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PNNL-34260

Wetlands Delineation Report

Big Eddy-Ostrander Transmission Line

May 2023

Dana B. Vesty, PWS
Ioana Bociu
Stephanie Johansen
Ann Miracle

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Prepared for
Bonneville Power Administration (BPA)

Pacific Northwest National Laboratory
Richland, Washington 99354

Acronyms and Abbreviations

BEOS	Big Eddy-Ostrander -No. 1 Transmission Line
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CRGNSA	Columbia River Gorge National Scenic Area
D	The Dalles weather station
DBH	Diameter at Breast Height
DSL	Oregon Department of State Lands
FEMA	Federal Emergency Management Agency
FIRM	Federal Insurance Rate Map
GPS	Global Positioning System
HGM	Hydrogeomorphic
HRE	Hood River Experimental weather station
kV	Kilovolt
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
OR	Oregon
ORWAP	Oregon Rapid Wetland Assessment Protocol
PEM	Palustrine Emergent
PFO	Palustrine Forested
PSS	Palustrine Scrub-Shrub
PNNL	Pacific Northwest National Laboratory
ROW	Right-of-way
SFBR	South Fork Bull Run weather station
T	Trace
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
USFS	US Forest Service
WETS	Wetlands Climate Tables
WOtUS	Waters of the United States

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1.0 Introduction

Bonneville Power Administration (BPA) proposes to replace the existing conductor along 66.5 miles of the 72-mile long Big Eddy-Ostrander (BEOS) No. 1, 500-kilovolt (kV) transmission line, located in Clackamas, Hood River and Wasco counties. The transmission line is located between The Dalles and terminates near Eagle Creek, Oregon (Figure 1).

The BEOS transmission line was originally constructed in 1960. The existing conductor is past its service-life and in need of replacement. Vendors are no longer providing replacement materials for this conductor and the spare stock is becoming unavailable. In the event of a failure, it would be difficult to restore the line's electrical service in a timely manner. Additionally, insulators and transmission structure hardware are also at the end of their typical service-life and in need of replacement. Improvements to the existing access road network are proposed and would include grading, rocking, and installing or replacing drainage features.

Pacific Northwest National Labs (PNNL) was contracted by BPA to prepare a Wetland Delineation Report to support project planning and compliance with state and federal wetland and waterway removal/fill regulations. This report documents the wetlands and waterways of the U.S./State located along the 66.5 miles of existing transmission line, the access road network, and in areas where hazard trees would be removed.

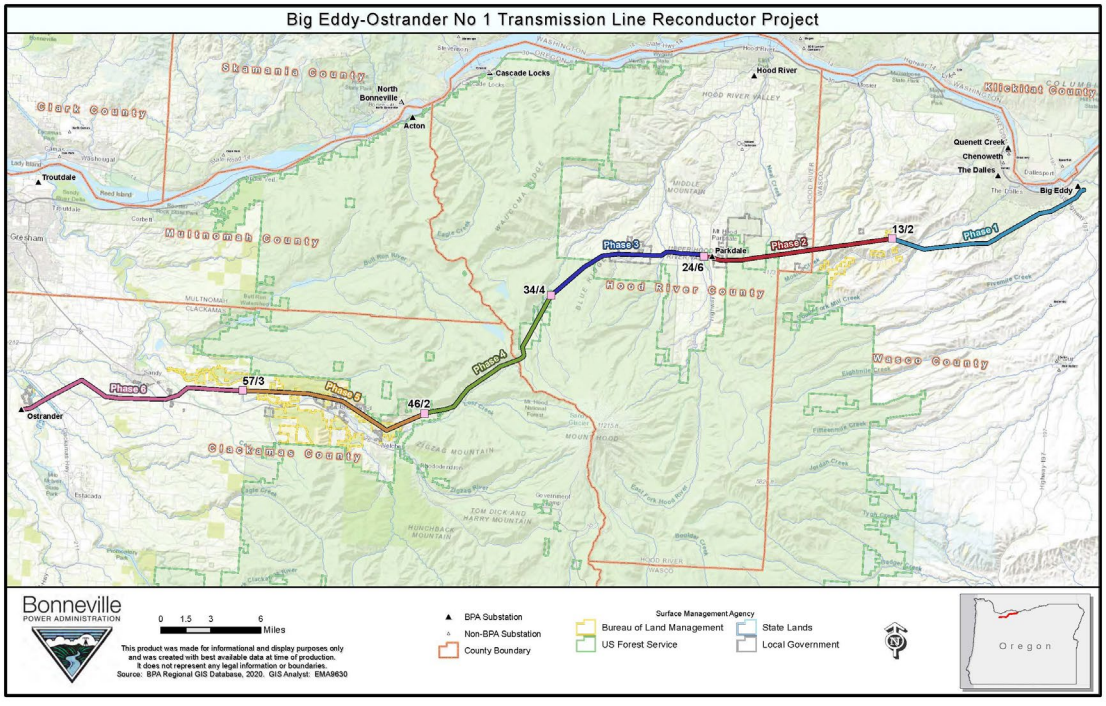


Figure 1-1 An overview map of Big Eddy-Ostrander, No 1 electrical transmission line coverage.

The project area begins just east of The Dalles, at the Big Eddy substation in Section 6, Township 1N, Range 14E, Willamette Meridian. It continues west, passing through Parkdale, and terminates to the southwest of Sandy, in Sections 17 and 20, Township 2S, Range 4E. In total, the project area passes through 92 Sections of Oregon Public Land Survey System (Table 1-1).

Table 1-1 Public Land Survey System Township, Range, and Sections of the Project Area.

Township and Range	Sections
1.00N 9.00E	33,34,35,36
1.00N 10.00E	31,32,33,34,35,36
1.00N 11.00E	24,25,26,27,28,29,30,31,32,34,35
1.00N 12.00E	13,19,20,21,22,23,24,26,27,28,30
1.00N 13.00E	11,12,15,16,19,20,21
1.00N 14.00E	6
1.00S 8.00E	13,24,25,26,35
1.00S 8.50E	1,11,12,14
1.00S 9.00E	5,6
2.00S 4.00E	17,20,21,22,23,24,26
2.00S 5.00E	14,16,19,20,21,23,24,29
2.00S 6.00E	15,16,17,18,19,20,21,22,23,24
2.00S 7.00E	19,23,24,26,27,28,29,30
2.00S 8.00E	2,3,4,8,9,17,18,19

During the installation of the new conductor, BPA construction contractors would need to remove existing conductor and tower structures and arrange for transportation of materials and equipment to work locations. BPA also proposes to improve the existing access road network in select areas. Proposed access road improvements include the following activities: 1) pole removal, pole installation, and conductor installation , 2) improvement or reconstruction of the existing access roads (blading, grading, rocking), 3) installation of drainage features (drain dips, water bars, and cleaning, replacing, or installing new culverts, and ford improvements, 4) installation or replacement gates and cattle guards, 5) creation of new landings for crew access and staging, 6) installation of temporary bridges, as needed to protect water quality and aquatic habitat during construction activities (bridge supports would be placed above

OHWM), and 7) vegetation removal. Construction activities would be within or directly adjacent to the existing right-of-way (ROW) or along existing access roads. Select danger trees removal would be conducted to help maintain reliable electrical service.

Table 1-2 A Summary Table of the Proposed Work

Activity Category	Quantities
Transmission Line	
Approach Sites	19 (6 existing; 1 repair; 12 new) Acres?
Tower Work Areas	147 acres (0.5 acres work area around 294 towers)
Tower Raises	57
Mid-span Ground Excavation to correct impairments	10 locations
Pulling and Tensioning Sites	24 probable sites, 3 alternate sites 35 acres
Access Roads	
New Construction	0.32 miles
Reconstruction	7 miles
Improvement	42 miles
Cross Drain Culverts	5 new, 2 replace
Stream Culverts	2 new, 3 replace, 1 repair
Fords	5 new, 8 repairs
Temporary Bridges	Approximately 5-10
Landings and Staging Areas	20 Landings (0.34acres) Landings range in size from 50 feet by 50 feet to 25 feet by 25 feet. Unknown # staging areas, decided by contractor based on site conditions
Vegetation	
Removal of trees in or adjacent to transmission line right-of-way	2,084 trees
Side limb of trees in or adjacent to transmission line right-of-way	137 trees
Removal or disturbance of vegetation around towers	59.0 acres

Within the project area a total of 158 wetlands were found, totaling approximately 29 acres. A majority (62) of the delineated wetlands are classified as palustrine scrub-shrub under the Cowardin system (Cowardin et al. 1979). Other Cowardin classifications observed included palustrine forested (PFO; 41), palustrine emergent (PEM; 53), and palustrine unconsolidated bottom (PUB; 2). Under the Oregon Hydrogeomorphic (HGM; NRCS 2008) classification systems, a majority (77) of the wetlands classify as Riverine. Other systems observed included Flats (15) and Slope (65).

The survey encountered 482 stream segments, totaling approximately 11 acres. The most common type of streams encountered was intermittent as 377 classified as such out of total 482. The remaining streams were classified as lower perennial (39) and upper perennial (66). Streams that crossed access roads through a culvert were identified as the same stream overall but different segments.

