Project would be located approximately 1.1 miles east of the intersection of Thorp Highway and Cove Road, in Section 30 of Township 18 North, Range 18 East, Willamette Meridian (Figure 1). The generation tie line would originate from the southwestern project site boundary and follow existing power poles to cross south along an existing access road, crossing the Ellensburg Power (EP) Canal three times and passing through the Ellensburg Golf and Country Club, to connect to the existing PSE distribution transmission line along Thorp Highway. The Typha Solar Project site is approximately 54.1 acres and the generation tie line is approximately 4.4 acres, totaling 54.1 acres for the overall project. Topography of the site generally slopes to the east toward the Yakima River. Surface elevation within the solar site and generation tie line ranges from 1,570 to 1,614 feet above mean sea level, the lowest elevation being along the eastern site boundary closest to the Yakima River and the highest elevation being at the southern end of the generation tie line near Thorp Highway.

# 2 METHODS

## 2.1 Study Area

The Typha Solar Project site is approximately 54.1 acres and the generation tie line is approximately 4.4 acres, totaling 54.1 acres for the overall project. The generation tie line portion of the project is 80 feet wide centered on the existing power poles and new proposed line connecting the solar site to the existing poles (Figure 1). Wetlands and streams outside of the project site and generation tie line but that occur within 200 feet of these boundaries and had the potential to have buffers extend into the project were included in the study area. Wetlands and streams outside of the project site and within the study area were visually inspected but not formally delineated.

## 2.2 Review of Existing Information

Prior to conducting fieldwork, background materials were reviewed to determine the potential for wetlands, floodplains, habitats, and other critical areas and their buffers to occur within the study area. Materials referenced during the desktop study are listed below. The following checklist follows the KCC Critical Areas required checklist outlined in KCC Chapter 17A.03.035.

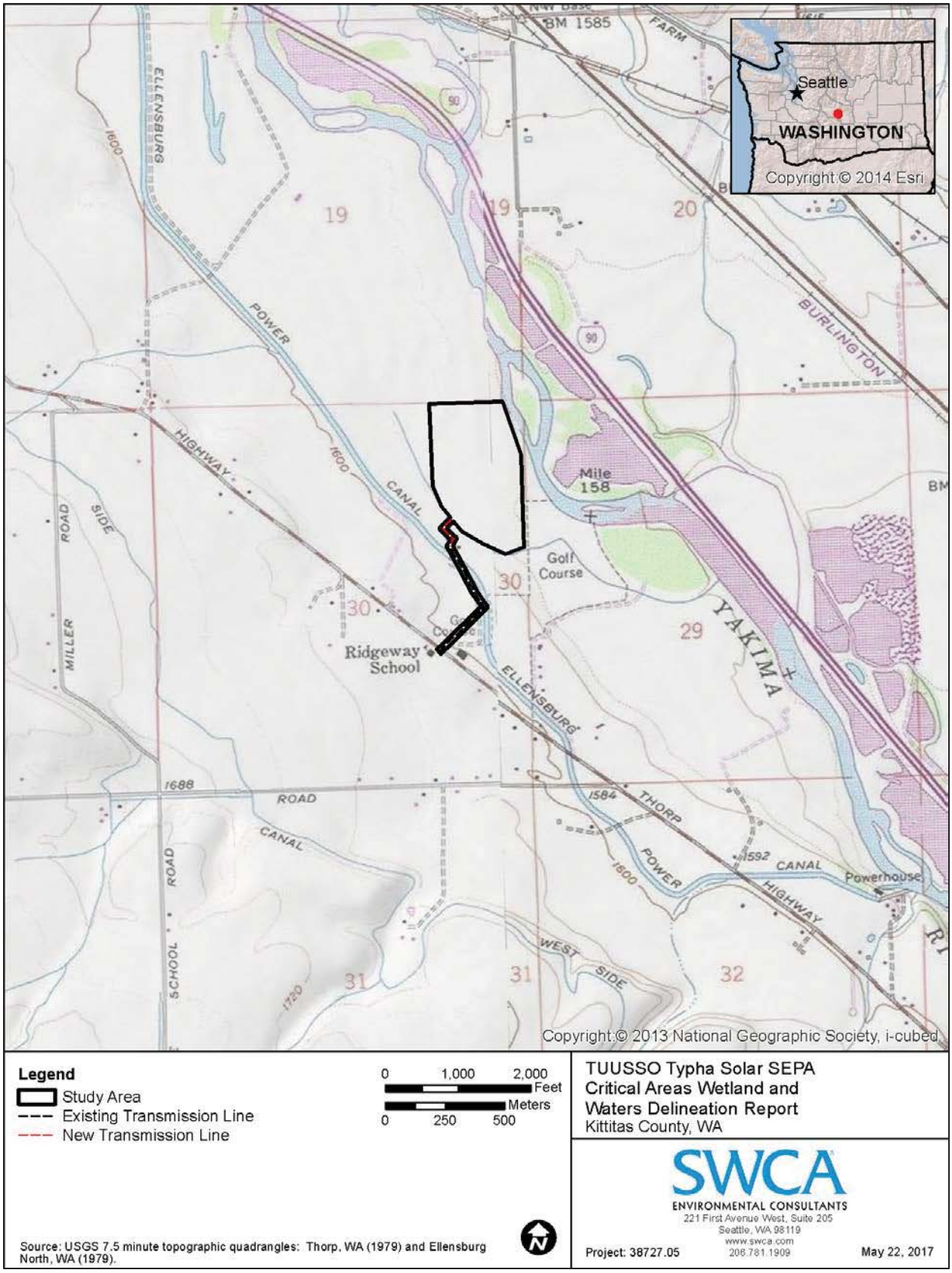


Figure 1. Project vicinity map.

Wetlands (KCC Chapter 17A.04)

- Historical Google Earth aerial photography (2000–2015).
- U.S. Department of Agriculture (USDA) historical imagery (USDA 1954).
- U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps for Ellensburg North and Thorp, Washington, included in Figure 1.
- USFWS National Wetlands Inventory (NWI) data and USGS National Hydrography Dataset (NHD), included in Figure 2.
- Natural Resources Conversation Service (NRCS) Soil Survey of Kittitas County Area, Washington and NRCS Web Soil Survey map of the study area, included in Figure 3.

Frequently flooded areas (KCC Chapter 17A.05)

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 5300950438C (as cited by Kittitas County 2017), included in Figure 2.

Geologically hazardous areas (KCC Chapter 17A.06)

- Includes erosion, landslide, mine, and seismic hazard areas.
- Kittitas County COMPAS mapping tool.

Habitats (KCC Chapter 17A.07)

- Includes riparian habitats and streams and rivers.
- Washington State Department of Fish and Wildlife (WDFW) SalmonScape online mapper.
- WDFW Priority Habitats and Species (PHS) online mapper, included in Figure 3.

Aquifer recharge areas (KCC Chapter 17A.08)

- No critical aquifer recharge locations have been identified in Kittitas County.

Spatial data obtained during the review of existing information were incorporated into Typha Solar Project base maps (Figures 1–3).

## 2.3 Field Investigation

Following the desktop review of existing information, a team of two biologists conducted site visits on April 3, 4, and 12, 2017, to assess the study area for the presence of wetland and waterbody features and to record data relevant to the Washington State Department of Ecology's (Ecology's) most recently approved version of the *Washington State Wetland Rating System for Eastern Washington, 2014 Update* (Hruby 2014). Visual observations were recorded within 200 feet of the project site and generation tie line, and included wildlife and habitat data.

Precipitation data were obtained from the closest wetlands climate analysis (WETS) climate station, the Ellensburg National Weather Service (NWS) station (ELBW1), approximately 5.5 miles to the southeast of the project site in southern Ellensburg, Washington. Historical (1971–2000) average annual rainfall is listed as 8.96 inches. Table 1 shows the monthly precipitation at the Ellensburg NWS weather station for the 3 months prior to the April 3, 4, and 12, 2017, site visits. Table 2 shows the rainfall received 2 weeks prior to the site visits, and the water-year-to-date (WYTD) rainfall. Rainfall recorded 3 months prior to fieldwork was wetter than normal.

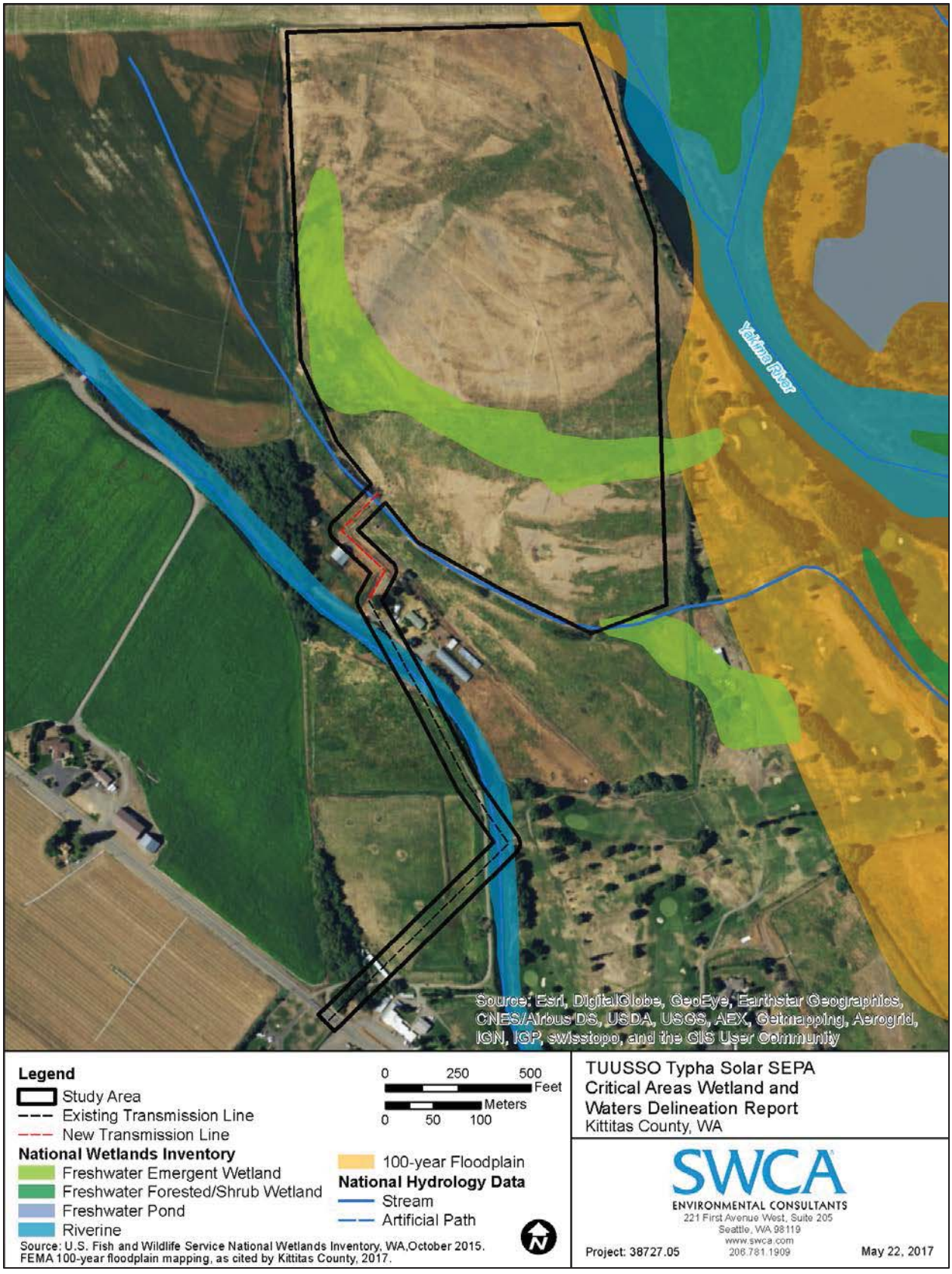


Figure 2. NWI, NHD, and floodplain mapping.

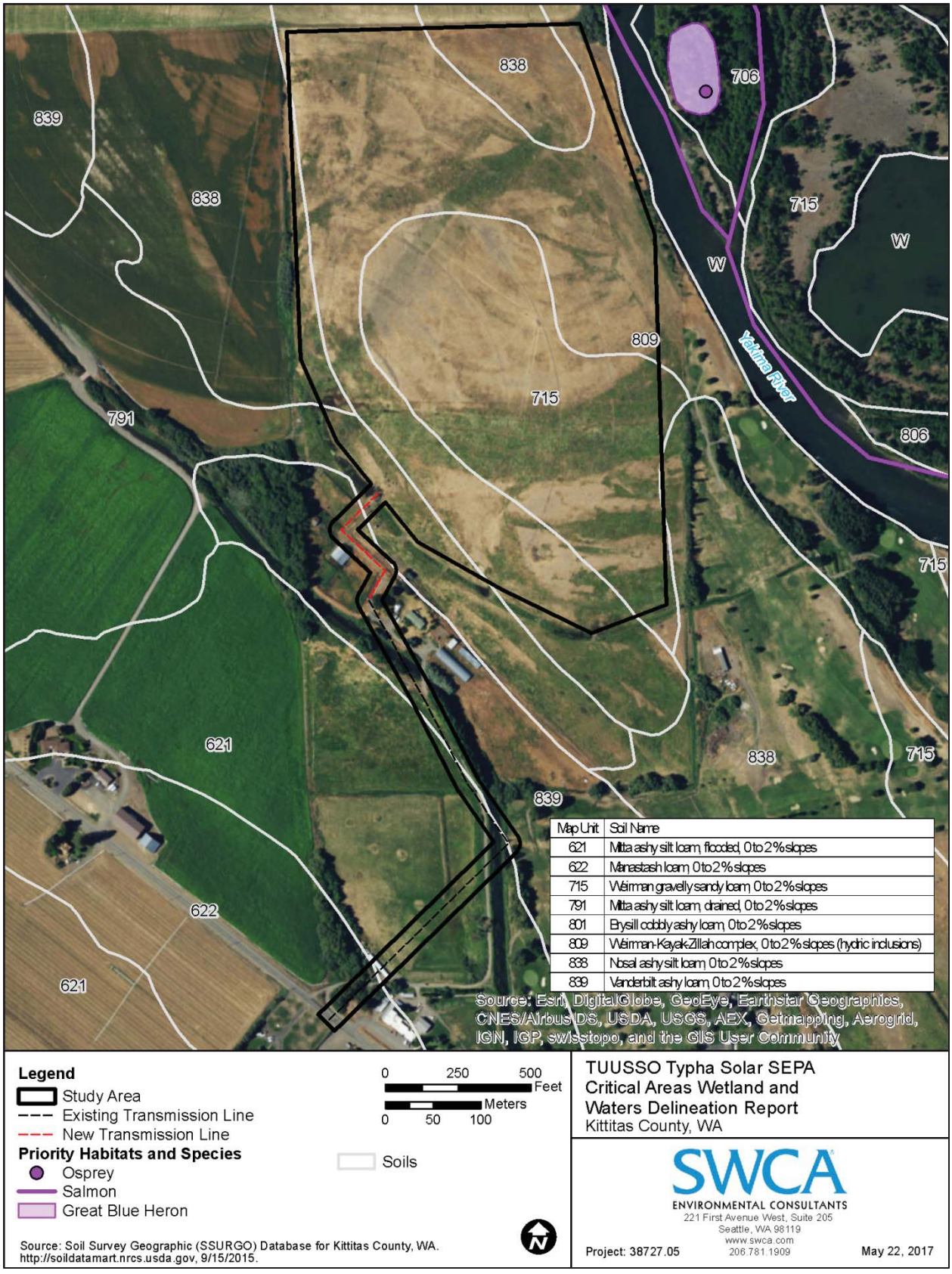


Figure 3. Soils and PHS mapping.

Table 1. Precipitation for 3 Months Prior to Site Visits (in inches)

| Month | Average | 30% Chance Will Have | | Observed Precipitation | Within Normal Range? |
|---|---|---|---|---|---|
| | | Less Than | More Than | | |
| March | 0.76 | 0.36 | 0.93 | 1.49 | Above |
| February | 0.91 | 0.59 | 1.10 | 2.04 | Above |
| January | 1.19 | 0.65 | 1.45 | 1.54 | Above |

Source: NRCS 2017b.

Table 2. Precipitation 2 Weeks Prior to Site Visits (in inches)

| Field Study | Precipitation 2 Weeks Prior | WYTD | Inches Above or Below Normal WYTD* |
|---|---|---|---|
| April 2–March 20, 2017 | 0.79 | 8.93 | 2.80 above |
| April 3–March 21, 2017 | 0.79 | 8.93 | 2.78 above |
| April 11–March 29, 2017 | 0.61 | 9.38 | 3.08 above |

*Based on average precipitation from 1981 to 2010.
Source: NRCS 2017b.

### *2.3.1 Wetlands*

The study area was investigated for wetlands in accordance with the current methodology of the U.S. Army Corps of Engineers' (USACE's) 2008 *Arid West Regional Supplement (Version 2)* and the *Wetlands Delineation Manual* (Environmental Laboratory 1987). A detailed description of the field methods used in this study is provided in Appendix A.

A Trimble Geo XT global positioning system (GPS) unit was used by the field team to assist in identifying the project site and generation tie line boundaries and to record site spatial data. This device is capable of submeter accuracy. The full extent of the study area was covered by the team of biologists. Photographs were collected and vegetation, soil, and hydrology characteristics were documented. The boundaries for wetlands located outside of the project site and generation tie line but within the study area were approximated using field observations and aerial imagery to determine the extent of on-site wetland buffers.

Geographic information system (GIS) software were used to analyze data and to produce the report figures (Figures 4 and 5). Per WAC 463-60-333 and KCC Chapter 17A, wetlands were rated using the *Washington State Wetland Rating System for Eastern Washington, 2014 Update*. Per KCC 17A.04.020, the resulting wetland ratings were used to determine the County-prescribed range of wetland buffers for each wetland. Table 3 lists Ecology's wetland rating criteria. Kittitas County's definition of a wetland is based on the Revised Code of Washington (RCW) 36.70A.030, which states:

> *(21) "Wetland" or "wetlands" means areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas created to mitigate conversion of wetlands.*

Table 3. Washington State Department of Ecology Wetland Rating System

| Category | | | |
|---|---|---|---|
| **I** | **II** | **III** | **IV** |
| Category I wetlands:<br>Represent a unique or rare wetland type; are more sensitive to disturbance than most wetlands; are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or provide a high level of functions. Specific wetlands that meet the Category I criteria include:<br>1. alkali wetlands, characterized by the presence of shallow saline water with a high pH;<br>2. natural heritage wetlands, specifically, wetlands identified by the Washington Natural Heritage Program/DNR as high quality relatively undisturbed wetlands; and wetlands that support state-listed threatened or endangered plants;<br>3. bogs and calcareous fens;<br>4. mature and old-growth forested wetlands with slow growing trees that are over 0.25 acre in size; and<br>5. wetlands that perform many functions very well, as indicated by a score of 22 or more points out of 27 on the wetland rating form. | Category II wetlands:<br>Wetlands that are difficult, though not impossible, to replace, and provide high levels of some functions. Specific wetlands that meet the Category II criteria include:<br>1. forested wetlands in the floodplains of rivers;<br>2. mature and old-growth forested wetlands with fast growing trees that are over 0.25 acre in size;<br>3. vernal pool that are located in a landscape with other wetlands and that are relatively undisturbed during the early spring; and<br>4. wetlands scoring between 19 and 21 points, out of 27, on the wetland rating form. | Category III wetlands:<br>Wetlands that provide a moderate level of functions. Specific wetlands that meet the Category III criteria include:<br>1. wetlands scoring between 16 and 18 points, out of 27, on the wetland rating form. | Category IV wetlands:<br>Wetlands that have the lowest levels of functions and are heavily disturbed. Specific wetlands that meet the Category IV criteria include:<br>1. wetlands scoring less than 16 points out of 27 on the wetland rating form. |

Source: Hruby (2014).
Kittitas County wetland category definitions defer to Washington Administrative Code for guidance.
Appendix F includes the County-issued guidance.

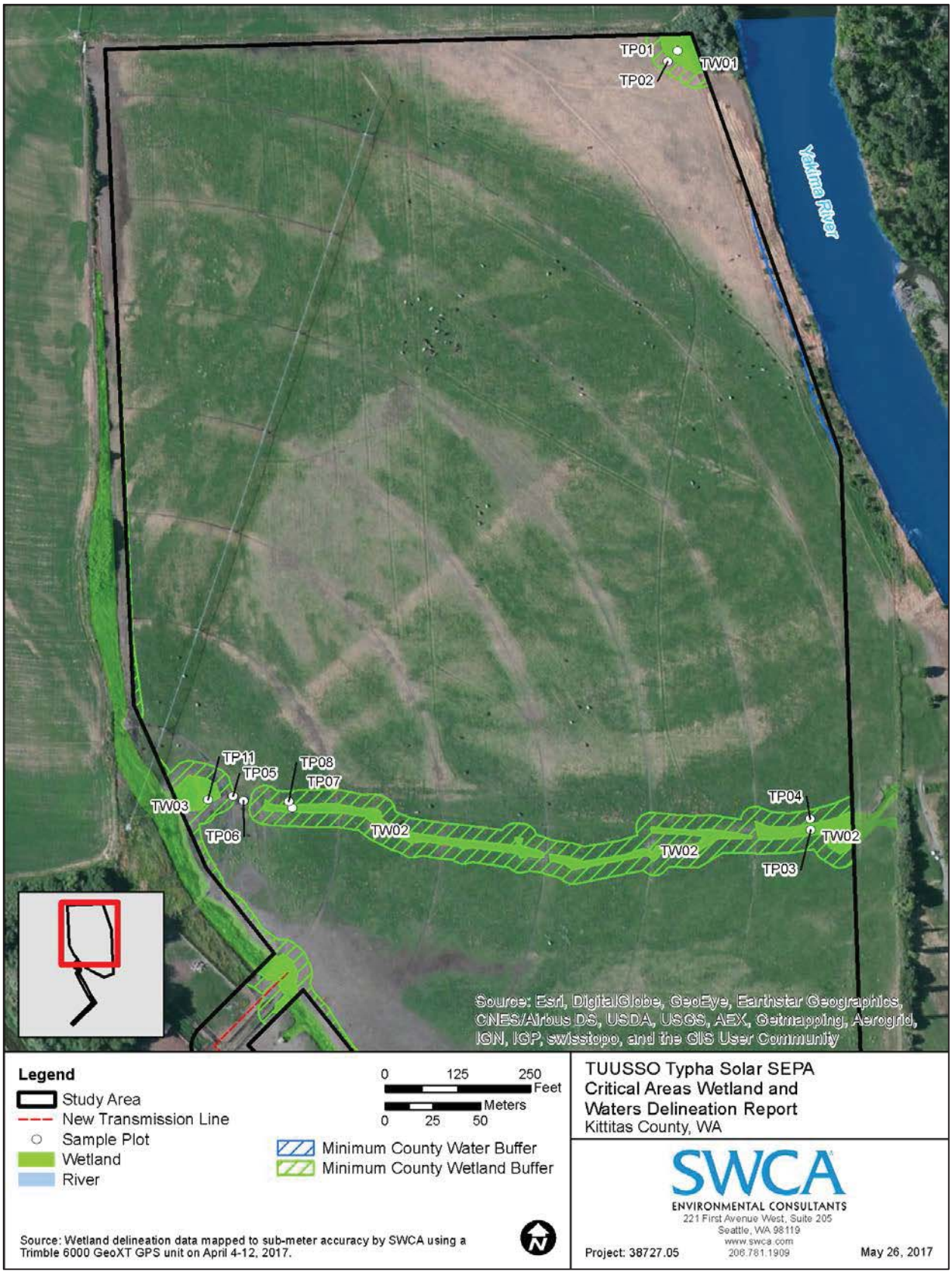


Figure 4. Wetland and waters delineation map, north portion.

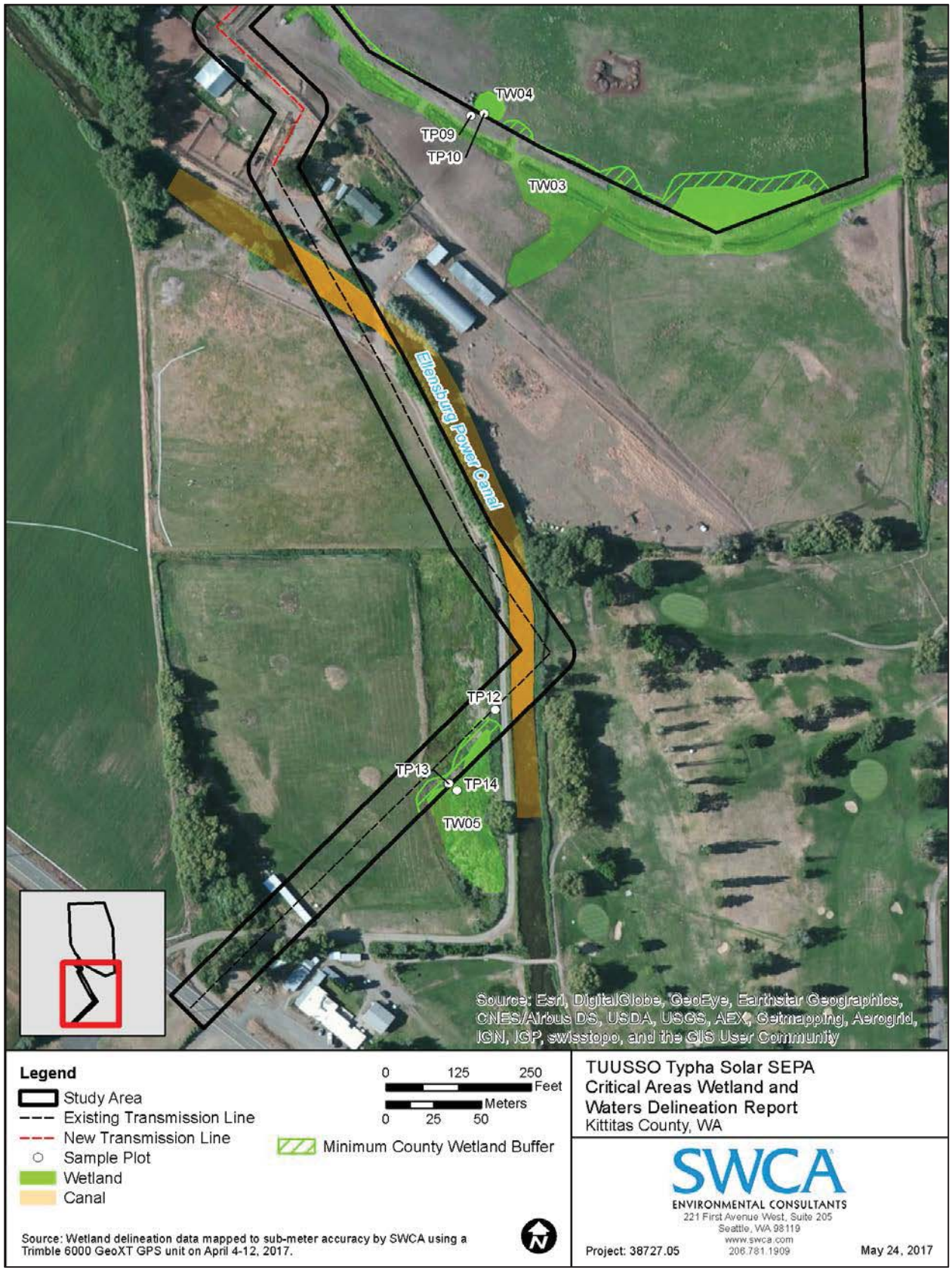


Figure 5. Wetland and waters delineation map, south portion.

