Fish and Wildlife Habitat Exhibit

Cascade Renewable Transmission

Wasco, Hood River, and Multnomah Counties, Oregon

February 2026

Prepared for
Cascade Renewable Transmission, LLC

Submitted to
Oregon Energy Facility Siting Council

Contents

Tables

Attachments

Acronyms and Abbreviations

Applicant	Cascade Renewable Transmission (CRT)
EMF	electromagnetic field
ESA	Endangered Species Act
GIS	geographic information system
GPS	global positioning system
HDD	horizontal directional drilling
HDR	HDR Engineering, Inc.
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Department of Lands
ORBIC	Oregon Biodiversity Information Center
ROW	right-of-way
SPI	sediment profile imaging
TVES	Terrestrial Visual Encounter Surveys
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

1 Introduction

This exhibit provides information about the fish and wildlife habitats and species that could be affected by the Cascade Renewable Transmission Project (Project) that are not addressed in the Threatened and Endangered Species Exhibit. This exhibit demonstrates that the Project can comply with the approval standard in Oregon Administrative Rules (OAR) 345-022-0060 and concludes that the design, construction, and operation of the Project, accounting for mitigation, would be consistent with the Oregon Department of Fish and Wildlife (ODFW) Habitat Mitigation Goals and Standards contained in OAR 635-415-0025.3

> ***OAR 345-022-060 Fish and Wildlife Habitat***
>
> *To issue a site certificate, the Council must find that the design, construction and operation of the facility, taking into account mitigation, are consistent with:*
>
> *(1) The general fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025(1) through (6) in effect as of February 24, 2017; and*
>
> *(2) For energy facilities that impact sage-grouse habitat, the sage-grouse specific habitat mitigation requirements of the Greater Sage-Grouse Conservation Strategy for Oregon at OAR 635-415-0025(7) and OAR 635-140-0000 through -0025 in effect as of February 24, 2017.*

RESPONSE

1.1 Analysis Area

In accordance with OAR 345-001-0010(59)(c) and pursuant to the Revised Project Order, the analysis area for fish and wildlife habitat and species consists of the area within and extending 0.5 mile from the site boundary and any downstream area of impact[1]. The site boundary is defined in detail in the Background Information Exhibit. The fish and wildlife habitat analysis area is shown in the Land Cover Map (Attachment 2-Appendix B, Figure 1). A portion of the site boundary in the Columbia River is designated as the micrositing corridor, where Project components may be located. This corridor ranges in width from approximately 100 to 200 feet (approximately 30 to 60 meters) along the full cable route where substrate data was collected in 2025 and includes the expected limits of substrate disturbance for cable installation.

The Project analysis area does not overlap with sage-grouse habitat; therefore, surveys and mitigation requirements per the Sage-Grouse Conservation Strategy are not applicable to this analysis (OAR 345-022-060 (2)) and are not discussed further in this document.

1.2 Agency Consultation

During development of a survey plan and prior to conducting surveys, Cascade Renewable Transmission, LLC (CRT , Applicant) consulted with ODFW regarding the appropriate survey requirements for documenting the presence of state sensitive species, as required in OAR 345-022-006-(3)(d), and the classification of fish and wildlife habitat, as required in OAR 345-022-0060(3)(b).

[1] Project actions within the Columbia River would be contained solely within open water aquatic habitats. The proposed cable would be installed via horizontal directional drill under the Willamette River.

Consultation consisted of emails and phone conversations with the ODFW area biologists. Most of the Project footprint on land is located along roadsides and in developed areas. The Project route avoids important habitats such as riparian areas and wetlands in Oregon, as discussed in the State and Local Laws and Regulations Exhibit.

The Applicant provided the Project boundary and maps of temporary and permanent ground disturbance areas for ODFW biologists to evaluate for species survey requirements. No protocol surveys for specific species were required. ODFW specifically confirmed that Washington ground squirrel surveys were not required because the species habitat is located outside the analysis area.

The Applicant's consultant, HDR Engineering, Inc. (HDR) proposed pedestrian surveys for habitat and wildlife encounters within and adjacent to the project footprint to document potential project impacts to species and habitats. Raptor and other bird nest observations were also proposed in the analysis area, including and beyond the ground disturbance footprint and the surrounding areas out to 0.25 mile (0.4 kilometer), where accessible. On April 1, 2024, the Applicant discussed the proposed surveys in a phone call with ODFW biologist Ariana Scipioni, and received concurrence on this approach. A summary of the consultation communications is provided in Attachment 1.

The Applicant conducted additional consultation to obtain information about existing conditions for species important to state agencies and local Tribes along the Columbia River, including the Confederated Tribes and Bands of the Yakama Nation, the Cowlitz Indian Tribe, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes of the Umatilla Indian Reservation. These species included freshwater mussels, lamprey, and white sturgeon. These were discussed via emails with the Washington Department of Fish and Wildlife (WDFW), ODFW, and the Xerces Society, whose personnel provided information to HDR about these species' habitats and distributions in the Columbia River (see Attachment 1).

2 Description of Biological and Botanical Surveys Performed (OAR 345-022-0060(3)(a))

(3) To assist the Council in determining whether the standard outlined in (1) through (2) has been met, the Applicant must submit information about the fish and wildlife habitat and the fish and wildlife species, other than the species addressed in OAR-022-0070(3) (the Threatened and Endangered Species Exhibit) that could be affected by the proposed facility, providing evidence to support a finding by the Council as required by this rule. The applicant must include:(a) A description of biological and botanical surveys performed that support the information in this exhibit, including a discussion of the timing and scope of each survey;

RESPONSE

This section describes the biological and botanical surveys conducted in support of this exhibit, as required under OAR 345-022-0060(3)(a), including the timing and scope of each survey. Biological and botanical surveys included an initial desktop information review followed by field surveys.

2.1 Information Review

2.1.1 Initial Desktop Review

The Applicant conducted a desktop review of species and critical habitat protected under the federal Endangered Species Act (ESA), essential fish habitat, and marine mammals protected under the Marine Mammal Protection Act. The Applicant also reviewed available desktop information about Oregon and Washington special status habitats and special status species. These reviews looked for the occurrence of and habitat requirements for special habitats that could occur within the analysis area (e.g., federal and state endangered, threatened, proposed, and candidate species, species of concern, birds of conservation concern, sensitive, and sensitive-critical species).

The Applicant also reviewed preliminary work windows, including the U.S. Army Corps of Engineers' (USACE) *Approved Work Windows for Fish Protection for Waters Within National Park Boundaries, Columbia River, Snake River, and Lakes by Watercourse* (n.d.); the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources* (ODFW 2024); and the WDFW *Times when Spawning or Incubating Salmonids are Least Likely to be within Washington State Freshwaters* (2018). In-water work windows on the Columbia River are generally from November 15 to February 15 in Oregon and January 1 to March 31 in Washington. The proposed in-water work window for the project is November 1 to February 28 downstream of Bonneville Dam and November 1 to March 15 upstream of Bonneville Dam.[2] The Applicant discussed this window with agency personnel from National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), WDFW, and ODFW during preliminary meetings in December 2023, and February 2024.

An initial screening of available online resources determined the ESA- and state-listed and sensitive species and habitats with potential to occur in the Project analysis area that warranted further desktop analysis and field surveys. These species and habitats are described in this document. The following resources were used for this initial assessment:

- USFWS Information for Planning and Conservation (IPaC) report online (2025).
- USFWS Threatened & Endangered Species Active Critical Habitat Report online mapper.
- National Oceanic and Atmospheric Administration (NOAA) Fisheries Protected Resources Application for ESA-listed species' ranges and critical habitat designations, managed by NOAA Fisheries' West Coast Region
- NOAA Fisheries Essential Fish Habitat Mapper
- StreamNet Online Mapper Fish Distribution by Species.
- Oregon Department of Agriculture Oregon Listed and Candidate Plants.
- Oregon Biodiversity Information Center (ORBIC). Rare, Threatened, and Endangered Species of Oregon
- ODFW, Centralized Oregon Mapping Products and Analysis Support System (Compass)

[2] The applicant may request an in-water work window extension during the permitting phase to minimize effects on spawning Columbia River Chum Salmon downstream of Bonneville Dam. This extension request will require approval from NMFS, USFWS, WDFW, and ODFW.

Species with potential to occur in the analysis area are listed in Section 0.

2.2 Field Surveys

Using the sources of data listed above, qualified HDR biologists conducted terrestrial field surveys to identify habitat suitable for the list of species that could potentially occur within the analysis area. The purpose of the surveys was to identify vegetation communities, wildlife habitat types, and any signs of special-status species or unique habitat features. Field biologists summarized and categorized habitat in the analysis area in accordance with general fish and wildlife habitat categories listed in OAR 635-415-0025. Due to the extent of the in-river portion of the Project, where activities would be confined to near mid-channel in the Columbia River, field biologists did not survey the shoreline habitat along the entire length but did conduct a desktop analysis of the entire length using geographic information system (GIS) software.

Areas of shoreline and riparian habitat where the Project transitions between buried land cable and underwater cable were assessed during the terrestrial field surveys. Table 1 provides a summary of field surveys conducted within the analysis area; the biological survey report is included in Attachment 2. Field surveys were conducted within the terrestrial portions of the Project boundary and the wider analysis area where undeveloped and property access allowed. The full extent of the analysis area was reviewed using a combination of reconnaissance-level survey from public rights-of-way (ROWs) and desktop analysis.

Wildlife habitat and vegetation surveys were conducted to identify important habitats (e.g., riparian areas, tidal marshes, and woodlands, as well as other areas with which ESA-listed or state-listed species have primary association). Biologists conducted field investigations mainly by walking the Project boundary, areas within public ROWs, and other legally accessible portions of the analysis area, and documented vegetation communities, evidence of wildlife presence, and potential habitat for ESA-listed species and species of concern.

Field surveys were conducted to document flora and fauna in the vicinity of the project sites, as well as different vegetation communities and habitat. Visual observations were recorded within and beyond the project corridor where the viewshed from the ROW allowed for the collection of incidental wildlife observations and habitat data. The biologist field team used a Trimble DA2 global positioning system (GPS) unit capable of submeter accuracy to assist in identifying the site boundaries and to record site spatial data. Photographs were taken and wildlife observations and vegetation characteristics were documented. The spatial location of some features observed outside of the Project site were approximated using field observations and aerial imagery to determine their extent. GIS software was used to analyze data and to produce the habitat map figures.

Field surveys were conducted in May and June 2024 to capture activity of nesting birds and blooming periods for many of the target plant species. The surveys were focused on ground-truthing habitat types derived through desktop analysis, as described above, and documenting nests, suitable nest trees, burrows, and incidental observations for multiple species.

Table 1. Summary of Field Surveys Conducted in the Analysis Area

Survey	Year	Extent
Pedestrian wildlife surveys	2024	Project boundary
Wildlife Habitat and Vegetation	2024	Project boundary
Raptor and Eagle Nest Surveys	2024	Project Boundary and within 0.25 mile of the terrestrial Project boundary

2.2.1 Pedestrian Wildlife Surveys

The protocols used during the Terrestrial Visual Encounter Surveys (TVES) were adapted from the U.S. Forest Service *Multiple Species Inventory and Monitoring Technical Guide* (Manley et al. 2006). The TVES are walking surveys that identify species presence through evidence of use. TVES include visual and auditory confirmation of a species, and evidence of sign such as burrows, nests, feathers, fecal material, and tracks. The focus of the TVES was on special status species (e.g., ESA-listed species, state-listed species, state sensitive species) as well as their habitat; however, species encountered during TVES were identified to the extent practical.

Biologists conducted pedestrian wildlife surveys throughout the entire terrestrial portion of the Project boundary and the analysis area where access was possible, but did not survey riparian areas along the Columbia River, where the cable route is entirely within the river, because hydroplow cable installation would not affect shorelines or vegetation. However, biologists completed a desktop analysis to document baseline conditions along adjacent shoreline habitats.

The field surveys targeted special status species, including federal and state endangered, threatened, proposed, and candidate species, species of concern, birds of conservation concern, sensitive, and sensitive-critical species. Biologists reviewed the list of special status species potentially occurring within the analysis area prior to conducting surveys to ensure familiarity with the species. Biologists used an online map in the Fieldmaps application and recorded GPS locations of special status wildlife species (or recognizable sign) and information on the number of individuals, behavior, and habitat characteristics. The results of these pedestrian wildlife surveys inform habitat categorization and sensitive species presence and habitat use.

2.2.2 Wildlife Habitat and Vegetation Surveys

Surveys for locating or enumerating individual animals or plants were not part of this effort (see Section 1.2, Attachment 1). Field surveys focused on ground-truthing land cover and habitat from the desktop analysis described above and included incidental observations for species and sign, including nests, burrows, etc.

To assist in mapping habitat types, the biologists collected GPS points in dominant habitats and changes in habitat type encountered. Dominant plant species and other habitat characteristics observed at these habitat points were recorded to accurately classify and describe habitat types. In addition, the biologists scanned the adjacent landscape from vantage points that allowed views across the landscape to help map habitat boundaries.

Biologists recorded special-status wildlife species and uncommon species observed during baseline habitat surveys. Observations of general wildlife encounters, including the sighting of individuals, scat, nests, etc., were recorded whenever observed during habitat surveys and while in-transit to survey locations along the corridor. No surveys were conducted specifically for wildlife species, including raptors, small mammals, or ungulates (i.e., deer and elk).

2.2.3 Raptor and Eagle Nest Surveys

Reconnaissance-level raptor nest surveys were conducted concurrently with the pedestrian wildlife surveys. These surveys were conducted from the ground, including views from public roads outside the Project boundary in order to gain vantage points on as much of the 0.25-mile (0.4-kilometer) raptor nest analysis area as possible. Occupied nests were documented based on observations at the time of the survey. In some cases, non-occupancy was not definitively confirmed, and these nests were conservatively considered occupied for the purposes of assessing potential project impacts.

2.2.4 Columbia River Substrate Surveys

Within the micrositing corridor in the Columbia River, a high-resolution geophysical survey using multibeam, side-scan sonar, and a sub-bottom profiler was conducted along the cable alignment in the summer of 2025. In addition, a sediment profile imaging (SPI) survey was conducted in July and August 2025 that produced data and images of substrate conditions at sample points along the route. Along the route, samples were taken every 1 kilometer (0.6 miles), and three sampling stations, in a cross-river transect, were taken at 5-kilometer (3.1-mile) intervals. These data were used to map habitat categories for key fish and aquatic species along the cable route within the micrositing corridor. High-resolution multibeam bathymetric data showed varying terrain, including large sand waves, boulder fields, rocky outcrops, and possible bedrock. The SPI data characterized grain-size distribution, benthic community patterns, and habitat quality gradients for fish and invertebrates, such as crayfish, clams and mussels, and sediment infauna.

3 Identification and Description of Habitat (OAR 345-022-0060(3)(b)(c))

(b) Identification of all fish and wildlife habitat in the analysis area, classified by the general fish and wildlife habitat categories as set forth in OAR 635-415-0025 and the sage-grouse specific habitats described in the Greater Sage-Grouse Conservation Strategy for Oregon at OAR 635-140-0000 through 635-140-0025 (core, low density, and general habitats), and a description of the characteristics and condition of that habitat in the analysis area, including a table of the areas of permanent disturbance and temporary disturbance (in acres) in each habitat category and subtype;

(c) A map showing the locations of the habitat identified in (b);

RESPONSE

3.1 Habitat Types and Categories within the Analysis Area

HDR mapped habitats within the study area based on surveys conducted on April 20, 2023, and May 30 and 31, 2024, as well as desktop review using aerial imagery and National Land Cover Database (NLCD) data (USGS 2024). Habitat types were also adapted from habitat descriptions in *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001). As mentioned in Section 1.1, sage-grouse specific habitats are not present in the analysis area for the Project and habitat categories in the Greater Sage-Grouse Conservation Strategy (OAR 635-140-0000) are not applicable.

3.1.1 Terrestrial Habitat

Surveys conducted in 2023 and 2024 verified land cover types that were mapped by the NLCD and the National Wetland Inventory (USFWS 2024) within the terrestrial portions of the analysis area. The initial survey conducted in 2023 was a reconnaissance-level pedestrian survey from accessible public roads. Biologists conducted more detailed surveys in 2024 and mapped observations of vegetation and species on properties outside of public ROW, where obtained permissions allowed. Compared against the NLCD, the survey verified the area was developed open space with low to high intensity ground cover for existing state and county roads. The Project boundary areas that extend outside of the road ROW, which includes the horizontal directional drilling (HDD) landing sites and converter station sites, were characterized as developed open space, mixed forest, woody wetland, and grassland herbaceous and barren land.

Level III Ecoregions present in the analysis area include Willamette Valley, Cascades, Eastern Cascades Slopes and Foothills, and Columbia Plateau (Table 2).

Table 2. Level III Ecoregions within the CRT Analysis Area

Level III Ecoregion	Major habitat type	Description
Willamette Valley	Prairies, deciduous/ coniferous forests, wetlands	Broad, lowland valley that consists of terraces and floodplains surrounded by rolling hills. The temperate climate is characterized by lower precipitation than the adjacent Coast Range and Cascades regions. Surface water systems in the portion of this ecoregion that occur in the analysis area are characterized by low gradient, meandering streams, numerous wetlands, oxbow lakes, and ponds. Major river systems in this ecoregion include a portion of the lower Columbia River, the Washougal River, and the lower portions of the East Fork Lewis and Lewis rivers, all of which drain to the Columbia River.
Cascades	Cascade mountain range, volcanoes, glaciers, coniferous forests, subalpine meadows	Steep ridges and river valleys to the west and high plateau to the east. Mountainous region with active and dormant volcanoes. Rocky alpine zones and subalpine meadows occur at high elevations. Maritime weather brings mild conditions that support coniferous forests of Douglas fir, western hemlock, and western red cedar. Surface water systems typically include reservoirs and medium gradient rivers and streams occurring in u-shaped, glaciated valleys in the lowlands; high to medium gradient streams and glacial rock- basin lakes occurring in montane highlands; sinuous, medium gradient streams, glacial rock basin lakes, small lakes on collapsed lava flows and wetlands in montane forested areas; and cascading streams and glacial tarns in subalpine/alpine areas. Major river systems in this ecoregion include the upper portions of the Cowlitz, Lewis, East Fork Lewis, Kalama, North Fork Toutle, and Cispus rivers, which flow to the Columbia River.

Level III Ecoregion	Major habitat type	Description
Eastern Cascades Slopes and Foothills	Coniferous forest, sagebrush steppe, grassland	The region is in the rain shadow of the Cascade Range. The dry continental climate creates greater temperature extremes. Vegetation is highly susceptible to wildfire. This region is one of Washington's most heavily forested areas with open ponderosa and lodgepole pine forests. Surface water systems typically include medium to high gradient, permanent and intermittent streams and rivers running through canyons, with springs commonly occurring in the Yakima Plateau and associated slopes; high gradient, permanent streams and rivers with scattered glacial rock-basin lakes in areas dominated by grand fir mixed forests; and permanent and intermittent, mostly medium gradient streams and rivers in the eastern Cascades and Columbia foothills. Major river systems in this ecoregion include the Little White Salmon, White Salmon, and Klickitat rivers, and a small section of the Yakima River, which all flow to the Columbia River.
Columbia Plateau	Shrubsteppe, fertile agricultural heartland, Palouse Hills	The Columbia Plateau is dominated by arid sagebrush steppe and grassland. The region is located within the rain shadow of the Cascade mountains. Summers are hot and dry with precipitation occurring mainly between late fall and early spring. Surface water systems typically include perennial, intermittent, and ephemeral streams, some of the larger of which flow through steep river canyons and coulees that are tributary to the Columbia River. Multiple human-created reservoirs are present and primarily used to supply hydroelectric power and irrigation water for the extensive agricultural uses that occur throughout this ecoregion. Extensive emergent wetlands supported by irrigation runoff are present as are riparian wetlands. Major river systems in this ecoregion include a portion of the middle Columbia River, as well as portions of the Yakima, Snake, and Walla Walla rivers, all of which flow to the Columbia River. Large human-created reservoirs are also present including multiple impoundments on both the Columbia River (Priest Rapids Lake, Lake Wanapum, Lake Entiat Rock Island Pool, Lake Pateros, Rufus Woods Lake, and part of Franklin Delano Roosevelt Lake) and the Snake River (Lake Sacajawea, Lake Herbert G. West, Lake Bryan).

Sources: Omernik 1987; USEPA 2023; LandScope America 2024

3.1.2 Columbia River and Riparian Habitat

The Columbia River originates in British Columbia, flows southwest through Washington State, and then flows west along the Washington/Oregon border to the Pacific Ocean. The portion of the Columbia River in the Project analysis area experiences considerable human use, including intensive recreation, commercial fishing, and commercial and industrial vessel traffic. The creation of impoundments on the Columbia River and its tributaries, dam operations, logging, diversions for irrigated agriculture, and human population growth have altered the Columbia's pre-settlement flow regime and have reduced the quality of salmon habitat across the river basin (National Academies of Sciences, Engineering, and Medicine 2004). On the mainstem of the Columbia River, numerous hydropower projects, including the Federal Columbia River Hydropower System, have created a series of dams that have altered the flow regime and created substantial barriers to in-river migration and dispersal for fish and other organisms. The regularly scheduled dredging that occurs in the river's Federal Navigation Channel has degraded benthic habitats. Collectively, these actions have degraded in-stream and benthic habitats for fish and aquatic species that migrate through or inhabit the Columbia River in the Project analysis area (Fresh et al. 2005; NMFS 2005).

Many salmon in the Columbia River basin are listed as threatened and endangered under the federal ESA, as well as by the states of Washington and Oregon. Annual salmon and steelhead

returns to the Columbia River estuary are estimated to have been as high as 16 million fish per year during the late 1800s. The returns have dwindled over time, dropping to nearly 1 million fish per year in the 1990s. These numbers rebounded in the late 1990s and early 2000s, largely because that time frame coincided with a period of favorable ocean conditions for salmon (National Academies of Sciences, Engineering, and Medicine 2004). Approximately 2 million salmon and steelhead returned to the Columbia Basin on average each year from 2000 to 2019 (Columbia Basin Partnership Task Force 2020). The current return of naturally produced salmon and steelhead to the Columbia Basin is less than 10 percent of the historical run (Columbia Basin Partnership Task Force 2020).

White sturgeon (*Acipenser transmontanus*) are native to the Columbia River Basin and are found throughout the Columbia River system, from the estuary near the Pacific Ocean upstream to the Canadian border (Parsley et al. 1993). Overharvesting during the late 1800s resulted in substantial population declines, and both Oregon and Washington restrict white sturgeon harvest within the Columbia and Snake River systems. White sturgeon within the Columbia River Basin are divided and managed as distinct populations based on geographic location and habitat fragmentation caused by dams.

Pacific lamprey (*Entosphenus tridentatus*), a species of Tribal significance, are anadromous and migrate up the Columbia River as adults to spawn in tributaries. The distribution of lamprey in the Columbia River is not well known but they are concentrated in tributaries and at river mouths. Larval Pacific lamprey may occur year-round within the fine sediments of the Columbia River, but research indicates densities are generally low except near (greater than 500 meters [1,640 feet]]) spawning tributary confluences with suitable fine sediment for burrowing (Blanchard et al 2023).

Freshwater mussels can be considered keystone species and indicators of the health of aquatic ecosystems. Key species include the Western ridged mussel (*Conidea angulata*), which is currently a candidate for listing under the ESA due to its low numbers, and floaters, including the winged floater mussel (*Anodonta nuttalliana*). The distribution of mussel beds in the mainstem Columbia River is not well documented. In general, mussels are known to inhabit shallower areas near river mouths with cobble and gravel substrates

Fish and wildlife habitat in the lower Columbia River has been and continues to be degraded by hydropower projects, water withdrawals, dredging, contamination by petrochemicals, heavy metals and radioactive waste, high water temperatures, and industrial, commercial, and residential development along the shoreline as well as logging and agricultural development within the watershed (Fresh et al. 2005; NMFS 2013). The reach of the mainstem Columbia River in the analysis area from the Washougal River downstream past Hayden Island is identified as temperature-impaired on the 303(d) list (Ecology 2024) and is included in the Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load prepared by the U.S. Environmental Protection Agency (USEPA 2021).

3.2 Quantity of Habitat Types and Habitat Categories within the Analysis Area

Baseline vegetation data collection provided sufficient detail to facilitate habitat characterization in accordance with the ODFW *Fish and Wildlife Habitat Mitigation Policy* (OAR 635-415). This policy provides the structure to develop appropriate mitigation for wildlife habitat impacts set forth in

ODFW's Mitigation Goals and Standards (OAR 635-415-0025), which specifies general mitigation goals and standards for six categories of habitat value. Mitigation goals and implementation standards for each ODFW habitat category are summarized in Table 3.

Table 3. ODFW Mitigation Goals and Strategies by Habitat Category

General Habitat Category	Description	Goal for Mitigation	Mitigation Strategy
Category 1	Irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population or unique assemblage.	No loss of habitat quantity or quality	Avoidance
Category 2	Essential habitat for a fish or wildlife species, population, or unique assemblage of species and is limited either on a physiographic province or site-specific basis depending on the individual species, population or unique assemblage.	No net loss of habitat quantity or quality and to provide a net benefit of habitat quantity or quality	In-kind, in-proximity mitigation
Category 3	Essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population.	No net loss of habitat quantity or quality	In-kind, in-proximity mitigation
Category 4	Important habitat for fish and wildlife species.	No net loss of habitat quantity or quality	In-kind or out-of-kind, in-proximity, or off-proximity mitigation
Category 5	Habitat for fish and wildlife having high potential to become either essential or important habitat.	Net benefit in habitat quantity or quality	Actions that improve habitat conditions
Category 6	Habitat that has low potential to become essential or important habitat for fish and wildlife.	Minimize impacts	Minimize direct habitat loss and avoid off-site impacts

Most of the cable route is sited to be buried under the bed of the Columbia River, and consequently, the micrositing corridor, predominantly consists of aquatic habitat. The terrestrial portions in the analysis area are comparatively short and encompass multiple general vegetation communities and waterbody types that serve as fish and wildlife habitats. The eight major habitat types present are forest and woodlands, grasslands and herbaceous, wetlands, shrub and scabland, agricultural, developed and disturbed, barren land, and open water. The vast majority of the terrestrial portion of the analysis area consists of developed land and grass/herbaceous areas. Developed areas include industrial, residential, or transportation land uses. Habitat in developed areas is fragmented due to buildings and roads, with small, vegetated patches in the form of landscaping or city parks. Agricultural areas also experience anthropogenic disturbance, having been converted to cultivated crops and/or pasture/hay.

Grasslands and shrublands in the analysis area differ in structure and species composition depending on the ecoregion, elevation, soil conditions, moisture regimes, and fire history present in the area. While these communities typically occur on dry flats and plains, rolling hills, saddles, and ridges where precipitation is low, there are outliers. Coastal sand dunes and strands occur along the Columbia River and include vegetation that tolerates both tidal and wind disturbances. Herbaceous bluffs are typically steep and vegetation is minimal. However, the common grasslands and

shrublands are dominated by forbs, grasses, and/or shrub species. Fire has historically played an important role in maintaining grassland and shrubland communities and served as a cyclical disturbance regime.

Several forest types occur within the analysis area, primarily in the Cascade Mountain Range (see Attachment 2-Appendix B, Figure 1). Forests can be coniferous dominant, deciduous dominant, or coniferous/deciduous mixed, depending on disturbance regime, soil type, elevation, slope, and aspect. Most common conifers are Douglas fir (*Pseudotsuga menzeisii*) and western hemlock (*Tsuga heterophylla*), and the most common deciduous species are bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), with various poplar (*Populus spp*.), and willow (*Salix spp*.) species. The understory can vary from shrubby trees such as vine maple (*Acer circutum*) to grass and forb dominant. Drier sites may have more ponderosa pine (*Pinus ponderosa*) and juniper species (*Juniperus spp*.) and a shrubby or grassy understory.

Wetlands are areas where water saturation is the dominant factor that determines the soil type/development, as well as the types of plants and animals that can inhabit these areas (Cowardin et al. 1979); wetlands are sparsely distributed in the analysis area but are found in all counties crossed by the Project in Oregon (see the State and Local Laws and Regulations Exhibit). The main waterbody in the analysis area is the Columbia River where the majority of the cable route is sited. The Columbia River and its tributaries form the fourth largest river basin in North America, originating at Columbia Lake in British Columbia. The Columbia River is buffered by riparian habitat along the majority of the reach within the analysis area. Waterbodies that would be crossed by the cable route where they intersect the terrestrial portion of the Project corridor include two ephemeral drainages, as well as Threemile Creek, the Columbia Slough, and the Willamette River. The cable would be installed deep under the Willamette River riverbed using HDD. Other waterbodies include stormwater features and two ditches. The *Wetlands and Waterbodies Delineation Report* (attachment to State and Local Laws and Regulations Exhibit) provides descriptions and details of the surface water features and wetlands in the Project corridor.

Each of the general vegetation communities and waterbody types discussed above can be further defined into subtypes based on the dominant plant species found within a vegetation community, or the hydraulic regime that controls the waterbody. Refining these general vegetation/waterbody types into subtypes is important when discussing fish and wildlife use because species composition can differ according to the specific conditions found within each subtype. For example, the wildlife species composition found in a forested wetland would likely be different from what would be found in an emergent wetland. Table 4 describes the general vegetation/waterbody types as well as the subtypes found within the analysis area based on National Land Cover Data, NatureServe Ecosystems, and field survey data.

Table 4. Description and Definition of General Habitat Types within the Overland Portion of the Analysis Area

Habitat Type	Habitat Sub-type	Description[1]
Agriculture	Cultivated Crops	This habitat type has crop cover of more than 20%. Common crops in the area include apples, cherries, grapes, and hay. Cultivated croplands and modified grasslands are typically plowed and harvested seasonally.[2]
	Pasture/Hay	Typically, pasture/hay agriculture includes areas of grasses, legumes, or mixtures of the two, where the pasture/hay is more than 20% of vegetation cover. Pastures are mowed, hayed, or grazed one or more times a year.[2]
Developed & Disturbed	Industrial	Industrial areas are characterized by development of factories, warehouses, paved roads, and similar infrastructure. If vegetated, they typically contain native and non-native vegetation, in the form of landscaping around buildings. May also contain invasive and nonnative plants that establish in disturbed landscapes.
	Residential	Residential areas are developed urban or suburban areas primarily used for housing. They typically contain more vegetation than industrial areas, as they have both native and non-native species in the form of ornamental plants used in landscaping around buildings. Invasive plants may also become established in these disturbed landscapes.
	Other	Other types of developed and disturbed land in the area includes recently burned grassland and unconsolidated shorelines.
Barren Land	Rock/Sand/Clay	Bare ground or areas with limited vegetation consist of lands where the endemic site conditions are unsuitable for consistent vegetative communities to develop, and where the predominant habitat features are related to geological structures as opposed to vegetative components. These areas include bedrock, cliffs, rock, volcanic material, glacial debris, gravel pits, and talus habitats, as well as areas where soil conditions prohibit the growth of most plant species. Vegetation cover is typically less than 15% of total cover.
Open Water & Unvegetated Wetland	Ponds and Lakes	Ponds and lakes are permanently flooded lands lying below the deep-water boundary of wetlands, which do not fall into the river and stream classifications.
	Perennial Rivers and Streams	Perennial rivers and streams consist of waterbodies that have a year-round flow of water.
	Intermittent Streams	Intermittent streams consist of waterbodies that do not have a year-round flow of water.
Forest & Woodland	North Pacific Lowland Riparian Forest and Shrubland	This ecosystem occurs on floodplains and riverine areas where flooding is the primary driver of ecosystem processes. It can be dominated by herbaceous, shrubby, and deciduous species, depending on the successional stage. Common deciduous plants include bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), Oregon ash (*Fraxinus latifolia*), red osier dogwood (*Cornus sericea*), big cottonwood (*Populus trichocarpa*), and several willow species (*Salix* spp.)
	North Pacific Lowland Mixed Hardwood Conifer Forest and Woodland	Occurs in low elevations on valley terraces and slopes. May be coniferous/deciduous mixed or coniferous dominant, which is more common in later successional stages. Common conifers include Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and grand fir (*Abies grandis*). Common deciduous species include bigleaf maple, red alder, and cascara (*Frangula purshiana*). The understory has forbs as well as both evergreen and deciduous shrubs, such as salal (*Gaultheria shallon*) and snowberry (*Symphoricarpus albus*).

Habitat Type	Habitat Sub-type	Description[1]
	Dry-Mesic Douglas fir/Western Hemlock Forest; Mesic-Wet Douglas-fir/Western Hemlock Forest	The Dry-Mesic Douglas-Fir/Western Hemlock forest occurs on west slopes of the Cascade Mountain Range and on the edges of the Willamette Valley. Douglas fir is typically dominant in the overstory, with western hemlock codominant in older stands. Otherwise, western hemlock is in the subcanopy along with grand fir, *Thuja plicata*, and big maple. Common species in the understory include salal, Oregon grape (*Mahonia nervousa*), vine leaf maple (*Acer circinatum*), pacific rhododendron (*Rhododendron macrophyllum*), huckleberry (*Vaccinium ovatum*), and western sword fern (*Polystichum munitum*). Sword fern cover of more than 40% indicates the system is the Mesic-Wet Douglas-fir/Western Hemlock Forest type. However, these two types can intermingle in drier areas. The wet forest differs from the dry in that it has moister soil, higher abundance of shade and moisture tolerant plants, and less frequent fires. Dominant overstory species include Douglas fir, western hemlock, and/or *Thuja plicata*. Big leaf maple and red alder are common at lower elevations. In the herb and shrub layers, sword fern, salal, Oregon grape, pacific rhododendron, vine leaf maple, salmonberry (*Rubus spectabilis*), and redwood sorrel (*Oxalis oregana*) are common.
	North Pacific Oak Woodland	Dry sites dominated by deciduous trees, mainly Oregon white oak (*Quercus garryana*), although codominance with Douglas fir and Ponderosa pine (*Pinus ponderosa*) may occur. In the absence of fire, a conifer dominant forest with a shrub understory will form.
	Columbia Plateau Western Juniper Woodland and Savanna	The western juniper (*Juniperus occidentalis*) is commonly the only tree species, but Ponderosa pine and Jeffrey pine (*Pinus jeffreyi*) may also be present. The understory is open shrub-steppe. Common species in the understory include big sagebrush (*Artemesia tridentata*), rabbitbrush (*Chrysothamnus viscidiflorus* and *Ericameria teretifolia*), bitterbrush (*Purshia tridentata*) and various perennial bunchgrasses such as Idaho fescue (*Festuca idahoensis*) and Sandberg bluegrass (*Poa secunda*). Grazing is common throughout this system and has allowed western juniper to expand into adjacent shrub steppe and grasslands.
	East Cascades Oak-Ponderosa Pine Forest and Woodland	Occurs within 40 miles (64 kilometers) of the Columbia River Gorge in the East Cascades and Columbia Plateau Ecoregions. Common dominant species include Oregon white oak, Ponderosa pine, and Douglas fir. The understory can vary from grass/herbaceous dominant to shrub-steppe. Shrub species may include bitterbrush, big sagebrush, rabbitbrush, Idaho fescue, and in wetter sets, some sedges (*Carex* spp.). Invasive species such as cheatgrass (*Bromus tectorum*) and bulbous grass (*Poa bulbosa)* are common. In the analysis area, this habitat also occurs in transitional areas in the Cascades, where snowberry, ocean spray, and deer brush (*Ceanothus integerrimus*) are common in the understory. Ponderosa pine and Douglas fir have invaded these systems at the lower tree line in the gorge and east Cascade foothills due to fire suppression.

Habitat Type	Habitat Sub-type	Description[1]
	North Pacific Montane Riparian Woodland and Shrubland	Occurs along streambanks and floodplains. Deciduous species are dominant, but Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) may occur in some sites at higher elevations. Several poplar species (*Populus* spp.), alder species (*Alnus* spp.) and willow species (*Salix* spp.) are present, as well as vine maple (*Acer circinatum*) and stink currant (*Ribes bracteosum*). Disturbance through flooding, scour, and deposition are essential to the maintenance of this system.
Shrub & Scrubland	Inter-Mountain Big Sagebrush Shrubland	Big sagebrush is the dominant vegetation, with juniper species (*Juniperus* spp.) and saltbrush (*Atriplex* spp.) present in some areas. Rabbitbrush, bitterbrush, and mountain snowberry (*Symphoricarpos oreophilus*) become more dominant in disturbed areas. Common grasses include Idaho fescue, Sandberg bluegrass, thickspike wheatgrass (*Elymus lanceolatus),* Indian ricegrass (*Achnatherum hymenoides*), and wild rye (*Leymus cinereus*).
	Columbia Plateau Scabland Shrubland	Vegetation cover is typically less than 50% in these systems, although moss and lichen can be up to 60% of ground cover in undisturbed areas. Vegetation that does occur is typically scabland sagebrush (*Artemesia rigida*) and wild buckwheat species (E*riogonum* spp.). Sparse perennial bunchgrasses, including Idaho fescue and Sandberg bluegrass, as well as forbs, including *Phlox*, *Sedum*, *Allium*, and *Balsamorhiza* species, may occur at some sites.
	Inter-Mountain Basins Mixed Salt Desert Scrub	Characterized by open to moderately dense shrubland with at least one saltbrush (*Atriplex* spp.) species present. Big sagebrush and rabbitbrush may occur in some locations. Perennial grasses such as Indian ricegrass, thickspike wheatgrass, and Sandberg bluegrass may occur in low to moderate densities.
Grasslands & Herbaceous	Willamette Valley Upland Prairie and Savanna	Occurs on flat to gently sloping terrain and can occur in various patch sizes in wet prairies and riparian forests. It has historically been maintained by anthropogenic fires, as sites without disturbance often succeed into forests. Deciduous or conifer species, such as Oregon white oak or Douglas fir may occur, but their occurrence is sparse. Perennial bunchgrasses are the dominant vegetation, primarily Idaho fescue and California oatgrass (*Danthonia californica*).
	Columbia Plateau Steppe and Grassland	This habitat type is similar to big sagebrush steppe but has more frequent fires (occurring less than every 20 years). Due to frequent burning, the shrub layer is minimal (less than 10%) and has been permanently converted to grassland. Perennial bunchgrasses and forbs are more than 25% of plant cover, with common species including Idaho fescue, Sandberg's bluegrass, and astragalus species (*Astragalus* spp.). Rabbitbrush and sagebrush may occur in disturbed areas.
	Introduced Upland Vegetation – Annual Grassland	Characterized by heavily disturbed/altered land that has become dominated by introduced annual grasses. Various brome species (*Bromus* spp.) are common, especially cheatgrass. Medusahead (*Taeniatherum caput-medusae*) and common mediterranean grass (*Schismus barbatus*) may also occur.

Habitat Type	Habitat Sub-type	Description[1]
	North Pacific Maritime Coastal Sand Dune and Strand	Within the analysis area sand dunes and strands occur on islands of the Columbia River and along its shores. Vegetation typically includes herbs, shrubs, and tree species that can tolerate wind and tidal disturbances. Red fescue (*Festuca rubra*) and American dunegrass (*Leymus mollis*) are common grasses. Common shrub species include salal and huckleberry (*Vaccinium ovatum*). Dunes may be forested, with dominant species depending on successional stage. Earlier stages include shore pine (*Pinus contorta* var. *contorta)* and later stages may have western hemlock and/or Douglas fir.
	Columbia Basin Foothill and Canyon Dry Grassland	Occurs on steep, open slopes along the Columbia River. Slope failure and fire frequency, which is less than 20 years, are major disturbance processes. Grasses, cacti, and forbs are the dominant vegetation cover. Common grass species include Idaho fescue and Bluebunch wheatgrass (*Pseudoroegneria spicata).* Deciduous shrubs such as snowberry (*Symphoricarpos* spp.), ocean spray (*Holodiscus discolor*), and currants or gooseberries (*Ribes* spp,) may invade systems where fire is excluded.
Wetlands	North Pacific Intertidal Freshwater Wetland	Occurs along the tidally influenced portions of the Columbia and Willamette Rivers. Vegetation varies between wetlands due to differences in tidal flooding and soil characteristics, but typical dominant species include some trees and several forbs, including Sitka spruce (*Picea sitchensis*), red alder, red osier dogwood, western watermilfoil (*Myriophyllum hippuroides*), narrowleaf cattail (*Typha angustifolia*), lady fern (*Athyrium filix-femina*), and Lyngbye's sedge (*Carex lyngbyei*).
	Temperate Pacific Freshwater Emergent Marsh	These freshwater wetlands occur in floodplains that are either semi permanently or seasonally flooded. Graminoids such as sedges, rushes (*Juncus* spp.), and common cattail (*Typha latifolia*), typically dominate. Emergent and floating vegetation includes bulrushes (*Scirpus* spp.), cattails, sedges (*Eleocharis* and *Carex* spp.), canary grasses (*Phalaris* spp.), wapato (*Sagittaria* spp.), water hemlocks (*Cicuta* spp), yellowcresses (*Rorippa* spp,), and monkeyflowers (*Mimulus* spp.).
	North Pacific Hardwood-Conifer Swamp	Occurs along the Columbia River Valley on flat to gentle slopes and in small patches. In the Willamette Valley, these systems are typically dominated by hardwoods, mainly Oregon white ash, rather than conifers. Overstory is less than 50%, but the understory has a dense cover of shrubs.

1. https://explorer.natureserve.org/
2. https://www.mrlc.gov/data/legends/national-land-cover-database-class-legend-and-description

Within the Project boundary and work areas (i.e., areas where project disturbance would occur), habitat was also qualitatively categorized based on functional importance to fish and wildlife, in accordance with the *ODFW Fish and Wildlife Habitat Mitigation Policy*. HDR biologists categorized terrestrial habitat using a combination of known species use, field survey observations, and aerial imagery interpretation. Aquatic habitat was assessed based on known species use and substrate data obtained from geophysical and SPI surveys conducted in 2025. Relevant GIS data layers showing potential habitat for ESA and state-listed species and habitats were also used. Data from geophysical and SPI surveys conducted in the micrositing corridor in the Columbia River in 2025 were used to categorize the aquatic habitat in the in-river portion of the project corridor. Using this as a foundation, terrestrial and aquatic habitats and vegetation types within field survey areas are qualitatively categorized as Category 1 through 6 in Table 5 and Table 6.

Table 5. Terrestrial Habitat Categories and Impact Framework for the CRT Project

ODFW General Habitat Category	CRT Project Category Definition and Impact Framework	Habitat Category Presence in Project Boundary
Category 1	• Terrestrial habitat within designated critical habitat for ESA-listed species and for which the Project would permanently alter the function of physical and biological features of critical habitat in an adverse manner. • State and federally ESA-listed rare plant populations identified during preconstruction surveys. • Old-growth forests.	ESA Critical Habitats are not present in the terrestrial portion of the Project boundary. No old-growth forest areas are present.
Category 2	• Riparian zones around intermittent and perennial streams. • Wetlands. • Trees with active nesting raptors. • Delineated habitat or buffers (northern spotted owl nesting habitat, raptor nests) for other state and federally sensitive/critical/rare wildlife and plant species.	Riparian habitat is present in and adjacent to the Project boundary along the shoreline of the Columbia River. The Project avoids impacts to riparian areas by siting in developed/disturbed areas and HDD installation of the cable under stream crossings and where the cable enters and exits the Columbia River. Trees containing nesting raptors including osprey and bald eagles were observed in forest areas along the shoreline of the Columbia River in the analysis area, but outside the Project Boundary.
Category 3	• Late Successional Mixed Conifer Forests (Oregon Strategy Habitat).	Mature mixed forest is present on Hayden Island and areas along the Columbia River. These habitats do not overlap with areas where ground disturbance will occur and no tree removal is planned for the Project.
Category 4	• Early successional forests (i.e., recent clear cuts on managed timberland). • Woodland and forested habitats in nondelineated habitat or buffers (northern spotted owl dispersal habitat, raptor nests) for state and federally sensitive/critical/rare wildlife and plant species. • Degraded habitats dominated by weeds or nonnative plants. • May include hedgerows, perennial crops, pasturelands, and non-cultivated agricultural fields. These areas provide some habitat for wildlife. • Developed/urban areas within utility easements and similar areas where maintenance and management are required at frequent (less than 5-year) intervals (developed/urban areas within Bonneville Power Administration ROW). These areas are typically maintained in an early seral stage of succession (scrub-shrub or herbaceous) by frequent mowing/removal of trees or application of herbicides. Nonnative and weedy species may be mixed with native species.	Potential dispersal habitat for northern spotted owl and early successional forests are located adjacent to the Project corridor, although these habitats do not overlap areas where ground disturbance will occur. Agricultural fields and pasturelands are present in the Project boundary at the eastern end. Maintained utility easements and early seral stage scrub-shrub or herbaceous cover is present in the Project boundary at both the east and west ends.

ODFW General Habitat Category	CRT Project Category Definition and Impact Framework	Habitat Category Presence in Project Boundary
Category 5	• Degraded aquatic habitats lacking suitable foraging opportunities, rearing opportunities, and water quality for healthy aquatic ecosystem. For example, water temperatures and dissolved oxygen levels that do not support continued use of habitats. • Areas degraded by human actions (i.e., unpaved roads); typically devoid of plants or have limited plant cover and are composed of imported rock. • Areas with minimal plant cover , dominated by weedy and invasive species. • Annually cultivated agriculture lands with limited wildlife habitat value, such as ryegrass fields, alfalfa, and row crops. Includes farmed wetlands that are plowed on a regular basis. • May be used as travel corridors for some species of wildlife, but they generally do not provide nesting/roosting, denning, foraging, or cover for wildlife.	The majority of the buried cable is sited alongside roadways within the unpaved shoulder and road prism and alongside developed areas. These areas are comprised of gravel, dirt, and/or rock, pasture, grass, and nonnative herbaceous vegetation typical of roadsides and developed areas.
Category 6	• Developed areas such as structures, roads, parking lots, and other impervious surfaces. • Provide no wildlife value and have minimal to no mitigation potential.	Some portions of the buried cable corridor will be installed under paved areas including roads.

Table 6: Aquatic Habitat Categories and Impact Framework for the CRT Project

ODFW General Habitat Category	CRT Project Category Definition and Impact Framework	Habitat Category Presence in Project Boundary
Category 1	• Essential aquatic habitat[1] that provides irreplaceable[2] function for aquatic species that is limited[3] within the Columbia River and whose loss or disturbance will permanently alter the functions of physical and biological features to an extent it no longer supports spawning, rearing or migration of any aquatic species assemblage.	• Aquatic habitat in the Columbia River that is limited and supports irreplaceable functions for species is not present along the cable route. The Project will not permanently alter physical and biological features (PBFs) for aquatic species to an extent that habitat is insufficient to sustain populations or support designated features and functions of habitat.
Category 2	• Essential waterbodies (Columbia River) designated as critical habitat for ESA-listed species that support spawning habitat. • Waterbodies (Columbia River) that support spawning of Oregon or Washington-state sensitive species. • Spawning habitat for white sturgeon in the Columbia River. • Spawning habitats for culturally-important aquatic species in waterbodies, including first foods for local Tribes along the Columbia River that will be permanently or temporarily impacted.	• Various Chinook, coho, and steelhead populations (all listed salmonids are also ESA-listed), although chum salmon and eulachon may spawn in the mainstem, the cable route avoids known spawning areas. • White sturgeon spawning areas are present up to 8 kilometers (5 miles) downstream of mainstem dams (Parsley et al. 1993).
Category 3	• Essential aquatic habitat that is limited geographically and supports rearing and migration of ESA-listed or state-sensitive species and foraging and rearing habitat for white sturgeon. • Aquatic habitat that supports species and culturally important aquatic species for local Tribes along the Columbia River that will be temporarily or permanently impacted.	• Columbia River salmonid rearing and migration throughout the analysis area. • Eulachon migratory habitat downstream of Bonneville Dam. • White sturgeon rearing and foraging habitat throughout the analysis area. • Larval lamprey rearing habitat limited to areas within 500 meters (1,640 feet) of tributary mouths.
Category 4	• Aquatic habitat that is not limited within the Columbia River that may support reproduction and rearing of culturally important aquatic species for Tribes in the Pacific Northwest.	• Suitable substrate for freshwater mussels present throughout most of the Project corridor, though no mussel beds observed in sediment profile imaging along route.
Category 5	• Aquatic habitats that are not limited with suitable foraging opportunities, rearing opportunities, and water quality to support healthy aquatic ecosystem. For example, suitable water temperatures and dissolved oxygen to support continued use of habitats.	• Although the Columbia River is degraded in some reaches (e.g., seasonal temperature), water quality along the cable route is generally suitable to support rearing and foraging by aquatic species.
Category 6	Degraded aquatic habitat with limited suitability for spawning, rearing, or foraging that is unlikely to provide such functions in the future.	• None

[1] Per OAR 635-415-0005: "Essential Habitat" means any habitat condition or set of habitat conditions which, if diminished in quality or quantity, would result in depletion of a fish or wildlife species.
[2] "Irreplaceable" means that successful in-kind habitat mitigation to replace lost habitat quantity and/or quality is not feasible within an acceptable period of time or location, or involves an unacceptable level of risk or uncertainty, depending on the habitat under consideration and the fish and wildlife species or populations that are affected. "Acceptable," for the purpose of this definition, means in a reasonable time frame to benefit the affected fish and wildlife species.
[3] "Limited habitat" means an amount insufficient or barely sufficient to sustain fish and wildlife populations over time.

4 Identification of State Sensitive Species and Site-Specific ODFW Issues (OAR 345-022-0060(3)(d))

(d) Based on consultation with the Oregon Department of Fish and Wildlife (ODFW) and appropriate field study and literature review, identification of all State Sensitive Species that might be present in the analysis area and a discussion of any site-specific issues of concern to ODFW;

RESPONSE

4.1 Rare and Special Status Plants

HDR conducted a desktop analysis to create a list of special status plant species with the potential to occur within the analysis area. Special status plants include species listed under the federal ESA (16 United States Code §1531 et seq.) or state-listed endangered, threatened, candidate, or sensitive vascular plant species, as defined by Oregon 603-073-0002. Specific sources of information that were reviewed include:

- USFWS species lists for Multnomah and Wasco Counties (USFWS 2025b);
- Oregon Department of Agriculture Oregon Listed and Candidate Plants.
- ORBIC Rare, Threatened, and Endangered Species of Oregon
- ODFW, Centralized Oregon Mapping Products and Analysis Support System (Compass)

Based on the background review, ORBIC identifies Barrett's penstemon (*Penstemon barrettieae*), a state candidate species, in several locations along the Columbia River. These include observations near Koberg Beach State Recreation Site, with the latest observations from 2004. Barrett's penstemon has also been recorded along the banks of the Columbia River in the City of Hood River and within 1 mile (1.6 kilometers) to the west, with the most recent observations from 1954 and 1931, respectively. It has been observed near Bonneville Lock and Dam, with the most recent observations from 2013. Columbia cress (*Rorippa columbiae*), a state candidate species, was recorded growing on the shores of the Columbia River near Warrendale and Troutdale. It was last observed near Warrendale in 1984 and Troutdale in 2013. HDR biologists did not observe any individuals of Barrett's penstemon or Columbia cress growing within the Project boundary.

Table 7 lists the special status plant species that were identified as potentially occurring in the project vicinity following a review of the resources listed above. These species were analyzed as part of desktop review and field surveys, as described below.

Table 7. Special Status Plant Species Potentially Occurring in the Analysis Area

Species	Federal Status[1]	State Status
Barrett's penstemon *Penstemon barrettiae*	None	C
Columbia cress *Rorippa columbiae*	None	C
Dwarf evening-primrose *Eremothera pygmaea*	None	C
Golden paintbrush *Castilleja levisecta*	DL	E
Jungermann's monkeyflower *Erythranthe jungermannioides*	None	C
Howellia *Howellia aquatilis*	T	DL
Howell's bentgrass *Agrostis howellii*	None	C
Howell's fleabane *Erigeron howellii*	None	C
Northern wormwood *Artemisia campestris* var. *wormskoldii*	SOC	E
Northern false coolwort *Bolandra oregana*	None	C
Gorge daisy *Erigeron oreganus*	None	C
Oregon coolwort *Sullivantia oregana*	SOC	C
Tall bugbane *Cimicifuga elata*	None	C
White meconella *Meconella oregana*	SOC	C
White rock larkspur *Delphinium leucophaeum*	SOC	E
Willamette daisy *Erigeron decumbens*	E	E

1. T= Threatened, E= Endangered, C= Candidate, SOC = Species of Concern, S = Sensitive, DL = Delisted

Most of the Project corridor is located along paved roadways within disturbed ROW. Special status plant surveys were conducted in May and June 2024 within the Project corridor in areas where ground disturbance from Project construction would occur. These surveys were conducted concurrently with habitat verification and mapping surveys. No special status plant species were observed during these surveys.

4.2 State Sensitive Species

This section addresses species that have been designated by the State of Oregon as state sensitive species. ODFW defines state sensitive species as "naturally reproducing fish and wildlife species, subspecies, or populations which are facing one or more threats to their populations and/or habitats" (OAR 635-100-0040). The ODFW further defines state sensitive species as either sensitive critical or sensitive vulnerable. Sensitive critical means the species is imperiled with extirpation from a specific geographic area because of small population sizes, habitat loss or degradation, and/or immediate threats. Species that are sensitive vulnerable face threats but are not currently imperiled with extirpation (ORBIC 2022).

Table 8 lists the state sensitive terrestrial species that potentially occur within the analysis area based on the desktop analysis information review and field surveys (see Section 2). State endangered, threatened, and candidate species are addressed in the Threatened and Endangered Species Exhibit. While not state sensitive species, golden eagles (*Aquila chrysaetos*) are addressed briefly in this exhibit as a species of concern protected under the Bald and Golden Eagle Protection Act.

Fish species determined by ODFW to be sensitive are described through species management units per the Native Fish Conservation Policy (OAR 635-007-0504(6)). The analysis area includes the micrositing corridor within the Columbia River. Some fish species' distribution is not well known and ODFW lists them as sensitive range-wide by ecoregion, despite a lack of detailed occurrence data. Fish species determined by ODFW to be sensitive in the Columbia Plateau and Willamette Valley Ecoregions are listed in Table 9 and discussed in Section 5.2 and Attachment 2.

HDR biologists referred to information from ODFW on state priority species to identify state listed fish species that could occur within the analysis area. Fish species listed by the state as threatened include Lower Columbia River coho salmon, Snake River fall-run Chinook salmon, and Snake River spring-run Chinook salmon. Other ODFW fish species listed as sensitive or sensitive-critical that occur in the analysis area include bull trout, Lower Columbia chum salmon, Snake River steelhead, rainbow trout, the resident form of steelhead, cutthroat trout, Pacific lamprey (*Entosphenus tridentatus*), Western brook lamprey (*Lampetra planeri*), green sturgeon (*Acipenser medirostris*), and white sturgeon. The habitat use and occurrence in the analysis area for these species is discussed in Attachment 2.

Table 8. Special-Status Terrestrial Species with Potential to Occur within the Site Boundary and Analysis Area

Species	Federal Status	ODFW Status	Expected Habitat
Northern spotted owl *Strix occidentalis caurina*	T	E	Strongly associated with old-growth forests that are characterized by multi-storied canopies, several species of trees, sizes, and ages, and standing and downed dead trees.
Streaked horned lark *Eremophila alpestris strigata*	T	S	Large open areas in native prairies, sandy islands, coastal foredunes and spits, airports, fallow and active agricultural fields, mudflats, and sparsely vegetated edges of grass fields.
Bald eagle *Haliaeetus leucocephalus*	None[a]	SC	Forested areas in association with aquatic environments
Golden eagle *Aquila chrysaetos*	None[a]	SC	Open and semi-open habitats in tundra, shrublands, grasslands, woodland brushlands, and coniferous forests, farmland and riparian areas. Typically forages in open habitats like grasslands or steppes. Usually nests on cliffs but also can nest in trees.
Ferruginous hawk *Buteo regalis*	SOC	S	High-desert sagebrush and bunchgrass prairies, canyon shrublands, desert playa, agricultural fields, and pastureland
Northern goshawk *Accipiter gentilis atricapillus*	SOC	S	Coniferous and deciduous forests, woodlands, or along tree lines adjacent to open areas; mature forest for nesting
Sandhill crane *Grus canadensis*	None	S	Relatively large wetland-wet/dry meadow complexes with a mosaic of aquatic and herbaceous conditions for nesting and foraging.
American white pelican *Pelecanus erythrorhynchos*	None	S	Nest on islands in rivers and lakes that have sparsely vegetated ground cover. Use shallow water areas for cooperative feeding.
Pileated woodpecker *Dryocopus pileatus*	None	S	Dense, mature mixed-conifer forests with large-diameter trees, snags, and logs for nesting and foraging
Lewis's woodpecker *Melanerpes lewis*	SOC	S	Open ponderosa pine woodlands, riparian areas dominated by cottonwood, or logged or burned pine forest.
Willow flycatcher *Empidonax traillii*	SOC	S	Moist, shrubby areas with standing or running water.
Olive-sided flycatcher *Contopus cooperi*	SOC	S	Montane mixed-conifer forests interspersed with natural openings and prominent perches for singing and flycatching.
Purple martin *Progne subis*	SOC	S	Forest areas close to water with abundant cavities for colonial nesting.
Grasshopper sparrow *Ammodramus savannarum perpallidus*	None	S	Moderately open, unfragmented grasslands with patches of bare ground, sometimes with light cover of shrubs.
Long-billed curlew *Numenius americanus*	None	S	Short- and mixed-grass prairies with flat to rolling topography
Western gray squirrel *Sciurus griseus*	None	S	Oak woodlands, oak savannas, and mixed oak-pine-fir woodlands.

Species	Federal Status	ODFW Status	Expected Habitat
Townsend's big-eared bat *Corynorhinus townsendii*	SOC	SC	Variety of habitat types, including coniferous forests, deserts, native prairies, riparian areas, agriculture fields, and coastal areas; require caves, rock crevices, or other roosts.
Pallid bat *Antrozous pallidus*	SOC	S	Variety of habitat types, including rocky, arid deserts and canyon lands, shrub-steppe, grasslands, karst formations, and coniferous forests under 2,000 feet (610 meters).
Silver-haired bat *Lasionycteris noctivagans*	SOC	S	Mature Douglas fir/ western hemlock and ponderosa pine forests as well as juniper woodland habitat near streams, ponds and lakes. Roosts in tree cavities, under loose bark, caves, mines and in abandoned buildings.
California myotis *Myotis californicus*	None	S	Forest habitats with snags for day roosts.
Fringed myotis *Myotis thysanodes*	SOC	S	Forest habitats with snags for day roosts.
Long-legged myotis *Myotis volans*	SOC	S	Late-successional conifer forests or other forested habitat with late-successional components. Large snags and hollow trees for day, night, and maternity roosts.
Hoary bat *Lasiurus cinereus*	SOC	S	Forested upland habitats, including junipers.
California mountain kingsnake *Lampropeltis zonata*	SOC	S	Pine forests, oak woodlands, and chaparral. Usually found in, under, or near rotting logs in open wooded areas near streams.
Northwestern pond turtle *Actinemys marmorata*	PT	S	Ponds, small lakes, and wetlands with adjacent open upland habitats with sun exposure including prairies and open forest types.
Painted turtle *Chrysemys picta*	None	S	Found in marsh ponds, small lakes, slow-moving streams, and quiet, off-channel portions of rivers.
Northern red-legged frog *Rana aurora*	SOC	S	Shallow-water ponds and wetlands with emergent vegetation. For breeding, they require forested sites with exposed (sunny), still-water habitat. Adults and juveniles also use moist riparian and upland forests.
Oregon slender salamander *Batrachoseps wrighti*	SOC	S	Late-successional and second-growth forests. They are often associated with large-diameter, decaying Douglas fir logs and bark debris mounds at the base of snags.
Western toad *Anaxyrus boreas*	None	S	Lakes, rivers, streams, and wetlands during breeding; variety of grassland, shrubland, woodland, and forests at other times of year.