As part of the project, a Biological Assessment, Rare Vegetation Report, and Fish Habitat Suitability Assessment were completed. These reports can be provided upon request.

1.1 Landscape Setting and Land Use

The proposed project is mostly within an existing 66.5-mile-long electrical transmission right-of-way (ROW) that stretches from The Dalles to near Sandy, Oregon (Figure 1-1). The majority of the existing ROW has three 500kV transmission lines, including the BEOS line. Elevation ranges from approximately 600-3,550 feet (Oregon Spatial Library).

The proposed project would not disturb the entire ROW. BPA identified the survey area for this project (Appendix A). PNNL generated numbered study area polygons based on the BPA designated survey areas. Total area of study area polygons was originally 1,140 acres but was reduced to approximately 980 acres in April 2022 to reduce impacts. PNNL examined the study areas plus visually examined 50 meters beyond for resource areas. Wetland delineations occurred within the polygons, and it was noted if the resources continued outside of the study area. Some of the delineation occurred prior to the study area reduction, resulting in areas outside of the study areas being delineated. In addition, when NWI resources were shown within the study areas and the boundary was located outside within 20 meters, the area closest to the study area was delineated. Please refer to maps in Appendix A for further details on these locations.

The BEOS study area spans four ecoregions: Willamette Valley, Western Cascades, Eastern Cascades and the Columbia Plateau (Figure 1-2). The majority of the project are in the two broad ecoregions: the West Cascades ecoregion and the East Cascades ecoregion. The West Cascades ecoregion extends from just east of the Cascade Mountains' summit westward to the foothills of the Willamette Valley. The East Cascades ecoregion extends from just east of the Cascade Mountains' summit eastward to the warmer, drier high desert of the Columbia Plateau ecoregion (ODFW 2016).

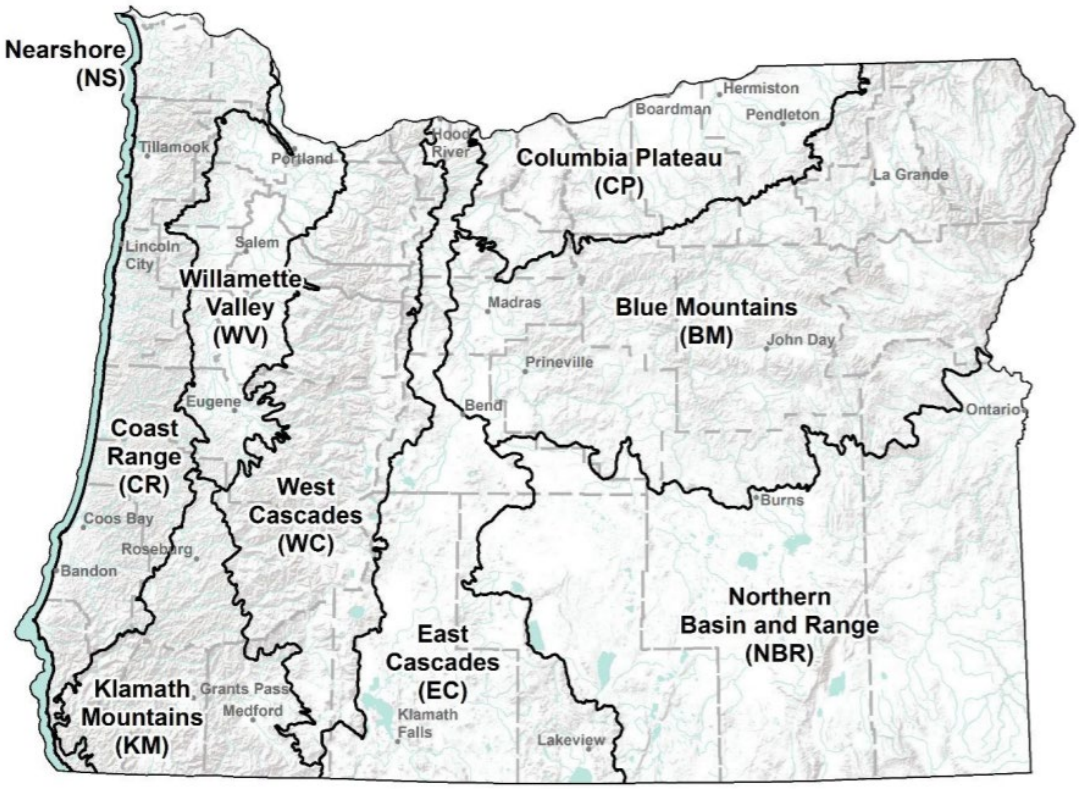


Figure 1-2 Ecoregions of Oregon (source: ODFW 2016).

The survey area crosses three watershed sub-basins: Clackamas (HUC Code 17090011), Lower Columbia-Sandy (HUC Code 17080001), and Middle Columbia-Hood (HUC Code 17070105). Below is a table where three broad watersheds are broken down to smaller sub-basins.

Table 1-3 Action Area Watersheds (10 and 12 Digit Hydrologic Units)

Watershed Name	HUC Code (10 Digit)	Sub-Watershed Name	HUC Code (12 Digit)
Fifteenmile Creek	1707010503	Lower Fifteenmile Creek	170701050306
Mill Creek Columbia River	1707010504	Town of Murdock-Columbia River	170701050406
		North Fork Mill Creek-South Fork Mill Creek	170701050403
		Threemile Creek	170701050402
		Mill Creek	170701050404
		Chenoweth Creek	170701050405
East Fork Hood River	1707010505	Lower East Fork Hood River	170701050506
		Lower Middle Fork Hood River	170701050505
West Fork Hood River	1707010506	Upper West Fork Hood River	170701050601
Hood River	1707010507	Neal Creek	170701050701
Mosier Creek-Columbia River	1707010511	Upper Mosier Creek	170701051102

		Lower Mosier Creek	170701051103
Upper Sandy River	170800010101	Headwaters Sandy River	170800010101
		Clear Creek-Sandy River"	170800010102
Middle Sandy River	1708000104	Wildcat Creek-Sandy River	170800010401
		Cedar Creek-Sandy River	170800010402
Lower Clackamas River	1709001106	Tickle Creek-Deep Creek	170900110604

Since the ROW spans such a broad range of habitats, land use and vegetation along the ROW are highly varied, consisting of areas of natural vegetation of varying degrees of disturbance and succession, along with agricultural areas and residential areas. Within the ROW, vegetation is maintained in an early seral state, consisting of low-growing shrubs, along with native and invasive plants). Lower elevations tend to support agricultural uses (pasture, orchards, tree farms) with lesser amounts of low density residential adjacent to the ROW. At higher elevations, vegetation within the ROW tends to be early seral, with low-growing shrubs, along with native and invasive herbs. Adjacent to the ROW at higher elevations, vegetation can be early seral or support deciduous or coniferous trees.

Forested, grassland, and agricultural land covers are the three most abundant land use/land cover types (LULCs) within the study area, and they occur in all three counties (Figure 1-3). Less frequent LULCs are the Aquatic/Riparian type (50.40 acres), Unique Habitats (54.75 acres), and residential lands (15.42).

Aquatic/Riparian LULCs consists of riparian areas, wetlands, and open water. Unique Habitats include natural land covers that total 25 acres or less, such as shrubby land covers (sagebrush, chaparral, juniper) as well as rocky habitats like cliffs/canyons and lava outcrops.