A detailed analysis of wetland functions is not included in this report; however, a brief description of wetland functions is provided as part of the general description for each wetland.

### *2.3.2 Riparian Habitats*

Biologists also investigated the Typha Solar Project study area for the presence of non-wetland waters and used a GPS device to delineate the ordinary high water marks (OHWMs) of streams per the definitions in WAC 173-22-030 (Figure 5). The OHWMs of streams and rivers outside of the project site and generation tie line but within the study area were approximated using field observations and aerial imagery to determine the extent of on-site stream buffers.

Streams identified in the study areas were classified according to the WAC stream typing system (WAC 222-16-030). Criteria for this typing system are described in Table 4. The stream types described in this report are based on the stream reaches within the study area; downstream reaches may be rated higher.

Table 4. Summary of the Water Typing System

| Stream Type | Definition [a] |
|---|---|
| S | All waters, within their bankfull width, as inventoried as "shorelines of the state" under Chapter 90.58 RCW and the rules promulgated pursuant to Chapter 90.58 RCW including periodically inundated areas of their associated wetlands. |
| F | All segments of natural waters that are not Type S waters, and that contain fish or fish habitat, including:<br>1) waters diverted for domestic use by more than 10 residential or camping units or by a public accommodation facility;<br>2) waters diverted for use by a federal, state, or Tribal fish hatchery from the point of diversion for 1,500 feet or the entire tributary if the tributary is highly significant for protection of downstream water quality;<br>3) waters that are within a federal, state, local, or private campground having more than 10 camping units; or<br>4) riverine ponds, wall-based channels, and other channel features that are used by fish for off-channel habitat. |
| Np | All segments of natural waters within the bankfull width of defined channels that are perennial non–fish habitat streams. Perennial streams are flowing waters that do not go dry any time of a year of normal rainfall and include the intermittent dry portions of the perennial channel below the uppermost point of perennial flow. |
| Ns | All segments of natural waters within the bankfull width of the defined channels that are not Type S, F, or Np waters. These are seasonal, non–fish habitat streams in which surface flow is not present for at least some portion of a year of normal rainfall and the stream is not located downstream from any stream reach that is a Type Np water. Ns waters must be physically connected by an above-ground channel system to Type S, F, or Np waters. |

[a] Definitions are summarized from WAC 222-16-030. Kittitas County stream type definitions defer to WAC for guidance.

## 3 RESULTS AND DISCUSSION

The Typha Solar Project site consists of formerly irrigated and grazed pasture along the right bank (when facing downstream) of the Yakima River. The site is currently fallow and dominated by weeds and non-native herbaceous species in upland areas, including tall false rye grass (*Schedonorus arundinaceus*), bluegrass (*Poa* spp.), remnant planted common timothy (*Phleum pretense*), garden yellow rocket (*Barbarea vulgaris*), hairy cat's-ear (*Hypochaeris radicata*), common dandelion (*Taraxacum officinale*), and white clover (*Trifolium repens*). In addition, the site has patches of noxious weeds, including Canadian thistle (*Cirsium arvense*), Scotch thistle (*Onopordum acanthium*), yellow nutsedge (*Cyperus esculentus*), and reed canary grass (*Phalaris arundinacea*). The generation tie line crosses areas of rural residential use, existing driveways and access roads, and a manicured gold course, including some areas with mature grand fir (*Abies grandis*), ponderosa pine (*Pinus ponderosa*), quaking aspen (*Populus tremuloides*), and crack willow (*Salix* X *fragilis*) trees, with Nootka rose (*Rosa nutkana*) shrubs along the EP Canal and nearby residences and other structures further south. Refer to Appendix B for a complete list of vegetation observed within the study area.

The proposed solar site is situated between the Yakima River and the Ellensburg Golf and Country Club to the east, active agricultural land to the north and west, and a wetland drainage and rural residence to the south. The generation tie line crosses over the EP Canal three times and over two ephemeral ditches that run along the existing access road and pass under the road through a culvert, until it ultimately terminates at Thorp Highway South to the south.

According to NRCS, the Typha Solar Project study area encompasses four different soil map units within the project site and three different soil map units with the generation tie line (Table 5). These soil map units range from somewhat poorly drained to well drained soils that occur on terraces, floodplains, valleys, and fans. The Weirman-Kayak-Zillah complex soil unit is on the National Hydric Soils list (NRCS 2015), which is a list of soils that can be indicative of saturated, flooded, or ponded areas that could meet the definition of a hydric soil.

Table 5. Soil Mapping within the Study Area

| Map Unit Symbol | Map Unit Name | Hydric |
|---|---|---|
| 621 | Mitta ashy silt loam, flooded, 0%–2% slopes | No |
| 622 | Manastash loam, 0%–2% slopes | No |
| 715 | Weirman gravelly sandy loam, 0%–2% slopes | No |
| 791 | Mitta ashy silt loam, drained, 0%–2% slopes | No |
| 809 | Weirman-Kayak-Zillah complex, 0%–2% slopes | Yes |
| 838 | Nosal ashy silt loam, 0%–2% slopes | No |
| 839 | Vanderbilt ashy loam, 0%–2% slopes | No |

Source: NRCS 2015 and 2017b.

## 3.1 Wetlands

Five wetlands were delineated within the Typha Solar Project study area (three only on the solar site, one only on the generation tie line, and one on both). Wetlands were distinguished from adjoining uplands by the presence or absence of indicators for wetland hydrology, hydric soils, and hydrophytic vegetation. Wetland delineation data sheets are provided in Appendix C, photographs are provided in Appendix D, and wetland rating forms are provided in Appendix E.

Table 6 summarizes the size, rating, and classification of wetlands found within the study area. All delineated wetlands would fall under the jurisdiction of the USACE, Ecology, and Kittitas County. Figures 4 and 5 show the locations of the wetlands, streams, data plots, and their associated minimum protection buffers. The minimum wetland protection buffers were calculated per KCC guidance based on Ecology's Wetland Rating for each wetland. Detailed descriptions of each wetland are provided in the following sections.

Table 6. Wetland Size, Rating, and Classification for Wetlands within the Study Area

| Wetland Name | Delineated Area within the Project (Wetland Rating Unit Size) [a] (acres) | Wetland Rating [b] | Hydrogeomorphic Classification | Cowardin Classification [c] | Dominant Species Observed within Wetland |
|---|---|---|---|---|---|
| **Solar Site** | | | | | |
| TW01 | 0.07 (estimated 0.33) | II | Riverine | PEM/PSS | Narrow-leaf willow, Nootka rose, red osier dogwood, common panic grass, and hairy cat's-ear |
| TW02 | 0.38 (estimated 0.68) | II | Riverine | PEM | Baltic rush, tall false rye grass, common timothy, reed canary grass, and Fuller's teasel |
| TW03 | 0.35 (estimated 8.45) | II | Riverine | PEM/PSS | Reed canary grass, common duckweed, Rocky Mountain iris, and bluegrass |
| TW04 | 0.04 (0.05) | III | Depressional | PEM | Broad-leaf cat-tail, reed canary grass, and tall false rye grass |
| **Generation Tie Line** | | | | | |
| TW03 | 0.07 (estimated 8.45) | II | Riverine | PEM/PSS | Reed canary grass, common duckweed, Rocky Mountain iris, and bluegrass |
| TW05 | 0.03 (estimated 0.47) | III | Riverine | PEM | Broad-leaf cat-tail, reed canary grass, and Baltic rush |

a Wetland rating unit size is the total area of wetland delineated or estimated based on aerial photograph interpretation and field reconnaissance. Area of delineated portions of the wetlands is based on SWCA survey data.

b Wetland ratings are based on *Washington State Wetland Rating System for Eastern Washington – Revised* (Hruby 2014).

c Cowardin et al. (1979).

### *3.1.1 Wetland TW01*

Palustrine emergent/scrub-shrub
Category II
0.07 acre within the project site, approximately 0.33 acre in total

Wetland TW01 is a riverine wetland located in the northeastern corner of the Typha Solar Project site, within the floodplain of the Yakima River (see Figure 5; and wetland rating Figures 1 through 4 in Appendix E). Delineation data were recorded at sample plots TP01 and TP02, provided on datasheets in Appendix C. The wetland extends off-site to the east to connect to the Yakima River, with its southwestern boundary defined by a subtle rise in topography and a change in the plant community. Wetland TW01 is located within the 100-year floodplain for the Yakima River (see Figure 2).

Wetland TW01 is composed of two Cowardin types, with palustrine emergent (PEM) wetland on the project side of the property boundary fence and palustrine scrub-shrub (PSS) wetland on the other side of the fence toward the Yakima River (Cowardin et al. 1979). Refer to Table A-1 in Appendix A for definitions of wetland indictor statuses listed in this section (i.e., FACU, FAC, FACW, and OBL). The PEM side is sparsely vegetated and consists of narrow-leaf willow (*Salix exigua*, FACW) saplings, common panic grass (*Panicum capillare*, FACU), and hairy cat's-ear (FACU). The off-site PSS portion of the wetland is dominated by narrow-leaf willow, red osier dogwood (*Cornus alba*, FACW), and Nootka rose (FACU).

Soils in Wetland TW01 are mapped as Weirman-Kayak-Zillah complex, with 0% to 2% slopes (NRCS 2017a) (see Figure 3). The typical soil profile observed within 16 inches of the soil surface consists of very dark brown (10YR 2/2) silt loam with redoximorphic features starting at 7 inches (Munsell Color 2009). The soils in Wetland TW01 meet the hydric soil indicator for Redox Dark Surface (F6).

No primary indicators of hydrology within the wetland were observed. The only secondary indicator observed was saturation visible on aerial imagery. This wetland was determined to have problematic hydrology under the USACE's 2008 *Arid West Regional Supplement (Version 2)* and, therefore, the presence of positive hydric soil and wetland vegetation indicators, and relative landscape position within the 100-year floodplain, was relied upon for the wetland determination.

Wetland TW01 is rated as a Category II wetland in the Ecology rating system (see Table 3), with a moderately high score for water quality improvement (7/9 points) and moderate scores for hydrologic function (6/9) and habitat function (5/9 points). Wetland TW01 has moderately high potential to provide water quality improvements because of its position within the Yakima River floodplain, which is a 303(d) listed water, which has total maximum daily load (TMDL) limits, and has flooding problems within its watershed.

### *3.1.2 Wetland TW02*

Palustrine emergent
Category II
0.38 acre within the project site, approximately 0.68 acre in total

Wetland TW02 is a riverine wetland drainage that crosses the southern middle of the site from west to east, is fed from overbank flooding from Wetland TW03, and feeds into the Yakima River east of the Typha Solar Project site (see Figure 5; and wetland rating Figures 1 through 5 in Appendix E). Delineation data were recorded at sample plots TP03, TP04, TP06, TP07, and TP08 and is provided on datasheets in Appendix C. This wetland has small areas of upland separating the wetland areas because of the slight berms along the tracks of the circular irrigator that passes through this wetland. The upland boundary of the wetland is defined by an obvious rise in elevation on either side of this wetland drainage.

Wetland TW02 is a PEM wetland habitat type (Cowardin et al. 1979). The wetland is dominated by Baltic rush (*Juncus balticus*, FACW), tall false rye grass (FACU), and remnant planted common timothy (FACU), with Nootka rose, narrow-leaf willow, Fuller's teasel (*Dipsacus fullonum*, FAC), and reed canary grass off-site to the east of the project site. The dominance of these species meets the wetland vegetation criteria. Wetland TW02 is partially located within a NWI-mapped palustrine emergent, persistent, seasonally flooded (PEM1C) wetland (see Figure 2).

Soils in Wetland TW02 are mapped as Weirman-Kayak-Zillah complex, with 0% to 2% slopes, and Weirman gravelly sandy loam, with 0% to 2% slops (NRCS 2017a) (see Figure 3). The soil profile observed within 16 inches of the soil surface in the eastern portion of the wetland consists of black (2.5Y 2.5/1) silt loam over a black silty clay loam with depletions of dark grayish brown (2.5Y 4/2) and redoximorphic features starting at 3 inches (Munsell Color 2009). The soil profile in the western portion of the wetland consists of black (10YR 2/1) silty clay loam with redoximorphic features starting at 7 inches, with a thin layer of sand at 10 inches. The soils in Wetland TW02 meet the hydric soil indicator for Redox Dark Surface (F6).

Primary indicators of hydrology within the wetland include saturation within the upper 12 inches and surface soil cracks. Secondary indicators of hydrology observed within the wetland include drainage patterns and saturation visible on aerial imagery. The presence of these indicators meets wetland hydrology criteria.

Wetland TW02 is rated as a Category II wetland in the Ecology rating system, with a moderately high score for hydrologic function (7/9 points) and moderate scores for habitat function (6/9 points) and water quality improvement (6/9 points). Wetland TW02 has moderately high potential to provide

hydrologic functions because of its potential to slow down water movement and help reduce flooding issues directly downstream in the Yakima River.

### *3.1.3 Wetland TW03*

Palustrine emergent/scrub-shrub
Category II
0.35 acre in the project site and 0.07 acre in the generation tie line, approximately 8.45 acres in total for the wetland unit

Wetland TW03 is a riverine wetland that surrounds a drainage that starts just outside of the western project site boundary and extends south and east along the southern study area boundary. This wetland is fed by runoff and irrigation from the agricultural fields to the north and west of the wetland and includes areas of open water as the drainage extends south and west, eventually feeding into the Yakima River east of the study area (see Figure 5; and wetland rating Figures 1 through 5 in Appendix E). Delineation data were recorded at sample plots TP05 and TP11 and is provided on datasheets in Appendix C. The drainage passes through many culverts along its route east, but the culverts are partially obstructed, causing the water to flood over the higher elevation areas between the main drainage reaches; therefore, these areas are included in the wetland. The upland boundary of the wetland is defined by an obvious rise in elevation on either side of the overall drainage.

Wetland TW03 is mostly a PEM wetland habitat type with some PSS areas off-site to the east of the project site (Cowardin et al. 1979). The wetland is dominated by reed canary grass, common duckweed (*Lemna minor*, OBL), Rocky Mountain iris (*Iris missouriensis*, FACW), bluegrass (*Poa* spp., FAC), tall false rye grass, and yellow nutsedge (FACW), with some broad-leaf cat-tail (*Typha latifolia*, OBL), Fuller's teasel, and narrow-leaf willow in the eastern portion of the wetland. The dominance of these species meets the wetland vegetation criteria. Wetland TW03 is located within two different NWI-mapped PEM1C wetland polygons, one along the western project site boundary and one in the southeastern corner of the project site that extends off-site (see Figure 2).

Soils in Wetland TW03 are mapped as Nosal ashy silt loam with 0% to 2% slopes; Mitta ashy silt loam, drained with 0% to 2% slopes; Weirman-Kayak-Zillah complex with 0% to 2% slopes; and Weirman gravelly sandy loam with 0% to 2% slopes (NRCS 2017a) (see Figure 3). The soil profile observed within 16 inches of the soil surface consists of black (2.5Y 2.5/1) silty clay loam with depletions of dark grayish brown (10YR 4/2) and redoximorphic features starting at 8 inches (Munsell Color 2009). The soils in Wetland TW03 meet the hydric soil indicator for Redox Dark Surface (F6).

Primary indicators of hydrology within this wetland include aquatic invertebrates. Secondary indicators of hydrology observed within the wetland include drift deposits (riverine) and drainage patterns. The presence of these indicators meets wetland hydrology criteria.

Wetland TW03 is rated as a Category II wetland in the Ecology rating system, with a high score for hydrologic function (8/9 points) and moderate scores for habitat function (6/9 points) and water quality improvement (6/9 points). Wetland TW03 has high potential to provide hydrologic functions because of its large wetland to channel width ratio and its potential to help reduce flooding issues directly downstream in the Yakima River.

### *3.1.4 Wetland TW04*

Palustrine emergent
Category III
0.04 acre within the project site, 0.05 acre in total

Wetland TW04 is a depressional wetland located at the southern project site boundary, approximately 25 feet north of TW03 (see Figure 5; and wetland rating Figures 1 through 5 in Appendix E). Delineation data were recorded at sample plots TP09 and TP10 and is provided on datasheets in Appendix C. This wetland is fed by overland flow that is intercepted before entering TW03 and has seasonal ponding that provides frog habitat. Frog egg masses were observed in this wetland during the site visit. The upland boundary of the wetland is defined by an obvious rise in elevation in all directions.

Wetland TW04 is a PEM wetland habitat type (Cowardin et al. 1979). The wetland is dominated by broad-leaf cat-tail, reed canary grass, and tall false rye grass. The dominance of these species meets the wetland vegetation criteria.

Soils in Wetland TW04 are mapped as Weirman-Kayak-Zillah complex with 0% to 2% slopes, and Mitta ashy silt loam, drained with 0% to 2% slopes (NRCS 2017a) (see Figure 3). The soil profile observed within 16 inches of the soil surface consists of black (10YR 2/1) silt loam with depletions of dark grayish brown (2.5Y 4/2) and medium to large rocks throughout (Munsell Color 2009). This wetland was determined to have problematic soils under the USACE's 2008 *Arid West Regional Supplement (Version 2)* and, therefore, the presence of positive wetland hydrology and wetland vegetation indicators, and the presence of rocks throughout the soil profile, which made detecting redoximorphic features difficult, was relied upon for the wetland determination.

Primary indicators of hydrology within the wetland include saturation and a high water table within the upper 12 inches and drift deposits (nonriverine). The presence of these indicators meets wetland hydrology criteria.

Wetland TW04 is rated as a Category III wetland in the Ecology rating system, with moderate scores for water quality improvement (6/9 points), hydrologic function (6/9 points), and habitat function (6/9 points). Wetland TW04 has moderate potential to provide water quality improvement and hydrologic function because of its lack of a surface water outlet, and it provides moderate habitat function because it provides amphibian egg laying habitat, as positively observed in the field.

### *3.1.5 Wetland TW05*

Palustrine emergent
Category III
0.03 acre within the project site, approximately 0.47 acre in total

Wetland TW05 is a riverine wetland fed by flooding from the EP Canal through a culvert under the access road along the eastern wetland boundary (see Figure 5; and wetland rating Figures 1 through 5 in Appendix E). Delineation data were recorded at sample plots TP12, TP13, and TP14 and is provided on datasheets in Appendix C. This wetland is partially mowed along the western boundary where it overlaps with the Ellensburg Golf and Country Club driving range. The upland boundary of the wetland is defined by an obvious rise in elevation along the access road and a subtle elevation change and vegetation community change to the west.

Wetland TW05 is a PEM wetland habitat type (Cowardin et al. 1979). The wetland is dominated by broad-leaf cat-tail, reed canary grass, and Baltic rush, with a few crack willow (FAC) near the culvert. The dominance of these species meets the wetland vegetation criteria.

Soils in Wetland TW05 are mapped as Mitta ashy silt loam, flooded, with 0% to 2% slopes (NRCS 2017a) (see Figure 3). The soil profile observed within 16 inches of the soil surface consists of black (2.5Y 2.5/1) mucky mineral soil over a black gleyed (N 2.5/0) layer within the upper 5 inches and very dark gray (2.5Y 3/1) silt loam with depletions of greyish brown (2.5Y 5/2) below 5 inches (Munsell Color 2009). The soils in Wetland TW05 meet the hydric soil indicator for Loamy Gleyed Matrix (F2).

Primary indicators of hydrology within the wetland include a water table at 12 inches and saturation to the soil surface. The presence of these indicators meets wetland hydrology criteria.

Wetland TW05 is rated as a Category III wetland in the Ecology rating system, with a moderately high score for hydrologic function (7/9 points), a moderately low score for water quality improvement (5/9 points), and a low score for habitat function (4/9 points). Wetland TW05 has moderately high potential to provide hydrologic functions because of its potential to store floodwaters and help reduce flooding issues directly downstream in the Yakima River, and it has a low score for habitat function because it does not provide adequate habitat structure and is isolated from habitat in the surrounding area.

## 3.2 Frequently Flooded Areas

FEMA floodplain mapping depicts the 100-year floodplain adjacent to the Yakima River, which extends onto the northeastern corner of the project site (see Figure 2). This area overlaps Wetland TW01 with a total area of 0.11 acre within the project site, and will likely be avoided during project design. Development within the 100-year floodplain will be avoided; therefore, no net loss of floodplain storage will be achieved.

## 3.3 Geologically Hazardous Areas

The Typha Solar Project site is not within any mapped geologically hazardous areas. No erosion/landslide geologic hazard areas, snow avalanche hazards, or mine hazard areas are mapped on any of the parcels that encompass the project site (Kittitas County 2017). The project will not require specialized engineering to ascertain that the property is suitable for development.

## 3.4 Habitats

Based on the criteria provided in KCC Chapter 17A.07, the Typha Solar Project study area includes riparian habitat and priority species habitat. The Typha Solar Project is not located on federal land or land owned or leased by the WDFW, and therefore is not considered big game winter range.

### *3.4.1 Riparian Habitat*

One perennial canal (EP Canal) and two ephemeral ditches are located in the Typha Solar Project study area. In addition, the Yakima River is located within 200 feet of the project site. Based on the field observations, the EP Canal and the Yakima River are considered jurisdictional waters for the USACE, Ecology, and Kittitas County because they satisfy the definition of “waters of the United States” under the Clean Water Rule 40 CFR 230.3. The two ephemeral ditches ultimately feed into the EP Canal; one that runs along the south side of the access road and another that crosses under the road from north to south through a culvert, connecting to the first ditch. Because these ditches are hydrologically connected to the EP Canal, they will likely be considered jurisdictional. Table 7 summarizes the size,

rating, and classification of the streams found in the study area (see Figures 4 and 5). Photographs of these features are provided in Appendix D.

Table 7. Summary of Streams in the Study Area

| Stream Name | Tributary to | Stream Type [a] | USACE Jurisdiction [b] | Average Width in Study Area (feet) [c] | Approximate Length in the Project (feet) [c] |
|---|---|---|---|---|---|
| Yakima River | Columbia River | S | RPW | 158 | 0 |
| EP Canal (TS01) | Yakima River | N/A | RPW | 45 | 540 |
| Unnamed Ephemeral Ditch 1 | EP Canal | N/A | NRPW | 4 | 115 |
| Unnamed Ephemeral Ditch 2 | EP Canal | N/A | NRPW | 10 | 42 |

[a] S = shoreline of the state (WAC 222-16-030), N/A = not applicable, due to ditches and canals being excluded from the WAC typing system.

[b] RPW = relatively permanent water; NPRW = non-relatively permanent water.

[c] Average widths and approximate lengths were determined based on SWCA survey data and field observations.

#### 3.4.1.1 Yakima River

The Yakima River is a perennial, fish bearing tributary of the Columbia River with a 6,150-square-mile drainage basin. The Yakima River is located approximately 35 feet outside of the project site, but is within 200 feet of the eastern project site boundary for approximately 1,150 feet. In the vicinity of the study area, the Yakima River is approximately 160 feet wide, with Wetland TW01 delineated within the 100-year floodplain. The project site is located near the cut bank, actively eroding, west side of the Yakima River, which may pose a long-term threat to the stability of the project site near the river. The thin riparian area between the project site and the Yakima River is dominated by herbaceous species, including stinging nettle (*Urtica dioica*), Fuller's teasel, Canadian thistle, and great mullein (*Verbascum thapsus*), with some areas of shrubs and saplings that included ponderosa pine, black hawthorn (*Crataegus douglasii*), narrow-leaf willow, red osier dogwood, and Nootka rose. According to WDFW mapping (WDFW 2017a, WDFW 2017b), coho (*Oncorhynchus kisutch)*, Chinook (*O. tshawytscha*), steelhead (*O. mykiss*), cutthroat (*O. clarki lewisi*), and bull trout (*Salvelinus confluentus*) are present in the Yakima River in the vicinity of the project site. Based on the Washington Water Typing Criteria (WAC 222-16-030) and the Shoreline Management Act's list of streams and rivers constituting shorelines of the state for Kittitas County (WAC 173-18-230), this portion of the Yakima River is designated as a shoreline of the state (Type S).

#### 3.4.1.2 Ellensburg Power Canal

The EP Canal is a perennial canal tributary to the Yakima River, located in the generation tie line, and is spanned three times by the existing line. Wetland TW05 receives floodwater from the EP Canal through a culvert under the access road that passes along the southwestern bank and crosses over the canal to the north. Within the study area, the EP Canal's OHWM is approximately 45 feet wide at each of the crossings. Vegetation on the riparian banks of this stream primarily consists of reed canary grass, stinging nettle, prickly lettuce (*Lactuca serriola*), Nootka rose, crack willow, narrow-leaf willow, black locust (*Robinia pseudoacacia*), quaking aspen, ponderosa pine, and grand fir.

Current WDFW mapping suggests that fish species do not occur in the EP Canal (WDFW 2017a, 2017b). This canal is highly manipulated by flow control measures to manage irrigation in the area; therefore, it is highly unlikely to support fish populations. Based on the Washington Water Typing Criteria (WAC 222-16-031) guidance, EP Canal does not fall into this typing system because it is a managed canal and not a stream.