[a] Listed under the Bald and Golden Eagle Protection Act

T= Threatened, E= Endangered, PT= Proposed Threatened, C= Candidate, SC = Sensitive Critical, S = Sensitive

Table 9. Special-Status Fish and Aquatic Species with Potential to Occur within the Site Boundary and Analysis Area

Species	Federal Status	ODFW Status	Expected Habitat	Observed, Expected, or Potential Occurrence within Analysis Area	Potential Use of Habitat within Analysis Area
Bull Trout *Salvelinus confluentus*	T	S	Columbia River and tributaries.	Potential occurrence	Adult and juvenile migration in the Columbia River, but no spawning.
Chinook Salmon[1] *Oncorhynchus tshawytscha*	T	T[2]	Columbia River and tributaries.	Expected	Adult and juvenile migration in the Columbia River. Some potential mainstem and side channel spawning but not in or adjacent to the Project Boundary.
Chum Salmon *Oncorhynchus keta*	T	SC	Columbia River and tributaries.	Expected / Documented	Adult and juvenile migration in the Columbia River. Some potential mainstem and side channel spawning but not in or adjacent to the Project Boundary.
Coho Salmon *Oncorhynchus kisutch*	None	T	Columbia River and tributaries.	Expected / Documented	Adult and juvenile migration in the Columbia River, but no spawning.
Steelhead[3] *Oncorhynchus mykiss*	T	SC	Columbia River and tributaries.	Expected / Documented	Adult and juvenile migration in the Columbia River, but no spawning.
Cutthroat Trout Oncorhynchus clarkii	None	S	Columbia River and tributaries.	Expected / Documented	Adult migration in the Columbia River.
Green Sturgeon *Acipenser medirostris*	T	S	Lower Columbia River	Potential occurrence downstream of Bonneville Dam	Adult and juvenile foraging downstream of Bonneville Dam.
White Sturgeon *Acipenser transmontanus*	None	S	Columbia River mainstem	Expected / Documented	Spawning, rearing, and foraging within the mainstem Columbia River.
Pacific Lamprey *Entosphenus tridentata*	None	S	Columbia River and tributaries.	Expected / Documented	Migration and rearing.
Pacific Brook Lamprey *Lampetra pacifica*	None	SC	Columbia River and tributaries.	Expected / Documented	Spawning and rearing in tributaries
Western Brook Lamprey *Lampetra richardsoni*	None	SC	Columbia River and tributaries.	Expected / Documented	Spawning and rearing in tributaries
Western River Lamprey *Lampetra ayresii*	None	SC	Columbia River and tributaries.	Expected / Documented	Spawning and rearing in tributaries

[1] Four threatened ESUs for Chinook Salmon: Lower Columbia River, Upper Willamette River, Snake River spring/summer run, and Snake River fall run.
[2]Snake River fall run and Snake River spring/summer run ESUs listed in Oregon State
[3] Five threatened DPSs for steelhead: Lower Columbia River, Upper Willamette River, Middle Columbia River, Upper Columbia River, and Snake River.
T= Threatened, E= Endangered, SC = Sensitive Critical, S = Sensitive

5 Baseline Survey of Habitat Use by State Sensitive Species (OAR 345-022-0060(3)(e))

(e) A baseline survey of the use of habitat in the analysis area by species identified in (d) performed according to a protocol approved by the Department and ODFW;

RESPONSE

The occurrence of potentially suitable habitat for state sensitive species in the analysis area is described in Table 10. The table also includes a description of each species' habitat requirements and a brief description of the observed, expected, or potential occurrence of the species in the micrositing corridor and analysis area. To determine if each species was expected to use the habitat within the analysis area for breeding, foraging, or other important activities, the Applicant analyzed the known habitat and range information for each species and compared this to the habitats mapped within the analysis area.

Project surveys documented the presence of suitable habitat and observations of state sensitive species in the land-based portion of the analysis area . Details about the survey methodology are summarized in Section 2. Additional details on the methods and survey results are provided in Attachment 2. Observations of state sensitive species during field surveys for the Project are summarized in Table 10.

5.1 Pedestrian Wildlife Surveys

State sensitive species and eagles observed during pedestrian wildlife surveys are shown in Attachment 2-Appendix B, Figure 2, and listed in Table 10. The probability of detection of individual species is dependent on many factors, including activity patterns of the species, timing of surveys, amount of time surveyors were present in a particular area, and detectability of the species. The number of observations for each species should not be interpreted as a measure of the number of individuals present within the analysis area. Independent observations could represent repeated observations of the same individual at different times.

Table 10. Habitat Use of State Sensitive Species Documented within the Analysis Area during Pedestrian Wildlife Surveys.

Species	ODFW Status	Habitat Subtypes Where Observed
Purple martin	S	North Pacific Lowland Riparian Forest and Shrubland
Pileated woodpecker	S	North Pacific Lowland Riparian Forest and Shrubland
American white pelican	S	Open water
Bald eagle	None	North Pacific Lowland Mixed Hardwood Conifer Forest and Woodland
Swainson's hawk	S	Columbia Basin Foothill and Canyon Dry Grassland

In addition to documenting sensitive species, pedestrian wildlife surveys also documented raptor nests.

5.1.1 Raptor and Nest Surveys

The analysis area is located within the Pacific Flyway, which provides habitat for a variety of raptors, land birds, and shorebirds protected under the Migratory Bird Treaty Act. The Columbia River is the largest river in the Pacific Northwest. It provides habitat and food for several migratory bird species. No dedicated raptor nest surveys or other aerial surveys occurred as part of this effort; however, incidental observations of raptor or other bird nests in the ROW and visible from ROW were recorded during field surveys.

Reconnaissance-level raptor nest surveys were conducted concurrently with the pedestrian wildlife surveys. Occupied nests were documented based on observations at the time of the survey. In some cases, it was not possible to definitively confirm non-occupancy; therefore, these nests were conservatively considered occupied for the purposes of assessing potential project impacts.

A total of four adult bald eagles (*Haliaeetus leucocephalus*) were observed during the field surveys. One adult was observed flying over Hayden Island and the other was perched on a power pole by Smith and Bybee natural area. Two adults were observed flying and then perching in large Douglas fir trees near the banks of the Columbia River just downstream of Bonneville Lock and Dam (Attachment 2-Appendix B, Figure 2). The bald eagle is protected under the Bald and Golden Eagle Protection Act - and Migratory Bird Treaty Act. They are habitat generalists, typically associated with aquatic habitats, preferring forested areas that surround fish-bearing lakes and rivers. A bald eagle nest was observed on Hayden Island during reconnaissance-level surveys outside the project corridor (Attachment 2-Appendix B, Figure 2). No other bald eagle nests were observed during the surveys, although habitat in the surrounding areas is suitable and some nesting is likely beyond the observed Project boundary and analysis area.

Osprey and occupied osprey nests were observed in areas alongside the Columbia River. During the pedestrian surveys, seven active osprey nests were observed, and two other nests were recorded, but these appeared to be inactive at the time of the field surveys (Attachment 2-Appendix B, Figure 2).

5.1.2 Special Status Wildlife

As described above, baseline surveys were conducted in the terrestrial portion of the Project boundary and not in the Columbia River. Table 11 lists the special status wildlife species and habitats expected or documented occurrence from the pedestrian surveys conducted in 2024. The fish and aquatic species are derived from literature sources and agency data and are described in Section 5.2.

Table 11: Special-Status Terrestrial Species and Habitats Observed During Pedestrian Wildlife Surveys in 2024.

Species	Observed, Expected, or Potential Occurrence within Analysis Area	Suitable Habitat within Analysis Area
Northern spotted owl *Strix occidentalis caurina*	Potential occurrence	Large tracts of mature conifer forest along the north and south sides of the Columbia River west of Cascade Locks, OR.
Streaked horned lark *Eremophila alpestris strigata*	Expected	Documented occurrence in large, open fields and shoreline areas near Portland airport.

Species	Observed, Expected, or Potential Occurrence within Analysis Area	Suitable Habitat within Analysis Area
Bald eagle[a] *Haliaeetus leucocephalus*	Observed	Nest observed on Hayden Island west of Project boundary. Adults observed flying and roosting in forested areas near Cascade Locks and Smith and Bybee.
Golden eagle[a] *Aquila chrysaetos*	Potential occurrence	Some potential habitat in eastern part of the Project corridor.
Ferruginous hawk *Buteo regalis*	Potential occurrence	Nesting and foraging habitat available at east end of Project.
Northern goshawk *Accipiter gentilis atricapillus*	Potential occurrence	Some potential habitat in eastern part of the Project corridor.
Sandhill crane *Grus canadensis*	Potential occurrence	Potential habitat in eastern part of the Project corridor.
American white pelican *Pelecanus erythrorhynchos*	Observed	Flying over the Project area and are known to congregate and forage downstream of McNary Dam in the Columbia River.
Pileated woodpecker *Dryocopus pileatus*	Observed	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project
Lewis's woodpecker *Melanerpes lewis*	Potential occurrence	Cottonwood riparian areas along the Columbia River
Willow flycatcher *Empidonax traillii*	Potential occurrence	Riparian areas along the Columbia River, including Hayden Island, Columbia Slough, and Willamette River.
Olive-sided flycatcher *Contopus cooperi*	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project
Purple martin *Progne subis*	Observed	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Grasshopper sparrow *Ammodramus savannarum perpallidus*	Expected	Nesting and foraging habitat available at east end of Project near the Dalles.
Long-billed curlew *Numenius americanus*	Potential occurrence	Open grass and herbaceous fields in east end of Project near the Dalles.
Western gray squirrel *Sciurus griseus*	Potential occurrence	Some potentially suitable habitat near North Bonneville.
Townsend's big-eared bat *Corynorhinus townsendii*	Potential occurrence	Roosting and foraging habitat available in analysis area, but caves or mines for maternity roosts or hibernacula lacking.
Pallid bat *Antrozous pallidus*	Potential occurrence	Some roosting and foraging habitat available in analysis area.
Silver-haired bat *Lasionycteris noctivagans*	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
California myotis *Myotis californicus*	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Fringed myotis *Myotis thysanodes*	Potential occurrence	Roosting and foraging habitat available in analysis area, but caves or mines for maternity roosts or hibernacula lacking.

Species	Observed, Expected, or Potential Occurrence within Analysis Area	Suitable Habitat within Analysis Area
Long-legged myotis *Myotis volans*	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Hoary bat *Lasiurus cinereus*	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
California mountain kingsnake *Lampropeltis zonata*	Potential occurrence	Potential habitat throughout the Project corridor, particularly the east end.
Northwestern pond turtle *Actinemys marmorata*	Expected	Known occurrence in Smith and Bybee wetlands area near west end of Project.
Painted turtle *Chrysemys picta*	Expected	Known occurrence in Smith and Bybee wetlands area near west end of Project.
Northern red-legged frog *Rana aurora*	Expected	Potential wetland and upland habitats throughout the Project corridor
Oregon slender salamander *Batrachoseps wrighti*	Potential occurrence	Forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Western toad *Anaxyrus boreas*	Expected	Potential wetland and upland habitats throughout the Project corridor

[a] Listed under the Bald and Golden Eagle Protection Act

5.2 Fish and Aquatic Species

This section describes the presence of fish-bearing streams that intersect the Project boundary and analysis area and identifies special status fish species that occur in the analysis area. Sources of information include the field observations from the wetlands and waters delineation conducted for the Project as well as desktop sources listed in Section 2.1. No fish were observed in streams that intersect the Project corridor during the wetlands and land-based field surveys.

The streams and waters in the analysis area are described in the *Wetlands and Waterbodies Delineation Report* appended to the State and Local Laws and Regulations Exhibit. Four rivers, including the Columbia River, intersect the Project boundary in Oregon.

The Columbia River, into which all the streams in the analysis area ultimately flow, contains many species of native fish, including Chinook salmon, chum salmon, coho salmon, sockeye salmon, steelhead, bull trout, and white sturgeon. The river provides essential migratory corridors for salmonids, Pacific lamprey, and white sturgeon, ensuring access to spawning, rearing, and foraging habitats across multiple life stages. Tributary mouths, shallow shoreline areas, and deep mid-channel zones are interconnected, allowing species to move freely between habitats as needed. No baseline surveys of fish and aquatic species were conducted within the Columbia River, and potential use and occurrence is derived from data from state agencies. Salmon and other aquatic species, including lamprey and freshwater mussels, are important to Tribes in the Columbia River basin. Native American Tribes have fished the Columbia River for millennia and it remains an important cultural activity, as well as providing a significant source of food for tribal members. The Columbia River Inter-Tribal Fish Commission manages “in-lieu sites” and “treaty fishing access sites” along the Columbia River for Native Americans to use for fishing (see the Recreation Exhibit).

Oregon Department of State Lands (ODSL) maps Threemile Creek as essential salmonid habitat for coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) and summer steelhead (ODSL 2023). ODFW also lists Threemile Creek as habitat for coho salmon (ODFW 2021).

The Project boundary crosses the Columbia Slough in one location; the Columbia Slough is a traditional navigable water. ODFW documents occurrences of and mapped essential salmonid habitat for fall Chinook salmon, coho salmon, and summer steelhead.

The cable route crosses the Willamette River at a single location near the west end of the Project. The river is an important migratory corridor for salmon and other fish species; fish presence is documented for many of the same species as are present in the Columbia River (ODFW 2021). The Willamette River is mapped as essential salmonid habitat for fall and winter Chinook salmon, coho salmon, and summer steelhead (ODSL 2023). The Willamette River discharges to the Columbia River roughly 3 miles (4.8 kilometers) downstream of the Project crossing.

Substrate analysis in the micrositing corridor in the Columbia River occurred in the summer of 2025 (see Section 2.2.4). CSA Ocean Sciences Inc. conducted an SPI survey to characterize the substrate along the proposed cable route in the Columbia River. SPI sampling occurred at a frequency of one sampling station every 1 kilometer (0.6 mile) along the route, and three sampling stations, in a cross-river transect, at every 5 kilometers (3.1 miles), along a 174-kilometer (108-mile) stretch of the Columbia River. The SPI survey data characterized grain-size distribution, benthic community patterns, and habitat quality gradients for fish and invertebrates, such as crayfish, clams and mussels and sediment infauna. The downstream riverbed was dominated by medium to coarse sands (74 percent) and cobbly substrates (17 percent). Chironomidae (fly) larvae were rare in substrate samples. Invasive Asian clam (*Corbicula fluminea)* siphons were abundant along the route near Hayden Island. Other biota such as snails and sponges were scarce and confined to coarse substrates near Bonneville Dam. The upstream riverbed was similarly dominated by medium to coarse sands (70 percent), with cobbly areas (12.5 percent) concentrated between river miles 180 and 190. Evidence of Chironomidae larvae was observed at seven stations, with densities reaching approximately 10,100 tubes per square meter. *C. fluminea* siphons were largely absent, although shell fragments were widespread.

In addition, a high-resolution geophysical survey was conducted along the cable alignment in the micrositing corridor in the Columbia River. Operations for the geophysical survey consisted of a high-resolution multibeam echosounder, side-scan sonar, sub-bottom profiler, and magnetometer survey. The multibeam bathymetric data showed varying terrain, including large sand waves, boulder fields, rocky outcrops, and possible bedrock. From river miles 151 to 189, the general bathymetry throughout is predominantly small (1 to 4 feet; 0.3 to 1.2 meters) to large (+5 feet; +1.5 meters) sand waves, boulder fields, and possible bedrock or hard, consolidated material, and just upstream of river mile 188 is a large boulder field.

6 Description of Potential Adverse Impacts (OAR 345-022-0060(3)(f))

(f) A description of the nature, extent and duration of potential adverse impacts on the habitat identified in (b) and species identified in (d) that could result from construction, operation and retirement of the proposed facility;

RESPONSE

Construction and operation of the Project would result in both permanent and temporary impacts on fish and wildlife and their habitats. Permanent impact areas are those that would be occupied by a permanent structure or otherwise used for the life of the Project; these areas would not be restored to pre-Project conditions. Examples of permanent impacts in the terrestrial environment include habitat disturbance or loss from construction of the new converter station buildings and infrastructure. In the aquatic environment, permanent impacts include benthic habitat conversion (from rocky or hard substrates to rock or concrete armoring) in areas where cable protection would be installed on the riverbed. Within the micrositing corridor, these areas are limited only to portions of the cable route (approximately 2.3 acres in total) where consolidated sediments preclude cable burial. Other potential permanent impacts could result from operation of the cable. These include thermal impacts from heat emanating from the active cable, as well as electromagnetic fields emitting from the active cable. Project-specific modeling indicates there would be no change in water temperatures adjacent to the cable during cable activation and operation. Minor, localized increases in substrate temperature may occur within 16 inches (41 centimeters) of the operating cable. This is only expected for the few areas where the cable cannot be buried and is covered by armored rock or concrete. Any localized change in ambient temperature in the substrate of the benthic environment would be exceedingly low, and is not expected to change species use or occurrence along the route.

Regarding electromagnetic fields, because the cables are shielded, electric fields would not emanate outside of the cable housing; however, magnetic fields would transmit from the cable. Analysis by the Applicant concluded that, in areas where the cable is buried at least 5 feet (1.5 meters) below the riverbed (10 feet [3 meters] wherever possible), emission of magnetic fields into the benthic zone and into the water column would be minimal. There would be exceedingly minor increases in ambient magnetic field levels in the Columbia River at the riverbed that dissipate a few feet above the riverbed (see Section 6.4). In areas where cable burial is not possible, magnetic fields would be detectable by aquatic organisms; however, the expected magnetic field strengths would be below those shown to elicit notable behavioral responses in fish with magnetosensory ability (e.g., salmon, lamprey). Further, because modeled results indicate a four-fold reduction in field strength per 1 meter (3.3 feet) of vertical separation from the cable, the area of magnetic field exposure reduces rapidly. For example, at midwater depths (greater than 2 meters [6.6 feet] above the riverbed), magnetic field strength from the cable becomes indistinguishable from background levels.

Temporary impact areas are those areas that would be disturbed during construction activities but restored and revegetated following construction. Examples of temporary impacts in the terrestrial portion of the project include trenching for cable installation on land, and excavated pits for HDD, which would be restored to pre-construction conditions or better (i.e., replanting with native vegetation). Habitat mitigation and vegetation management associated with construction and

operation are discussed in the *Draft Habitat Management Plan* (Attachment 3), and the *Draft Revegetation Plan* (Attachment 4). Temporary impacts in the aquatic environment include habitat and species disturbance from cable installation and temporary cofferdam installation for the land to water transitions using HDD. These activities would temporarily disturb the substrate and create a turbidity plume that would last only 1 to 12 minutes depending on substrate materials and river flows (see Section 6.4). Displacement of benthic fauna in the affected 2-foot-wide hydroplow trench, or 70-foot-wide cofferdam areas, would last from several weeks to approximately 1 year before benthic species are expected to fully recolonize disturbed areas.

6.1 Potential Impacts to ODFW Habitat Category Types

Table 12 shows the acres of impact that would occur to each habitat type and corresponding ODFW habitat categories, as defined for the Project. The permanent impacts reported in this table relate to areas that would not return to preconstruction conditions, while the temporary impacts include those that would be restored to preconstruction conditions.

Table 12. Temporary and Permanent Impacted Areas by Habitat Type and Category (Acres)

Habitat Type	Habitat Sub-type	Total Acres within Analysis Area	Acres within Analysis Area											
			Category 1		Category 2		Category 3		Category 4		Category 5		Category 6	
			Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts
Developed & Disturbed	Industrial	3,668	0	0	0	0	0	0	0	0	0	0	2.5	0
	Residential	8,245	0	0	0	0	0	0	0	0	0.5	0	0	0
	Other	1,877	0	0	0	0	0	0	0	0	1.5	0	0	0
Barren Land	Rock/Sand/Clay	529	0	0	0	0	0	0	0	0	0.9	0	0	0
Agriculture	Cropland	1,192	0	0	0	0	0	0	0	0	5.0	5.0	0	0
Open Water & Unvegetated Wetland	Perennial Rivers and Streams - Columbia River riverbed	33,366	0	0	3.9	1.72	19.21	0.72	0	0	0	0	0	0
	Perennial Rivers and Streams - Columbia River Slough	24	0	0	0	0	0 HDD avoids stream impacts	0	0	0	0	0	0	0
	Perennial Rivers and Streams - Willamette River	377	0	0	0	0	0 HDD avoids stream impacts	0	0	0	0	0	0	0
Forest & Woodland	Riparian Forests, Woodlands, & Shrublands – NLCD ‘mixed forest’	1,118	0	0	0	0	0	0	0	0	0	0	0	0
	Mixed Conifer Forests & Woodland NLCD ‘evergreen’	5,078	0	0	0	0	0	0	0	0	0	0	0	0
Shrub & Scrubland	Sagebrush shrubland and scabland	4,404	0	0	0	0	0	0	3.1	0	0	0	0	0
Grasslands & Herbaceous	Herbaceous	2,469	0	0	0	0	0	0	3.0	0	0	0	0	0
	Introduced Upland Vegetation - Annual Grassland	1,159	0	0	0	0	0	0	8.8	5	0	0	0	0
Wetlands	Palustrine Scrub Shrub	4.023	0	0	0	0	0	0	0	0	0	0	0	0
	Palustrine Emergent	1.033	0	0	0	0	0	0	0	0	0	0	0	0

1. Area of trenching and temporary cofferdams for cable installation.
2. Estimated area of cable protection. At 10 feet (3 meters) above the riverbed within the water column, magnetic field strengths are expected to range from 1 to 5 microtesla above ambient levels throughout the length of the cable corridor in the Columbia River (see Section 6.4).
3. Delineated during wetlands study (see State and Local Laws and Regulations Exhibit).

6.2 General Wildlife, Including Raptors

Potential Project-related impacts on wildlife during construction include direct loss of habitat, alterations to habitat quality, disturbance, and direct mortality. Vegetation located within the site boundary would be cleared, as necessary, for the construction of the Project. The proposed converter stations, HDD pits, and cable trenching would be sited in previously disturbed and developed areas along roadways and clearings that are largely unvegetated and provide only low quality and unsuitable habitat for wildlife species.

Construction of the Project would also alter the quality of habitats within and adjacent to the site boundary. The initial clearing of vegetation and resulting soil disturbance during construction could create conditions for the establishment of invasive plant species. The establishment of invasive plant species can affect the quality of wildlife habitat through competition with, and the eventual replacement of, desirable native plant species (Westbrooks 1998). The replacement of native plant species can have various environmental effects on wildlife habitat, including changes in the nutrient regime of soils (thereby reducing the quality of forage species), increased soil erosion (resulting in additional loss of vegetated areas, as well as sedimentation to aquatic habitats), or reductions in the abundance of important forage species. These alterations to habitat quality can extend beyond the area of initial impacts (e.g., invasive-plant species can spread to areas beyond the initial disturbance). However, the risk of invasive plant species spread or establishment would be minimized through the measures described in the Habitat Mitigation Plan (Attachment 3) and *Revegetation and Noxious Weed Control Plan* (Attachment 4).

Construction of the Project could also result in general disturbance to habitats in the form of noise, visual disturbance from heavy equipment and traffic, fugitive dust dispersing from the immediate construction area, and small amounts of air pollution from construction equipment's exhaust. Direct mortality would be rare within the site boundary, as most wildlife species would avoid the work sites due to the disturbance related to construction activities. However, species or individuals that are less mobile or less sensitive to these disturbances could be directly threatened by construction activities. For example, species living underground and nesting birds may not be able to avoid construction equipment, and as a result, would be vulnerable to direct mortality. These mortality events are not expected to be common or result in substantial impact on the species, as construction windows would be timed to avoid or minimize disturbances when species may be less mobile (e.g., to times outside of the typical breeding season).

Trenching to install the cable in terrestrial portions of the Project would occur along the existing road prism, which provides limited, if any, habitat for wildlife. Trenching activities would be confined to the Project footprint and adjacent road surfaces. Temporary construction impacts from equipment and trenching activities would not extend into riparian or forested habitats suitable for many bird and other wildlife species. No suitable nesting or roosting trees for birds or bats would be removed for Project construction and operation.

Migratory bird species have potential to occur in the Project vicinity during construction activities and could be impacted by noise. No nests were observed during field surveys in areas of shrub cover, and no tree removal would be conducted as part of Project construction. Because baseline field surveys were conducted in 2024, pre-construction nest surveys would be conducted prior to the start of construction during surveys for sensitive plants or habitats (e.g., milkweed) as part of avoidance and minimization measures. Most of the terrestrial cable route is within road ROW and in developed

areas. Potential nesting habitat for migratory bird species is generally lacking. If any migratory bird nests are identified during preconstruction surveys, the Applicant would avoid them, if feasible, and coordinate with ODFW to determine appropriate mitigation strategies in the highly unlikely scenario where avoidance is not possible.

Bald eagles are known to nest in the riparian forested areas on the south side of Hayden Island, and a bald eagle nest was located approximately 0.75 mile (1.2 kilometers) to the northwest of a proposed HDD area. Nesting eagles could be exposed to elevated noise during Project construction of the HDD pits and trenching. If feasible, the trenching and HDD work from Hayden Island will occur between September and December to avoid the nesting season. The cable route and HDD pit are sited in existing open disturbed areas following an access corridor for the transmission lines that cross the island, and no mature trees suitable for nesting would be removed.

6.3 Special Status Terrestrial Species

State sensitive bat species that may occur in the analysis area include hoary bats (*Lasiurus cinereus*), pallid bats (*Antrozous pallidus*), silver-haired bats (*Lasionycteris noctivagans*), spotted bats (*Euderma maculatum*), and Townsend's big-eared bats (*Corynorhinus townsendii*). However, the proposed impact areas are not located within typical maternal or roosting habitat for these species. While areas of cliffs, caves, and talus are located within the analysis area along canyon rims, construction and operation of the Project would not impact these areas. Similarly, impacts to foraging habitats such as wetlands and tributaries, including the Columbia Slough and Willamette River riparian areas, have been avoided by the use of HDD for cable installation. No trees are proposed for removal for construction of the Project and consequently tree roosting habitat would not be impacted. Additionally, construction activities are expected to occur during daylight hours when bats are generally absent; therefore, construction activities are not anticipated to disturb foraging bats.

State sensitive bird species, including two eagle species, may occur in the analysis area (Table 4). Although no trees would be removed, construction and operation of the Project would result in some temporary impacts to habitat, which could displace birds nesting and foraging on the ground and in undergrowth. Birds using habitat within the proposed impact areas are expected to relocate to other comparable habitat in the analysis area and the greater vicinity of the Project. However, breeding success could be affected by this displacement and foraging opportunities may be reduced temporarily during construction.

Osprey nests were observed throughout the east and west ends of the Project, but all were located outside the Project boundary. These nests sites occurred near roadways, rail lines, and other developed sites in The Dalles and Portland, and the birds would be accustomed to noise and human activity.

No impacts to habitat supporting terrestrial state sensitive and special status species would occur because of the Project. Vegetation clearing for the converter stations, HDD pits, and cable trenching would occur in previously disturbed and developed areas along roadways and clearings and are not located in areas that contain suitable habitat for any sensitive terrestrial species.

Trenching to install the cable in terrestrial portions of the Project would occur in existing roadside and road prism, which does not provide habitat that is suitable for or used by ESA-listed species.

Trenching activities would be confined to the Project footprint and adjacent road surfaces and temporary construction impacts from equipment and trenching activities would not extend into riparian or suitable habitats for northwest pond turtle (*Actinemys marmorata*), northern spotted owl (*Strix occidentalis caurina*), or streaked horned larks (*Eremophila alpestris*). Streaked horned larks have been observed near Broughton Beach Park (USFWS 2025c) and suitable habitat is present in the analysis area. No suitable nesting or roosting trees for northern spotted owl would be removed for Project construction and operation.

Terrestrial species could be affected by temporary construction noise during construction of the converter stations as well as trenching and backfilling the cable trenches in the terrestrial portions of the Project boundary. Elevated construction noise levels could be audible up to approximately 0.16 mile (0.26 kilometer) from the Project trenching corridor and up to 0.24 mile (0.39 kilometer) from the sheetpile cofferdam installation and removal operations at four locations in the Columbia River.

Nearby nesting or roosting birds may perceive elevated in-air noise and temporarily alert to the noise source. However, significant alterations in behavior or displacement from occupied habitats are not expected. HDD and trenching on Hayden Island would occur outside of the streaked horned larks' breeding season from mid-April to August (USFWS 2019) and would not impact forested riparian areas used by multiple species. Habitat suitability for wildlife species and the areas within 0.16 mile (0.26 kilometer) of the Project boundary is marginal due to the developed nature of the cable route alongside roadways and other development. Streaked horned lark observations at Broughton Beach and areas near Portland Airport have been documented but are located 3.3 miles (5.3 kilometers) from the Project footprint and are outside the extent of in-air construction noise. Therefore, the potential for individuals of either species moving through and in proximity to the cable trenching and HDD work during construction is highly unlikely. Individuals could readily disperse to other nearby habitable areas to avoid nuisance noise. Therefore, the effects of temporary elevated in-air noise from construction are not expected to elicit any negative behavioral response in terrestrial species.

6.4 Aquatic Species

Freshwater habitat for fish species in the Columbia River would be temporarily degraded during construction of the Project. Project construction would result in short-term elevated underwater noise and turbidity from cable installation and vibratory installation of the sheetpile cofferdams where cable connections would be made between the in-river and on-land sections. Cofferdam installation and removal at all locations would occur within standard in-water work windows for the Columbia River (November 1 to February 28 downstream of Bonneville Dam and November 1 to March 15 upstream of Bonneville Dam), or another window approved by NMFS, USFWS, WDFW, and ODFW (Section 2.2.1)). Although in-water construction activities could stir up sediments, increased turbidity would impact only areas in proximity to the hydroplow given the narrow width (approximately 24 inches [61 centimeters]) of the temporary trench. Temporary, localized turbidity plumes would also result from dredging activities at the four temporary cofferdam locations.

Based on samples collected in November 2024, sediment in the areas proposed for dredging associated with cofferdams and land-to-water HDD connection is predominantly characterized by fine sand with smaller components of gravel and sand/silt mixes. In addition, as indicated in the State and Local Laws and Regulations Exhibit, laboratory analysis results show the sediment samples do not contain contaminants above agency thresholds. In July 2025, USACE Portland

Sediment Evaluation Team issued a suitability determination for sediments with dredge prisms, indicating proposed dredged materials were suitable for in-river disposal. This indicates that the hydroplow activity would have minimal impacts on water quality in the Columbia River. The Project was sited to avoid known contaminated sites; therefore, temporary or permanent changes to toxic compounds or concentrations within the Columbia River are not expected. As a result, installation of the cable would not result in contaminating downstream aquatic resources, particularly those used by Tribes under their treaty rights.

Sediment analysis conducted for the Project identified the sediments throughout the Project corridor as primarily coarse, heavy sand and sediment modeling shows the sand is not expected to drift or stay suspended in the water column. Suspended sediment is highly correlated to flow on the Columbia River. Using the expected flow conditions during the in-water work window, when this work would take place, the quantity of sediment potentially suspended by hydroplow operations was estimated. Turbidity resulting from hydroplow and dredging activities would quickly dissipate because sandy material would quickly drop out of the water column and finer material would be diluted by riverine flow. Based on sediment and flow modelling, suspended sediments resulting from hydroplow operations are anticipated to remain close to the riverbed (10-foot high plume or less) and remain in the water column for 12 minutes for the finer grained material, and less than 1 minute for coarse-grained sands (HDR 2025). Based on modeling, in the highest velocity scenario (most conservative), fine sand could be transported approximately 4,000 feet (1,219 meters) downstream (most conservative) and coarse sand could be transported approximately 1,000 feet (305 meters) downstream due to hydroplow activities.

Increased levels of turbidity could have temporary negative impacts on habitat for aquatic species and, if present within the sediment plume during the time of construction, could affect individuals directly. Available habitat for bottom-feeding (demersal) species would be temporarily disturbed and altered, slightly reducing the area available for use. The highest concentrations of suspended sediments would be close to the riverbed adjacent to the trench being plowed. Suspended material from the dredging of the temporary cofferdams for the HDD water-to-land transitions, as well as adjacent in-water disposal of these sediments would have similar impacts. This could be a deterrent for some fishes, particularly mid-column (pelagic) species such as salmon and cause them to avoid the densest part of the plume. The Columbia River is a large waterbody that provides for increased dilution and reduces the size of the potential area of mixing. Natural currents and flow patterns in the Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation and upstream and downstream water management at dams. High-volume flow events can result in hydraulic forces that resuspend benthic sediments, temporarily elevating turbidity locally. Thus, the volume of flow through the Project area would help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

Potential impacts to the benthic community would result from the trenching for cable installation and potential dredging for pre-installation depths in the navigation channel and the HDD receiving pits for the land-to-water transitions of the cable. Trenching the riverbed with the hydroplow and dredging are likely to result in the mortality of some benthic invertebrates in the disturbed footprint. Immediately following dredging and the narrow path of the hydroplow, these areas would likely be devoid of any benthic invertebrates. However, the 24-inch wide trench would backfill immediately with displaced sediments. Given the small size of this area, recolonization is expected to occur from adjacent areas that were not disturbed; therefore, this reduction in potential forage would be

temporary. In the Columbia River, dredging occurs within the channel and the benthic community exists under these periodic disturbances within the navigation channel. For dredging, Dernie et al. (2003) found that clean sand communities had the most rapid recovery rate following disturbance, whereas communities from muddy sand habitats had the slowest physical and biological recovery rates. The dominant substrate from the sediment samples taken in 2024 was sand. Additional sediment data was collected along the cable route in 2025 and confirmed the dominate substrate along the entire cable route is sand. After installation is complete, sediment disturbance would no longer occur, and benthic communities are expected to recolonize within a year.

During cable installation, fish may be temporarily disturbed by elevated underwater noise. Localized vessel use (including the cable laying vessel, project tugs and barges) would create transient underwater noise at the location where cable installation is occurring as work progresses up or down the river. However, given the extensive use of the Federal Navigation Channel by maritime vessels, the limited number of vessels associated with the Project is not likely to create noise that is measurable above ambient levels. Therefore, underwater noise from the cable laying vessel, or vessel and barge that are deploying the cable is not expected to impact aquatic species.

The Project would not measurably alter river or shoreline habitat; the Columbia River in the analysis area would continue to be used primarily as a migratory corridor for species like salmonids, similar to current conditions. The proposed cable route is located in or near mid-channel and close to or within the navigation channel through much of its length. The Columbia River in the analysis area experiences high levels of vessel traffic associated with use of the Federal Navigation Channel and relatively high levels of underwater noise and currents that generate suspended sediments (NMFS 2017). The narrow strip of affected river bottom is not considered high-quality habitat for fish and the Project route would avoid important near-shore and more productive habitats, including salmon spawning areas and tributary mouths.

The installation of cable protection in areas where the cable cannot be buried adequately would alter substrate conditions within the footprint of the material which is 8 feet (2.4 meters) wide centered on the cable. Cable protection areas consisting of articulated concrete blocks or armor rock would alter a total area of 2.3 acres of streambed habitat by adding hard substrate. Some of these areas are located over exposed bedrock or consolidated sediments, which prevents the hydroplow from burying the cable. Given the cable protection is to occur where there is bedrock, there would be negligible impacts to sediments. After installation, the cable protection concrete or rock could be recolonized and in the short term and has the potential to provide additional habitat complexity.

Current through the cable during operations produces an electromagnetic field (EMF) with two components: electric fields (E-fields) and magnetic fields (B-fields). To minimize EMF generated by cables, all cabling would be contained in electrical shielding that eliminates any electric field from emanating outside the cable housing. As a result, no electric field would occur in the surrounding substrate or water column. In the unlikely event of a cable rupture (e.g., anchor strike), the flow of electricity shuts down instantaneously. The electrical shielding and depth of burial are expected to control the intensity of EMF; however, magnetic field emissions cannot be reduced by shielding and would emanate from the cable through the surrounding substrate. The proposed cable in the Columbia River would be buried to a depth of at least 10 feet (3 meters) below the substrate wherever possible. The strength of the EMF field dissipates rapidly with distance from the cable. Naturally occurring magnetic fields from the earth are also present and these background levels are

approximately 54 microtesla in the Columbia River. The Applicant conducted an analysis for a 320- and 400-kilovolt cable that would be used for the Project to determine the strength and extent of EMF generated. The results of this study showed levels of magnetic field below background when the cables were buried at depths of 5 and 10 feet (1.5 and 3 meters). The Applicant requested analysis at additional burial levels of 0.5 feet (0.15 meter), 2 feet (0.6 meter), 5 feet (1.5 meters), and 10 feet (3 meters). The results of the analysis showed the magnetic field levels at the river bottom would exceed the natural background levels of approximately 54 microtesla normally occurring in the Columbia River. At burial depths of at least 5 feet (1.5 meters), minor increases in magnetic field levels are expected, but levels return to background within a few feet of the riverbed. At burial depths of 0.5 feet (0.15 meter) and 2 feet (0.6 meter), increases over ambient magnetic field levels would be greater; however, modeled levels are below those reported to elicit notable behavioral responses in fish, as discussed in more detail below. The magnetic field decreases with distance and dissipates to natural background levels of 54 microtesla at 5 feet (1.5 meters) from the centerline of the cable and near 0 at 30 feet (0 to 9 meters) from centerline of the cable.

Multiple studies regarding the effects of magnetic fields on aquatic species have included sturgeon and Atlantic salmon (BOEM 2019; Armstrong et al. 2015; Normandeau et al. 2011). Armstrong et al. (2015) studied the behavior of captive Atlantic salmon in a laboratory, which found no significant differences in approach, traverse, or departure times associated with activation of magnetic fields up to 95 microtesla. These laboratory-induced magnetic field intensities are high compared to microtesla or nanotesla fields measured around subsea cables. The biological assessment prepared for this Project includes a detailed summary of existing research on salmon and sturgeon, as well as other species similar to those found in the Columbia River. Based on the available scientific literature and the analysis on magnetic field levels generated by the cable, it is unlikely that there would be any measurable effects on salmonids and other fish species due to magnetic field exposure from the proposed cable.

When electric energy is transported, a certain amount gets lost as heat, leading to an increased temperature of the cable surface. This has the potential to impact the environment immediately surrounding the cable with localized increases in temperature. Minor increases in ambient temperature from cables have the potential to cause impacts to benthic organisms (Ospar Commission 2012). A study using field measurements from a wind energy project in the Baltic Sea (Taormina et al. 2018) concluded that the narrowness of cable corridors and the expected weakness of thermal radiation limits thermal effects from submarine cables. This conclusion was corroborated by several NMFS biological opinions for offshore wind projects on the east coast of the U.S. (NMFS 2021, 2023a, 2023b, 2023c).

The Applicant analyzed temperature influence from the cable at various depths to better understand cable impacts. There would be a localized (16-inch diameter) increase in ambient sediment temperatures (3 degrees Celsius [°C]) where the cable is buried at 2 feet (0.6 meter) or less. The deeper the burial, the more influence substrate has on heat insulation. Heat generated from the cable buried at a depth of 10 feet (3 meters) in the substrate is anticipated to return to ambient conditions at approximately 2.3 feet (0.7 meter) below the riverbed surface (approximately 7.7 feet [2.3 meters] away from the cable) and outside of the benthic zone. Therefore, effects of thermal radiation from the operation of the cable for the proposed Project are not anticipated to measurably change the abundance, distribution of benthic organisms, or the availability of potential invertebrate prey for fish species.

The cable would be installed using HDD under the Willamette River and the Columbia River Slough along with their associated riparian corridors, avoiding impacts to these waterways and their aquatic habitats and species.

6.5 Special Status Aquatic Species

6.5.1 Columbia River Salmon Species

Special status aquatic species include Oregon State-listed threatened and endangered species and habitats, state sensitive species in Oregon, and species and critical habitat protected under the federal ESA, These include Oregon State-listed Snake River fall-run Chinook salmon and Snake River spring/summer-run Chinook salmon evolutionarily significant units, as well as lower Columbia River coho salmon. Four other federally listed ESUs of Pacific salmon also inhabit the Columbia River, including chum salmon and sockeye salmon, as well as five populations of steelhead from the Columbia and Snake rivers. Cable installation would occur within the micrositing corridor during the proposed work window of November 1 to February 28 downstream of Bonneville Dam and November 1 to March 15 upstream of Bonneville Dam, which avoids the majority of the time when these species are migrating through the analysis area. Any requested work window variance would require the approval of NMFS, USFWS, ODFW, and WDFW. Individuals present during cable installation activities would be exposed to impacts discussed above in Section 6.4. Impacts to these species are further analyzed in the Threatened and Endangered Species Exhibit as well as the biological assessment produced for the Project.

The following sections describe impacts to non-federally listed species that are sate listed, sensitive, or of cultural importance that inhabit the Columbia River in the analysis area.

6.5.2 Pacific Lamprey

Pacific lamprey are anadromous and migrate up the Columbia River as adults to spawn in tributaries. Larval lamprey burrow in fine sediments where they remain as filter feeders. Pacific lamprey are a species of Tribal significance. The larval life stage is the most susceptible to impacts from the Project due to their low mobility and presence year-round in substrates of the Columbia River in close proximity to the confluence of spawning tributaries. During the SPI survey conducted along the cable route in the summer of 2025, no larval lamprey were observed in over 634 plan view and profile images. The distribution of lamprey in the Columbia River is not well known but they are concentrated in tributaries and at river mouths. The cable route and trenching operations avoid these areas, and therefore, reduce the likelihood of impacts to larval lamprey.

In a study evaluating the distribution and density of larval lamprey in the mainstem Columbia River, Blanchard et al. (2023) found the probability of presence for both Pacific lampreys and Lampetra spp. decreased with increasing distance from the closest tributary river mouth, and distance from the nearest mainstem riverbank. The probability approached zero at distances of 500 meters (1,640 feet) from those locations. The cable route is situated near mid-channel throughout the proposed route and avoids most of the areas encompassed within 500 meters (1,640 feet) of a spawning tributary. There are four locations where the cable route does overlap areas within the outer edges of 500 meters (1,640 feet) from tributary mouths and, in the unlikely event larvae are present within the narrow hydroplow trench, they could become entrained or buried. Dredging would occur at the HDD pit locations, which are located outside of these areas where lamprey potentially

occur, with the closest being 155 feet (47 meters) from the edge of expected lamprey occurrence sites. Further, because the current would transport suspended sediments downstream, suspended sediments are not expected to move laterally and deposit at river mouths or shallower riverbank areas where larval lamprey are more likely to occur.

Adults migrate up the Columbia River generally between February and June; therefore, some migrating adults could be present in the late part of the in-water work window. As with migrating salmon, turbidity and noise effects from the cable installation would be localized and may cause a behavioral response in lamprey in the vicinity, but risk of entrainment or physical harm is considered remote. For species that have not undergone direct magnetic field research, such as larval lamprey, extrapolation from related taxa that share a similar life history suggests a low likelihood of sensitivity to magnetic fields, particularly at the low intensities modeled for this project. Further, magnetic field transmission into the benthic column would be restricted to the cable route in mid-channel, typically more than 500 meters (1,640 feet) from tributary mouths (or 500 meters from the shoreline near spawning tributaries) where lamprey larvae are likely to occur.

A study on thermal sensitivity of larval Pacific lamprey found all larvae survived in temperatures averaging ≤ 27.7 C, and the upper incipient lethal temperature was reported at 29.2°C (Whitesel and Uh 2022). This is well above the anticipated substrate and water temperatures based on the CRT modeling completed to date. Modeling indicates, if the cable were only buried 0.5 feet (0.15 meter) deep, the top 1 foot of the benthic zone would potentially increase from 15 to 18°C (PSC Specialist Consultants 2024).

6.5.3 White Sturgeon

White sturgeon occur in the river both upstream and downstream of Bonneville Lock and Dam year-round and would be present during the cable installation in-water work window. Sturgeon are bottom-oriented and are more likely to be in proximity to the cable route during and following installation of the cable. White sturgeon spawn and rear in the mainstem Columbia River and both adults and juvenile life stages would potentially be exposed to Project impacts. Adults and subadults are highly mobile and would be able to avoid areas temporarily impacted by turbidity and underwater noise. As described in the biological assessment, magnetic field levels would be below background at the surface of the riverbed where the cable is buried 10 feet (3 meters) or more. When buried at depths of 5 feet (1.5 meters) or less, variable levels of magnetic fields would be emitted above background in the area immediately above the cable. However, studies have shown that magnetic fields need to be considerably higher (in some cases orders of magnitude) than produced by underwater transmission cables to elicit a behavioral response in sturgeon and Atlantic salmon (Bevelhimer et al. 2013; BOEM 2019).

White sturgeon spawning sanctuaries are located just downstream of Bonneville Dam and the Dalles Dam; therefore, it is possible that sturgeon eggs and larvae could be deposited in suitable sediment. Although white sturgeon may spawn along the cable route downstream of Bonneville and the Dalles dams, their peak spring spawning period (April and May) does not overlap with the proposed in-water work window. Therefore, exposure of eggs to sediments suspended during dredging for the HDD cofferdams for the land to water cable transition is unlikely. Because white sturgeon prefer to spawn in turbid waters at high flows (Parsley et al. 1993; Perrin et al. 2003), the effects of fine sediment deposition on reproductive success are unknown but presumably minor.

The area around the cable route where the magnetic field would be above background levels is limited to where it cannot be buried to 5 or more feet (1.5 or more meters). Areas where cable is buried less than 5 feet would have magnetic fields above background within 10 feet (3 meters) of the cable. Sturgeon are bottom-dwelling species; therefore, they could be at depths where they may encounter the magnetic field from the cable. The area where the magnetic field is above background is within 5 feet (1.5 meters) above and laterally from the centerline of the cable, but compared to the extent of the riverbed in the action area, this represents a fraction of habitat. Studies on sturgeon have shown no notable behavioral or physiological responses to magnetic field exposure at field strengths comparable and higher than those expected from the buried Project cables (Klimley et al. 2017, McIntyre 2017).

6.5.4 Cutthroat Trout

Cutthroat trout inhabit the upper reaches and headwaters of tributaries and can be resident (remain in freshwater streams) or anadromous. The anadromous form is similar to salmon in that they live and feed in the ocean for a period of time and then return upriver to tributaries to spawn; these rivers include the Sandy River, Hood River, and smaller tributaries in the Columbia Gorge. Anadromous cutthroat trout use the Columbia River as a migratory corridor in the Project area. As described in Section 6.4,, impacts from the cable installation would be localized and temporary, and migrating fish could avoid the area, so impacts are considered insignificant. Cutthroat trout are also pelagic and would not be associated with the riverbed and consequently not exposed to EMF or thermal effects from the operating cable.

6.5.5 Freshwater Mussels

Freshwater mussels that inhabit the Columbia River include the Western ridged mussel *(Conidea angulata*), which is currently a candidate for listing under the ESA due to its low numbers, and floaters, including the winged floater mussel (*Anodonta nuttalliana*). Freshwater mussel are species of Tribal significance to local Tribes along the Columbia River. The distribution of mussel beds in the mainstem Columbia River is not well documented. As described in Section 5.2, a sediment analysis, high-resolution geophysical survey, and SPI survey were conducted along the cable alignment in the Columbia River in 2025. The SPI survey provided high resolution images of the substrate at 1-kilometer (0.6-mile) intervals along the cable route, enabling the identification of discrete biological features for each sample. Because of the high resolution of the photographs, it is likely that mussel siphons would have been visible in the images; however, no mussels were observed in over 634 plan view and profile images collected during the survey. Although no mussels were observed at sample locations, some images captured high densities of invasive Asian clams, and siphons and shells were visible on the riverbed.

The SPI and geophysical substrate data was used to characterize habitat suitability for mussels and inform the impact analysis for cable trenching on aquatic habitats (see Attachment 3, Habitat Mitigation Plan). Mussels are known to inhabit shallow areas near river mouths with cobble and gravel substrates. They have also been found in deeper waters during dredging operations. Mussels that may occur in the path of the cable installation and land-to-water transition cofferdam areas would be susceptible to displacement, entrainment in a clamshell dredge, or burial from settling sediments and side cast dredge material. The cable route in and adjacent to the navigation channel reduces this risk due to placement in an already disturbed and routinely dredged area where mussels and other benthic organisms are less likely to occur. The deep water soft substrate and

regular disturbance in the navigation channel also makes it less likely that mussels would colonize the substrate above the buried cable and are unlikely to be exposed to magnetic fields and thermal effects that dissipate to ambient levels in the benthic zone. In areas where the cable is buried less than 5 feet (1.5 meters), magnetic fields would be transmitted to the benthic zone above background within 10 feet (3 meters) of the cable. Any mussels within these areas would be exposed to a static magnetic field that may be perceptible above background. Mussels lack specialized electroreceptive or magneto-receptive organs. Literature reviewed and available to date (e.g., Bevelhimer et al. 2013; Cada et al. 2011) suggest minimal risk from magnetic field exposure to mussels even at higher field strengths. There are a limited number of studies testing upper thermal limits in freshwater mussels. A thesis study on the Western ridged mussel (*Gonidea angulata*) and Western Pearlshell (*Margaritifera falcata*), both species that occur in the Columbia River, found upper thermal maximums of 34.1°C and 33.2°C, respectively (Valeria 2024). Based on Project modeling completed to date, if the cable were only buried 0.5 feet (0.15 meter) deep, the top foot of the benthic zone would potentially increase from 15 to 18°C (PSC Specialist Consultants 2024), well below temperatures observed to cause stress in these mussel species.

7 Measures to Avoid, Reduce, or Mitigate Impacts (OAR 345-022-0060(3)(g))

(g) A description of any measures proposed by the applicant to avoid, reduce, or mitigate the potential adverse impacts described in (f) in accordance with the general fish and wildlife habitat mitigation goals and standards described in OAR 635-415-0025 and a description of any measures proposed by the applicant to avoid, minimize, and provide compensatory mitigation for the potential adverse impacts described in (f) in accordance with the sage-grouse specific habitat mitigation requirements described in the Greater Sage-Grouse Conservation Strategy for Oregon at OAR 635-140-0000 through 635-140-0025, and a discussion of how the proposed measures would achieve those goals and requirements;

RESPONSE

The measures discussed here have been or will be implemented to avoid, minimize, and mitigate the effects on fish and wildlife habitat and state sensitive species from the loss of suitable habitat from activities that can cause disturbance (e.g., behavioral avoidance) to wildlife breeding or other critical periods.

7.1 Avoidance and Minimization

7.1.1 Prior to Construction

Routing the cable in the Columbia River has been designed to avoid nearshore and shallow water habitats important to fish and invertebrates by being within or adjacent to the navigation channel. Unavoidable impacts to the benthic and aquatic community will be assessed and mitigation will adhere to measures defined in the aquatic resources mitigation plan that is currently under development.

Overland routes for the buried cable have been designed within existing disturbed roadside and developed areas to avoid wildlife habitats as much as possible. The use of HDD avoids riparian areas by placing the cable underground below stream crossings and where the cable enters and exits the Columbia River. Routing the cable in existing open, developed, and disturbed areas avoids tree removal.

7.1.2 During Construction

Measures for avoiding and minimizing impacts to fish and wildlife habitat and to state sensitive and other wildlife species will be implemented during construction. The Applicant will minimize impacts to habitat and wildlife by initiating revegetation efforts in areas of temporary ground disturbance as soon as practicable and within the appropriate season to facilitate germination, as described in the *Draft Revegetation Plan* (Attachment 4). The *Draft Revegetation Plan* promotes native plant establishment or non-invasive and non-persistent non-native species when native plants are not available and provides measures to avoid and minimize the spread of noxious weeds due to Project disturbance.

7.1.2.1 Aquatic Resources

The Applicant will implement several impact minimization measures to avoid or reduce the potential for adverse effects upon aquatic resources, including special status species and their habitat. Installation of the cable in the overland portion of the route will use HDD methods to install the cable underground below the streambed and riparian vegetation of streams that cross the Project corridor. Construction will be completed in compliance with the ODEQ Water Quality Standards (OAR 340, Division 41). Routing the cable in the Columbia River has been designed to avoid nearshore and shallow water habitats important to fish and invertebrates by being within or adjacent to the navigation channel.

General best management practices for aquatic resources include erosion control, sedimentation retention, water quality monitoring, and stormwater treatment during project construction and operation. Additional minimization efforts to reduce impacts for in-river activities are listed below:

- Coordinating day-to-day installation schedule with other maritime activities and the U.S. Coast Guard. Planned installation and construction sequencing is intended to maintain the safe movement of commercial and recreation traffic along the cable route and to minimize the disturbance and impact to Federal Navigation Channel maintenance.
- Locating the surface water intake for the hydroplow near the water surface at the barge or cable laying vessel and screening per NMFS salmonid screening criteria.
- No impact pile driving will occur and a vibratory hammer will be used to drive sheetpiles to minimize noise levels.
- Pre-dredging and installing and removing sheetpile only within the proposed in-water work window.
- Inspecting barge, cable laying, and dredging equipment daily for leaks and other problems that could result in the discharge of petroleum-based products or other material into waters of the Columbia River.

- Dredging and disposing of material disposal in compliance with Washington and Oregon state water quality standards (173-201A WAC and OAR 340 Division 41). The Applicant will prepare a *Water Quality Monitoring Plan* for the Project, which will be implemented during pre-installation dredging and cable installation activities in accordance with the Clean Water Act Section 401 Water Quality Certification to be obtained for the Project.
- If pre-installation dredging is required, a clamshell dredge will be used—impacts are highly localized and clamshell dredging is not documented to have notable entrainment, unlike hydraulic or suction dredging.
    - Increasing cycle time (slowing the velocity through the water column).
    - Pausing the dredge bucket near the bottom while descending and near the water line while ascending.
    - Eliminating multiple bites at a given location.
    - Using bottom-dump scows—accept and transport sediments dredged from the pre-installation dredging area. Bottom scows will contain water and sediment and avoid overflow during disposal.
    - Using GPS navigation—ensures accurate GPS positioning to identify the correct footprint for dredging and disposal.
    - Using spuds to secure the barge/dredge location—these are passively lowered into the substrate and do not require active driving (e.g., vibratory pile driving) to set into the substrate.

7.1.2.2 Special Status Wildlife

The Project corridor is routed through existing disturbed habitats, including paved areas and road shoulders for most of its length. These areas provide little to no habitat value for wildlife species. The Project avoids forested areas, meadows, wetlands, and streams and no trees are slated to be removed for Project construction. Best management practices include erosion control, sedimentation retention, water quality monitoring, and stormwater treatment during construction and operation. The following measures are considered part of the proposed Project:

- Trenching and installation of the buried cable along SR 14 in Washington will occur within 0.25 mile (0.4 kilometer) of potential nesting and foraging habitat for northern spotted owl, and this work would be restricted to occur outside of the nesting season (March 1 to September 30) to avoid impacts to northern spotted owls.
- Land disturbing activities will be limited to the minimum disturbance footprint required to construct the converter stations and HDD sites.
- An HDD *Inadvertent Return Plan* (i.e., Frac-out) will be developed to provide contingency measures for containment and cleanup in the event of frac-out. An example HDD Inadvertent Returns Contingency Plan is provided as an attachment to the Waste Minimization Exhibit.
- Barriers to prevent sediment from leaving the site and entering downstream waterways via runoff (e.g., silt fences, straw bale barriers, and sediment ponds or basins) will be installed prior to grading.

- For landward construction, project staging and material storage areas will be located a minimum of 150 feet (46 meters) from surface waters in currently developed areas such as parking lots or managed fields. No oil, fuels, or chemicals will be discharged to surface waters or onto land where there is a potential for re-entry into surface waters.
- Petroleum products, fresh cement, lime, uncured concrete, chemicals, or other toxic or deleterious materials will not be allowed to enter surface waters.
- Water used during the placement of concrete for washdown or related operations will not be allowed to enter any streams or the Columbia River. Any process water/contact water will be routed to a contained area for treatment and will be disposed of at an authorized upland location.
- Process water generated on site from construction, demolition, or washing activities will be contained and treated to meet applicable water quality standards before entering or reentering surface waters.
- Stabilized construction entrances to minimize sediment tracking from active work areas will be used.
- Construction vehicles and equipment will be required to use a wheel wash prior to entering public streets.
- The contractor will develop, implement, and maintain a stormwater pollution plan (SWPPP) to minimize erosion of sediments due to rainfall runoff at construction sites, and to reduce, eliminate, and prevent the pollution of stormwater.

7.1.3 During Operation

The Project corridor is routed through existing disturbed habitats, including paved areas and road shoulders for most of its length. These areas provide little to no habitat value for wildlife species. Operations and any maintenance at the converter stations would occur using existing roadways. Once post-construction ground restoration is complete and the buried cable is operating, no maintenance is required and there will be no further disturbance to the ground and vegetation along the buried cable route.

7.2 Mitigation

After avoidance and minimization measures have been implemented, some impacts to wildlife habitat and sensitive species will remain. For terrestrial resources, temporary and long-term habitat loss in Oregon will be mitigated according to ODFW Habitat Mitigation Policy goals and standards, as described in the *Draft Habitat Mitigation Plan* (Attachment 3). Prior to construction, the Applicant will finalize the Habitat Mitigation Plan pursuant to the ODFW Habitat Mitigation Policy. Impact quantification and mitigation planning is currently under development for aquatic species and habitats in the Columbia River in consultation with USFWS, NMFS, Columbia River Tribes, WDFW, ODFW, and the USACE.

8 Monitoring Program (OAR 345-022-0060(3)(h))

(h) A description of the applicant's proposed monitoring plans to evaluate the success of the measures described in (g).

RESPONSE

As described in the *Draft Revegetation Plan* (Attachment 4), restoration and replanted terrestrial areas will be monitored during operation to assess whether the Project is meeting revegetation success criteria, including control of noxious weeds.

9 Conclusions

As part of the Project siting process, the fish and wildlife habitats within the analysis area were identified and categorized pursuant to OAR 635-415-0025. Facilities and the cable route have been sited to avoid Category 1 habitats within the category and impact framework defined for this Project. The cable route and facilities have been sited to minimize impacts to Category 2, 3, 4, and 5 habitats. Unavoidable habitat impacts will be mitigated in accordance with OAR 635-415-0025.

10 References

Armstrong, J.D., Hunter, D-C, Fryer, R.J., Rycroft, P. and Orwood, J.E. 2015. Behavioural Responses of Atlantic Salmon to Mains Frequency Magnetic Fields. Scottish Marine and Freshwater Science Vol 6 No 9. Edinburgh: Scottish Government, 17pp.

Aubry, K.B., J. Rohrer, C.M. Raley, and S. Fitkin. 2014. Wolverine Distribution and Ecology in the North Cascades Ecosystem. 2014 Annual report. 50 pp. December 30, 2014. Available online at: https://wdfw.wa.gov/sites/default/files/publications/02163/wdfw02163.pdf.

Bevelhimer, M.S., G.F. Cada, A.M. Fortner, P.E. Schweizer, and K.P. Riemer. 2013. Behavioral Responses of Representative Freshwater Fish Species to Electromagnetic Fields. Transactions of the American Fisheries Society 142:802–813.

Black, S. H., and D. M. Vaughan. 2005. Species Profile: Icaricia icarioides. In Shepherd, M. D., D. M. Vaughan, and S. H. Black (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland, OR: The Xerces Society for Invertebrate Conservation.

Blanchard, M. R., Harris, J. E., Skalicky, J. J., Silver, G. S., & Jolley, J. C. 2023. Patterns in distribution and density of larval lampreys in the main-stem Columbia River, Washington–Oregon. North American Journal of Fisheries Management, 43(6), 1458-1474.

BOEM (Bureau of Ocean Energy Management). 2019. CSA Ocean Sciences Inc. and Exponent Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA. OCS Study BOEM 2019-049. 59 pp.

Cada, G. F., Bevelhimer, M. S., Riemer, K. P., & Turner, J. W. (2011). Effects on freshwater organisms of magnetic fields associated with hydrokinetic turbines (No. ORNL/TM-2011/244). Oak Ridge National Lab. (ORNL), Oak Ridge, TN (United States).

Columbia Basin Partnership Task Force. 2020. *A Vision for Salmon and Steelhead. Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin*. Available online at: https://s3.amazonaws.com/media.fisheries.noaa.gov/2020-10/MAFAC_CRB_Phase2ReportFinal_508.pdf?null

Cowardin, L.M., Carter, V., Golet, F.C., and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Washington, D.C., Government Printing Office.