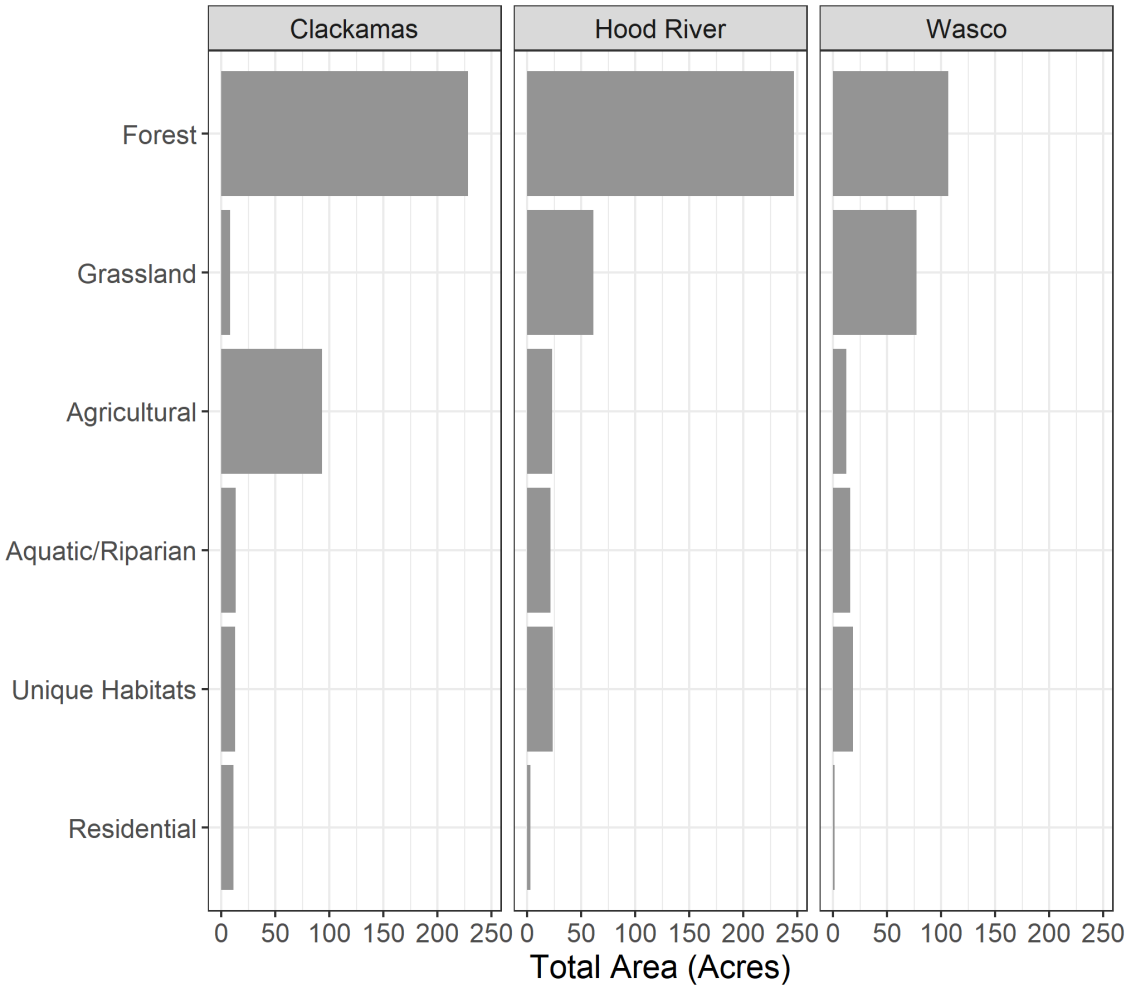


Figure 1-3 Major land use/land cover type acreage of study area polygons by county, based on data from Oregon Statewide Habitat Map (PSU 2018)

The study area polygons occur on public and private lands, with approximately 12 miles of ROW occurring on the Mt. Hood National Forest (MHNF), managed by the United States Forest Service (USFS) (Table 1-4). Another six miles of the project area cross Bureau of Land Management (BLM) land. BPA has easements or other authorizations with landowners for all of the transmission line right-of-way (ROW) and access roads. The BEOS transmission line shares a ROW with other 500-kV transmission lines. The ROW varies in width, ranging from 250 to 700-feet-wide.

Table 1-4 Acreage of study area polygons by landowner or manager.

Land Owner or Manager	Acres
United States Forest Service	203.84
United States Bureau of Land Management	87.85
Local Government	58.44

Columbia River Gorge National Scenic Area (private land/public manager)	53.04
BPA	1.58
Private landowners separate from CRGNSA	576.87
TOTAL	980.04

1.2 Site Alteration

1.2.1 Transmission Line and Access Roads

Most of the ROW was logged in the late 1950s, prior to the construction of the BEOS transmission line, which has resulted in a major change from forested habitat to a shrub and herbaceous plant habitat. BPA manages the ROW to meet electrical reliability requirements by keeping the ROW vegetation low-growing and by removing hazard trees. ROW vegetation generally consists of tree saplings, shrubs, and emergent vegetation. Regular vegetation maintenance activities include tree removal, mowing and spraying noxious weeds and woody vegetation within and adjacent to the ROW. Most of the tree removal occurs along the edge of the ROW. In addition to vegetation management, BPA conducts maintenance and repairs to the transmission line throughout the study area.

Gravel and dirt access roads within the ROW facilitate maintenance access to transmission structures. Culverts or fords are present at most stream crossings; however, some intermittent and ephemeral streams do not have culverts or fords, which has impounded some drainages. In some instances, stream flow has been intercepted by existing access roads and the stream flows down access roads. At certain locations along the corridor, existing culverts are in need of cleaning, repair, or replacement.

1.2.2 Residential and Commercial Properties

In many locations, the BPA ROW provides multiple land uses, where the underlying landowners have developed orchards or pastures for livestock. Disturbances as listed below were observed during the Fall 2021 and Spring 2022 field work within these actively managed areas.

Mowing and grazing were observed within pastures and orchards. Historically, agriculture has altered the land to make it better suited for the crop and animals. Orchards have created man-made ponds such as Sandy Reservoir near transmission tower 67/4 (polygon 3) or the unnamed pond along the off ROW access road (polygon 242.5) that leads to transmission structure 9/3, where the access road was re-routed around a residential house. Commonly streams are channelized to provide water to crops and streams within pastures and orchards, which tended to have a steep bank that coincided with the OHWM. Wetlands within pastures were observed to be confined by the toe of a steep slope and have

maintained grass at the boundary. A pasture wetland was observed outside of the study area boundaries, north of tower 11/2 in polygon 237. Fences were observed within streams, which didn't alter the flow but was a historical disturbance within the area.

In addition, recent logging was observed between Parkdale and the Dalles, Oregon on private land. The logs were observed within stream channels and obscured potential intermittent streams where the ground was leveled from equipment driving around. In the case of C16S3 and C16S2, a stream channel was not observed between the two intermittent stream segments due to the logging and leveling. In the case of C17S1-3, multiple layers of logs were within the stream between this segment and C17S1-1, but the stream was reached by climbing down the ravine to the west.

1.3 Precipitation Data and Analysis

Fall 2021 fieldwork occurred from October 17-25 and November 7-12. The field work continued the following growing season, generally every other week starting the week of March 21, 2022 and continuing until July 1, 2022. Additional field work was conducted on August 5th and August 25th and 26th of 2022. Non-wetland test plots were taken during field surveys in October and November 2022.

For the precipitation analysis, PNNL obtained monthly summary data and Wetlands Climate Tables (WETS) data from four weather stations close to the study area polygons (Table 1-5), depending on distance, elevation, and distinct changes in land use/land cover. Comparing the historical data from the past 30 years to what was observed during the field season, on average the fall seasons tended to be below the precipitation range while the spring season tended to be above the historic range as shown in Table 1-6. A few months were within the normal historic range. Overall, the average over the entire field season tended to average out from the rainy spring to the dry fall. A breakdown of each individual station and the time frame the field work occurred are found in Tables 1-7 through 1-12.

Table 1-5 Overview of weather stations used in precipitation analysis. All data accessed from AgACIS (https://agacis.rcc-acis.org/).

Corridor Miles	Station Name	Latitude	Longitude	Elevation (ft)	Growing Season	County
Miles 1-16	The Dalles	45.6069	-121.2047	150	3/18-11/7 * (233 days)	Wasco
Miles 17-26	Hood River Experimental Station	45.6847	-1212047	150	3/11 – 11/4** (238 days)	Hood River

Miles 27-50	Greenpoint Snotel	45.6200	-121.700	3,310	4/7-11/10** (217 days)	Hood River
Miles 51-68	Headworks Portland Water Bureau	45.4486	-122.1547	748	1/14 - 12/23** (343 days)	Clackamas

* The Dalles WETS table reported that insufficient temperature data were available to calculate growing season dates. Therefore, we used first/last dates for the years 1991-2020 for a temperature of <= 28° deg F.

**WETs table dates for each of the weather stations for the years 1991-2020, using the 70% chance for growing season (days 28°F or higher).

Table 1-6 Percent of normal rainfall for by station and sampling month. Data accessed and compiled from AgACIS (https://agacis.rcc-acis.org/).

Station	Sampling Month	Actual Precipitation (in)	Average Precipitation WETS 30 Year (in)	Comparison to Normal (%)	Precipitation Normal Range 30 Year WETS (in)	Precipitation Outside 30 Year Range*
The Dalles	October 2021	1.00	1.07	93.46	0.7 0 - 1.35	--
	October 2022	0.69	1.07	64.49	0.7 0 – 1.35	Below
	November 2022	1.69	1.88	89.89	1.23 – 2.41	--
Hood River Experimental Station	October 2021	1.45	2.64	54.92	1.51 – 3.03	Below
	June 2022	1.69	0.82	206.10	0.45 - 1.00	--
	September 2022	0.29	0.71	40.85	0.26 - 0.75	--
	October 2022	1.19	2.64	45.08	1.51 – 3.03	Below
	November 2022	4.25	4.83	87.99	2.83 – 5.86	--
Greenpoint Snotel	April 2022	10.4	5.11	203.52	3.47 – 6.11	Above
	May 2022	7.50	3.03	247.52	1.9 – 3.66	Above
	June 2022	4.20	2.16	194.44	1.57 – 2.56	Above
	July 2022	0.20	0.36	55.56	0.21 – 0.42	Below
	August 2022	0.10	0.73	13.70	0.00 – 0.74	--
	September 2022	0.50	2.28	21.93	1.01 – 2.79	Below
	October 2022	3.50	6.79	51.55	4.16 – 8.23	Below
	November 2022	12.70	10.95	115.98	7.66 – 13.02	--
Headworks Portland Water Bureau	November 2021	12.89	10.62	121.37	7.73 – 12.48	Above
	March 2022	7.79	8.50	91.65	9.94 – 16.00	Below
	April 2022	10.94	7.34	149.05	5.84 – 8.38	Above
	November 2022	11.85	10.62	111.58	7.73 – 12.48	--

* The 30-year period is from 1991-2020

Table 1-7 Monthly Precipitation Analysis For The Dalles, Wasco County, with historic precipitation 1991-2020. Data accessed and compiled from AgACIS (https://agacis.rcc-acis.org/).