### *3.4.2 Priority Habitats and Species*

PHS fish species are designated in the portion of the Yakima River that is adjacent to the Typha Solar Project study area and include coho, rainbow trout (*O. mykiss*), summer steelhead, spring Chinook, bull trout (*Salvelinus malma*), and westslope cutthroat (WDFW 2017a). In addition, there is a great blue heron (*Ardea herodias*) rookery and osprey (*Pandion haliaetus*) occurrence point on the east bank of the Yakima River, opposite and within 300 feet of the project site (WDFW 2017a). Great blue heron were observed during site visits foraging in the project site. PHS mapping is depicted in Figure 3.

These PHS-mapped areas occur off-site and within the protection buffers of other wetland and water features; therefore, no additional designation will be required under KCC 17A.07.020.

## 3.5 Aquifer Recharge Areas

As described in KCC 17A.08.010, no critical aquifer recharge locations have been identified in Kittitas County. Additionally, the Typha Solar Project will not involve any hazardous materials or disposal of on-site sewage. No well-heads have been identified within the study area.

# 4 CONCLUSIONS AND RECOMMENDATIONS

EFSEC will provide permitting requirements for the Typha Solar Project, but this report evaluates and shows compliance with County requirements. A review of the Typha Solar Project study area determined that the following Kittitas County defined critical areas have the potential to be affected by the project:

- Wetlands
- Frequently Flooded Areas
- Habitats:
    - Riparian Habitat

A summary of all wetlands, waters, and critical area buffers documented within the study area is provided in Table 8. The wetland and non-wetland waters identified in and adjacent to the study area will likely be determined jurisdictional by Ecology and the USACE. Although EFSEC will provide permitting requirements for the proposed project, to show compliance with County requirements, KCC guidance (Chapter 17A.07.010) defines a minimum 40-foot protection buffer for Type S waters, such as the Yakima River. However, up to a 200-foot protection buffer could be requested once Kittitas County has had the opportunity to review the results of this study and has had discussions with TUUSSO Energy (see Figures 4 and 5). KCC guidance does not define protection buffers for irrigation canals and ditches, such as The EP Canal and the delineated ephemeral ditches, because they do not qualify as streams. The minimum and maximum wetland protection buffers required by the KCC (Chapter 17A.04.020) are listed in Appendix F, and are provided for these wetlands in Table 8, but only the minimum protection buffers are depicted on Figures 4 and 5. Consultation with the County would be required to determine exact buffer distances.

Table 8. Wetland and Waters Summary

| Critical Area | Wetland Rating/Water Typing [a] | Kittitas County Minimum/Maximum Buffer Distances (feet) [b] | Total Size of Feature Within the Project (acres) [c] |
|---|---|---|---|
| **Wetlands** | | | |
| Wetland TW01 | II | 25 / 100 | 0.07 |
| Wetland TW02 | II | 25 / 100 | 0.38 |
| Wetland TW03 | II | 25 / 100 | 0.42 |
| Wetland TW04 | III | 0 / 0 [d] | 0.04 |
| Wetland TW05 | III | 20 / 80 | 0.03 |
| **Frequently Flooded Areas** | | | |
| Yakima River flood zone | N/A | N/A | 0.11 |
| **Riparian Habitat** | | | |
| Yakima River | S | 40 / 200 | 0.00 |
| EP Canal (TS01) | N/A | None | 0.44 |
| Ditches | N/A | None | 0.02 |

[a] II = Category II (Hruby 2014); III = Category III (Hruby 2014); S = shoreline of the state (WAC 22-16-030);
[b] Only minimum buffer distances are depicted on maps;
[c] Does not include buffer areas;
[d] No Kittitas County buffer is defined because the wetland area is below the minimum size threshold for protection; however, building setbacks may be required based on zoning lot line setbacks, but would not exceed 25 feet.

Design plans are incomplete for the proposed Typha Solar Project; however, TUUSSO Energy will attempt to design the project to avoid, reduce, or eliminate impacts to wetlands, waters, and their buffers. Following the finalization of the design footprint, all removal-fill activities proposed within jurisdictional features would require a Joint Aquatic Resources Permit Application (JARPA) submitted for USACE and Ecology review.

There is no minimum threshold to implement mitigation sequencing for potential impacts to wetland and waters features. Where possible, the Typha Solar Project should demonstrate avoidance of jurisdictional features and then minimization of impacts. Avoidance and minimization could be achieved by making minor design alterations around delineated feature boundaries.

Where impact avoidance is not possible, mitigation measures should be implemented to minimize temporary construction disturbance and other permanent alterations to the features. Mitigation would include the implementation of construction best management practices. Where permanent alterations to wetland and waters features are unavoidable, wetland mitigation measures to achieve “no net loss” would be required. Desktop research shows that there are no approved mitigation banks or in-lieu fee programs in Kittitas County; therefore, any mitigation that would be required must be conducted as an Advance Permittee-Responsible Mitigation. Under KCC guidance (Chapter 17A.04.050), the mitigation ratio for a Category II wetland is 2:1, and the mitigation ratio for a Category III wetland is 1:1.

# 5 DISCLAIMER

This report documents the investigation, best professional judgment, and conclusions of the investigators. This should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and is not a final determination.

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# APPENDIX A: WETLAND DELINEATION METHODOLOGY

Wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The methods used to delineate wetlands within the study area conform to guidance in the *Washington State Wetland Identification and Delineation Manual* (Ecology 1997), the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008).

To be considered a wetland by the U.S. Army Corps of Engineers (USACE), an area must express hydrophytic vegetation, hydric soils, and wetland hydrology. SWCA Environmental Consultants (SWCA) staff documented site conditions for these parameters in areas representative of the study area and in areas most likely to exhibit wetland features. Staff collected additional data in associated uplands, as needed, to confirm wetland boundaries. Wetland boundaries, stream boundaries, and wetland data plot locations in the study area were recorded with a Trimble Geo XT global positioning system (GPS) unit. All delineated wetlands and streams were processed and projected onto existing base maps using ArcGIS software.

**Vegetation**

The dominant and sub-dominant plants were identified and recorded at each sample plot location. These plants were evaluated based on their wetland indicator status to determine if the vegetation was hydrophytic. SWCA biologists utilized the 50/20 rule per USACE recommendations to determine which plants were dominant at each sample plot. Under this guidance, absolute cover estimates were made for each species found rooted within the sample plot radius for each vegetative strata found in the habitat (tree, sapling/shrub, herb, and woody vine). Refer to the USACE regional supplement for exact applications of this method of determining dominance (USACE 2008).

Sample plot radii varied in size depending on site topography and habitat complexity. When documenting vegetation in smaller or oddly-shaped wetlands or habitat features, vegetation strata radii may be adjusted to more accurately depict vegetation rooted within the wetland or habitat feature being delineated.

Hydrophytic vegetation is defined as vegetation adapted to wetland conditions, such as inundation or prolonged saturation. To meet the hydrophytic vegetation criterion, more than 50% of the total dominant plants across all stratums must have a wetland indicator status of Facultative (FAC), Facultative Wetland (FACW), or Obligate (OBL). The wetland indicator status is assigned to plant species that have the potential to occur in wetlands by the USACE (Lichvar et al. 2016). Table A-1 lists the definitions for each wetland indicator status.

Table A-1. Definitions for Each Wetland Plant Indicator Status

| Wetland Indicator Status | Symbol | Definition |
|---|---|---|
| Obligate Wetland Plants | OBL | Plants that almost always (> 99% of the time) occur in wetlands, but which may rarely (< 1% of the time) occur in non-wetlands. |
| Facultative Wetland Plants | FACW | Plants that often (67 to 99% of the time) occurs in wetlands, but sometimes (1 to 33% of the time) occur in non-wetlands. |
| Facultative Plants | FAC | Plants with a similar likelihood (34 to 66% of the time) of occurring in both wetlands and non-wetlands. |
| Facultative Upland Plants | FACU | Plants that sometimes (1 to 33% of the time) occur in wetlands, but occur more often (67 to 99% of the time) in non-wetlands. |
| Upland Plants | UPL | Plants that rarely (< 1% of the time) occur in wetlands, and almost always (> 99% of the time) occur in non-wetlands. |

Source: Lichvar et al. (2016).

SWCA biologists identified plants found in the field to species whenever possible, when adequate vegetative or flowering characteristics were available. Scientific and common plant names were reported with the currently accepted nomenclature.

**Soils**

An area typically must contain hydric soils to be considered a wetland, except when problematic site conditions occur. Hydric soils typically form under an area that experiences durations of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper portion of the soil profile. Chemical and biological processes in saturated soil result in reduced oxygen concentrations and promote anaerobic metabolism in microorganisms. These prolonged anaerobic conditions often create mottling and other distinct patterns in the soil, which are used as indicators of hydric soils. The hue, value, and chroma and relative percentage of mottling are recorded in the field at each data plot location. Other important hydric soil indicators include organic matter accumulations in the surface horizon, reduced sulfur odors, and organic matter staining in the soil profile (Natural Resource Conservation Service [NRCS] 2017a).

SWCA staff examined soil profiles at each data plot location by excavating sample pits to a depth of 16 to 20 inches to observe the soil profile, colors, and textures. In some cases, a shallower soil pit was used due to shovel refusal from obstructions in the soil profile, such as gravel, bedrock, thick roots, or clay hardpan. Munsell color charts (Munsell Color 2009) were used to determine soil colors in the field.

**Hydrology**

SWCA staff investigated the entire project area for evidence of wetland hydrology. Where data plot locations were taken, additional notes were recorded to fully document the presence of primary and secondary wetland hydrology indicators at the sample location. According to the USACE, wetland hydrology criteria were considered to be satisfied if the soil was seasonally inundated or saturated to the surface for a consecutive number of days greater than or equal to 12.5% of the growing season. The growing season for the area was determined based on the period in which temperatures are above 28 degrees Fahrenheit 5 out of 10 years (Ecology 1997) using the long-term climatological data collected by the NRCS (2017). Using the wetlands climate analysis (WETS) table for the nearest station (Ellensburg, Washington), the growing season was approximated as typically between April 20 and October 10, or a total of 173 days (NRCS 17b).

However, often times multiple site visits to determine the duration of seasonal inundation or saturation are not possible. Therefore, field indicators are used in an attempt to determine an area's hydro-period through field observations. Wetland hydrology indicators are divided into two categories: primary and secondary indicators (USACE 2008). Primary indicators of hydrology include, but are not limited to, surface inundation and high water table and saturated soils within 12 inches of the soil surface. The presence of one primary indicator is sufficient to conclude that wetland hydrology is present. Secondary hydrology indicators are also recorded and may substitute in the case of a lack of any primary indicators if multiple secondary indicators are observed. Secondary indicators of hydrology include, but are not limited to, drainage patterns, crayfish burrows, and dry-season water table (USACE 2008). If no primary indicators, and fewer than two secondary indicators, are observed within the sample area, then it is likely that the area is not considered a wetland, unless problematic conditions exist on-site. Aerial and historic imagery are often reviewed before and after site visits to ensure all possible hydrology indicators are taken into account.

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# APPENDIX B: VEGETATION LIST

# Typha Solar Site and Transmission Line Project
## Vegetation Table
## April 3, 4, and 12, 2017

| Common Name | Scientific Name | Wetland Indicator Status[1] | Native / Introduced and Invasive / Noxious |
|---|---|---|---|
| Grand Fir | *Abies grandis* | FACU | native |
| Garden Yellow-Rocket | *Barbarea vulgaris* | FAC | non-native |
| Canadian Thistle | *Cirsium arvense* | FACU | invasive, noxious |
| Red Osier | *Cornus alba* | FACW | native |
| Black Hawthorn | *Crataegus douglasii* | FAC | native |
| Chufa (yellow nutsedge) | *Cyperus esculentus* | FACW | native, noxious |
| Fuller's Teasel | *Dipsacus fullonum* | FAC | invasive, noxious |
| Hairy Cat's-Ear | *Hypochaeris radicata* | FACU | non-native, noxious |
| Rocky Mountain Iris | *Iris missouriensis* | FACW | native |
| Baltic Rush | *Juncus balticus* | FACW | native |
| Prickly Lettuce | *Lactuca serriola* | FACU | non-native |
| Common Duckweed | *Lemna minor* | OBL | native |
| Spearmint | *Mentha spicata* | FACW | non-native |
| scotch thistle | *Onopordum acanthium* | NOL | noxious |
| Common Panic Grass | *Panicum capillare* | FACU | native |
| Reed Canary Grass | *Phalaris arundinacea* | FACW | invasive, noxious |
| Common Timothy | *Phleum pratense* | FACU | non-native |
| Ponderosa Pine | *Pinus ponderosa* | FACU | native |
| bluegrass | *Poa species* | FAC ? | - |
| Quaking Aspen | *Populus tremuloides* | FACU | native |
| Black Locust | *Robinia pseudoacacia* | FACU | non-native |
| Nootka Rose | *Rosa nutkana* | FACU | native |
| Curly Dock | *Rumex crispus* | FAC | non-native |
| Narrow-Leaf Willow | *Salix exigua* | FACW | native |
| crack willow | *Salix X fragilis* | FAC | non-native |
| Tall False Rye Grass | *Schedonorus arundinaceus* | FACU | non-native |
| Common Dandelion | *Taraxacum officinale* | FACU | non-native |
| False Mayweed | *Tripleurospermum maritimum* | FACU | non-native, noxious |
| White Clover | *Trifolium repens* | FACU | non-native |
| Broad-Leaf Cat-Tail | *Typha latifolia* | OBL | native |
| Stinging Nettle | *Urtica dioica* | FAC | native |
| Great Mullein | *Verbascum thapsus* | FACU | non-native |
| | | | |

[1]Wetland Indicator Status (WIS) from the NWPL AW Region - see below.
A question mark (?) preceded by a space indicates our default assumption that the plant is FAC.

Wetland Indicator Status (WIS) and taxonomy for the AW Region per the National Wetland Plant List 2016v3.3:
(common names are capitalized) http://wetland-plants.usace.army.mil/ Accessed January 10, 2017
WIS for non-wetland plants and taxonomy from Reed 1988 and Reed et al. 1993, and the USDA PLANTS database:
(common names are not capitalized) http://plants.usda.gov/ Accessed multiple dates

Native per Hitchcock & Cronquist 1973 and http://plants.usda.gov/
Noxious per Washington State NWCB 2017 http://www.nwcb.wa.gov/

| WETLAND INDICATOR STATUS - Arid West Region | |
|---|---|
| OBL | **Obligate Wetland** – Almost always is a hydrophyte, rarely in uplands. Examples: broad-leaf cat-tail, yellow-skunk-cabbage |
| FACW | **Facultative Wetland** - Usually is a hydrophyte but occasionally found in uplands. Examples: Oregon ash, red osier |
| FAC | **Facultative** – Commonly occurs as either a hydrophyte or non-hydrophyte. Examples: red alder, salmon raspberry |
| FACU | **Facultative Upland** - Occasionally is a hydrophyte but usually occurs in uplands. Examples: big-leaf maple, Himalayan blackberry |
| UPL | **Upland** - Rarely is a hydrophyte, almost always in uplands. These plants have been removed from the NWPL WMVC Region. |
| NOL | **Not Listed** - Not on the list; assumed to be UPL. |

# APPENDIX C: WETLAND DATA SHEETS

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP01**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.028478 Long: -120.625543 Datum: NAD 1983

Soil Map Unit Name: Weirman-Kayak-Zillah complex, 0 to 2 percent slopes (809) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 ____ | **Is the Sampled Area within a Wetland?** | **Yes X No ____** |
| Hydric Soil Present? | Yes X | No ____ | | |
| Wetland Hydrology Present? | Yes X | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

**TWO1.** Wetland is located within the 100-year floodplain of the Yakima River. PEM on-site and PSS off-site.

## VEGETATION

| Tree Stratum (Plot size: 30' r ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r )** | | | |
| 1. *Salix exigua* | 15% | Yes | FACW |
| 2. *Rosa nutkana* | 5% | Yes | FACU |
| 3. *Cornus alba* | 5% | Yes | FACW |
| 4. | | | |
| 5. | | | |
| | 25% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r )** | | | |
| 1. *Panicum capillare* | 5% | Yes | FACU |
| 2. *Hypochaeris radicata* | 5% | Yes | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 10% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r )** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 90%

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 0 | x 1 = | 0 |
| FACW species 20 | x 2 = | 40 |
| FAC species 0 | x 3 = | 0 |
| FACU species 15 | x 4 = | 60 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 35 (A) | | 100 (B) |

Prevalence Index = B/A = 2.86

**Hydrophytic Vegetation Indicators:**

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- X 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.

**Hydrophytic Vegetation Present?** **Yes X No ____**

Remarks: Entered by: KL/ED QC by: TJD

The off-site PSS wetland portion is dominated by *Rosa nutkana*, *Salix exigua*, *Cornus alba*, and *Crataegus douglasii*.

## SOIL

Sampling Point: **TP01**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-7 | 10YR 2/2 | 100 | | | | | SiL | |
| 7-10+ | 10YR 2/2 | 97 | 7.5YR 3/3 | 3 | C | M, PL | SiL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Shovel refusal at 10" due to large rocks.

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- X Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >10 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >10 |

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

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

Remarks: Entered by: KL/ED QC by: TJD
Snow mold was prevalent in the area. Some old drift deposits were visible in the off-site PSS portion.

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP02**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.028432 Long: -120.625613 Datum: NAD 1983

Soil Map Unit Name: Weirman-Kayak-Zillah complex, 0 to 2 percent slopes (809) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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** | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10' r) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum** (Plot size: 5' r) | | | |
| 1. *Schedonorus arundinaceus* | 20% | Yes | FACU |
| 2. *Barbarea vulgaris* | 5% | No | FAC |
| 3. *Panicum capillare* | 2% | No | FACU |
| 4. *Hypochaeris radicata* | 1% | No | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 28% = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10' r) | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 72%

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 0 | x 1 = | 0 |
| FACW species 0 | x 2 = | 0 |
| FAC species 5 | x 3 = | 15 |
| FACU species 23 | x 4 = | 92 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 28 (A) | | 107 (B) |

Prevalence Index = B/A = 3.82

**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.

**Hydrophytic Vegetation Present?** Yes ____ No **X**

Remarks:
Sparsely vegetated.

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP02**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-10 | 10YR 3/1 | 100 | | | | | SiL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Large rocks (shovel refusal at 10")

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >10 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >10 |

**Wetland Hydrology Present?**

**Yes** ___ **No X**

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

Remarks:

Entered by: KL/ED QC by: TJD

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP03**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.024787 Long: -120.624788 Datum: NAD 1983

Soil Map Unit Name: Weirman gravelly sandy loam, 0 to 2 percent slopes (715) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 X | No ____ | **Is the Sampled Area within a Wetland?** | **Yes X No ____** |
| Wetland Hydrology Present? | Yes X | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

**TW02.** PEM wetland that drains off-site to the east, slightly impounded flow along the wetland every 180' at bermed tracks for the irrigation system.

### VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Juncus balticus* | 30% | Yes | FACW |
| 2. *Schedonorus arundinaceus* | 15% | Yes | FACU |
| 3. *Poa species* | 15% | Yes | FAC ? |
| 4. *Phleum pratense* | 15% | Yes | FACU |
| 5. *Rumex crispus* | 3% | No | FAC |
| 6. *Barbarea vulgaris* | 2% | No | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 80% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 20%

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

**Prevalence Index worksheet:**

| | Total % Cover of: | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 30 | x 2 = | 60 |
| FAC species | 20 | x 3 = | 60 |
| FACU species | 30 | x 4 = | 120 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 80 (A) | | 240 (B) |

Prevalence Index = B/A = 3.00

**Hydrophytic Vegetation Indicators:**

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- X 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.

**Hydrophytic Vegetation Present?** **Yes X No ____**

Remarks:

*Phalaris arundinacea* is dominant further east.

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP03**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-3 | 2.5Y 2.5/1 | 100 | | | | | SiL | |
| 3-13 | 2.5Y 2.5/1 | 68 | 2.5Y 4/2 | 30 | D | M | SiCL | |
| | | | 10YR 4/4 | 2 | C | M, PL | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Shoval refusal at 13" due to large rocks.

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes X | No ___ | Depth (inches): | 13 |
| Saturation Present? (includes capillary fringe) | Yes X | No ___ | Depth (inches): | 12 |

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

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

Remarks: Entered by: KL/ED QC by: TJD
In addition, saturation at 0-3" was observed from recent heavy rainfall. Surface water is present to the east. Some hummocky ground.

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP04**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.024839 Long: -120.624789 Datum: NAD 1983

Soil Map Unit Name: Weirman gravelly sandy loam, 0 to 2 percent slopes (715) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Schedonorus arundinaceus* | 50% | Yes | FACU |
| 2. *Phleum pratense* | 45% | Yes | FACU |
| 3. *Onopordum acanthium* | 1% | No | NOL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 96% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 4%

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 0 | x 1 = | 0 |
| FACW species 0 | x 2 = | 0 |
| FAC species 0 | x 3 = | 0 |
| FACU species 95 | x 4 = | 380 |
| UPL species 1 | x 5 = | 5 |
| Column Totals: 96 (A) | | 385 (B) |

Prevalence Index = B/A = 4.01

**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.

**Hydrophytic Vegetation Present?** **Yes** ____ **No** X

Remarks:

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP04**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-10 | 2.5Y 2.5/1 | 100 | | | | | SiL | |
| 10-14 | 2.5Y 2.5/1 | 74 | 2.5Y 4/2 | 25 | D | M | SiCL | |
| | | | 10YR 3/4 | 1 | C | M, PL | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Thick roots present in the 0-10" layer.

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >14 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >14 |

**Wetland Hydrology Present?**

**Yes** ___ **No** X

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

Remarks:

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP05**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.025029 Long: -120.628765 Datum: NAD 1983

Soil Map Unit Name: Nosal ashy silt loam, 0 to 2 percent slopes (838) NWI classification: PEMC

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 **X** | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:
Sample plot taken in upland area between wetlands TW02 and TW03. Water appears to overflow from TW03 into TW02.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Schedonorus arundinaceus* | 50% | Yes | FACU |
| 2. *Phleum pratense* | 40% | Yes | FACU |
| 3. *Phalaris arundinacea* | 5% | No | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 95% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 5%

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 0 | x 1 = | 0 |
| FACW species 5 | x 2 = | 10 |
| FAC species 0 | x 3 = | 0 |
| FACU species 90 | x 4 = | 360 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 95 (A) | | 370 (B) |

Prevalence Index = B/A = 3.89

**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.

**Hydrophytic Vegetation Present?** **Yes** ____ **No** **X**

Remarks:

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP05**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-7 | 2.5Y 2.5/1 | 100 | | | | | SiL | |
| 7 | 10YR 4/2 | 100 | | | | | Sand | Very thin layer |
| 7-12 | 2.5Y 2.5/1 | 100 | | | | | SiL | |
| 12-14 | 2.5Y 2.5/1 | 98 | 7.5YR 4/6 | 2 | C | M | SiCL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Sand layer at 7" could be from historic 500-year level flood event.

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- X 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >14 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >14 |

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

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

Remarks:
Snail shells present nearby towards TW03.

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP06**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.025004 Long: -120.628694 Datum: NAD 1983

Soil Map Unit Name: Weirman-Kayak-Zillah complex, 0 to 2 percent slopes (809) NWI classification: PEMC

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 **X** | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:
Sample plot located in dry slight depression between wetlands TW02 and TW03.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Juncus balticus* | 35% | Yes | FACW |
| 2. *Schedonorus arundinaceus* | 20% | Yes | FACU |
| 3. *Phleum pratense* | 20% | Yes | FACU |
| 4. *Poa species* | 20% | Yes | FAC ? |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 95% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 5%

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 0 | x 1 = | 0 |
| FACW species 35 | x 2 = | 70 |
| FAC species 20 | x 3 = | 60 |
| FACU species 40 | x 4 = | 160 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 95 (A) | | 290 (B) |

Prevalence Index = B/A = 3.05

**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.

**Hydrophytic Vegetation Present?** **Yes** ____ **No** **X**

Remarks: Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP06**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-5 | 2.5Y 2.5/1 | 100 | | | | | SiL | |
| 5 | 10YR 4/2 | 100 | | | | | Sand | Very thin layer |
| 5-11 | 2.5Y 2.5/1 | 100 | | | | | SiCL | |
| 11-14 | 2.5Y 2.5/1 | 98 | 7.5YR 4/6 | 2 | C | PL | SiCL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Sand layer at 5" could be from historic 500-year level flood event.

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes X | No ___ | Depth (inches): | 13 |
| Saturation Present? (includes capillary fringe) | Yes X | No ___ | Depth (inches): | 12 |

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

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

Remarks:

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP07**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.024964 Long: -120.628357 Datum: NAD 1983

Soil Map Unit Name: Weirman-Kayak-Zillah complex, 0 to 2 percent slopes (809) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 ____ | **Is the Sampled Area within a Wetland?** | **Yes X No ____** |
| Hydric Soil Present? | Yes X | No ____ | | |
| Wetland Hydrology Present? | Yes X | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

**TW02.** Wetland is fed by overflow from TW03. Problematic wetland vegetation, assumed wetland based on soils and hydrology.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Schedonorus arundinaceus* | 25% | Yes | FACU |
| 2. *Poa species* | 25% | Yes | FAC ? |
| 3. *Phleum pratense* | 15% | No | FACU |
| 4. *Juncus balticus* | 15% | No | FACW |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 80% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 20%

**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 | 0 | x 1 = | 0 |
| FACW species | 15 | x 2 = | 30 |
| FAC species | 25 | x 3 = | 75 |
| FACU species | 40 | x 4 = | 160 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 80 (A) | | 265 (B) |

Prevalence Index = B/A = 3.31

**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]
- X Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

**Hydrophytic Vegetation Present?** **Yes X No ____**

Remarks: Entered by: KL/ED QC by: TJD

This site has been actively grazed which may have prevented the growth of wetland plants in the drier areas of the wetland.

## SOIL

Sampling Point: **TP07**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-7 | 10YR 2/1 | 100 | | | | | SiCL | |
| 7-10 | 10YR 2/1 | 93 | 7.5YR 4/6 | 7 | C | M. PL | SiCL | |
| 10 | 10YR 4/2 | 100 | | | | | Sand | Very thin layer |
| 10-15 | 10YR 2/1 | 93 | 7.5YR 4/6 | 7 | C | M. PL | SiCL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Sand layer at 10" could be from historic 500-year level flood event.