Dernie, K.M., M.J. Kaiser and R.M. Warwick. 2003. Recovery rates of benthic communities following physical disturbance. Journal of Animal Ecology 72:1043–1056.

Ecology (Washington State Department of Ecology). 2024. Water Quality Atlas Map – Version 2.0.0.0. Accessed December 2024. https://apps.ecology.wa.gov/waterqualityatlas/wqa.

Fresh, K.L., E. Casillas, L.L. Johnson, and D.L. Bottom. 2005. Role of the estuary in the recovery of Columbia River Basin salmon and steelhead: An evaluation of the effects of selected factors on salmonid population viability. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-69, September 1, 2005.

HDR (HDR Engineering, Inc.). 2025.Hydraulic Numerical Modeling and Sediment Transport Report. Prepared for Cascade Renewable Transmission, LLC. Submitted to the U.S. Army Corps of Engineers, Section 408 Project Delivery Team. October 22, 2025.

Johnson, D.H. and O'Niel, T.A. 2001. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press.

Klimley, A. P., Wyman, M. T., and Kavet, R. 2017. Chinook salmon and green sturgeon migrate through San Francisco Estuary despite large distortions in the local magnetic field produced by bridges. *PLoS ONE*, *12*(6).

Lamprey Technical Workgroup. 2021. Monitoring and minimizing effects of dredging on lampreys. Original Version 1.0, March 2021. Available: https://www.fws.gov/pacificlamprey/LTWGMainpage.cfm.

LandScope America, 2024. LandScope Washington: Ecoregions in Washington. Accessed July 2024. Available at: http://www.landscope.org/washington/natural_geography/ecoregions/.

Manley, P.N.; Van Horne, B.; Roth, J.K.; Zielinski, W.J.; McKenzie, M.M.; Weller, T.J.; Weckerly, F.W.; Vojta, C. 2006. Multiple species inventory and monitoring technical guide. Gen. Tech. Rep. WO-73. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. 204 p.

McIntyre III, A. 2017. Behavioral responses of sub-adult Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) to electromagnetic and magnetic fields under laboratory conditions.

National Academies of Sciences, Engineering, and Medicine. 2004. Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival. Washington, DC: The National Academies Press. https://doi.org/10.17226/10962.

NMFS (National Marine Fisheries Service). 2005. Endangered and threatened species: final listings determinations for 16 ESUs of west coast salmon and final 4(D) protective regulations for threatened salmonid ESUs. *Federal Register* 70(123)37160-37204.

____. 2013. ESA recovery plan for Lower Columbia River Coho salmon, Lower Columbia River Chinook salmon, lower Chum River Chinook salmon, and Lower Columbia River steelhead. NMFS, Northwest Region.

____. 2016. 2016 5-Year Review: Summary & Evaluation of Lower Columbia River Chinook Salmon Columbia River Chum Salmon Lower Columbia River Coho Salmon Lower Columbia River Steelhead. National Marine Fisheries Service, West Coast Region. Portland, Oregon.

____. 2017. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Kalama Manufacturing and Marine Export Facility, Cowlitz County, Washington (Sixth Field HUC 170800030804 Lower Columbia River) (Corps No.: NWP-2014-1772).

____. 2020. Presence of ESA-listed fish species in the Lower Columbia River by life stage, NMFS' Northwest Fisheries Science Center, and NMFS' Protected Resources Division. Provided to Danette L. Guy, Biologist/Sr. Project Manager, USACE, Seattle District. December 2020.

____. 2021. Endangered Species Act Section 7(a)(2) Biological Opinion and Conference for the Construction, Operation, Maintenance, and Decommissioning of the South Fork Offshore Energy Project (Lease OCS-A 0517). GARFO-2021-00353.

____. 2023a. Endangered Species Act Section 7(a)(2) Biological Opinion Response for the Construction, Operation, Maintenance, and Decommissioning of the Revolution Wind Offshore Energy Project (Lease OCS-A 0486). GARFO-2022-03532.

____. 2023b. Endangered Species Act Section 7(a)(2) Biological Opinion Response for the Construction, Operation, Maintenance, and Decommissioning of the Empire Wind Offshore Energy Project (Lease OCS-A 0512) and the Connected Action at South Brooklyn Marine Terminal. GARFO-2023-00454.

____. 2023c. Endangered Species Act Section 7(a)(2) Biological Opinion and Conference for the Construction, Operation, Maintenance, and Decommissioning of the Coastal Virginia Offshore Wind Commercial Project (Lease OCS-A 0483). OPR-2023-02218.

____. 2024. ESA Threatened & Endangered Species Directory. Accessed March 2024. https://www.fisheries.noaa.gov/species-directory/threatened-endangered.

Normandeau, E., T.C. Tricas, and A.B. Gill, Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. 2011. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region. OCS Study BOEMRE 2011-09.

ODA (Oregon Department of Agriculture). No date. Willamette Daisy (Erigeron decumbens). Accessed March 14, 2024. https://www.oregon.gov/ODA/shared/Documents/Publications/PlantConservation/ErigeronDecumbensProfile.pdf.

ODFW (Oregon Department of Fish and Wildlife). 2010. Final Lower Columbia River conservation and recovery plan for Oregon populations of salmon and steelhead. Oregon Department of Fish and Wildlife. Salem, Oregon. August 6, 2010.

____. 2015. Oregon Fish Habitat Distribution Map Service. Created September 21, 2015.

____. 2021. Compass: Mapping Oregon's wildlife habitats – An online data and planning tool. Last Updated: May 10, 2021. Accessed online December 2024. https://compass.dfw.state.or.us/visualize/#x=-120.50&y=44.09&z=6&logo=true&dls%5B%5D=true&dls%5B%5D=0.5&dls%5B%5D=549&basemap=ESRI+Satellite&tab=data&print=false.

____. 2024. Oregon Guidelines for Timing Of In-Water Work To Protect Fish And Wildlife Resources. Online at: https://www.dfw.state.or.us/lands/inwater/2024%20Oregon%20In-Water%20Work%20Guidelines.pdf.

ODSL (Oregon Department of State Lands). 2023. Essential Salmon Habitat Map. Accessed December 2024. https://maps.dsl.state.or.us/esh/.

Omernik, J.M., 1987. Ecoregions of the conterminous United States. Map (scale 1:7,500,000). Annals of the Association of American Geographers 77(1):118-125.

ORBIC (Oregon Biodiversity Information Center). 2022. Rare, Threatened and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, Oregon. 133 pp.

OSPAR Commission. 2012. Guidelines on Best Environmental Practice (BEP) in Cable Laying and Operation. OSPAR Commission Agreement 2012-02. https://www.gc.noaa.gov/documents/2017/12-02e_agreement_cables_guidelines.pdf.

Parsley, Michael J., Lance G. Beckman, and George T. McCabe, Jr. 1993. Spawning and Rearing Habitat Use by White Sturgeons in the Columbia River Downstream from McNary Dam. Transactions of the American Fisheries Society 122:217-227.

Perrin, C.J., L.L. Rempel, and M.L. Rosenau. 2003. White Sturgeon spawning habitat in an unregulated river: Fraser River, Canada. Transactions of the American Fisheries Society 132: 154-165.

PSC Specialist Consultants to the Electricity Industry. 2024. Memo: Cascade HVDC Submarine Cable EMF Levels (Additional Burial Levels). Prepared for PowerBridge. March 5, 2024.

Taormina, B., Bald, J., Want, A., Thouzeau, G., Lejart, M., Desroy, N., and Carlier, A. 2018. A review of poten-tial impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations and future directions. Renewable and Sustainable Energy Reviews, 96, 380-391. doi:10.1016/j.rser.2018.07.026.

USACE (U.S. Army Corps of Engineers). Undated. Approved Work Windows For Fish Protection For Waters Within National Park Boundaries, Columbia River, Snake River, and Lakes By Watercourse. Available at: https://www.nws.usace.army.mil/Portals/27/docs/regulatory/ESA%20forms%20and%20templates/work_windows%20Waters_in_NPs_CR_SR_Lakes.pdf.

USEPA (U.S. Environmental Protection Agency). 2021. Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load. US EPA Region 10. August 13, 2021.

____. 2023. Ecoregions. Accessed November 2024. Available at: https://www.epa.gov/eco-research/ecoregions.

USFWS (U.S. Fish and Wildlife Service). 2019. Species Biological Report for the Streaked Horned Lark (Eremophila alpestris strigata). Version 1.0. February 2019. Portland, Oregon.

____. 2024. National Wetland Inventory – Wetlands Project, Branch of Resource and Mapping Support. Last updated: March 12, 2024. Accessed: http://www.fws.gov/wetlands/Data/Limitations.html.

____. 2025a. Critical Habitat for Threatened and Endangered Species Interactive web map. https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77.

____. 2025b. Environmental Conservation Online System. Listed Plants. https://ecos.fws.gov/ecp/.

____. 2025c. Information for Planning and Consultation. Ecological Services Program. Accessed March 2025.https://ipac.ecosphere.fws.gov/.

USGS (U.S. Geological Survey). 2024, Annual NLCD Collection 1 Science Products: U.S. Geological Survey data release. https://doi.org/10.5066/P94UXNTS.

Valeria, R. 2024. Upper Thermal Tolerance of the Western Ridged Mussel (*Gonidea angulata*), Western Pearlshell (*Margaritifera falcata*), and Western Sculpin Species (Cottus spp.). Thesis for College of Graduate Sciences, University of Idaho.

WDFW (Washington Department of Fish and Wildlife). 2018. Times when spawning or incubating salmonids are least likely to be within Washington State freshwater. June 1, 2018.

Westbrooks, Randy G., 1998. Invasive Plants: Changing the Landscape of America (1998). All U.S. Government Documents (Utah Regional Depository). Paper 490. https://digitalcommons.usu.edu/govdocs/490/.

Whitesel, T. A., & Uh, C. T. (2023). Upper temperature limit of larval Pacific lamprey Entosphenus tridentatus: implications for conservation in a warming climate. Environmental Biology of Fishes, 106(5), 837-852.

Attachment 1. Agency Coordination

Attachment 1
Agency Coordination

During development of a survey plan and prior to conducting surveys, the Applicant has consulted with the Oregon Department of Fish and Wildlife (ODFW) regarding the appropriate survey requirements for documenting the presence of state sensitive species as required in OAR 345-021-0010(1)(p)(D) and the classification of fish and wildlife habitat as required in OAR 345-021-0010(1)(p)(B).

Consultation consisted of emails and phone conversations with the ODFW area biologists and are included in this attachment. It was determined that Washington ground squirrel protocol surveys were not required as the study area for the Project is not located within areas with suitable habitat or known occurrences of WA ground squirrel. No protocol surveys for any specific species were required for the study area. Much of the study area is along roadsides and in developed areas. Important habitats such as riparian areas and wetlands have been avoided by the routing of the Project.

On April 1, 2024, the Applicant discussed in a phone call with ODFW biologist Ariana Scpioni, the proposed surveys to be conducted as described above, and received concurrence on this approach. A summary of the consultation communications is provided in Attachment P-1.

From: Welch, Ian
To: Cavanagh, Suzy; Dammarell (Connors), Amy
Cc: Schnellbach, Rose
Subject: ODFW call re: EFSC studies
Date: Tuesday, April 2, 2024 1:46:00 PM

Hi Suzy and Amy,
Just wanted to update you that Ariana from ODFW called me as a follow-up for my emails about the EFSC studies and we had a conversation yesterday afternoon about my proposed wildlife and ESA species studies for Exhibits P and Q. She was good with us to proceed with my study plans and the species and habitats we proposed for the upcoming fieldwork in late April and into May. She concurred with our proposed study parameters and timing. We discussed if there were any specific species or habitats of particular concern for ODFW and she mentioned the northwest pond turtle which I had listed as one of our target species/habitats for our surveys. She did not have really any concerns with the terrestrial habitats on the project route and I emphasized we would be looking at riparian areas by the land to water transitions and that these would be bored to avoid these habitats.
A lot of our discussion focused on her teams' main concerns with in-river habitats in particular gravel areas and mussel beds. I re-iterated that the nav channel route would avoid these habitats but I am also looking into possible locations for these using bathymetry or other sources for my affects analysis etc. We talked about how there is little available information on these within the portions of the Columbia River in the project area, and she provided me with some contacts for a mussel expert from the Xercies Society and the USFWS lamprey expert Joe Skalicky who is conducting larval surveys this summer for the Hood River bridge project area.
She also asked about video survey/mapping of the river bed and I mentioned that some sort of surveys would be needed ahead of the jet plow route to look for any obstacles etc. but I wasn't sure on the timing of these i.e. would it happen immediately or days ahead of cable install as they go, or would route be surveyed ahead of time? – do either of you know if this is the case?
I am compiling these notes and will post in the agency communications folder along with her email reply with the contact info for the lamprey and mussel experts.

Thanks,
Ian

Ian Welch
D 253-432-5046 **M** 253-225-1020

hdrinc.com/follow-us

Meeting Notes

Project:	Cascade Renewable Transmission
Subject:	Oregon EFSC Exhibits P and Q Study Plan
Date:	Monday, April 01, 2024
Location:	Phone

Contacts

Ian Welch Project Biologist ian.welch@hdrinc.com ,

Meeting Attendees

Cascade Renewable Transmission (CRT) Project Team Attendees:

Affiliation	Project Team Member	Affiliation	Project Team Member
HDR	Ian Welch		

Agency Attendees:

Agency	Name	Agency	Name
ODFW	Ariana Scipioni		

Summary

Ariana from ODFW called me as a follow-up for my emails about the EFSC studies and we had a conversation yesterday afternoon about my proposed wildlife and ESA species studies for Exhibits P and Q. She was good with us to proceed with my study plans and the species and habitats we proposed for the upcoming fieldwork in late April and into May. She concurred with our proposed study parameters and timing. We discussed if there were any specific species or habitats of particular concern for ODFW and she mentioned the northwest pond turtle which I had listed as one of our target species/habitats for our surveys. She did not have really any concerns with the terrestrial habitats on the project route and I emphasized we would be looking at riparian areas by the land to water transitions and that these would be bored to avoid these habitats.

A lot of our discussion focused on her teams' main concerns with in-river habitats in particular gravel areas and mussel beds. I re-iterated that the nav channel route would avoid these habitats but I am also looking into possible locations for these using bathymetry or other sources for my affects analysis etc. We talked about how there is little available information on these within the portions of the Columbia River in the project area, and she provided me with some contacts for a mussel expert from the Xercies Society and the USFWS lamprey expert Joe Skalicky who is conducting larval surveys this summer for the Hood River bridge project area.

She also asked about video survey/mapping of the river bed and I mentioned that some sort of surveys would be needed ahead of the jet plow route to look for any obstacles etc. but I wasn't sure on the timing of these i.e. would it happen immediately or days ahead of cable install as they go, or would route be surveyed ahead of time and told her I would get back to her with that info.

Ariana also mentioned her team was wondering about the location of the water intake for the jet plow and any screening specs for the intake. I told her I would find out and send her the information.

Next Steps

Ariana sent contact info for the lamprey and mussel experts.

I will follow-up with info gathered on jet plow intake screening and timing of stream bed surveys.

From: SCIPIONI Ariana R * ODFW
To: Welch, Ian
Cc: BARNES Susan P * ODFW; jeremy.l.thompson
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys
Date: Thursday, August 1, 2024 3:37:11 PM
Attachments: image001.png

Hi Ian,

How has your field season been? How is the aquatic analysis going? I have had a great time surveying for freshwater mussel, Northern Red Legged Frog, and bullfrog trapping and diet analysis. I am transitioning to a new job, so I wanted to connect you with Jeremy Thompson, Statewide Energy Coordinator, for any upcoming questions. Susan Barnes, our Regional Conservation Biologist, is also available for questions specific to the North Willamette/Columbia River.

Take care,
Ariana

From: SCIPIONI Ariana R * ODFW <Ariana.R.SCIPIONI@odfw.oregon.gov>
Sent: Wednesday, February 21, 2024 5:19 PM
To: Welch, Ian <Ian.Welch@hdrinc.com>
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys

Hi Ian,

Thanks so much for this info. What type of aquatic analysis will be done via desktop? Will aquatic habitat types be characterized, and function and values be calculated?

" Aquatic habitat along the cable route in the Columbia River will be assessed and documented using desktop analysis and incidental observations from terrestrial surveys."

I will review this with my team and get back to you. Unfortunately, they are very busy with field surveys, conferences, and other duties. I hope to get something internally on the calendar at the beginning of March and then connect with you shortly thereafter.

Cheers
Ariana

From: Welch, Ian <Ian.Welch@hdrinc.com>
Sent: Monday, February 12, 2024 9:20 AM
To: SCIPIONI Ariana R * ODFW <Ariana.R.SCIPIONI@odfw.oregon.gov>
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys

Hi Ariana,
Sorry for the delayed response on this – I was juggling some field work the last couple weeks.
Attached is a draft outline of our planned field surveys to support the OR EFSC Exhibits P and Q for fish and wildlife for the CRTS project. I have also attached a kmz showing the proposed analysis area for the field surveys (0.5 mile buffer on the project boundary). Please note that the long stretches of the project that are solely in the Columbia River will not be surveyed in the field. Due to the extent of the in-river portion of the project and all activities will be confined to near mid-channel in the Columbia River, the shoreline habitat along the entire length will not be surveyed in the field but will be analyzed and summarized via desktop and GIS. Areas of shoreline and riparian habitat where the project transitions between buried land cable and underwater cable will be assessed in the field - as shown in the draft analysis area maps.

Please pass on to your team as you mentioned previously and let me know if you have any questions etc. Once you've had a look I'd like to set up a meeting to discuss as needed in order to plan my upcoming field surveys. In answer to your question, we are targeting April through May for the fieldwork.
I look forward to our discussion on this.

Cheers,
Ian

Ian Welch
Fish and Wildlife Biologist

HDR
4717 97th Street NW
Gig Harbor, WA, 98332
D 253-432-5046 **M** 253-225-1020

hdrinc.com/follow-us

From: SCIPIONI Ariana R * ODFW <Ariana.R.SCIPIONI@odfw.oregon.gov>
Sent: Thursday, January 18, 2024 3:39 PM
To: Welch, Ian <Ian.Welch@hdrinc.com>
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys

Hi Ian,
Glad to hear no major damage. We lost power and currently do not have water, but mild compared to some of my neighbors who are experiencing great losses.
Thanks so much for the update. Do you still plan to start surveys in March? The Cascade meeting on Tues mentioned April.

Warmly
Ariana

From: Welch, Ian <Ian.Welch@hdrinc.com>
Sent: Thursday, January 18, 2024 3:24 PM
To: SCIPIONI Ariana R * ODFW <Ariana.R.SCIPIONI@odfw.oregon.gov>
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys

> You don't often get email from ian.welch@hdrinc.com. Learn why this is important

Hi Ariana,
Thank you for your prompt response. Thankfully no major weather issues at my place – just some branches down and some frozen water troughs for the horses.
I am compiling/organizing the information you asked about in your email and plan on sending to you next week.

Cheers,
Ian

Ian Welch
Fish and Wildlife Biologist

HDR
4717 97th Street NW
Gig Harbor, WA, 98332
D 253-432-5046 **M** 253-225-1020

hdrinc.com/follow-us

From: SCIPIONI Ariana R * ODFW <Ariana.R.SCIPIONI@odfw.oregon.gov>
Sent: Thursday, January 18, 2024 1:38 PM
To: Welch, Ian <Ian.Welch@hdrinc.com>
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys

> You don't often get email from ariana.r.scipioni@odfw.oregon.gov. Learn why this is important

Hi Ian,

Hope you have been faring well in this wild weather. I wanted to touch base with you on the below questions.

Warmly
Ariana

From: SCIPIONI Ariana R * ODFW <ariana.r.scipioni@odfw.oregon.gov>
Sent: Friday, January 12, 2024 8:31 AM
To: Welch, Ian <Ian.Welch@hdrinc.com>; NIEMELA Steve A * ODFW <Steve.A.NIEMELA@odfw.oregon.gov>; MARTIN Art C * ODFW <Art.C.MARTIN@odfw.oregon.gov>; THOMPSON Jeremy L * ODFW <Jeremy.L.THOMPSON@odfw.oregon.gov>
Subject: RE: Cascade Renewable Transmission Project EFSEC wildlife surveys

Hi Ian,
Thanks for reaching out. Could you share a matrix that covers proposed temporary and permanent impacts, what you currently have for species occurrences/habitats, and your construction sequencing? Please include a list of your proposed survey protocols. I will coordinate with our team to review it and then we can schedule a meeting to discuss with your team. Do you have a timeframe that you'd like to receive this feedback by?

Warmly
Ariana

Ariana Scipioni
pronouns: she/her/hers
Regional Habitat Biologist
North Willamette Watershed District
Oregon Department of Fish and Wildlife
17330 SE Evelyn St, Clackamas OR 97015
ariana.r.scipioni@odfw.oregon.gov
Office: (971) 673-1134
ODFW Habitat Division

From: Welch, Ian <Ian.Welch@hdrinc.com>
Sent: Thursday, January 11, 2024 2:13 PM
To: SCIPIONI Ariana R * ODFW <ariana.r.scipioni@odfw.oregon.gov>; NIEMELA Steve A * ODFW <steve.a.niemela@odfw.oregon.gov>; MARTIN Art C * ODFW <art.c.martin@odfw.oregon.gov>; THOMPSON Jeremy L * ODFW <jeremy.l.thompson@odfw.oregon.gov>
Subject: Cascade Renewable Transmission Project EFSEC wildlife surveys

Hello all,

I am working on the fish and wildlife survey planning for Exhibits P and Q in the OR EFSEC application and am reaching out to get your input on species and habitats in the study area for the project. Attached are a couple maps of the terrestrial portions of the project in Oregon (as you know there is also a long component between these areas within the Columbia River).
We plan on conducting pedestrian surveys for habitat categorization, sensitive and listed species habitats, encounter observations, and bird and raptor nest surveys this spring (March - June timeframe). The study area for these surveys is planned for 0.5 mile buffer around the project footprint shown in the attached maps. We have obtained ORBIC data for the project area and I have reviewed.
Any species information you can provide on what species and habitats potentially occurring in our study area and guidance on survey protocols is greatly appreciated.
I would also like to discuss our proposed protocols for these surveys with you and any input into species distribution, avoidance and minimization measures etc. in a virtual meeting in the very near future.
Please feel free to pass along to others that you would like to include in these discussions and I will set up a doodle poll to come up with a time.

Thank you,
Ian

Ian Welch
Fish and Wildlife Biologist

HDR
4717 97th Street NW
Gig Harbor, WA, 98332
D 253-432-5046 **M** 253-225-1020

hdrinc.com/follow-us

Attachment 2. Oregon Fish Wildlife and Habitat Report

DRAFT Habitat, Fish, and Wildlife Report

Cascade Renewable Transmission Project

Multnomah and Wasco Counties, OR
February 28, 2025

This page intentionally left blank.

Contents

Tables

Appendices

Acronyms

Acronyms used more than once in the report text.

AC	alternating current
BGEPA	Bald and Golden Eagle Protection Act
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
CRT	Cascade Renewable Transmission
DPS	distinct population segment
ESU	evolutionarily significant unit
FMO	foraging, migration, and overwintering
FWHCA	fish and wildlife habitat conservation area
GPS	global positioning system
HDD	horizontal directional drilling
HDR	HDR Engineering, Inc.
HVAC	high-voltage alternating current
HVDC	high-voltage direct current
kV	kilovolt
LCR	Lower Columbia River
MBTA	Migratory Bird Treaty Act
MCR	Middle Columbia River
NHD	National Hydrography Dataset
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
ODFW	Oregon Department of Fish and Wildlife
OHWM	ordinary high-water mark
PBF	physical and biological features
PGE	Portland General Electric
RM	river mile
ROW	right-of-way
UCR	Upper Columbia River
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

This page intentionally left blank.

1 Introduction

The proposed Project is a roughly 95-mile, 320-kilovolt (kV)/1,100-megawatt (MW) high-voltage direct current (HVDC) electric transmission cable interconnecting the existing Bonneville Power Administration (BPA) Big Eddy 500-kV alternating current (AC) substation located near The Dalles, Oregon, and the existing Portland General Electric (PGE) Harborton 230-kV AC substation located in Portland, Oregon (Figure 1, Appendix B). The eastern converter station would convert AC power from Big Eddy substation to direct current (DC) for transmission on the Project's 320-kV cable system to the western converter station, where power would be converted back to AC for injection at Harborton substation.

As described in Section 1.1 of the CRT OR EFSC Application for Site Certification, most of the cable alignment throughout the length of the entire Project would be installed in the bed of the Columbia River. In Oregon, two converter stations would be constructed, and the cable would be installed landward of the river in The Dalles and Portland. This report presents the existing conditions for fish, wildlife, and habitat for the OR EFSC site application and is focused on the portion of the Project that is located in Oregon, where the buried cable would be routed on land to connect the converter stations and the east and west ends of the Project. Findings of the wetland delineations completed on land in Oregon are presented in the Wetlands and Waters Report (Exhibit J of the OR EFSC site application).

1.1 Project Description

At the eastern end of the Project in The Dalles, Oregon (east end), a converter station is proposed near the Big Eddy substation with approximately 500 feet of overhead, (500-kV) high-voltage alternating current (HVAC) transmission line to connect the converter station to the substation. The transmission cables would be bundled with associated fiber optic communications cable (cable bundle) in underground conduits to the edge of the Columbia River. The cable bundle would be buried in the bed of the Columbia River in Oregon and Washington from The Dalles to Portland using jet plow methods. All in-water to land transitions would be completed using horizontal directional drilling (HDD) installation methods to avoid Columbia River shoreline areas and other waters of the U.S. and state. Another trenchless installation method, horizontal auger boring (HAB), may be used for shorter paths beneath railroads and roadways.

To transition the cable bundle from the Columbia River to the landward portion of the proposed alignment, a temporary three-sided, wet cofferdam would be placed in the river. From the wet cofferdam, the cable bundle would be installed via horizontal directional drilling (HDD) methods under the riverbed, shorelands, a rail lines, and roadways.

Conduit for the subsequent pull-through installation of the HVDC cable into the river would be installed using HDD for approximately 1,100 feet into the Columbia River. Another temporary three-sided, wet cofferdam would be established in the river below the Bonneville Lock and Dam to transition from HDD to jet plow methods to bury the cable in the Columbia River. The cable would remain in the river until the next landing site located in Portland, Oregon.

The trench for underground HVDC transmission cable would be approximately 2.5 feet wide by 4.5 feet deep. Within the trench, two 8-inch conduits side by side and one 4-inch fiber optic conduit on top (cable bundle) would be placed within a 6-inch concrete casing. HDD would be used to transition the in-river cables to land, avoiding any shorelands. To cross highways, railroads, or sensitive areas, the transmission line would be placed with HDD.

To bypass the dam, locks, juvenile fish passage, and tribal fishing areas at the Bonneville Lock and Dam, the HVDC cable bundle would be brought on land in Washington east of the dam complex, buried underground on the Washington side of the Columbia River for approximately 7.5 miles, then re-enter the river west of the dam complex. The wildlife habitat and survey findings performed in Washington State are presented in documentation for WA EFSEC and not addressed in this report.

In Portland, the cable bundle would exit the Columbia River north of Hayden Island, be placed beneath the channel of the Columbia River adjacent to the south of Hayden Island via HDD methods, and landfall near Terminal 6 at the Port of Portland. The western converter station in Portland would be connected to the existing Harborton substation with three-phase, 230-kV transmission cable, installed via HDD beneath the Columbia Slough and Ramsey wetlands and via trench in road rights-of-way (ROWs) to the edge of the Willamette River. Approximately 0.5 miles of transmission cable would cross under the bed of the Willamette River, installed by HDD to a final landing site at Harborton substation.

1.2 Regional Setting

The proposed Project lies within the Cascades (4) level III ecoregion and the Western Cascades Lowlands and Valleys (4a) level IV ecoregion (EPA 2016). The Cascades ecoregion is primarily characterized by mountains underlain by volcanic rock and shaped by alpine glaciations. The major landforms within the Project area and surrounding landscape include steep ridges, generally less than 3,200 feet in elevation associated with the Cascades Mountain Range, and the relatively narrow Columbia River valley. The climate is wet (60-90 mean annual inches of precipitation) and mild (mean temperature 31-78 degrees Fahrenheit [°F]), promoting coniferous forests comprised mainly of Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), red alder (*Alnus rubra*) and vine maple (*Acer circinatum*) (Thorson et al. 2003).

In accordance with OAR 345-001-0010(59)(c) and pursuant to the Project Order, the analysis area for fish and wildlife habitat and species consists of the area within and extending 0.5 mile from the Project site boundary and any downstream area of impact. The Project site boundary is defined in detail in Exhibits B and C. Most of the Project analysis area in Wasco and Multnomah counties has been altered by development including agriculture, electric transmission and distribution networks, road and rail ways, parks, industrial and urban infrastructure, and, to a lesser degree, residential development. These alterations have likely impacted vegetation, soils, and surface water flows within the analysis area and on adjacent lands.

1.2.1 East End

The east end of the analysis area lies within the Columbia Plateau (10) Level III ecoregion and the Pleistocene Lake Basin (10e) Level IV ecoregion, at elevations between roughly 100 and 800 feet above mean sea level (amsl) (Thorson et al. 2003).

The Columbia Plateau is a dry, low elevation island surrounded by a mountainous region with both higher elevation and rainfall. Rain shadow from the Cascade Mountains to the west results in an arid to semi-arid climate, typical of mid-latitude deserts to mid-latitude steppes. The mountains also separate this region from the influence of the ocean, leading to a higher occurrence of extreme or unpredictable weather. Precipitation is seasonally variable over much of the region. The perennial streams and rivers located here originate from the adjacent mountainous areas. The remaining streams are ephemeral, with flowing water present only for a short duration during or following precipitation events. Most of this region is covered in arid sagebrush steppe or grassland. Tree cover throughout much of the region is sparse to nonexistent (Thorson et. al 2003).

The Pleistocene Lake Basins once contained vast, temporary lakes that were created by flood waters from glacial lakes Missoula and Columbia. In Oregon, the flood waters accumulated from the eastern entrance of the Columbia River Gorge, upstream to the Wallula Gap to form ancient Lake Condon. Today, the Pleistocene Lake Basin Ecoregion is the driest and warmest part of the Columbia Plateau, with mean annual precipitation varying from 7 to 10 inches. Native vegetation consists of bunchgrass and sagebrush (Thorson et. al 2003).

1.2.2 West End

The west end of the analysis area lies within the Willamette Valley (3) Level III ecoregion, and the Pleistocene Portland Vancouver (3a) Level IV ecoregion, at elevations between 10 and 50 feet amsl (Thorson et al. 2003).

The Willamette Valley contains terraces and floodplains of the Willamette River system, scattered hills, buttes, and adjacent foothills. Originally, it was covered by prairies, oak savanna, coniferous forest, extensive wetlands, and deciduous riparian rainforests. Elevation and relief around the lower Willamette River and the vegetation mosaic differs from the coniferous forest of the surrounding ecoregions. Mean annual rainfall is 37 to 60 inches, and summers are generally dry; overall, precipitation is lower than in the surrounding mountains. Today, the Willamette Valley contains the bulk of Oregon’s population, industry, commerce, and cropland. Productive soils and a temperate climate make it one of the most important agricultural areas in Oregon (Thorson et. al 2003).

The Portland Vancouver ecoregion is a depression at the base of the Portland Hills fault block. It contains the confluence of the Columbia and Willamette Rivers and is composed of deltaic sands and gravels deposited by Pleistocene floods. Today, many wetlands, oxbow lakes, and ponds still occur, but overall, the Portland/Vancouver Basin is dominated by urban and suburban development, pastures, and nurseries. The climate is usually marine influenced, but periodically, easterly winds entering via the Columbia River Gorge bring continental temperature extremes to the Portland Vancouver Basin (Thorson et. al 2003).

1.3 Project Study Area

Within the analysis area, field surveys were conducted in the terrestrial portions of the Project site boundary and adjacent habitats accessible from roadways and public ROWs. Field surveys were conducted to document flora and fauna in the vicinity of the project sites, as well as different vegetation communities and habitat, and included incidental wildlife observations. This terrestrial area where field surveys were conducted constitutes the study area for this documentation. The roughly 387-acre study area occurs within two distinct locations; one located in the City of The Dalles, Oregon (east end), and one in the City of Portland, Oregon (west end) (Figure 1,

Appendix B). In each city, the study area encompasses areas identified to be necessary for construction of the converter stations, cable trenching areas, cable landing and HDD/HAB sites, and construction staging and laydown sites. Landownership types within the study area include federal, state, and local governmental agencies, ports, railroads, local businesses, and private residences.

In general, vegetation and habitats were surveyed within at least 25 feet on either side of the proposed alignment to encompass the project footprint for cable installation. Observations extended farther than 25 feet where ROW and permissions to enter were granted.

1.3.1 East End

Approximately 152 acres of the study area occurs within the City of The Dalles city limits and in unincorporated Wasco County, on BPA property at the Big Eddy Substation located just east of The Dalles (Figure 1, Appendix B). The legal land description of this portion of the study area includes the following Township/Range/Section: T2N, R14E, Sections 31 and 32; T1N, R14E, Sections 5, 6 and 7; T1N, R13E, Section 1, 2, and 3; Willamette Meridian. The east end of the Project is located within U.S. Geological Survey (USGS) 7.5-minute quadrangle maps for The Dalles South and Petersburg, and in the Hydrologic Unit Code (HUC) 17070105 Middle Columbia-Hood in the Pacific Northwest Region.

From the proposed eastern converter station site at the substation, the Project cable alignment follows Columbia View Drive roughly 1.9 miles to U.S. Route 197 (US-197). The proposed converter station site and surrounding study area is comprised of actively farmed wheat fields and electric transmission infrastructure, including multiple substations and maintained transmission line ROW. The study area along Columbia View Drive is comprised of predominantly paved roadway and roadway shoulder, with undeveloped land and BPA infrastructure and offices adjacent.

The alignment continues north on US-197 for roughly 1.2 miles to the junction with Oregon Route 30 (OR-30), follows OR-30 for about 900 feet until the State Street exit, continuing east for 600 feet before leaving the roadway prism to an HDD site located just south of the Burlington Northern Sante Fe (BNSF) rail lines, north of State Street (Figure 2, Appendix B). The study area along US-197, OR-30, and State Street is comprised of paved roadway and roadway ROW with vegetated shoulder areas adjacent. Threemile Creek occurs adjacent to these roadways and crosses beneath the alignment in three locations.

The cable would be installed by HAB methods beneath the BNSF rail lines and continue via trenching methods through a vegetated area just east of a railroad access road. The study area is comprised of a large, vegetated parcel that includes a portion of Threemile Creek and is bordered by road and rail ways. The alignment continues west roughly 1.5 miles along a paved road that parallels U.S. Interstate 84 (I-84) to the south to an HDD landing site (HDD Area 12) located in a vegetated depressional area between I-84 and Tie Plant Road (Figure 2, Appendix B). The study area also includes parcels to the south of Tie Plant Road. From HDD Area 12, the cable would be drilled under I-84 and the Columbia River shoreline to a cofferdam within the river channel.

1.3.2 West End

Approximately 235 acres of the study area occurs within the City of Portland city limits and in unincorporated Multnomah County on Hayden Island. The legal land description of this portion of the study area includes the following Township/Range/Section: T2N, R1E, Sections 25, 29, 30, 31, and

32 and T2N, R1W, Sections 23, 24, 25, 26, 27, 34 and 35; Willamette Meridian. The west end of the Project is located within USGS 7.5-minute quadrangle maps for Vancouver, Portland, Sauvie Island, and Linnton, and in HUC 17090012 Lower Willamette in the Pacific Northwest Region.

The Project study area begins on the north side of Hayden Island where in-river cable installation methods transition to HDD methods to bring the cable on land near N. Hayden Island Drive (Figure 2, Appendix B). From HDD Area 08, the cable would be installed using trenching methods along an existing graveled transmission line access road. Two alternative routes were evaluated to bring the alignment from Hayden Island south to Terminal 6 at the Port of Portland (Figure 2, Appendix B). The study area on Hayden Island is comprised mainly of maintained transmission line ROW with some forested riparian areas near the Columbia River shoreline.

From the proposed landing site alternatives within Terminal 6, the cable would be placed via trenching methods within the shoulder areas of N. Marine Drive and N. Leadbetter Road for approximately 1.8 to 2.3 miles to the proposed western converter station site (Figure 2). The study area at the landing sites, HDD areas, and the converter station site is comprised of undeveloped and previously disturbed land. The study area along existing roadways is predominantly landscaped ROW.

From west of the proposed converter station site, two alternative routes beneath the Columbia Slough and Ramsey Lake are being considered. HDD methods are proposed for each alternative to avoid Project effects to these waterways. Two alternative landing sites were evaluated west of the Columbia Slough and Ramsey Lake. From each of the alternative landing sites, the proposed alignment would land within the Rivergate Industrial Area on previously developed industrial parcels and continue west to N. Columbia Boulevard, south to Ramsey Road, and west to N. Rivergate Boulevard. The alignment would veer west from N. Rivergate Boulevard to HDD Area 2 prior to being drilled under the bed of the Willamette River. HDD methods would also be used to cross the cable under two existing rail lines along with route. Most of the study area is comprised of paved roadways and railroad ROW with one undeveloped area parcel adjacent to the east side of the Willamette River. The study area on the west side of the Willamette River is comprised of river shoreline, a large, vegetated material stockpile, and the fenced, graveled yard of PGE's Harborton Substation.

2 Methods

This section describes the methodologies HDR biologists used to assess the analysis area, including a desktop review and field investigations. Environmental resources within the Project site boundary and surrounding analysis area were examined through a search of existing publicly available data and an initial reconnaissance-level site visit. This site visit was used to verify general habitat features from the desktop and geographic information system (GIS) map review, as well as document stream crossings and other features that intersect the project corridor. A subsequent field survey was conducted to identify wildlife habitats, plants, and occurrence of special status species. Photographs of the Project area are presented in Appendix A.

2.1 Desktop Review

HDR biologists first completed a desktop review of the analysis area using exiting literature, maps, GIS data, and other materials from federal, state, and local regulatory resources. The following sources of information were reviewed to support the analysis of fish, wildlife, and vegetation in the analysis area:

- Aerial photography of the project corridor
- National Marine Fisheries Service (NMFS) Endangered Species Act (ESA) status reviews and listing information
- NMFS West Coast Region species and habitat web map (NMFS 2024a)
- NMFS Essential Fish Habitat web map (NMFS 2024b)
- USFWS Threatened and Endangered Species Critical Habitat Report online mapper (USFWS 2024a)
- USFWS Information for Planning and Conservation (IPaC) report online (USFWS 2024c)
- eBird Northwest (Cornell Laboratory of Ornithology) (eBird 2024)
- Oregon Department of Fish and Wildlife (ODFW) Compass Mapping for Fish and Wildlife Habitats (ODFW 2021)
- Oregon Fish Passage Barrier Data (ODFW 2024)
- Essential Salmonid Habitat Map (DSL 2023)
- Multnomah and Wasco County Noxious Weed Lists

2.2 Field Surveys

Wildlife and vegetation surveys were conducted to identify important habitats (e.g., riparian areas, tidal marshes, and woodlands, as well as other areas with which ESA-listed or state-listed species have primary association). Biologists conducted the field investigations mainly by walking the study area within public ROW, and other legally accessible portions of the study area, and documented vegetation communities, evidence of wildlife presence, and potential habitat for ESA-listed species and species of concern.

Field surveys were conducted to document flora and fauna in the vicinity of the project sites, as well as habitat. Visual observations were recorded beyond the project corridor where the viewshed from the ROW allowed and included incidental wildlife observations and habitat data. A Trimble DA2 global positioning system (GPS) unit capable of submeter accuracy was used by the biologist field team to assist in identifying the site boundaries and to record site spatial data. Photographs were taken and wildlife observations and vegetation characteristics were documented. The spatial location of some features observed outside of project sites were approximated using field observations and aerial imagery to determine their extent. GIS software was used to analyze data and to produce the habitat map figures in Appendix B.

2.2.1 Wildlife and Vegetation

Surveys for locating or enumerating individual animals or plants were not part of this effort. Field surveys focused on ground-truthing forest habitat from the desktop analysis described above and included incidental observations for species and sign, including nests, burrows, etc. Accessible portions of riparian habitat areas and high-quality ecosystems in the analysis area were also visited.

2.2.2 Raptor and Nest Surveys

Reconnaissance level raptor nest surveys were conducted concurrently with the pedestrian wildlife surveys. These surveys were conducted from the ground, including views from public roads outside the Project site boundary in order to gain vantage points on as much of the study area as possible. Occupancy of nests were documented based on observations at the time of the survey and follow-up pre-construction visits may need to be conducted in order to confirm these results, as feasible. In some cases, non-occupancy may not be definitively confirmed, and these nests are conservatively considered occupied for the purposes of assessing potential project impacts.

All special-status wildlife species and uncommon species observed while biologists were conducting surveys were recorded as part of baseline habitat surveys. Observations of general wildlife encounters, including the sighting of individuals, scat, nests, etc., were recorded whenever observed during habitat surveys and while in-transit to survey locations along the corridor. No surveys were conducted specifically for wildlife species, including raptors, small mammal, or ungulates (i.e., deer and elk).

2.2.3 Waterbodies

HDR biologists conducting the wetland and waters investigations (Wetlands and Waters Report Exhibit J) identified the ordinary high-water mark (OHWM) and bankfull width on non-tidal waterbodies in the study area using Ecology's (Anderson et al. 2016) guidance for OHWM identification., Biologists looked for physical indicators, including, but not limited to, a natural scour line impressed on the bank, distribution of upland and water tolerant vegetation, and drift deposits.

HDR biologists conducting the fish wildlife and vegetation surveys also observed the streams that crossed the project corridor in the context of providing fish habitat, riparian habitat, and connectivity to the Columbia River. No surveys for fish species were performed. Listed or sensitive fish species were assumed present in all watersheds that desktop analysis of agency data and the Federal Register for listed species indicated presence.

3 Results

3.1 Landcover and Habitats

HDR mapped habitats within the study area based on surveys conducted on April 20, 2023, and May 30 and 31, 2024, as well as desktop review using National Land Cover Database (NLCD) data (USGS 2024). Figure 1 (Appendix B) shows the landcover categories mapped in the study area. Habitat types were also adapted from habitat descriptions in Wildlife-Habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001). Surveys conducted in 2023 and 2024 verified land cover types that were mapped by the NLCD and the National Wetland Inventory (NWI) (USFWS

2024) within the majority of the study area. The initial survey in 2023 was a reconnaissance level pedestrian survey conducted from accessible public roads within the study area. Surveys in 2024 were more detailed and mapped observations of vegetation and species on properties outside of public ROW where obtained permissions allowed. The study area, which is primarily within existing roadway ROW, was almost entirely void of vegetation except for sparce ruderal plant species growing on the road shoulder. The study area was investigated against the NLCD, which was verified as developed open space and low-to-high intensity ground cover for existing state and county roads. The study area that extends outside of the road ROW, which includes the landing sites, contained vegetation that includes developed open space, mixed forest, woody wetland, and grassland herbaceous and baren land (rock, sand, clay).

To assist in mapping habitat types, the biologists collected GPS points in dominant habitats and changes in habitat type encountered. Dominant plant species and other habitat characteristics observed at these habitat points were recorded to accurately classify and describe habitat types. In addition, the biologists scanned the adjacent landscape from vantage points that allowed views across the landscape to help map habitat boundaries. Habitat boundaries were digitized using ArcGIS software following the field surveys.

The analysis area encompasses multiple general vegetation communities and waterbody types that serve as fish and wildlife habitats. The eight major habitat types present are: forest and woodlands, grasslands and herbaceous, wetlands, shrub and scabland, agricultural, developed and disturbed, barren land, and open water. The vast majority of the analysis area consists of developed land and grass/herbaceous areas. Areas may be developed for industrial, residential, or transportation purposes. Habitat in developed areas is fragmented due to buildings and roads, with small, vegetated patches in the form of landscaping or city parks. Agricultural areas also experience anthropogenic disturbance, having been converted to cultivated crops and/or pasture/hay.

Grasslands and shrublands in the analysis area differ in structure and species composition depending on the ecoregion, elevation, soil conditions, moisture regimes, and fire history present in the area. While these communities typically occur on dry flats and plains, rolling hills, saddles, and ridges where precipitation is low; there are a couple outliers. Coastal sand dune and strand occurs along the Columbia River and has vegetation that tolerates both tidal and wind disturbances. Herbaceous bluffs are typically steep, and vegetation is minimal. However, the common grasslands and shrublands are dominated by forbs, grasses, and/or shrub species. Fire has historically played an important role in maintaining grassland and shrubland communities and served as a cyclical disturbance regime.

Several forest types occur within the analysis area, primarily in the Cascade Mountain Range. Forests can be coniferous dominant, deciduous dominant, or coniferous/deciduous mixed, depending on disturbance regime, soil type, elevation, slope, and aspect. Most common conifers are Doug-fir (*Pseudotsuga menzeisii*), western hemlock (*Tsuga heterophylla*) and the most common deciduous species are bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), with various poplar (Populus spp.) and willow (Salix spp.) species. The understory can vary from shrubby trees such as vine maple (*Acer circutum*), to grass and forb dominant. Drier sites may have more Ponderosa pine (*Pinus ponderosa*) and Juniper species (*Juniperus spp*.), and a shrubby or grassy understory.

Wetlands are areas where water saturation is the dominant factor that determines the soil type/development, as well as the types of plants and animals that can inhabit these areas (Cowardin

et al. 1979). Wetlands are sparsely distributed in the analysis area but are found in all counties crossed by the Project in Oregon (see Exhibit J). Bare ground, cliffs, and talus cover only small areas of land at each occurrence and are rare in the analysis area.

Each of the general vegetation communities and waterbody types, discussed above, can be further defined into subtypes based on the dominant plant species found within a vegetation community, or the hydraulic regime that controls the waterbody. Refining these general vegetation/waterbody types into subtypes is important when discussing fish and wildlife use, because species composition can differ according to the specific conditions found within each subtype. For example, the wildlife species composition found in a forested wetland would likely be different from what would be found in an emergent wetland. Table 1 describes the general vegetation/waterbody types, as well as the subtypes found within the analysis area based on National Land Cover Data, NatureServe Ecosystems, and field survey data. For the descriptions of landcover and habitats, the analysis area is divided into in-river areas and overland areas to differentiate between the portions of the Project corridor that were surveyed on land. The overland study area is where wildlife and vegetation surveys were conducted, where the Project alignment transitions from the Columbia River and crosses land to each of the converter stations in the Dalles and Portland. The in-river study area was assessed by desktop analysis to cover the riparian and shoreline areas of the Columbia River where the cable is located in the river and is presented in Table 2. Table 3 lists the mapped areas of each of the habitat types from GIS.

Table 1. Description and Definition of General Habitat Types within the Overland Study Area.

General Vegetation Type	Habitat Type	Description[1]
Agriculture	Cultivated Crops	This system has crop cover of more than 20%. Common crops in the area include apples, cherries, grapes, and hay. Cultivated croplands and modified grasslands are typically plowed and harvested seasonally.[2]
	Pasture/Hay	Typically, pasture/hay agriculture includes areas of grasses, legumes, or mixtures of the two, where the pasture/hay is more than 20% of vegetation cover. Pastures are mowed, hayed, or grazed one or more times a year.[2]
Developed & Disturbed	Industrial	Industrial areas typically contain native and non-native vegetation, in the form of landscaping around buildings. May also contain invasive and nonnative plants that establish in disturbed landscapes.
	Residential	Residential areas typically contain more vegetation than industrial areas, as they have both native and non-native species in the form of ornamental plants used in landscaping around buildings. Invasive plants may also become established in these disturbed landscapes.
	Other	Other types of developed and disturbed land in the area includes recently burned grassland and unconsolidated shorelines.
Barren Land	Rock/Sand/Clay	Bare ground or areas with limited vegetation consist of lands where the endemic site conditions are unsuitable for consistent vegetative communities to develop, and where the predominant habitat features are related to geological structures as opposed to vegetative components. These areas include bedrock, cliffs, rock, volcanic material, glacial debris, gravel pits, and talus habitats, as well as areas where soil conditions prohibit the growth of most plant species. Vegetation cover is typically less than 15% of total cover.

General Vegetation Type	Habitat Type	Description[1]
Open Water & Unvegetated Wetland	Ponds and Lakes	Ponds and lakes are permanently flooded lands lying below the deep-water boundary of wetlands, which do not fall into the river and stream classifications.
	Perennial Rivers and Streams	Perennial rivers and streams consist of waterbodies that have a year-round flow of water.
	Intermittent Streams	Intermittent streams consist of waterbodies that do not have a year-round flow of water.
Forest & Woodland	North Pacific Lowland Riparian Forest and Shrubland	This ecosystem occurs on floodplains and riverine areas where flooding is the primary driver of ecosystem processes. It can be dominated by herbaceous, shrubby, and deciduous species, depending on the successional stage. Common deciduous plants include bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), Oregon ash (*Fraxinus latifolia*), red osier dogwood (*Cornus sericea*), big cottonwood (*Populus trichocarpa*), and several willow species (*Salix* spp.)
	North Pacific Lowland Mixed Hardwood Conifer Forest and Woodland	Occurs in low elevations on valley terraces and slopes. May be coniferous/deciduous mixed or coniferous dominant, which is more common in later successional stages. Common conifers include Doug-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and grand fir (*Abies grandis*). Common deciduous species include bigleaf maple, red alder, and cascara (*Frangula purshiana*). The understory has forbs as well as both evergreen and deciduous shrubs, such as salal (*Gaultheria shallon*) and snowberry (*Symphoricarpus albus*).
	Dry-Mesic Douglas-fir/Western Hemlock Forest; Mesic-Wet Douglas-fir/Western Hemlock Forest	The Dry-Mesic Douglas-Fir/Western Hemlock Forest occurs on west slopes of the Cascade Mountain Range and on the edges of the Willamette Valley. Doug-fir is typically dominant in the overstory, with western hemlock codominant in older stands. Otherwise, western hemlock is in the subcanopy along with grand fir, western redcedar (*Thuja plicata)*, and big maple. Common species in the understory include salal, Oregon grape (*Mahonia nervousa*), vine leaf maple (*Acer circinatum*), pacific rhododendron (*Rhododendron macrophyllum*), huckleberry (*Vaccinium ovatum*), and western sword fern (*Polystichum munitum*). Sword fern cover of more than 40% indicates the system is the Mesic-Wet Douglas-fir/Western Hemlock Forest type. However, these two types can intermingle in drier areas. The wet forest differs from the dry in that it has moister soil, higher abundance of shade and moisture tolerant plants, and less frequent fires. Dominant overstory species include Doug-fir, western hemlock, and/or western redcedar. Big leaf maple and red alder are common at lower elevations. In the herb and shrub layers, sword fern, salal, Oregon grape, pacific rhododendron, vine leaf maple, salmonberry (*Rubus spectabilis*), and redwood sorrel (*Oxalis oregana*) are common.
	North Pacific Oak Woodland	Dry sites dominated by deciduous trees, mainly Oregon white oak (*Quercus garryana*), although codominance with Doug-fir and Ponderosa pine (*Pinus ponderosa*) may occur. In the absence of fire, a conifer dominant forest with a shrub understory will form.

General Vegetation Type	Habitat Type	Description[1]
	Columbia Plateau Western Juniper Woodland and Savanna	The western juniper (*Juniperus occidentalis*) is commonly the only tree species, but Ponderosa pine and Jeffrey pine (*Pinus jeffreyi*) may also be present. The understory is open shrub-steppe. Common species in the understory include big sagebrush (*Artemesia tridentata*), rabbitbrush (*Chrysothamnus viscidiflorus* and *Ericameria teretifolia*), bitterbrush (*Purshia tridentata*) and various perennial bunchgrasses such as Idaho fescue (*Festuca idahoensis*) and Sandberg bluegrass (*Poa secunda*). Grazing is common throughout this system and has allowed western juniper to expand into adjacent shrub steppe and grasslands.
	East Cascades Oak-Ponderosa Pine Forest and Woodland	Occurs within 40 miles of the Columbia River Gorge in the East Cascades and Columbia Plateau Ecoregions. Common dominant species include Oregon white oak, Ponderosa pine, and Doug-fir. The understory can vary from grass/herbaceous dominant to shrub-steppe. Shrub species may include bitterbrush, big sagebrush, rabbitbrush, Idaho fescue, and in wetter areas, some sedges (*Carex* spp.). Invasive species such as cheatgrass (*Bromus tectorum*) and bulbous grass (*Poa bulbosa)* are common. In the study area, the system also occurs in transitional areas in the Cascades, where snowberry, ocean spray, and deer brush (*Ceanothus integerrimus*) are common in the understory. Ponderosa pine and Doug-fir have invaded these systems at the lower treeline in the gorge and east Cascade foothills due to fire suppression.
	North Pacific Montane Riparian Woodland and Shrubland	Occurs along streambanks and floodplains. Deciduous species are dominant, but Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) may occur in some sites at higher elevations. Several poplar species (*Populus* spp.), alder species (*Alnus* spp.) and willow species (*Salix* spp.) are present, as well as vine maple (*Acer circinatum*) and stink currant (*Ribes bracteosum*). Disturbance through flooding, scour, and deposition are essential to the maintenance of this system.
Shrub & Scrubland	Inter-Mountain Big Sagebrush Shrubland	Big sagebrush is the dominant vegetation, with juniper species (*Juniperus* spp.) and saltbrush (*Atriplex* spp.) present in some areas. Rabbitbrush, bitterbrush, and mountain snowberry (*Symphoricarpos oreophilus*) become more dominant in disturbed areas. Common grasses include Idaho fescue, Sandberg bluegrass, thickspike wheatgrass (*Elymus lanceolatus),* Indian ricegrass (*Achnatherum hymenoides*), and wild rye (*Leymus cinereus*).
	Columbia Plateau Scabland Shrubland	Vegetation cover is typically less than 50% in these systems, although moss and lichen can be up to 60% of ground cover in undisturbed areas. Vegetation that does occur is typically scabland sagebrush (*Artemesia rigida*) and wild buckwheat species (*Eriogonum* spp.). Sparse perennial bunchgrasses, including Idaho fescue and Sandberg bluegrass, as well as forbs, including *Phlox*, *Sedum*, *Allium*, and *Balsamorhiza* species, may occur at some sites.
	Inter-Mountain Basins Mixed Salt Desert Scrub	Characterized by open to moderately dense shrubland with at least one saltbrush (*Atriplex* spp.) species present. Big sagebrush and rabbitbrush may occur in some locations. Perennial grasses such as Indian ricegrass, thickspike wheatgrass, and Sandberg bluegrass may occur in low to moderate densities.

General Vegetation Type	Habitat Type	Description[1]
Grasslands & Herbaceous	Willamette Valley Upland Prairie and Savanna	Occurs on flat to gently sloping terrain and can occur in various patch sizes in wet prairies and riparian forests. It has historically been maintained by anthropogenic fires, as sites without disturbance often succeed into forests. Deciduous or conifer species, such as Oregon white oak or Doug-fir may occur, but their occurrence is sparse. Perennial bunchgrasses are the dominant vegetation, primarily Idaho fescue and California oatgrass (*Danthonia californica*).
	Columbia Plateau Steppe and Grassland	This system is similar to big sagebrush steppe but has more frequent fires (occurring less than every 20 years). Due to frequent burning, the shrub layer is minimal (less than 10%) and has been permanently converted to grassland. Perennial bunchgrasses and forbs are more than 25% of plant cover, with common species including Idaho fescue, Sandberg's bluegrass, and astragalus species (*Astragalus* spp.). Rabbitbrush and sagebrush may occur in disturbed areas.
	Introduced Upland Vegetation – Annual Grassland	Characterized by heavily disturbed/altered land that has become dominated by introduced annual grasses. Various brome species (*Bromus* spp.) are common, especially cheatgrass. Medusahead (*Taeniatherum caput-medusae*) and common mediterranean grass (*Schismus barbatus*) may also occur.
	North Pacific Maritime Coastal Sand Dune and Strand	Within the study area, sand dunes and strands occur on islands of the Columbia River and along its shores. Vegetation typically includes herbs, shrubs, and tree species that can tolerate wind and tidal disturbances. Red fescue (*Festuca rubra*) and American dunegrass (*Leymus mollis*) are common grasses. Common shrub species include salal and huckleberry (*Vaccinium ovatum*). Dunes may be forested, with dominant species depending on successional stage. Earlier stages include shore pine (*Pinus contorta* var. *contorta),* and later stages may have western hemlock and/or Doug-fir.
	Columbia Basin Foothill and Canyon Dry Grassland	Occurs on steep, open slopes along the Columbia River. Slope failure and fire frequency, which is less than 20 years, are major disturbance processes. Grasses, cacti, and forbs are the dominant vegetation cover. Common grass species include Idaho fescue and Bluebunch wheatgrass (*Pseudoroegneria spicata).* Deciduous shrubs such as snowberry (*Symphoricarpos* spp.), ocean spray (*Holodiscus discolor*), and currants or gooseberries (*Ribes* spp,) may invade systems where fire is excluded.
Wetlands	North Pacific Intertidal Freshwater Wetland	Occurs along the tidally influenced portions of the Columbia and Willamette Rivers. Vegetation varies between wetlands due to differences in tidal flooding and soil characteristics, but typical dominant species include some trees and several forbs, including Sitka spruce (*Picea sitchensis*), red alder, red osier dogwood, western watermilfoil (*Myriophyllum hippuroides*), narrowleaf cattail (*Typha angustifolia*), lady fern (*Athyrium filix-femina*), and Lyngbye's sedge (*Carex lyngbyei*).
	Temperate Pacific Freshwater Emergent Marsh	These freshwater wetlands occur in floodplains that are either semi permanently or seasonally flooded. Graminoids such as sedges, rushes (*Juncus* spp.), and common cattail (*Typha latifolia*), typically dominate. Emergent and floating vegetation includes bulrushes (*Scirpus* spp.), cattails, sedges (*Eleocharis* and *Carex* spp.), canary grass (*Phalaris* spp.), wapato (*Sagittaria* spp.), water hemlock (*Cicuta* spp), yellowcress (*Rorippa* spp,), and monkeyflower (*Mimulus* spp.).

General Vegetation Type	Habitat Type	Description[1]
	North Pacific Hardwood-Conifer Swamp	Occurs along the Columbia River Valley on flat to gentle slopes, and in small patches. In the Willamette Valley, these systems are typically dominated by hardwoods, mainly Oregon white ash, rather than conifers. Overstory is less than 50%, but the understory has a dense cover of shrubs.

1. https://explorer.natureserve.org/
2. https://www.mrlc.gov/data/legends/national-land-cover-database-class-legend-and-description

Table 2. Description and Definition of General Habitat Types within the In-River Analysis Area.