		Precipitation (in)				Analysis			
Sample Month	**Previous Months**	**Historic Average**	**30% Chance will have (Min-Max)**		**Observed At Station**	**Condition**	**Value** (1 = dry; 2= normal; 3 = wet)	**Month Weight**	**Value * Month Weight**
October 2021	Sept. 2021	0.32	0.05	0.24	0.25	Wet	3	3	9
	August 2021	0.19	0.00	0.17	0.00	Normal	2	2	4
	July 2021	0.15	0.00	0.06	0.00	Normal	2	1	2
								Sum	13
								Result	**Normal**
October 2022	Sept. 2022	0.32	0.05	0.24	0.21	Normal	2	3	6
	August 2022	0.19	0.00	0.17	0.00	Normal	2	2	4
	July 2022	0.15	0.00	0.06	0.03	Normal	2	1	2
								Sum	12
								Result	**Normal**
Nov. 2022	October 2022	1.07	1.23	2.41	1.69	Normal	2	3	6
	Sept. 2022	0.32	0.05	0.24	0.21	Normal	2	2	4
	August 2022	0.19	0.00	0.17	0.00	Normal	2	1	2
								Sum	12
								Result	**Normal**

*Rainfall of prior period was *drier* than normal (product sum 6-9); *normal* (product sum 10-14); or *wetter* than normal (product sum 15-18).

Table 1-8 Monthly precipitation analysis for Hood River Experimental Station, Hood River County, with historic precipitation 1991-2020. Data accessed and compiled from AgACIS (https://agacis.rcc-acis.org/).

		Precipitation (in)				Analysis			
Sample Month	**Previous Months**	**Historic Average**	**30% Chance will have (Min-Max)**		**Observed at Station**	**Condition**	**Value** (1 = dry; 2= normal; 3 = wet)	**Month Weight**	**Value * Month Weight**
October 2021	Sept. 2021	0.71	0.26	0.75	1.45	Wet	3	3	9
	August 2021	0.24	0.00	0.31	0.98	Wet	3	2	6
	July 2021	0.24	0.00	0.24	0.06	Normal	2	1	2
								Sum	17
								Result	**Wet**
June 2022	May 2022	1.32	0.70	1.61	2.46	Wet	3	3	9
	April 2022	1.84	1.18	2.26	4.19	Wet	3	2	6
	March 2022	3.18	2.19	3.85	2.53	Normal	2	1	2
								Sum	17
								Result	**Wet**
Sept. 2022	August 2022	0.24	0.00	0.31	0.00	Normal	2	3	6
	July 2022	0.24	0.00	0.24	0.06	Normal	2	2	4
	June 2022	0.82	0.45	1.00	1.69	Wet	3	1	3
								Sum	13
								Result	**Normal**
October 2022	Sept. 2022	0.71	0.26	0.75	0.29	Normal	2	3	6
	August 2022	0.24	0.00	0.31	0.00	Normal	2	2	4
	July 2022	0.24	0.00	0.24	0.06	Normal	2	1	2
								Sum	12
								Result	**Normal**
Nov. 2022	Oct. 2022	2.64	1.51	3.03	1.19	Dry	1	3	3
	Sept. 2022	0.71	0.26	0.75	0.29	Normal	2	2	4
	Aug. 2022	0.24	0.00	0.31	0.00	Normal	2	1	2
								Sum	8
								Result	**Dry**

*Rainfall of prior period was *drier* than normal (product sum 6-9); *normal* (product sum 10-14); or *wetter* than normal (product sum 15-18).

Table 1-9 Monthly precipitation analysis for Greenpoint Snotel, Hood River County, with historic precipitation 1991-2020. Data accessed and compiled from AgACIS (https://agacis.rcc-acis.org/).

		Precipitation (in)				Analysis			
Sample Month	**Previous Months**	**Historic Average**	**30% Chance will have (Min-Max)**		**Observed at Station**	**Condition**	**Value** (1 = dry; 2= normal; 3 = wet)	**Month Weight**	**Value * Month Weight**
April 2022	Mar. 2022	7.59	5.20	9.06	4.40	Dry	1	3	3
	Feb. 2022	8.06	5.80	9.53	5.00	Dry	1	2	2
	Jan. 2022	11.45	8.42	13.46	11.8	Normal	2	1	2
								Sum	7
								Result	**Dry**
May 2022	April 2022	5.11	3.47	6.11	10.40	Wet	3	3	9
	Mar. 2022	7.59	5.20	9.06	4.40	Dry	1	2	2
	Feb. 2022	8.06	5.80	9.53	5.00	Dry	1	1	1
								Sum	12
								Result	**Normal**
June 2022	May 2022	3.03	1.90	3.66	7.50	Wet	3	3	9
	April 2022	5.11	5.11	3.47	10.40	Wet	3	2	6
	Mar. 2022	7.59	7.59	5.20	4.40	Dry	1	1	1
								Sum	16
								Result	**Wet**
July 2022	June 2022	2.16	1.57	2.56	4.20	Wet	3	3	9
	May 2022	3.03	1.90	3.66	7.50	Wet	3	2	6
	April 2022	5.11	5.11	3.47	10.40	Wet	3	1	3
								Sum	18
								Result	**Wet**
August 2022	July 2022	0.36	0.21	0.42	0.20	Dry	1	3	3
	June 2022	2.16	1.57	2.56	4.20	Wet	3	2	6
	May 2022	3.03	1.90	3.66	7.50	Wet	3	1	3
								Sum	12
								Result	**Normal**
Sept. 2022	Aug. 2022	0.73	0.00	0.74	0.10	Normal	2	3	6
	July 2022	0.36	0.21	0.42	0.20	Dry	1	2	2
	June 2022	2.16	1.57	2.56	4.20	Wet	3	1	3
								Sum	11
								Result	**Normal**
Oct. 2022	Sept. 2022	2.28	1.01	2.79	0.50	Dry	1	3	3
	Aug. 2022	0.73	0.00	0.74	0.10	Normal	2	2	4
	July 2022	0.36	0.21	0.42	0.20	Dry	1	1	1
								Sum	8
								Result	**Dry**
Nov. 2022	October 2022	6.79	4.16	8.23	3.5	Dry	1	3	3

	Sept. 2022	2.28	1.01	2.79	0.5	Dry	1	2	2
	August 2022	0.73	0.00	0.74	0.1	Normal	2	1	2
								Sum	8
								Result	**Dry**

*Rainfall of prior period was *drier* than normal (product sum 6-9); *normal* (product sum 10-14); or *wetter* than normal (product sum 15-18).

Table 1-10 Monthly Precipitation Analysis For Headworks Portland Water Bureau, Clackamas County. Data accessed and compiled from AgACIS (https://agacis.rcc-acis.org/).

		Precipitation (in)				Analysis*			
Sample Month	**Previous Months**	**Historic Average**	**30% Chance will have (Min-Max)**		**Observed At Station**	**Condition**	**Value** (1 = dry; 2= normal; 3 = wet)	**Month Weight**	**Multiply Value and Month Weight**
Nov. 2021	Oct. 2021	7.37	5.32	8.70	7.38	Normal	2	3	6
	Sept. 2021	3.42	1.49	4.17	5.30	Wet	3	2	6
	Aug. 2021	1.20	0.44	1.38	0.49	Normal	2	1	2
								Sum	14
								Result	**Normal**
March 2022	February 2022	7.95	5.56	9.41	5.75	Normal	2	3	6
	Jan. 2022	10.26	8.10	11.77	9.90	Normal	2	2	4
	Dec. 2021	11.67	9.34	13.23	13.15	Normal	2	1	2
								Sum	12
								Result	**Normal**
April 2022	Mar. 2022	8.50	6.37	9.94	7.79	Normal	2	3	6
	Feb. 2022	7.95	5.56	9.41	5.75	Normal	2	2	4
	Jan. 2022	10.26	8.10	11.77	9.90	Normal	2	1	2
								Sum	12
								Result	**Normal**
Nov. 2022	October 2022	7.37	5.32	8.70	6.57	Normal	2	3	6
	Sept. 2022	3.42	1.49	4.17	0.91	Dry	1	2	2
	August 2022	1.20	0.44	1.38	0.15	Dry	1	1	2
								Sum	10
								Result	**Normal**

*Rainfall of prior period was *drier* than normal (product sum 6-9); *normal* (product sum 10-14); or *wetter* than normal (product sum 15-18).