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >15 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >15 |

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

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

Remarks:
Sparsely vegetated concave area along wetland drainage.

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP08**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.024995 Long: -120.628381 Datum: NAD 1983

Soil Map Unit Name: Weirman-Kayak-Zillah complex, 0 to 2 percent slopes (809) NWI classification: PEMC

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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** | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10' r) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum** (Plot size: 5' r) | | | |
| 1. *Schedonorus arundinaceus* | 40% | Yes | FACU |
| 2. *Poa species* | 25% | Yes | FAC ? |
| 3. *Phleum pratense* | 25% | Yes | FACU |
| 4. *Phalaris arundinacea* | 10% | No | FACW |
| 5. *Onopordum acanthium* | 1% | No | NOL |
| 6. *Taraxacum officinale* | 1% | No | FACU |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 102% = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10' r) | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 0%

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 0 | x 1 = | 0 |
| FACW species 10 | x 2 = | 20 |
| FAC species 25 | x 3 = | 75 |
| FACU species 66 | x 4 = | 264 |
| UPL species 1 | x 5 = | 5 |
| Column Totals: 102 (A) | | 364 (B) |

Prevalence Index = B/A = 3.57

**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.

**Hydrophytic Vegetation Present?** Yes ____ No **X**

Remarks: Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP08**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-8 | 10YR 2/2 | 100 | | | | | SiL | |
| 8-12 | 10YR 2/1 | 100 | | | | | SiCL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Rocks and gravels (possibly fill material) from 3 to 8 inches. Shoval refusal at 12" due to large rocks.

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >12 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >12 |

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

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

Remarks:

Entered by: KL/ED QC by: TJD

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP09**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 0

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.023402 Long: -120.627208 Datum: NAD 1983

Soil Map Unit Name: Mitta ashy silt loam, drained, 0 to 2 percent slopes (791) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 | **Is the Sampled Area within a Wetland?** | **Yes ____ No X** |
| Wetland Hydrology Present? | Yes ____ | No X | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:
Sample plot located on berm between TW03 and TW04.

### VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Poa species* | 60% | Yes | FAC ? |
| 2. *Schedonorus arundinaceus* | 15% | No | FACU |
| 3. *Trifolium repens* | 10% | No | FACU |
| 4. *Phleum pratense* | 10% | No | FACU |
| 5. *Iris missouriensis* | 2% | No | FACW |
| 6. *Taraxacum officinale* | 2% | No | FACU |
| 7. *Tripleurospermum maritimum* | 1% | No | FACU |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 0%

**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 0 | x 1 = | 0 |
| FACW species 2 | x 2 = | 4 |
| FAC species 60 | x 3 = | 180 |
| FACU species 38 | x 4 = | 152 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 100 (A) | | 336 (B) |

Prevalence Index = B/A = 3.36

**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.

**Hydrophytic Vegetation Present?** **Yes X No ____**

Remarks: Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP09**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-3 | 10YR 2/1 | 100 | | | | | SiL | |
| 3-13 | 10YR 3/2 | 100 | | | | | SaL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Large rocks throughout 3-13" layer. Shovel refusal at 13".

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >13 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >13 |

**Wetland Hydrology Present?**

**Yes** ___ **No X**

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

Remarks:

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP10**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.023411 Long: -120.627114 Datum: NAD 1983

Soil Map Unit Name: Mitta ashy silt loam, drained, 0 to 2 percent slopes (791) NWI classification: None

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

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

Are Vegetation ____, Soil X, 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 ____ | **Is the Sampled Area within a Wetland?** | **Yes X** **No** ____ |
| Hydric Soil Present? | Yes **X** | No ____ | | |
| Wetland Hydrology Present? | Yes **X** | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

**TW04.** Depressional wetland intercepting overland runoff before TW03. Frog egg masses observed.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Schedonorus arundinaceus* | 25% | Yes | FACU |
| 2. *Poa species* | 25% | Yes | FAC ? |
| 3. *Phalaris arundinacea* | 20% | Yes | FACW |
| 4. *Typha latifolia* | 5% | No | OBL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 75% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 5%

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species 5 | x 1 = | 5 |
| FACW species 20 | x 2 = | 40 |
| FAC species 25 | x 3 = | 75 |
| FACU species 25 | x 4 = | 100 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 75 (A) | | 220 (B) |

Prevalence Index = B/A = 2.93

**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.

**Hydrophytic Vegetation Present?** **Yes X** **No** ____

Remarks:

20% open water.

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP10**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-11 | 10YR 2/1 | 98 | 2.5Y 4/2 | 2 | D | M | SiL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
The large rocks throughout the soil profile may be reducing the ability to locate redox; some small depletions observed.

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes X | No ___ | Depth (inches): | 9 |
| Saturation Present? (includes capillary fringe) | Yes X | No ___ | Depth (inches): | 11 |

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

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

Remarks: Entered by: KL/ED QC by: TJD
Surface water was recorded at 5" deep within 5 feet of the sample plot.

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/4/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP11**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.025016 Long: -120.628938 Datum: NAD 1983

Soil Map Unit Name: Nosal ashy silt loam, 0 to 2 percent slopes (838) NWI classification: PEMC

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 ____ | **Is the Sampled Area within a Wetland?** | **Yes X No ____** |
| Hydric Soil Present? | Yes X | No ____ | | |
| Wetland Hydrology Present? | Yes X | No ____ | | |

Precipitation prior to fieldwork: 0.79" two weeks prior, 2.32" above normal for CYTD, 2.78" above normal for WYTD. *Wetter than normal.

Remarks:

**TW03.** Sample plot located northeast of the open ponded area where overflowing occurs to feed TW02.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Schedonorus arundinaceus* | 45% | Yes | FACU |
| 2. *Poa species* | 30% | Yes | FAC ? |
| 3. *Phalaris arundinacea* | 20% | Yes | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 95% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 5%

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

**Prevalence Index worksheet:**

| | Total % Cover of: | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 20 | x 2 = | 40 |
| FAC species | 30 | x 3 = | 90 |
| FACU species | 45 | x 4 = | 180 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 95 (A) | | 310 (B) |

Prevalence Index = B/A = 3.26

**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.

**Hydrophytic Vegetation Present? Yes X No ____**

Remarks:

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP11**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-8 | 2.5Y 2.5/1 | 100 | | | | | SiCL | |
| 8-13 | 2.5Y 2.5/1 | 93 | 10YR 4/2 | 5 | D | M | SiCL | |
| | | | 7.5YR 3/3 | 2 | C | PL | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- X 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- X Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >13 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >13 |

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

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

Remarks:
Snail shells present.

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/12/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP12**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.020595 Long: -120.627165 Datum: NAD 1983

Soil Map Unit Name: Mitta ashy silt loam, flooded, 0 to 2 percent slopes (621) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 X | No ____ | **Is the Sampled Area within a Wetland?** | **Yes** ____ **No** X |
| Wetland Hydrology Present? | Yes ____ | No X | | |

Precipitation prior to fieldwork: 0.61" two weeks prior, 2.62" above normal for CYTD, 3.08" above normal for WYTD. Wetter than normal.

Remarks:
Sample plot located at the toe of slope for the access road.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Phalaris arundinacea* | 80% | Yes | FACW |
| 2. *Cirsium arvense* | 20% | Yes | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 0%

**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 | 0 | x 1 = | 0 |
| FACW species | 80 | x 2 = | 160 |
| FAC species | 0 | x 3 = | 0 |
| FACU species | 20 | x 4 = | 80 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 100 (A) | | 240 (B) |

Prevalence Index = B/A = 2.40

**Hydrophytic Vegetation Indicators:**

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- X 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.

**Hydrophytic Vegetation Present?** **Yes** X **No** ____

Remarks: Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP12**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-7 | 10YR 3/1 | 90 | | | | | SiL | |
| | 10YR 3/1 | 10 | | | | | LS | mixed matrix |
| 7-14 | 2.5Y 3/1 | 77 | 7.5YR 4/6 | 3 | C | PL | SiL | |
| | 10YR 4/2 | 20 | | | | | LS | mixed matrix |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Mixed matrix throughout loamy sand and silty loam from disturbance, likely during road construction.

## 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) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes ___ | No X | Depth (inches): | >14 |
| Saturation Present? (includes capillary fringe) | Yes ___ | No X | Depth (inches): | >14 |

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

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

Remarks:

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/12/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP13**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.020253 Long: -120.627497 Datum: NAD 1983

Soil Map Unit Name: Mitta ashy silt loam, flooded, 0 to 2 percent slopes (621) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 | **Is the Sampled Area within a Wetland?** | **Yes** ____ **No** X |
| Wetland Hydrology Present? | Yes X | No ____ | | |

Precipitation prior to fieldwork: 0.61" two weeks prior, 2.62" above normal for CYTD, 3.08" above normal for WYTD. Wetter than normal.

Remarks:
Determined not to be a wetland based on lack of hydric soils.

## VEGETATION

| Tree Stratum (Plot size: 30' r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum (Plot size: 5' r)** | | | |
| 1. *Phalaris arundinacea* | 85% | Yes | FACW |
| 2. *Typha latifolia* | 10% | No | OBL |
| 3. *Juncus balticus* | 5% | No | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100% = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10' r)** | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 0%

**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 10 | x 1 = | 10 |
| FACW species 90 | x 2 = | 180 |
| FAC species 0 | x 3 = | 0 |
| FACU species 0 | x 4 = | 0 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 100 (A) | | 190 (B) |

Prevalence Index = B/A = 1.90

**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.

**Hydrophytic Vegetation Present?** **Yes** X **No** ____

Remarks: Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP13**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-5 | 10YR 2/1 | 100 | | | | | | |
| 5-14 | 2.5Y 3/1 | 100 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes X | No ___ | Depth (inches): | 12 |
| Saturation Present? (includes capillary fringe) | Yes X | No ___ | Depth (inches): | to surface |

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

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

Remarks:

Entered by: KL/ED QC by: TJD

# WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Typha Solar Project City/County: - / Kittitas Sampling Date: 4/12/2017

Applicant/Owner: TUUSSO Energy, LLC State: WA Sampling Point: **TP14**

Investigator(s): Evan Dulin, Jamie Young Section, Township, Range: Section 30, T18N, R18E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): B, Columbia/Snake River Plateau Lat: 47.020219 Long: -120.627443 Datum: NAD 1983

Soil Map Unit Name: Mitta ashy silt loam, flooded, 0 to 2 percent slopes (621) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ 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 ____ | **Is the Sampled Area within a Wetland?** | **Yes X No ____** |
| Hydric Soil Present? | Yes X | No ____ | | |
| Wetland Hydrology Present? | Yes X | No ____ | | |

Precipitation prior to fieldwork: 0.61" two weeks prior, 2.62" above normal for CYTD, 3.08" above normal for WYTD. Wetter than normal.

Remarks:

**TW05.** Wetland fed by overbank flooding of EP Canal via a culvert under the access road seperating the wetland from the canal.

## VEGETATION

| Tree Stratum (Plot size: 30' r ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0% = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10' r ) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0% = Total Cover | | |
| **Herb Stratum** (Plot size: 5' r ) | | | |
| 1. *Typha latifolia* | 50% | Yes | OBL |
| 2. *Phalaris arundinacea* | 45% | Yes | FACW |
| 3. *Juncus balticus* | 5% | No | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100% = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10' r ) | | | |
| 1. | | | |
| 2. | | | |
| | 0% = Total Cover | | |

% Bare Ground in Herb Stratum 0%

**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 50 | x 1 = | 50 |
| FACW species 50 | x 2 = | 100 |
| FAC species 0 | x 3 = | 0 |
| FACU species 0 | x 4 = | 0 |
| UPL species 0 | x 5 = | 0 |
| Column Totals: 100 (A) | | 150 (B) |

Prevalence Index = B/A = 1.50

**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.

**Hydrophytic Vegetation Present?** **Yes X No ____**

Remarks:

Entered by: KL/ED QC by: TJD

## SOIL

Sampling Point: **TP14**

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

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-3 | 2.5Y 2.5/1 | 100 | | | | | Mucky Mineral | |
| 3-5 | N 2.5/0 | 100 | | | | | Mucky Mineral | Gleyed |
| 5-15 | 2.5Y 3/1 | 98 | 2.5Y 5/2 | 2 | D | M | SiL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ 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)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

**Restrictive Layer (if present):**

Type: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
3-5" Layer feels mucky mineral. Thick roots in 0-3" layer.

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ 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)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | | |
|---|---|---|---|---|
| Surface Water Present? | Yes ___ | No X | Depth (inches): | N/A |
| Water Table Present? | Yes X | No ___ | Depth (inches): | 12 |
| Saturation Present? (includes capillary fringe) | Yes X | No ___ | Depth (inches): | to surface |

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

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

Remarks:

Entered by: KL/ED QC by: TJD

# APPENDIX D: WETLAND AND STREAM PHOTOGRAPHS


**Photo A.** View northeast of Wetland TW01.

**Photo B.** View east of the eastern portion of Wetland TW02 (TP03).

**Photo C.** View east of Wetland TW02 at eastern site boundary, extends off-site.

**Photo D.** View south of the western portion of Wetland TW02 (TP07).

**Photo E.** View east of Wetland TW03 at eastern site boundary, extends off-site.

**Photo F.** View east of Wetland TW03 at one of several culverts.

**Photo G.** View south of open water area in western portion of Wetland TW03 (TP11).

**Photo H.** View northwest of western portion of Wetland TW03.

**Photo I.** View north of off-site portion of Wetland TW03 to the west.

**Photo J.** View west of Wetland TW04.

**Photo K.** View south of Wetland TW04.


**Photo L.** View northwest of EP Canal at first crossing near the road crossing bridge.

**Photo M.** View southeast of EP Canal at second crossing.

**Photo N.** View northeast of the western wetland boundary for Wetland TW05.

**Photo O.** View west of culvert entering Wetland TW05 from EP Canal.

**Photo P.** View west of roadside ditch on the south side of the access road.

**Photo Q.** View northwest of ditch on the north side of the access road.

**Photo R.** View east of Great Blue Heron rookery on east side of the Yakima River.

**Photo S.** View down of frog egg masses in Wetland TW04.

**Photo T.** View down of dead vole (living voles were abundant throughout the site).

# APPENDIX E: ECOLOGY RATING FORMS

Wetland name or number TW01

# RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): TW01 Date of site visit: 4/4/17

Rated by N. Evan Dulin Trained by Ecology? ✓ Yes ___ No Date of training 3/29/17

**HGM Class used for rating** Riverine Wetland has multiple HGM classes? ___Y ✓N

**NOTE: Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

## OVERALL WETLAND CATEGORY II (based on functions ✓ or special characteristics ___)

### 1. Category of wetland based on FUNCTIONS

___**Category I** – Total score = 22-27

✓**Category II** – Total score = 19-21

___**Category III** – Total score = 16-18

___**Category IV** – Total score = 9-15

| FUNCTION | Improving Water Quality | Hydrologic | Habitat | |
|---|---|---|---|---|
| | *Circle the appropriate ratings* | | | |
| Site Potential | H (M) L | H (M) L | H M (L) | |
| Landscape Potential | H (M) L | H M (L) | H (M) L | |
| Value | (H) M L | (H) M L | (H) M L | TOTAL |
| **Score Based on Ratings** | 7 | 6 | 6 | 19 |

**Score for each function based on three ratings** *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

| CHARACTERISTIC | CATEGORY *Circle the appropriate category* |
|---|---|
| **Vernal Pools** | **II** **III** |
| **Alkali** | **I** |
| **Wetland of High Conservation Value** | **I** |
| **Bog and Calcareous Fens** | **I** |
| **Old Growth or Mature Forest – slow growing** | **I** |
| **Aspen Forest** | **I** |
| **Old Growth or Mature Forest – fast growing** | **II** |
| **Floodplain forest** | **II** |
| None of the above | ✓ |

Wetland name or number TW01

## Maps and figures required to answer questions correctly for Eastern Washington

### Depressional Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | D 1.3, H 1.1, H 1.5 | |
| Hydroperiods (including area of open water for H 1.3) | D 1.4, H 1.2, H 1.3 | |
| Location of outlet (*can be added to map of hydroperiods)* | D 1.1, D 4.1 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | D 2.2, D 5.2 | |
| Map of the contributing basin | D 5.3 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | D 3.1, D 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | D 3.3 | |

### Riverine Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | 1 |
| Hydroperiods | H 1.2, H 1.3 | 1 |
| Ponded depressions – None | R 1.1 | 1 |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | R 2.4 | 1 |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | 5 |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | 1 |
| Width of wetland vs. width of stream *(can be added to another figure)* | R 4.1 | 1 |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | 2 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | 3 |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | R 3.2, R 3.3 | 4 |

### Lake Fringe Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | L 1.1, L 4.1, H 1.1, H 1.5 | |
| Plant cover of trees, shrubs, and herbaceous plants | L 1.2 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | L 2.2 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | L 3.1, L 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | L 3.3 | |

### Slope Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | |
| Hydroperiods | H 1.2, H 1.3 | |
| Plant cover of **dense** trees, shrubs, and herbaceous plants | S 1.3 | |
| Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)* | S 4.1 | |
| Boundary of area within 150 ft of the wetland (*can be added to another figure*) | S 2.1, S 5.1 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | S 3.1, S 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | S 3.3 | |

Wetland name or number TW01

# HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ___The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ___At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ✓ The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ✓ The water leaves the wetland **without being impounded.**

   NO - go to 3 YES – The wetland class is **Slope**
   **NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ✓ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ✓ The overbank flooding occurs at least once every 10 years.

   NO - go to 4 YES – The wetland class is **Riverine**
   **NOTE:** The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number TW01

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

| HGM classes within the wetland unit being rated | HGM Class to use in rating |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake Fringe | Lake Fringe |
| Depressional + Riverine (the riverine portion is within the boundary of depression) | Depressional |
| Depressional + Lake Fringe | Depressional |
| Riverine + Lake Fringe | Riverine |

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number TW01

| **RIVERINE WETLANDS**<br>**Water Quality Functions** - Indicators that the site functions to improve water quality | Points (only 1 score per box) |
|---|---|
| R 1.0. Does the site have the potential to improve water quality? | |
| R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:<br>Depressions cover > 1/3 area of wetland — points = 6<br>Depressions cover > 1/10 area of wetland — points = 3<br>Depressions present but cover < 1/10 area of wetland — points = 1<br>~~No depressions present~~ — points = 0 | 0 |
| R 1.2. Structure of plants in the wetland (areas with >90% cover at person height; **not** Cowardin classes):<br>~~Forest or shrub > 2/3 the area of the wetland~~ — points = 10<br>Forest or shrub 1/3 – 2/3 area of the wetland — points = 5<br>Ungrazed, herbaceous plants > 2/3 area of wetland — points = 5<br>Ungrazed herbaceous plants 1/3 – 2/3 area of wetland — points = 2<br>Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland — points = 0 | 10 |
| Total for R 1 — Add the points in the boxes above | 10 |

**Rating of Site Potential** If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

| R 2.0. Does the landscape have the potential to support the water quality function of the site? | |
|---|---|
| R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 (No = 0) | 0 |
| R 2.2. Does the contributing basin include a UGA or incorporated area? Yes = 1 (No = 0) | 0 |
| R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? (Yes = 1) No = 0 | 1 |
| R 2.4. Is > 10% of the area within 150 ft of wetland in land uses that generate pollutants (Yes = 1) No = 0 | 1 |
| R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4? Source_____ Yes = 1 (No = 0) | 0 |
| Total for R 2 — Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3-6 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| R 3.0. Is the water quality improvement provided by the site valuable to society? | |
|---|---|
| R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? (Yes = 1) No = 0 | 1 |
| R 3.2. Does the river or stream have TMDL limits for nutrients, toxics, or pathogens? (Yes = 1) No = 0 | 1 |
| R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the drainage in which wetland is found.* (Yes = 2) No = 0 | 2 |
| Total for R 3 — Add the points in the boxes above | 4 |

**Rating of Value** If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TW01

| **RIVERINE WETLANDS**<br>**Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion | Points (only 1 score per box) |
|---|---|
| R 4.0. Does the site have the potential to reduce flooding and erosion? | |
| R 4.1. Characteristics of the overbank storage the wetland provides:<br>*Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).*<br>If the ratio is more than 2 — points = 10<br>If the ratio is 1-2 — points = 8<br>— If the ratio is ½-<1 — points = 4<br>If the ratio is ¼-< ½ — points = 2<br>If the ratio is < ¼ — points = 1<br>~ 90' / 175' = >½ | 4 |
| R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have > 90% cover at person height. These are NOT Cowardin classes).*<br>— Forest or shrub for more than $^2/_3$ the area of the wetland ~80% — points = 6<br>Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area — points = 4<br>Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area — points = 2<br>Plants do not meet above criteria — points = 0 | 6 |
| Total for R 5 — Add the points in the boxes above | 10 |

**Rating of Site Potential** If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

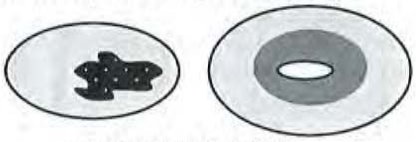
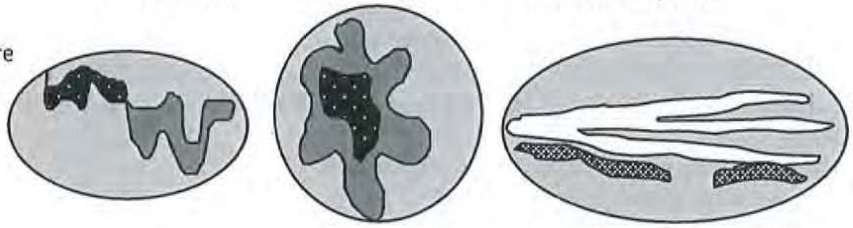
| R 5.0. Does the landscape have the potential to support the hydrologic functions of the site? | | |
|---|---|---|
| R 5.1. Is the stream or river adjacent to the wetland downcut? | (Yes = 0) No = 1 | 0 |
| R 5.2. Does the up-gradient watershed include a UGA or incorporated area? | Yes = 1 (No = 0) | 0 |
| R 5.3. Is the up-gradient stream or river controlled by dams? | (Yes = 0) No = 1 | 0 |
| Total for R 5 — Add the points in the boxes above | | 0 |

**Rating of Landscape Potential** If score is: ___ **3 = H** ___ **1 or 2 = M** ✓ **0 = L** *Record the rating on the first page*

| R 6.0. Are the hydrologic functions provided by the site valuable to society? | |
|---|---|
| R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.*<br>— The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources — points = 2<br>Surface flooding problems are in a basin farther down-gradient — points = 1<br>No flooding problems anywhere downstream — points = 0 | 2 |
| R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? — Yes = 2 (No = 0) | 0 |
| Total for R 6 — Add the points in the boxes above | 2 |

**Rating of Value** If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TW01

| **These questions apply to wetlands of all HGM classes.**<br>**HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat | (only 1 score per box) |
|---|---|
| **H 1.0. Does the wetland have the potential to provide habitat for many species?** | |
| H 1.1. Structure of the plant community:<br>*Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.*<br>____Aquatic bed<br>____Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover (<30% cover, lots of bare ground)<br>____Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover<br>____Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover<br>__✓__Scrub-shrub (areas where shrubs have >30% cover) 4 or more checks: points = 3<br>____Forested (areas where trees have >30% cover) 3 checks: points = 2<br>2 checks: points = 1<br>__ 1 check: points = 0 | 0 |
| H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0 | 0 |
| H 1.3. Surface water<br>H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? *Answer YES for Lake Fringe wetlands.* Yes = 3 points & go to H 1.4 No = go to H 1.3.2<br>H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No.*<br>Yes = 3 No = 0 | 3 |
| H 1.4. Richness of plant species<br>Count the number of plant species in the wetland that cover at least 10 ft$^2$. *Different patches of the same species can be combined to meet the size threshold. You do not have to name the species.*<br>*Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)*<br># of species 5<br>Scoring: > 9 species: points = 2<br>4-9 species: points = 1<br>< 4 species: points = 0 | 1 |
| H 1.5. Interspersion of habitats<br>Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none.<br>*Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*<br>  **None** = 0 points<br>  **Low** = 1 point<br>  **Moderate** = 2 points<br>All three diagrams in this row are **High** = 3 points<br>  <br>Riparian braided channels with 2 classes | Figure__<br>1 |

Wetland name or number TW01

| | |
|---|---|
| H 1.6. Special habitat features<br>*Check the habitat features that are present in the wetland. The number of checks is the number of points.*<br>____Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream.<br>____Cattails or bulrushes are present within the wetland.<br>____Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge.<br>____Emergent or shrub vegetation in areas that are permanently inundated/ponded.<br>____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity<br>✓ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)* | 1 |
| Total for H 1 — Add the points in the boxes above | 6 |

**Rating of Site Potential** If score is: ___ **15-18 = H** ___ **7-14 = M** ✓ **0-6 = L** *Record the rating on the first page*

| H 2.0. Does the landscape have the potential to support habitat functions of the site? | |
|---|---|
| H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is:<br>*Calculate:* % undisturbed habitat 19 + [(% moderate and low intensity land uses)/2] 4.5 = 23.5 %<br>> 1/3 (33.3%) of 1 km Polygon — points = 3<br>— 20-33% of 1km Polygon — points = 2<br>10-19% of 1km Polygon — points = 1<br><10% of 1km Polygon — points = 0<br>1 km poly ≈ 812 ac<br>Accessible undis = 157 ac = ~19%<br>" mid-intensity = 74 = ~9% | 2 |
| H 2.2. Undisturbed habitat in 1 km Polygon around wetland.<br>*Calculate:* % undisturbed habitat 19 + [(% moderate and low intensity land uses)/2] 13 = 32 %<br>Undisturbed habitat > 50% of Polygon — points = 3<br>— Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2<br>Undisturbed habitat 10 - 50% and > 3 patches — points = 1<br>Undisturbed habitat < 10% of Polygon — points = 0<br>mid-intensity = 74+136/812 = 26%<br>2 patches | 2 |
| H 2.3. Land use intensity in 1 km Polygon:<br>— > 50% of Polygon is high intensity land use — points = (- 2)<br>Does not meet criterion above — points = 0<br>High intensity 445/812 = 55% | -2 |
| H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 (No = 0) | 0 |
| Total for H 2 — Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **4-9 = H** ✓ **1-3 = M** ___ **< 1 = L** *Record the rating on the first page*

| H 3.0. Is the habitat provided by the site valuable to society? | |
|---|---|
| H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated*<br>Site meets ANY of the following criteria: — points = 2<br>✓ — It has 3 or more priority habitats within 100 m (see Appendix B)<br>— It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists)<br>— It is mapped as a location for an individual WDFW species<br>— It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>— It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan<br>Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1<br>Site does not meet any of the criteria above — points = 0 | 2 |