General Vegetation Type	Habitat Type	Description[1]
Agriculture	Cultivated Crops	This system has crop cover of more than 20%. Common crops in the area include apples, cherries, grapes, and hay. Cultivated croplands and modified grasslands are typically plowed and harvested seasonally. [2]
	Pasture/Hay	Typically, pasture/hay agriculture includes areas of grasses, legumes, or mixtures of the two, where the pasture/hay is more than 20% of vegetation cover. Pastures are mowed, hayed, or grazed one or more times a year.[2]
Developed & Disturbed	Industrial	Industrial areas typically contain native and non-native vegetation, in the form of landscaping around buildings. May also contain invasive and nonnative plants that establish in disturbed landscapes.
	Residential	Residential areas typically contain more vegetation than industrial areas, as they have both native and non-native species in the form of ornamental plants used in landscaping around buildings. Invasive plants may also become established in these disturbed landscapes.
	Other	Other types of developed and disturbed land include recently burned grassland, harvested forest – grass/forb regeneration; harvested forest – NW conifer regeneration; and unconsolidated shorelines.
Barren Land	North Pacific Montane Massive Bedrock, Cliff, and Talus	Vascular plant cover is less than 10%, but nonvascular species may cover over 10% of sites. Includes steep cliff faces, narrow canyons, large rock outcrops, and unstable scree and talus. Sparse vegetation may grow in areas where there are cracked rocks and less steep or more stable slopes. Species that may grow include Nootka cypress (*Callitropsis nootkatensis*), hemlock species (*Tsuga* spp.), *Thuja plicata*, Doug-fir, fir species (*Abies* spp.), and shrubs such as vine maple, green alder (*Alnus viridis*), and currants or gooseberries.
	Rocky Mountain Cliff, Canyon and Massive Bedrock	Plant cover is typically less than 10%, as sites are very dry. Includes steep cliff faces, narrow canyons, small rock outcrops, and unstable scree and talus slopes. At lower elevations, tree and shrub species may grow in small or scattered patches. Common tree species include Doug-fir, Ponderosa pine, limber pine (*Pinus flexilis*), quaking aspen (*Populus tremuloides),* and few fir species. Shrubs that may grow include junipers, *Holodiscus* species, roses (*Rosa* spp.), ninebark (*Physocarpus* spp.), creeping Oregon grape (*Mahonia repens*), and currants or gooseberries.
	Rock/Sand/Clay	Bare ground or areas with limited vegetation consist of lands where the endemic site conditions are unsuitable for consistent vegetative communities to develop, and where the predominant habitat features are related to geological structures as opposed to vegetative components. These areas include bedrock, cliffs, rock, volcanic material, glacial debris, gravel pits, and talus habitats, as well as areas where soil conditions prohibit the growth of most plant species. Vegetation cover is typically less than 15% of total cover.
Open Water & Unvegetated Wetland	Ponds and Lakes	Ponds and lakes are permanently flooded lands lying below the deep-water boundary of wetlands, which do not fall into the river and stream classifications.
	Perennial Rivers and Streams	Perennial rivers and streams consist of waterbodies that have a year-round flow of water.

General Vegetation Type	Habitat Type	Description[1]
	Intermittent Streams	Intermittent streams consist of waterbodies that do not have a year-round flow of water.
Forest & Woodland	North Pacific Lowland Mixed Hardwood Conifer Forest and Woodland	Occurs in low elevations on valley terraces and slopes. May be coniferous/deciduous mixed or coniferous dominant, which is more common in later successional stages. Common conifers include Doug-fir, western hemlock, and grand fir. Common deciduous species include bigleaf maple, red alder, and cascara. The understory has forbs as well as both evergreen and deciduous shrubs, such as salal and snowberry.
	North Pacific Lowland Riparian Forest and Shrubland	This ecosystem occurs on floodplains and riverine areas where flooding is the primary driver of ecosystem processes. It can be dominated by herbaceous, shrubby, and deciduous species, depending on the successional stage. Common deciduous plants include bigleaf maple, red alder, Oregon ash, red osier dogwood, big cottonwood, and several willow species.
	Maritime Dry-Mesic Douglas-fir/Western Hemlock Forest; Maritime Mesic – Wet Douglas-fir/Western Hemlock Forest	The Dry-Mesic Douglas-Fir/Western Hemlock Forest occurs on west slopes of the Cascade Mountain Range and on the edges of the Willamette Valley. Doug-fir is typically dominant in the overstory, with western hemlock codominant in older stands. Otherwise, western hemlock is in the subcanopy along with grand fir, *Thuja plicata*, and big maple. Common species in the understory include salal, Oregon grape, vine leaf maple, pacific rhododendron, huckleberry, and western sword fern. Sword fern cover of more than 40% indicates the system is the Mesic-Wet Douglas-fir/Western Hemlock Forest type. However, these two types can intermingle in drier areas. The wet forest differs from the dry in that it has moister soil, higher abundance of shade and moisture tolerant plants, and less frequent fires. Dominant overstory species include Doug-fir, western hemlock, and/or *Thuja plicata*. Big leaf maple and red alder are common at lower elevations. In the herb and shrub layers, sword fern, salal, Oregon grape, pacific rhododendron, vine leaf maple, salmonberry, and redwood sorrel are common.
	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	Most commonly occur on moderate to very steep slopes or ridgetops. Ponderosa pine is the dominant overstory species. The understory shrub layer can be dominant or patchy depending on fire regime. Common shrubs include big sagebrush, bitterbrush, snowberry, rose species, manzanita species (*Arctostaphylos* spp.), chokecheery (*Prunus virginiana*), and serviceberry (*Amelanchier alnifolia).* In the open, savanna areas, grasses and forbs may include fire-resistant species such as Bluebunch wheatgrass (*Pseudoroegneria spicata*), stipa (*Hesperostipa* spp.), ricegrasss (*Achnatherum* spp.), and Idaho fescue.

General Vegetation Type	Habitat Type	Description[1]
	East Cascades Oak-Ponderosa Pine Forest and Woodland	Occurs within 40 miles of the Columbia River Gorge in the East Cascades and Columbia Plateau Ecoregions. Common dominant species include Oregon white oak, Ponderosa pine, and Doug-fir. The understory can vary from grass/herbaceous dominant to shrub-steppe. Shrub species may include bitterbrush, big sagebrush, rabbitbrush, Idaho fescue, and in wetter sets, some sedges. Invasive species such as cheatgrass and bulbous grass are common. In the study area, the system also occurs in transitional areas in the Cascades, where snowberry, ocean spray, and deer brush are common in the understory. Ponderosa pine and Doug-fir have invaded these systems at the lower treeline in the gorge and east Cascade foothills due to fire suppression.
	North Pacific Dry Douglas-fir (Madrone) Forest and Woodland	Occurs within the Willamette Valley Ecoregion of the study area. Doug-fir is the dominant overstory species, but pacific madrone (*Arbutus menziesii*), lodgepole pine (*Pinus contorta*), bigleaf maple, and grand fir may be codominant or locally dominant species. Pacific madrone will be dominant where high severity fires are common.
	North Pacific Montane Riparian Woodland and Shrubland	Occurs along streambanks and floodplains at medium to high elevations, but below alpine systems. Deciduous species are dominant, but Sierra lodgepole pine may occur in some sites at higher elevations. Several poplar species, alder species, and willow species are present, as well as vine maple and stink currant. Disturbance through flooding, scour, and deposition are essential to the maintenance of this system.
	North Pacific Oak Woodland	Dry sites dominated by deciduous trees, mainly Oregon white oak, although codominance with Doug-fir and Ponderosa pine may occur. In the absence of fire, a conifer dominant forest with a shrub understory will form.
	Broadleaf Landslide Forest and Shrubland	Occurs on steep slopes and bluffs where major landslides happen. Dominant tree species are typically red alder and big leaf maple, with common shrubs including salmonberry, thimbleberry (*Rubus parviflorus*), stink currant, and devil's club (*Oplopanax horridus*). Areas with sparse or herbaceous dominant vegetation can also occur, with Arctic sweet coltsfoot (Petasites frigidus) common. Once the system is stable, it will succeed to conifer dominance.
Shrub & Shrubland	Columbia Plateau Scabland Shrubland	Vegetation cover is typically less than 50% in these systems, although moss and lichen can be up to 60% of ground cover in undisturbed areas. Vegetation that does occur is typically scabland sagebrush and wild buckwheat species. Sparse perennial bunchgrasses, including Idaho fescue and Sandberg bluegrass, as well as forbs, including *Phlox*, *Sedum*, *Allium*, and *Balsamorhiza* species, may occur at some sites.
	Inter-Mountain Big Sagebrush Shrubland	Big sagebrush is the dominant vegetation, with juniper species and saltbrush present in some areas. Rabbitbrush, bitterbrush, and mountain snowberry become more dominant in disturbed areas. Common grasses include Idaho fescue, Sandberg bluegrass, thickspike wheatgrass, Indian ricegrass, and wild rye.

General Vegetation Type	Habitat Type	Description[1]
Grassland & Herbaceous	North Pacific Maritime Coastal Sand Dune and Strand	Within the study area sand dunes and strands occur on islands of the Columbia River and along its shores. Vegetation typically includes herbs, shrubs, and tree species that can tolerate wind and tidal disturbances. Red fescue and American dunegrass are common grasses. Common shrub species include salal and huckleberry. Dunes may be forested, with dominant species depending on successional stage. Earlier stages include shore pine and later stages may have western hemlock and/or Doug-fir.
	North Pacific Herbaceous Bald and Bluff	Occurs within the Willamette Valley and West Cascades Ecoregions of the study area. Sites are typically dry, sunny, and steep. Therefore, there is minimal to no tree growth except in savanna type sites where Doug-fir or Oregon white ash may occur. Grasses are typically dominant although forbs and small shrubs may also be present. Common grasses include Idaho fescue, California oatgrass, Lemmon's stipa (*Achnatherum lemmonii*), and prairie junegrass (*Koeleria macrantha*). Common forbs include Camas species (*Camassia* spp.), white brodiaea (*Triteleia hyacinthine*), and desert parsley (*Lomatium martindalei*). Common dwarf-shrubs include manzanita species and common juniper (*Juniperus communis*). Rocky outcrops may be dominated by mosses and lichens.
	Willamette Valley Upland Prairie and Savanna	Occurs on flat to gently sloping terrain and can occur in various patch sizes in wet prairies and riparian forests. It has historically been maintained by anthropogenic fires, as sites without disturbance often succeed into forests. Deciduous or conifer species, such as Oregon white oak or Doug-fir may occur, but their occurrence is sparse. Perennial bunchgrasses are the dominant vegetation, primarily Idaho fescue and California oatgrass.
	Columbia Basin Foothill and Canyon Dry Grassland	Occurs on steep, open slopes along the Columbia River. Slope failure and fire frequency, which is less than 20 years, are major disturbance processes. Grasses, cacti, and forbs are the dominant vegetation cover. Common grass species include Idaho fescue and Bluebunch wheatgrass. Deciduous shrubs such as snowberry, ocean spray, and currants or gooseberries may invade systems where fire is excluded.
	Introduced Upland Vegetation – Annual Grassland	Characterized by heavily disturbed/altered land that has become dominated by introduced annual grasses. Various brome species are common, especially cheatgrass. Medusahead and common mediterranean grass may also occur.
	Columbia Plateau Steppe and Grassland	This system is similar to big sagebrush steppe but has more frequent fires (occurring less than every 20 years). Due to frequent burning, the shrub layer is minimal (less than 10%) and has been permanently converted to grassland. Perennial bunchgrasses and forbs are more than 25% of plant cover, with common species including Idaho fescue, Sandberg's bluegrass, and astragalus species. Rabbitbrush and sagebrush may occur in disturbed areas.

General Vegetation Type	Habitat Type	Description[1]
	Inter-Mountain Basins Active and Stabilized Dune	Includes anchored dunes with less than 30% vegetation cover, migrating, bare dunes, and stabilized dunes that are likely be migrate again. Any vegetation that does occur typically forms grasslands, shrublands, or steppe habitats, although the occasional woodland can occur. Shrub species are dominant in mid-late seral stands, and may include sagebrushes (*Artemsia* spp.), bitterbrush, rabbitbrush, and fourwing saltbrush (*Atriplex canescens*). Grasses are common in early seral stages and may include sand wildrye (*Leymus flavescens*), Ephedra species (*Ephedra* spp.), Indian ricegrass, and blowout grass (*Redfieldia flexuosa*).
Wetlands	Willamette Valley Wet Prairie	Temporarily and seasonally flooded high-nutrient wetlands within the Willamette Valley Ecoregion. Due to agricultural conversion and grazing, these systems now only occur in small patches. Grasses are dominant, and typically include tufted hairgrass (*Deschampsia cespitosa*), common camas (*Camassia quamash*), and sedges. Forbs like Nuttall's quillwort (*Isoetes nuttallii*) and shrubs like Nootka rose (*Rosa nutkana*) may dominate some sites.
	Temperate Pacific Freshwater Emergent Marsh	These freshwater wetlands occur in floodplains that are either semi permanently or seasonally flooded. Graminoids such as sedges, rushes, and common cattail typically dominate. Emergent and floating vegetation includes bulrushes, cattails, sedges, canary grass, wapato, water hemlock, yellowcres, and monkeyflower.
	North Pacific Intertidal Freshwater Wetland	Occurs along the tidally influenced portions of the Columbia and Willamette Rivers. Vegetation varies between wetlands due to differences in tidal flooding and soil characteristics, but typical dominant species include some trees and several forbs, including Sitka spruce, red alder, red osier dogwood, western watermilfoil, narrowleaf cattail, lady fern, and Lyngbye's sedge.
	Temperate Pacific Freshwater mudflat	Occurs in seasonally flooded floodplain lakebeds. They may be sparsely to densely vegetated with low growing herbaceous species, depending on fluctuating water levels and mudflat exposure. Dominant vegetation may include blunt spikerush (*Eleocharis obtuse*), western grasswort (*Lilaeopsis occidentalis*), common pygmyweed (*Crassula aquatica*), and water purslane (*Ludwigia palustris*).
	North Pacific Hardwood-Conifer Swamp	In the study area, this system occurs along the Columbia River Valley. Usually occurs on flat to gentle slopes and in small patches. In the Willamette Valley, these systems are typically dominated by hardwoods, mainly Oregon white ash, rather than conifers. Overstory is less than 50%, but the understory has a dense cover of shrubs.
	North Pacific Shrub Swamp	Occurs in seasonally flooded depressions, lakes, ponds, and river terraces. Deciduous broadleaf shrubs are dominant, mostly Sitka alder (*Alnus viridis ssp. sinuate*) but several willow species, red osier dogwood, other alders (*Alnus* spp.), Douglas spiraea (*Spiraea douglasii*), and Oregon crabapple (*Malus fusca*) can also dominate. Hardwood dominated stands, namely by Oregon white ash may also occur, with sedges, water horsetail (*Equisetum fluviatile*), and western skunk cabbage (*Lysichiton americanus*) in the understory. This hardwood shrub swamp system is only considered in this category when not surrounded by conifer forests.

1. https://explorer.natureserve.org/
2. https://www.mrlc.gov/data/legends/national-land-cover-database-class-legend-and-description

Table 3. Area of Habitat Types and Subtypes in the Overland Study Area

Habitat Type	Area (acres)	Percent of Study Area
Agriculture	14.4	0.8
Developed/Disturbed	604.8	32.9
Barren Land	23.8	1.3
Deciduous Forest	54.5	3
Evergreen Forest	677.1	36.9
Mixed Forest	102.3	5.6
Grasslands and Herbaceous	93.4	5.1
Shrub and Scrubland	150.5	8.2
Wetlands	113.2	6.2

3.1.1 Agriculture, Pastures, and Mixed Environs

Agricultural land consists of areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle (USGS 2024). This land cover is represented in the study area by open grassy areas south of the town of North Bonneville (Appendix A, photo 2). Unimproved pastures are predominantly grassland sites that may or may not be grazed by livestock and include rangelands planted with exotic grasses that are found on private land, state wildlife areas, and federal wildlife refuges. These areas provide habitat for many wildlife species including small mammals and insects.

3.1.2 Developed/Disturbed

Developed/disturbed areas include the existing roads (SR-14, Ash Lake Road, Fort Cascades Drive), and open space associated with the Burlington Northern Railroad and the Columbia Gorge Museum (Appendix A, photos 6 and 12). The majority of these areas are impervious soils or open, cleared spaces with minimal vegetation growth. Vegetation that occurs within these areas are primarily ruderal species (i.e., species that colonize or thrive in disturbed areas).

Developed land cover in the study area accounts for the second largest component behind evergreen forest. Much of the Project corridor is routed through existing developed areas, primarily roads and roadside gravel areas that offer little to no habitat value to wildlife species. These areas generally lack wildlife habitat features and are a risk to wildlife. Developed unvegetated surfaces without vehicle or foot traffic (e.g., roofs) may have some habitat value because structures may provide cover, perch, and even nesting opportunities.

3.1.3 Barren Land

Baren land is defined as areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover (USGS 2024). Barren land cover in the analysis area is the extensive shoreline armoring along the bank of the Columbia River along the tailrace downstream of Bonneville Dam as well as the shoreline banks of the islands that are part of the dam facility. This armoring consists of rock and rip rap, is almost entirely unvegetated, and provides little to no habitat value for wildlife and poorly functioning stream bank habitat for fish. These areas are in the analysis area but located outside the footprint of the project for trenching and cable installation.

3.1.4 Deciduous Forest

Deciduous forest is defined as areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change (USGS 2024). Patches of deciduous forest in the analysis area predominantly occur on Hayden Island and in riparian areas along Columbia Slough in the western end of the Project. These forested areas are outside the Project footprint for the trenching and cable installation.

3.1.5 Evergreen Forest

Evergreen forest includes areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year (USGS 2024). Evergreen and mixed forest land cover accounts for the largest portion of landcover adjacent to the project footprint in the west end of the Project. The Project is designed to be installed within existing cleared areas and road prism along the cable route to avoid impacts to forested, riparian, and wetland habitats.

3.1.6 Mixed Forest

Mixed forest is defined as areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover (USGS 2024). Similar to the distribution of deciduous forest, patches of deciduous forest in the study area occur in riparian areas primarily on Hayden Island and along Columbia Slough, as well as larger areas in the western end of the study area southeast of Bonneville Dam. These areas are outside the Project footprint for the trenching and cable installation.

3.1.7 Grassland/Herbaceous

Grassland and herbaceous vegetation communities include uncultivated areas dominated by gramanoid or herbaceous vegetation, generally accounting for greater than 80% of total vegetation cover (USGS 2024). Areas mapped as grassland are predominantly in the east end of the Project corridor (Appendix A, photos 1,2).

This landcover also includes areas along roadways that are maintained for vehicular safety and are regularly mowed. These areas are disturbed regularly with maintenance actions, herbicide application, roadway noise, and pollution. These areas are dominated by nonnative grasses and forbs with scattered scotch broom and blackberry. There is limited habitat structure, and the periodic maintenance causes high disturbance. These areas may provide some browsing habitat for herbivores such as deer, rabbits, and rodents, and some limited foraging habitat for birds.

3.1.8 Shrub/Scrub

Landcover classified as shrub/scrub includes areas dominated by shrubs less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation (USGS 2024). This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions. Shrubland habitat includes areas where the shrub components account for 5 percent or more of the vegetation cover.

Invasive shrubs dominate some areas, including dense Himalayan blackberry and Scotch broom, often with nonnative herbaceous layer. These areas may be part of the maintained ROW, but invasive shrubs persist. There is low habitat structure, and the amount of disturbance is high, making these areas low value habitats for wildlife; although, they may provide some cover for small mammals and nesting habitat for birds. Shrubland habitat includes areas in the Dalles as well as some roadside areas throughout the corridor.

3.2 Rare and Special Status Plants

HDR conducted a desktop analysis to create a list of special status plant species with the potential to occur within the study area. Special Status Plants include species listed under the federal ESA (16 U.S.C §1531 et seq.) or state-listed endangered, threatened, candidate, or sensitive vascular plant species as defined by Oregon 603-073-0002. Specific sources of information that were reviewed include:

- USFWS species lists for Multnomah and Wasco Counties (USFWS 2024a).
- Oregon Department of Agriculture. Oregon Listed and Candidate Plants (2018).
- Oregon Biodiversity Information Center (ORBIC). Rare, Threatened, and Endangered Species of Oregon (2019).

Based on the background review, ORBIC identifies Barrett's penstemon (*Penstemon barrettieae*), a state candidate species, in several locations along the Columbia River. These include observations near Koberg Beach state Recreation Site, with latest observations recorded in 2004. Barrett's penstemon is also recorded along the banks of the Columbia River in Hood River and just west of it, with the most recent observations documented in 1954 and 1931, respectively. It has been observed near Bonneville Dam, with the most recent observations documented in 2013. Columbia cress (*Rorippa columbiae*), a state candidate species, is recorded growing on the shores of the Columbia River near Warrendale and Troutdale. It was last observed near Warrandale in 1984 and Troutdale in 2013. HDR biologists did not observe any individuals of Barrett's penstemon or Columbia cress growing within the study area.

Table 4 lists the special status plant species that were identified as potentially occurring in the project vicinity following a review of the resources listed above. These species were analyzed as part of desktop review and field surveys, as described below.

Table 4. Special Status Plant Species Potentially Occurring in the Study Area

Species	Federal Status	State Status
Barrett's penstemon *Penstemon barrettieae*	None	C
Columbia cress *Rorippa columbiae*	None	C
Dwarf evening-primrose *Eremothera pygmaea*	None	C
Golden paintbrush *Castilleja levisecta*	DL	E
Hepatic monkeyflower *Erythranthe jungermannioides*	None	C
Howellia *Howellia aquatilis*	T	DL

Species	Federal Status	State Status
Howell's bentgrass *Agrostis howellii*	None	C
Howell's daisy *Erigeron howellii*	None	C
Northern wormwood *Artemesia campestris* var. *wormskoldii*	SOC	E
Oregon bolandra *Bolandra oregana*	None	C
Oregon daisy *Erigeron oreganus*	None	C
Oregon sullivantia *Sullivantia oregana*	SOC	C
Peacock larkspur *Delphinium pavonaceum*	SOC	E
Tall bugbane *Cimicifuga elata*	None	C
Sessile mousetail *Myosurus sessilis*	SOC	C
Suksdorf's lomatium *Lomatium suksdorfii*	None	C
White meconella *Meconella oregana*	SOC	C
White rock larkspur *Delphinium leucophaeum*	SOC	E
White-topped aster *Sericocarpus rigidus*	SOC	T
Willamette daisy *Erigeron decumbens*	E	E

T= Threatened, E= Endangered, C= Candidate, SOC = Species of Concern, S = Sensitive, PDL = Proposed Delisted, DL = Delisted

The majority of the terrestrial portion of the Project Corridor is located along paved roadways within disturbed ROW. Special status plant surveys were conducted in May and June 2024, concurrently with the habitat verification and mapping surveys. No special status plant species were observed during these surveys.

3.2.1 Noxious weeds

Noxious weed observations were noted concurrently with habitat verification and mapping and special status plant surveys. Surveys conducted in 2024 did not cover the entire Project study area but focused on the ground disturbed area in the project corridor; therefore, other state- and/or county-designated noxious weeds may also occur within the wider study area. Table 5 lists the noxious weeds documented in the study area and notes if observed during habitat surveys.

Table 5. Documented occurrences of noxious weeds in the Project corridor and vicinity.

Species	Habitat[1]	Class[2]
Bull Thistle *Cirsium vulgare*	Disturbed pastures, rangelands, roadsides, and recently logged areas. Potentially roadside of I-84, North Marine Drive, and Hayden Island.	B
Butterfly bush *Buddleja davidii*	Dry meadows, open slopes, and right-of-ways. Potentially near the Columbia River Slough and Smith and Bybee Wetlands.	B
Canada Thistle *Cirsium arvense*	Disturbed areas such as pastures, rangeland, lawns, roadsides, and waste areas. Also found in riparian areas and forests. Potentially	B

Species	Habitat[1]	Class[2]
	roadside of I-84, North Marine Drive, US Highway 30, and Hayden Island.	
Common Reed *Phragmites australis*	Wet areas such as wetlands, roadside ditches, and depressions. Potentially within wet roadside depressions of I-84, North Marine Drive, and North Columbia Boulevard.	B
Dalmatian Toadflax *Linaria dalmatica ssp. dalmatica*	Roadsides, pastures, rangelands, and waste areas.[3] Potentially roadside of I-84.	B, T
Diffuse Knapweed *Centaurea diffusa*	Riparian areas, rangelands, and disturbed sites such as roadsides and waste lots. Potentially within The Dalles, roadside of I-84, North Marine Drive, and North Columbia Boulevard.	B
English hawthorn *Crataegus monogyna*	Disturbed roadsides, fields, meadows, and forest edges. Potentially roadside of forested areas along I-84 and near the Columbia River Slough.	B
Field bindweed *Convolvulus arvensis*	Disturbed, open areas including fields, roadsides, and wastelots.[3] Potentially within The Dalles, roadside of I-84, North Marine Drive, and Hayden Island.	B
Goatsrue *Galega officinalis*	Pastures, streambanks, irrigation canals, moist meadows. Potentially along the Columbia River Slough.	A, T
Himalayan Blackberry *Rubus armeniacus*	Disturbed sites such as roadsides, railroad tracks, logged lands, field margins, and riparian areas.[3] Potentially growing in The Dalles, along I-84, North Marine Drive, and Hayden Island.	B
Hoary cress whitetop *Lepidium draba*	Disturbed areas such as roadsides and fields. Also found in sagebrush desert.[3] Potentially in The Dalles and along US Highway 30.	B
Houndstongue *Cynoglossum officinale*	Disturbed areas such as roadsides and ditches. Can also be found in fields, meadows, and forest edges.[3] Potentially found along I-84 and North Marine Drive.	B
Indigo bush *Amorpha fruticosa*	Disturbed, wet areas including roadsides, waste lots, and along streams.[3] Potentially in The Dalles, roadside of I-84, and Hayden Island.	B
Japanese knotweed *Fallopia japonica*	Riparian areas and disturbed sites such as roadsides and ditches.[3] Potentially roadside of I-84 and near the Columbia River Slough.	B
Kochia *Kochia scoparia*	Disturbed areas such as roadsides, ditches, and waste lots. Also found in pasture, rangeland, and cropland. Potentially within The Dalles, roadside of I-84, and near the Columbia River Slough.	B
Meadow knapweed *Centaurea pratensis*	Roadsides, riverbanks, irrigated pastures, moist meadows, grasslands, and other disturbed areas. Potentially found roadside of I-84.	B
Medusahead rye *Taeniatherum caput-medusae*	Disturbed sites such as roadsides and waste lots. Also found in sagebrush desert.[3] Potentially roadside of I-84, east of the Cascade crest.	B
Milk thistle *Silybum marianum*	Roadsides, waste areas, and pastureland. Potentially roadside of North Marine Drive.	B
Musk thistle *Carduus nutans*	Disturbed areas such as roadsides, ditches, and pastures. Potentially roadside of US Highway 30.	B
Parrot's feather *Myriophyllum aquaticum*	Lakes, ponds, streams, canals, and wet riverbanks. Potentially near the Columbia River Slough and Smith and Bybee Wetlands.	B
Perennial pepperweed *Lepidium latifolium*	Wetlands, rangeland, crop fields, roadsides, and irrigation ditches. Potentially along roadsides and irrigation ditches within The Dalles.	B, T
Poison Hemlock *Conium maculatum*	Streams, irrigation ditches, pasturelands. Potentially in roadside depressions or irrigation ditches in The Dalles, along I-84, Hayden Island, and US Highway 30.	B
Puncturevine *Tribulus terrestris*	Edges of fields, ditches, and roadsides. Can also grow in orchards and vineyards. Potentially in The Dalles, roadside of North Columbia Boulevard, and near Smith and Bybee Wetlands.	B

Species	Habitat[1]	Class[2]
Purple loosestrife *Lythrum salicaria*	Wetlands and other moist areas. Potentially near the Columbia River Slough and Smith and Bybee Wetlands.	B
Rush Skeletonweed *Chondrilla juncea*	Pastures, rangeland, cropland, roadsides, open and disturbed areas.[3] Potentially within The Dalles, roadside of I-84 and North Columbia Boulevard, and in Smith and Bybee Wetlands,	B, T
Scotch Broom *Cytisus scoparius*	Roadsides, pastures, grasslands, open areas, and disturbed areas.[3] Potentially roadside of I-84 west of the Cascade crest, along North Marine Drive, and on Hayden Island.	B
South American waterweed *Egeria densa*	Ponds, lakes, and other waterways. [3] Potentially near Smith and Bybee Wetlands and the Columbia River Slough.	B
Spotted knapweed *Centaurea stoebe*	Disturbed areas such as roadsides and wastelots. Also found in meadows, fields, and forest openings. Potentially roadside of I-84 and the North Industrial Area of Portland.	B, T
St. John's wort *Hypericum perforatum*	Disturbed areas such as roadsides, rangelands, trails, and logged lands. Potentially within The Dalles, roadside of I-84 and North Marine Drive, on Hayden Island, and in Smith and Bybee Wetlands.	B
Tansy Ragwort *Jacobaea vulgaris*	Disturbed roadsides, clear cuts, and pasturelands. Roadside of I-84 west of the Cascade crest, roadside of US Highway 30, and on Hayden Island.	B, T
Tree-of-Heaven *Ailanthus altissima*	Grows in a variety of habitats. Forest edges, woodlands, fence rows, roadsides, old fields, and urban parks.[3] Potentially within The Dalles and roadside of I-84.	B
Ventenata grass *Ventenata dubia*	Dry, open, and often disturbed habitats, but prefers sites that are inundated in early spring and dried out by late spring.[3] Potentially roadside of I-84.	B
Yellow flag iris *Iris pseudacorus*	Wetlands and other wet areas. Potentially roadside of wet areas along I-84, primarily west of the Cascade crest, and within Smith and Bybee Wetlands.	B
Yellow starthistle *Centaurea solstialis*	Disturbed areas such as roadsides and waste areas. Can also be found in pastureland, hay fields, meadows, and other open areas. Potentially along dry roadside areas of I-84, primarily east of the Cascade crest.	B
Yellow toadflax *Linaria vulgaris*	Disturbed roadsides, waste areas, and fields.[3] Potentially roadside of I-84 and North Columbia Boulevard, and near the Columbia River Slough.	B

1. Habitat descriptions from ODA : Oregon Noxious Weed Profiles : Oregon Noxious Weeds : State of Oregon unless otherwise noted.
2. The Oregon State Weed Control Board describes the classes as follows:
   Class "A" noxious weeds occur in small infestations within the state. They may also be in neighboring states and make it seem that occurrence in Oregon is imminent. The goals are eradication or intensive control.
   Class "B" noxious weeds are regionally abundant but may have a limited distribution in some counties. Limited, intensive control of infestations is decided at the state, county, or regional level on a case-by-case basis. Where a statewide management plan is not feasible, biological control (when available) will be the primary control method.
   Class "T" noxious weeds are weeds selected from the A or B list by the Oregon state Weed Board for priority prevention and control. Requires ODA to develop and implement a statewide management plan (Oregon Department of Agriculture, 2022).
3. Burke Herbarium Image Collection

3.3 Wildlife

This section summarizes special status wildlife species known or expected to occur in the study area, other wildlife observed at the Project (based on baseline wildlife surveys conducted in the study area), and the presence of Fish and Wildlife Habitat Conservation Areas (FWHCA), which are considered Critical Areas under City of North Bonneville 21.10.070.E., Skamania County Code 19.05 FWHCA, and City of Stevenson 18.13.095. Sources of information for the desktop reviews and the results of Project-specific surveys are indicated in each subsection.

3.3.1 Raptor and Nest Surveys

The study area is located within the Pacific Flyway and therefore provides habitat for a variety of raptors, land birds, and shorebirds protected under the Migratory Bird Treaty Act (MBTA). The Columbia River is the largest river in the Pacific Northwest. It provides habitat and food for numerous migratory bird species, including bald eagles and the western grebe (*Aechmophorus occidentalis*) (NOAA 2004). No dedicated raptor nest surveys or other aerial surveys occurred as part of this effort; however, incidental observations of raptor or other bird nests in the ROW were recorded during field surveys.

Occupancy of nests were documented based on observations at the time of the survey, and follow-up visits or pre-construction surveys may need to be conducted in order to confirm results as feasible.

A total of 4 adult bald eagles (*Haliaeetus leucocephalus*) and 1 juvenile bald eagle were observed during the field surveys. Two adults and one juvenile were observed flying near Ash Lake Rd, and the other 2 adults were observed flying then perching in large Douglas fir trees on the Oregon side of the Columbia River across from Hamilton Island (Figure 2, Appendix B). The adults observed may have been mated pairs, but no bald eagle nests were observed during the surveys; however, habitat in the surrounding areas is suitable and some nesting is likely beyond the study areas observed.

Osprey (*Pandion haliaetus*) and occupied osprey nests were observed in areas alongside the Columbia River. During the pedestrian surveys, five active osprey nests were observed, and two other nests were recorded, but these appeared to be inactive (Figure 2, Appendix B)

3.3.2 Special Status Wildlife

For purposes of this assessment, the term “special status wildlife” includes species listed under the federal ESA, state endangered species (designated in WAC 220-610-010), state threatened species (designated in WAC 220-200-100), state sensitive species (designated in WAC 220-200-100), state candidate species (designated and reviewed by WDFW per WAC 220-610-010), WDFW priority species (WDFW 2008), and eagles (protected under the Bald and Golden Eagle Protection Act (BGEPA) and WAC 220-610-100 for bald eagles). Nearly all native bird species are protected under the MBTA and therefore these species are addressed under General Wildlife rather than Special Status Wildlife, unless the species are also otherwise designated special status (e.g., state threatened birds).

Project biologists reviewed the list of ODFW listed and special status wildlife and other federally and locally protected species likely to be present in Multnomah and Wasco Counties and identified species that could be present based on the species’ distributions and the habitat types present in the study area. These are listed below in Table 6. These species were analyzed as part of desktop review and field surveys.

Table 6. Special Status Wildlife Potentially Present in the Study Area

Species	Federal Status	ODFW Status	Expected Habitat	Observed, Expected, or Potential Occurrence within Analysis Area	Potential Use of Habitat within Analysis Area
Birds					
Northern Spotted Owl *Strix occidentalis caurina*	T	E	Strongly associated with old-growth forests that are characterized by multi-storied canopies, several species of trees, sizes, and ages, and standing and downed dead trees.	Potential occurrence	Large tracts of mature conifer forest along the north and south sides of the Columbia River by Stevenson WA and west of Cascade Locks, OR.
Streaked horned lark *Eremophila alpestris strigata*	T	E	Large open areas in native prairies, sandy islands, coastal foredunes and spits, airports, fallow and active agricultural fields, mudflats, and sparsely vegetated edges of grass fields.	Expected	Documented occurrence in large, open fields and shoreline areas near Portland airport.
Bald Eagle *Haliaeetus leucocephalus*	None[a]	None	Forested areas in association with aquatic environments.	Observed	Nest observed on Hayden Island west of Project site boundary. Adults observed flying and roosting in forested areas near Cascade Locks and Smith and Bybee.
Golden eagle *Aquila chrysaetos*	None[a]	C	Open and semi-open habitats in tundra, shrublands, grasslands, woodland brushlands, and coniferous forests, farmland and riparian areas. Typically forages in open habitats like grasslands or steppes. Usually nests on cliffs but also can nest in trees.	Potential occurrence	Some potential habitat in eastern part of the Project corridor.
Ferruginous Hawk *Buteo regalis*	SOC	S	High-desert sagebrush and bunchgrass prairies, canyon shrublands, desert playa, agricultural fields, and pastureland.	Potential occurrence	Nesting and foraging habitat available at east end of Project.

Species	Federal Status	ODFW Status	Expected Habitat	Observed, Expected, or Potential Occurrence within Analysis Area	Potential Use of Habitat within Analysis Area
Northern Goshawk *Accipiter gentilis atricapillus*	SOC	S	Coniferous and deciduous forests, woodlands, or along treelines adjacent to open areas; mature forest for nesting.	Potential occurrence	Some potential habitat in eastern part of the Project corridor.
Sandhill Crane *Grus canadensis*	None	S	Relatively large wetland-wet/dry meadow complexes with a mosaic of aquatic and herbaceous conditions for nesting and foraging.	Potential occurrence	Some potential habitat in eastern part of the Project corridor.
American White Pelican *Pelecanus erythrorhynchos*	None	S	Nest on islands in rivers and lakes that have sparsely vegetated ground cover. Use shallow water areas for cooperative feeding.	Observed	Flying over study area and known to congregate and forage downstream of McNary Dam in the Columbia River.
Pileated Woodpecker *Dryocopus pileatus*	None	S	Dense, mature mixed-conifer forests with large-diameter trees, snags, and logs for nesting and foraging.	Observed	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project
Lewis's Woodpecker *Melanerpes lewis*	SOC	S	Open ponderosa pine woodlands, riparian areas dominated by cottonwood, or logged or burned pine forest.	Potential occurrence	Cottonwood riparian areas along the Columbia River
Willow Flycatcher *Empidonax traillii*	SOC	S	Moist, shrubby areas with standing or running water.	Potential occurrence	Riparian areas along the Columbia River including Hayden Island, Columbia Slough, and Willamette River.
Olive-sided flycatcher *Contopus cooperi*	SOC	S	Montane mixed-conifer forests interspersed with natural openings and prominent perches for singing and flycatching.	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project

Species	Federal Status	ODFW Status	Expected Habitat	Observed, Expected, or Potential Occurrence within Analysis Area	Potential Use of Habitat within Analysis Area
Purple martin *Progne subis*	SOC	S	Forest areas close to water with abundant cavities for colonial nesting.	Observed	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Grasshopper Sparrow *Ammodramus savannarum perpallidus*	None	S	Moderately open, unfragmented grasslands with patches of bare ground, sometimes with light cover of shrubs.	Expected	Nesting and foraging habitat available at east end of Project near the Dalles.
Long-billed curlew *Numenius americanus*	None	S	Short- and mixed-grass prairies with flat to rolling topography.	Potential occurrence	Open grass and herbaceous fields in east end of Project near the Dalles.
Mammals					
Western Gray Squirrel *Sciurus griseus*	None	S	Oak woodlands, oak savannas, and mixed oak-pine-fir woodlands.	Potential occurrence	Some potentially suitable habitat near North Bonneville.
Townsend's big-eared bat *Corynorhinus townsendii*	SOC	SC	Variety of habitat types, including coniferous forests, deserts, native prairies, riparian areas, agriculture fields, and coastal areas; require caves, rock crevices, or other roosts.	Potential occurrence	Roosting and foraging habitat available in analysis area, but caves or mines for maternity roosts or hibernacula lacking.
Pallid bat *Antrozous pallidus*	SOC	S	Variety of habitat types, including rocky, arid deserts and canyon lands, shrub-steppe, grasslands, karst formations, and coniferous forests under 2,000 feet.	Potential occurrence	Some roosting and foraging habitat available in analysis area.
Silver-haired Bat *Lasionycteris noctivagans*	SOC	S	Mature Douglas fir/ western hemlock and ponderosa pine forests as well as juniper woodland habitat near streams, ponds and lakes. Roosts in tree cavities, under loose bark, caves, mines and in abandoned buildings.	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.

Species	Federal Status	ODFW Status	Expected Habitat	Observed, Expected, or Potential Occurrence within Analysis Area	Potential Use of Habitat within Analysis Area
California Myotis *Myotis californicus*	None	S	Forest habitats with snags for day roosts.	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Fringed Myotis *Myotis thysanodes*	SOC	S	Forest habitats with snags for day roosts.	Potential occurrence	Roosting and foraging habitat available in analysis area, but caves or mines for maternity roosts or hibernacula lacking.
Long-legged Myotis *Myotis volans*	SOC	S	Late-successional conifer forests or other forested habitat with late-successional components. Large snags and hollow trees for day, night, and maternity roosts.	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Hoary bat *Lasiurus cinereus*	SOC	S	Forested upland habitats, including junipers.	Potential occurrence	Mixed forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Reptiles					
California mountain kingsnake *Lampropeltis zonata*	SOC	S	Pine forests, oak woodlands, and chaparral. Usually found in, under, or near rotting logs in open wooded areas near streams.	Potential occurrence	Potential habitat throughout the Project corridor, particularly the east end.
Northwestern pond turtle *Actinemys marmorata*	PT	S	Ponds, small lakes, and wetlands with adjacent open upland habitats with sun exposure including prairies and open forest types.	Expected	Known occurrence in Smith and Bybee wetlands area near west end of Project.
Painted turtle *Chrysemys picta*	None	S	Found in marsh ponds, small lakes, slow-moving streams, and quiet, off-channel portions of rivers.	Expected	Known occurrence in Smith and Bybee wetlands area near west end of Project.

Species	Federal Status	ODFW Status	Expected Habitat	Observed, Expected, or Potential Occurrence within Analysis Area	Potential Use of Habitat within Analysis Area
Northern red-legged frog *Rana aurora*	SOC	S	Shallow-water ponds and wetlands with emergent vegetation. For breeding, they require forested sites with exposed (sunny), still-water habitat. Adults and juveniles also use moist riparian and upland forests.	Expected	Potential wetland and upland habitats throughout the Project corridor
Oregon slender salamander *Batrachoseps wrighti*	SOC	S	Late-successional and second-growth forests. They are often associated with large-diameter, decaying Douglas fir logs and bark debris mounds at the base of snags.	Potential occurrence	Forested areas on Hayden Island and riparian areas along the Columbia River near the west end of the Project.
Western Toad *Anaxyrus boreas*	None	S	Lakes, rivers, streams, and wetlands during breeding; variety of grassland, shrubland, woodland, and forests at other times of year.	Expected	Potential wetland and upland habitats throughout the Project corridor

The bald eagle is a Federal Species of Concern, in addition to being BGEPA- and MBTA-protected. Eagles are habitat generalists, typically associated with aquatic habitats, preferring forested areas that surround fish-bearing lakes and rivers. One eagle nest was observed during the field surveys in 2024, and both adult and juvenile eagles were observed flying and perching in and near forested areas in the western portion of the Project corridor.

No wildlife species currently listed, or candidates for listing, under the federal ESA are expected to occur within areas of ground disturbance in the Project footprint. A review of the USFWS IPaC project planning tool indicates seven federally listed wildlife species known or expected to occur in the Project vicinity: gray wolf (*Canis lupus*; federally endangered, state endangered), the North American wolverine (*Gulo gulo luscus*) yellow-billed cuckoo (*Coccyzus americanus*), northern spotted owl (*Strix occidentalis caurina*), northwestern pond turtle (*Actinemys marmorata*), and the monarch butterfly (*Danaus plexippus*) (USFWS 2024). The study area does not overlap with any existing critical habitat designated for any of the listed terrestrial species. There are currently no wolf packs near the study area. Areas around Smith and Bybee wetlands and Columbia Slough provide potential habitat for frogs and turtles, including the northwestern pond turtle. The following sections describe the ESA-listed species with the potential to occur in the general Project vicinity and the likelihood of occurrence in the study area.

3.3.3 Northern Spotted Owl

The northern spotted owl was federally listed as threatened in June 1990 (55 FR 26114). On May 3, 2022, USFWS reconfirmed that reclassification of the northern spotted owl as an endangered species is warranted; however, USFWS noted that “uplisting the species to endangered status would not substantively increase protections but would more accurately classify the species given its current status” (87 FR 26173).

Northern spotted owls are believed to have historically inhabited most forests throughout southwestern British Columbia, western Washington and Oregon, and northwestern California, as far south as San Francisco Bay. The primary causes of spotted owl population declines are loss and adverse modification of nesting, roosting, and foraging habitat due to timber harvesting, land conversions, natural disturbances such as fire, windstorms, and insect outbreaks, and competition with encroaching barred owls (USFWS 2024b). An estimated 60 percent reduction in habitat has occurred over the last 190 years. Owl numbers appear to have declined annually since 1985, when many studies began. Range-wide, spotted owls are currently declining at an average rate of 2.9 percent each year (USFWS 2013).

Although some potentially suitable conifer forest is present in the analysis area where noise from vibratory pile driving and HDD may extend, much of the area surrounding most of the Project corridor is highly disturbed with urban and industrial areas, railway and highways, and rural residential and agricultural uses. Small patches of older forest north of SR 14 between Ash Lake Road and Bonneville Dam, as well as north of Greenleaf Creek and North Bonneville, currently function as potential foraging or dispersal habitat for transient spotted owls dispersing across the landscape. These patches include coniferous forest where older trees are interspersed with areas of seral forest that have been logged at different time periods. However, typical nesting habitat is not present. Spotted owl presence, particularly dispersing or foraging individuals, throughout the forested areas surrounding the Project ROW is possible; however, their presence is unlikely.

3.3.4 Yellow-billed Cuckoo

On October 3, 2013, the Western Distinct Population Segment (DPS) of the yellow-billed cuckoo (*Coccyzus americanus*) was proposed as a threatened species under the ESA and was subsequently listed on October 3, 2014 (79 FR 59992). Critical habitat was designated for the yellow-billed cuckoo on May 21, 2021; no critical habitat is designated in Washington or Oregon (86 FR 20798) because the species has been extirpated as a breeder from these states since at least the 1940s (86 FR 20849).

The yellow-billed cuckoo is a slender, long-tailed passerine that formerly occurred on both sides of the Cascades in both Oregon and Washington but is a rare migrant in both states (USFWS 2022d). Yellow-billed cuckoos display a strong preference for large, continuous riparian zones dominated by cottonwoods (*Populus spp*.) and willows (*Salix spp*.) (WDFW 2024d).

Currently, yellow-billed cuckoos are extremely rare summer visitors to Washington and Oregon, with only 20 sightings have been reported since the 1950s, all, or nearly all, of which were likely non-breeding vagrants or migrants (Wiles and Kalasz 2017). Of the 20 sightings, 19 were recorded from 1974 to 2016, and 16 of the total sightings occurred in eastern Washington near the Cascades (Wiles and Kalasz 2017). Although historical observations of yellow-billed cuckoo occurred along the Columbia River in Clark County, Washington, no detections have been documented in the county since 1937 (Wiles and Kalasz 2017).

The yellow-billed cuckoo is not documented to occur in the analysis area (ODFW 2021). With the exception of Hayden Island, the project corridor lacks large, contiguous blocks of cottonwood and willow riparian forest. Ground disturbance in the Project corridor on Hayden Island is located within an existing access road and no tree removal will occur for cable installation and burial.

3.3.5 Northwestern Pond Turtle

On October 3, 2023, the northwestern pond turtle (*Actinemys marmorata*) was proposed as a threatened species under the ESA throughout its range (88 FR 68370). Various recovery actions, including the release of captive-bred and wild-bred head-started turtles, have been conducted across six recovery sites in Washington. Four recovery sites are located in the Columbia River Gorge (Hallock et al. 2017, WDFW 2023e).

Specific habitat needs include: 1) aquatic features such as ponds, lakes, and streams for breeding, feeding, overwintering, sheltering, and dispersal; 2) basking sites that allow for thermoregulation; and 3) terrestrial or upland features adjacent to aquatic habitat for nesting, overwintering, aestivation, and to provide corridors for dispersal and connectivity between populations (USFWS 2023). Northwestern pond turtles typically occur in open upland habitats that receive extensive sun exposure, including oak-pine savanna and other open forest types in the Columbia Gorge, and pastures (WDFW 2023e). Although the species utilizes a variety of flowing and still-water habitats in other parts of their range, in Washington they are only known to inhabit ponds and lakes (WDFW 2023e).

The population occurring near the study area is at the Bergen site, located in Skamania County in a mosaic of approximately 200 acres of United States Forest Service (USFS) land and 65 acres of adjacent private lands. The Bergen site includes an extensive lake, pond, and wetland complex within a forested and pasture environment (Hallock et al. 2017) and is located near Bergen Road off of Washington State Route 14.

3.3.6 Gray Wolf

The gray wolf (*Canis lupus*) has been federally listed as an endangered species since the 1970s. Effective January 4, 2021, USFWS delisted the gray wolf throughout the lower 48 states and relinquished management authority in Washington to WDFW outside of tribal lands (85 FR 69778). However, on February 10, 2022, a U.S. District Court vacated the delisting rule, effective immediately, and restored endangered species protections.

The gray wolf is a carnivorous, opportunistic feeder, whose primary prey are elk, deer, moose, and smaller animals when those prey are not available, such as rabbits, beavers, coyotes, and fish. Wolves are highly social and typically live in packs of 5 to 10 members. Packs establish territories, usually about 200 to 400 square miles in size, and defend these territories from other wolves. From late April until September, pack activity is centered at or near den or rendezvous sites, as adults hunt and bring food back to the pups. At sexual maturity, wolves disperse from their natal pack to search for a mate and to start a new pack; dispersal may be to either nearby or distant unoccupied habitat. Wolves are habitat generalists but mostly occupy forests and nearby open habitats with sufficient prey.

The year-end minimum population count for 2023 in Oregon was at least 178 known wolves in 22 known packs, including at least 15 breeding pairs (ODFW 2024a). The Warm Springs pack is located in the Columbia Plateau and is the closest pack to the analysis area, located approximately 48 miles south of the Dalles, Oregon. According to the annual population survey completed in December 2023, the pack had a minimum count of seven wolves and has successful breeding pairs (ODFW 2024b). The OR129 group had a minimum count of two wolves and is the closest wolf activity area to the Project, approximately 22 miles from the Dalles.

Although denning is not known to occur in the analysis area, transient individuals, including those associated with the OR129 pack, could potentially transit the area during construction of the Project. However, the Project corridor between the Dalles and Hood River is within the Columbia River for cable laying operation, and terrestrial noise and ground disturbance occurs in developed areas in the Dalles. The surrounding areas are generally disturbed with rural development and heavy traffic on I 84 and SR 197 and an active rail line and therefore provide unsuitable habitat for gray wolves.

3.3.7 North American Wolverine

On November 30, 2023, the USFWS relisted the North American DPS of wolverine (*Gulo gulo luscus*) as a threatened species under the ESA, effective January 2, 2024 (88 FR 83726). Critical habitat has not been designated.

The wolverine is a carnivore that occupies arctic, alpine, and subalpine habitats in the northern portions of the northern hemisphere (Copeland et al. 2010). The species is wide-ranging, with documented long-distance dispersals across habitats far from the high mountains near the timberline where known populations reside in Washington, Idaho, Montana, and Wyoming (USFWS 2013b). The northern Cascade Range in Washington is the southernmost extent of the current wolverine range along the Pacific Coast, although individual wolverines have been found as far south as California and the species is more widely distributed in Washington than once thought (Aubry et al. 2014).

Wolverines prefer extensive remote wilderness dominated by coniferous forest as well as high elevations above the tree line. The requirement of cold, snowy conditions means that, in the

southern portion of the species' range where ambient temperatures are warmest, wolverine distribution is restricted to high elevations (USFWS 2013b).

There is no suitable habitat for wolverines in or adjacent to the project corridor and the analysis area does not overlap with any documented occurrences.

3.4 Fish

This section describes the presence of fish-bearing streams that intersect the study area and identifies fish that are federally listed under the ESA, as well as state-listed and special status fish species that occur in the analysis area. Sources of information include the field observations from the wetlands and waters delineation conducted for the Project as well as desktop sources listed in Section 2.1. No fish were observed in streams in the Project corridor during the field surveys.

Review of National Hydrology Dataset (NHD) (USGS 2024) and the online data identified 3 perennial and 6 intermittent/ephemeral streams within the study area. The wetlands and waters delineation conducted by HDR in 2023 and 2024 (see Exhibit J Wetlands and Waters Report) identified a single stream, Threemile Creek, in addition to The Columbia River, Columbia Slough, and the Willamette River within the study area.

3.4.1 Oregon State Listed Fish Species

Information from ODFW on state priority species was referenced to identify state listed fish species that could occur within the study area. Fish species listed by the state as threatened include lower Columbia River coho salmon (*Oncorhynchus kisutch*), Snake River fall-run Chinook salmon (*Oncorhynchus tshawytscha*), and Snake River spring-run Chinook salmon. Other ODFW fish species listed as sensitive or sensitive-critical that occur in the study area include Bull trout (*Salvelinus confluentus*), lower Columbia chum salmon (*Oncorhynchus keta*), Snake River steelhead (*Oncorhynchus mykiss*), rainbow trout, the resident form of steelhead, cutthroat trout (*Oncorhynchus clarkii*), Pacific lamprey, Western brook lamprey, green sturgeon, and white sturgeon (*Acipenser transmontanus*).

Cutthroat Trout are widespread throughout small streams in the region and are documented to be present in the Columbia River and tributaries in the analysis area. They seek smaller streams with minimal flow and small gravel substrate including sand. They prefer the uppermost portions of these streams, areas that are generally too shallow for other salmonids. They can be anadromous and rear in streams for 2 to 3 years or be resident and remain entirely in fresh water (Wydoski and Whitney 2003). Cutthroat trout inhabit the upper reaches and headwaters of tributaries and can be resident (remain in freshwater streams) or anadromous. The anadromous form are similar to salmon in that they live and feed in the ocean for a period of time and then return upriver to tributaries to spawn, that include the Sandy River, Hood River, and smaller tributaries in the Columbia Gorge. Anadromous cutthroat trout use the Columbia River as a migratory corridor in the Project area.

Pacific Lamprey

Pacific lamprey (*Entosphenus tridentatus*) are anadromous and migrate up the Columbia River as adults to spawn in tributaries. Larval lamprey burrow in fine sediments where they remain as filter feeders. The larval life stage is the most susceptible to impacts from the Project due to their low

mobility and presence year-round in the substrate. The distribution of lamprey in the Columbia River is not well known, but they are concentrated in tributaries and at river mouths.

3.4.2 ESA-Listed Fish Species

The Columbia River, to which all the streams in the study area ultimately drain, contains many species of fish, including ESA listed Chinook salmon, Chum Salmon, Coho Salmon, Sockeye Salmon (*Oncorhynchus nerka*), steelhead, and Bull Trout. The Willamette River also contains runs of these same ESA-listed salmon species with the exception of Sockeye salmon; however, individuals that are migrating in the Columbia River could be present at the mouth and lower reach of the Willamette River in the analysis area.

NMFS (NOAA Fisheries) designated critical habitat occurs in the Columbia River for the following Evolutionarily Significant Units (ESUs) and DPSs of salmon and steelhead: Columbia River ESU chum salmon, Lower Columbia River DPS steelhead, Lower Columbia River ESU coho salmon, Lower Columbia River ESU Chinook salmon, Middle Columbia River DPS steelhead, Upper Columbia River spring-run ESU Chinook salmon, Upper Columbia River DPS steelhead, Snake River fall-run ESU Chinook salmon, Snake River ESU sockeye salmon, and Snake River Basin DPS steelhead (Table 7; USFWS 2024).

Table 7. Federally Listed Salmonid Species That May Occur in the Study Area

Species	ESU/DPS	Listing Status	Agency	Critical Habitat
Fish				
Bull Trout (*Salvelinus confluentus*)	Coterminous United States	Threatened	USFWS	Designated in Columbia River in study area
Chinook Salmon *(Oncorhynchus tshawytscha)*	Upper Columbia River spring-run ESU	Endangered	NMFS	Designated in Columbia River in study area
Chinook Salmon *(Oncorhynchus tshawytscha)*	Multiple ESUs[1]	Threatened	NMFS	Designated in Columbia River in study area
Steelhead *(Oncorhynchus mykiss)*	Multiple DPSs[2]	Threatened	NMFS	Designated in Columbia River in study area
Chum Salmon *(Oncorhynchus keta)*	Columbia River ESU	Threatened	NMFS	Designated in Columbia River in study area
Coho Salmon *(Oncorhynchus kisutch)*	Lower Columbia River ESU	Threatened	NMFS	Designated in Columbia River in study area
Sockeye Salmon *(Oncorhynchus nerka)*	Snake River ESU	Endangered	NMFS	Designated in Columbia River in study area
Eulachon *(Thaleichthys pacificus)*	Southern DPS	Threatened	NMFS	Designated in Columbia River in study area

Note: ESU = Evolutionary Significant Unit; DPS = Distinct Population Segment; NA = not applicable; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service

[1] Three threatened ESUs for Chinook salmon: Lower Columbia River, Snake River spring/summer run, and Snake River fall run.

[2] Four threatened DPSs for steelhead: Lower Columbia River, Middle Columbia River, Upper Columbia River, and Snake River.

Bull Trout

In November 1999, the USFWS listed all populations of bull trout within the conterminous United States as a threatened species pursuant to the ESA (64 FR 58910). Critical habitat for bull trout was revised in a final rule published on October 18, 2010 (75 FR 63898) and includes the Columbia River in the analysis area.

Bull trout express both resident and migratory life history strategies (Rieman and McIntyre 1993). Resident forms complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams, where juvenile fish rear for 1 to 4 years before migrating to either a lake (adfluvial form), a river (fluvial form) (Fraley and Shepard 1989) or, in certain coastal areas, to saltwater (amphidromous) (Brenkman and Corbett 2005).

Bull trout have some of the most demanding habitat requirements of all salmonids (Rieman and McIntyre 1993). To successfully spawn and rear, Bull Trout require the following habitat conditions (USFWS 2015):

- Water temperatures ranging from -2°C to 22°C, depending on life history stage and form, geography, elevation, diurnal and seasonal variation, and local groundwater influence.
- A natural hydrograph including peak, high, low, and base flows within historic ranges or if regulated according to an opinion that supports bull trout populations by minimizing daily and day-to-day fluctuations.
- Migratory corridors with no physical, biological, or chemical barriers between spawning, rearing, overwintering, and foraging habitats.
- An abundant food base including prey items such as macro-invertebrates of aquatic or terrestrial origin and forage fish.
- Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.

The mainstem Columbia River from the mouth, upstream to John Day Dam provides foraging, migration, and overwintering (FMO) habitat for extant populations of Bull Trout in the Lewis, Hood, Klickitat, and Deschutes rivers, and is considered essential for maintaining connectivity for amphidromous and fluvial life histories (USFWS 2010a). Bull trout have been documented in the Columbia River and its tributaries; however, no known spawning occurs in the mainstem Columbia River that supports its own local population (USFWS 2010a). Bull trout have been observed in the fish ladders at Bonneville and The Dalles dams; however, bull trout have never been officially recorded on United States Army Corps of Engineers (USACE) fish ladder counts, although it is possible that fish counters may have observed them (USFWS 2010a).

The analysis area is located in the Coastal Recovery Unit under the Bull Trout recovery Plan (USFWS 2015) and overlaps with The Klickitat, White Salmon and Hood River core areas. It is anticipated that the mainstem Columbia River will have increasing importance as key foraging and overwintering habitat for fluvial bull trout as passage improvements are made at hydroelectric facilities currently isolating individual core areas and as populations improve in status (USFWS 2015).

Bull trout are not expected to be in the rivers and streams in the analysis area during the proposed in-water work window (November 1 to March 15 upstream of Bonneville Lock and Dam, November 1

to February 28 downstream of Bonneville Lock and Dam) because post-spawned adults are expected to be in natal tributaries resting and preparing to overwinter. No bull trout spawning or rearing occurs in the analysis area and juvenile bull trout are not expected to occur within the mainstem Columbia River within the study area at any time of the year.

Critical Habitat

Bull trout critical habitat is designated in the mainstem Columbia River including the analysis area. Within designated critical habitat, the physical and biological features (PBFs) for bull trout include those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering (USFWS 2010b). The USFWS (2010b) has determined that nine PBFs are essential for the conservation of bull trout. The nine PBFs and their occurrences in the analysis area are identified below.

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

   Existing Condition: Shallow springs, seeps, and ground water sources may occur sporadically in the mainstem Columbia River. However, the Columbia River in the study area is modified by shoreline development; additionally, the mainstem Columbia River in the study area is identified as temperature-impaired on the 303(d) list (Ecology 2022a). Therefore, this PBF is not fully functioning in the study area.

2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

   Existing Condition: No barriers exist downstream of the portion of the study area downstream of Bonneville Lock and Dam that would preclude upstream passage of individuals. Therefore, PBF 2 is properly functioning in this reach of the river and contributes to the function of the Mainstem Lower Columbia River Critical Habitat Unit as a migratory pathway between the Pacific Ocean and upriver spawning and FMO habitat. In the portion of the study area upstream of Bonneville Lock and Dam, PBF 2 is degraded by the partial barrier to upstream migration presented by the dam, necessitating bull trout to use fish ladders to access upstream spawning and FMO habitat.

3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

   Existing Condition: The mainstem Columbia River provides an abundant food source for migratory bull trout in the fall, winter, and spring (USFWS 2010b); therefore, PBF 3 is properly functioning and contributes to FMO habitat in the Columbia River.

4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks, and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

   Existing Condition: Riparian habitat in the study area is degraded and many areas are restricted by highways, rail lines, and other development, as well as shore armoring and riprap, and lacks most of the components of PBF 4. Therefore, this PBF is not fully functioning in the analysis area.

5. Water temperatures ranging from 36 to 59 degrees Fahrenheit (°F) (2 to 15°C), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; and local groundwater influence.

   Existing Condition: PBF 5 is not fully functioning in the study area. The mainstem Columbia River in the analysis area is identified as temperature-impaired on the 303(d) list (Ecology 2022a). The river is wide and lacks riparian shading and is slow flowing due to the impoundment by Bonneville Lock and Dam.