Table 1-11 Compiled Actual and Normal Water Year Precipitation by Station. Precipitation for Water Year 2023 Compiled Only for Survey Months.

Station	Month	Precipitation 2022 Water Year (in)	Precipitation 2023 Water Year (in)	Normal Precipitation for Month (in)	Normal Precipitation Excluding Month (in)
The Dalles	October	1.99	0.69	0.32	0
The Dalles	November	2.72	1.69	1.07	0.32
The Dalles	December	0.7	--	1.88	1.39
The Dalles	January	0.31	--	2.91	3.27
The Dalles	February	1.01	--	2.45	6.18
The Dalles	March	1.91	--	1.64	8.63
The Dalles	April	1.77	--	1.25	10.27
The Dalles	May	1.1	--	0.96	11.52
The Dalles	June	0.03	--	0.76	12.48
The Dalles	July	0	--	0.41	13.24
The Dalles	August	0.21	--	0.15	13.65
The Dalles	September	0.69	--	0.19	13.8
Hood River ES	October	1.45	1.19	2.64	0
Hood River ES	November	5.14	4.25	4.83	2.64
Hood River ES	December	5.82	--	5.86	7.47
Hood River ES	January	5.22	--	5.23	13.33
Hood River ES	February	3.28	--	3.51	18.56
Hood River ES	March	0.61	--	3.18	22.07
Hood River ES	April	0.26	--	1.84	25.25
Hood River ES	May	0.45	--	1.32	27.09
Hood River ES	June	0.82	--	0.82	28.41
Hood River ES	July	0	--	0.24	29.23
Hood River ES	August	0.06	--	0.24	29.47
Hood River ES	September	0.98	--	0.71	29.71
Greenpoint Snotel	October	5.40	3.50	6.79	0
Greenpoint Snotel	November	13.70	12.70	10.95	6.79
Greenpoint Snotel	December	16.10	--	13.05	17.74
Greenpoint Snotel	January	12.10	--	11.45	30.79
Greenpoint Snotel	February	12.90	--	8.06	42.24
Greenpoint Snotel	March	2.70	--	7.59	50.3
Greenpoint Snotel	April	1.40	--	5.11	57.89

Greenpoint Snotel	May	1.70	--	3.03	63
Greenpoint Snotel	June	1.70	--	2.16	66.03
Greenpoint Snotel	July	0.00	--	0.36	68.19
Greenpoint Snotel	August	0.10	--	0.73	68.55
Greenpoint Snotel	September	3.60	--	2.28	69.28
Headworks PWB	October	7.38	6.57	7.37	0
Headworks PWB	November	12.89	11.85	10.62	7.37
Headworks PWB	December	13.15	--	11.67	17.99
Headworks PWB	January	9.9	--	10.26	29.66
Headworks PWB	February	5.75	--	7.95	39.92
Headworks PWB	March	7.79	--	8.5	47.87
Headworks PWB	April	10.94	--	7.34	56.37
Headworks PWB	May	9.73	--	5.72	63.71
Headworks PWB	June	8.91	--	3.96	69.43
Headworks PWB	July	0.47	--	0.95	73.39
Headworks PWB	August	0.15	--	1.2	74.34
Headworks PWB	September	0.91	--	3.42	75.54

Table 1-12 Precipitation Analysis for Survey Dates, by Relevant WETS Station and County where Survey Occurred. Data accessed and compiled from AgACIS (https://agacis.rcc-acis.org/).

Station	County	Survey Date	Precipitation Day of Survey (in)	Precipitation Previous 14 Days (in)	Precipitation Current Water Year (in)	Precipitation Normal Water Year (in)	% Normal Water year
The Dalles	Wasco	10/22/2021	0.50	0.05	0.65	1.79	36.35
The Dalles	Wasco	10/23/2021	0.00	0.55	0.65	2.16	30.11
The Dalles	Wasco	10/24/2021	0.00	0.55	0.65	2.25	28.85
The Dalles	Wasco	10/25/2021	0.00	0.55	0.65	2.35	27.70
The Dalles	Wasco	10/20/2022	0.00	0.20	0.20	0.69	28.97
Hood River Experimental Station	Hood River	10/18/2021	0.00	0.16	0.16	1.53	10.44
Hood River Experimental Station	Hood River	10/19/2021	0.00	0.16	0.16	1.62	9.89
Hood River Experimental Station	Hood River	10/20/2021	0.01	0.16	0.17	1.70	9.98
Hood River Experimental Station	Hood River	10/21/2021	0.01	0.17	0.18	1.79	10.06
Hood River Experimental Station	Hood River	6/7/2022	0.00	0.89	27.70	28.60	96.85
Hood River Experimental Station	Hood River	6/9/2022	0.00	0.89	27.70	28.66	96.66
Hood River Experimental Station	Wasco	9/1/2022	0.00	0.00	28.38	29.73	95.45
Hood River Experimental Station	Hood River	9/1/2022	0.00	0.00	28.38	29.73	95.45
Hood River Experimental Station	Hood River	10/19/2022	0.00	0.00	0.00	1.62	0.00
Hood River Experimental Station	Wasco	10/21/2022	0.00	0.00	0.00	1.79	0.00

Station	County	Survey Date	Precipitation Day of Survey (in)	Precipitation Previous 14 Days (in)	Precipitation Current Water Year (in)	Precipitation Normal Water Year (in)	% Normal Water year
Hood River Experimental Station	Hood River	10/21/2022	0.00	0.00	0.00	1.79	0.00
Hood River Experimental Station	Hood River	11/3/2022	0.02	1.42	6.82	3.12	218.38
Headworks Portland Water Bureau	Clackamas	11/8/2021	0.22	4.80	10.21	10.20	100.08
Greenpoint Snotel	Clackamas	4/7/2022	0.10	2.50	44.20	59.08	74.81
Greenpoint Snotel	Clackamas	4/8/2022	0.10	2.60	44.30	59.25	74.76
Greenpoint Snotel	Clackamas	4/18/2022	0.30	7.00	49.40	60.96	81.04
Greenpoint Snotel	Clackamas	4/19/2022	0.20	5.60	49.60	60.96	81.37
Greenpoint Snotel	Clackamas	4/20/2022	0.40	5.60	50.00	61.30	81.57
Greenpoint Snotel	Clackamas	4/22/2022	0.10	5.90	50.20	61.64	81.44
Greenpoint Snotel	Clackamas	5/3/2022	0.00	2.70	52.20	63.29	82.47
Greenpoint Snotel	Clackamas	5/4/2022	0.10	2.50	52.40	63.39	82.66
Greenpoint Snotel	Clackamas	5/6/2022	1.20	2.50	52.40	63.59	82.41
Greenpoint Snotel	Hood River	5/16/2022	0.00	5.90	57.90	64.56	89.68
Greenpoint Snotel	Hood River	5/17/2022	0.00	5.80	57.90	64.66	89.54
Greenpoint Snotel	Hood River	5/18/2022	0.30	5.80	58.20	64.76	89.87
Greenpoint Snotel	Hood River	5/19/2022	0.10	6.00	58.30	64.86	89.89
Greenpoint Snotel	Hood River	5/20/2022	0.10	5.70	58.40	64.95	89.91
Greenpoint Snotel	Hood River	6/20/2022	0.00	2.90	63.70	67.47	94.41
Greenpoint Snotel	Hood River	6/21/2022	0.00	2.90	63.70	67.54	94.31
Greenpoint Snotel	Hood River	6/22/2022	0.00	2.90	63.70	67.61	94.21
Greenpoint Snotel	Hood River	6/23/2022	0.00	2.90	63.70	67.69	94.11

Station	County	Survey Date	Precipitation Day of Survey (in)	Precipitation Previous 14 Days (in)	Precipitation Current Water Year (in)	Precipitation Normal Water Year (in)	% Normal Water year
Greenpoint Snotel	Hood River	6/29/2022	0.00	0.20	63.70	68.12	93.51
Greenpoint Snotel	Hood River	6/30/2022	0.00	0.20	63.70	68.19	93.42
Greenpoint Snotel	Hood River	7/1/2022	0.00	0.20	63.70	68.20	93.40
Greenpoint Snotel	Clackamas	7/1/2022	0.00	0.20	63.70	68.20	93.40
Greenpoint Snotel	Clackamas	8/5/2022	0.00	0.00	63.90	68.67	93.06
Greenpoint Snotel	Clackamas	8/29/2022	0.00	0.00	64.00	69.23	92.44
Greenpoint Snotel	Clackamas	8/30/2022	0.00	0.00	64.00	69.26	92.41
Greenpoint Snotel	Hood River	9/1/2022	0.00	0.00	64.00	69.36	92.28
Greenpoint Snotel	Hood River	10/6/2022	0.00	0.30	0.00	1.31	0.00
Greenpoint Snotel	Hood River	10/17/2022	0.00	0.10	0.10	3.72	2.69
Greenpoint Snotel	Hood River	10/18/2022	0.00	0.10	0.10	3.94	2.54
Greenpoint Snotel	Hood River	10/19/2022	0.00	0.00	0.10	4.16	2.40
Greenpoint Snotel	Clackamas	11/1/2022	0.94	3.40	8.87	14.56	60.90
Greenpoint Snotel	Clackamas	11/1/2022	0.94	4.34	8.87	7.72	114.84
Greenpoint Snotel	Clackamas	11/1/2022	0.94	5.28	8.87	7.72	114.84
Headworks Portland Water Bureau	Clackamas	11/7/2021	0.43	4.89	9.99	9.85	101.44
Headworks Portland Water Bureau	Clackamas	11/8/2021	0.22	4.80	10.21	10.20	100.08
Headworks Portland Water Bureau	Clackamas	11/9/2021	0.30	4.76	10.51	10.56	99.56
Headworks Portland Water Bureau	Clackamas	11/10/2021	0.34	4.33	10.85	10.91	99.45
Headworks Portland Water Bureau	Clackamas	11/11/2021	2.38	4.60	13.23	11.26	117.45