**Rating of Value** If score is: ✓ **2 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

# Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

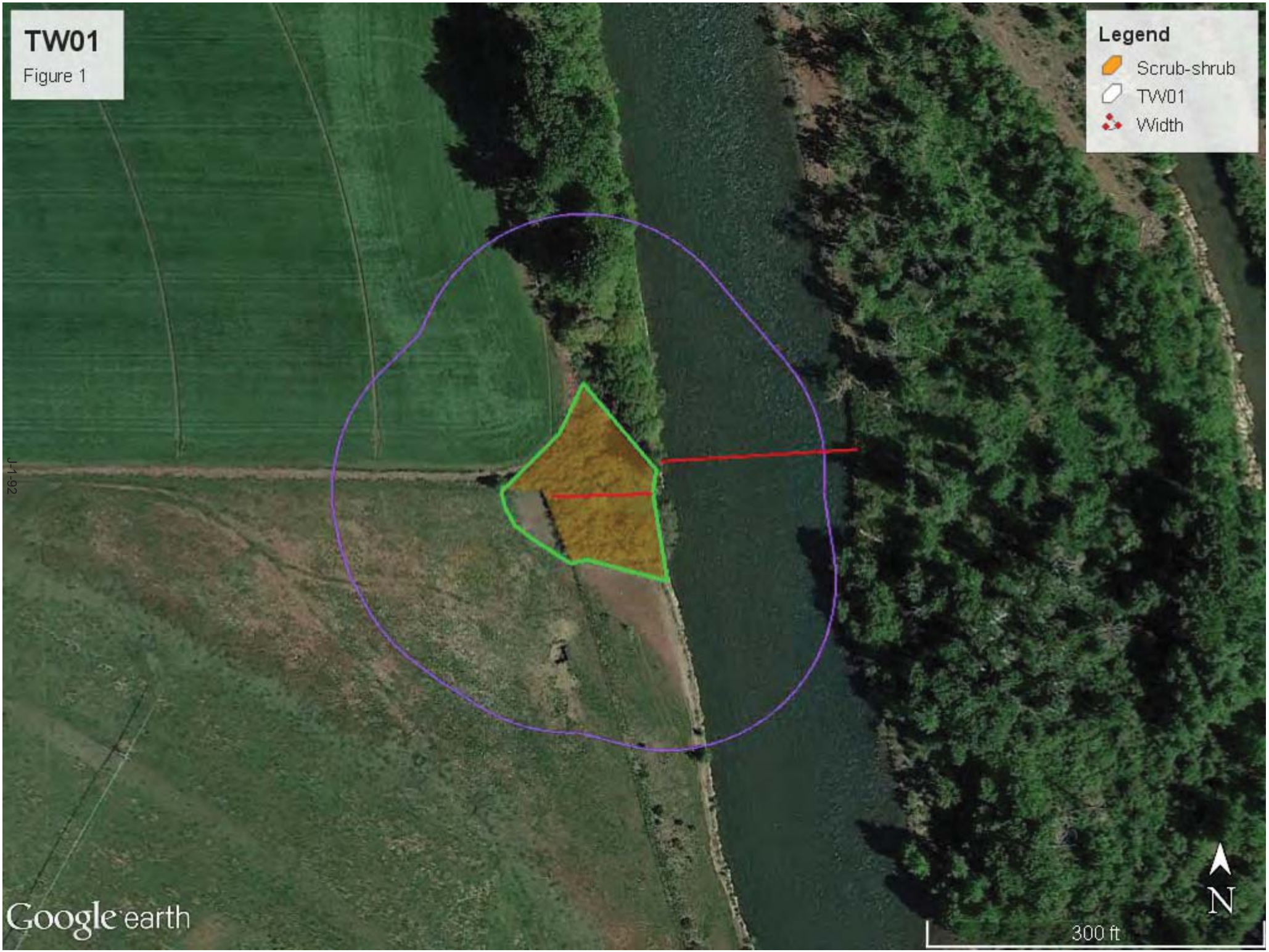
— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm ) in diameter at the largest end, and > 20 ft (6 m) long.

— **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

— **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

— **Juniper Savannah:** All juniper woodlands.

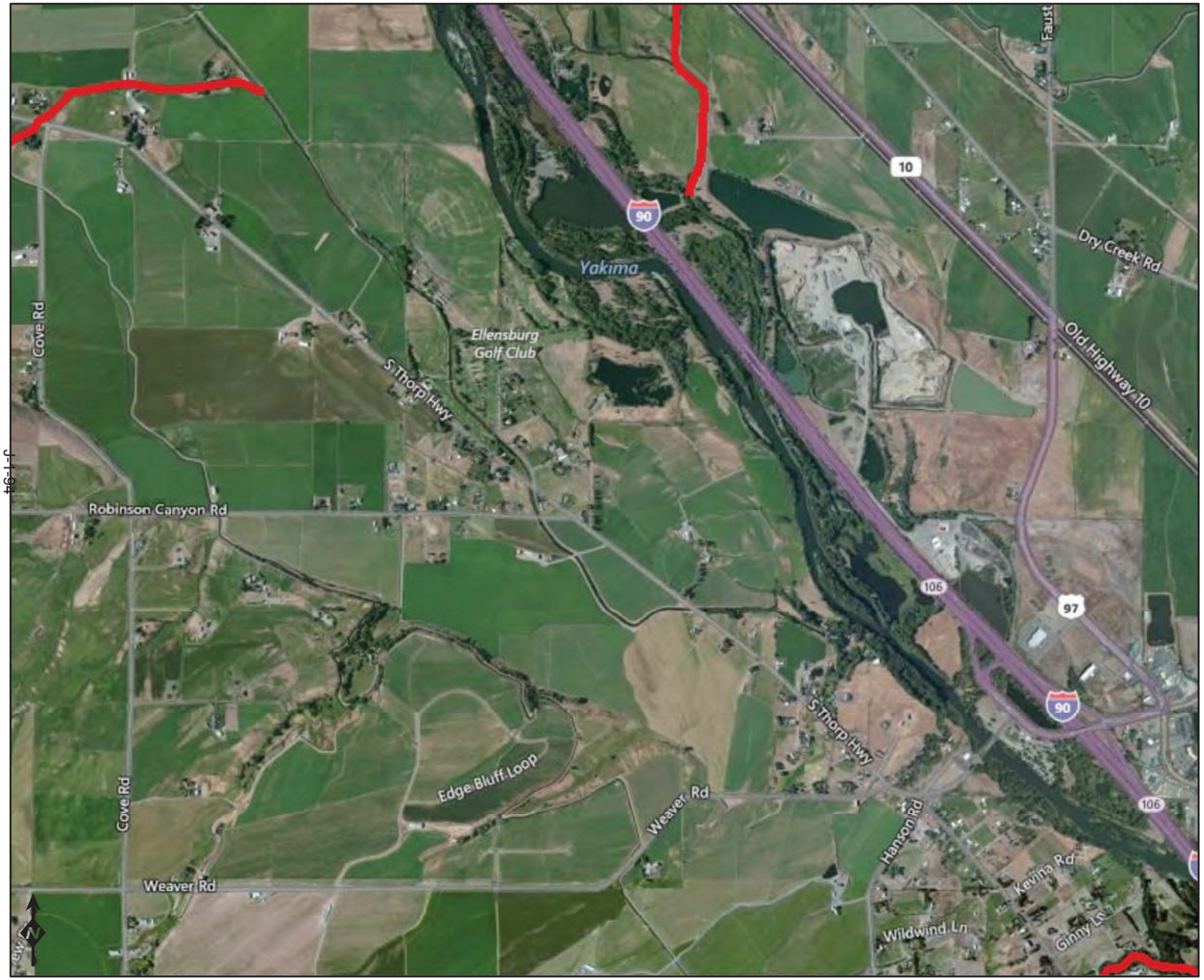
**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.


TW01
Figure 1
Legend
Scrub-shrub
TW01
Width
J-1-92
Google earth
N
300 ft


TW01
Figure 2
Legend
Mid-intensity
TW01
Undisturbed
Klocke Rd
10
97
J1-93
Tinsdale Hwy S
90
N
3000 ft
Google earth
© 2016 Google

April 24, 2017

# TW01 - Figure 3




**Assessed Waters/Sediment**

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Miles
0 0.25 0.5 1



DEPARTMENT OF ECOLOGY
State of Washington

# Water Quality Improvement Projects (TMDLs)

**WATER QUALITY IMPROVEMENT PROJECTS (TMDLs)**

Overview of the process
Project Catalog
- by WRIA
- by County

Funding Opportunities
Project Development Priority Lists
Related Information
TMDL Contacts

**RELATED ECOLOGY PROGRAMS**

Water Quality

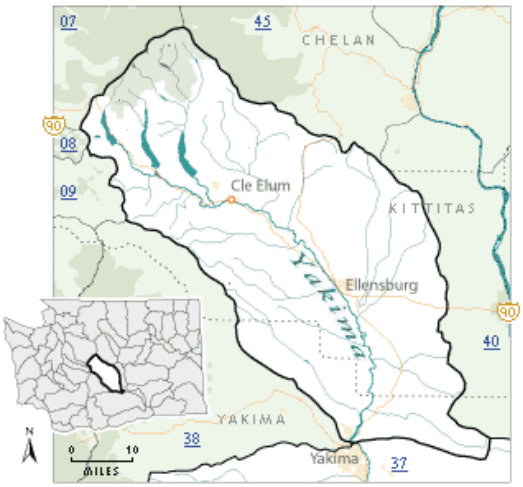
Water Quality Improvement > Water Quality Improvement Projects by WRIA > WRIA 39: Upper Yakima

## WRIA 39: Upper Yakima

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

**Yakima River basin project index:**
**www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html**
**Counties**

- Kittitas
- Yakima




| Project Name | Pollutants | Status** | TMDL Lead |
|---|---|---|---|
| Crystal Creek | Ammonia-N<br>BOD (5-day)<br>Chlorine<br>Fecal Coliform | EPA approved | Jane Creech<br>509-454-7860 |
| Selah Ditch | Fecal Coliform<br>Temperature | EPA approved | Greg Bohn<br>509-454-4174 |
| Teanaway River segments:<br>• Upper West Fork Teanaway River<br>• Upper Middle Fork Teanaway River<br>• Upper North Fork Teanaway River<br>• Stafford Creek<br>• Lower West Fork Teanaway River<br>• Lower Middle Fork Teanaway River<br>• Lower North Fork Teanaway River<br>• Mainstem Teanaway River | Temperature | EPA approved | Jane Creech<br>509-454-7860 |
| Wilson/Cooke Creek Tributaries:<br>• Badger Creek<br>• Bull Ditch<br>• Caribou Creek<br>• Cherry Creek<br>• CID Canal<br>• Coleman Creek<br>• Cook Creek<br>• EWC Canal<br>• Johnson Drain<br>• KRD Canal | Fecal Coliform | EPA approved<br>Has an implementation plan<br><br>Post-TMDL monitoring report | Jane Creech<br>509-454-7860<br>Greg Bohn<br>509-454-4174 |

| | | | |
|---|---|---|---|
| Mercer Creek<br>• Naneum Creek<br>• Parke Creek<br>• Whiskey Creek<br>• Wilson Creek<br>• Wipple Wasteway | | | |
| Yakima River, Upper | Dieldrin<br>DDT<br>Suspended Sediments<br>Turbidity | EPA approved | Jane Creech<br>509-454-7860 |
| | Temperature | EPA approved<br>Has an implementation plan | Jane Creech<br>509-454-7860 |
| Yakima River | Toxics | Under development | Jane Creech<br>509-454-7860 |

**** Status** will be listed as one of the following: Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

**For more information about WRIA 39:**

- Waterbodies in WRIA 39 - using the Water Quality Assessment Query Tool
- Watershed Information for WRIA 39

* The Department of Ecology and other state resource agencies frequently use a system of 62 "Water Resource Inventory Areas" or "WRIAs" to refer to the state's major watershed basins.

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Last updated December 2016

Wetland name or number TW02

# RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): TW02 Date of site visit: 4/4/17

Rated by N. Evan Dulin Trained by Ecology? ✓ Yes ___ No Date of training 3/24/17

**HGM Class used for rating** Riverine Wetland has multiple HGM classes? ___Y ✓N

**NOTE: Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

## OVERALL WETLAND CATEGORY II (based on functions ✓ or special characteristics ___)

### 1. Category of wetland based on FUNCTIONS

___**Category I** – Total score = 22-27
✓ **Category II** – Total score = 19-21
___**Category III** – Total score = 16-18
___**Category IV** – Total score = 9-15

| FUNCTION | Improving Water Quality | Hydrologic | Habitat | |
|---|---|---|---|---|
| | *Circle the appropriate ratings* | | | |
| Site Potential | H (M) L | H (M) L | H M (L) | |
| Landscape Potential | H (M) L | H (M) L | H (M) L | |
| Value | H (M) L | (H) M L | (H) M L | TOTAL |
| **Score Based on Ratings** | 6 | 7 | 6 | 19 |

**Score for each function based on three ratings** *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

| CHARACTERISTIC | CATEGORY *Circle the appropriate category* |
|---|---|
| **Vernal Pools** | II III |
| **Alkali** | I |
| **Wetland of High Conservation Value** | I |
| **Bog and Calcareous Fens** | I |
| **Old Growth or Mature Forest – slow growing** | I |
| **Aspen Forest** | I |
| **Old Growth or Mature Forest – fast growing** | II |
| **Floodplain forest** | II |
| None of the above | ✓ |

Wetland name or number TW02

## Maps and figures required to answer questions correctly for Eastern Washington

### Depressional Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | D 1.3, H 1.1, H 1.5 | |
| Hydroperiods (including area of open water for H 1.3) | D 1.4, H 1.2, H 1.3 | |
| Location of outlet (*can be added to map of hydroperiods)* | D 1.1, D 4.1 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | D 2.2, D 5.2 | |
| Map of the contributing basin | D 5.3 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | D 3.1, D 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | D 3.3 | |

### Riverine Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | 1 |
| Hydroperiods | H 1.2, H 1.3 | 1 |
| Ponded depressions | R 1.1 | 1 |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | R 2.4 | 1 |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | 2 |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | 1 |
| Width of wetland vs. width of stream *(can be added to another figure)* | R 4.1 | 1 |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | 3 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | 4 |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | R 3.2, R 3.3 | 5 |

### Lake Fringe Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | L 1.1, L 4.1, H 1.1, H 1.5 | |
| Plant cover of trees, shrubs, and herbaceous plants | L 1.2 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | L 2.2 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | L 3.1, L 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | L 3.3 | |

### Slope Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | |
| Hydroperiods | H 1.2, H 1.3 | |
| Plant cover of **dense** trees, shrubs, and herbaceous plants | S 1.3 | |
| Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)* | S 4.1 | |
| Boundary of area within 150 ft of the wetland (*can be added to another figure*) | S 2.1, S 5.1 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | S 3.1, S 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | S 3.3 | |

Wetland name or number TW02

# HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ___The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ___At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ✓ The wetland is on a slope (*slope can be very gradual*),
   ✓ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ___The water leaves the wetland **without being impounded**.

   NO - go to 3 YES – The wetland class is **Slope**
   **NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ✓ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ✓ The overbank flooding occurs at least once every 10 years.

   NO - go to 4 YES – The wetland class is **Riverine**
   **NOTE:** The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number Two2

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

| HGM classes within the wetland unit being rated | HGM Class to use in rating |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake Fringe | Lake Fringe |
| Depressional + Riverine (the riverine portion is within the boundary of depression) | Depressional |
| Depressional + Lake Fringe | Depressional |
| Riverine + Lake Fringe | Riverine |

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Two2

| **RIVERINE WETLANDS**<br>**Water Quality Functions** - Indicators that the site functions to improve water quality | | Points (only 1 score per box) |
|---|---|---|
| R 1.0. Does the site have the potential to improve water quality? | | |
| R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: | | |
| Depressions cover > 1/3 area of wetland (13,220 sqft / 29,998 sqft = 44%) | points = 6 | 6 |
| Depressions cover > 1/10 area of wetland | points = 3 | |
| Depressions present but cover < 1/10 area of wetland | points = 1 | |
| No depressions present | points = 0 | |
| R 1.2. Structure of plants in the wetland (areas with >90% cover at person height; **not** Cowardin classes): | | |
| Forest or shrub > 2/3 the area of the wetland | points = 10 | 0 |
| Forest or shrub 1/3 – 2/3 area of the wetland (14% ungrazed) | points = 5 | |
| Ungrazed, herbaceous plants > 2/3 area of wetland | points = 5 | |
| Ungrazed herbaceous plants 1/3 – 2/3 area of wetland | points = 2 | |
| Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland | points = 0 | |
| Total for R 1 | Add the points in the boxes above | 6 |

**Rating of Site Potential** If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

| R 2.0. Does the landscape have the potential to support the water quality function of the site? | | |
|---|---|---|
| R 2.1. Is the wetland within an incorporated city or within its UGA? | Yes = 2 (No = 0) | 0 |
| R 2.2. Does the contributing basin include a UGA or incorporated area? | Yes = 1 (No = 0) | 0 |
| R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? | (Yes = 1) No = 0 | 1 |
| R 2.4. Is > 10% of the area within 150 ft of wetland in land uses that generate pollutants | (Yes = 1) No = 0 | 1 |
| R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4? Source_____ | Yes = 1 (No = 0) | 0 |
| Total for R 2 | Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3-6 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| R 3.0. Is the water quality improvement provided by the site valuable to society? | | |
|---|---|---|
| R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Drains to Yakima River within 1 mile | (Yes = 1) No = 0 | 1 |
| R 3.2. Does the river or stream have TMDL limits for nutrients, toxics, or pathogens? | Yes = 1 (No = 0) | 0 |
| R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the drainage in which wetland is found.* | Yes = 2 (No = 0) | 0 |
| Total for R 3 | Add the points in the boxes above | 1 |

**Rating of Value** If score is: ___ **2-4 = H** ✓ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TW02

| **RIVERINE WETLANDS**<br>**Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion | | Points (only 1 score per box) |
|---|---|---|
| R 4.0. Does the site have the potential to reduce flooding and erosion? | | |
| R 4.1. Characteristics of the overbank storage the wetland provides:<br>*Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).*<br>If the ratio is more than 2 (14' wetland / 22' channel)<br>If the ratio is 1-2<br>— If the ratio is ½-<1<br>If the ratio is ¼-< ½<br>If the ratio is < ¼ | points = 10<br>points = 8<br>points = 4<br>points = 2<br>points = 1 | 4 |
| R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have > 90% cover at person height. These are NOT Cowardin classes).*<br>Forest or shrub for more than $^2/_3$ the area of the wetland (~7% = 2,095 sqft shrub)<br>— Forest or shrub for >$^1/_3$ area OR emergent plants > $^2/_3$ area (~93% emergent)<br>Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area<br>Plants do not meet above criteria | points = 6<br>points = 4<br>points = 2<br>points = 0 | 4 |
| Total for R 5 | Add the points in the boxes above | 8 |

**Rating of Site Potential** If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

| R 5.0. Does the landscape have the potential to support the hydrologic functions of the site? | | |
|---|---|---|
| R 5.1. Is the stream or river adjacent to the wetland downcut? | Yes = 0 (No = 1) | 1 |
| R 5.2. Does the up-gradient watershed include a UGA or incorporated area? | Yes = 1 (No = 0) | 0 |
| R 5.3. Is the up-gradient stream or river controlled by dams? | Yes = 0 (No = 1) | 1 |
| Total for R 5 | Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| R 6.0. Are the hydrologic functions provided by the site valuable to society? | | |
|---|---|---|
| R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.*<br>The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources<br>Surface flooding problems are in a basin farther down-gradient<br>No flooding problems anywhere downstream | — points = 2<br>points = 1<br>points = 0 | 2 |
| R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? | Yes = 2 (No = 0) | 0 |
| Total for R 6 | Add the points in the boxes above | 2 |

**Rating of Value** If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Tw02

| **These questions apply to wetlands of all HGM classes.**<br>**HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat | (only 1 score per box) |
|---|---|
| H 1.0. Does the wetland have the potential to provide habitat for many species? | |
| H 1.1. Structure of the plant community:<br>*Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.*<br>____Aquatic bed<br>__✓__Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover<br>____Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover<br>____Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover <10% of wetland<br>____Scrub-shrub (areas where shrubs have >30% cover) <10% of wetland<br>____Forested (areas where trees have >30% cover)<br>4 or more checks: points = 3<br>3 checks: points = 2<br>2 checks: points = 1<br>1 check: points = 0 | 0 |
| H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0 | 0 |
| H 1.3. Surface water<br>H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? *Answer YES for Lake Fringe wetlands.* Yes = 3 points & go to H 1.4 No = go to H 1.3.2<br>H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No.*<br>Yes = 3 No = 0 | 0 |
| H 1.4. Richness of plant species<br>Count the number of plant species in the wetland that cover at least 10 ft$^2$. *Different patches of the same species can be combined to meet the size threshold. You do not have to name the species.*<br>*Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)*<br># of species ____<br>Rush, Fescue, Rush, Rush<br>Scoring: > 9 species: points = 2<br>4-9 species: points = 1<br>< 4 species: points = 0 | 0 |
| H 1.5. Interspersion of habitats<br>Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none.<br>*Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*<br>**None** = 0 points **Low** = 1 point **Moderate** = 2 points<br>All three diagrams in this row are **High** = 3 points<br>Riparian braided channels with 2 classes | Figure__<br>1 |

Wetland name or number TW02

| H 1.6. Special habitat features | |
|---|---|
| *Check the habitat features that are present in the wetland. The number of checks is the number of points.*<br>✓ Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream.<br>✓ Cattails or bulrushes are present within the wetland.<br>___ Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge.<br>___ Emergent or shrub vegetation in areas that are permanently inundated/ponded.<br>___ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity<br>✓ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)* | 3 |
| Total for H 1 — Add the points in the boxes above | 4 |

**Rating of Site Potential** If score is: ___ **15-18 = H** ___ **7-14 = M** ✓ **0-6 = L** *Record the rating on the first page*

| H 2.0. Does the landscape have the potential to support habitat functions of the site? | |
|---|---|
| H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is:<br>*Calculate:* % undisturbed habitat 16 + [(% moderate and low intensity land uses)/2] 7 = 23 %<br>> 1/3 (33.3%) of 1 km Polygon — points = 3<br>20-33% of 1km Polygon — points = 2<br>10-19% of 1km Polygon — points = 1<br><10% of 1km Polygon — points = 0<br>undisturbed 158 ac ≈ 16%; 1 Km Poly 960 ac; mid-intensity 131/960 = 14% | 2 |
| H 2.2. Undisturbed habitat in 1 km Polygon around wetland.<br>*Calculate:* % undisturbed habitat 16 + [(% moderate and low intensity land uses)/2] 14 = 30 %<br>Undisturbed habitat > 50% of Polygon — points = 3<br>Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2<br>Undisturbed habitat 10 - 50% and > 3 patches — points = 1<br>Undisturbed habitat < 10% of Polygon — points = 0<br>mid-intensity 273/960 = 28%; 3 patches | 2 |
| H 2.3. Land use intensity in 1 km Polygon:<br>> 50% of Polygon is high intensity land use — points = (- 2)<br>Does not meet criterion above — points = 0<br>529/960 = 55% | -2 |
| H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 (No = 0) | 0 |
| Total for H 2 — Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **4-9 = H** ✓ **1-3 = M** ___ **< 1 = L** *Record the rating on the first page*

| H 3.0. Is the habitat provided by the site valuable to society? | |
|---|---|
| H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated*<br>Site meets ANY of the following criteria: — points = 2<br>✓ — It has 3 or more priority habitats within 100 m (see Appendix B)<br>— It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists)<br>— It is mapped as a location for an individual WDFW species<br>— It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>— It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan<br>Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1<br>Site does not meet any of the criteria above — points = 0 | 2 |

**Rating of Value** If score is: ✓ **2 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

# Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

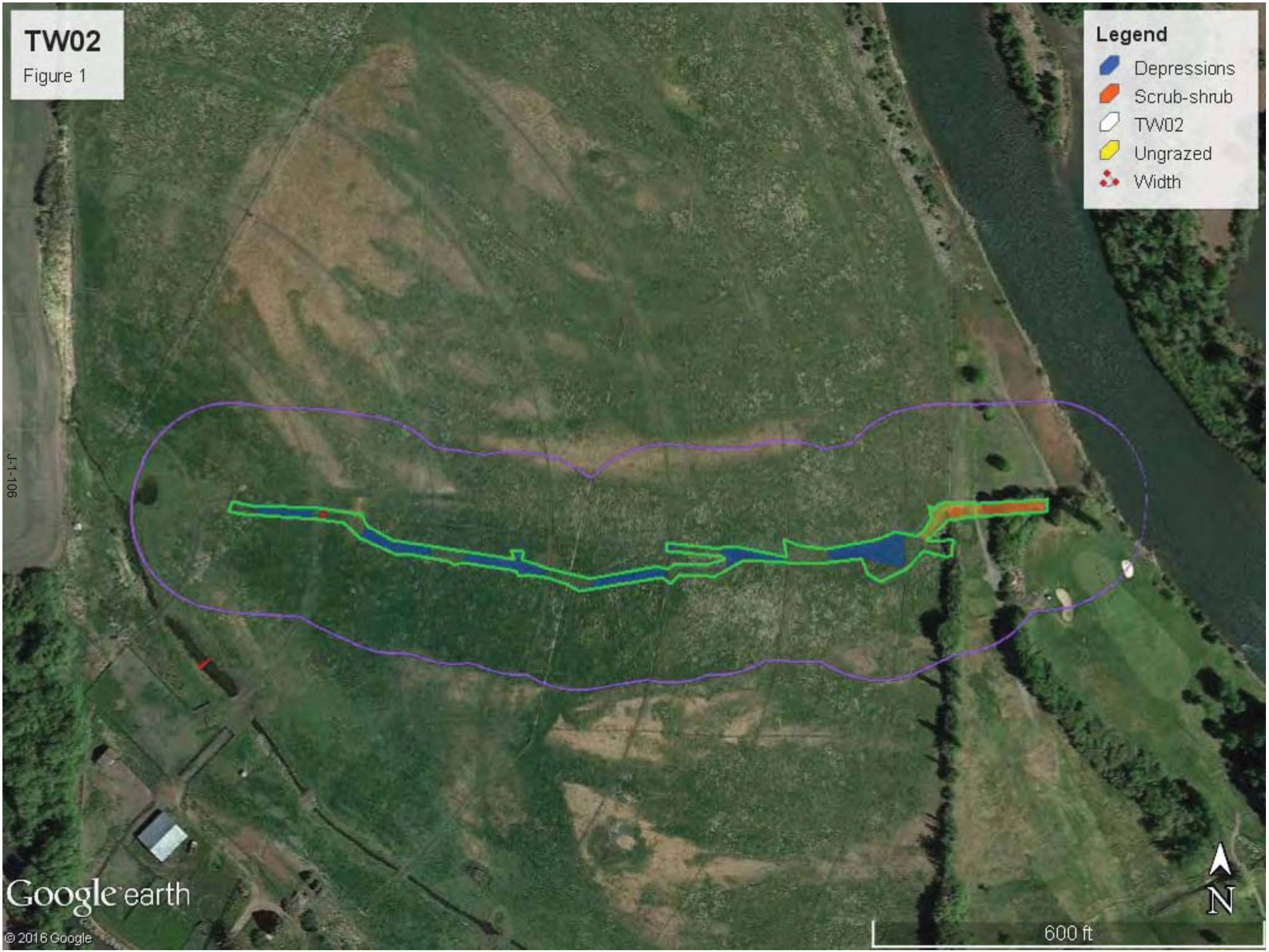
— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm ) in diameter at the largest end, and > 20 ft (6 m) long.