6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions; the sizes and amounts of fine sediment suitable to bull trout will likely vary from system to system.

   Existing Condition: Bull trout are not known to spawn or rear in the analysis area, and the mainstem Columbia River provides only FMO habitat (USFWS 2010b). This PBF is not present in the analysis area.

7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges, or, if flows are controlled, minimal flow departure from a natural hydrograph.

   Existing Condition: Numerous hydropower projects, including the Federal Columbia River Hydropower System, have created a series of dams that have greatly altered the flow regime of the lower Columbia River. As a result, this PBF is not fully functioning in the analysis area.

8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

   Existing Condition: The baseline condition of this PBF is not fully functioning in the study area. The reach of the Columbia River in the analysis area is a 303(d)-listed reach for bacteria and water temperature (Ecology 2022a).

9. Few or no non-native predatory (e.g., lake trout [*Salvelinus namaycush*], walleye [*Sander vitreus*], northern pike [*Esox spp.*], smallmouth bass [*Micropterus dolomieu*]), inbreeding (e.g., brook trout [*S. fontinalis*]), or competitive species (e.g., brown trout [*Salmo trutta*]) present.

   Existing Condition: The mainstem Columbia River is inhabited by a large and increasing population of non-native aquatic species, including many non-native fish species, particularly in the Bonneville Pool upstream of the dam. Therefore, this PBF is not fully functioning in the analysis area.

Chinook Salmon

Chinook salmon from five ESUs occur in the Columbia River in the analysis area. These include the Lower Columbia River ESU, Upper Columbia River (UCR) spring-run ESU, Snake River fall-run ESU, and Snake River spring/summer-run ESUs.

Chinook salmon runs are designated based on when adults enter freshwater. Early, spring-run Chinook salmon tend to enter freshwater as immature or bright fish, migrate upriver (holding in rivers for several months), and finally spawn in late summer and early autumn. Fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (NMFS 2005a). Generally, spring-run Chinook salmon select the upper reaches of tributaries, summer runs use the mouths of tributaries, and fall runs spawn in the mainstems of larger streams (Wydoski and Whitney 2003).

After emergence, juveniles rear in freshwater from a few days to several years (Wydoski and Whitney 2003). Juvenile Chinook salmon that remain in freshwater after emergence may migrate to the ocean any time of year, although most within a population tend to migrate at similar times and ages (Healey 1991). Chinook salmon fry tend to migrate along the banks and move offshore as they grow (Healey 1991). Most fall-run Chinook salmon fry rear in freshwater habitat for 1 to 4 months before emigrating to the ocean as subyearlings (age 0). A few fall Chinook salmon remain in freshwater until their second spring and emigrate as yearlings. Before alteration of the Snake River basin by dams, Snake River fall-run Chinook salmon exhibited a largely ocean-type life history, where they migrated downstream during their first year (NMFS 2017b). Today, fall-run Chinook salmon in the Snake River basin exhibit one of two life histories that Connor et al. (2005) called ocean-type and reservoir-type. Juveniles exhibiting the reservoir-type life history overwinter in the pools created by the dams before migrating out of the Snake River.

Populations of spring-run Chinook salmon are also present in the lower river, particularly in basins in the upper Columbia Gorge (NMFS 2013) and may move into the mainstem Columbia River or estuary in fall to overwinter. Spring-run Chinook salmon emerge from the gravel earlier than fall-run Chinook salmon, generally in late winter/early spring and normally spend 1 full year in freshwater and emigrate to sea in their second spring (NMFS 2005c).

Individuals from several populations of Chinook salmon could occur in the analysis area during the cable installation in-water work window (November 1 to March 15), as described below.

Lower Columbia River (LCR) Chinook salmon are classified as spring, fall, or late fall based on when adults return to fresh water (NMFS 2013), with adults migrating through the lower Columbia River from March through October (Table 8). LCR spring-run Chinook salmon spawn primarily in upstream, higher elevation portions of large sub-basins. Fall-run Chinook salmon spawn in moderate-sized streams and large river mainstems and enter freshwater from August to September. They spawn from late September to November, with peak spawning activity in mid-October. Late-fall Chinook salmon, are less mature when they enter the Columbia River, and spawn later in the year. Late-fall Chinook salmon enter the Columbia River from August to October and spawn from November to January, with peak spawning in mid-November. Ocean-type (fall-run) juvenile Chinook salmon generally migrate downstream in spring within 3 months of emergence and a brief freshwater rearing period (Healey 1991; Myers et al. 1998). LCR Chinook salmon juveniles are likely to occur in the lower Columbia River in the analysis area, migrating from February through early August with a peak in mid-April through mid-June. They may rear in the lower Columbia River throughout the year (Table 8).

Adult Upper Columbia River (UCR) spring-run Chinook salmon migrate upstream through the lower Columbia River from mid-May through June (Table 8) and will not be present during the in-water work window. Outmigrating juveniles may occur in the analysis area during the cable installation

work window. Juveniles pass through the lower Columbia River from February through November, with the majority present in mid-May to mid-June (NMFS 2020). UCR spring-run Chinook salmon juveniles also move into upper reaches of the mainstem Columbia River to rear before migrating to the estuary in spring (April through June) (UCSRB 2007) and do not use the lower Columbia River for rearing (NMFS 2020).

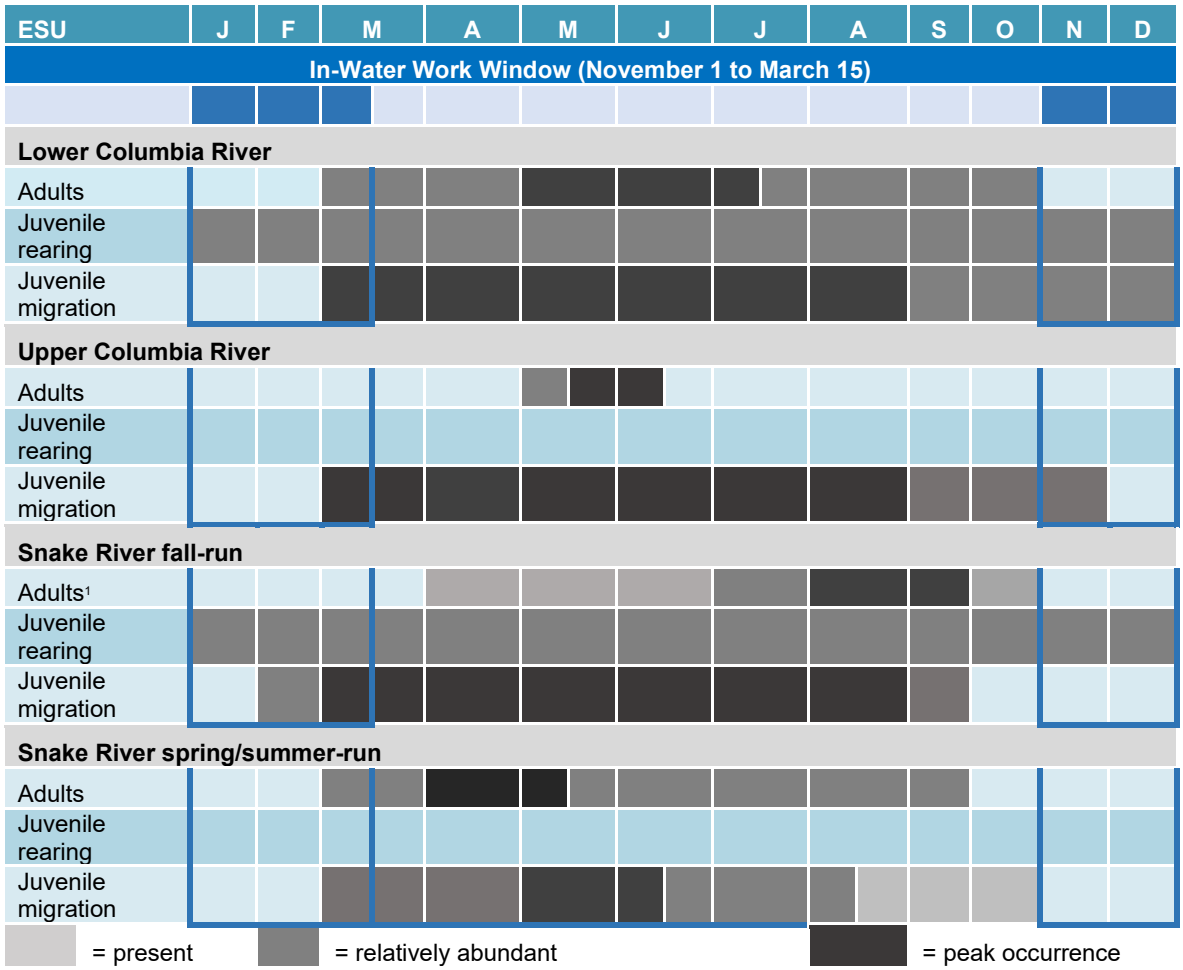
Adult Snake River fall-run Chinook salmon migrate through the lower Columbia River from April through October, peaking in August and September (Columbia River DART 2023; NMFS 2017c) (Table 8). Adults move quickly through the estuary in deep water, largely using the shipping channels, on their way to upstream holding and spawning areas. Therefore, Snake River fall-run adults are unlikely to be present during the cable installation work window. Based on fish passage data at Bonneville Lock and Dam (Columbia River DART 2023), juvenile Snake River fall-run Chinook salmon migrate in the lower Columbia River from February to November, with a peak in May and June.

Snake River spring- and summer-run Chinook salmon use the Columbia River as a migration corridor within the study area, and move quickly through the estuary in deep water, primarily using the shipping channels on their way to upstream holding and spawning areas. Snake River spring/summer-run Chinook salmon adults migrate through the lower Columbia River from March through September (NMFS 2020), with peak occurrence from mid-April to mid-May for spring-run Chinook salmon and from late-June to mid-July for summer-run Chinook salmon (Matthews and Waples 1991). Migrating adult Snake River spring/summer Chinook salmon are therefore unlikely to be present during the cable installation work window. Juvenile Snake River spring/summer-run Chinook salmon exhibit a stream-type life history and migrate swiftly to the ocean as yearling smolts mainly in spring (NMFS 2020) and are unlikely to be present during the work window. On average, more than 50 percent of Snake River yearling Chinook salmon outmigrants are routinely transported by barge or truck around the Snake River and Columbia River dams and released downstream of Bonneville Lock and Dam.

Chinook salmon spawning habitat includes riffles, tailouts, and the swifter areas in glides containing a mixture of gravel and cobble sizes with flow of sufficient depth for spawning activity (NMFS 2013). Due to the water depth and lack of suitable spawning substrate in the proposed cable route, no Chinook salmon spawning habitat is present in the analysis area.

Juvenile active rearing habitat includes relatively slow-water habitat types, often near velocity shears and associated with relatively low-gradient stream channel reaches, including primary pools, backwaters, tailouts, glides, and beaver ponds (NMFS 2013). Inactive rearing habitat includes non-turbulent habitat types, particularly deeper water types within the main channel. Therefore, inactive rearing habitat is present in the study area. Some juveniles from populations migrate downstream from their natal tributaries in fall and early winter into larger rivers, including the mainstem Columbia River, where they are believed to over-winter before outmigrating the next spring as yearling smolts (LCFRB 2010).

Table 8. Timing of Chinook Salmon Life Histories in the Analysis Area



Source: NMFS 2020; Columbia River DART 2023. Dark blue border indicates proposed in-water work window (November 1 to March 15).
[1] Adult run timing based on occurrence indicated in Snake River fall Chinook salmon recovery plan (NMFS 2017c) and Columbia River DART (2023) because presence indicated in NMFS (2020) is inconsistent with these sources.

Critical Habitat

The in-water portions of the Project are located within designated critical habitat for ESA-listed Chinook salmon populations in the analysis area. Critical habitat for the LCR Chinook salmon and UCR spring-run Chinook salmon was designated in 2005 (NMFS 2005b), and critical habitat for the Snake River fall and spring/summer runs was designated in 1993 (58 FR 68543). The primary use of the analysis area is for migration by both adults and outmigrating juveniles, though juveniles expressing the ocean-type life history, which migrate as subyearlings, may remain in shorelines along the lower Columbia River for longer periods as they migrate to the estuary.

Critical habitat consists of six PBFs that are considered essential for the conservation of ESA-listed Chinook salmon. The six PBFs and their occurrence in the study area are identified below.

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.

   Existing Condition: There is no known spawning habitat within the study area in the Columbia River; therefore, this PBF is not present in the analysis area.

2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

   Existing Condition: Limited freshwater rearing may be provided for Chinook salmon populations expressing the ocean-type juvenile life history. Riparian habitat in the study area is degraded and many areas are restricted by highways, rail lines, and other development as well as shore armoring and riprap, and lacks most of the components of PBF 2. Therefore, this PBF is not fully functioning in the analysis area.

3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

   Existing Condition: The lower Columbia River mainstem is used as migratory habitat for both adults and juveniles migrating to and from the Pacific Ocean and upstream (tributary) spawning and rearing areas. Therefore, PBF 3 is present and properly functioning in the analysis area.

4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between freshwater and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

   Existing Condition: The study area encompasses an approximately 7-mile reach of the Columbia River extending from approximately river mile (RM) 143 to RM 150. The study area does not include estuarine areas; therefore, this PBF is not present in the analysis area.

5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

   Existing Condition: As described above, the study area encompasses an approximately 7-mile reach of the Columbia River extending from approximately RM 143 upstream to RM 150. The analysis area does not extend to nearshore marine areas; therefore, this PBF is not present.

6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

   Existing Condition: The analysis area does not extend to offshore marine areas; therefore, this PBF is not present.

Steelhead

Four ESA-listed steelhead DPSs traverse the analysis area in the lower Columbia River during adult upstream and juvenile downstream migrations: the LCR DPS, Middle Columbia River (MCR) DPS, UCR DPS, and Snake River DPS.

Unlike many salmonid species, *O. mykiss* exhibit complex and variable life history characteristics, such that their offspring can exhibit different life-history forms from the parental generation (NMFS 2009a). For example, offspring of resident fish may migrate to sea, and offspring of anadromous steelhead may remain in streams as resident fish (Burgner et al. 1992). Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before they die. However, it is rare for steelhead to spawn more than twice before dying, and those that do are usually females (Busby et al. 1996).

Over their entire range, West Coast steelhead spawning migrations occur throughout the year, with seasonal peaks of migration activity varying by location. However, even in a given river basin, there might be more than one seasonal migration peak, typically referred to as winter, spring, summer, and fall steelhead runs. Although there are generally four migration seasons, steelhead are typically divided into two basic reproductive ecotypes (summer and winter), based on the state of sexual maturity at the time they enter freshwater and the duration of spawning migration (Burgner et al. 1992). The summer, or stream maturing, type enters freshwater in an immature condition between May and October and matures in freshwater over several months. The winter, or ocean maturing, type enters freshwater in a mature condition between November and April and spawns shortly thereafter (NMFS 2009a). Spawning typically occurs between March and June (NMFS 2009a).

Steelhead spawn in clear, cool streams with suitable gravel size, depth, and current velocity (NMFS 2009a). Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. They need cover in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity (NMFS 2009a). Adult steelhead may enter streams and arrive at spawning grounds weeks or even months before they spawn (NMFS 2013).

Young steelhead typically rear in streams for 2 or more years before migrating to the ocean as smolts. Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types (NMFS 2009a).

Steelhead smolts have been shown to migrate at ages ranging from 1 to 5 years throughout the Columbia River basin, but most steelhead generally smolt after 2 years in freshwater (NMFS 2009a, 2013). Downstream migration generally occurs between March and June (NMFS 2009a). Once in the ocean, steelhead tend to migrate directly offshore during their first summer, rather than migrating nearer the coast. Most steelhead spend 2 years in the ocean (range 1 to 4 years) before migrating back to their natal streams (NMFS 2009a, 2013).

Individuals from several ESA-listed populations of steelhead could occur in the analysis area during the in-water work window. Table 9 displays the typical seasonal timing of adult and juvenile steelhead from the five DPSs that migrate through the analysis area, overlain with the proposed in-water work window for cable installation (November 1 to March 15).

LCR steelhead exhibit two distinct run timings: summer and winter, although most are winter run (Myers et al. 2006). Summer-run LCR steelhead migrate through the analysis area between mid-

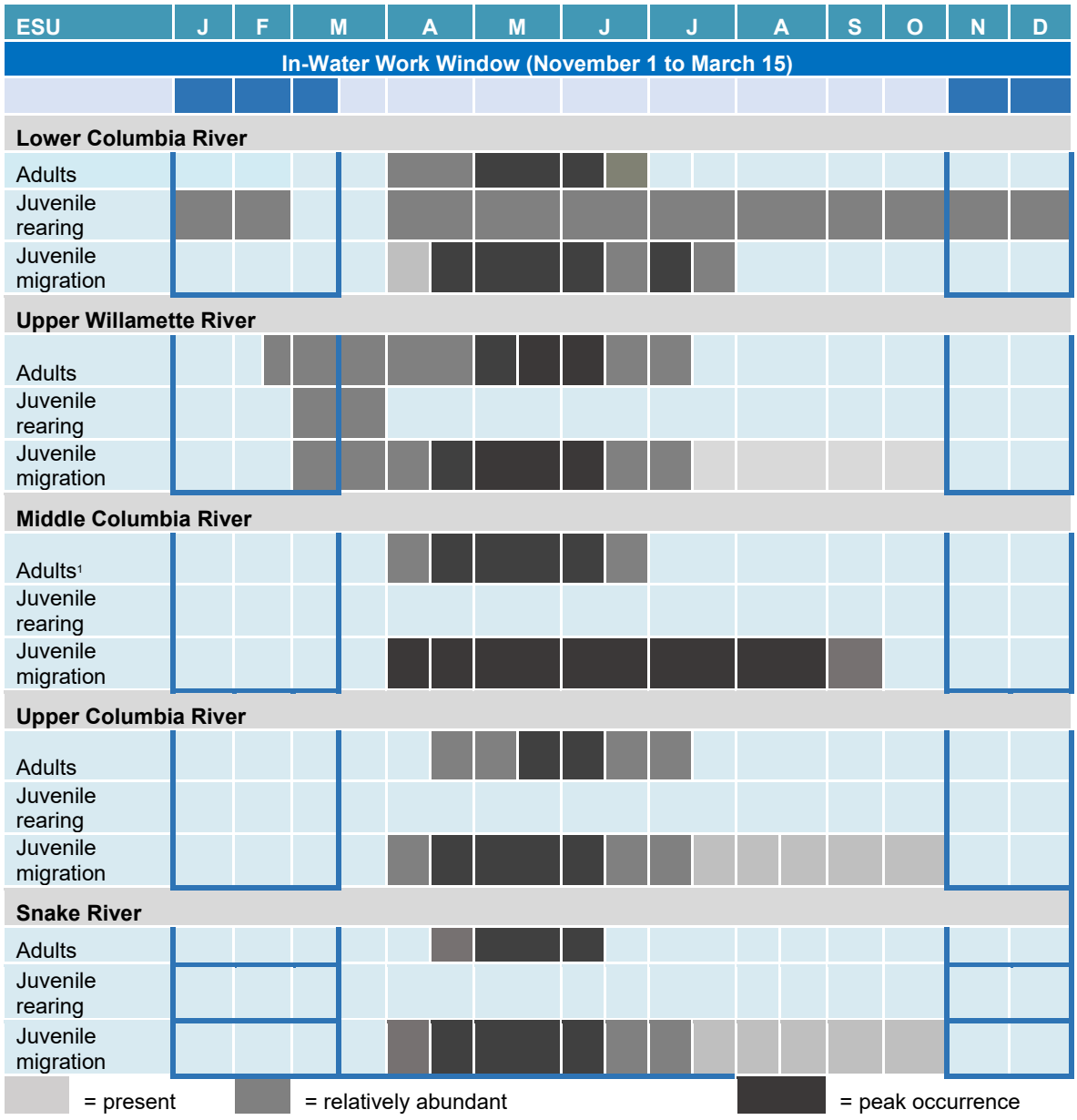
April and mid-June (Table 9) and spawn in tributaries (outside of the analysis area) between January and June (Myers et al. 2006). In contrast, adult winter steelhead enter the lower Columbia River and pass through the analysis area between December and May. Therefore, based on adult run timing, adult LCR winter-run steelhead could be present in the analysis area during cable installation. Juvenile LCR steelhead rear throughout the year (NMFS 2020) and therefore may also be present in the analysis area during cable installation.

Most adults from the MCR DPS migrate upstream through the Columbia River from mid-April through mid-June, with a peak in abundance from late April through mid-June (Table 9). In addition, several populations have later runs that enter freshwater in August and continue in the lower Columbia River through October or November. The winter runs to the Klickitat River typically enter freshwater beginning in January. Based on this information, at least some adult fish from this DPS could occur in the analysis area from November through December during the cable installation work window. Juvenile downstream migration through the lower Columbia River occurs from March through mid-October, with peak abundance occurring from late April through mid-June, and therefore early outmigrants may occur in the analysis area during the work window for cable installation. Juvenile rearing does not occur in the analysis area (NMFS 2020).

UCR steelhead enter the Columbia River from mid-April to mid-July with the peak occurrence in late May and early June (Table 9). Juvenile downstream migration through the lower Columbia River occurs from March through mid-October, with peak abundance occurring from late April through mid-June and therefore may occur in the analysis area during the latter part of the cable installation work window (Table 9). Juvenile rearing does not occur in the analysis area (NMFS 2020).

Snake River steelhead typically enter the Columbia River from mid-April through mid-June, with peak migration from mid-May through mid-June (Table 9). Based on adult run timing, it is unlikely that adult Snake River steelhead would be present in the analysis area during the work window. Snake River steelhead juveniles outmigrate through the Columbia River from March through October, with a peak from mid-April to mid-June (NMFS 2020); therefore, early outmigrants may be present in the analysis area during the latter part of the cable installation window.

Table 9. Timing of ESA-Listed Steelhead DPSs in the Analysis Area



Source: Columbia River DART 2023 (adults)[1] and NMFS 2020 (juveniles). Dark blue border indicates cable installation work window (November 1 to March 15).
[1] Although winter run LCR steelhead may occur in study area, because they persist at low abundance (NMFS 2016), timing is not indicated in the table.

Critical Habitat

Critical habitat for the four DPSs of steelhead that occur in the analysis area was designated in 2005 (NMFS 2005b). Critical habitat for all steelhead populations in the Columbia River includes all the basins supporting the populations and the mainstem Columbia River, including the lower Columbia River, which is designated as a migration corridor (NMFS 2005b). Critical habitat PBFs in the analysis area are the same as those for Chinook salmon described above in Section 3.4.2.2. The analysis area is located within the designated migration corridor for both adult and juvenile steelhead

(PBF 3). Riparian habitat in much of the analysis area is generally degraded by the proximity of development, highways, and rail lines, and areas of armoring and riprap that lacks most of the components of PBF 2. However, there are some areas at the west end and by Hayden Island that include vegetated and natural shorelines that may support a diversity of aquatic organisms for PBF 2. PBFs 1 and 4 through 6 are not present in the analysis area.

Columbia River Chum Salmon

The Columbia River chum salmon ESU was listed as threatened on March 25, 1999, and was reaffirmed in 2005 (NMFS 2005a). The ESU includes all the naturally spawned populations of chum salmon in the Columbia River and its tributaries in Oregon and Washington (NMFS 2005a).

Columbia River chum salmon once were widely distributed throughout the lower Columbia River basin and spawned in the mainstem Columbia River and the lower reaches of most of the lower Columbia River tributaries. Historically, spawning occurred as far upstream as the Umatilla and Walla Walla rivers, but it now is restricted largely to tributary and mainstem areas downstream of Bonneville Lock and Dam (NMFS 2013).

Most chum salmon remain in the ocean between 3 and 5 years before reaching maturity and migrating to coastal rivers and streams to spawn. Although chum salmon are strong swimmers, they rarely pass river blockages and waterfalls that pose no hindrance to other salmon or steelhead and therefore they spawn in low-gradient, low-elevation reaches and side channels (ODFW 2010).

Chum salmon fry emerge from the gravel from March through May and are usually in freshwater for only a few days after emerging, before they promptly migrate downstream to the Columbia River estuary, where they rear anywhere from weeks to months prior to moving into ocean waters (NMFS 2013). Shallow, protected habitats such as salt marshes, tidal creeks, and intertidal flats serve as significant rearing areas for juvenile chum salmon during estuarine residency (LCFRB 2010). Juvenile chum salmon rear in the Columbia River estuary (i.e., lower 23 miles of the river [Johnson and O'Neil 2001]) from January through mid-May before beginning long-distance ocean migration (NMFS 2020).

Columbia River chum salmon could occur within the analysis area during cable installation downstream of Bonneville Lock and Dam. Adult chum salmon return to the Columbia River from mid-September through December (NMFS 2020) and spawn from early November to late December (NMFS 2013), which overlaps with the in-water work window for cable installation.

Critical Habitat

Critical habitat for Columbia River chum salmon was designated in 2005 (NMFS 2005b) and includes the mainstem Columbia River upstream to the White Salmon River, including the study area. The PBFs of critical habitat for Columbia River chum salmon are the same as those previously discussed for Chinook salmon (Section 5.2.7). The portion of the Columbia River in the analysis area supports primarily migration habitat (PBF 3). Lower portions of the river near the estuary (i.e., outside the analysis area) also support juvenile rearing habitat.

Lower Columbia River Coho Salmon

The LCR coho salmon ESU was listed as threatened under the ESA on June 28, 2005 (NMFS 2005a). The ESU includes all naturally spawned populations of coho salmon in the lower Columbia River and its tributaries, from the mouth of the Columbia River upstream to and including the Hood

River (in Oregon), the White Salmon River (in Washington), and the Willamette River up to Willamette Falls (NMFS 2005a).

Most coho salmon spend 3 years living in the ocean before returning to spawn, while a small percentage of males, called jacks, return to natal waters at age 2 (NMFS 2013). Most spawning occurs from November to January, but some occurs as late as March (NMFS 2013). Coho salmon generally occupy intermediate positions in tributaries and typically spawn in small to medium, low- to moderate-elevation streams from valley bottoms to stream headwaters, favoring small, rain-driven, lower-elevation streams characterized by relatively low flows during late summer, and increased river flows in winter (LCFRB 2010; ODFW 2010). On their return, adult fish often mill near the river mouths or in lower river pools until the first fall freshets occur (LCFRB 2010). Coho salmon construct redds in gravel and small cobble substrate in pool tailouts, riffles, and glides, with sufficient flow depth for spawning activity (NMFS 2013).

Eggs incubate over late fall and winter for about 45 to 140 days, depending on water temperature (NMFS 2013). Juveniles typically rear in freshwater for more than a year. Coho salmon fry rear in low-velocity areas, preferring pool habitat, and quiet backwaters, side channels, and small creeks with riparian cover and woody debris (NMFS 2013). Juvenile coho salmon normally spend 1 year rearing in freshwater before they become smolts and migrate to the ocean in spring.

LCR coho salmon are typically categorized into early- and late-returning stocks. Adult coho salmon enter the Columbia River from June through February (NMFS 2020); therefore, adult coho salmon could be present within the analysis area during the in-water work window for cable installation.

Coho salmon juveniles outmigrate through the lower Columbia River from March through mid-June and rear in the lower Columbia River throughout the year (NMFS 2020). Therefore, other than a few potential early outmigrants, it is unlikely that juvenile coho salmon would be present in the analysis area during the in-water work window for cable installation.

Critical Habitat

Critical habitat for LCR coho salmon was designated in 2005 (NMFS 2005b) and includes the same PBFs as those discussed for Chinook salmon (Section 5.2.7). Designated habitat includes the entirety of the mainstem Columbia River in the analysis area. The analysis area functions primarily as a migratory corridor for adults and juveniles (PBF 3). PBFs 1 and 4 through 6 are not present.

Snake River Sockeye Salmon

The Snake River sockeye salmon ESU was listed as threatened under the ESA in June 2005, and that status was reaffirmed in 2005 (70 FR 37160). The ESU includes populations of anadromous sockeye salmon in the Snake River basin, Idaho (extant populations occur only in the Stanley basin in Redfish Lake), as well as one captive propagation hatchery program (NMFS 2005a).

Sockeye salmon in the Columbia River constitute the southernmost major run in North America (Wydoski and Whitney 2003). While few sockeye salmon currently follow an anadromous life cycle, the small remnant run of the historical population in Redfish Lake migrates 900 miles downstream from the Sawtooth Valley through the Salmon, Snake, and Columbia rivers to the ocean (NMFS 2015).

Sockeye salmon differ from other species of salmon in that most stocks require a lake environment for part of their life cycle. Spawning occurs over gravel in streams, and the fry migrate upstream or

downstream to a lake soon after they emerge and continue to rear in the lake environment (Wydoski and Whitney 2003). Snake River sockeye salmon inhabit the Sawtooth Valley and spawn in gravel areas in lakes, where the juveniles rear for 1 to 3 years (Groot and Margolis 1991). Other populations have adopted a resident life history pattern, remaining in freshwater to mature and reproduce. After rearing in nursery lakes, anadromous sockeye salmon begin migrating to the sea as smolts during spring, and peak emigration to the ocean occurs in mid-April to early May. They remain at sea for an additional 1 to 3 years before returning to natal areas to spawn (Bjornn et al. 1968; Groot and Margolis 1991).

Outmigrating Snake River sockeye salmon tend to use deeper water; less than 3 percent have been found to use waters that are less than 6 meters deep (Dauble et al. 1989). Snake River sockeye salmon, like other stream-type salmonids, move relatively quickly downstream through the estuary, probably passing through the area within 2 to 3 days.

Most adult sockeye salmon enter the Columbia River from approximately mid-April through mid-July (NMFS 2020). Outmigrating sockeye salmon juveniles migrate in spring and tend to reach the lower river from March to mid-July, peaking in May, with low numbers occurring through mid-October (NMFS 2020). Therefore, early migrating sockeye salmon are anticipated to potentially overlap with the later part of the in-water work window in March.

Critical Habitat

Critical habitat for the Snake River sockeye salmon was designated in 1993 (58 FR 68543). The designated critical habitat includes the mainstem Columbia River, including the study area, which is used as migration habitat. PBFs for Snake River sockeye salmon critical habitat are the same as those described above for Chinook salmon (Section 5.2.7), and the river in the study area is used as a migratory corridor for both adults and juveniles (PBF 3).

Eulachon

Eulachon are an anadromous forage fish endemic to the northeastern Pacific Ocean. In March 2010, NMFS listed the Southern DPS of Pacific eulachon as threatened under the ESA (75 FR 13012). The Columbia River has been identified as one of the primary spawning rivers of the Southern DPS of eulachon (WDFW 2020).

Eulachon are small ocean-going fish that occur in offshore marine waters and return to tidal portions of rivers to spawn. After spending 3 to 5 years in the ocean, adult eulachon return to freshwater in the lower reaches of rivers to spawn. Like most salmonids, both male and female adults die after spawning. Eulachon are broadcast spawners, and spawning events typically occur over coarse, sandy substrates or pea-sized gravels (WDFW and ODFW 2001; Willson et al. 2006). Eulachon eggs have been observed in water from 8 to 20 feet in depth. Females typically produce between 7,000 and 60,000 eggs that are distributed downstream by river currents (Gustafson et al. 2010; WDFW and ODFW 2008; Willson et al. 2006). The fertilized eggs sink to the bottom and adhere to the sand or gravel, where they incubate for 20 to 40 days before hatching (NMFS 2017d; Parente and Snyder 1970; WDFW and ODFW 2001). After hatching, larvae have little mobility and are carried downstream and dispersed widely by estuarine and ocean currents.

In the Columbia River, eulachon typically spawn in January, February, and March (NMFS 2017d), but small runs (often referred to as “pilot runs”) can occur as early as November or December (Emmett et al. 1991; NMFS 2017d; WDFW and ODFW 2001). Larval outflow collection data from the

Lower Columbia River (RM 34) indicated a minor peak in mid-January, which is associated with adults arriving in late-November through December (Langness et al. 2020). Therefore, adult eulachon could occur in the analysis area downstream of Bonneville Lock and Dam during the in-work window for cable installation (November 1 to March 15).

Critical Habitat

Critical habitat for eulachon was designated on October 20, 2011 (76 FR 65324) and includes the Columbia River from the mouth upstream to Bonneville Lock and Dam at RM 146, and therefore, includes the analysis area. The lateral extent of critical habitat is the OHWM.

The PBFs essential to the conservation of the Southern DPS fall into three major categories reflecting key life history phases of eulachon: (1) freshwater spawning and incubation sites with water flow, quality, and temperature conditions and substrate supporting spawning and incubation, and with migratory access for adults and juveniles; (2) freshwater and estuarine migration corridors associated with spawning and incubation sites that are free of obstruction and with water flow, quality, and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted; and (3) nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival (76 FR 65333). Eulachon are known to spawn in the mainstem Columbia River, and the study area contains substrates that may provide for suitable egg adhesion; therefore, PBF 1 and PBF 2 are present in the analysis area.

4 References

Anderson, P.S., S. Meyer, P. Olson, E. Stockdale. 2016. *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State.* Shorelands and Environmental Assistance Program. Washington State Department of Ecology. Publication no. 16-06-029. October 2016.

Aubry, K.B., K.S. McKelvey, and J.P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. Journal of Wildlife Management. 71:2147–2158.

Brenkman, S.J., and S.C. Corbett. 2005. Extent of anadromy in Bull Trout and implications for conservation of a threatened species. North American Journal of Fisheries Management 25:1073–1081.

Copeland, J. P., K.S. McKelvey, K.B. Aubry, and A. Landa. 2010. The bioclimatic envelope of the wolverine (Gulo gulo): Do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88:233–246.

Environmental Protection Agency (EPA). 2016. Ecoregions of the Pacific Northwest (Idaho, Oregon, Washington). U.S. EPA, National Health and Ecological Effect Research laboratory, Western Ecology Division, Corvallis, Oregon. Map scale 1:1,500,000. Accessed online: Region10_PNW_Eco_v3 (epa.gov)

Fraley, J.J., and B.B. Shepard. 1989. Life history, ecology, and subpopulation status of migratory Bull Trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. Northwest Science 63:133–143.

Hallock, L. A., A. McMillan, and G. J. Wiles. 2017. Periodic status review for the Western Pond Turtle in Washington. Washington Department of Fish and Wildlife, Olympia, Washington. 19+v pp.

Johnson, D.H., and T.A. O'Neil. 2001. Wildlife Habitat Relationships in Oregon and Washington. Corvallis: Oregon State University Press.

National Oceanic and Atmospheric Administration (NOAA)

2021 Essential Fish Habitat Mapper. Last updated July 22, 2021. Accessed online: https://www.habitat.noaa.gov/apps/efhmapper/?page=page_4&views=view_14.

2024 National Endangered Species Act Critical Habitat Mapper. National Marine Fisheries Service, NOAA Office of Protected Resources. Last updated: October 16, 2023. Access online October 2023: National ESA Critical Habitat Mapper | NOAA Fisheries.

Oregon Department of Fish and Wildlife. 2024a. ODFW Gray Wolf Population (state.or.us)

Oregon Department of Fish and Wildlife (ODFW). 2024b. Oregon Wolf Conservation and Management 2023 Annual Report. Oregon Department of Fish and Wildlife, 4034 Fairview Industrial Drive SE. Salem, OR, 97302.

Rieman, B.E., and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. USDA Forest Service, Intermountain Research Station. General Technical Report INT-302.

Roegner, G.C., Dawley, E.W., Russell, M., Whiting, A., and D.J. Teel. 2010. Juvenile Salmonid Use of Reconnected Tidal Freshwater Wetlands in Grays River, Lower Columbia River Basin. Transactions of the American Fisheries Society. 139:1211-1232, 2010.

Thorson, T.D., S.A. Bryce, D.A. Lammers, A.J. Woods, J.M. Omernik, J. Kagan, D.E. Pater, and J.A. Comstock. 2003. Ecoregions of Oregon. Color poster with map (map sclae 1:1,500,000), descriptive text, summary tables, and photographs. U.S. Geological Survey, Reston, Virginia.

U.S Fish and Wildlife Service (USFWS)

2010a Bull Trout Final Critical Habitat Justification: Rationale for Why Habitat is Essential, and Documentation of Occupancy Chapter 8. Coastal Recovery Unit —Mainstem Lower Columbia River Critical Habitat Unit.

2010b Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States, Final Rule. Federal Register 75:63898–64069.

2013a Biological Opinion for Effects to Northern Spotted Owls, Critical Habitat for Northern Spotted Owls, Marbled Murrelets, Critical Habitat for Marbled Murrelets, Bull Trout, and Critical Habitat for Bull Trout from Selected Programmatic Forest Management Activities March 25, 2013 to December 31, 2023 on the Olympic National Forest Washington. USFWS Reference: 13410-2009-F-0388. Washington Fish and Wildlife Office, U.S. Fish and Wildlife Service, Lacey, Washington.

2013b Endangered and Threatened Wildlife and Plants; Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States; Proposed rule. 50 CFR Part 17.

2015 Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). Portland, Oregon.

2022 Critical habitat for Threatened and Endangers Species. Last updated December 9, 2022. Accessed November 2024: Critical Habitat for Threatened & Endangered Species [USFWS] - (arcgis.com).

2023 Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for the Northwestern Pond Turtle and Southwestern Pond Turtle. Federal Register 88:68370-68399. October 3.

2024a National Wetland Inventory Surface Water and Wetlands Online Mapper. Accessed November 2024: National Wetlands Inventory (usgs.gov).

2024b Northern spotted owl (*Strix occidentalis caurina*) Species Factsheet Webpage. Available online at: https://www.fws.gov/species/northern-spotted-owl-strix-occidentalis-caurina. Accessed November 2024.

U.S. Department of Agriculture, National Resource Conservation Service (USDA NRCS). 2022. *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin.* USDA, Agricultural Handbook 296. May 2022.

U.S. Geological Survey (USGS). 2024. National Hydrography Dataset. Accessed December 2024: National Hydrography Dataset | U.S. Geological Survey (usgs.gov).

Washington Department of Fish and Wildlife (WDFW)

2023. Washington Gray Wolf Conservation and Management 2022 Annual Report. Washington Department of Fish and Wildlife, Ellensburg, WA, USA.

2024a Priority Habitats and Species on the Web. Accessed December 2024: https://geodataservices.wdfw.wa.gov/hp/phs/.

2024b SalmonScape online mapping system. Accessed December 2024: http://apps.wdfw.wa.gov/salmonscape/.

2024c. Northern spotted owl (*Strix occidentalis caurina*). Available online at: https://wdfw.wa.gov/species-habitats/species/strix-occidentalis-caurina#climate. Accessed November 2024.

2024d. Yellow-billed cuckoo (*Coccyzus americanus*). Available online at: https://wdfw.wa.gov/species-habitats/species/coccyzus-americanus#resources. Accessed November 2024.

2024e. Northwestern pond turtle (*Actinemys marmorata*) Available online at: https://wdfw.wa.gov/species-habitats/species/actinemys-marmorata#desc-range. Accessed December 6, 2023.

Northwest Indian Fisheries Commission (NWIFC). 2024. Statewide Integrated Fish Distribution, Washington Geospatial Open Data Portal. Updated April 27, 2023. Accessed online Statewide Washington Integrated Fish Distribution | Statewide Washington Integrated Fish Distribution | Washington State Geospatial Open Data Portal.

Washington Department of Natural Resources (WDNR). 2024. Forest Practices Application Review System – Forest Practices Application Mapping Tool. Accessed November 2024: Forest Practices Application Mapping Tool (FPAMT) (wa.gov).

Washington Natural Heritage Program (WNHP). 2024. Data Explorer for Rare Plant and Ecosystem Locations. Accessed December 2024: WNHP Data Explorer (arcgis.com).

Wiles, G.J., and K.S. Kalasz. 2017. Status report for the Yellow-billed Cuckoo in Washington. Washington Department of Fish and Wildlife, Olympia, Washington.

Wydoski, R.S. and R.R. Whitney. 2003. Inland fishes of Washington. University of Washington Press, Seattle, Washington. Second Edition.

Appendix A. Field Survey Photos

This page intentionally left blank.

Photo 1: Overview of fields where proposed converter station is sited near the existing BPA substation in the Dalles at the east end of Project corridor, viewing southeast. June 2024.

Photo 2: View of roadway from converter station in the Dalles where the cable is sited in the road prism showing grass and shrub scrub adjacent habitat, viewing east. June 2024.

Photo 3: Orchards and agricultural fields adjacent to the cable route alongside SR 197 in the Dalles, viewing northwest. June 2024.

Photo 4: Disturbed roadside area where HDD sited to install cable under Threemile Creek in the Dalles, viewing northeast. June 2024.

Photo 5: Shoreline riparian area along the south bank of the Columbia River in Riverfront Park in the Dalles, viewing north. June 2024.

Photo 6: Access road on Hayden Island where the cable is routed after coming ashore, viewing north. May 2024.

Photo 7: Transmission line access road on Hayden Island where cable installation is proposed, viewing west. May 2024.

Photo 8: Cottonwood dominant riparian forest on Hayden Island avoided by installing the cable underneath using HDD, viewing south. May 2024.

Photo 9: Open field at HDD landing site in Portland for west alternative route, viewing north. May 2024.

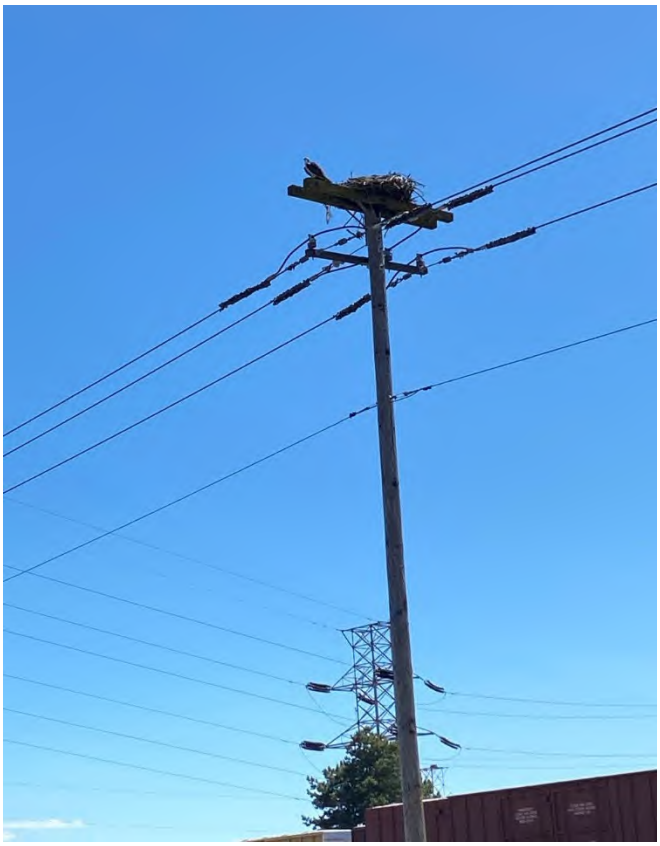


Photo 10: Active osprey nest near railway in Portland, northwest of HDD landing for the west alternative cable route. May 2024.

Photo 11: Open field at HDD landing site in Portland for east alternative route, viewing north. May 2024.

Photo 12: General view of cable route along roadside through developed area in Portland. May 2024.

Photo 13: Disturbed open field at location for HDD crossing of the Willamette River, viewing north. May 2024.

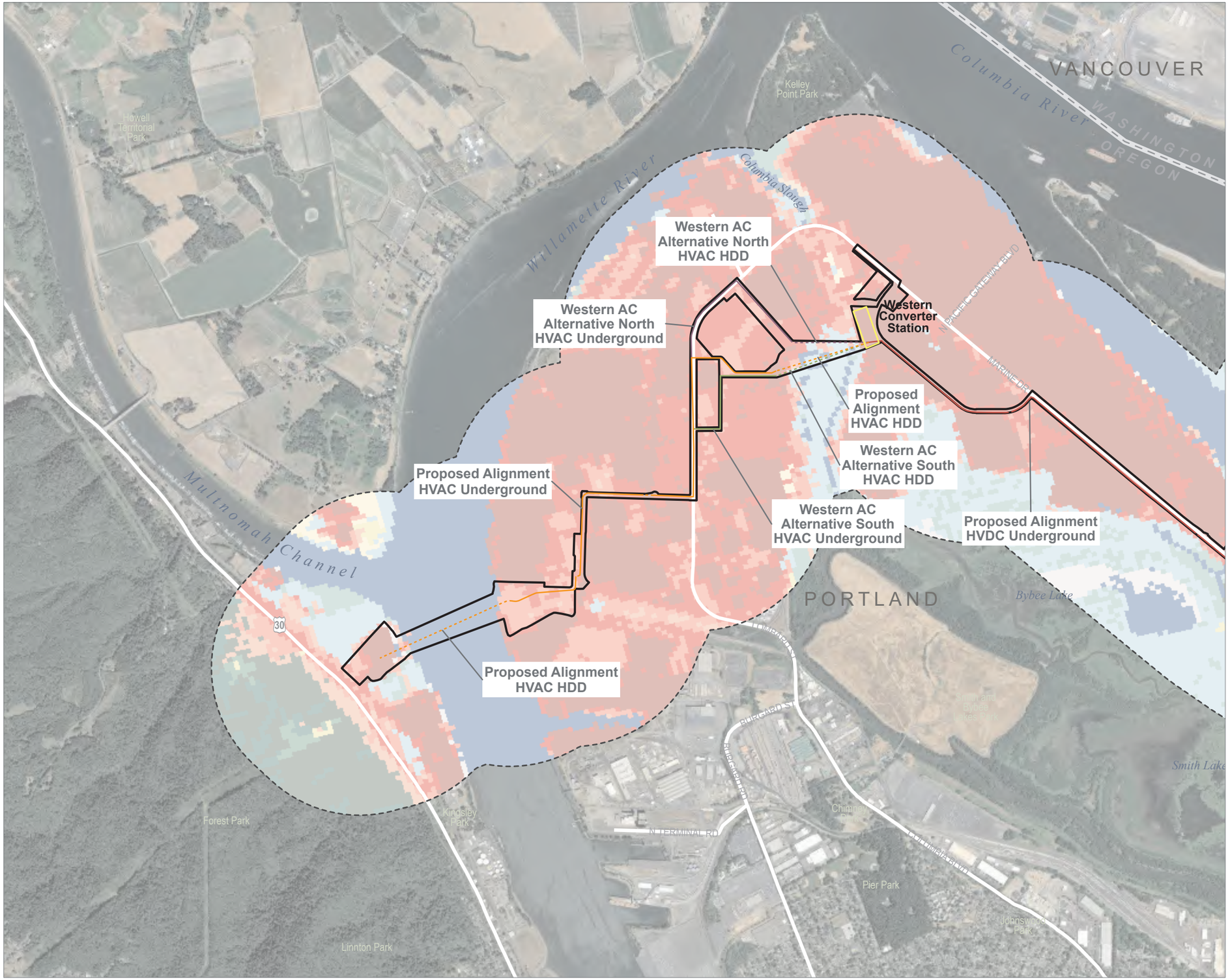
Photo 14: West side of Willamette River where HDD landing area is proposed next to Harborton substation, viewing east. May 2024.

Photo 15: Ponded wetland outside the Project Site Boundary, north of Harborton substation at western terminus of the Project. May 2024.

Appendix B. Figures

This page intentionally left blank.

FIGURE 1
LANDCOVER MAP
PAGE 1 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVAC HDD
- PROPOSED ALIGNMENT - HVAC UNDERGROUND
- WESTERN AC ALT NORTH - HVAC HDD
- WESTERN AC ALT NORTH - HVAC UNDERGROUND
- WESTERN AC ALT SOUTH - HVAC HDD
- WESTERN AC ALT SOUTH - HVAC UNDERGROUND
- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- CONVERTER STATION
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

NLCD LAND COVER

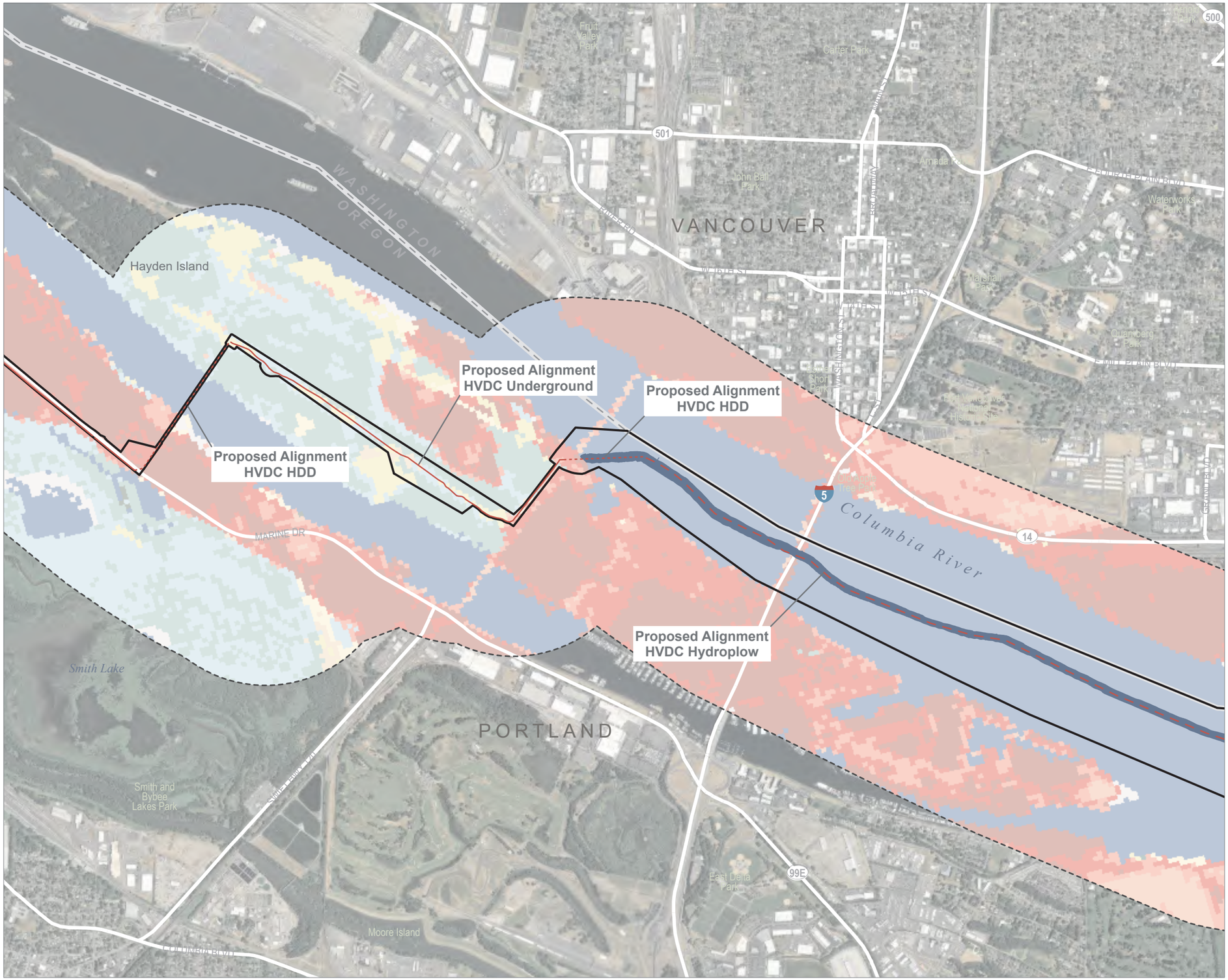
- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 2 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

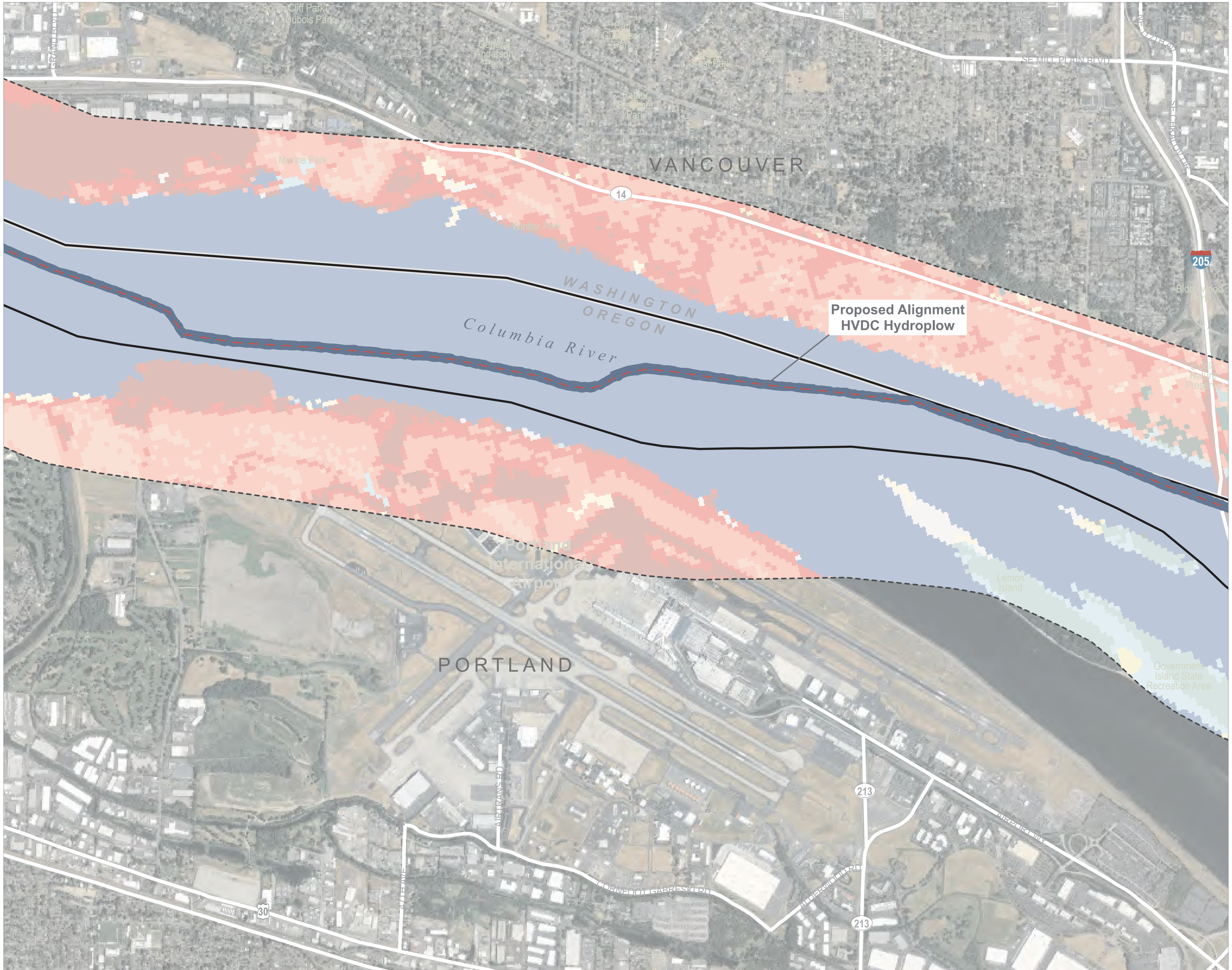


FIGURE 1
LANDCOVER MAP
PAGE 3 OF 21

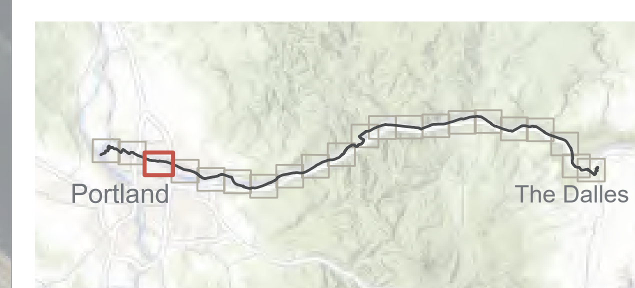
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

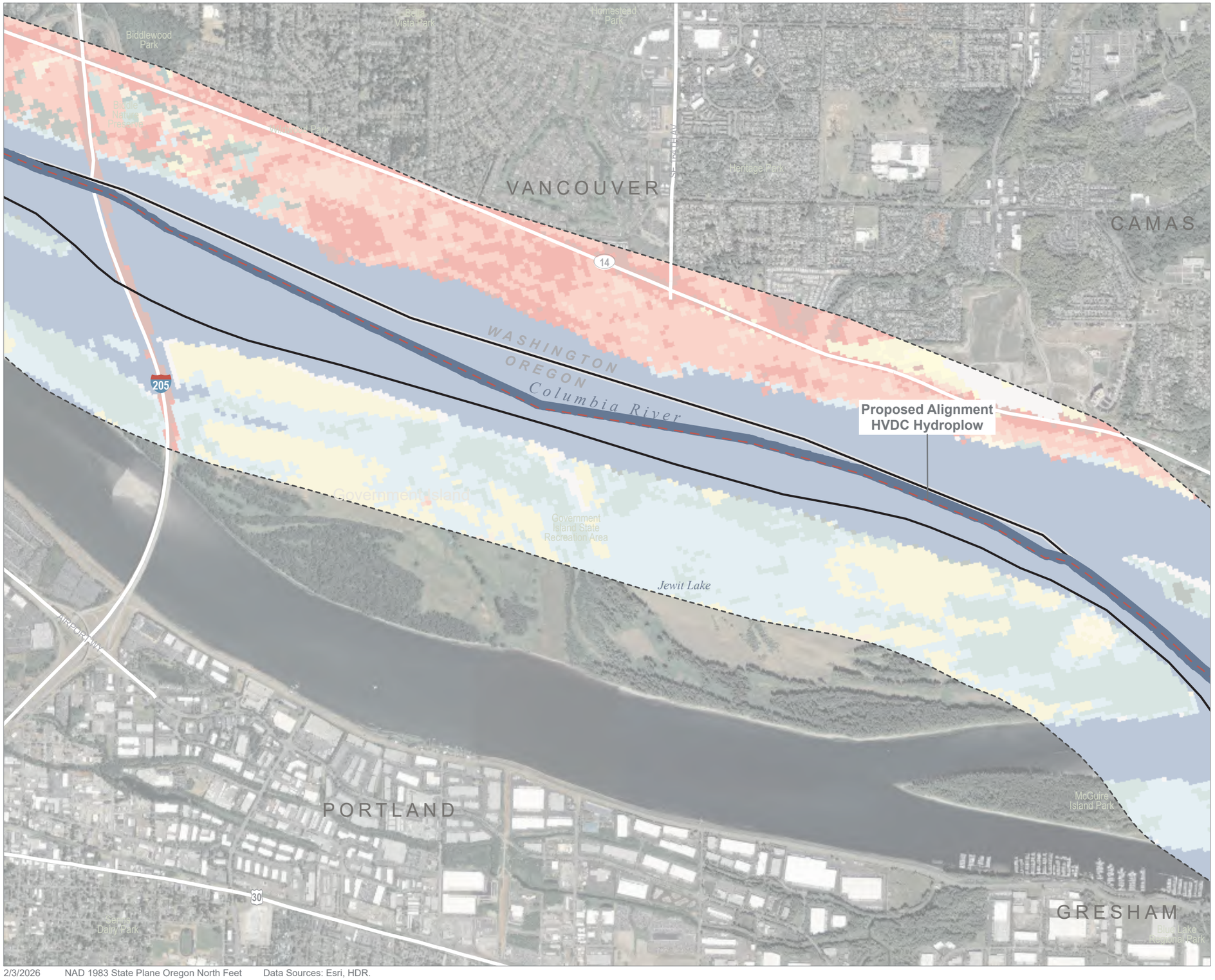
CASCADE RENEWABLE TRANSMISSION



0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 4 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 5 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

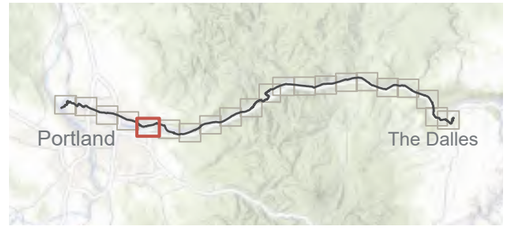
NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

Proposed Alignment
HVDC Hydroplow

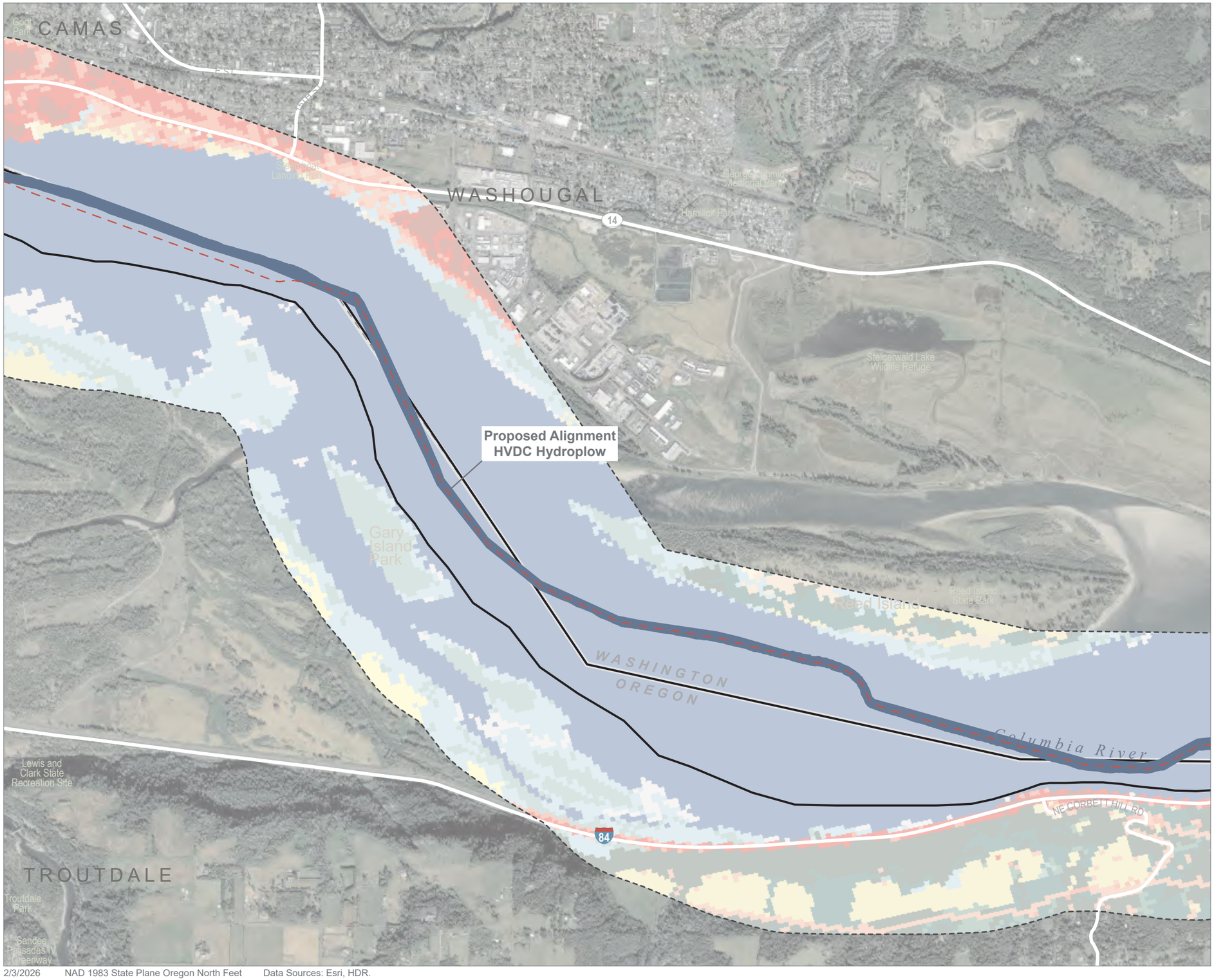
CAMAS
WASHOUGAL
WASHINGTON
OREGON
Columbia River
TROUTDALE
GRESHAM
FAIRVIEW
WOOD VILLAGE
Forest Home Park
Lacamas Lake Park
Louis Block Park
Goot Park
Government Island State Recreation Area
McGuire Island Park
Chinook Landing Marine Park
Blue Lake Regional Park
Hockaday Park
Lakeshore Park
Pelfrey Park
Pettygrove Park
Heron Cheechokee Park
Clegne Park
Handy Park
Marburn's Park
Wood Village City Park
Helen Althaus Park
Strawberry Meadows Greenway
Troutdale Park
Depot Park
Lewis and Clark State Recreation Site
500
14
30
84

CASCADE RENEWABLE TRANSMISSION



0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.