Station	County	Survey Date	Precipitation Day of Survey (in)	Precipitation Previous 14 Days (in)	Precipitation Current Water Year (in)	Precipitation Normal Water Year (in)	% Normal Water year
Headworks Portland Water Bureau	Clackamas	11/12/2021	2.25	6.91	15.48	11.62	133.24
Headworks Portland Water Bureau	Clackamas	3/21/2022	0.88	4.22	56.29	53.63	104.96
Headworks Portland Water Bureau	Clackamas	3/22/2022	0.08	5.10	56.37	53.90	104.58
Headworks Portland Water Bureau	Clackamas	3/23/2022	0.15	4.08	56.52	54.18	104.33
Headworks Portland Water Bureau	Clackamas	3/24/2022	0.00	4.07	56.52	54.45	103.80
Headworks Portland Water Bureau	Clackamas	4/4/2022	0.71	2.41	58.53	57.35	102.06
Headworks Portland Water Bureau	Clackamas	4/5/2022	0.06	2.24	58.59	57.59	101.73
Headworks Portland Water Bureau	Clackamas	4/6/2022	0.00	2.22	58.59	57.84	101.30
Headworks Portland Water Bureau	Clackamas	11/2/2022	0.90	7.37	8.87	7.72	114.84
Headworks Portland Water Bureau	Clackamas	11/2/2022	0.90	8.27	8.87	7.72	114.84
Headworks Portland Water Bureau	Clackamas	11/3/2022	0.60	8.27	9.47	8.08	117.23

2.0 Methodology

2.1 Preliminary Investigation

The following data sources were reviewed for information on topography, drainage patterns, soils, vegetation, and potential or known wetlands and streams in the project vicinity:

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) Map
- National Wetlands Inventory (NWI) maps (USFWS 2017; FGDC 2013)
- USACE *Western Mountains, Valleys, and Coast Regional Supplement (Version 2.0, May 2010)* coverage
- USACE *Arid West Regional Supplement (Version 2.0, September 2008)* coverage
- Oregon Department of State Lands: Wetlands & Waterway, Statewide Wetlands Inventory (2021)
- United States Department of Agriculture, Natural Resources Conservation Service (NRCS), Web Soil Survey maps of Clackamas County, Hood River County, and Wasco County (USDA, 2019)
- United States Geological Survey, National Hydrography Dataset (2020)

Scientific plant names were from the USACE National Wetland Plant List (NWPL), version 3.4 (USACE 2018)

As part of the preliminary investigation, hydric soils were identified. There were five hydric soils within the project area, besides water, as shown in Table 2-1 and the soil map in Appendix A.

Table 2-1 Hydric Soils within the Project Area

Symbol	Soil Name	Hydric Rating
84	Wapato silty clay loam	Hydric
7B	Borges silty clay loam, 0 to 8 percent slopes	Hydric
73	Riverwash	Hydric
30C	Delena silt loam, 3 to 12 percent slopes	Hydric
27	Crutch variant loamy coarse sand, 0 to 3 percent slopes	Hydric

2.2 Wetland Delineation and Classification

The wetland delineation was completed in accordance with the *1987 United States Army Corps Wetlands Delineation Manual,* the USACE *Western Mountains, Valleys, and Coast Regional Supplement (Version 2.0, May 2010)*, and the USACE *Arid West Regional Supplement (Version 2.0, September 2008)*. USACE Regional Supplements are applied according to designation of area (*i.e.,* Western Mountains, Valleys, and Coast or Arid Supplements). Three study areas (276, 275, and 273) out of 276 areas were completely within the USACE Arid West supplemental region. One polygon (272) was partially within the Arid West Region, while the other half was in the Western Mountain, Valleys, and Coast regional area. The remaining 272 polygons were completely within Western Mountain, Valleys, and Coast regional area.

The ordinary high water mark (OHWM) delineation was conducted in accordance with the Regulatory Guidance Letter No. 05-05 from the USACE dated December 7, 2005. The OHWM is defined as "the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas."

According to the USACE Wetland Delineation Manual (1987), a wetland delineation is based on a three-indicator approach evaluating the presence or absence of hydrophytic vegetation, hydric soil, and wetland hydrology. Data was collected for these characteristics during the delineation with USACE data forms and Oregon Rapid Wetland Assessment Protocol (ORWAP) forms. Classification of all resources used the Cowardin (Cowardin et al. 1979) and the hydrogeomorphic (HGM; NRCS 2008) systems.

2.2.1 Wetland Delineation Methodology

During fall 2021 and spring through the fall 2022 growing season, wetland field staff conducted a visual survey of the ROW and approximately 50 meters off the study area boundaries until a resource area was found within the study area. When a resource area was found within the study area, a delineation was performed in accordance with the USACE manual, USACE regional supplements, and the ORWAP of Oregon. Data collection involved completing the associated data form and taking representative photos to document the current conditions of the area. Wetland Determination Data forms are in Appendix B, and ground level plot photos are in Appendix C.

In accordance with the USACE manual, the wetland crew established a minimum of two plots per wetland: one within the upland and one within the wetland. Where there was a sharp wetland boundary, paired plots were positioned as close as possible (≤10 feet) to document the wetland boundary. Where the boundaries between wetlands and uplands were more gradual, plots were located as close together to demonstrate distinct differences between the wetland and upland.

When plots could not be paired close together, the data sheets noted why this was done. Wherever possible, more than one paired plot was collected for each wetland feature, especially large or complex wetlands. At each plot, the crew determined the presence or absence of hydrophytic vegetation, hydric soils, and wetland hydrology indicators.

When a resource area was not found within a study area and it was not connected by an existing access road to another study area with a resource area, a non-wetland plot was taken at the lowest elevation of the study area. Any suspect areas or resource areas marked by NWI had a plot taken. Plots entirely within an orchard with no resource areas did not have a plot taken. DSL agreed with this approach for these non-wetland confirming plots.

Vegetation at each delineated wetland was examined within four strata: trees, shrubs/saplings, herbaceous plants, and woody vines. The crew visually estimated the percent cover of each stratum in circular plots as follows:

- Tree plots had a 30-foot radius. Trees are woody plants three inches or more in diameter at breast height (DBH), regardless of height (USACE *Western Mountains, Valleys, and Coast Regional Supplement*, 2010).

- Shrub/sapling plots had a 15-foot radius. Shrubs and saplings are woody plants less than three inches in DBH (USACE *Western Mountains, Valleys, and Coast Regional Supplement*, 2010).

- Herbaceous plant plots had a 5-foot radius. Herbs are all herbaceous (non-woody) plants, including herbaceous vines, regardless of size (USACE *Western Mountains, Valleys, and Coast Regional Supplement*, 2010).

- Woody vines plots had a 15-foot radius. Woody vines are woody climbing or twining plants (USACE *Western Mountains, Valleys, and Coast Regional Supplement*, 2010).

Plants were identified using regional botanical keys and online resources, such as the Oregon Flora Project, Flora of the Pacific Northwest, and Turner's Tree and Shrubs of the Pacific Northwest. Additional guides were used as needed. To the extent possible, plants were identified to species level. If vegetation identification was not possible in the field, multiple pictures and measurements were taken of the distinct plant characteristics. Scientific names follow current nomenclature of the USACE 2018 National Wetland Plant List (NWPL) and the 2020 NWPL Update Information. All species were assigned the appropriate wetland indicator status from the appropriate Regional Supplement. Presence or absence of hydrophytic vegetation was determined using the rapid test for hydrophytic vegetation, dominance test, and/or prevalence index, as appropriate.