— **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

— **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

— **Juniper Savannah:** All juniper woodlands.

**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.


TW02
Figure 1
Legend
Depressions
Scrub-shrub
TW02
Ungrazed
Width
J-1-106
Google earth
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N
600 ft


TW02
Figure 2
Legend
Contributing Basin
TW02
90
J-1-107
Google earth
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N
1000 ft


TW02
Figure 3
Legend
Mid-intensity
TW02
Undisturbed
J-1-108
Thorp Hwy S
Parkwood Ln
90
N
3000 ft
Google earth
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April 25, 2017

# TW02 - Figure 4


**Assessed Waters/Sediment**

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Miles
0 0.125 0.25 0.5



DEPARTMENT OF ECOLOGY
State of Washington

# Water Quality Improvement Projects (TMDLs)

**WATER QUALITY IMPROVEMENT PROJECTS (TMDLs)**

Overview of the process
Project Catalog
- by WRIA
- by County

Funding Opportunities
Project Development Priority Lists
Related Information
TMDL Contacts

**RELATED ECOLOGY PROGRAMS**

Water Quality

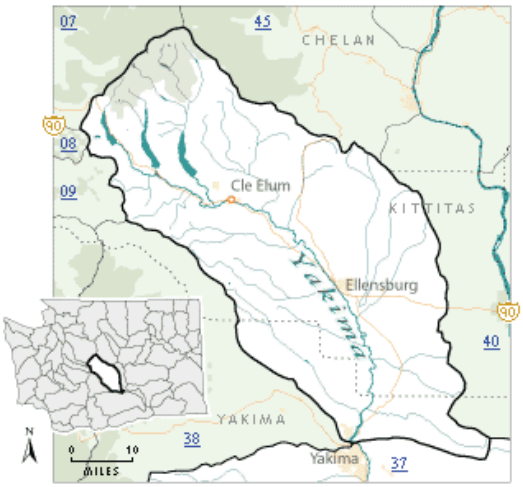
Water Quality Improvement > Water Quality Improvement Projects by WRIA > WRIA 39: Upper Yakima

## WRIA 39: Upper Yakima

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

**Yakima River basin project index:**
**www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html**
**Counties**

- Kittitas
- Yakima




| Project Name | Pollutants | Status** | TMDL Lead |
|---|---|---|---|
| Crystal Creek | Ammonia-N<br>BOD (5-day)<br>Chlorine<br>Fecal Coliform | EPA approved | Jane Creech<br>509-454-7860 |
| Selah Ditch | Fecal Coliform<br>Temperature | EPA approved | Greg Bohn<br>509-454-4174 |
| Teanaway River segments:<br>• Upper West Fork Teanaway River<br>• Upper Middle Fork Teanaway River<br>• Upper North Fork Teanaway River<br>• Stafford Creek<br>• Lower West Fork Teanaway River<br>• Lower Middle Fork Teanaway River<br>• Lower North Fork Teanaway River<br>• Mainstem Teanaway River | Temperature | EPA approved | Jane Creech<br>509-454-7860 |
| Wilson/Cooke Creek Tributaries:<br>• Badger Creek<br>• Bull Ditch<br>• Caribou Creek<br>• Cherry Creek<br>• CID Canal<br>• Coleman Creek<br>• Cook Creek<br>• EWC Canal<br>• Johnson Drain<br>• KRD Canal | Fecal Coliform | EPA approved<br>Has an implementation plan<br><br>Post-TMDL monitoring report | Jane Creech<br>509-454-7860<br>Greg Bohn<br>509-454-4174 |

| | | | |
|---|---|---|---|
| Mercer Creek<br>• Naneum Creek<br>• Parke Creek<br>• Whiskey Creek<br>• Wilson Creek<br>• Wipple Wasteway | | | |
| Yakima River, Upper | Dieldrin<br>DDT<br>Suspended Sediments<br>Turbidity | EPA approved | Jane Creech<br>509-454-7860 |
| | Temperature | EPA approved<br>Has an implementation plan | Jane Creech<br>509-454-7860 |
| Yakima River | Toxics | Under development | Jane Creech<br>509-454-7860 |

**** Status** will be listed as one of the following: Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

**For more information about WRIA 39:**

- Waterbodies in WRIA 39 - using the Water Quality Assessment Query Tool
- Watershed Information for WRIA 39

* The Department of Ecology and other state resource agencies frequently use a system of 62 "Water Resource Inventory Areas" or "WRIAs" to refer to the state's major watershed basins.

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Last updated December 2016

Wetland name or number TW03

# RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): TW03 Date of site visit: 4/4/17

Rated by N. Evan Dulin Trained by Ecology? ✓ Yes ___ No Date of training 3/24/17

**HGM Class used for rating** Riverine Wetland has multiple HGM classes? ___Y ✓N

**NOTE: Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

## OVERALL WETLAND CATEGORY II (based on functions ✓ or special characteristics ___)

### 1. Category of wetland based on FUNCTIONS

___**Category I** – Total score = 22-27
✓**Category II** – Total score = 19-21
___**Category III** – Total score = 16-18
___**Category IV** – Total score = 9-15

| FUNCTION | Improving Water Quality | Hydrologic | Habitat | |
|---|---|---|---|---|
| | *Circle the appropriate ratings* | | | |
| Site Potential | H (M) L | (H) M L | H (M) L | |
| Landscape Potential | H (M) L | H (M) L | H (M) L | |
| Value | H (M) L | (H) M L | H (M) L | TOTAL |
| **Score Based on Ratings** | 6 | 8 | 6 | 20 |

**Score for each function based on three ratings** *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

| CHARACTERISTIC | CATEGORY *Circle the appropriate category* |
|---|---|
| **Vernal Pools** | **II** **III** |
| **Alkali** | **I** |
| **Wetland of High Conservation Value** | **I** |
| **Bog and Calcareous Fens** | **I** |
| **Old Growth or Mature Forest – slow growing** | **I** |
| **Aspen Forest** | **I** |
| **Old Growth or Mature Forest – fast growing** | **II** |
| **Floodplain forest** | **II** |
| None of the above | ✓ |

Wetland name or number TW03

## Maps and figures required to answer questions correctly for Eastern Washington

### Depressional Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | D 1.3, H 1.1, H 1.5 | |
| Hydroperiods (including area of open water for H 1.3) | D 1.4, H 1.2, H 1.3 | |
| Location of outlet (*can be added to map of hydroperiods)* | D 1.1, D 4.1 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | D 2.2, D 5.2 | |
| Map of the contributing basin | D 5.3 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | D 3.1, D 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | D 3.3 | |

### Riverine Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | 1 |
| Hydroperiods | H 1.2, H 1.3 | 1 |
| Ponded depressions | R 1.1 | 1 |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | R 2.4 | 1 |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | 2 |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | 1 |
| Width of wetland vs. width of stream *(can be added to another figure)* | R 4.1 | 1 |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | 3 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | 4 |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | R 3.2, R 3.3 | 5 |

### Lake Fringe Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | L 1.1, L 4.1, H 1.1, H 1.5 | |
| Plant cover of trees, shrubs, and herbaceous plants | L 1.2 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | L 2.2 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | L 3.1, L 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | L 3.3 | |

### Slope Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | |
| Hydroperiods | H 1.2, H 1.3 | |
| Plant cover of **dense** trees, shrubs, and herbaceous plants | S 1.3 | |
| Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)* | S 4.1 | |
| Boundary of area within 150 ft of the wetland (*can be added to another figure*) | S 2.1, S 5.1 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | S 3.1, S 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | S 3.3 | |

Wetland name or number TW03

# HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ___The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ___At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ___The water leaves the wetland **without being impounded**.

   NO - go to 3 YES – The wetland class is **Slope**
   **NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ✓ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ✓ The overbank flooding occurs at least once every 10 years.

   NO - go to 4 YES – The wetland class is **Riverine**
   **NOTE:** The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number TW03

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

| HGM classes within the wetland unit being rated | HGM Class to use in rating |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake Fringe | Lake Fringe |
| Depressional + Riverine (the riverine portion is within the boundary of depression) | Depressional |
| Depressional + Lake Fringe | Depressional |
| Riverine + Lake Fringe | Riverine |

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number TW03

| RIVERINE WETLANDS<br>**Water Quality Functions** - Indicators that the site functions to improve water quality | Points (only 1 score per box) |
|---|---|
| **R 1.0. Does the site have the potential to improve water quality?** | |
| R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:<br>Depressions cover >1/3 area of wetland — points = 6<br>Depressions cover > 1/10 area of wetland — points = 3<br>Depressions present but cover < 1/10 area of wetland — points = 1<br>No depressions present — points = 0<br>0.85ac / 2.8ac = 31% | 6 |
| R 1.2. Structure of plants in the wetland (areas with >90% cover at person height; **not** Cowardin classes):<br>Forest or shrub > 2/3 the area of the wetland — points = 10<br>Forest or shrub 1/3 – 2/3 area of the wetland — points = 5<br>Ungrazed, herbaceous plants > 2/3 area of wetland — points = 5<br>Ungrazed herbaceous plants 1/3 – 2/3 area of wetland — points = 2<br>Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland — points = 0<br>shrub 0.39ac / 2.8 = 14% | 2 |
| Total for R 1 — Add the points in the boxes above | 8 |

**Rating of Site Potential** If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

| R 2.0. Does the landscape have the potential to support the water quality function of the site? | |
|---|---|
| R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 (No = 0) | 0 |
| R 2.2. Does the contributing basin include a UGA or incorporated area? Yes = 1 (No = 0) | 0 |
| R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? (Yes = 1) No = 0 | 1 |
| R 2.4. Is > 10% of the area within 150 ft of wetland in land uses that generate pollutants (Yes = 1) No = 0 | 1 |
| R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4? Source_____ Yes = 1 (No = 0) | 0 |
| Total for R 2 — Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3-6 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| R 3.0. Is the water quality improvement provided by the site valuable to society? | |
|---|---|
| R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Drains to Yakima River within 1 mile (Yes = 1) No = 0 | 1 |
| R 3.2. Does the river or stream have TMDL limits for nutrients, toxics, or pathogens? Yes = 1 (No = 0) | 0 |
| R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the drainage in which wetland is found.* Yes = 2 (No = 0) | 0 |
| Total for R 3 — Add the points in the boxes above | 1 |

**Rating of Value** If score is: ___ **2-4 = H** ✓ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TW03

| RIVERINE WETLANDS<br>**Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion | | Points (only 1 score per box) |
|---|---|---|
| R 4.0. Does the site have the potential to reduce flooding and erosion? | | |
| R 4.1. Characteristics of the overbank storage the wetland provides:<br>*Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).*<br>— If the ratio is more than 2 (50' wetland / 8' stream)<br>If the ratio is 1-2<br>If the ratio is ½-<1<br>If the ratio is ¼-< ½<br>If the ratio is < ¼ | points = 10<br>points = 8<br>points = 4<br>points = 2<br>points = 1 | 10 |
| R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have > 90% cover at person height. These are NOT Cowardin classes).*<br>Forest or shrub for more than $^2/_3$ the area of the wetland<br>Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area<br>~ Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area<br>Plants do not meet above criteria | points = 6<br>points = 4<br>points = 2<br>points = 0 | 2 |
| Total for R 5 | Add the points in the boxes above | 12 |

**Rating of Site Potential** If score is: ✓ **12-16 = H** ___ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

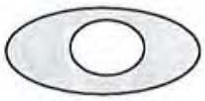
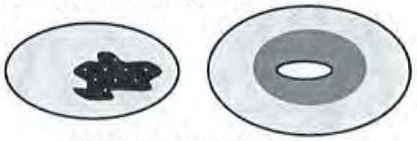
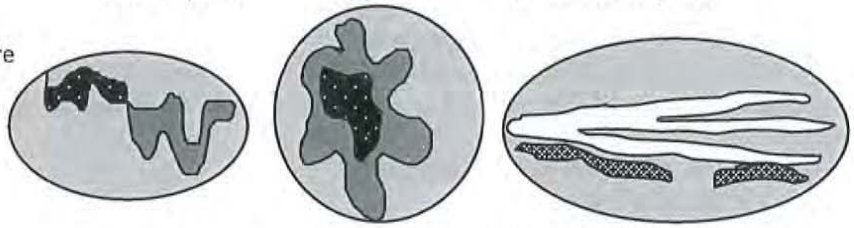
| R 5.0. Does the landscape have the potential to support the hydrologic functions of the site? | | |
|---|---|---|
| R 5.1. Is the stream or river adjacent to the wetland downcut? | Yes = 0 (No = 1) | 1 |
| R 5.2. Does the up-gradient watershed include a UGA or incorporated area? | Yes = 1 (No = 0) | 0 |
| R 5.3. Is the up-gradient stream or river controlled by dams? | Yes = 0 (No = 1) | 1 |
| Total for R 5 | Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| R 6.0. Are the hydrologic functions provided by the site valuable to society? | | |
|---|---|---|
| R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.*<br>— The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources<br>Surface flooding problems are in a basin farther down-gradient<br>No flooding problems anywhere downstream | points = 2<br>points = 1<br>points = 0 | 2 |
| R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? | Yes = 2 (No = 0) | 0 |
| Total for R 6 | Add the points in the boxes above | 2 |

**Rating of Value** If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TW03

| **These questions apply to wetlands of all HGM classes.**<br>**HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat | (only 1 score per box) |
|---|---|
| **H 1.0. Does the wetland have the potential to provide habitat for many species?** | |
| H 1.1. Structure of the plant community:<br>*Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.*<br>✓ Aquatic bed 0.29 acres<br>✓ Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover >33%<br>✓ Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover<br>___ Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover<br>✓ Scrub-shrub (areas where shrubs have >30% cover) ~14%<br>___ Forested (areas where trees have >30% cover)<br>4 or more checks: points = 3<br>3 checks: points = 2<br>2 checks: points = 1<br>1 check: points = 0 | 3 |
| H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0 | 1 |
| H 1.3. Surface water<br>H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? *Answer YES for Lake Fringe wetlands.* Yes = 3 points & go to H 1.4 No = go to H 1.3.2<br>H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No.*<br>Yes = 3 No = 0 | 3 |
| H 1.4. Richness of plant species<br>Count the number of plant species in the wetland that cover at least 10 ft$^2$. *Different patches of the same species can be combined to meet the size threshold. You do not have to name the species.*<br>*Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)*<br># of species ____<br>Scoring: > 9 species: points = 2<br>4-9 species: points = 1<br>< 4 species: points = 0 | 1 |
| H 1.5. Interspersion of habitats<br>Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none.<br>*Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*<br>  **None** = 0 points<br>  **Low** = 1 point<br>  **Moderate** = 2 points<br>All three diagrams in this row are **High** = 3 points<br>  <br>Riparian braided channels with 2 classes | Figure__<br>2 |

Wetland name or number TW03

| | |
|---|---|
| H 1.6. Special habitat features<br>*Check the habitat features that are present in the wetland. The number of checks is the number of points.*<br>✓ Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream.<br>✓ Cattails or bulrushes are present within the wetland.<br>___ Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge.<br>✓ Emergent or shrub vegetation in areas that are permanently inundated/ponded.<br>___ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity<br>___ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)* | 3 |
| Total for H 1 — Add the points in the boxes above | 13 |

**Rating of Site Potential** If score is: ___ **15-18 = H** ✓ **7-14 = M** ___ **0-6 = L** *Record the rating on the first page*

| | |
|---|---|
| **H 2.0. Does the landscape have the potential to support habitat functions of the site?** | |
| H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is:<br>*Calculate:* % undisturbed habitat 15 + [(% moderate and low intensity land uses)/2] 6.5 = 21.5 %<br>> 1/3 (33.3%) of 1 km Polygon — points = 3<br>— 20-33% of 1km Polygon — points = 2<br>10-19% of 1km Polygon — points = 1<br><10% of 1km Polygon — points = 0<br>Undisturbed 176 / 1150 ac = 15%<br>mid 154 / 1150 = 13% | 2 |
| H 2.2. Undisturbed habitat in 1 km Polygon around wetland.<br>*Calculate:* % undisturbed habitat 15 + [(% moderate and low intensity land uses)/2] 23.5 = 38.5 %<br>Undisturbed habitat > 50% of Polygon — points = 3<br>Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2<br>— Undisturbed habitat 10 - 50% and > 3 patches — points = 1<br>Undisturbed habitat < 10% of Polygon — points = 0<br>mid 305 / 1150 = 27% (4 patches) | 1 |
| H 2.3. Land use intensity in 1 km Polygon:<br>— > 50% of Polygon is high intensity land use 58% — points = (- 2)<br>Does not meet criterion above — points = 0 | -2 |
| H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 No = 0 | |
| Total for H 2 — Add the points in the boxes above | 1 |

**Rating of Landscape Potential** If score is: ___ **4-9 = H** ✓ **1-3 = M** ___ **< 1 = L** *Record the rating on the first page*

| | |
|---|---|
| **H 3.0. Is the habitat provided by the site valuable to society?** | |
| H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated*<br>Site meets ANY of the following criteria: — points = 2<br>— It has 3 or more priority habitats within 100 m (see Appendix B)<br>— It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists)<br>— It is mapped as a location for an individual WDFW species<br>— It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>— It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan<br>— Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1<br>Site does not meet any of the criteria above — points = 0 | 1 |

**Rating of Value** If score is: ___ **2 = H** ✓ **1 = M** ___ **0 = L** *Record the rating on the first page*

# Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

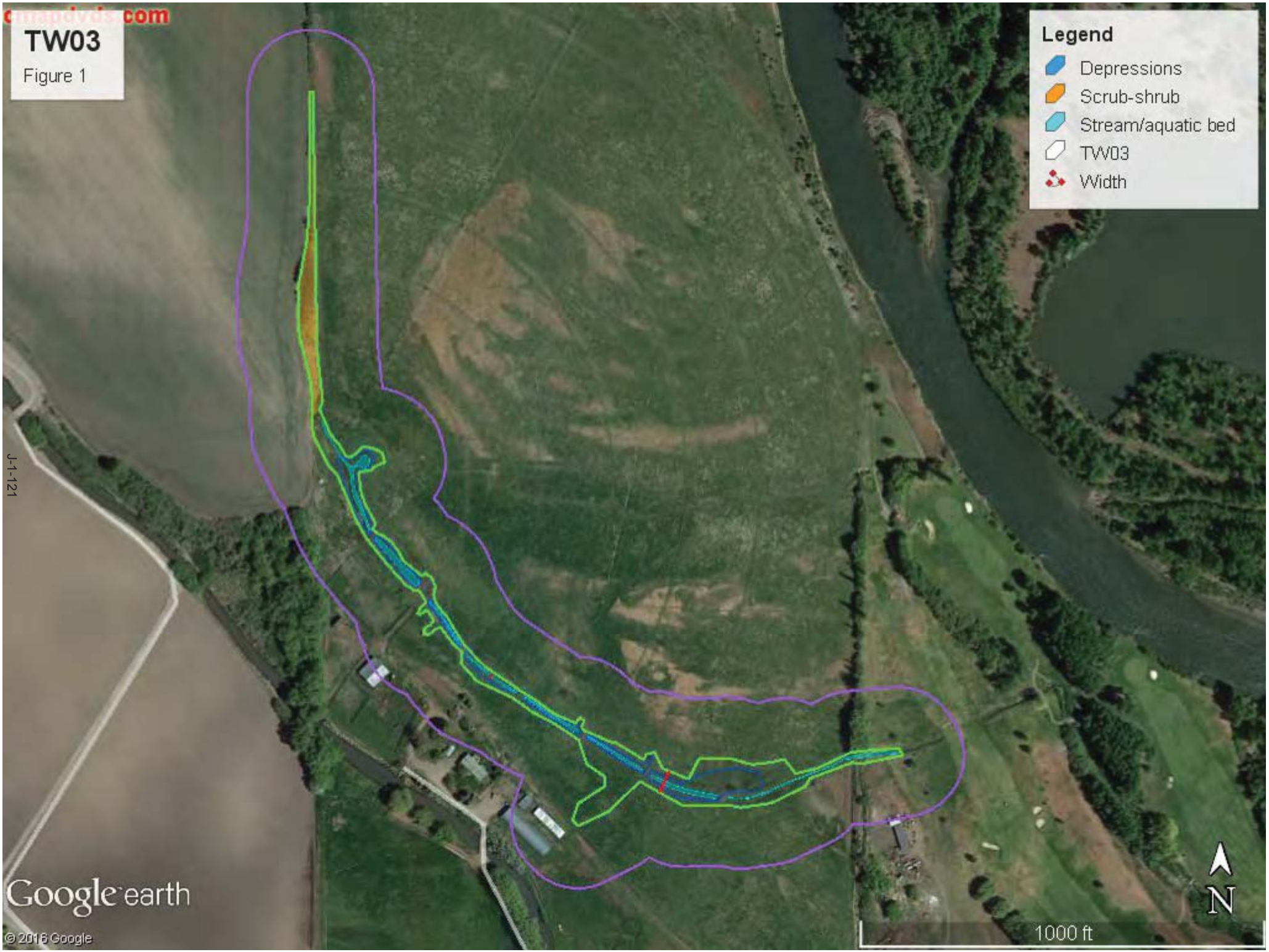
— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm ) in diameter at the largest end, and > 20 ft (6 m) long.

— **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

— **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

— **Juniper Savannah:** All juniper woodlands.

**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.


TW03
Figure 1
Legend
Depressions
Scrub-shrub
Stream/aquatic bed
TW03
Width
J-1-121
Google earth
© 2016 Google
1000 ft
N


TW03
Figure 2
Legend
Contributing Basin
TW03
90
J-1-122
Google earth
© 2016 Google
N
1000 ft


TW03
Figure 3
Legend
Mid-intensity
TW03
Undisturbed
10
97
90
Dry Creek Rd
J-1-123
Parkwood Ln
Thorp Hwy S
Robinson Canyon Rd
Google earth
© 2016 Google
4000 ft
N

April 25, 2017

# TW03 - Figure 4


**Assessed Waters/Sediment**

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Miles
0 0.125 0.25 0.5



DEPARTMENT OF ECOLOGY
State of Washington

# Water Quality Improvement Projects (TMDLs)

**WATER QUALITY IMPROVEMENT PROJECTS (TMDLs)**

Overview of the process
Project Catalog
- by WRIA
- by County

Funding Opportunities
Project Development Priority Lists
Related Information
TMDL Contacts

**RELATED ECOLOGY PROGRAMS**

Water Quality

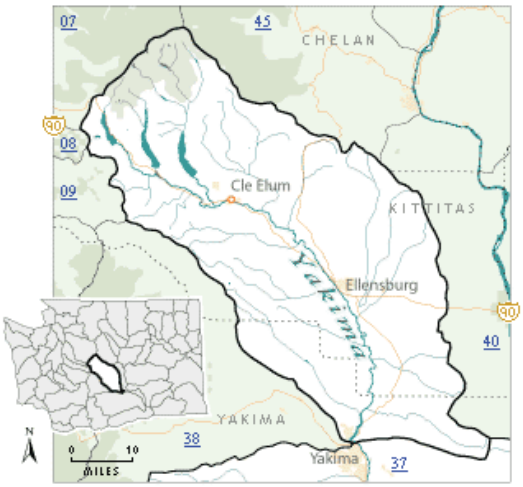
Water Quality Improvement > Water Quality Improvement Projects by WRIA > WRIA 39: Upper Yakima

## WRIA 39: Upper Yakima

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

**Yakima River basin project index:**
**www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html**
**Counties**

- Kittitas
- Yakima




| Project Name | Pollutants | Status** | TMDL Lead |
|---|---|---|---|
| Crystal Creek | Ammonia-N<br>BOD (5-day)<br>Chlorine<br>Fecal Coliform | EPA approved | Jane Creech<br>509-454-7860 |
| Selah Ditch | Fecal Coliform<br>Temperature | EPA approved | Greg Bohn<br>509-454-4174 |
| Teanaway River segments:<br>• Upper West Fork Teanaway River<br>• Upper Middle Fork Teanaway River<br>• Upper North Fork Teanaway River<br>• Stafford Creek<br>• Lower West Fork Teanaway River<br>• Lower Middle Fork Teanaway River<br>• Lower North Fork Teanaway River<br>• Mainstem Teanaway River | Temperature | EPA approved | Jane Creech<br>509-454-7860 |
| Wilson/Cooke Creek Tributaries:<br>• Badger Creek<br>• Bull Ditch<br>• Caribou Creek<br>• Cherry Creek<br>• CID Canal<br>• Coleman Creek<br>• Cook Creek<br>• EWC Canal<br>• Johnson Drain<br>• KRD Canal | Fecal Coliform | EPA approved<br>Has an implementation plan<br>Post-TMDL monitoring report | Jane Creech<br>509-454-7860<br>Greg Bohn<br>509-454-4174 |

| | | | |
|---|---|---|---|
| Mercer Creek<br>• Naneum Creek<br>• Parke Creek<br>• Whiskey Creek<br>• Wilson Creek<br>• Wipple Wasteway | | | |
| Yakima River, Upper | Dieldrin<br>DDT<br>Suspended Sediments<br>Turbidity | EPA approved | Jane Creech<br>509-454-7860 |
| | Temperature | EPA approved<br>Has an implementation plan | Jane Creech<br>509-454-7860 |
| Yakima River | Toxics | Under development | Jane Creech<br>509-454-7860 |

**** Status** will be listed as one of the following: Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

**For more information about WRIA 39:**

- Waterbodies in WRIA 39 - using the Water Quality Assessment Query Tool
- Watershed Information for WRIA 39

* The Department of Ecology and other state resource agencies frequently use a system of 62 "Water Resource Inventory Areas" or "WRIAs" to refer to the state's major watershed basins.