2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 6 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi

1:24,000

FIGURE 1
LANDCOVER MAP
PAGE 7 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

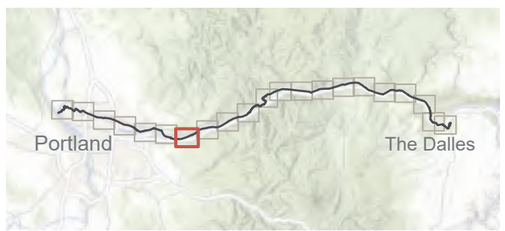
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

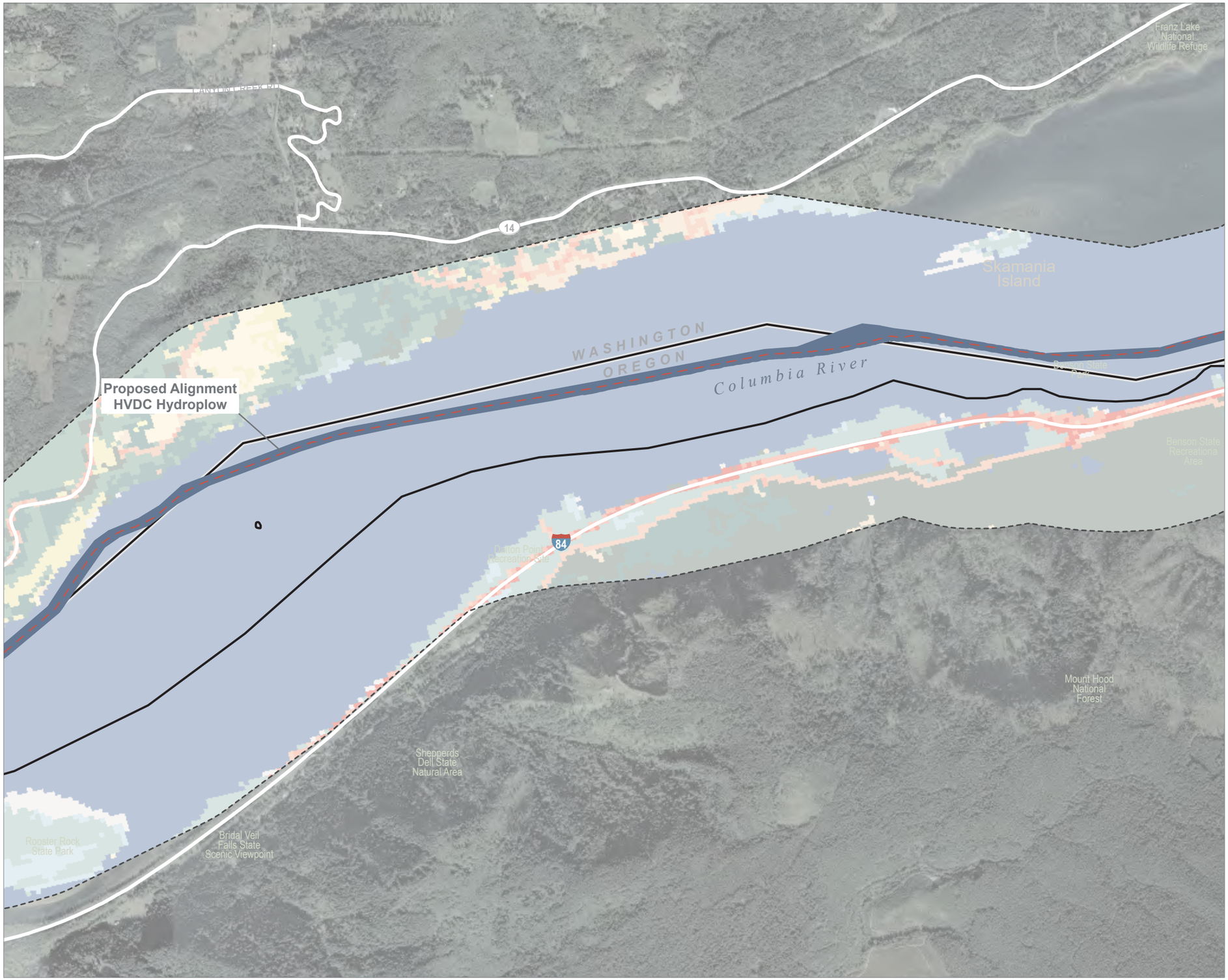
Steigerwald Lake Wildlife Refuge
Reed Island State Park
Proposed Alignment HVDC Hydroplow
14
WASHINGTON
OREGON
Columbia River
Sand Island
84
Rooster Rock State Park
Shepperds Dell State Natural Area
Guy W. Talbot State Park
Portland Women's Forum State Scenic Viewpoint
George W. Joseph State Natural Area

CASCADE RENEWABLE TRANSMISSION



0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.



2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 8 OF 21

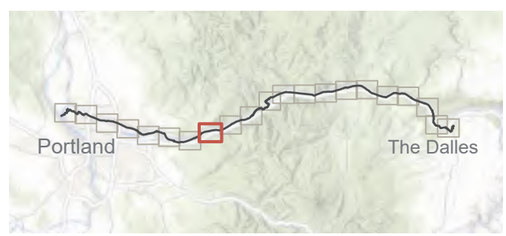
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION



0 0.5 mi

1:24,000

FIGURE 1
LANDCOVER MAP
PAGE 9 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

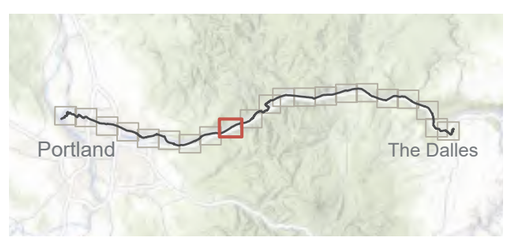
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

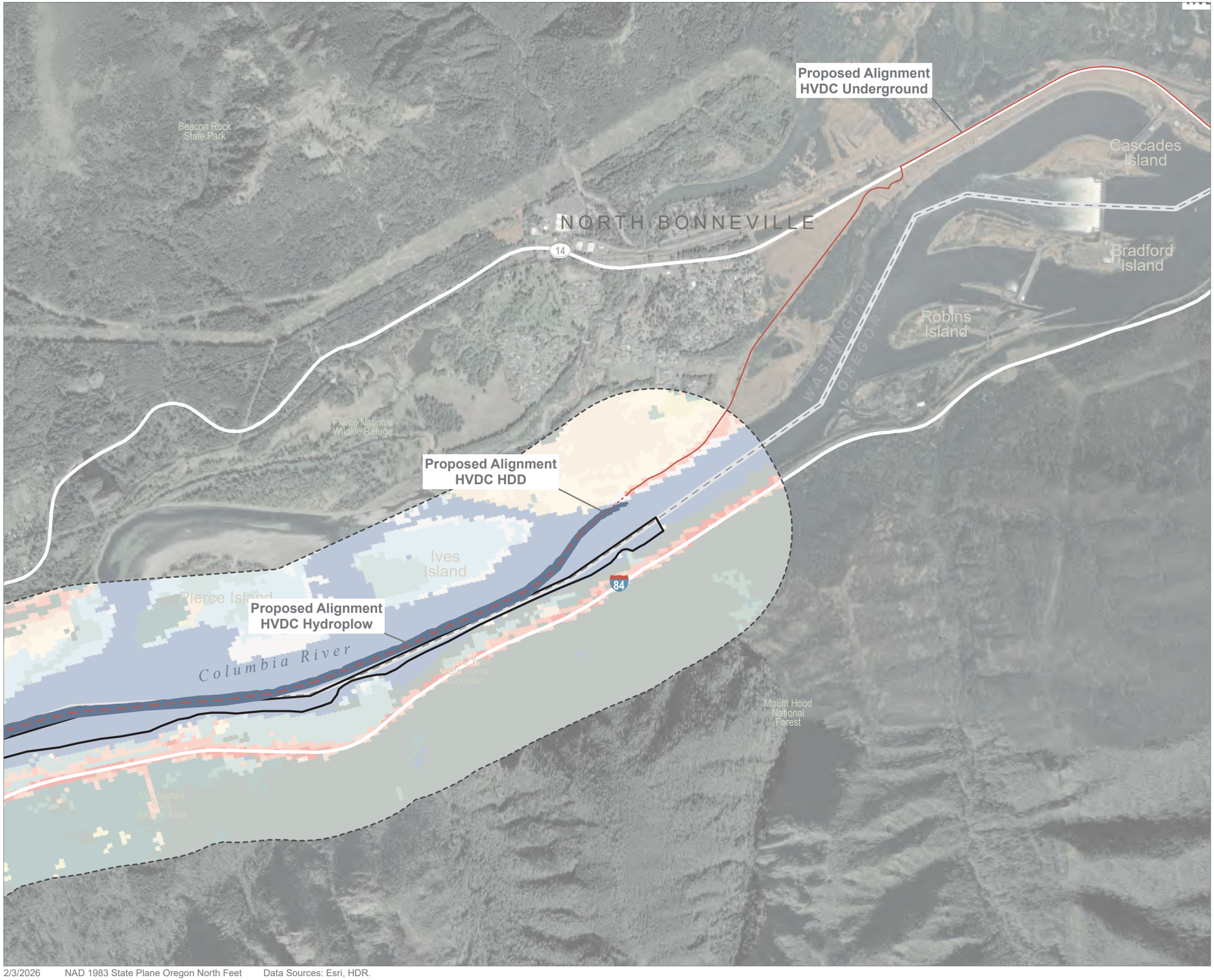
Columbia Falls Natural Area Preserve
Beacon Rock State Park
Proposed Alignment HVDC Hydroplow
Franz Lake
Franz Lake National Wildlife Refuge
WASHINGTON
OREGON
McLoughlin State Natural Area
Dodson-Warrendale State Park
Columbia River
Benson State Recreation Area
Mount Hood National Forest
14
84

CASCADE RENEWABLE TRANSMISSION



0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.



2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 10 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

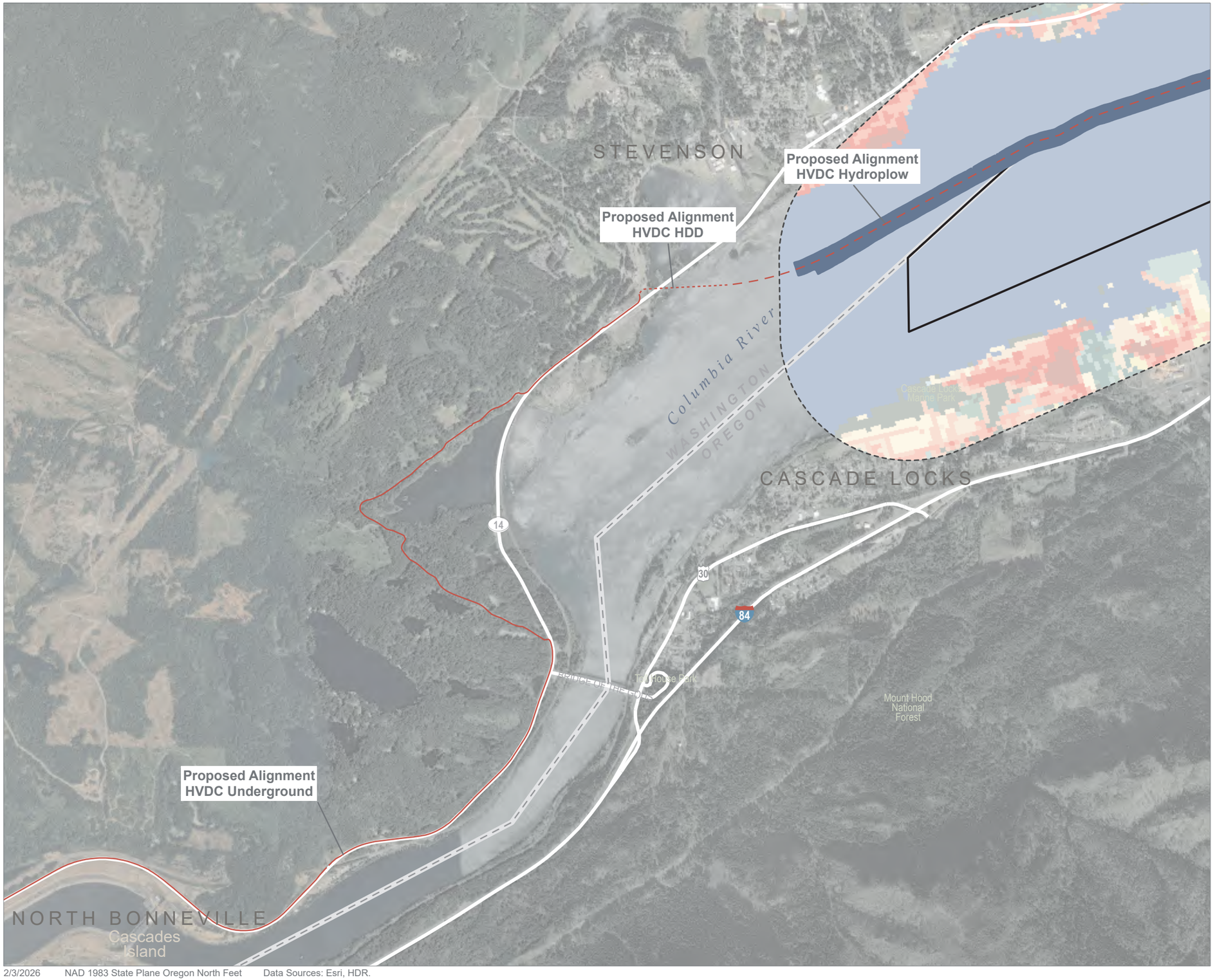
NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

FIGURE 1
LANDCOVER MAP
PAGE 11 OF 21



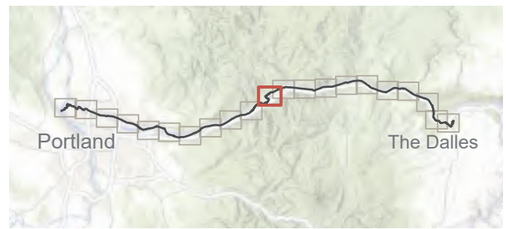
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION



2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

0 0.5 mi

1:24,000

FIGURE 1
LANDCOVER MAP
PAGE 12 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CARSON RIVER VALLEY (ESTIMATED)

STEVENSON

WASHINGTON

OREGON

Columbia River

Proposed Alignment
HVDC Hydroplow

Lewis and Clark State Scenic Corridor

CASCADE LOCKS

Cascade Locks Marine Park

Mount Hood National Forest

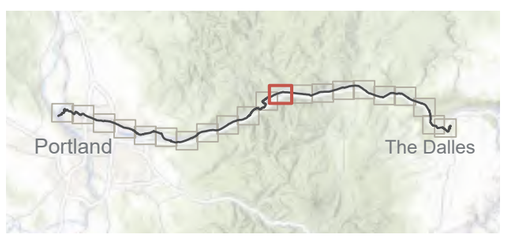
14

84

30

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION



HDR

0 0.5 mi

1:24,000

FIGURE 1
LANDCOVER MAP
PAGE 13 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

Gifford Pinchot National Forest

WASHINGTON

Columbia River OREGON

14

Wyeth State Recreation Area

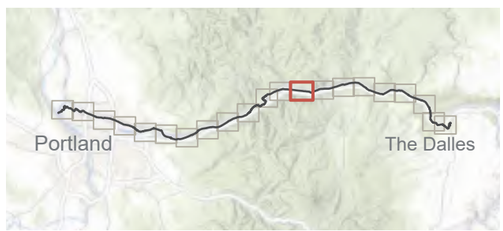
84

Lindsey Creek State Scenic Corridor

Proposed Alignment HVDC Hydroplow

Mount Hood National Forest

CASCADE RENEWABLE TRANSMISSION

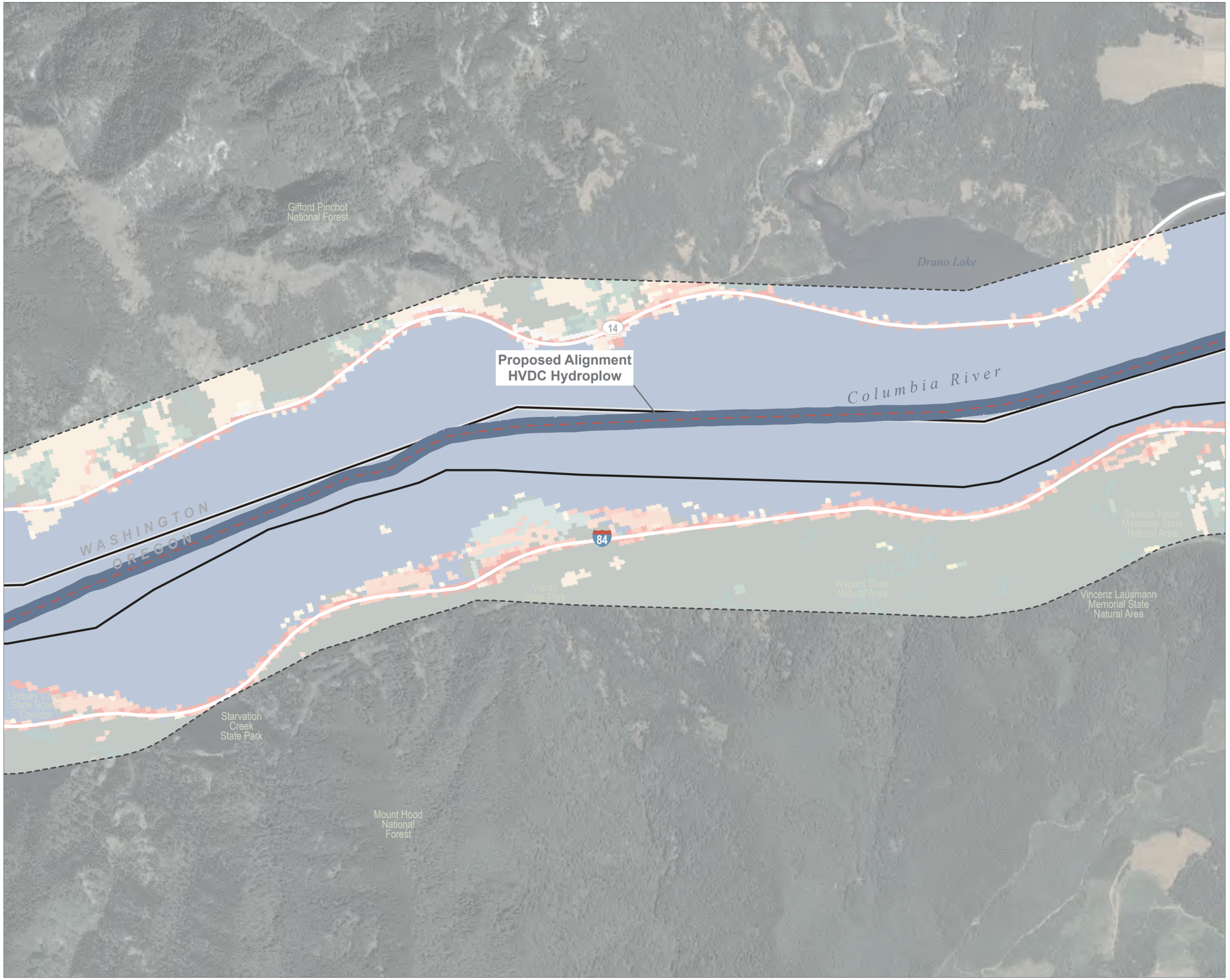


0 0.5 mi

1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 14 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

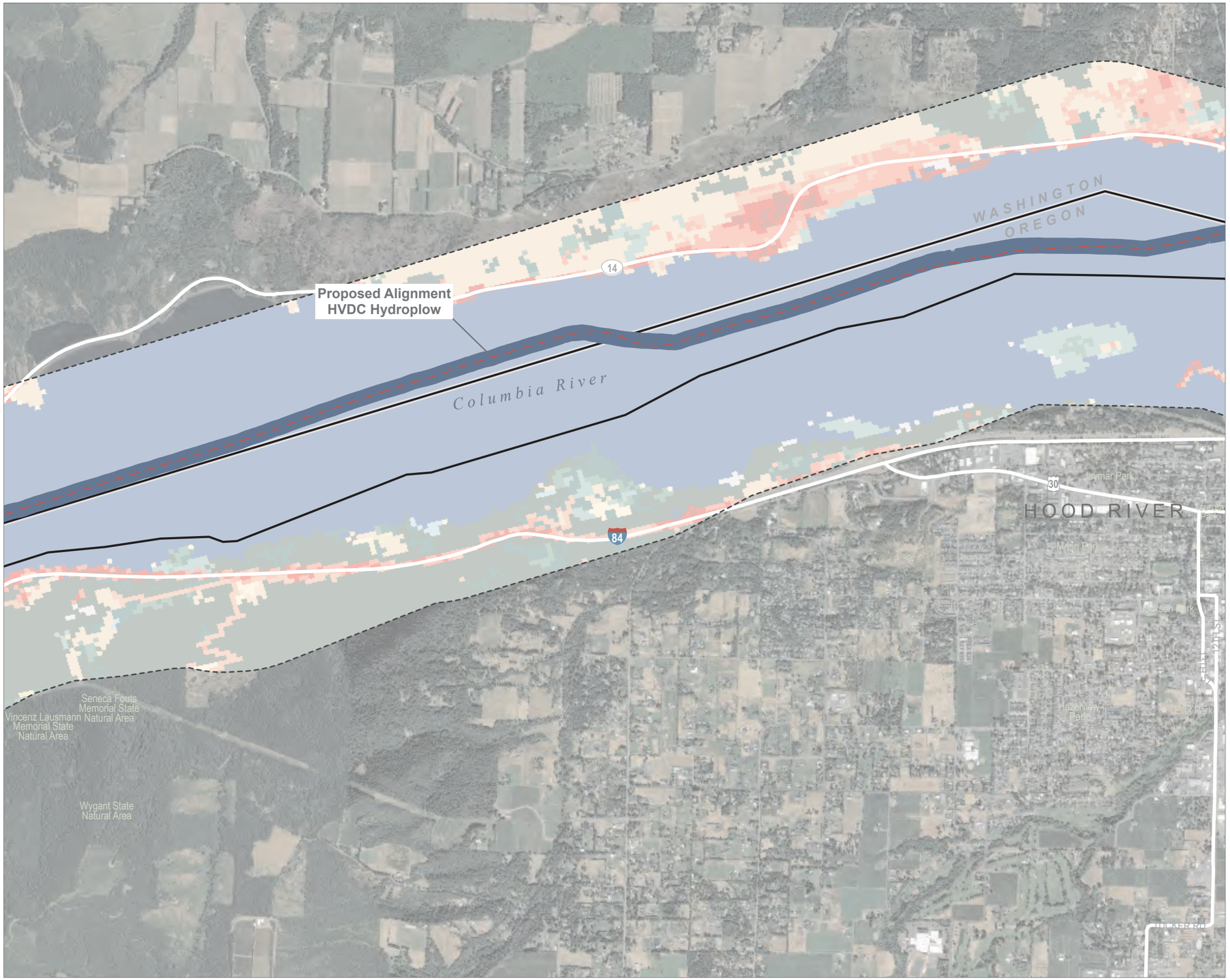
CASCADE RENEWABLE TRANSMISSION

0 0.5 mi

1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 15 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

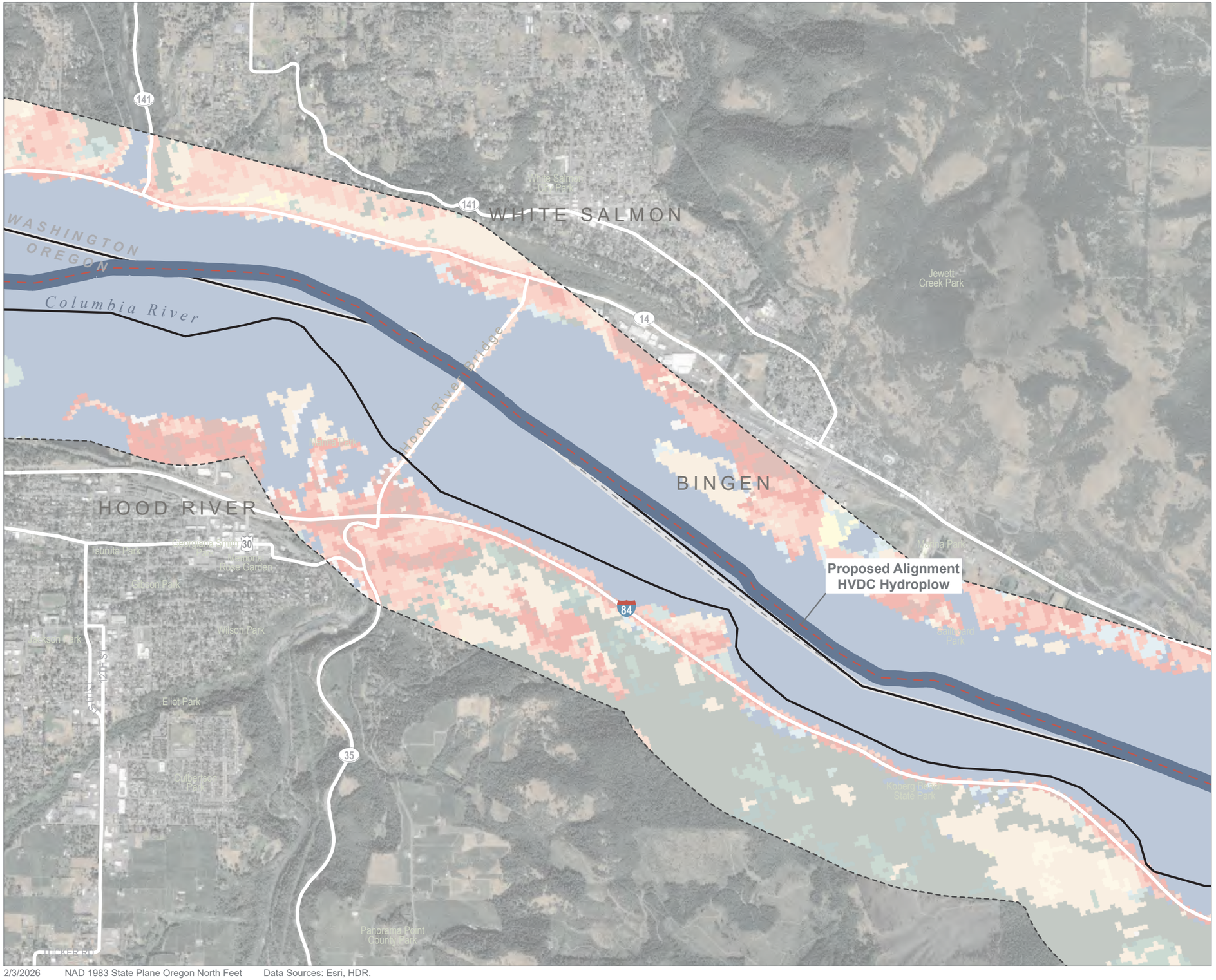
CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 16 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING



PROPOSED ALIGNMENT - HVDC HYDROPLOW
OREGON EFSC SITE BOUNDARY
STATE BOUNDARY
ANALYSIS AREA (0.5 MILE BUFFER)
MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 17 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

Jewett Creek Park
Rowland Lake
WASHINGTON
OREGON
14
Columbia River
Koberg Beach State Park
Memaloose State Park
Proposed Alignment
HVDC Hydroplow
84
MOSIER

CASCADE RENEWABLE TRANSMISSION

HDR

0 0,5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 18 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

Proposed Alignment
HVDC Hydroplow

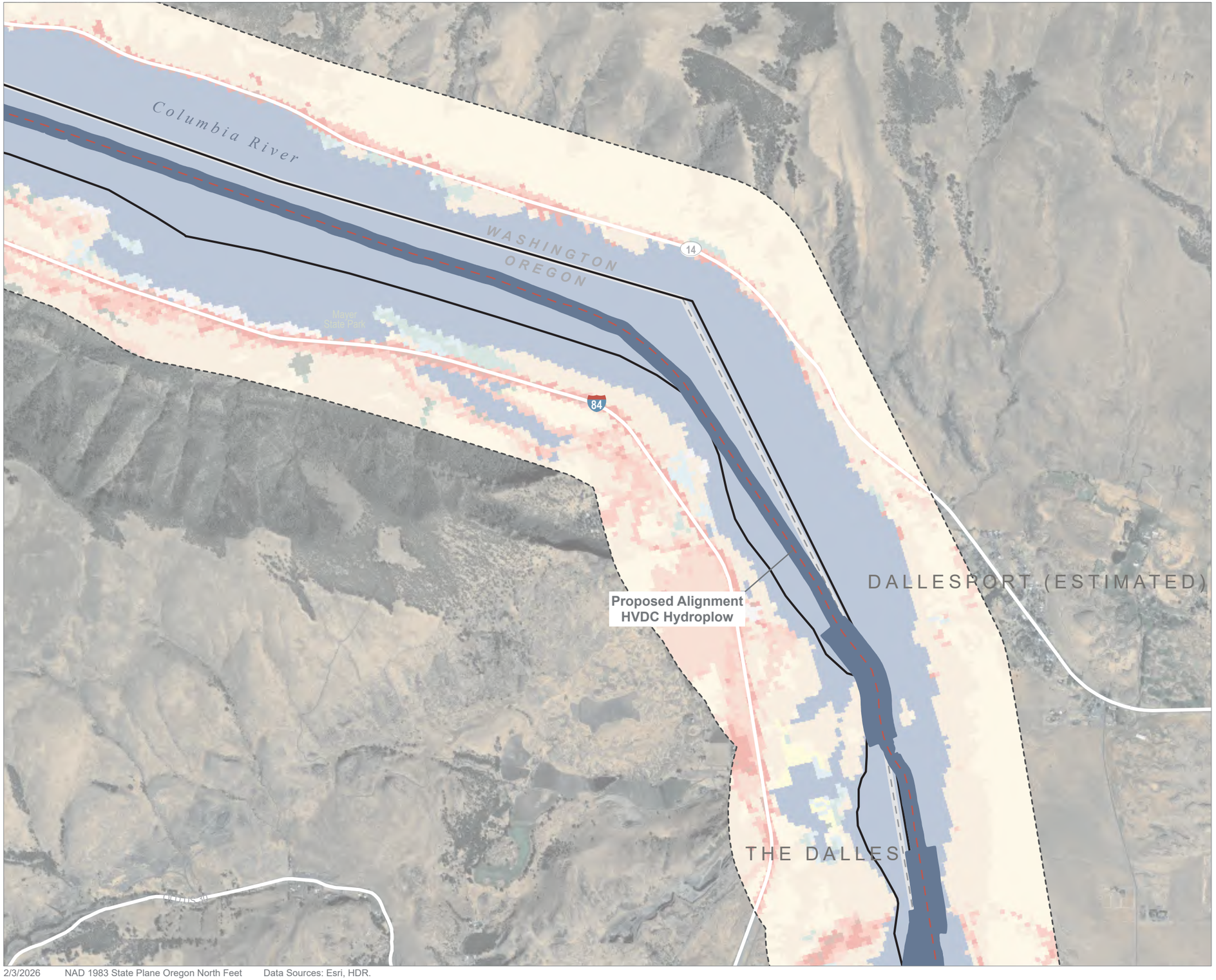
Chamberlain Lake
LYLE (ESTIMATED)
Lyle Park
Maryhill State Park
Mayer State Park
WASHINGTON
OREGON
Columbia River
14
142
84

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 19 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

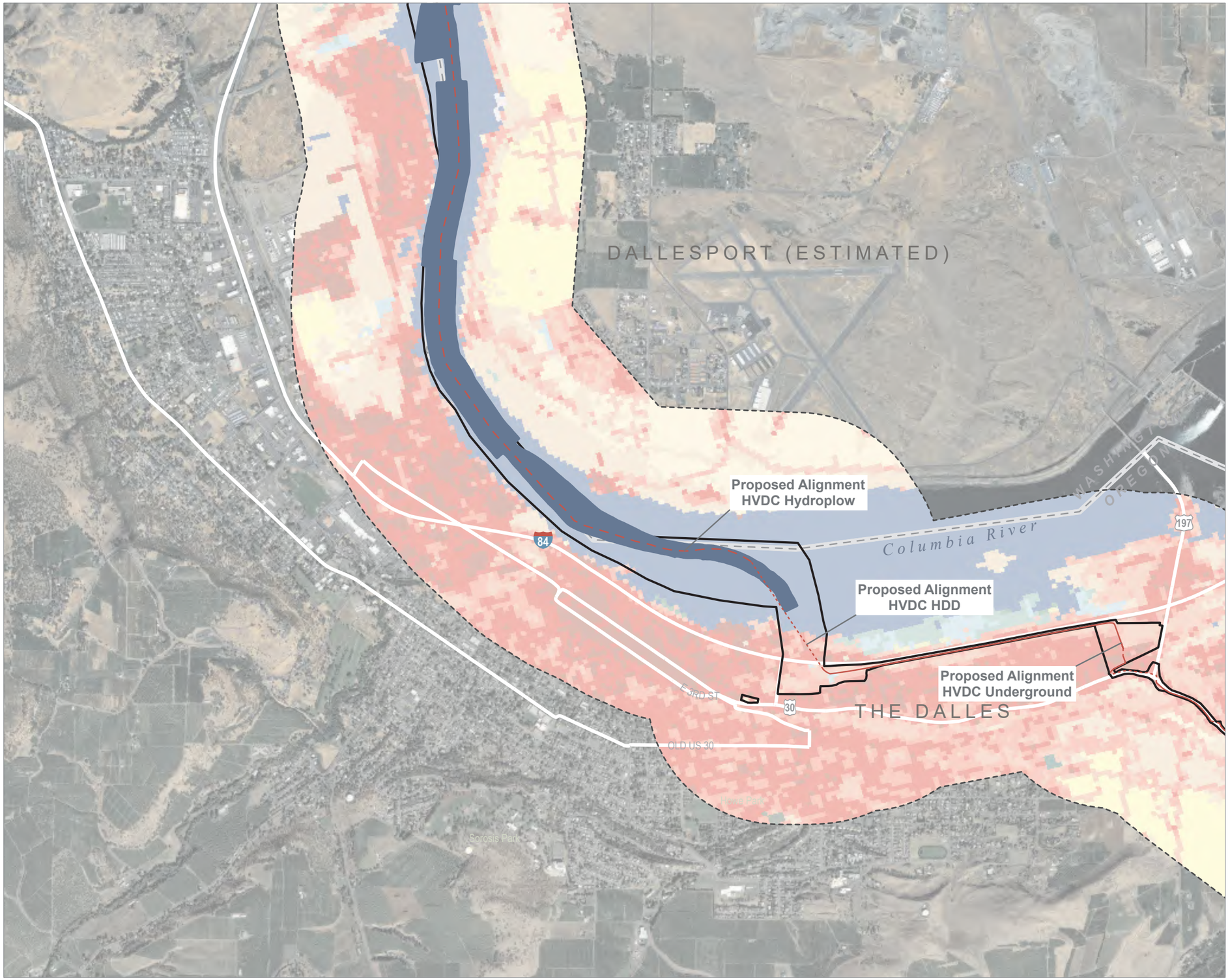
- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 20 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

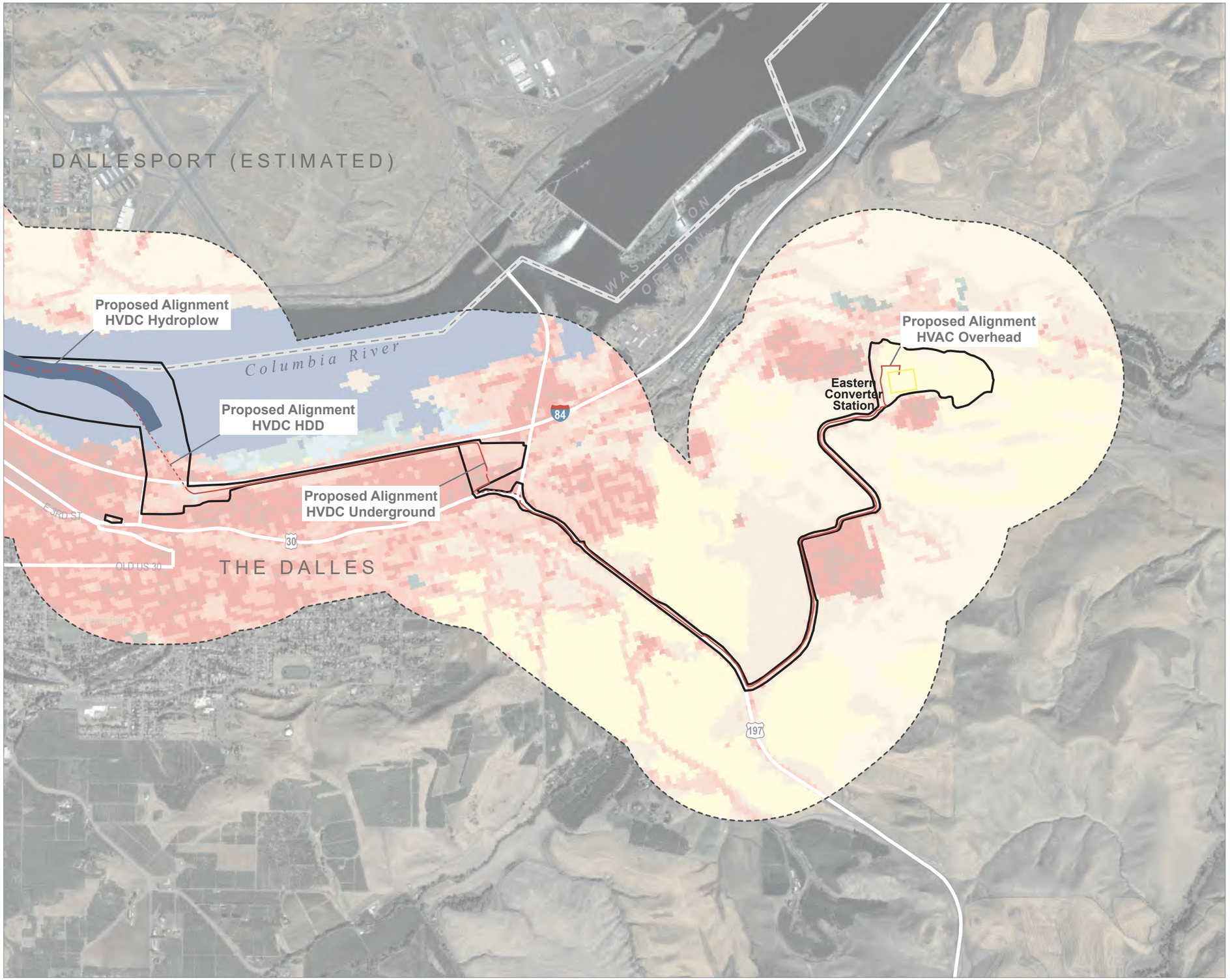
- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- BARREN LAND
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 1
LANDCOVER MAP
PAGE 21 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- CONVERTER STATION
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)
- MICROSITING CORRIDOR

NLCD LAND COVER

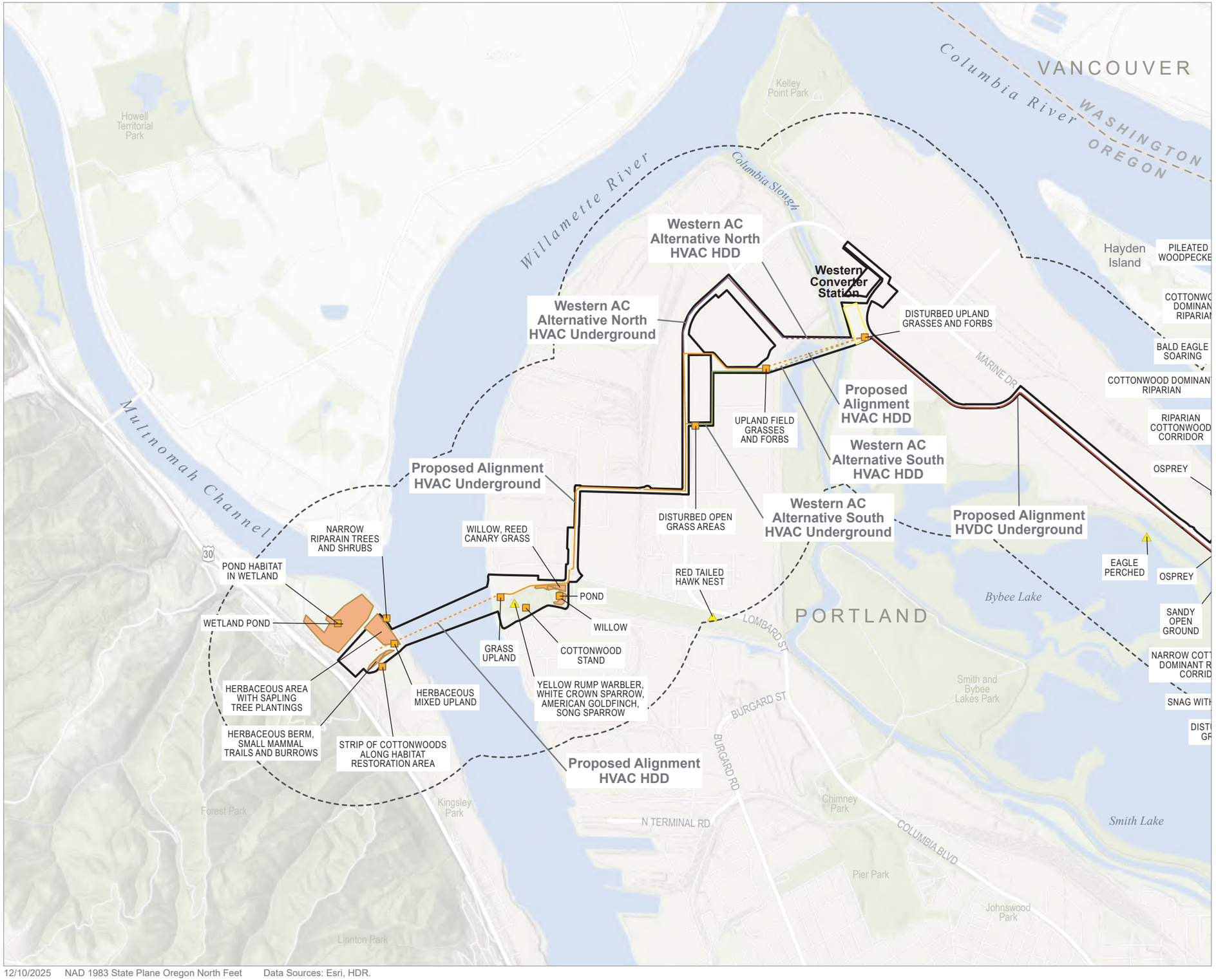
- OPEN WATER
- DEVELOPED OPEN SPACE
- DEVELOPED LOW INTENSITY
- DEVELOPED MEDIUM INTENSITY
- DEVELOPED HIGH INTENSITY
- DECIDUOUS FOREST
- EVERGREEN FOREST
- MIXED FOREST
- SHRUB/SCRUB
- GRASSLAND/HERBACEOUS
- PASTURE/HAY
- CULTIVATED CROPS
- WOODY WETLANDS
- EMERGENT HERBACEOUS WETLANDS

CASCADE RENEWABLE TRANSMISSION

2/3/2026 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

0 0.5 mi
1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 1 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVAC HDD
- PROPOSED ALIGNMENT - HVAC UNDERGROUND
- WESTERN AC ALTERNATIVE NORTH - HVAC HDD
- WESTERN AC ALTERNATIVE NORTH - HVAC UNDERGROUND
- WESTERN AC ALTERNATIVE SOUTH - HVAC HDD
- WESTERN AC ALTERNATIVE SOUTH - HVAC UNDERGROUND
- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- CONVERTER STATION
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

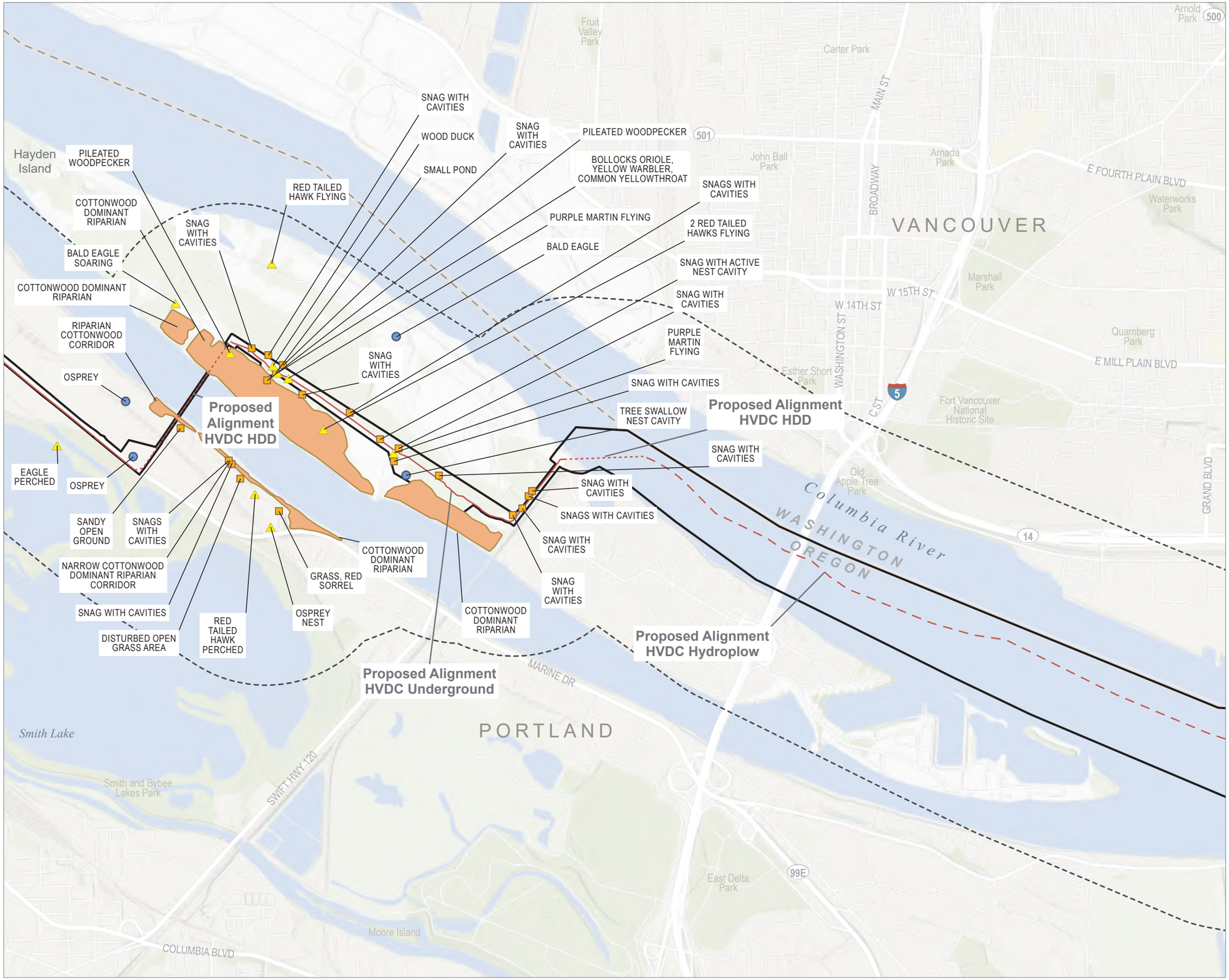
- NESTS
- INCIDENTAL OBSERVATIONS
- HABITAT POINT
- HABITAT AREA

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 2 OF 21



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

- NESTS
- INCIDENTAL OBSERVATIONS
- HABITAT POINT
- HABITAT AREA

CASCADE RENEWABLE TRANSMISSION

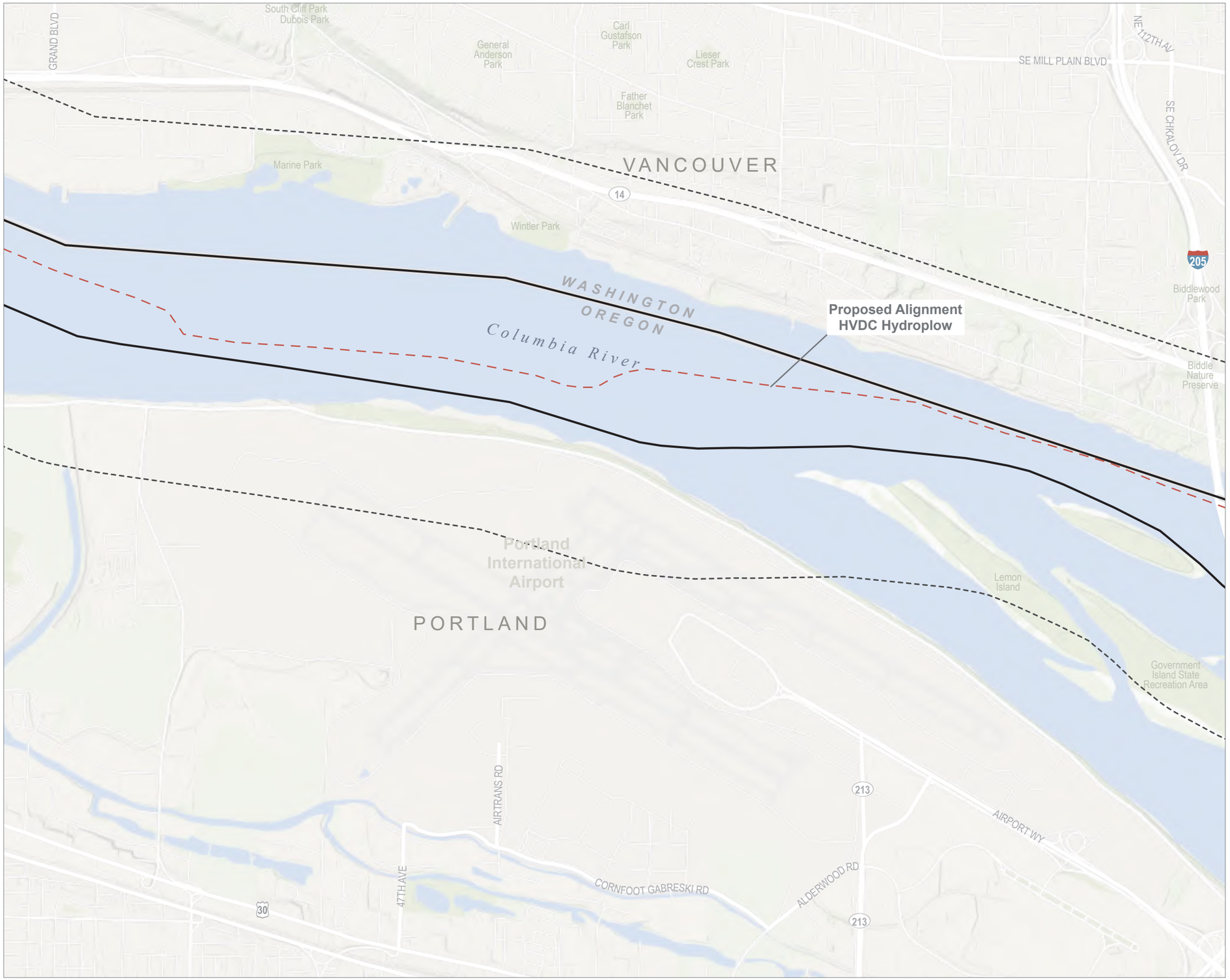
0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 3 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

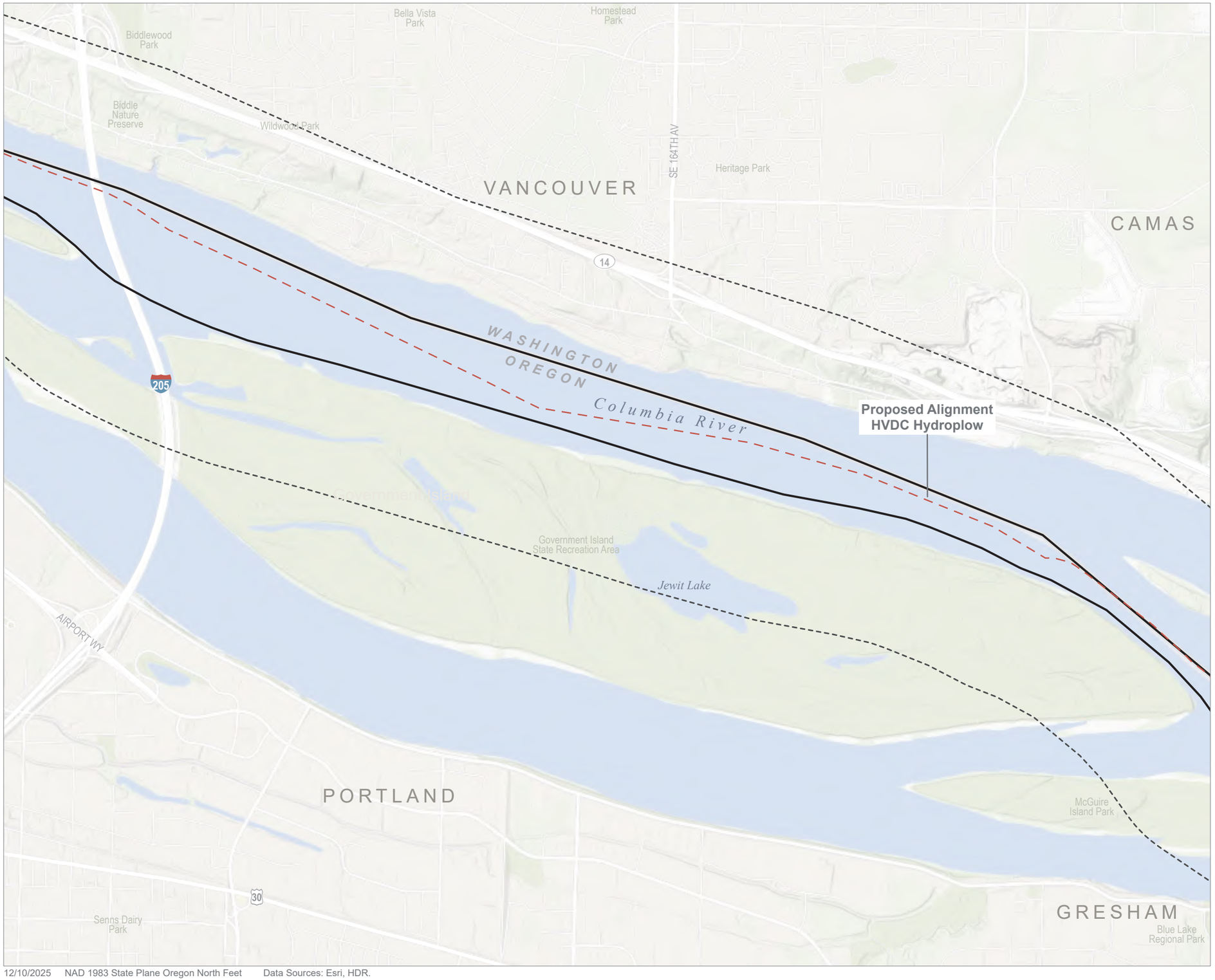
0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 4 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

HDR

0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 5 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