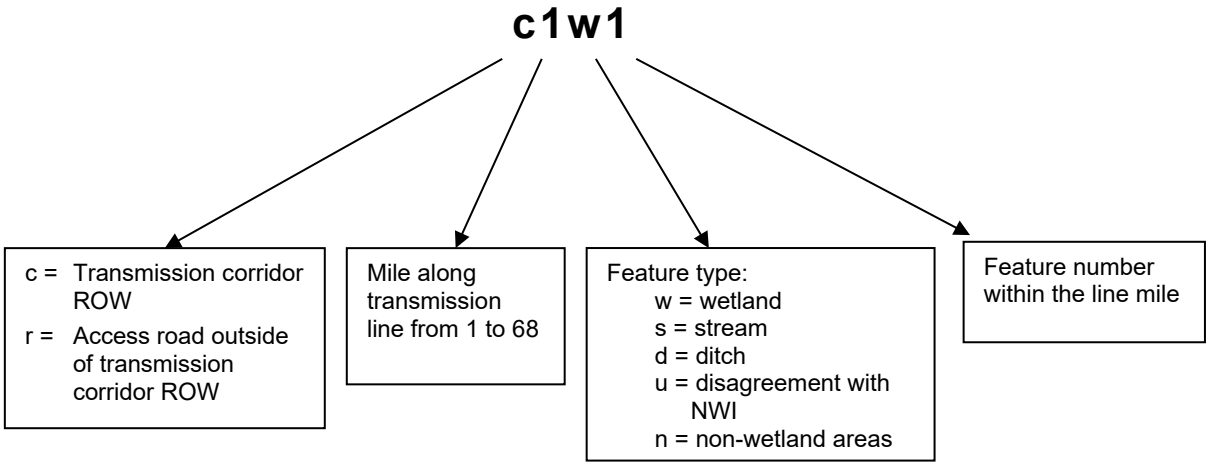
The wetland crew used a trenching shovel or auger to excavate soil test pits within wetland and upland areas to collect soil profile data. Soil test pits were excavated to a minimum of 16 inches, unless hydric soils were confirmed at shallower depths or refusal due to rocks and restrictive layers. Deeper test pits were needed to meet

thickness requirements for certain hydric soil types. Soil profile characteristics were evaluated using hydric soils manual (USDA *Field Indicators of Hydric Soils in the United States*, 2016). If a profile met one or more hydric soil indicators, these were denoted on the wetland determination form.

The hydrologic indicators were assessed visually in the field during the growing season, in accordance with the USACE Wetlands Delineation Manual. These indicators may include watermarks, drift lines, sediment deposits, saturation, inundation, drainage patterns within wetlands, and dry cracked surface. Additional field indicators can be found in the regional supplemental form. Any further observations were noted on the wetland determination data form.

Pink flagging tape was placed on either wooden stakes or woody vegetation, as applicable, to mark water OHWM and wetland resource boundaries. The spacing of the flagging tape allowed a direct line of sight from one flag to the next. Flagging tape was labeled with a sequential wetland complex number, consisting of a letter code for transmission corridor or access road (c or r), line mile number, resource feature code (wetland [w], stream [s], ditch [d], areas of disagreement with NWI [u], and non-wetland area requiring a plot in accordance with Oregon Guidelines [n]), and a sequential feature number within the line mile. Within each complex, labeling started from the inner most resource area outwards. A Trimble handheld GPS unit with submeter accuracy collected each flag point, soil test pit, and transect location. Data plots for wetlands were labelled by the feature identifier, plot number, and plot type (wetland or upland).

The waters/wetlands features were labeled based on the following convention:



3.0 Description of All Wetlands and Other Non-Wetland Waters

Within the ROW, field staff located wetlands and waterways. Resources are defined above in Section 2.2 and summarized below and in Section 6.0. Delineated wetlands and other waters, and sample plot locations are shown on figures in Appendix A. Appendix B contains USACE wetland delineation forms, and ground-level color photographs of the areas of investigation are provided in Appendix C. Wetland sizes were based off the delineated area within the study area and may be part of a larger complex.

3.1 Non-wetland Waters

Within the project area, the wetland survey crew identified 482 resources that would be delineated by the OHWM. Streams were collected as hydraulic connections above the centerline with a handheld Trimble GPS unit then digitized if the stream was less than six feet wide. For streams more than six feet wide, the OHWM was delineated on each side and then a polygon was digitized. When streams flowed through an existing culvert, branched, or different segments of the stream were mapped, the streams retained the same unique id but included a dash number to indicate that it was a different portion of the stream (*i.e.*, C13S1-1 and C13S1-2 are the same stream overall but on different sides of a culvert). A summary of stream information is provided in the table D-1 in Appendix D

3.2 Wetlands

Per DSL Delineation Guidance for Large or Linear Projects (DSL 2017), a summary of Wetland information is provided in the table D-2 in Appendix D. Approximately 158 wetland resources were identified during the wetland/waters delineation, as shown on the maps in Appendix A. Many of the wetland features identified in this report are associated with streams that run through narrow valleys or ravine bottoms. Generally, these wetlands occur on floodplain terraces with boundaries well defined by topographic relief among other characteristics.

3.3 Deviation from LWI or NWI

No Local Wetlands Inventory has been compiled for the study area. NWI-mapped wetlands occur throughout the project's study area and somewhat match those identified in the field. The mapping method used during the field survey is more precise for wetland delineation than are those used for mapping with NWI. In addition, the NWI classifies based on the entire wetland complex, and the classifications in this report were for the specific delineated areas within the study area.

The table below depicts the areas where the delineation varied from NWI. There were approximately 14 areas where NWI had a resource area mapped and no

wetland or stream was found. The other 16 areas within the chart have a different classification than what was mapped due to the scale of the delineation.

Table 3-1 Deviations from the NWI Classified Wetlands found within the study area.

	Classification		
Resource ID	**NWI**	**Site**	**Notes**
C2S1	PSS1C	R2UB4	The area had minimal vegetation growing within the channel. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C7S4	PSS1A	R4SBA	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C9S1	PSS1A	R4SBA	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C9S4	PFO1A	R4SBA	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C10S1	PFO1A	R4SBA	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
R11S21	PFO1C	R4SBC	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which

			means a stream would better classify the area rather than a wetland.
C12S3	PSS1C	R4SBC	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C14S1	PSS1C	R4SBC	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C16S1	R4SBC	None	No defined stream channel was present. A picture may be found within the photo log in Appendix C.
C18S1	PFO1A	R3UBA	The area did not have hydric soil in the area. Occasionally, a few skunk cabbages grew on the banks of the stream, where it might occasionally flood, but no more than two feet away from the stream. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C34W25	PABFb	PEM2C	The wetland was not submerged at the time of the site visit nor did it show signs of continuous hydrology.
C35S18	PSSC	R4SBC	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C36S1	PSSC	R3RB2C	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which

			means a stream would better classify the area rather than a wetland.
C49S1	PFOA	R3UBA	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
R52S4	PFO1C	R3RBC	The area did not have hydrophytic vegetation or hydric soil in the area. A distinct flow path was present, which means a stream would better classify the area rather than a wetland.
C53W7	R5UBH	PEMC/PFOC	While the area had a defined channel, there was also hydrophytic vegetation and hydric soil. Therefore, a wetland is a better classification.
C8U1	R5UBH	None	No defined channel within or an inlet and outlet to the depression were observed. Although hydrology indicators were observed (two primary, one secondary), no hydrophytic vegetation or hydric soils were observed within the plot.
C10U1	PFO1A	None	No defined channel within or inlet and outlet to the depression were observed. Hydrophytic vegetation, hydric soils, and hydrology indicators were not observed at the time of the site visit.
C16U1	PFO1A/R5UBH	None	No defined channel within or inlet and outlet to the depression were observed. Hydrophytic vegetation, hydric soils, and hydrology indicators were not observed at the time of the site visit.
C21U4	PFO1C	None	No defined channel within or inlet and outlet to the depression were observed. Hydrophytic vegetation, hydric soils,

			and hydrology indicators were not observed at the time of the site visit.
C24U1	R3USC	None	A perennial stream is located approximately 400 feet away, at the toe of another slope. The plot was taken at the lowest point of elevation of the study area, uphill of a perennial stream, on a terrace between two slopes. Hydrophytic vegetation, hydric soils, and hydrology indicators were not observed within the plot.
C26U1	PFO1C	None	The plot was taken at the lowest point of elevation of the study area, uphill of a perennial stream. The Oregon State wetlands GIS depicts a wetland at a higher elevation than where the plot was taken. The NWI wetland was shown at a lower elevation. Hydrophytic vegetation, hydric soils, and wetland hydrology indicators were not observed within the plot.
C28U1	PFO1A	None	No defined channel within or inlet and outlet to the depression were observed. Hydrophytic vegetation, hydric soils, and hydrology indicators were not observed at the time of the site visit.
C36U1	PSSC	None	A historic stream bed with upland vegetation growing within the channel. Hydrophytic vegetation and hydric soil were not present at the time of the site visit.
C36U2	None	None	Suspect area with hydrophytic vegetation but no hydric soils or signs of hydrology present besides geomorphic position.
C37U1	PSSB	None	The area had mixed vegetation but overall did not pass the dominance or

			prevalence test. Hydric soils and hydrology were not present as well.
C40U1	PSSC	None	Suspect area with hydrophytic vegetation but no hydric soils or signs of hydrology present besides geomorphic position.
C46U1	None	None	Suspect area with hydrophytic vegetation but no hydric soils or signs of hydrology present besides geomorphic position.
C48U1	R5UBH	None	Suspect area with hydrophytic vegetation but no hydric soils or signs of hydrology present besides geomorphic position.
C54U1	R5UBH	None	Suspect area within a floodplain but no hydric soils or hydrophytic vegetation present besides geomorphic position.