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Last updated December 2016

Wetland name or number TW04

# RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): TW04 Date of site visit: 4/4/17

Rated by N. Evan Dahl Trained by Ecology? ✓ Yes ___ No Date of training 3/24/17

**HGM Class used for rating** Depressional Wetland has multiple HGM classes? ___Y ✓N

**NOTE: Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

## OVERALL WETLAND CATEGORY III (based on functions ✓ or special characteristics ___)

### 1. Category of wetland based on FUNCTIONS

___**Category I** – Total score = 22-27
___**Category II** – Total score = 19-21
✓**Category III** – Total score = 16-18
___**Category IV** – Total score = 9-15

| FUNCTION | Improving Water Quality | Hydrologic | Habitat | |
|---|---|---|---|---|
| | *Circle the appropriate ratings* | | | |
| Site Potential | H (M) L | (H) M L | H (M) L | |
| Landscape Potential | H (M) L | H M (L) | H (M) L | |
| Value | H (M) L | H (M) L | H (M) L | TOTAL |
| Score Based on Ratings | 6 | 6 | 6 | 18 |

**Score for each function based on three ratings** *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

| CHARACTERISTIC | CATEGORY *Circle the appropriate category* |
|---|---|
| **Vernal Pools** | II III |
| **Alkali** | I |
| **Wetland of High Conservation Value** | I |
| **Bog and Calcareous Fens** | I |
| **Old Growth or Mature Forest – slow growing** | I |
| **Aspen Forest** | I |
| **Old Growth or Mature Forest – fast growing** | II |
| **Floodplain forest** | II |
| None of the above | ✓ |

Wetland name or number Two4

## Maps and figures required to answer questions correctly for Eastern Washington

### Depressional Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | D 1.3, H 1.1, H 1.5 | 1 |
| Hydroperiods (including area of open water for H 1.3) | D 1.4, H 1.2, H 1.3 | 1 |
| Location of outlet (*can be added to map of hydroperiods)* | D 1.1, D 4.1 | 1 |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | D 2.2, D 5.2 | 1 |
| Map of the contributing basin | D 5.3 | 2 |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | 3 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | D 3.1, D 3.2 | 4 |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | D 3.3 | 5 |

### Riverine Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | |
| Hydroperiods | H 1.2, H 1.3 | |
| Ponded depressions | R 1.1 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | R 2.4 | |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | |
| Width of wetland vs. width of stream *(can be added to another figure)* | R 4.1 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | R 3.2, R 3.3 | |

### Lake Fringe Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | L 1.1, L 4.1, H 1.1, H 1.5 | |
| Plant cover of trees, shrubs, and herbaceous plants | L 1.2 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | L 2.2 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | L 3.1, L 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | L 3.3 | |

### Slope Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | |
| Hydroperiods | H 1.2, H 1.3 | |
| Plant cover of **dense** trees, shrubs, and herbaceous plants | S 1.3 | |
| Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)* | S 4.1 | |
| Boundary of area within 150 ft of the wetland (*can be added to another figure*) | S 2.1, S 5.1 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | S 3.1, S 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | S 3.3 | |

Wetland name or number TW04

# HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ___The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ___At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ___The water leaves the wetland **without being impounded**.

   NO - go to 3 YES – The wetland class is **Slope**
   **NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ___The overbank flooding occurs at least once every 10 years. ~10

   NO - go to 4 YES – The wetland class is **Riverine**
   **NOTE:** The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number TW04

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

| HGM classes within the wetland unit being rated | HGM Class to use in rating |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake Fringe | Lake Fringe |
| Depressional + Riverine (the riverine portion is within the boundary of depression) | Depressional |
| Depressional + Lake Fringe | Depressional |
| Riverine + Lake Fringe | Riverine |

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have* ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number TW04

| **DEPRESSIONAL WETLANDS**<br>**Water Quality Functions** - Indicators that the site functions to improve water quality | Points (only 1 score per box) |
|---|---|
| **D 1.0. Does the site have the potential to improve water quality?** | |
| D 1.1. Characteristics of surface water outflows from the wetland:<br>— Wetland has no surface water outlet points = 5<br>Wetland has an intermittently flowing outlet points = 3<br>Wetland has a highly constricted permanently flowing outlet points = 3<br>Wetland has a permanently flowing, unconstricted, surface outlet points = 1 | 5 |
| D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions of soils)*<br>YES = 3 (NO = 0) | 0 |
| D 1.3. Characteristics of persistent vegetation (Emergent, Scrub-shrub, and/or Forested Cowardin classes)<br>Wetland has persistent, ungrazed, vegetation for > $^2/_3$ of area points = 5<br>Wetland has persistent, ungrazed, vegetation from $^1/_3$ to $^2/_3$ of area points = 3<br>— Wetland has persistent, ungrazed vegetation from $^1/_{10}$ to < $^1/_3$ of area points = 1<br>Wetland has persistent, ungrazed vegetation < $^1/_{10}$ of area points = 0 | 1 |
| D 1.4. Characteristics of seasonal ponding or inundation:<br>*This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.*<br>Area seasonally ponded is > ½ total area of wetland points = 3<br>— Area seasonally ponded is ¼ - ½ total area of wetland points = 1<br>Area seasonally ponded is < ¼ total area of wetland points = 0 | 1 |
| Total for D 1 — Add the points in the boxes above | 7 |

**Rating of Site Potential** If score is: ___ **12- 16 = H** ✓ **6- 11 = M** ___ **0- 5 = L** *Record the rating on the first page*

| **D 2.0. Does the landscape have the potential to support the water quality function of the site?** | |
|---|---|
| D 2.1. Does the wetland receive stormwater discharges? Yes = 1 (No = 0) | 0 |
| D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? (Yes = 1) No = 0 | 1 |
| D 2.3. Are there septic systems within 250 ft of the wetland? *very possibly* (Yes = 1) No = 0 | 1 |
| D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1- D 2.3? Source_____ Yes = 1 (No = 0) | 0 |
| Total for D 2 — Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3 or 4 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| **D 3.0. Is the water quality improvement provided by the site valuable to society?** | |
|---|---|
| D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, or lake that is on the 303(d) list? Yes = 1 (No = 0) | 0 |
| D 3.2. Is the wetland in a basin or sub-basin where water quality is an issue in some aquatic resource [303(d) list, eutrophic lakes, problems with nuisance and toxic algae]? (Yes = 1) No = 0 | 1 |
| D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the drainage or basin in which the wetland is found*)? Yes = 2 (No = 0) | 0 |
| Total for D 3 — Add the points in the boxes above | 1 |

**Rating of Value** If score is: ___ **2-4 = H** ✓ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TW04

| **DEPRESSIONAL WETLANDS**<br>**Hydrologic Functions** - Indicators that the site functions to reduce flooding and erosion. | Points (only 1 score per box) |
|---|---|
| **D 4.0. Does the site have the potential to reduce flooding and erosion?** | |
| D 4.1. Characteristics of surface water outflows from the wetland:<br>— Wetland has no surface water outlet — points = 8<br>Wetland has an intermittently flowing outlet — points = 4<br>Wetland has a highly constricted permanently flowing outlet — points = 4<br>Wetland has a permanently flowing unconstricted surface outlet — points = 0<br>*(If outlet is a ditch and not permanently flowing treat wetland as "intermittently flowing")* | 8 |
| D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or deepest part (if dry).*<br>Seasonal ponding: > 3 ft above the lowest point in wetland or the surface of permanent ponding — points = 8<br>\ Seasonal ponding: 2 ft - < 3 ft above the lowest point in wetland or the surface of permanent ponding — points = 6<br>The wetland is a headwater wetland — points = 4<br>Seasonal ponding: 1 ft - < 2 ft — points = 4 (~2ft)<br>Seasonal ponding: 6 in - < 1 ft — points = 2<br>Seasonal ponding: < 6 in or wetland has only saturated soils — points = 0 | 6 |
| Total for D 4 — Add the points in the boxes above | 14 |

**Rating of Site Potential** If score is: ✓ **12-16 = H** ___ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

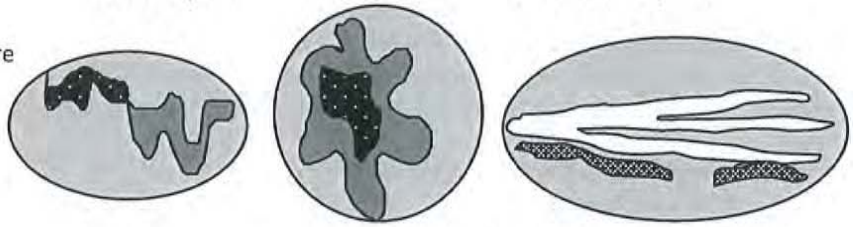
| **D 5.0. Does the landscape have the potential to support the hydrologic functions of the site?** | |
|---|---|
| D 5.1. Does the wetland receive stormwater discharges? Yes = 1 (No = 0) | 0 |
| D 5.2. Is > 10% of the area within 150 ft of the wetland in a land use that generates runoff? Yes = 1 (No = 0) | 0 |
| D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses? Yes = 1 (No = 0) | 0 |
| Total for D 5 — Add the points in the boxes above | 0 |

**Rating of Landscape Potential** If score is: ___ **3 = H** ___ **1 or 2 = M** ✓ **0 = L** *Record the rating on the first page*

| **D 6.0. Are the hydrologic functions provided by the site valuable to society?** | |
|---|---|
| D 6.1. The wetland is in a landscape that has flooding problems.<br>Choose the description that best matches conditions around the wetland being rated. *Do not add points. Choose the highest score if more than one condition is met.*<br>The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds), AND<br>Flooding occurs in sub-basin that is immediately down-gradient of wetland — points = 2<br>\ Surface flooding problems are in a sub-basin farther down-gradient — points = 1<br>The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood.<br>*Explain why* _____ — points = 0<br>There are no problems with flooding downstream of the wetland — points = 0 | 1 |
| D 6.2. Has the site has been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 (No = 0) | 0 |
| Total for D 6 — Add the points in the boxes above | 1 |

**Rating of Value** If score is: ___ **2-4 = H** ✓ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number Two4

| **These questions apply to wetlands of all HGM classes.**<br>**HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat | (only 1 score per box) |
|---|---|
| **H 1.0. Does the wetland have the potential to provide habitat for many species?** | |
| H 1.1. Structure of the plant community:<br>*Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.*<br>✓ Aquatic bed 42%<br>✓ Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover<br>___ Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover<br>✓ Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover 12%<br>___ Scrub-shrub (areas where shrubs have >30% cover)<br>___ Forested (areas where trees have >30% cover)<br>4 or more checks: points = 3<br>3 checks: points = 2<br>2 checks: points = 1<br>1 check: points = 0 | 2 |
| H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0 | 1 |
| H 1.3. Surface water<br>H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? *Answer YES for Lake Fringe wetlands.* Yes = 3 points & go to H 1.4 No = go to H 1.3.2<br>H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No.* Yes = 3 No = 0 | 3 |
| H 1.4. Richness of plant species<br>Count the number of plant species in the wetland that cover at least 10 ft$^2$. *Different patches of the same species can be combined to meet the size threshold. You do not have to name the species.*<br>*Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)*<br># of species ___ 3<br>Scoring: > 9 species: points = 2<br>4-9 species: points = 1<br>< 4 species: points = 0 | 0 |
| H 1.5. Interspersion of habitats<br>Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none.<br>*Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*<br>  <br>**None** = 0 points **Low** = 1 point **Moderate** = 2 points<br>All three diagrams in this row are **High** = 3 points<br>  <br>Riparian braided channels with 2 classes | Figure__ 1 |

Wetland name or number TW04

| | |
|---|---|
| H 1.6. Special habitat features<br>*Check the habitat features that are present in the wetland. The number of checks is the number of points.*<br>✓ Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream.<br>✓ Cattails or bulrushes are present within the wetland.<br>___ Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge.<br>___ Emergent or shrub vegetation in areas that are permanently inundated/ponded.<br>___ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity<br>✓ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)* | 3 |
| Total for H 1 — Add the points in the boxes above | 10 |

**Rating of Site Potential** If score is: ___ **15-18 = H** ✓ **7-14 = M** ___ **0-6 = L** *Record the rating on the first page*

| | |
|---|---|
| **H 2.0. Does the landscape have the potential to support habitat functions of the site?** | |
| H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is:<br>*Calculate:* % undisturbed habitat 17 + [(% moderate and low intensity land uses)/2] 9 = 26 %<br>> 1/3 (33.3%) of 1 km Polygon — points = 3<br>— 20-33% of 1km Polygon — points = 2<br>10-19% of 1km Polygon — points = 1<br><10% of 1km Polygon — points = 0<br>undist 135/785 = 17%  mid 139/785 = 18% | 2 |
| H 2.2. Undisturbed habitat in 1 km Polygon around wetland.<br>*Calculate:* % undisturbed habitat 17 + [(% moderate and low intensity land uses)/2] 13.5 = 30.5 %<br>Undisturbed habitat > 50% of Polygon — points = 3<br>—Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2<br>Undisturbed habitat 10 - 50% and > 3 patches — points = 1<br>Undisturbed habitat < 10% of Polygon — points = 0<br>mid 212/785 = 27 (3 patches) | 2 |
| H 2.3. Land use intensity in 1 km Polygon:<br>> 50% of Polygon is high intensity land use 56% — points = (- 2)<br>Does not meet criterion above — points = 0 | -2 |
| H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 (No = 0) | 0 |
| Total for H 2 — Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **4-9 = H** ✓ **1-3 = M** ___ **< 1 = L** *Record the rating on the first page*

| | |
|---|---|
| **H 3.0. Is the habitat provided by the site valuable to society?** | |
| H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated*<br>Site meets ANY of the following criteria: — points = 2<br>— It has 3 or more priority habitats within 100 m (see Appendix B)<br>— It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists)<br>— It is mapped as a location for an individual WDFW species<br>— It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>— It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan<br>✓ Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1<br>Site does not meet any of the criteria above — points = 0 | 1 |

**Rating of Value** If score is: ___ **2 = H** ✓ **1 = M** ___ **0 = L** *Record the rating on the first page*

# Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

✓— **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

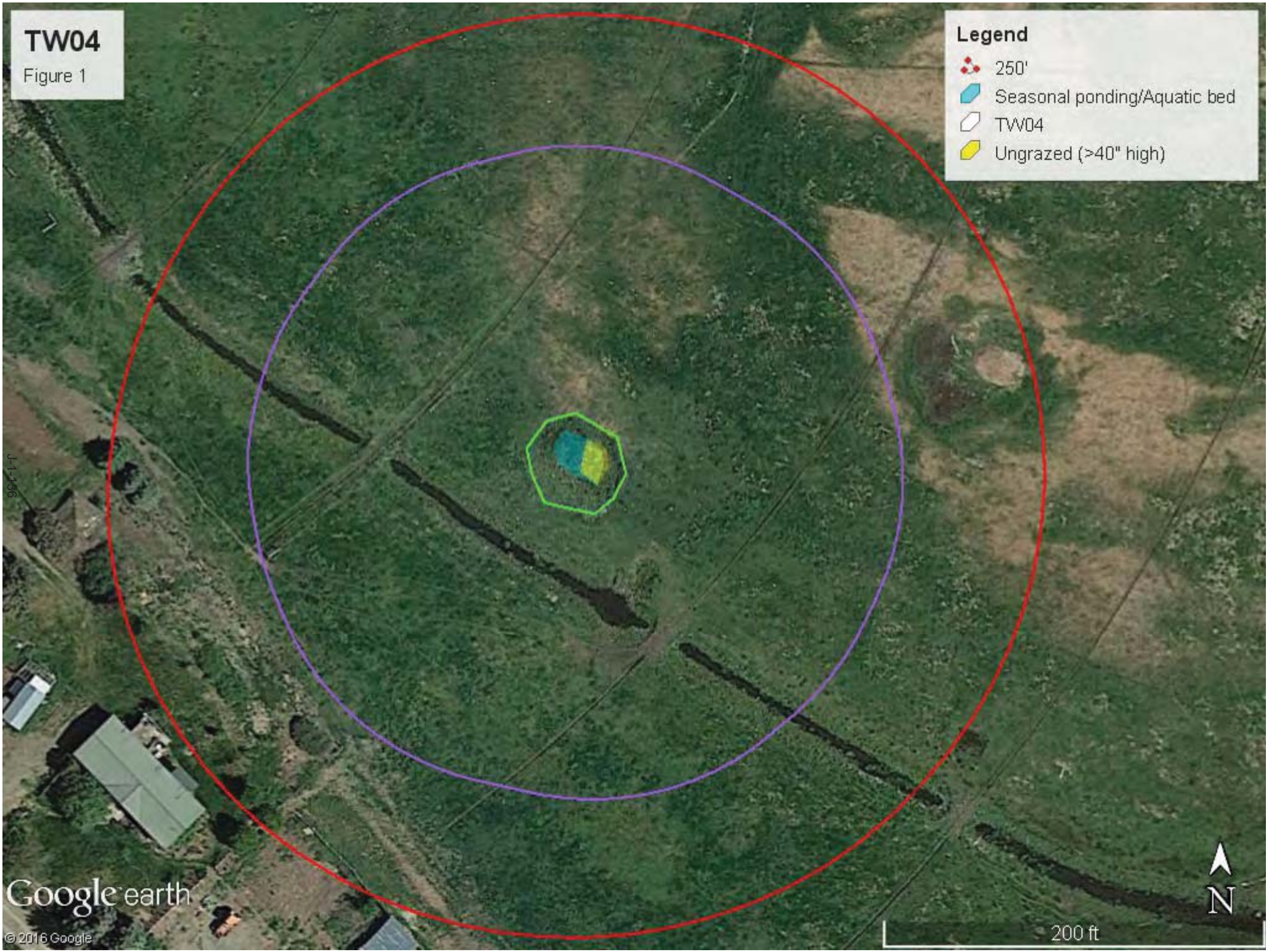
— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm ) in diameter at the largest end, and > 20 ft (6 m) long.

— **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

— **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

— **Juniper Savannah:** All juniper woodlands.

**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.


TW04
Figure 1
Legend
250'
Seasonal ponding/Aquatic bed
TW04
Ungrazed (>40" high)
J-1-266
Google earth
© 2016 Google
N
200 ft


TW04
Figure 2
Legend
Contributing Basin
TW04
Google earth
© 2016 Google
N
500 ft


TW04
Figure 3
Legend
Mid-intensity
TW04
Undisturbed
J-1-138
Peckwood Ln
Thorpe Hwy S
Robinson Canyon Rd
Google earth
© 2016 Google
N
3000 ft

April 25, 2017

# TW04 - Figure 4


**Assessed Waters/Sediment**

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation © 2010 NAVTEQ © AND

Miles
0 0.125 0.25 0.5

DEPARTMENT OF ECOLOGY
State of Washington

# Water Quality Improvement Projects (TMDLs)

**WATER QUALITY IMPROVEMENT PROJECTS (TMDLs)**

Overview of the process
Project Catalog
- by WRIA
- by County

Funding Opportunities
Project Development Priority Lists
Related Information
TMDL Contacts

**RELATED ECOLOGY PROGRAMS**

Water Quality

Water Quality Improvement > Water Quality Improvement Projects by WRIA > WRIA 39: Upper Yakima

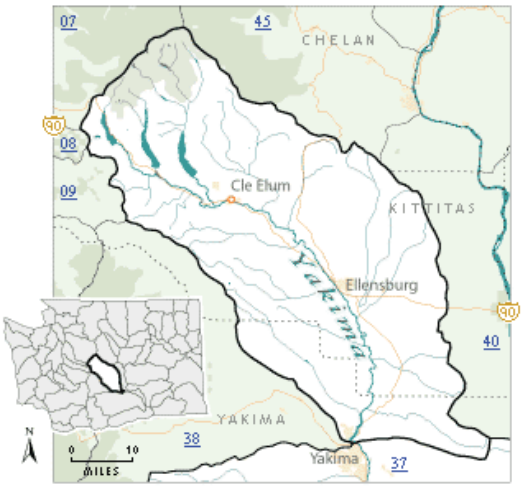
## WRIA 39: Upper Yakima

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

**Yakima River basin project index:**
**www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html**

**Counties**

- Kittitas
- Yakima




| Project Name | Pollutants | Status** | TMDL Lead |
|---|---|---|---|
| Crystal Creek | Ammonia-N<br>BOD (5-day)<br>Chlorine<br>Fecal Coliform | EPA approved | Jane Creech<br>509-454-7860 |
| Selah Ditch | Fecal Coliform<br>Temperature | EPA approved | Greg Bohn<br>509-454-4174 |
| Teanaway River segments:<br>• Upper West Fork Teanaway River<br>• Upper Middle Fork Teanaway River<br>• Upper North Fork Teanaway River<br>• Stafford Creek<br>• Lower West Fork Teanaway River<br>• Lower Middle Fork Teanaway River<br>• Lower North Fork Teanaway River<br>• Mainstem Teanaway River | Temperature | EPA approved | Jane Creech<br>509-454-7860 |
| Wilson/Cooke Creek Tributaries:<br>• Badger Creek<br>• Bull Ditch<br>• Caribou Creek<br>• Cherry Creek<br>• CID Canal<br>• Coleman Creek<br>• Cook Creek<br>• EWC Canal<br>• Johnson Drain<br>• KRD Canal | Fecal Coliform | EPA approved<br>Has an implementation plan<br><br>Post-TMDL monitoring report | Jane Creech<br>509-454-7860<br>Greg Bohn<br>509-454-4174 |

| | | | |
|---|---|---|---|
| • Mercer Creek<br>• Naneum Creek<br>• Parke Creek<br>• Whiskey Creek<br>• Wilson Creek<br>• Wipple Wasteway | | | |
| Yakima River, Upper | Dieldrin<br>DDT<br>Suspended Sediments<br>Turbidity | EPA approved | Jane Creech<br>509-454-7860 |
| | Temperature | EPA approved<br>Has an implementation plan | Jane Creech<br>509-454-7860 |
| Yakima River | Toxics | Under development | Jane Creech<br>509-454-7860 |

**** Status** will be listed as one of the following: Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

**For more information about WRIA 39:**

- Waterbodies in WRIA 39 - using the Water Quality Assessment Query Tool
- Watershed Information for WRIA 39

* The Department of Ecology and other state resource agencies frequently use a system of 62 "Water Resource Inventory Areas" or "WRIAs" to refer to the state's major watershed basins.

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Last updated December 2016

Wetland name or number TWO5

# RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): TWO5 Date of site visit: 4/12/17

Rated by N. Evan Dulik Trained by Ecology? ✓ Yes ___ No Date of training 3/24/17

**HGM Class used for rating** Riverine Wetland has multiple HGM classes? ___Y ✓N

**NOTE: Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

## OVERALL WETLAND CATEGORY III (based on functions ✓ or special characteristics ___)

### 1. Category of wetland based on FUNCTIONS

___**Category I** – Total score = 22-27
___**Category II** – Total score = 19-21
✓**Category III** – Total score = 16-18
___**Category IV** – Total score = 9-15

| FUNCTION | Improving Water Quality | Hydrologic | Habitat | |
|---|---|---|---|---|
| | *Circle the appropriate ratings* | | | |
| Site Potential | H (M) L | (H) M L | H M (L) | |
| Landscape Potential | H (M) L | H M (L) | H M (L) | |
| Value | H M (L) | (H) M L | H (M) L | TOTAL |
| **Score Based on Ratings** | 5 | 7 | 4 | 16 |

**Score for each function based on three ratings** *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

| CHARACTERISTIC | CATEGORY *Circle the appropriate category* |
|---|---|
| **Vernal Pools** | II III |
| **Alkali** | I |
| **Wetland of High Conservation Value** | I |
| **Bog and Calcareous Fens** | I |
| **Old Growth or Mature Forest – slow growing** | I |
| **Aspen Forest** | I |
| **Old Growth or Mature Forest – fast growing** | II |
| **Floodplain forest** | II |
| None of the above | ✓ |

Wetland name or number Two S

## Maps and figures required to answer questions correctly for Eastern Washington

### Depressional Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | D 1.3, H 1.1, H 1.5 | |
| Hydroperiods (including area of open water for H 1.3) | D 1.4, H 1.2, H 1.3 | |
| Location of outlet (*can be added to map of hydroperiods)* | D 1.1, D 4.1 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | D 2.2, D 5.2 | |
| Map of the contributing basin | D 5.3 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | D 3.1, D 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | D 3.3 | |

### Riverine Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | 1 |
| Hydroperiods | H 1.2, H 1.3 | 1 |
| Ponded depressions | R 1.1 | 1 |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | R 2.4 | 1 |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | 2 |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | 1 |
| Width of wetland vs. width of stream *(can be added to another figure)* | R 4.1 | 1 |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | 3 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | 4 |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | R 3.2, R 3.3 | 5 |

### Lake Fringe Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | L 1.1, L 4.1, H 1.1, H 1.5 | |
| Plant cover of trees, shrubs, and herbaceous plants | L 1.2 | |
| Boundary of area within 150 ft of the wetland *(can be added to another figure)* | L 2.2 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | L 3.1, L 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | L 3.3 | |

### Slope Wetlands

| Map of: | To answer questions: | Figure # |
|---|---|---|
| Cowardin plant classes and classes of emergents | H 1.1, H 1.5 | |
| Hydroperiods | H 1.2, H 1.3 | |
| Plant cover of **dense** trees, shrubs, and herbaceous plants | S 1.3 | |
| Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)* | S 4.1 | |
| Boundary of area within 150 ft of the wetland (*can be added to another figure*) | S 2.1, S 5.1 | |
| 1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat | H 2.1, H 2.2, H 2.3 | |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | S 3.1, S 3.2 | |
| Screen capture of list of TMDLs for WRIA in which wetland is found (website) | S 3.3 | |

Wetland name or number TWO S

# HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ___The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ___At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ___The water leaves the wetland **without being impounded**.