Proposed Alignment
HVDC Hydroplow

CAMAS
WASHOUGAL
TROUTDALE
GRESHAM
FAIRVIEW
WOOD VILLAGE
WASHINGTON
OREGON
Columbia River
Forest Home Park
NE 6TH AVE
Louis Block Park
Lacamas Lake Park
NE 3RD AVE
Goot Park
Government Island State Recreation Area
McGuire Island Park
Chinook Landing Marine Park
Blue Lake Regional Park
Hockaday Park
Lakeshore Park
Pelfrey Park
Pettijohn Park
Handy-Nechocokee Park
Cleone Park
Handy Park
Marilyn's Park
238TH DR
Wood Village City Park
Helen Althaus Park
Strawberry Meadows Greenway
Troutdale Park
Mayor's Square
Depot Park
Lewis and Clark State Recreation Site
500
14
30
84

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

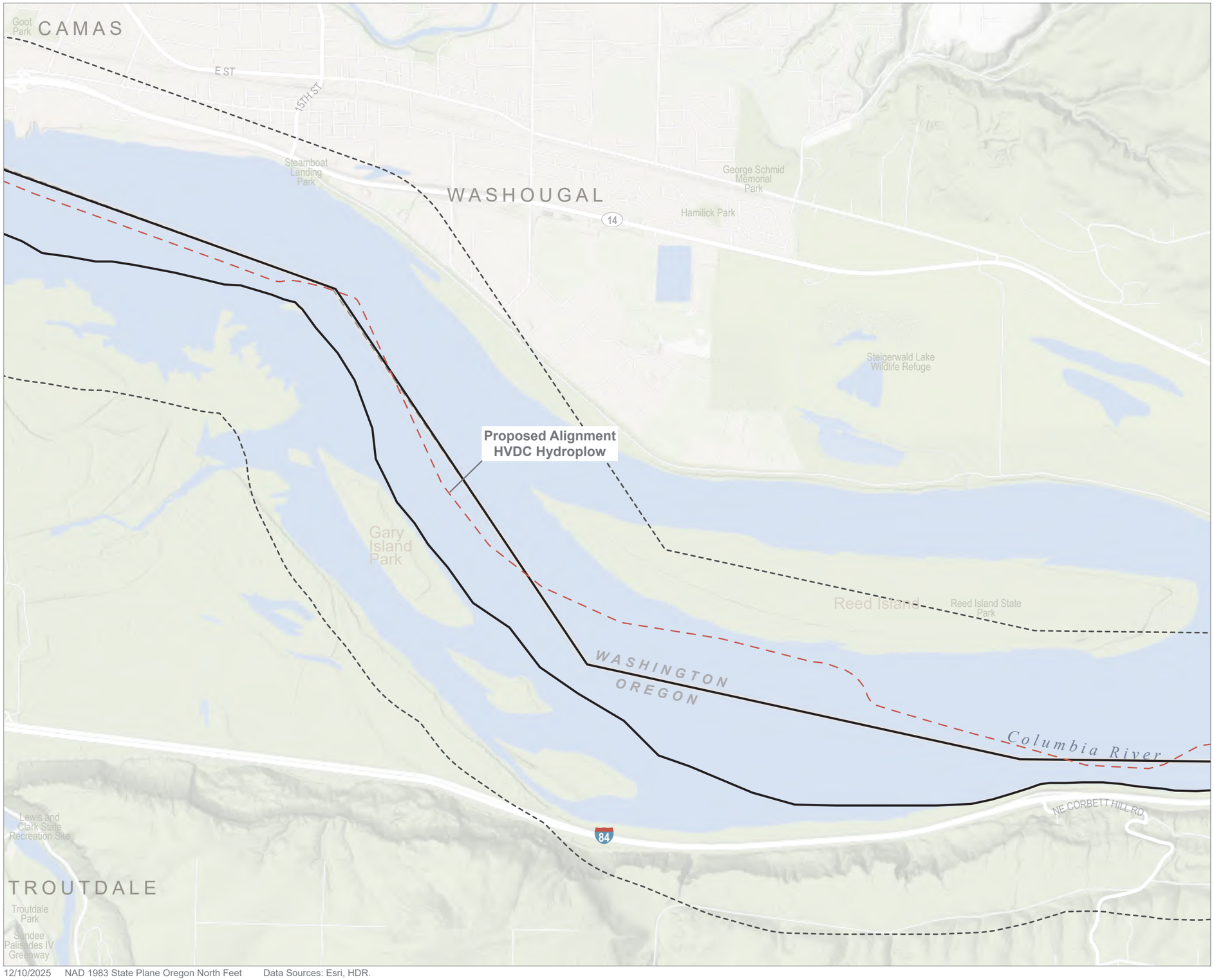
CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 6 OF 21

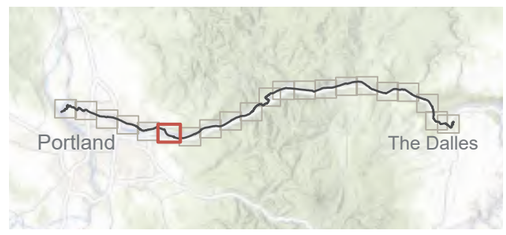
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION



HDR

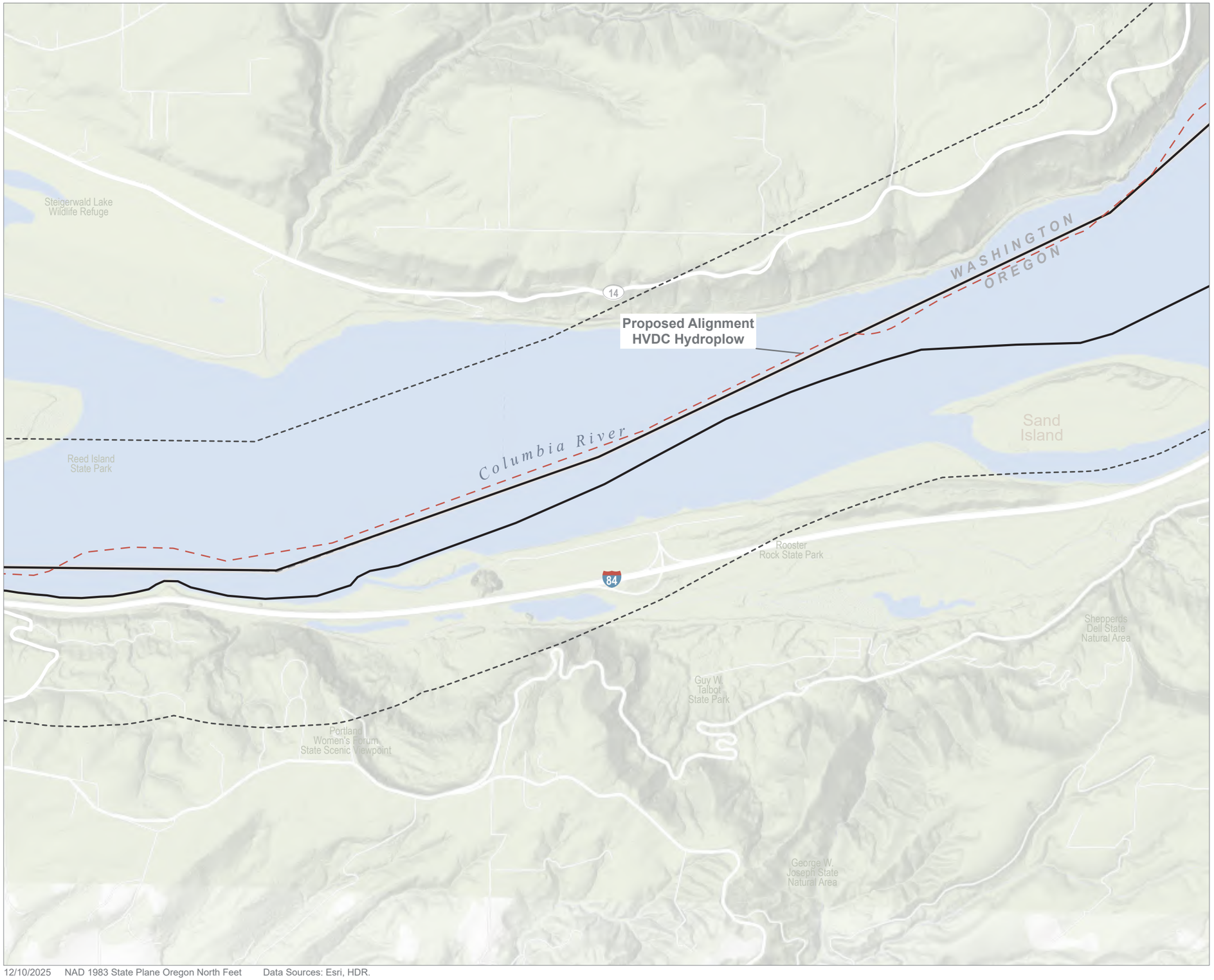
0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 7 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

HDR

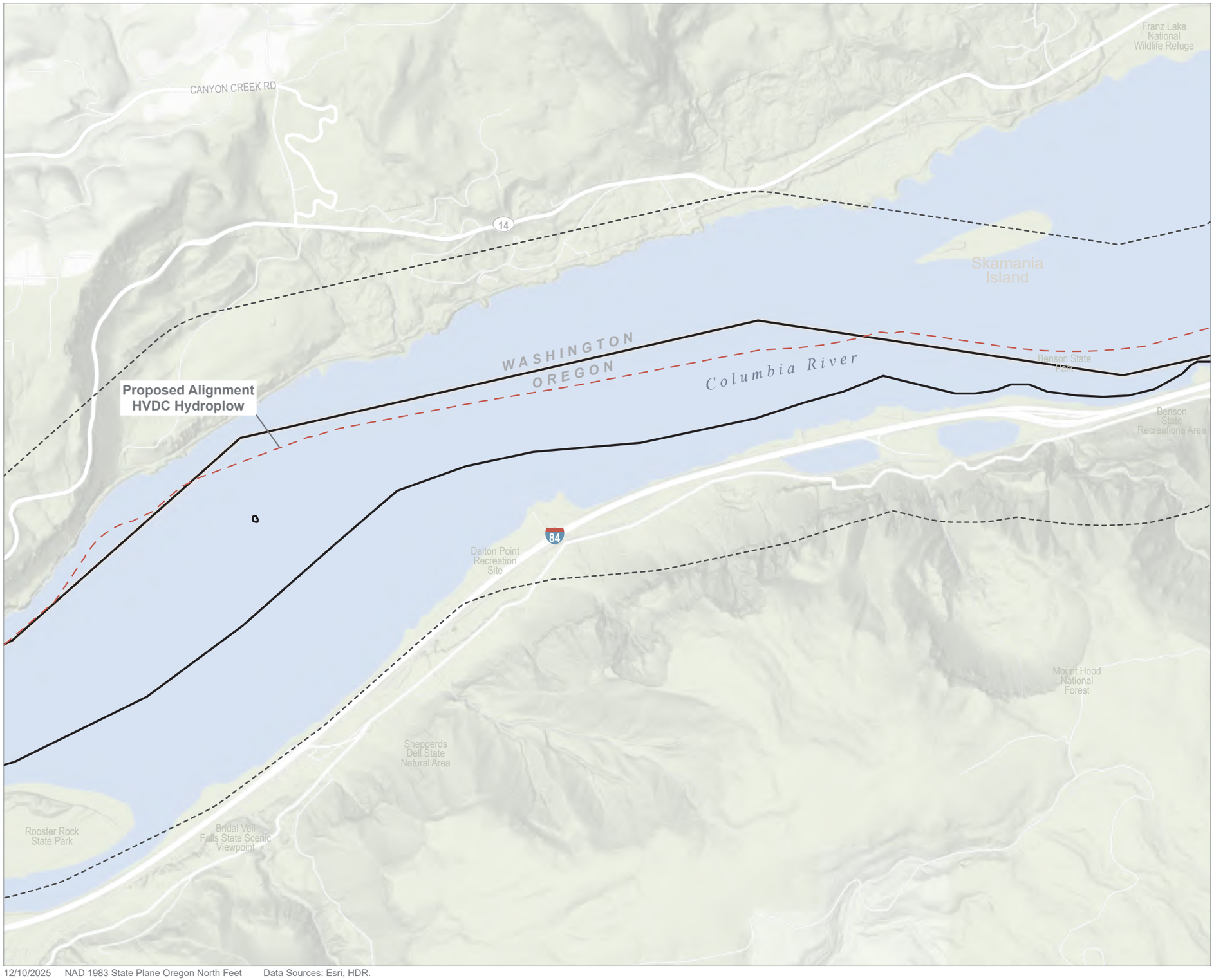
0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 8 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

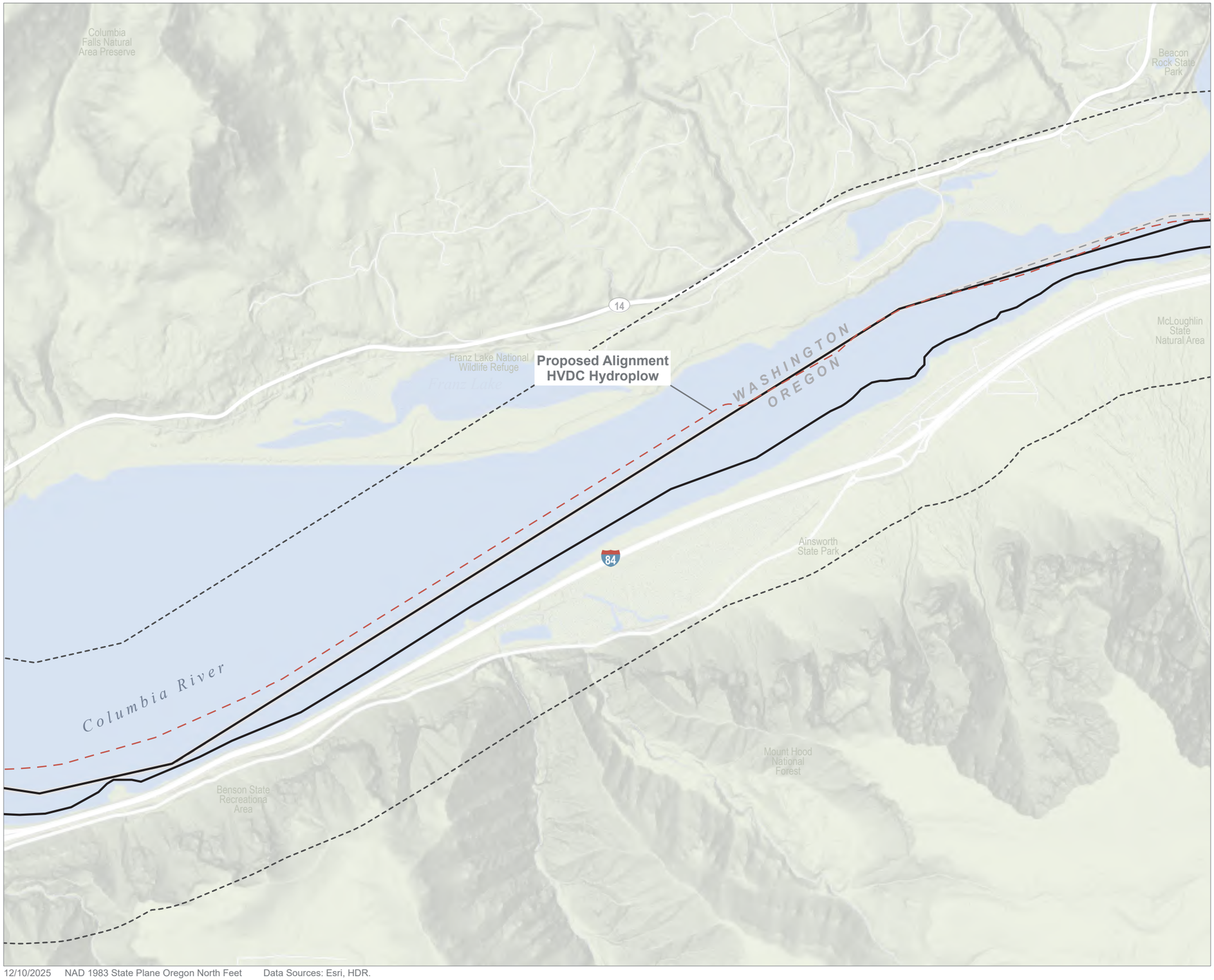


12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi

1:24,000



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 9 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

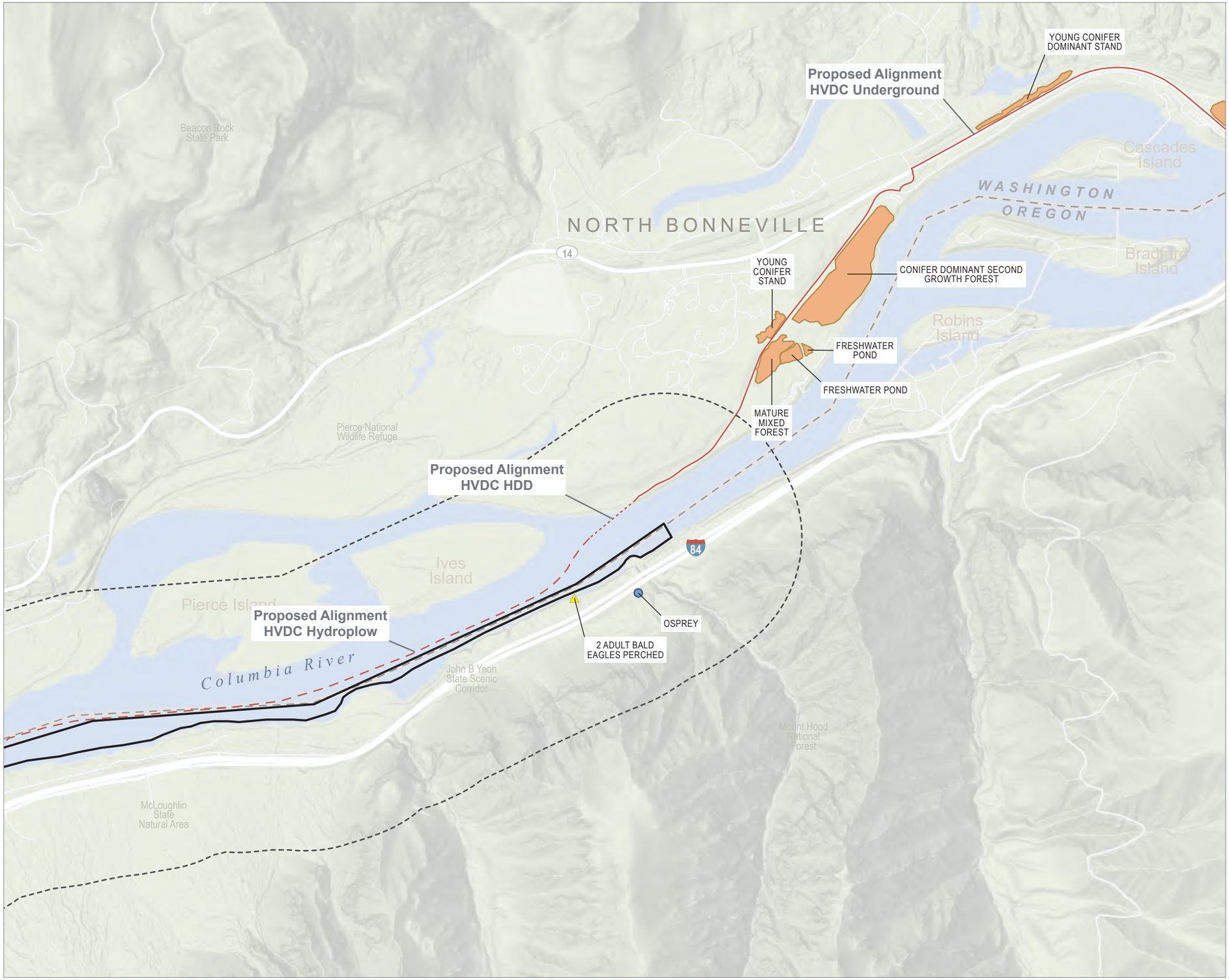
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 10 OF 21



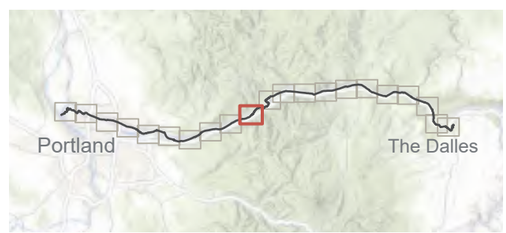
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

- NESTS
- INCIDENTAL OBSERVATIONS
- HABITAT AREA

CASCADE RENEWABLE TRANSMISSION

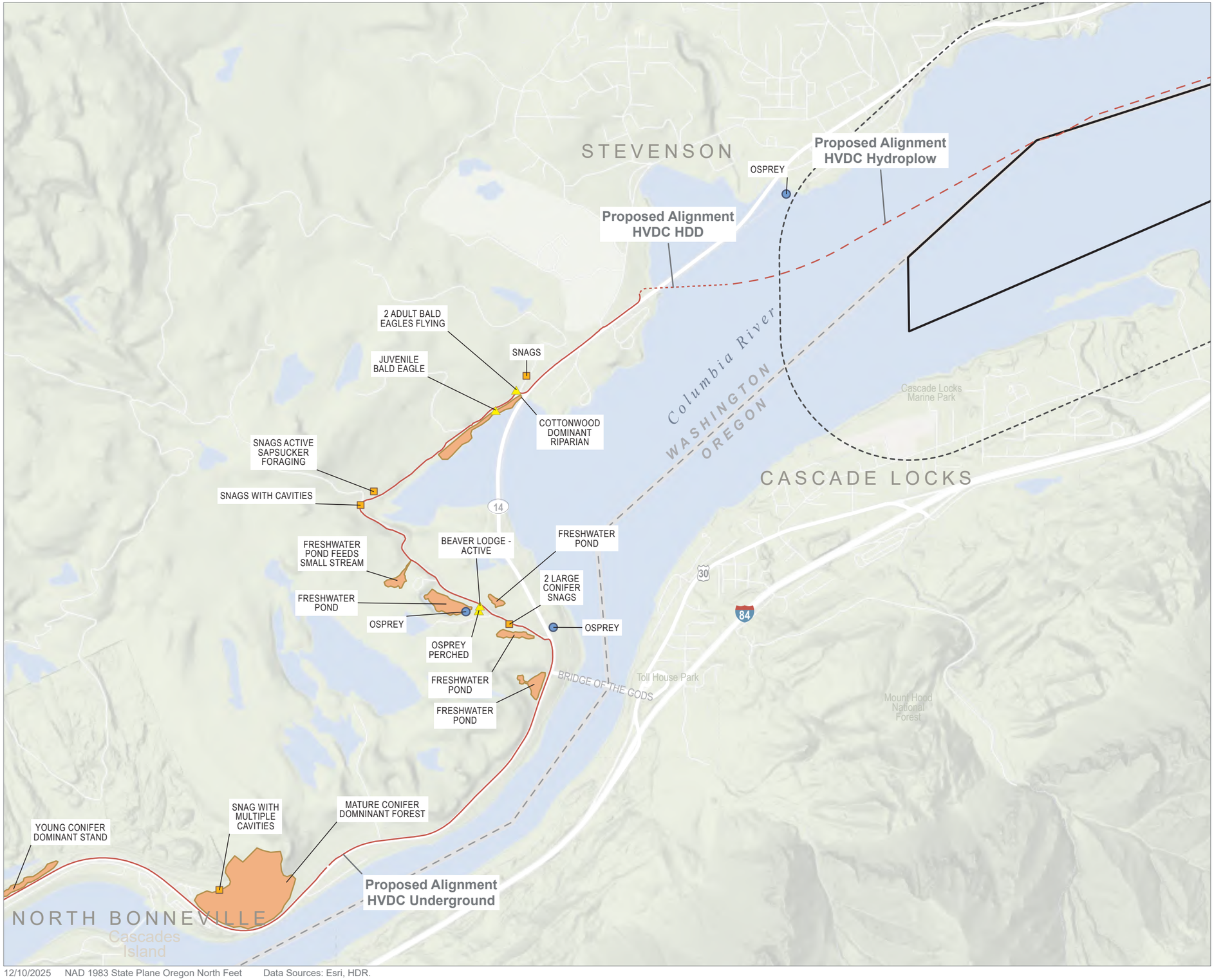


0 0.5 mi

1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 11 OF 21



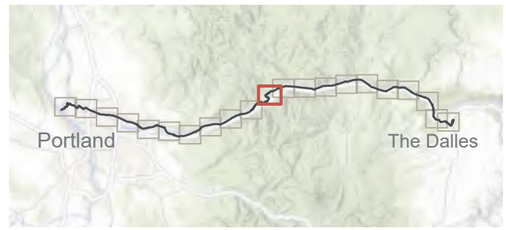
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

- NESTS
- INCIDENTAL OBSERVATIONS
- HABITAT POINT
- HABITAT AREA

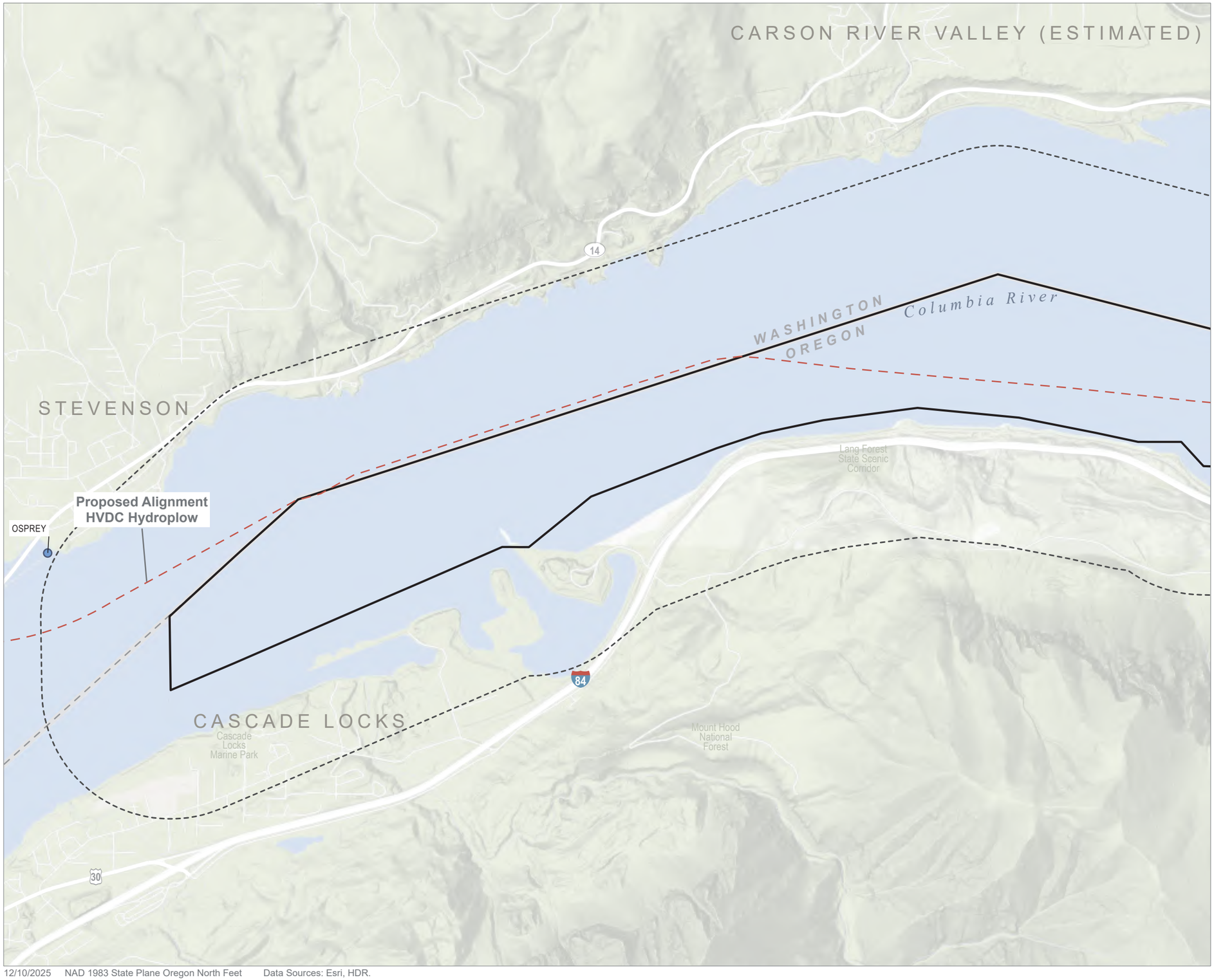
CASCADE RENEWABLE TRANSMISSION



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

0 0.5 mi
1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 12 OF 21



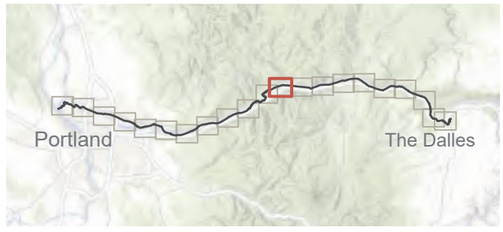
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

- NESTS

CASCADE RENEWABLE TRANSMISSION



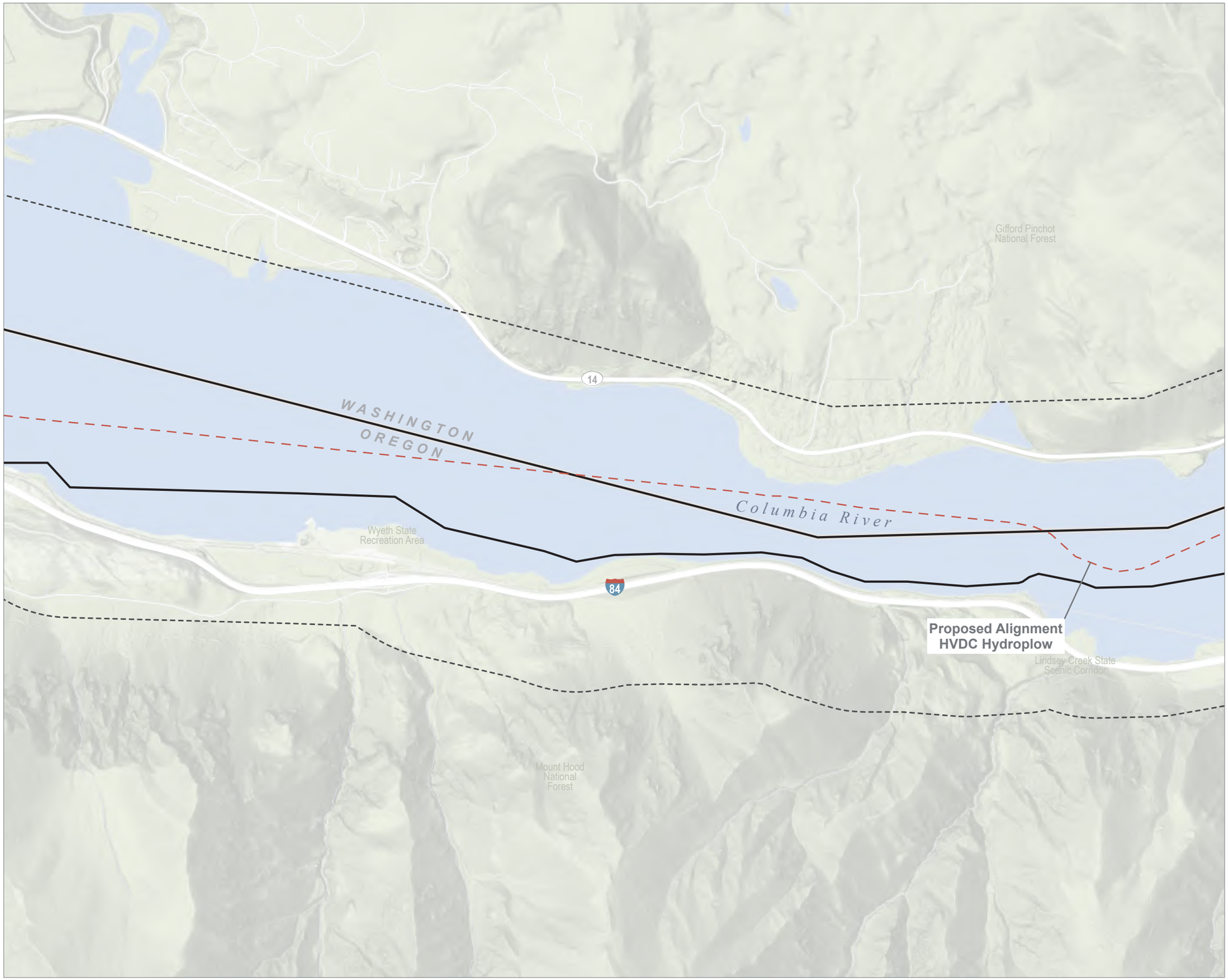
0 0.5 mi
1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 13 OF 21

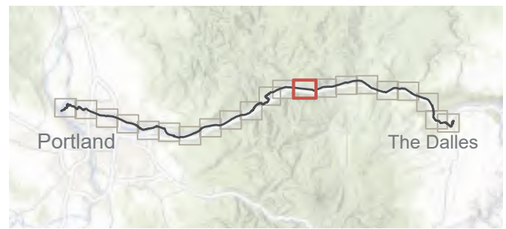
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION



0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 14 OF 21

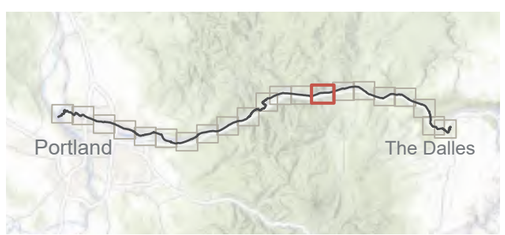
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

Gifford Pinchot National Forest
Drano Lake
14
Proposed Alignment
HVDC Hydroplow
WASHINGTON
OREGON
Columbia River
84
Seneca Fouts Memorial State Natural Area
Viento State Park
Wygant State Natural Area
Vincenz Lausmann Memorial State Natural Area
Lindsey Creek State Scenic Corridor
Starvation Creek State Park
Mount Hood National Forest

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

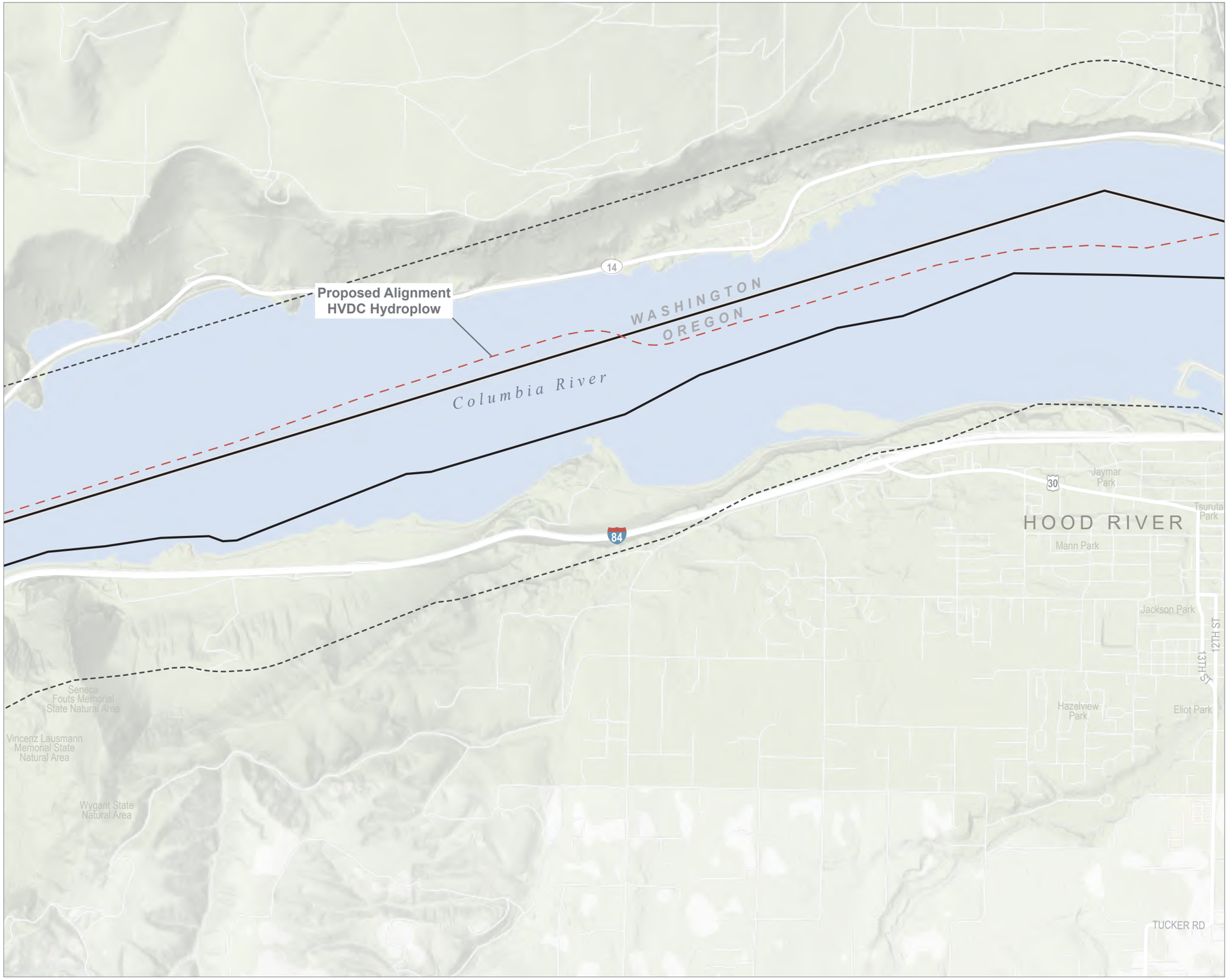


0 0.5 mi
1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 15 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

HDR

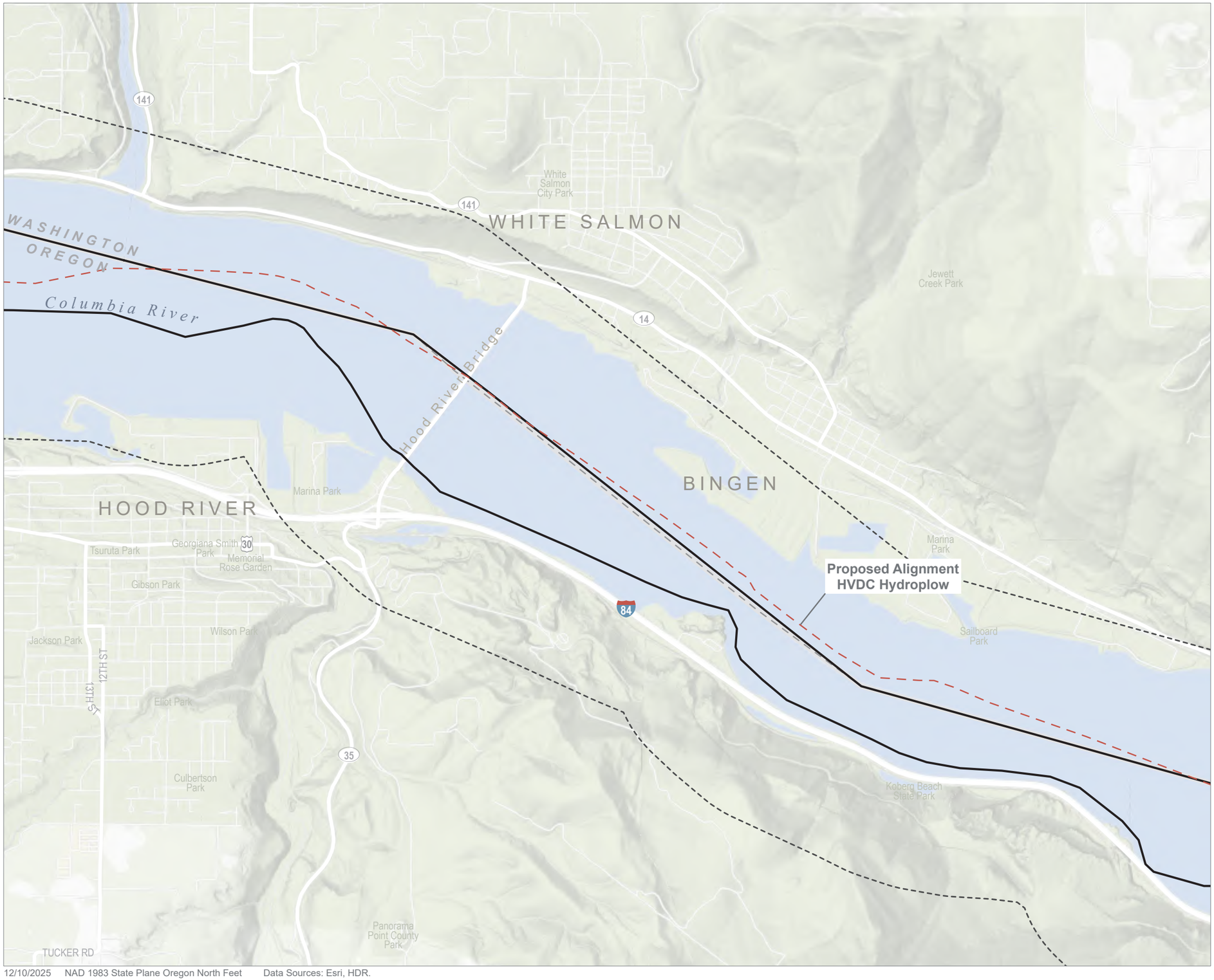
0 0.5 mi

1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 16 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 17 OF 21

FOR INFORMATION ONLY - CONCEPT DRAWING

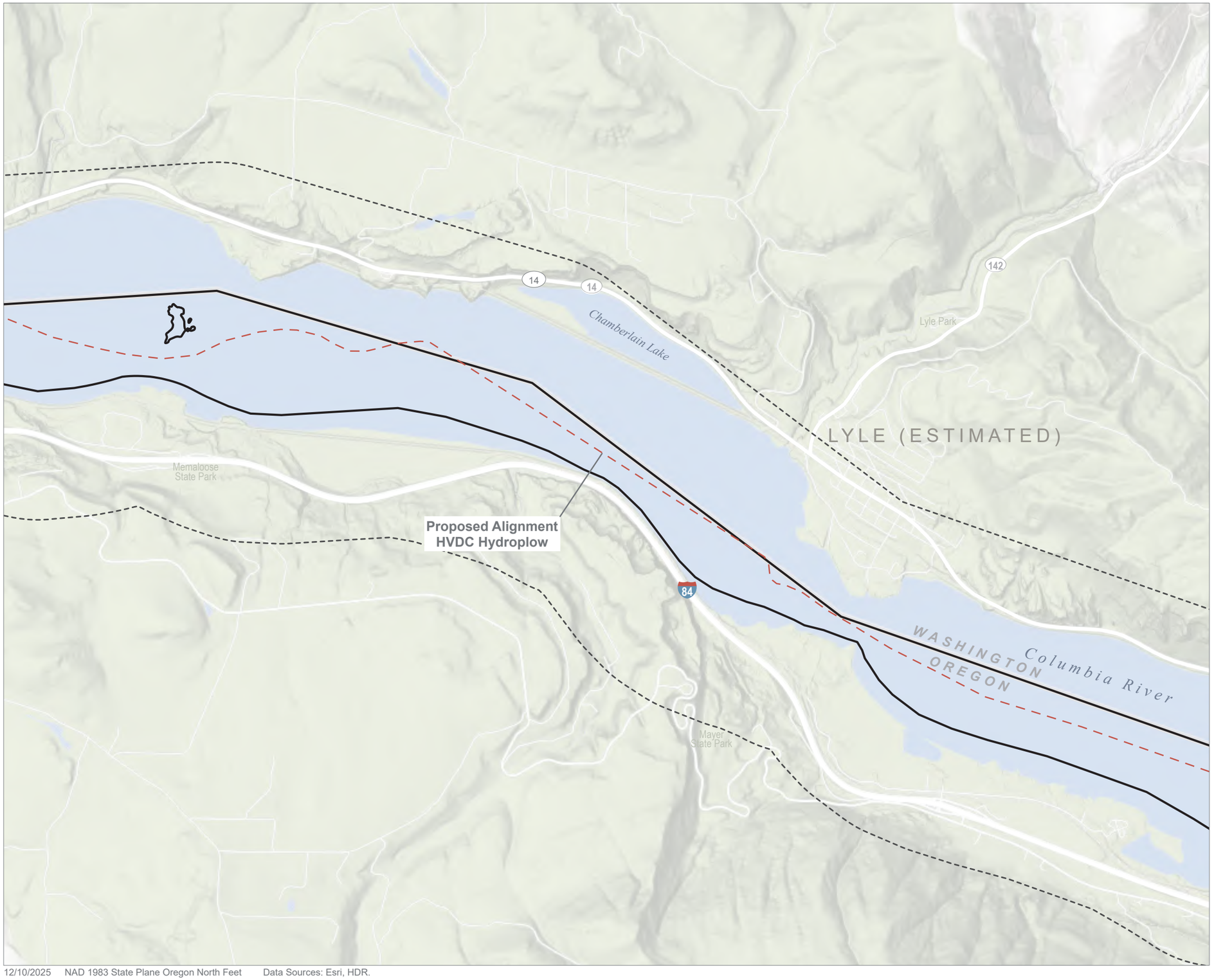
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

Rowland Lake
Jewett Creek Park
14
WASHINGTON
OREGON
Columbia River
Koberg Beach State Park
Memaloose State Park
Proposed Alignment HVDC Hydroplow
84
MOSIER
OLD US 30

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.



12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 18 OF 21

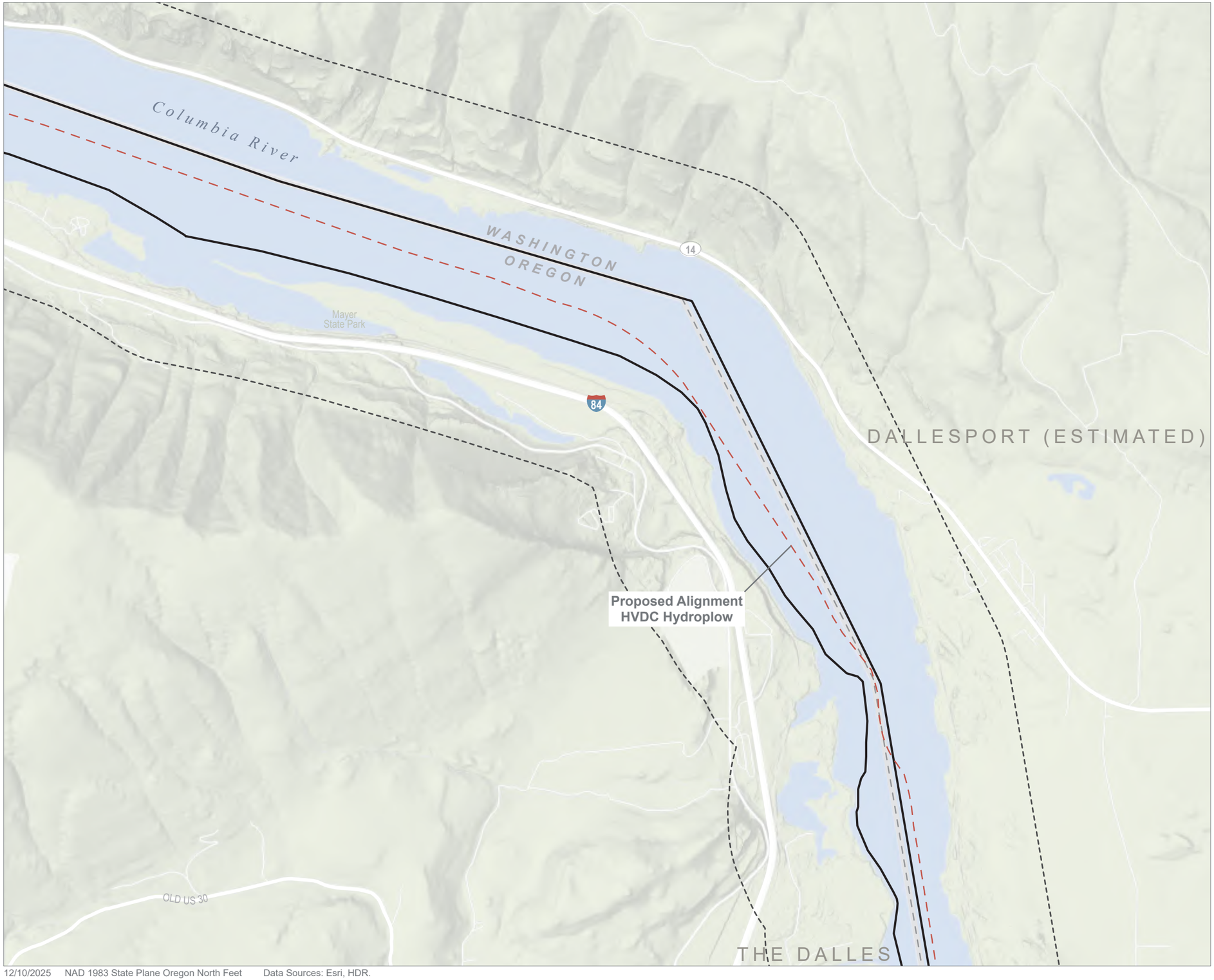
FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

FIGURE 2
FIELD SURVEY RESULTS
PAGE 19 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

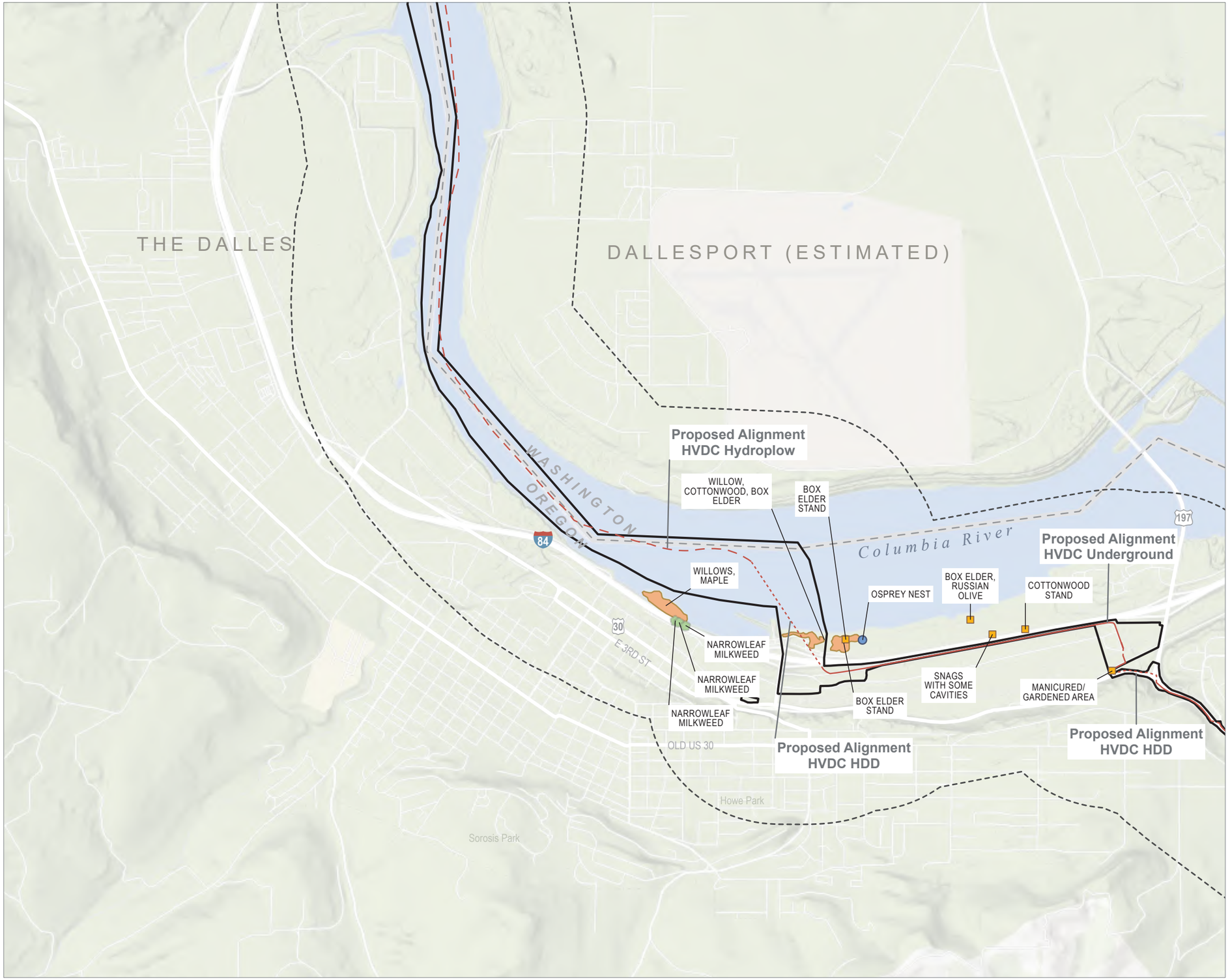
CASCADE RENEWABLE TRANSMISSION

0 0.5 mi

1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 20 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

- SPECIAL STATUS PLANT
- NESTS
- HABITAT POINT
- HABITAT AREA

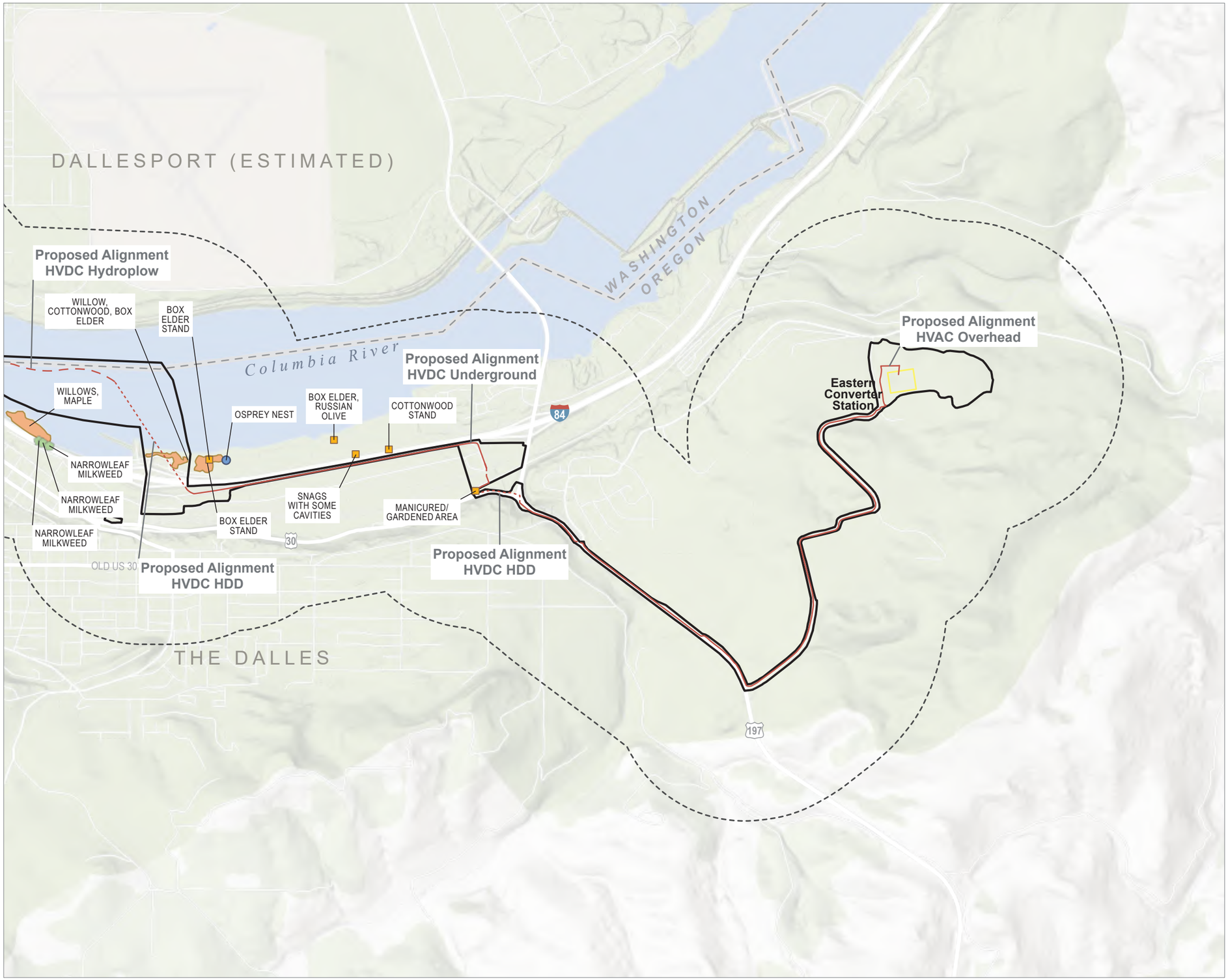
CASCADE RENEWABLE TRANSMISSION

0 0.5 mi

1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

FIGURE 2
FIELD SURVEY RESULTS
PAGE 21 OF 21



FOR INFORMATION ONLY - CONCEPT DRAWING

- PROPOSED ALIGNMENT - HVDC HDD
- PROPOSED ALIGNMENT - HVDC HYDROPLOW
- PROPOSED ALIGNMENT - HVDC UNDERGROUND
- CONVERTER STATION
- OREGON EFSC SITE BOUNDARY
- STATE BOUNDARY
- ANALYSIS AREA (0.5 MILE BUFFER)

FIELD SURVEY

- SPECIAL STATUS PLANT
- NESTS
- HABITAT POINT
- HABITAT AREA

CASCADE RENEWABLE TRANSMISSION

0 0.5 mi
1:24,000

12/10/2025 NAD 1983 State Plane Oregon North Feet Data Sources: Esri, HDR.

Attachment 3. Draft Habitat Mitigation Plan

Habitat Mitigation Plan

Cascade Renewable Transmission

Wasco, Hood River, and Multnomah Counties, Oregon

February 2026

Prepared for
Cascade Renewable Transmission, LLC

Submitted to
Oregon Energy Facility Siting Council

Table of Contents

Tables

1 Introduction

This Draft Habitat Mitigation Plan (HMP) describes how the Cascade Renewable Transmission LLC (Applicant) will mitigate for the unavoidable impacts to fish and wildlife habitat as a result of the Project. Specifically, this HMP outlines how the Applicant will construct and operate the Project consistent with the Oregon Department of Fish and Wildlife (ODFW) Habitat Mitigation Policy. This HMP addresses mitigation for both the permanent impacts of Project components and the temporary impacts associated with Project construction (temporary impacts with a longer [5+ years] restoration timeframe).

In addition, the Applicant reserves the right to pursue alternative mitigation pathways if available in the future by pursuing an amendment to this HMP.

1.1 Analysis Area

In accordance with OAR 345-001-0010(59)(c) and pursuant to the Project Order, the Analysis Area for fish and wildlife habitat and species studies consists of the area within and extending 0.5 mile from the Site Boundary, and any downstream area of impact. The Site Boundary is defined in detail in Exhibits B and C. The Fish and Wildlife Habitat Analysis Area is shown in the Land Cover Map in in Attachment 2 to the Fish and Wildlife Habitat Exhibit (Appendix B, Figure 1).

The vast majority of the analysis area consists of the micrositing corridor in the Columbia River. This corridor ranges in width from approximately 100 to 200 feet (approximately 30 to 60 meters) along the full cable route where substrate data was collected in 2025 and includes the expected limits of substrate disturbance for cable installation, Aquatic habitat in the micrositing corridor is predominately sand substrates and is used for migration of many aquatic species including salmon and sturgeon. The terrestrial portion of the corridor is dominated by developed land and grass/herbaceous areas. Areas may be developed for industrial, residential, or transportation purposes. Habitat in developed areas is fragmented due to buildings and roads, with small, vegetated patches in the form of landscaping or city parks. Agricultural areas also experience anthropogenic disturbance, having been converted to cultivated crops and/or pasture/hay.