4.0 Mapping Method

During the field delineation, points, polygons, and polylines were surveyed using a sub-meter Trimble global positioning system (GPS) unit and differential correction software. The GPS data was post-corrected to an average of 95% accurate within five meters. The data was originally collected in NAD 1983 UTM Zone 10N (meters) and was projected into GCS_WGS_1984 with the current units being decimal degrees.

5.0 Additional Information

No additional information provided.

6.0 Results and Conclusions

Within the survey, approximately 29.41 acres of wetlands occurred within the study area polygons (Table 6-1). Using the Cowardin classification, the PEM type covered the most area (approximately 7.02 acres). Using the HGM classification, the dominant wetland type was Riverine.

Of the identified wetland, all but 12 had all three wetland indicators present. Problematic sites were C23W1 (soils), C24W15 (vegetation), C25W2 (soils), C26W6 (soils), C33W20 (vegetation), C36W5 (soils), C37W4 (soils), C39W15 (soils), C39W20 (soils), C40W18 (vegetation), and R59W2 (soils).

Table 6-1 Summary of the water and wetland resources within the survey area by wetland ID, size, classification, and wetland indicators.

Wetland ID [(d)]	Wetland Size (Acres) within Study Area[(a)]	Wetland Classification		Wetland Indicators			
		Cowardian[(b)]	HGM[(c)]	Soils	Vegetation	Hydrology	Extends outside of Study Area
R9W3	0.033	PSS	R	X	X	X	X
R9W100	0.032	PUB	S	--	--	--	X
C17W100	0.045	PSS	S	X	X	X	X
C21W2	0.179	PFO/PEM	R	X	X	X	X
C21W3	0.004	PEM	R	X	X	X	X
C23W1	0.007	PFO	S		X	X	X
C24W6	0.199	PEM	F	X	X	X	X
C24W7	0.024	PEM	R	X	X	X	X
C24W11	0.009	PEM	F	X	X	X	X
C24W13	0.271	PSS	F	X	X	X	X
C24W15	0.031	PEM	S	X		X	X
C24W100	0.057	PEM/PFO	R	X	X	X	X
C25S1	0.024	PEM	R	X	X	X	X
C25W2	0.233	PEM	R		X	X	X
C25W3	0.088	PFO	R		X	X	X
C26W2	0.003	PEM/PSS	R	X	X	X	X
C26W3	0.025	PEM	S	X	X	X	
C26W6	0.038	PEM/PSS	R		X	X	X
C27W2	0.025	PFO	R	X	X	X	X
C27W3	4.931	PSS	R	X	X	X	X
C27W6	0.367	PEM/PFO	S	X	X	X	X
C33W2	0.297	PSS	S	X	X	X	X
C33W5	1.565	PEM	S	X	X	X	X
C33W8	0.028	PSS	S	X	X	X	

Wetland ID [d]	Wetland Size (Acres) within Study Area[a]	Wetland Classification		Wetland Indicators			
		Cowardian[b]	HGM[c]	Soils	Vegetation	Hydrology	Extends outside of Study Area
C33W10	0.371	PEM	S	X	X	X	X
C33W19	0.229	PEM	S	X	X	X	
C33W20	0.104	PEM	S	X		X	X
C33W24	0.145	PSS	R	X	X	X	X
C33W100	0.025	PSS	R		X	X	
C34W2	0.082	PSS	S	X	X	X	X
C34W3	0.656	PSS	R	X	X	X	X
C34W8	0.509	PSS	R	X	X	X	X
C34W12	1.678	PSS	S	X	X	X	X
C34W22	0.045	PEM	S	X	X	X	X
C34W24	0.059	PEM	S	X	X	X	X
C34W25	0.022	PEM	S	X	X	X	X
C34W32	0.005	PEM	R	X	X	X	
C35W8	0.054	PEM	S	X	X	X	
C35W9	0.063	PSS	R	X	X	X	
C35W16	0.008	PEM	S	X	X	X	X
C36W5	0.022	PFO	S		X	X	X
C37W1	0.068	PSS	F	X	X	X	X
C37W4	0.063	PSS	F		X	X	
C37W10	0.026	PSS	R	X	X	X	X
C37W17	0.049	PEM	S	X	X	X	
C37W23	0.080	PSS	R	X	X	X	X
C38W2	0.231	PSS	R	X	X	X	X
C38W6	0.107	PSS	R	X	X	X	
C38W14	0.174	PFO	S	X	X	X	X
C38W23	0.099	PFO	R	X	X	X	X
C38W29	0.399	PFO/PSS	R	X	X	X	X
C38W31	0.103	PSS	S	X	X	X	X
C39W1	0.033	PFO	S	X	X	X	
C39W2	0.193	PEM	S	X	X	X	X
C39W3	0.040	PFO	S	X	X	X	
C39W7	0.020	PSS	S	X	X	X	X
C39W15	0.585	PEM	S		X	X	X
C39W20	0.009	PEM	S		X	X	
C40W2	1.564	PSS	S/R	X	X	X	X
C40W8	0.035	PSS	R	X	X	X	X

Wetland ID (d)	Wetland Size (Acres) within Study Area(a)	Wetland Classification		Wetland Indicators			
		Cowardian(b)	HGM(c)	Soils	Vegetation	Hydrology	Extends outside of Study Area
C40W11	0.009	PEM	S	X	X	X	
C40W16	0.005	PSS	R	X	X	X	
C40W18	0.115	PFO/PSS	R	X		X	X
R40W24	0.071	PFO	R	X	X	X	X
C40W25	0.057	PSS	S	X	X	X	X
C41W3	0.327	PEM	S	X	X	X	X
C45W1	0.259	PSS	S	X	X	X	X
C45W6	0.480	PEM	R	X	X	X	X
C46W2	0.079	PEM	F	X	X	X	X
C46W3	0.053	PEM	S	X	X	X	X
C46W7	0.395	PEM	S	X	X	X	X
C46W10	0.255	PSS	S	X	X	X	X
C46W13	0.114	PFO	R	X	X	X	X
C46W14	0.126	PSS	R	X	X	X	
C46W16	0.007	PEM	S	X	X	X	X
C46W19	0.020	PSS	R	X	X	X	X
C46W20	0.044	PFO	S	X	X	X	X
C49W3	0.040	PSS	R	X	X	X	X
C50W1	0.109	PFO	S	X	X	X	X
C53W3	0.911	PEM	R	X	X	X	X
C53W4	0.131	PEM	S	X	X	X	X
C53W7	0.827	PEM/PFO	R	X	X	X	X
C53W11	0.165	PEM	R	X	X	X	X
C53W13	0.077	PSS	R	X	X	X	X
R54W6	0.112	PEM	S	X	X	X	X
C54W7	0.563	PFO	R	X	X	X	X
C55W1	0.216	PFO	R	X	X	X	X
C55W3	0.251	PSS	R	X	X	X	X
C56W2	0.112	PFO	R	X	X	X	X
C57W1	0.457	PFO	F	X	X	X	X
C57W2	0.762	PSS	R	X	X	X	X
C57W3	0.002	PSS	F	X	X	X	
C57W5	0.050	PSS	F	X	X	X	X
C57W6	0.457	PFO	F	X	X	X	X
C59W1	0.207	PEM	R	X	X	X	X
R59W2	0.021	PFO	F	X	X	X	X

Wetland ID (d)	Wetland Size (Acres) within Study Area(a)	Wetland Classification		Wetland Indicators			
		Cowardian(b)	HGM(c)	Soils	Vegetation	Hydrology	Extends outside of Study Area
C60W1	0.033	PEM/PSS	R	X	X	X	X
C62W2	0.056	PFO	R	X	X	X	X
C63W1	0.506	PSS	R	X	X	X	X
C64W1	0.669	PUB	S	--	--	--	X
C64W2	0.118	PEM/PSS	S	X	X	X	X
C64W3	0.004	PEM	S	--	--	--	X
R66W2	0.690	PFO	S	X	X	X	X
R67W1	0.156	PEM	S	X	X	X	X
Total	29.41						

(a) Wetland size is based on the delineated portion of the resource area. Resource areas may be larger outside of the survey area.
(b) NWI Class based on vegetation: PEM = palustrine emergent, PFO= Palustrine Forested, PSS= Palustrine Scrub-Shrub (Cowardin et al. 1979).
(c) The hydrogeomorphic characterization of wetlands. This classification system does not classify water bodies. R=Riverine, F=Flats, S=Slope
(d) The wetland complex number consists of a letter code for transmission corridor or access road (c or r), line mile number, resource feature code (wetland [w], stream [s], or ditch [d]), and a sequentially feature number within the line mile.

7.0 Required Disclaimer

This report documents the investigation, best professional judgment, and conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

Appendix A –Figures

Appendix B – USACE Wetland Data Forms

Appendix C – Ground Level Color Photographs

Appendix D – Additional Tables and Information

Appendix E – Literature Cited

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Pacific Northwest National Laboratory

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99354
1-888-375-PNNL (7665)

www.pnnl.gov