   NO - go to 3 YES – The wetland class is **Slope**
   **NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ___The overbank flooding occurs at least once every 10 years.

   NO - go to 4 YES – The wetland class is **Riverine**
   **NOTE:** The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number TWO5

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

| HGM classes within the wetland unit being rated | HGM Class to use in rating |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake Fringe | Lake Fringe |
| Depressional + Riverine (the riverine portion is within the boundary of depression) | Depressional |
| Depressional + Lake Fringe | Depressional |
| Riverine + Lake Fringe | Riverine |

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have* ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Two S

| **RIVERINE WETLANDS**<br>**Water Quality Functions** - Indicators that the site functions to improve water quality | | Points (only 1 score per box) |
|---|---|---|
| R 1.0. Does the site have the potential to improve water quality? | | |
| R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: | | |
| _ Depressions cover >1/3 area of wetland | points = 6 | 6 |
| Depressions cover > 1/10 area of wetland (0.18 ac / 0.47 ac = 38%) | points = 3 | |
| Depressions present but cover < 1/10 area of wetland | points = 1 | |
| No depressions present | points = 0 | |
| R 1.2. Structure of plants in the wetland (areas with >90% cover at person height; **not** Cowardin classes): | | |
| Forest or shrub > 2/3 the area of the wetland | points = 10 | 5 |
| Forest or shrub 1/3 – 2/3 area of the wetland (0.31 / 0.47 = 66%) | points = 5 | |
| ~ Ungrazed, herbaceous plants > 2/3 area of wetland | points = 5 | |
| Ungrazed herbaceous plants 1/3 – 2/3 area of wetland | points = 2 | |
| Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland | points = 0 | |
| Total for R 1 | Add the points in the boxes above | 11 |

**Rating of Site Potential** If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

| R 2.0. Does the landscape have the potential to support the water quality function of the site? | | |
|---|---|---|
| R 2.1. Is the wetland within an incorporated city or within its UGA? | Yes = 2 (No = 0) | 0 |
| R 2.2. Does the contributing basin include a UGA or incorporated area? | Yes = 1 (No = 0) | 0 |
| R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? ↳ diverted water from upper Yakima River | Yes = 1 No = 0 | 1 |
| R 2.4. Is > 10% of the area within 150 ft of wetland in land uses that generate pollutants | (Yes = 1) No = 0 | 1 |
| R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4? Source_____ | Yes = 1 (No = 0) | 0 |
| Total for R 2 | Add the points in the boxes above | 2 |

**Rating of Landscape Potential** If score is: ___ **3-6 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

| R 3.0. Is the water quality improvement provided by the site valuable to society? | | |
|---|---|---|
| R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yakima River > 1 mile | Yes = 1 (No = 0) | 0 |
| R 3.2. Does the river or stream have TMDL limits for nutrients, toxics, or pathogens? | Yes = 1 (No = 0) | 0 |
| R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the drainage in which wetland is found.* | Yes = 2 (No = 0) | 0 |
| Total for R 3 | Add the points in the boxes above | 0 |

**Rating of Value** If score is: ___ **2-4 = H** ___ **1 = M** ✓ **0 = L** *Record the rating on the first page*

Wetland name or number TWO S

| **RIVERINE WETLANDS**<br>**Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion | | Points (only 1 score per box) |
|---|---|---|
| R 4.0. Does the site have the potential to reduce flooding and erosion? | | |
| R 4.1. Characteristics of the overbank storage the wetland provides:<br>*Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).*<br>~75' / 40' = 1.9 x | | 8 |
| If the ratio is more than 2 | points = 10 | |
| _ If the ratio is 1-2 | points = 8 | |
| If the ratio is ½-<1 | points = 4 | |
| If the ratio is ¼-< ½ | points = 2 | |
| If the ratio is < ¼ | points = 1 | |
| R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have > 90% cover at person height. These are NOT Cowardin classes).* | | 4 |
| Forest or shrub for more than $^2/_3$ the area of the wetland | points = 6 | |
| _ Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area 66% | points = 4 | |
| Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area | points = 2 | |
| Plants do not meet above criteria | points = 0 | |
| Total for R 5 | Add the points in the boxes above | 12 |

**Rating of Site Potential** If score is: ✓ **12-16 = H** ___ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

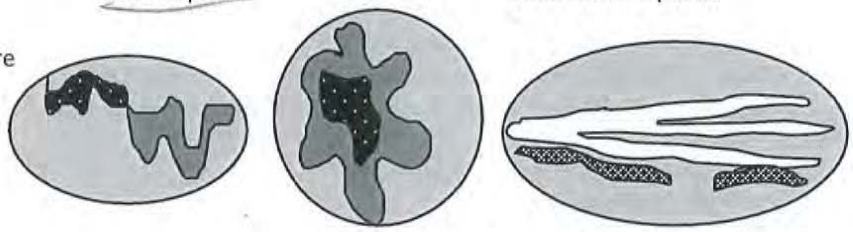
| R 5.0. Does the landscape have the potential to support the hydrologic functions of the site? | | |
|---|---|---|
| R 5.1. Is the stream or river adjacent to the wetland downcut? | (Yes = 0) No = 1 | 0 |
| R 5.2. Does the up-gradient watershed include a UGA or incorporated area? | Yes = 1 (No = 0) | 0 |
| R 5.3. Is the up-gradient stream or river controlled by dams? | (Yes = 0) No = 1 | 0 |
| Total for R 5 | Add the points in the boxes above | 0 |

**Rating of Landscape Potential** If score is: ___ **3 = H** ___ **1 or 2 = M** ✓ **0 = L** *Record the rating on the first page*

| R 6.0. Are the hydrologic functions provided by the site valuable to society? | | |
|---|---|---|
| R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.* | | 2 |
| _ The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources | points = 2 | |
| Surface flooding problems are in a basin farther down-gradient | points = 1 | |
| No flooding problems anywhere downstream | points = 0 | |
| R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? | Yes = 2 (No = 0) | 0 |
| Total for R 6 | Add the points in the boxes above | 2 |

**Rating of Value** If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number TWO S

| **These questions apply to wetlands of all HGM classes.**<br>**HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat | (only 1 score per box) |
|---|---|
| **H 1.0. Does the wetland have the potential to provide habitat for many species?** | |
| H 1.1. Structure of the plant community:<br>*Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.*<br>____Aquatic bed<br>__✓__Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover 20%<br>____Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover<br>__✓__Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover 60%<br>____Scrub-shrub (areas where shrubs have >30% cover) 8%<br>____Forested (areas where trees have >30% cover)<br>4 or more checks: points = 3<br>3 checks: points = 2<br>2 checks: points = 1<br>1 check: points = 0 | 1 |
| H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0 | 0 |
| H 1.3. Surface water<br>H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? ***Answer YES for Lake Fringe wetlands.*** Yes = 3 points & go to H 1.4 No = go to H 1.3.2<br>H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No.*<br>Yes = 3 No = 0 | 0 |
| H 1.4. Richness of plant species<br>Count the number of plant species in the wetland that cover at least 10 ft$^2$. *Different patches of the same species can be combined to meet the size threshold. You do not have to name the species.*<br>*Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)*<br># of species ____ 111<br>Scoring: > 9 species: points = 2<br>4-9 species: points = 1<br>< 4 species: points = 0 | 0 |
| H 1.5. Interspersion of habitats<br>Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none.<br>*Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*<br>  <br>**None** = 0 points **Low** = 1 point **Moderate** = 2 points<br>All three diagrams in this row are **High** = 3 points<br>  <br>Riparian braided channels with 2 classes | Figure__ 1 |

Wetland name or number TWO S

| | |
|---|---|
| H 1.6. Special habitat features<br>*Check the habitat features that are present in the wetland. The number of checks is the number of points.*<br>____Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream.<br>__✓__Cattails or bulrushes are present within the wetland.<br>____Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge.<br>____Emergent or shrub vegetation in areas that are permanently inundated/ponded.<br>____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity<br>____ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)* | 1 |
| Total for H 1 — Add the points in the boxes above | 3 |

**Rating of Site Potential** If score is:___**15-18 = H** ___**7-14 = M** ✓**0-6 = L** *Record the rating on the first page*

| | |
|---|---|
| **H 2.0. Does the landscape have the potential to support habitat functions of the site?** | |
| H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is:<br>*Calculate:* % undisturbed habitat 0 + [(% moderate and low intensity land uses)/2] 0 = 0 %<br>> 1/3 (33.3%) of 1 km Polygon — points = 3<br>20-33% of 1km Polygon — points = 2<br>10-19% of 1km Polygon — points = 1<br>—<10% of 1km Polygon — points = 0<br>undis 0/830 ac = 0 mid 0/830 = 0 | 0 |
| H 2.2. Undisturbed habitat in 1 km Polygon around wetland.<br>*Calculate:* % undisturbed habitat 12 + [(% moderate and low intensity land uses)/2] 12.5 = 24.5 %<br>Undisturbed habitat > 50% of Polygon — points = 3<br>—Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2<br>Undisturbed habitat 10 - 50% and > 3 patches — points = 1<br>Undisturbed habitat < 10% of Polygon — points = 0<br>undis 103/830 = 12% mid 206/830 = 25% 2 Patches | 2 |
| H 2.3. Land use intensity in 1 km Polygon:<br>> 50% of Polygon is high intensity land use 63% — points = (- 2)<br>Does not meet criterion above — points = 0 | -2 |
| H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 (No = 0) | 0 |
| Total for H 2 — Add the points in the boxes above | 0 |

**Rating of Landscape Potential** If score is:___**4-9 = H** ___**1-3 = M** ✓**< 1 = L** *Record the rating on the first page*

| | |
|---|---|
| **H 3.0. Is the habitat provided by the site valuable to society?** | |
| H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated*<br>Site meets ANY of the following criteria: — points = 2<br>— It has 3 or more priority habitats within 100 m (see Appendix B)<br>— It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists)<br>— It is mapped as a location for an individual WDFW species<br>— It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>— It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan<br>—Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1<br>Site does not meet any of the criteria above — points = 0 | 1 |

**Rating of Value** If score is:___**2 = H** ✓**1 = M** ___**0 = L** *Record the rating on the first page*

# Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

✓— **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm ) in diameter at the largest end, and > 20 ft (6 m) long.

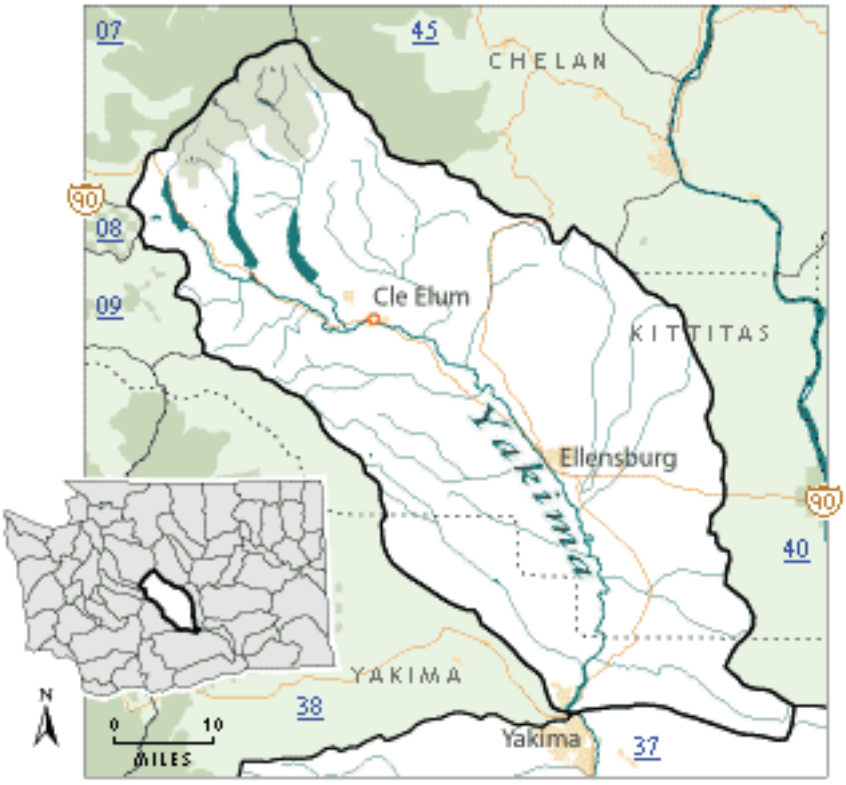
— **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

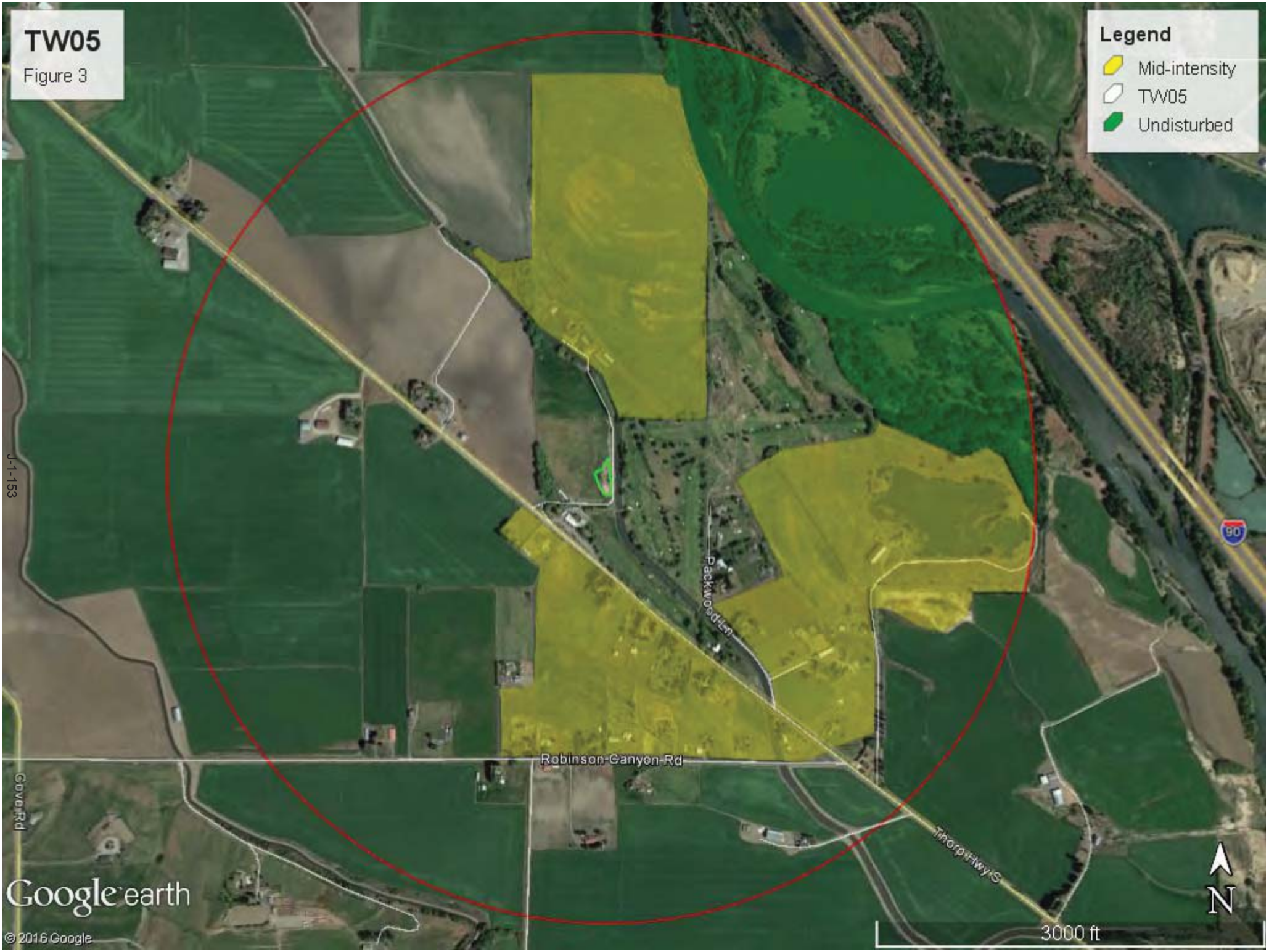
— **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

— **Juniper Savannah:** All juniper woodlands.

**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.


TW05
Figure 1
Legend
Depression
Outlet/inlet
Scrub-shrub
TW05
Ungrazed (>40")
Width
Outlet/inlet
J-1-151
Google earth
© 2016 Google
N
300 ft


07
45
CHELAN
90
08
09
Cle Elum
KITTITAS
Yakima
Ellensburg
90
40
YAKIMA
38
Yakima
37
N
0
10
MILES


TW05
Figure 3
Legend
Mid-intensity
TW05
Undisturbed
J-1-153
Cover Rd
Packwood Ln
Robinson Canyon Rd
Thorp Hwy S
90
N
3000 ft
Google earth
© 2016 Google

April 25, 2017

# TW05 - Figure 4


**Assessed Waters/Sediment**

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Miles
0 0.125 0.25 0.5



DEPARTMENT OF ECOLOGY
State of Washington

# Water Quality Improvement Projects (TMDLs)

**WATER QUALITY IMPROVEMENT PROJECTS (TMDLs)**

Overview of the process
Project Catalog
- by WRIA
- by County

Funding Opportunities
Project Development Priority Lists
Related Information
TMDL Contacts

**RELATED ECOLOGY PROGRAMS**

Water Quality

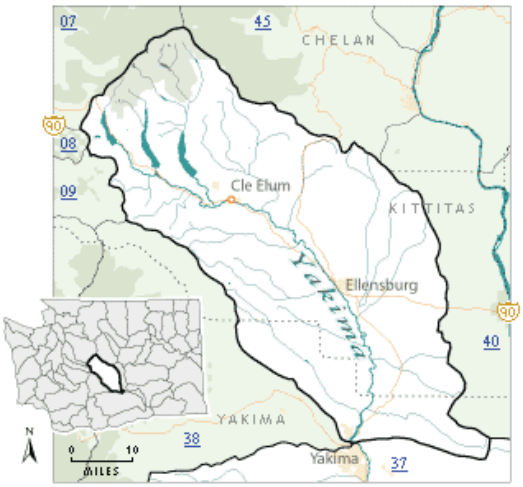
Water Quality Improvement > Water Quality Improvement Projects by WRIA > WRIA 39: Upper Yakima

## WRIA 39: Upper Yakima

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

**Yakima River basin project index:**
**www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html**
**Counties**

- Kittitas
- Yakima




| Project Name | Pollutants | Status** | TMDL Lead |
|---|---|---|---|
| Crystal Creek | Ammonia-N<br>BOD (5-day)<br>Chlorine<br>Fecal Coliform | EPA approved | Jane Creech<br>509-454-7860 |
| Selah Ditch | Fecal Coliform<br>Temperature | EPA approved | Greg Bohn<br>509-454-4174 |
| Teanaway River segments:<br>• Upper West Fork Teanaway River<br>• Upper Middle Fork Teanaway River<br>• Upper North Fork Teanaway River<br>• Stafford Creek<br>• Lower West Fork Teanaway River<br>• Lower Middle Fork Teanaway River<br>• Lower North Fork Teanaway River<br>• Mainstem Teanaway River | Temperature | EPA approved | Jane Creech<br>509-454-7860 |
| Wilson/Cooke Creek Tributaries:<br>• Badger Creek<br>• Bull Ditch<br>• Caribou Creek<br>• Cherry Creek<br>• CID Canal<br>• Coleman Creek<br>• Cook Creek<br>• EWC Canal<br>• Johnson Drain<br>• KRD Canal | Fecal Coliform | EPA approved<br>Has an implementation plan<br>Post-TMDL monitoring report | Jane Creech<br>509-454-7860<br>Greg Bohn<br>509-454-4174 |

| | | | |
|---|---|---|---|
| Mercer Creek<br>• Naneum Creek<br>• Parke Creek<br>• Whiskey Creek<br>• Wilson Creek<br>• Wipple Wasteway | | | |
| Yakima River, Upper | Dieldrin<br>DDT<br>Suspended Sediments<br>Turbidity | EPA approved | Jane Creech<br>509-454-7860 |
| | Temperature | EPA approved<br>Has an implementation plan | Jane Creech<br>509-454-7860 |
| Yakima River | Toxics | Under development | Jane Creech<br>509-454-7860 |

**** Status** will be listed as one of the following: Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

**For more information about WRIA 39:**

- Waterbodies in WRIA 39 - using the Water Quality Assessment Query Tool
- Watershed Information for WRIA 39

* The Department of Ecology and other state resource agencies frequently use a system of 62 "Water Resource Inventory Areas" or "WRIAs" to refer to the state's major watershed basins.

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Last updated December 2016

# APPENDIX F: KITTITAS COUNTY WETLAND BUFFER GUIDANCE

Chapter 17A.04
CRITICAL AREAS DESIGNATION AND DEVELOPMENT STANDARDS

**Sections**



17A.04.010 Wetlands.
Wetlands in Kittitas County are defined in Section 17A.02.310 and classified in four categories: Category I (extreme high value), Category II (high value), Category III (average value), Category IV (less than average value). Critical area wetlands in Kittitas County are defined as Category I, Category II, Category III and Category IV wetlands as determined by the planning manager.

Category IV wetlands may be determined by the director to constitute a critical area based upon application of the criteria in this chapter. (Ord. 95-15 (part), 1995; Ord. 94-22 (part), 1994).

17A.04.015 No net loss of wetland areas.
Kittitas County shall require, to the extent practical, and except for Category IV wetlands, a zero net loss of natural wetlands functions and values together with, if reasonably possible through voluntary agreements or government incentives, a gain of wetlands in the long term. (Ord. 94-22 (part), 1994).

17A.04.020 Buffer width requirements.
Wetland buffer requirements apply to all nonexempt activities on regulated wetlands. All wetland buffers shall be measured from the wetland boundary.

| Category | Size of Wetland | Required Buffer |
|---|---|---|
| I | any size | 50 - 200 feet |
| II | over 2,000 sq. ft. | 25 - 100 feet |
| III | over 10,000 sq. ft. | 20 - 80 feet |
| IV* | 43,560 sq. ft. (1 acre) | Building setbacks will be determined by the zoning lot line setbacks, but shall not exceed 25 feet. |

*Includes only nonirrigation induced or enhanced Category IV wetlands. Irrigation water does influence ground water table elevations in Kittitas County.

(Ord. 96-14 (part), 1996; Ord. 95-15 (part), 1995; Ord. 94-22 (part), 1994).

17A.04.025 Wetland buffer ranges.
The wetland buffer ranges have been established to reflect the impact of certain intense land uses on wetland function and values. The director shall base the buffer size on the following criteria and shall establish the least restrictive width of buffer necessary to account for all of the following considerations:

1. The overall intensity of the proposed use;
2. The presence of threatened, endangered, or sensitive species;
3. The site's susceptibility to severe erosion;
4. The use of a buffer enhancement plan by the applicant which uses native vegetation or other measures which will enhance the functions and values of the wetland or buffer. (Ord. 94-22 (part), 1994).

17A.04.030 Wetland buffer averaging.
Wetland buffers may be modified by averaging buffer widths. Wetland buffer width averaging shall be allowed only where the applicant demonstrates that the following exists:

1. That averaging is necessary to avoid an extraordinary hardship to the applicant caused by circumstances peculiar to the property;
2. That the wetland contains variations in sensitivity due to existing physical characteristics;
3. That the proposed use would be located adjacent to areas where buffer width is reduced, and that such land uses are low in impact;
4. That width averaging will not adversely impact wetland function and values. (Ord. 9422 (part), 1994).

17A.04.035 Natural condition of wetland buffer.
Natural condition of wetland buffer. Wetland buffer areas shall be retained in their natural condition or may be improved to enhance buffer functions and values. Where buffer disturbance has occurred during construction, revegetation with native vegetation may be required. The Kittitas County noxious weed ordinance shall be adhered to. (Ord. 94-22 (part), 1994).

17A.04.040 Allowed uses.
In addition to exempt activities otherwise identified herein, the following activities are allowed to occur on wetland and wetland buffer areas: nonmotorized outdoor recreational activities including hunting and fishing; educational activities; existing and ongoing agricultural activities, silviculture and mining; and maintenance of existing facilities, structures, ditches, roads, bridges and other utility systems. Up to two acres of Class IV wetlands may be filled, drained or modified with no approval required from the planning manager. If more than two acres of Class IV wetlands are filled, drained or modified, approval of the planning manager is required. Such development activity shall provide mitigation in accordance with Section 17A.04.050 for that portion of the wetland fill or modification that exceeds two acres. Category IV wetlands may be used for secondary stormwater management facilities having no reasonable alternative on-site location, provided there is no significant adverse impact to the functions and values of those wetlands. (Ord. 95-15 (part), 1995; Ord. 94-22 (part), 1994).

17A.04.045 Building setback lines from wetland buffers.
A building setback line equal to the side yard setback requirement of the applicable zoning district is required from the edge of any wetland buffer. Minor intrusions into the area of the building setback may be allowed if the director determines that such intrusions will not negatively impact the wetland. The setbacks shall be shown on all site plans submitted with the application. (Ord. 94-22 (part), 1994).

17A.04.050 Wetland replacement ratios.
Wetland replacement ratios are expressed in gross area required for replacement. The actual replacement, enhancement or rehabilitation of wetlands shall be determined by the director and meet all applicable standards for such. Replacement areas shall be determined according to function, acreage, type, location, time factors, ability to be self sustaining and projected success. Wetland functions and values shall be calculated using the Kittitas County critical areas policy document and the professional judgment of the director.

| **Category of Wetland** | **Replacement Ratio** |
|---|---|
| I | 3:1 |
| II | 2:1 |
| III | 1.5:1 |
| IV | 1:1 for the portion of a wetland fill or modification |

(Ord. 96-14 (part), 1996; Ord. 95-15 (part), 1995; Ord. 94-22 (part), 1994).