2 Description of Potential Adverse Impacts

Baseline vegetation data collection provided sufficient detail to facilitate habitat characterization in accordance with the *ODFW Fish and Wildlife Habitat Mitigation Policy* (OAR 635-415). This policy provides the structure to develop appropriate mitigation for wildlife habitat impacts set forth in ODFW's Mitigation Goals and Standards (OAR 635-415- 0025), which specifies general mitigation goals and standards for six categories of habitat value.

Within the Site Boundary, the Applicant established a micrositing corridor within which Project components will be installed. This approach allows some flexibility with specific component locations and design in response to site-specific conditions and engineering requirements that will be determined prior to construction. Construction and operation of the Project will result in both permanent and temporary impacts to fish and wildlife and their habitats within the Site Boundary and micrositing corridor. Permanent impact areas are those that will be occupied by a permanent

structure or otherwise used for the life of the Project; these areas will not be restored to pre-Project conditions. Examples of permanent impacts in the terrestrial environment include habitat disturbance or loss from construction of the new converter station buildings and associated infrastructure. In the aquatic environment, permanent impacts include cable protection areas in the bed of Columbia River where the cable cannot be buried to sufficient depth due to substrate constraints as described in the Fish and Wildlife Habitat Exhibit. Temporary impact areas are those areas that would be disturbed during construction activities but restored and revegetated following construction. Examples of temporary terrestrial impacts include trenching for cable installation on land, and excavated pits for HDD, which will be restored to pre-construction conditions or better (i.e. replanting with native vegetation). Temporary impacts in the aquatic environment include habitat and species disturbance from cable installation and temporary cofferdams installation for the land to water transitions using HDD. These activities would temporarily disturb the substrate and create a turbidity plume that would last only 1 to 12 minutes depending on substrate materials and river flows (see Section 6.4). Displacement of benthic fauna in the affected 2-foot-wide hydroplow trench, or 70-foot-wide cofferdam areas, would last from several weeks to approximately 1 year before benthic species are expected to fully recolonize disturbed areas.

2.1 Terrestrial Species and Habitats

Potential Project-related impacts on wildlife during construction would include direct loss of habitat, alterations to habitat quality, disturbance, and direct mortality. Vegetation located within the land portion of the Site Boundary would be cleared as necessary for the construction of the Project. Vegetation clearing for the converter stations, HDD pits, and cable trenching would occur in previously disturbed and developed areas along roadways and clearings and are not located in areas that contain suitable habitat for any listed species. The initial clearing of vegetation and resulting soil disturbance during construction could create conditions for the establishment of invasive-plant species. However, the risk of invasive-plant species spread or establishment would be minimized through the measures described in the mitigation and monitoring plans, and Revegetation and Noxious Weed Control Plan (Attachment 4 to the Fish and Wildlife Habitat Exhibit).

Trenching to install the cable in all terrestrial portions of the Project would occur in existing roadside and road prism, which does not provide habitat that is suitable or used by special status species. Trenching activities would be confined to the project footprint and adjacent road surfaces, and temporary construction impacts from equipment and trenching activities would not extend into riparian or forested habitats suitable for many bird and other wildlife species. No suitable nesting or roosting trees for birds or bats would be removed for Project construction and operation.

Table 1 lists the acres of impact that would occur to each terrestrial habitat type and corresponding ODFW Habitat Category as a result of the Project. As discussed above, the permanent impacts reported in this table relate to areas that would not return to preconstruction conditions, while the temporary impacts include those that would be restored as described in Attachment 4 to the Fish and Wildlife Habitat Exhibit (Revegetation and Noxious Weed Control Plan). Impacts to the Columbia River are discussed in the section below.

2.2 Aquatic Species and Habitats

Increased levels of turbidity could have temporary negative impacts on habitat for fish species and, if any individuals are present within the sediment plume during the time of construction, could affect them directly. Available habitat for bottom-feeding (demersal) species would be temporarily disturbed and altered by dredging the HDD cofferdam areas and by the installation of the cable using a hydroplow, slightly reducing the area available for use in the Columbia River during these operations. The highest concentrations of suspended sediments would be close to the riverbed adjacent to the trench while it is being plowed. This could be a deterrent for some fishes, particularly mid-column (pelagic) species such as salmon, and cause them to avoid the densest part of the plume. The Columbia River is a large water body that provides for increased dilution and reduces the size of the potential mixing zone. Natural currents and flow patterns in the Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation, as well as upstream and downstream water management at dams. High-volume flow events can result in hydraulic forces that resuspend benthic sediments, temporarily elevating turbidity locally. Additionally, the volume of flow through the action area will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

Permanent impacts include benthic habitat conversion (from rocky or hard substrates to rock or concrete armoring) in areas where cable protection would be installed on the riverbed. Within the micrositing corridor, these areas are limited only to portions of the cable route (approximately 2.3 acres in total) where consolidated sediments preclude cable burial. Other potential permanent impacts could result from operation of the cable. These include thermal impacts from heat emanating from the active cable, as well as electromagnetic fields emitting from the active cable. Project-specific modeling indicates there would be no change in water temperatures adjacent to the cable during cable activation and operation. Minor, localized increases in substrate temperature may occur within 16 inches (41 centimeters) of the operating cable. This is only expected for the few areas where the cable cannot be buried and is covered by armored rock or concrete. Any localized change in ambient temperature in the substrate of the benthic environment would be exceedingly low, and is not expected to change species use or occurrence along the route. Regarding electromagnetic fields, because the cables are shielded, electric fields would not emanate outside of the cable housing; however, magnetic fields would transmit from the cable. Analysis by the Applicant concluded that, in areas where the cable is buried at least 5 feet (1.5 meters) below the riverbed (10 feet [3 meters] wherever possible), emission of magnetic fields into the benthic zone and into the water column would be minimal. There would be exceedingly minor increases in ambient magnetic field levels in the Columbia River at the riverbed that dissipate a few feet above the riverbed. In areas where cable burial is not possible, magnetic fields would be detectable by aquatic organisms; however, the expected magnetic field strengths would be below those shown to elicit notable behavioral responses in fish with magnetosensory ability (e.g., salmon, lamprey). Further, because modeled results indicate a four-fold reduction in field strength per 1 meter (3.3 feet) of vertical separation from the cable, the area of magnetic field exposure reduces rapidly. For example, at midwater depths (greater than 2 meters [6.6 feet] above the riverbed), magnetic field strength from the cable becomes indistinguishable from background levels.

Dredging and material disposal will comply with Washington State water quality standards (173-201A Washington Administrative Code) and the ODEQ Water Quality Standards (Oregon Administrative Rules 340, Division 41). The Applicant has prepared a Water Quality Monitoring Plan

for the Project, which will be implemented during dredging and cable installation activities in accordance with the CWA Section 401 Water Quality Certification to be obtained for the project.

The Project will not measurably alter river or shoreline habitat, and the Columbia River in the analysis area will continue to be used primarily as a migratory corridor the same as under current conditions. The proposed cable route is located in or near mid-channel, and within the navigation channel through much of its length. The Columbia River in the analysis area experiences high levels of vessel traffic associated with use of the Federal Navigation Channel, and relatively high levels of underwater noise and currents that generate suspended sediments (NMFS 2017). The narrow strip of affected river bottom is not considered high-quality habitat for fish, and the project route avoids important near-shore and more productive habitats including salmon spawning areas and tributary mouths.

After the transmission cable is installed to its required depth, no maintenance is anticipated over the 50-year service life of the transmission line. Therefore, further disturbance to the aquatic environment would be avoided.

2.3 Potential Impacts to ODFW Habitat Category Types

Table 1 shows the acres of impact that would occur to each habitat type and corresponding ODFW habitat categories, as defined for the Project (see the Fish and Wildlife Exhibit for detailed descriptions). The permanent impacts reported in this table relate to areas that would not return to preconstruction conditions, while the temporary impacts include those that would be restored to preconstruction conditions.

Table 1: Temporary and Permanent Impacted Areas by Habitat Category

Habitat Type	Habitat Sub-type	Total Acres within Analysis Area	Acres within Analysis Area											
			Category 1		Category 2		Category 3		Category 4		Category 5		Category 6	
			Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts	Temporary Impacts	Permanent Impacts
Developed & Disturbed	Industrial	3,668	0	0	0	0	0	0	0	0	0	0	2.5	0
	Residential	8,245	0	0	0	0	0	0	0	0	0.5	0	0	0
	Other	1,877	0	0	0	0	0	0	0	0	1.5	0	0	0
Barren Land	Rock/Sand/Clay	529	0	0	0	0	0	0	0	0	0.9	0	0	0
Agriculture	Cropland	1,192	0	0	0	0	0	0	0	0	5.0	5.0	0	0
Open Water & Unvegetated Wetland	Perennial Rivers and Streams - Columbia River riverbed	33,366	0	0	3.9	1.72	19.21	0.72	0	0	0	0	0	0
	Perennial Rivers and Streams - Columbia River Slough	24	0	0	0	0	0 HDD avoids stream impacts	0	0	0	0	0	0	0
	Perennial Rivers and Streams - Willamette River	377	0	0	0	0	0 HDD avoids stream impacts	0	0	0	0	0	0	0
Forest & Woodland	Riparian Forests, Woodlands, & Shrublands – NLCD 'mixed forest'	1,118	0	0	0	0	0	0	0	0	0	0	0	0
	Mixed Conifer Forests & Woodland NLCD 'evergreen'	5,078	0	0	0	0	0	0	0	0	0	0	0	0
Shrub & Scrubland	Sagebrush shrubland and scabland	4,404	0	0	0	0	0	0	3.1	0	0	0	0	0
Grasslands & Herbaceous	Herbaceous	2,469	0	0	0	0	0	0	3.0	0	0	0	0	0
	Introduced Upland Vegetation - Annual Grassland	1,159	0	0	0	0	0	0	8.8	5	0	0	0	0
Wetlands	Palustrine Scrub Shrub	4.023	0	0	0	0	0	0	0	0	0	0	0	0
	Palustrine Emergent	1.033	0	0	0	0	0	0	0	0	0	0	0	0

1. Area of trenching and temporary cofferdams for cable installation.
2. Estimated area of cable protection. At 10 feet (3 meters) above the riverbed within the water column, magnetic field strengths are expected to range from 1 to 5 microtesla above ambient levels throughout the length of the cable corridor in the Columbia River.
3. Delineated during wetlands study (see State and Local Laws and Regulations Exhibit).

3 Measures to Avoid, Reduce, or Mitigate Impacts

The measures discussed here have been, or will be, implemented to avoid, minimize, and mitigate the effects on fish and wildlife habitat and state sensitive species, from the loss of suitable habitat from activities that can cause disturbance (e.g., behavioral avoidance) to wildlife breeding or other critical periods.

Routing the cable in the Columbia River has been designed to avoid nearshore and shallow water habitats important to fish and invertebrates by being within or adjacent to the navigation channel. Unavoidable impacts to the benthic and aquatic community will be assessed and mitigation will adhere to mitigated for measures defined in the aquatic resources mitigation plan that is currently under development in discussions with agencies and local Tribes.

Overland routes for the buried cable have been designed within existing disturbed roadside and developed areas to avoid wildlife habitats as much as possible. The use of HDD avoids riparian areas by placing the cable underground below stream crossings and where the cable enters and exits the Columbia River. Routing the cable in existing open, developed, and disturbed areas avoids tree removal.

3.1 Terrestrial Resources

The Applicant will minimize disturbance to habitat and wildlife by initiating revegetation efforts in areas of temporary ground disturbance as soon as practicable, and within the appropriate season to facilitate germination as described in the Draft Revegetation and Noxious Weed Control Plan (Attachment 4 to the Fish and Wildlife Habitat Exhibit). The Draft Revegetation and Noxious Weed Control Plan promotes native plant establishment, or non-invasive and non-persistent, non-native species when native plants are not available, and contains measures to avoid and minimize the spread of noxious weeds due to Project disturbance.

The Project corridor is routed through existing disturbed habitats including paved areas and road shoulders for the majority of its length. These areas provide little to no habitat value for wildlife species. The Project avoids forested areas, meadows, wetlands, and streams, and no trees are slated to be removed for Project construction. BMPs include erosion control, sedimentation retention, water quality/quantity, and implementation of the following measures:

- Land disturbing activities will be limited to the minimum disturbance footprint required to construct the converter stations and HDD sites.
- An HDD Inadvertent Return Plan (i.e., Frac-out) will be developed to provide contingency measures for containment and cleanup in the event of frac-out.
- Barriers to prevent sediment from leaving work sites and entering downstream waterways via runoff (e.g., silt fences, straw bale barriers, and sediment ponds or basins) will be installed prior to grading.
- For landward construction, project staging and material storage areas will be located a minimum of 150 feet from surface waters, in currently developed areas such as parking lots

or managed fields. No oil, fuels, or chemicals will be discharged to surface waters or onto land where there is a potential for re-entry into surface waters.

- Petroleum products, fresh cement, lime, uncured concrete, chemicals, or other toxic or deleterious materials will not be allowed to enter surface waters.
- Water used during the placement of concrete for washdown or related operations will not be allowed to enter any streams or the Columbia River. Any process water/contact water will be routed to a contained area for treatment and will be disposed of at an authorized upland location.
- Process water generated on site from construction, demolition or washing activities will be contained and treated to meet applicable water quality standards before entering or reentering surface waters.
- Stabilized construction entrances to minimize sediment tracking from active work areas will be used.
- Construction vehicles and equipment will be required to utilize a wheel wash prior to entering public streets.

3.2 Aquatic Resources

The Applicant will implement several impact minimization measures to avoid or reduce the potential for adverse effects upon aquatic resources, including ESA-listed species and their habitat. Installation of the cable in the overland portion of the route will use HDD methods to install the cable underground below the streambed and riparian vegetation of streams that cross the Project corridor along Ash Lake Road. Construction would be completed in compliance with Washington State Water Quality Standards (Chapter 173-201A WAC) and the ODEQ Water Quality Standards (Oregon Administrative Rules [OAR] 340, Division 41). The routing of the cable in the Columbia River has been designed to avoid nearshore and shallow water habitats important to fish and invertebrates by being within or adjacent to the navigation channel.

BMPs include erosion control, sedimentation retention, water quality/quantity, and stormwater treatment during project construction and operation. Additional minimization efforts to reduce impacts for in-river activities are listed below:

- The contractor will develop, implement, and maintain a Stormwater Pollution Prevention Plan (SWPPP) to minimize erosion of sediments due to rainfall runoff at construction sites, and to reduce, eliminate, and prevent the pollution of stormwater.
- A Spill Prevention, Control, and Countermeasures Plan (SPCCP) will be developed, implemented, and maintained to manage toxic materials associated with construction activities (e.g., equipment leakage, disposal of oily wastes, cleanup of spills, and storage of petroleum products/chemicals in contained areas away from streams and wetlands). The SPCCP will outline BMPs, responsive actions in the event of a spill or release, and notification and reporting procedures. The SPCCP will also outline management elements such as personnel responsibilities, site security, site inspections, and training. Spill response will take precedence over normal work. Cleanup will include proper disposal of any spilled material and used cleanup material.

- Construction will be completed in compliance with Washington State Water Quality Standards (Chapter 173-201A Washington Administrative Code) and the ODEQ Water Quality Standards (Oregon Administrative Rules 340, Division 41). The Applicant has prepared a Water Quality Monitoring Plan for the Project, which will be implemented during dredging and cable installation. The Water Quality Monitoring Plan identifies the timing and methodology for water quality sampling during construction of the Project, as well as methods of implementation and reporting.
- The day-to-day installation schedule will be coordinated with other maritime activities and the United States Coast Guard. Planned installation and construction sequencing is intended to maintain the safe movement of commercial and recreation traffic along the cable route, and to minimize the disturbance and impact due to Federal Navigation Channel maintenance.
- The surface water intake for the hydroplow is located near the water surface at the barge or cable laying vessel and will be screened per NMFS salmonid screening criteria.
- A vibratory hammer will be used to drive sheetpiles to minimize noise levels.
- Dredging, hydroplow operations, and sheetpile installation and removal will only be conducted within the proposed in-water work window.
- Equipment will be inspected daily for leaks and other problems that could result in the discharge of petroleum-based products or other material into waters of the Columbia River.
- Vessel operators will have industry-standard spill containment equipment on board, including oil booms.
- Dredging will be conducted using a clamshell dredge; impacts are highly localized, and clamshell dredging is not documented to have notable entrainment, unlike hydraulic or suction dredging. Clamshell dredging will implement Increased cycle time (slowing the velocity through the water column) and pausing the dredge bucket near the bottom while descending and near the water line while ascending.
- Use of GPS navigation—ensures accurate GPS positioning to identify the correct footprint for dredging and disposal.
- Bottom-dump scows will be used to accept and transport sediments dredged from the dredging area to avoid overflow during disposal.
- Spuds will be utilized to secure the barge/dredge location. Spuds will be passively lowered into the substrate and will not require active driving (e.g., vibratory pile driving) to set into the substrate, which minimizes noise levels.

4 Mitigation

The Project has been designed and sited to avoid and minimize many potential impacts to the terrestrial and aquatic environments. After avoidance and minimization measures have been implemented, some impacts to fish and wildlife habitat and sensitive species will remain. Temporary and permanent habitat loss will be mitigated for according to ODFW Habitat Mitigation Policy goals and standards. Prior to construction, the Applicant will finalize the HMP pursuant to the ODFW

Habitat Mitigation Policy. Compensatory mitigation actions will occur prior to or in conjunction with habitat-disturbing activities and provide the intended benefits for the duration of the Project.

The mitigation area for the Project will be determined based on the final design and actual habitat impacts. The final mitigation approach will offer enough suitable habitat to achieve the ODFW habitat mitigation goals of no net loss of habitat quantity or quality and provide a net benefit in habitat quantity for impacts to Category 2 habitat, no net loss of habitat quantity or quality for impacts to Category 3 and 4 habitat, and a net benefit in habitat quality or quantity for impacts to Category 5 habitat.

Terrestrial impacts along the buried cable route will be mitigated for onsite through planting of native vegetation cover. This is Category 4 and 5 habitat, as it is located alongside roadways, within road prism, and in existing disturbed and cleared areas. Temporary impacts will be mitigated through successful implementation of the Draft Revegetation and Noxious Weed Control Plan (Attachment 4 to the Fish and Wildlife Habitat Exhibit).

4.1 Compensatory Mitigation Strategy

The mitigation plan is currently under development in consultation with ODFW, NMFS, and local Tribes, particularly for impacts to the riverbed of the Columbia River. The local Tribes include the Confederated Tribes and Bands of the Yakama Nation, the Cowlitz Indian Tribe, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes of the Umatilla Indian Reservation.

As described above, terrestrial impacts will be mitigated on site through restoration and improvement of existing conditions (i.e. planting native vegetation) after completion of construction. Because on-site mitigation for impacts in the Columbia River is not feasible for the Project, the Applicant will utilize off-site mitigation opportunities to offset these impacts. The Applicant considered but eliminated the use of mitigation banks as mitigation banks primarily address impacts to salmonids and would not effectively address Project impacts to other aquatic species such as White Sturgeon, Pacific Lamprey, or mussels. Applicant also considered permittee-responsible compensatory mitigation. However, this type of mitigation would require a 5 to 10-year post-construction monitoring commitment by the Applicant. Permittee-responsible mitigation was therefore also eliminated as an option.

The Applicant evaluated opportunities for on-site, in-kind restoration for aquatic impacts in the Columbia River but determined that such measures are not practicable or feasible within the immediate Project area due to physical, regulatory, and operational constraints. These constraints are representative of challenges described in federal compensatory mitigation guidance, which recognizes that some sites, particularly regulated river corridors, cannot support functionally equivalent on-site restoration (FEMA 2025).

As compensatory mitigation will be required to address the permanent effects of the Project, the Applicant is proposing an alternative mitigation methodology grounded in the core concepts of Habitat-Equivalent Mitigation (HEM) (NOAA 2000). This “HEM-like” approach is also consistent with the USFWS landscape-scale mitigation strategies that emphasize watershed-level conservation benefits and ecological function (USFWS 2023) and NOAA’s 2022 Mitigation Policy for Trust Resources. Although HEM is typically used to compensate for “damages” to natural resources, its

underlying principle—to restore, replace, rehabilitate, or acquire the equivalent of the injured resources—is equally applicable when on-site and/or in-kind compensatory mitigation for a project's permanent effects is not feasible. This applicability is the cornerstone of the Applicants' Compensatory mitigation approach.

Under this proposed approach, the Applicant would meet compensatory mitigation requirements by providing a fixed period of annual funding to support existing or planned habitat or species restoration programs capable of delivering ecological benefits equivalent to those lost due to the Project. The identified programs have been developed within the Columbia River Basin by Federal, State, Tribal, local, or non-governmental entities, including local Tribes, CRITFC, ODFW, and WDFW. These efforts have been recognized for their high conservation value but currently lack sufficient or stable funding for full implementation, program expansion, or long-term continuity. The Applicant's funding would be directed toward activities that directly support the species and habitat types permanently affected by the Project, thereby ensuring ecologically meaningful and functionally equivalent compensation.

As mentioned above, development of the mitigation plan, in particular for impacts in the Columbia River, is currently ongoing in discussions with ODFW, NOAA, and local Tribes.

5 Monitoring

The Applicant will hire a qualified investigator (botanist, wildlife biologist, or revegetation specialist) to conduct a monitoring program, based on a monitoring plan, for the mitigation area(s). The monitoring plan shall, at a minimum, include sampling design (i.e., paired monitoring and reference sites, with the number of sites based on diversity of habitat subtypes and enhancement action locations) and vegetation maps with monitoring locations identified; description of data collection methods and monitoring procedures; monitoring schedule; agency consultation schedule and methods for data analysis. The purpose of the monitoring program is to evaluate on an ongoing basis the protection of the habitat quality and the results of enhancement actions, especially during the wildlife breeding seasons. The Applicant shall finalize, for ODOE and ODFW review and approval, success criteria appropriate for tracking the success of restoration actions to be implemented and monitored.

6 References

FEMA (Federal Emergency Management Agency). 2025. Hazard Mitigation Assistance Program and Policy Guide. Available online: https://www.fema.gov/sites/default/files/documents/fema_hma-guide-v2.1_2025.pdf.

NMFS (National Marine Fisheries Service). 2017. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Kalama Manufacturing and Marine Export Facility, Cowlitz County, Washington (Sixth Field HUC 170800030804 Lower Columbia River) (Corps No.: NWP-2014-1772).

NOAA (National Oceanic and Atmospheric Administration). 2000. Habitat Equivalency Analysis: An Overview Damage Assessment and Restoration Program National Oceanic and Atmospheric Administration Department of Commerce. Revised October 4, 2000.

____. 2022. NOAA Mitigation Policy for Trust Resource. NOAA Administrative Order 216-123, Jull 22.

USFWS (U.S. Fish and Wildlife Service). 2023. U.S. Fish & Wildlife Service Mitigation Policy Appendix 1, 501 FW 2, May 2023.

Attachment 4. Draft Revegetation Plan

Draft Revegetation and Noxious Weed Control Plan

Cascade Renewable Transmission Project

Multnomah and Wasco Counties, Oregon
February 28, 2025

Contents

Tables

1 Introduction

Cascade Renewable Transmission, LLC (CRT; Applicant) proposes to construct and operate a high-voltage direct current (HVDC) (400-kilovolt [kV]), 1,100-megawatt (MW) electric transmission facility (Facility). The Facility would interconnect the existing Bonneville Power Administration (BPA) Big Eddy 500kV alternating current (AC) substation, located near The Dalles in Wasco County, Oregon (Eastern Interconnection), and the existing Portland General Electric (PGE) Harborton 230-kV AC substation, located in Portland, Multnomah County, Oregon (Western Interconnection) (see Figure C-1 in Exhibit C). This Draft Revegetation Plan (Plan) has been prepared to guide restoration of areas temporarily disturbed during construction of the Project. This Plan will be updated, as necessary, in coordination with the Oregon Department of Energy (ODOE), the Oregon Department of Fish and Wildlife (ODFW), and Multnomah and Wasco Counties, and will be updated as needed to reflect the final layout of the Facility.

Throughout construction, revegetation, and operation activities, the Applicant will take appropriate actions to prevent the spread of state and county listed noxious weeds. A Draft Noxious Weed Control Plan has also been prepared, which contains information on state and Counties (Wasco and Multnomah) listed noxious weeds, noxious weeds observed during surveys, and treatment and monitoring of noxious weeds.

2 Site Description

The Project has a long, narrow, linear boundary along the proposed cable route that extends for approximately 99 miles, within which all the Project components will be located. The Project lies within both the Columbia Plateau and Willamette Valley Ecoregions. The Project is located within state and county road ROW, on BPA owned property and ROW, and there are two sections of private property that will require an easement. The Applicant would request new ROW from BPA for the western converter station location, and approximately 500 feet of overhead 500-kV AC transmission line from Big Eddy substation to the eastern converter station. The overland terrestrial portions of the corridor where the cable will be buried have specifically been sited-almost entirely within previously disturbed roadways and ROWs. Where the cable is located outside of roads and ROW, previously disturbed and unvegetated lands have been prioritized for use. The Applicant selected the corridors in the Dalles and Portland for cable burial based on the availability of previously disturbed areas, such as public roadways.

Habitat mapping and categorization of the site boundary were conducted for the Project in 2024. Habitat types within the site boundary include Agriculture, Pasture, and Mixed Environs (habitat subtype: Orchards, Vineyards, Wheat Fields, Other Row Crops); Urban and Mixed Environs; Upland Grassland, Shrub-steppe, and Shrubland (habitat subtypes: Eastside Grasslands, Sagebrush Shrubsteppe); Wetlands (habitat subtype: Emergent Wetlands); and Open Water-Lakes, Rivers, and Streams. Details on habitat types, subtypes, and categories can be found in Exhibit P and Attachment P-2, which contains the biological survey reports. Details on potential impacts to habitat from construction and operation of the Project, as well as avoidance and minimization measures, can be found in the Exhibits P and Q.

3 Description of Temporary and Permanent Impacts

Construction of the Project will result in up to approximately 35.9 acres of temporary and 12.7 acres of permanent impacts (see Exhibits C and P). The land area in Oregon impacted by the various Project components is listed in Table 1. The approximate land area disturbance values were calculated using preliminary alignment data and represent the Applicant's best estimate of preliminary impacts for each component.

Table 1. Approximate Land Area of Facilities in Oregon

Facility Component	Approximate Land Area*
Eastern Converter Station	5 acres (permanent), 5 acres (temporary)
Western Converter Station	5 acres (permanent), 5 acres (temporary)
HVAC overhead transmission to connect eastern converter station to existing substation	500 feet, with anticipated 200-foot ROW width; permanent disturbance accounted for in converter station footprint.
HVDC Transmission	80.29 acres total (temporary) 19.51 acres total (permanent) On-land: 10.32 acres (temporary) On-land: 2.72 acres (permanent underground) In-river: 69.97 acres (temporary) In-river: 16.79 acres (permanent) HDD work areas: 8.59 acres, (work area in western converter station footprint not counted).
HVAC underground transmission to connect western converter station to existing substation	7.01 acres (temporary) 3.4 acres (permanent underground & under Willamette River)

* Approximate land area in Washington not included.
Abbreviations: HVAC = high-voltage alternating current; HVDC = high-voltage direct current; HDD = horizontal directional drilling; ROW = right-of-way

Although actual impacts may change depending on the final layout, the estimates in Table 1 represent the estimated maximum acreage of impact. Exhibit P details the acres of each habitat subtype that would be temporarily and permanently disturbed during construction of the Project. All areas where the cable is buried below ground and associated work areas are considered temporary impacts and would be mitigated on site with restoration and plantings as described in the Habitat Mitigation Plan (Exhibit P, Attachment P-3). The converter stations would be considered permanent impacts.

Temporary impacts would occur in areas where the cable is buried, and the temporary trenching will be backfilled and replanted. Areas for horizontal directional drilling (HDD) access pits and drilling to place the cable under streams, roads, and railways will also be temporarily excavated, then backfilled and replanted. Other than the buried cable, these areas will not be occupied by permanent facilities.

The eastern converter station would be sited on approximately 5 acres, graveled and fenced with minimal parking, and constructed with appropriate site-specific drainage. An additional 5 acres would be needed for temporary laydown and staging of materials during construction.

Most of the underground portions of the transmission line corridor would be located within public road ROWs. From the eastern converter station, the HVDC would be placed in a trench along road ROWs for approximately 4.8 miles to near the edge of the Columbia River, where it would be placed into the Columbia River via HDD. The temporary HDD areas would require 1.4 acres for temporary material laydown areas but would be returned to previous conditions after construction.

The cable is proposed to exit the Columbia River at Hayden Island and be trenched along both the existing utility corridor and road ROW to the western converter station.

The western converter station, like the eastern, would be sited on approximately 5 acres, graveled and fenced with minimal parking, and constructed with appropriate site-specific drainage. An additional 5 acres would be needed for temporary laydown and staging of materials during construction.

4 Agency Consultation

The Applicant will consult with the ODFW, ODOE, and Wasco, Hood River, and Multnomah counties' weed departments prior to construction to discuss areas to be revegetated, reference site location and conditions, topsoil restoration and revegetation methods, erosion and sediment control measures, and implementation schedule. Six months prior to commercial operation of each Project phase, if applicable, the Applicant will meet with ODFW, ODOE, and the Wasco, Hood River, and Multnomah counties' weed departments to review the actual extent and conditions of temporarily impacted areas, to confirm the revegetation methods agreed to during pre-construction review are still appropriate.

5 Revegetation Methods

This Plan addresses revegetation methods for temporary impacts to agricultural (wheatfields), and non-developed land types (i.e., urban and mixed environs habitat subtype). The applicant has selected the terrestrial corridor based on the availability of previously disturbed areas, such as public roadways and railroad property, for cable installation. In Wasco County, portions of the proposed Facility (eastern converter station) would be within Exclusive Farm Use Zone (A-1); however, they would occur on land owned by BPA that is currently used for BPA electricity transmission assets. Restoration of temporarily disturbed developed habitat (i.e., Urban and Mixed Environs habitat subtype) would be determined on a case-by-case basis and is not covered further in this plan. Temporary disturbances to agricultural habitat (i.e., wheat fields) would be restored as described in Section 5.3. The Applicant would restore temporarily disturbed areas by re-establishing slope, surface stability, and drainage features, as needed, followed by soil preparation and seeding. Soil preparation and seeding techniques are described below.

Revegetation would begin as soon as feasible after completion of each construction phase. Seeding and planting would be done in a timely manner and in the appropriate season to facilitate germination and establishment of seeded species.

5.1 Soils Preparation

Prior to seeding and/or planting of revegetation areas, soils would be prepared to facilitate revegetation success. Soil preparation would include standard, commonly used methods and would consider relevant site-specific factors, including slope, size of area, and erosion potential. In areas where soil is removed during construction, the topsoil would be stockpiled separately from subsurface soils, where possible. The stockpiled topsoil would be put back in place prior to revegetation activities. Additional site-specific soil preparation may be determined during the agency consultation period. The Applicant would use mulching, installation of geotextile products, and other appropriate practices to control erosion and sediment during revegetation efforts.

5.2 Seeding

Following preparation of the soil, an agency-approved seed mix would be applied. The seed mix would be selected based on the pre-construction conditions and land use, and approved by the ODFW, ODOE, Wasco, Hood River, and Multnomah counties, as well as private landowners, as appropriate. Seeds would be obtained from a reputable supplier in compliance with the Oregon Department of Agriculture (ODA) Oregon Seed Laws.

The Applicant would choose seeding methods based on site-specific factors such as slope, erosion potential, and the size of the area in need of revegetation. Two common seed application methods that may be used are broadcast and drill seeding.

5.2.1 Broadcast Seeding

Broadcast seeding is the application of seed directly to the ground surface. This method may be chosen for areas with shallow and rocky soils, and the type of broadcast spreader would depend on the size of the area to be seeded and the terrain. The agency-approved seed mix would be applied at the specified application rates. Where feasible, half of the total mix would be applied in one direction and the second half of the mix would be applied in the perpendicular direction. A tracking dye may be added to facilitate uniform seed application. Immediately following seed application, certified weed-free straw would be applied at a rate of 2 tons per acre. Straw would be crimped into the ground to a depth of 2 inches using a crimping disc or similar device. As an alternative to crimping, a tackifier (a chemical compound to increase the adhesiveness) may be applied using hydroseed equipment. Prior to mixing the tackifier, the tank would be visually inspected for cleanliness and, if remnants from previous applications exist, the tank would be washed.

5.2.2 Drill Seeding

Drill seeding can be used for larger areas with deeper soils and moderate to gentle terrain to accommodate mechanical equipment. This method provides the advantage of planting the seed at a uniform depth and may provide better soil to seed contact. Using an agricultural or range seed drill, the agency-approved seed mix would be planted according to the application rates recommended by the seed supplier. Where feasible, half of the total mix would be applied in one direction and the second half of mix in the perpendicular direction. If mulch has been previously applied in heavy construction areas, it is possible for the seed to be drilled through the mulch, resulting in seed-to-soil contact conducive for seed germination.

5.2.3 Hydroseeding

Hydroseeding is most applicable for areas drill or broadcast seeding machinery cannot access, which usually includes steeper sloped or narrow terrain, but can be used in all terrains. Soil bed preparation is also crucial for growth success and frequently includes tracking perpendicular to the slope to create micro conditions for seed. Flat grading and compaction are not recommended. Seeding rates increase by 30 to 50 percent of broadcast seeding rates or single applications per consultation with the seed supplier and ODFW. Prior to hydroseeding, the tackifier and fertilizer, if included, would be reviewed and approved in consultation with ODFW.

5.3 Restoration of Cropland

Croplands would be reseeded with the appropriate crop or maintained as fallow in consultation with the landowner or farm operator. The Applicant would also consult with the landowner or farm operator to determine seed mix and application methods and rates for seed and fertilizer. Soil compaction is a concern for restoring agricultural soils to their pre-construction productivity. During construction of the eastern converter station, the Applicant would excavate and store soils by soil horizon, so that soils could be replaced and restored appropriately, including replacing topsoil, where possible. During post-construction restoration of temporary impacts to agricultural areas, the Applicant would loosen agricultural soil to an appropriate depth to reduce the potential effects of compaction.

5.4 Revegetation of Temporarily Disturbed Agricultural Lands

Temporarily disturbed agricultural lands would be reseeded with the appropriate crop or maintained as fallow in consultation with the landowner or farm operator. The Applicant would also consult with the landowner or farm operator to determine seed mix, application methods, and rates for seed and fertilizer. Success of cropland revegetation would have been achieved when production of the revegetated area is comparable to that of adjacent, non-disturbed croplands of the same type. Success determination would involve consultation with the landowner or farm operator, and the Applicant would report to ODOE on the success of cropland restoration efforts. Noxious weed control is necessary for successful revegetation of croplands and would be implemented per the methods described below in Section 6.

5.5 Revegetation of Other Habitat

During construction, the Applicant would implement site stabilization measures, including seeding of temporarily disturbed areas according to the Applicant's anticipated NPDES 1200-C permit. Approximately 6 months prior to commercial operation of each phase of construction, the Applicant would meet with ODFW, ODOE, and Multnomah County Weed Control Authority personnel to review the actual extent and conditions of temporarily impacted areas, confirm the revegetation methods to be implemented, and to revisit reference sites, as necessary.

Following each construction phase, all areas, with the exception of temporarily disturbed agricultural lands, would be reseeded with a mix of native or non-invasive, non-persistent non-native grasses and forbs. All seeds would be obtained from a reputable supplier in compliance with the Oregon Seed Law (Oregon Administrative Rule 603-056).

The seeding methods and timing of planting would be appropriate to the seed mixes, weather conditions (e.g., precipitation, wind speed, temperature, etc.), and site conditions (including area size, slope, and erosion potential) based upon consultation with ODFW, the Wasco, Hood River and Multnomah County Weed Control Supervisor, and the seed supplier. Seeding between late-fall and late- winter/early-spring is typically recommended; however, the Applicant would consult with ODFW, Wasco, Hood River, and Multnomah counties' weed control departments, and/or the seed supplier to determine the optimal timing for seed application based on climatic conditions of the particular year when construction and revegetation efforts are implemented. Three common seed application methods that may be used are broadcast seeding, drill seeding, and hydroseeding; each of these are discussed further above. Other seeding methods may be proposed for review and approval prior to revegetation efforts.

6 Noxious Weed Prevention and Control

Throughout construction and revegetation activities, the Applicant would take appropriate actions to prevent the spread of noxious weeds. Where appropriate, and pursuant to consultation with the Umatilla County Weed Department, monitoring of noxious weeds and the effectiveness of weed control/eradication efforts would be performed concurrently with the revegetation monitoring described in this document.

6.1 Regulatory Framework

6.1.1 State of Oregon

In Oregon, noxious weeds are defined under Oregon Revised Statutes (ORS) 569.175 as "terrestrial, aquatic, or marine plants designated by the State Weed Board (OSWB) under ORS 569.615 as among those representing the greatest public menace and as a top priority for action by weed control programs." Noxious weeds have been declared by ORS 569.350 as a menace to public welfare, and control of these plants is the responsibility of private landowners and operators, as well as county, state, and federal governments.

The OSWB was established under ORS 561.650. It provides direction to control noxious weeds at the state level and develops and maintains the State Noxious Weed List. OSWB and the ODA classify noxious weeds in Oregon in accordance with the ODA Noxious Weed Classification System (ODA 2019a). Currently, there are 138 noxious weeds listed in Oregon (ODA 2019a; Appendix A). There are three designations for noxious weeds under the State's system:

- **Class A State Listed Noxious Weed**: A weed of known economic importance which occurs in the state in small enough infestations to make eradication or /containment possible; or is not known to occur in Oregon, but its presence in neighboring states makes future occurrence seem imminent. **Recommended Action**: Infestations are subject to eradication or intensive control when and where.
- **Class B State Listed Noxious Weed**: A weed of economic importance that is regionally abundant but may have limited distribution in some counties. **Recommended Action**: Limited to intensive control at the state, county, or regional level as determined on a site-specific, case-by-case basis. Where implementation of a fully integrated statewide

management plan is not feasible, biological control (when available) shall be the primary control method.

- **Class T Designated State Noxious Weeds**: Priority noxious weed species selected and designated by the OSWB as the focus of prevention and control actions by the Noxious Weed Control Program. T-designated noxious weeds are selected annually from either the A or B list and the ODA is directed to develop and implement a statewide management plan for these species.

6.1.2 Wasco County

Wasco County has an active Noxious Weed Control Program, which aims to manage the invasion and spread of noxious weeds throughout the county. The Wasco County Code Land Use and Development Ordinance establishes procedures for managing noxious weeds during construction through the authority granted to general law counties by ORS Chapter 203. Wasco County has its own weed classification system that differs from the state. Currently, there are 4 classes of noxious weeds, A pests, B pests, C pests and Q pests, which are defined below (Wasco County, 2008):

- **A Pests:** A weed of known economic importance known to occur in the county in small enough infestations to make eradication practical.
- **B Pests**: A weed of known economic importance and of limited distribution within the county and is subject to intensive control or eradication, where feasible, at the county level
- **C Pests**: A weed that also has economic importance but is more widely spread. Control of these weeds would be limited by conditions that warrant special attention.
- **Q Pests**: A weed that exists in the county, but is of little, no, or undetermined economic importance. However, they are to be monitored and subject to control if they begin to appear threatening.

As of 2008, there were 12 listed A Pests, nine B Pests, 20 C Pests, and two Q Pests in Wasco County.

6.1.3 Multnomah County

Noxious weeds in Multnomah County are identified in Chapter 39.5520 of the county code. In Multnomah County, nuisance and invasive non-native plants include those plants listed in the latest edition of the Metro Nuisance Plant List the Prohibited Plant List, the latest edition of the State of Oregon Noxious weed List or deemed equivalent by the Planning Director in consultation with a native plant authority or specialist.

6.2 Noxious Weeds Identified in Site Boundary

Thirty-five noxious weed species were recorded within the Site Boundary during surveys conducted in 2024 (see Exhibit P, Attachment P-2). These species and their state and county weed status are presented in Table 2.

Table 2. Documented occurrences of noxious weeds in the Project corridor and vicinity.

Species	Habitat[1]	Class[2]
Bull Thistle *Cirsium vulgare*	Disturbed pastures, rangelands, roadsides, and recently logged areas. Potentially roadside of I-84, North Marine Drive, and Hayden Island.	B
Butterfly bush *Buddleja davidii*	Dry meadows, open slopes, and rights-of-way. Potentially near the Columbia River Slough and Smith and Bybee Wetlands.	B
Canada Thistle *Cirsium arvense*	Disturbed areas such as pastures, rangeland, lawns, roadsides, and waste areas. Also found in riparian areas and forests. Potentially roadside of I-84, North Marine Drive, US Highway 30, and Hayden Island.	B
Common Reed *Phragmites australis*	Wet areas such as wetlands, roadside ditches, and depressions. Potentially within wet roadside depressions of I-84, North Marine Drive, and North Columbia Boulevard.	B
Dalmatian Toadflax *Linaria dalmatica ssp. dalmatica*	Roadsides, pastures, rangelands, and waste areas.[3] Potentially roadside of I-84.	B, T
Diffuse Knapweed *Centaurea diffusa*	Riparian areas, rangelands, and disturbed sites such as roadsides and waste lots. Potentially within The Dalles, roadside of I-84, North Marine Drive, and North Columbia Boulevard.	B
English hawthorn *Crataegus monogyna*	Disturbed roadsides, fields, meadows, and forest edges. Potentially roadside of forested areas along I-84 and near the Columbia River Slough.	B
Field bindweed *Convolvulus arvensis*	Disturbed, open areas including fields, roadsides, and wastelots.[3] Potentially within The Dalles, roadside of I-84, North Marine Drive, and Hayden Island.	B
Goatsrue *Galega officinalis*	Pastures, streambanks, irrigation canals, moist meadows. Potentially along the Columbia River Slough.	A, T
Himalayan Blackberry *Rubus armeniacus*	Disturbed sites such as roadsides, railroad tracks, logged lands, field margins, and riparian areas.[3] Potentially growing in The Dalles, along I-84, North Marine Drive, and Hayden Island.	B
Hoary cress whitetop *Lepidium draba*	Disturbed areas such as roadsides and fields. Also found in sagebrush desert.[3] Potentially in The Dalles and along US Highway 30.	B
Houndstongue *Cynoglossum officinale*	Disturbed areas such as roadsides and ditches. Can also be found in fields, meadows, and forest edges.[3] Potentially found along I-84 and North Marine Drive.	B
Indigo bush *Amorpha fruticosa*	Disturbed, wet areas including roadsides, waste lots, and along streams. [3] Potentially in The Dalles, roadside of I-84, and Hayden Island.	B
Japanese knotweed *Fallopia japonica*	Riparian areas and disturbed sites such as roadsides and ditches.[3] Potentially roadside of I-84 and near the Columbia River Slough.	B
Kochia *Kochia scoparia*	Disturbed areas such as roadsides, ditches, and waste lots. Also found in pasture, rangeland, and cropland. Potentially within The Dalles, roadside of I-84, and near the Columbia River Slough.	B
Meadow knapweed *Centaurea pratensis*	Roadsides, riverbanks, irrigated pastures, moist meadows, grasslands, and other disturbed areas. Potentially found roadside of I-84.	B
Medusahead rye *Taeniatherum caput-medusae*	Disturbed sites such as roadsides and waste lots. Also found in sagebrush desert.[3] Potentially roadside of I-84, east of the Cascade crest.	B
Milk thistle *Silybum marianum*	Roadsides, waste areas, and pastureland. Potentially roadside of North Marine Drive.	B
Musk thistle *Carduus nutans*	Disturbed areas such as roadsides, ditches, and pastures. Potentially roadside of US Highway 30.	B
Parrot's feather *Myriophyllum aquaticum*	Lakes, ponds, streams, canals, and wet riverbanks. Potentially near the Columbia River Slough and Smith and Bybee Wetlands.	B

Species	Habitat[1]	Class[2]
Perennial pepperweed *Lepidium latifolium*	Wetlands, rangeland, crop fields, roadsides, and irrigation ditches. Potentially along roadsides and irrigation ditches within The Dalles.	B, T
Poison Hemlock *Conium maculatum*	Streams, irrigation ditches, pasturelands. Potentially in roadside depressions or irrigation ditches in The Dalles, along I-84, Hayden Island, and US Highway 30.	B
Puncturevine *Tribulus terrestris*	Edges of fields, ditches, and roadsides. Can also grow in orchards and vineyards. Potentially in The Dalles, roadside of North Columbia Boulevard, and near Smith and Bybee Wetlands.	B
Purple loosestrife *Lythrum salicaria*	Wetlands and other moist areas. Potentially near the Columbia River Slough and Smith and Bybee Wetlands.	B
Rush Skeletonweed *Chondrilla juncea*	Pastures, rangeland, cropland, roadsides, open and disturbed areas.[3] Potentially within The Dalles, roadside of I-84 and North Columbia Boulevard, and in Smith and Bybee Wetlands,	B, T
Scotch Broom *Cytisus scoparius*	Roadsides, pastures, grasslands, open areas, and disturbed areas.[3] Potentially roadside of I-84 west of the Cascade crest, along North Marine Drive, and on Hayden Island.	B
South American waterweed *Egeria densa*	Ponds, lakes, and other waterways.[3] Potentially near Smith and Bybee Wetlands and the Columbia River Slough.	B
Spotted knapweed *Centaurea stoebe*	Disturbed areas such as roadsides and wastelots. Also found in meadows, fields, and forest openings. Potentially roadside of I-84 and the North Industrial Area of Portland.	B, T
St. John's wort *Hypericum perforatum*	Disturbed areas such as roadsides, rangelands, trails, and logged lands. Potentially within The Dalles, roadside of I-84 and North Marine Drive, on Hayden Island, and in Smith and Bybee Wetlands.	B
Tansy Ragwort *Jacobaea vulgaris*	Disturbed roadsides, clear cuts, and pasturelands. Roadside of I-84 west of the Cascade crest, roadside of US Highway 30, and on Hayden Island.	B, T
Tree-of-Heaven *Ailanthus altissima*	Grows in a variety of habitats. Forest edges, woodlands, fence rows, roadsides, old fields, and urban parks.[3] Potentially within The Dalles and roadside of I-84.	B
Ventenata grass *Ventenata dubia*	Dry, open, and often disturbed habitats, but prefers sites that are inundated in early spring and dried out by late spring.[3] Potentially roadside of I-84.	B
Yellow flag iris *Iris pseudacorus*	Wetlands and other wet areas. Potentially roadside of wet areas along I-84, primarily west of the Cascade crest, and within Smith and Bybee Wetlands.	B
Yellow starthistle *Centaurea solstialis*	Disturbed areas such as roadsides and waste areas. Can also be found in pastureland, hay fields, meadows, and other open areas. Potentially along dry roadside areas of I-84, primarily east of the Cascade crest.	B
Yellow toadflax *Linaria vulgaris*	Disturbed roadsides, waste areas, and fields.[3] Potentially roadside of I-84 and North Columbia Boulevard, and near the Columbia River Slough.	B

1. Habitat descriptions from ODA : Oregon Noxious Weed Profiles : Oregon Noxious Weeds : State of Oregon unless otherwise noted.
2. The Oregon State Weed Control Board describes the classes as follows:
   Class "A" noxious weeds occur in small infestations within the state. They may also be in neighboring states and make it seem that occurrence in Oregon is imminent. The goals are eradication or intensive control.
   Class "B" noxious weeds are regionally abundant but may have a limited distribution in some counties. Limited, intensive control of infestations is decided at the state, county, or regional level on a case-by-case basis. Where a statewide management plan is not feasible, biological control (when available) would be the primary control method.
   Class "T" noxious weeds are weeds selected from the A or B list by the Oregon state Weed Board for priority prevention and control. Requires ODA to develop and implement a statewide management plan (Oregon Department of Agriculture, 2022).
3. Burke Herbarium Image Collection

6.3 Noxious Weed Management

This section describes the steps the Applicant would take to prevent and control the establishment and spread of noxious weed species during both construction and operation of the Facility. Noxious weed control methods for the Facility described have been developed utilizing information from the ODA Noxious Weed Control Program, the Wasco County Weed Department, and the City of Portland's Nuisance Plants Required Removal Program.

The management of noxious weeds would be considered throughout all stages of construction and operation of the Facility and would include:

- **Prevention:** Implementing measures to prevent the spread of noxious weeds during construction, operation, and maintenance activities.
- **Treatment:** Treating noxious weed populations with their appropriate control methods, at appropriate time intervals.
- **Monitoring:** Assessing noxious weed changes within the Facility site boundary over time and ensuring that legacy as well as new weed populations are not increasing their distributions.

The Applicant's objective is to prevent the introduction of new noxious weed populations and the spread of existing noxious weed populations. The methods described below would be implemented to minimize the spread of noxious weeds during construction activities. New noxious weeds detected during post-construction revegetation would be considered a result of construction activities and would be controlled accordingly.

6.3.1 Prevention

Prior to the start of construction, all personnel would be instructed on of the importance of noxious weed control. As part of start-up activities, and to help facilitate the avoidance of existing infestations and identification of new infestations, the Applicant or their construction contractor would provide information and training to all construction personnel regarding noxious weed identification and prevention strategies. Operations and maintenance personnel would be similarly informed. The importance of preventing the spread of noxious weeds in areas not currently infested and controlling the proliferation of noxious weeds already present within or near the Facility would be emphasized.

Implementation of the following best management practices would also aid in minimizing the spread of noxious weeds during construction activities, revegetation efforts, and operation and maintenance activities. The following practices center around ensuring that noxious weed seeds or reproductive plant fragments are not unintentionally dispersed within or outside of the Facility boundaries by personnel or their vehicles. These practices allow for responsible movement around sites with noxious weeds already present and ensure that new populations or species are not accidentally introduced into the Facility boundaries.

- Providing information regarding target noxious weed species at the O&M Building;
- Flagging areas of noxious weed infestations, where practical, prior to construction to alert construction personnel to their presence and limit or prevent access to those areas;
- Limiting vehicle access to designated routes, whether existing roads or newly constructed roads, and the outer limits of constructed-related disturbances;

- Limiting vehicle traffic in noxious weed-infested areas;
- Cleaning construction vehicles prior to entering the Project for the first time and upon completion of work at the Project;
- Cleaning vehicles after performing work in noxious weed-infested areas;
- Identifying topsoil and other soils that came from noxious weed–infested areas and placing next to the infested area so they are returned to their previous location during reclamation activities;
- Treating soils from infested areas with a pre-emergent herbicide prior to initiation of revegetation efforts, depending on site-specific conditions;
- Limiting movement of topsoil and other soils from non-infested areas to eliminate the transport of weed seeds, roots, or rhizomes;
- Implementing noxious weed treatments via mechanical or chemical control;
- Preventing conditions favorable for noxious weed germination and spread by revegetating temporarily disturbed areas as soon as possible;
- Monitoring areas of disturbance for noxious weeds after construction, during the normal course of revegetation maintenance of temporary work spaces, and implementing control measures as appropriate;
- Revegetating the site with appropriate, local native seed or native plants; when these are not available, non-invasive and non-persistent non-native species may be used; and
- Purchasing seed and straw mulch (used for site rehabilitation and revegetation) that is certified free of noxious weed seed and propagules, if possible.

6.3.2 Treatment and Control

Noxious weed treatment would focus on control of existing populations of noxious weeds within areas disturbed by construction. Additionally, if it is determined that noxious weeds have invaded areas adjacent to disturbance areas as a result of construction, the Applicant would contact the landowner and seek approval to treat those noxious weed populations. New noxious weeds detected during post-construction restoration would also be considered a result of construction activities and shall be controlled and treated accordingly.

Control of noxious weeds would be implemented through manual, mechanical, or chemical control measures. Manual control methods include hand-pulling and using hand tools to remove noxious weeds. Mechanical control includes mowing or disking with machinery. Chemical application is accomplished through use of herbicides targeted to the individual weed species. The Applicant would be responsible for hiring a qualified contractor to implement the treatment of noxious weeds. The Applicant would ensure that noxious weed management actions would be conducted by specialists with the following qualifications:

- Experience in native plant, non-native and invasive plants, and noxious weed identification;
- Experience in noxious weed mapping;

- If chemical control is used, specialists must possess a Commercial or Public Pesticide Applicator License from the ODA, or possess an Immediately Supervised Pesticide Trainee License and be supervised by a licensed applicator;
- Training in noxious weed management or Integrated Pest Management with an emphasis in noxious weeds; and
- Experience in coordination with agencies and private landowners.

Existing noxious weed populations should be prevented from expanding in size and density and should not be allowed to spread to new sites. Where practicable, existing populations of noxious weeds should be eradicated. If it is determined that noxious weeds have invaded areas immediately adjacent to the Facility (e.g., areas visible just beyond the outer limits of construction disturbances associated with the Facility or along access roads) as a result of construction, the Applicant would contact the landowner and seek approval to treat those noxious weed populations.

Long-term weed control methods would be described in a long-term monitoring plan as described in Section 7.3. The main factor in long-term weed control is successful revegetation with non-weedy species. Short-term noxious weed control would be done through mechanical or chemical treatment. However, it would be important to ensure that the short-term treatment does not affect the establishment of the native perennial cover that would help provide the long-term control. Additionally, early detection and control of small noxious weed populations before they can expand into larger populations is extremely important for successful weed control efforts.

Noxious weed control would continue until the disturbed areas meet the identified success criteria described in Section 7.4. Supplemental seeding of desirable species may be needed to achieve this goal. Fertilizer application would be limited in areas treated for noxious weeds, as fertilizer can stimulate the growth of noxious weeds, and the timing of revegetation activities would need to be coordinated with noxious weed treatments.

The most appropriate control method depends on the noxious weed species being treated, the size of infestation, and the terrain and habitat needing treated. Standard treatment methods for noxious weeds can be found in the Pacific Northwest Weed Management Handbook (Peachey 2019), ODA's Oregon Noxious Weed Profiles (ODA 2019), and Weed Control in Natural Areas in the Western United States (DiTomaso et al. 2013).

6.3.3 Mechanical Treatment

Mechanical treatment would be one method of treatment used for existing noxious weed populations within the boundaries of the Facility. Mechanical control methods rely on removal of plants, seed heads, and/or cutting roots with a shovel or other hand tools or equipment that can be used to remove, mow, or disc noxious weed populations. Hand removal of plants is also included under this treatment method. Mechanical methods are useful for smaller, isolated populations of noxious weeds in areas of sensitive habitats. Additionally, hand removal of small infestations can minimize soil disturbance, allowing desirable species to remain and limiting conditions favorable for noxious weeds.

Some rhizomatous plants can spread by discing or tillage. In addition, rush skeletonweed, which has been identified within the Facility site boundary, can reproduce vegetatively from small segments of root, and discing or tilling can facilitate the spread of this species. As such, implementation of discing would be species-specific and avoided in areas where rush skeletonweed individuals have been found.

If discing is employed in areas that would be revegetated following construction, subsequent seeding would be conducted to re-establish desirable vegetative cover that would stabilize the soils and slow the potential re-invasion of noxious weeds. Discing, tilling, or other mechanical treatments that disturb the soil surface within native habitats would also be avoided in favor of herbicide application, which is an effective means of reducing the size of noxious weed populations as well as preventing the establishment of new infestations.

6.3.4 Chemical Treatment

Chemical control can effectively remove noxious weeds through use of selective herbicides. The specific herbicide used and the timing of application would be chosen based on the specific noxious weed being treated, as appropriate herbicides differ between species and types of plants. The status of herbicide approval (e.g., confirming herbicides are approved for use by the U.S. Environmental Protection Agency [USEPA] and ODA) would be checked annually.

Prior to construction and every fall season during facility operation, the Applicant or its contractor would consult with the appropriate county weed authority on timing, method, and application rates for each identified weed species of concern, to allow for adaptive weed management given changes in weed control effectiveness from noxious weed species tolerance to herbicide treatment over time. Results of the consultation shall be reported in the Applicant's annual monitoring report. Any alternative control methods can be proposed by the Applicant or its contractors after consulting with the county weed authorities and included in the Applicant's annual monitoring report.

Herbicides would be applied to identified, treatable, noxious weed infestations. The Applicant or their contractors would coordinate with the applicable county weed authority to determine which populations are treatable and would notify landowners of proposed herbicide use on their lands prior to application. If a noxious weed population is deemed to be untreatable (e.g., too widespread and established in an area to successfully control), the Applicant would implement the applicable prevention measures discussed in Section 6.3.1, except for treatment with herbicides.

Herbicide Application and Handling

Herbicide application would adhere to USEPA and ODA standards. Only those herbicides that are approved by the USEPA and ODA would be used. In general, application of herbicides would not occur when the following conditions exists:

- Wind velocity exceeds 15 miles per hour for granular application, or exceeds 10 miles per hour for liquid applications;
- Snow or ice covers the foliage of target species; or
- Adverse weather conditions are forecasted within the next few days.

Hand application methods (e.g., backpack spraying) may be used in roadless areas or in rough terrain. Vehicle-mounted sprayers (e.g., handgun, boom, and injector) would be used mainly in open areas that are readily accessible by vehicle. Calibration checks of equipment would be conducted prior to spraying activities, as well as periodically throughout use, to ensure that appropriate application rates are achieved.

Herbicides would be transported to the Facility daily with the following stipulations:

- Only the quantity needed for that day's work would be transported.

- Concentrate would be transported in approved containers only, and in a manner that would prevent spilling, stored separately from food, clothing, and safety equipment.
- Mixing would be done off-site and at a distance greater than 200 feet from open or flowing water, wetlands, or other sensitive species' habitat. No herbicides would be applied at these areas unless authorized by the appropriate regulatory agencies.
- All herbicide equipment and containers would be inspected daily for leaks.
- Herbicides use would be in accordance with all manufacture's label recommendations and warnings.

Herbicide Spills and Cleanups

All appropriate precautions would be taken to avoid herbicide spills. In the event of a spill, cleanup would be immediate. Contractors would keep spill kits in their vehicles and in an appropriate storage shed to allow for quick and effective response to spills. Items included in the spill kit would be:

- Protective clothing and gloves
- Adsorptive clay, "kitty litter," or other commercial adsorbent;
- Plastic bags and a bucket;
- A shovel;
- A fiber brush and screw-in handle;
- A dustpan;
- Caution tape;
- Highway flares (use on existing hard-top roads only); and
- Detergent.

Response to an herbicide spill would vary with the size and location of the spill, but general procedures include:

- Stopping the leak;
- Containing the spilled material;
- Traffic control;
- Dressing the clean-up team in protective clothing;
- Cleaning up and removing the spilled herbicide, as well as the contaminated adsorptive material and soil; and
- Transporting the spilled herbicide and contaminated material to an authorized disposal site.

Herbicide Spill Reporting

All herbicide contractors would have readily available copies of the appropriate material safety data sheets for the herbicides used at their disposal and would keep copies of the material safety data sheets in the application vehicle. All herbicide spills would be reported in accordance with applicable laws and requirements. If a spill occurs, the appropriate agency and spill coordinators would be notified promptly. In case of a spill into wetlands and waterbodies, the appropriate federal, state, and county agencies would be notified immediately.

6.3.5 Revegetation Documentation

Records would be kept of revegetation efforts, both for croplands and other habitats; records would include:

- Date construction was completed in the area to be revegetated;
- Description of the affected area;
- Date revegetation work was initiated;
- Description of the revegetation work implemented; and
- Supporting figures representing the location, acres affected, and pre-disturbance condition of the revegetation area.

The Applicant would update these records periodically as revegetation work occurs and would provide ODOE with copies of these records with submission of the monitoring report required by the site certificate.

7 Monitoring

7.1 Monitoring of Noxious Weeds

Following construction, monitoring for noxious weeds would be conducted annually for the first 5 years to assess weed growth and inform noxious weed control measures. Annual checks for noxious weed infestations would also enable the Applicant to respond to new noxious weeds infestations in a timely manner and ensure the success of the site's revegetation. Annual noxious weed inspections would occur across the entire Facility through visual inspection of the site while driving and/or walking. These inspections would be used to inform ongoing noxious weed control efforts.

The initial monitoring survey would be scheduled slightly before herbicide application, as applicable, to identify any noxious weed species within the areas to be treated, with a focus on target noxious weed species that may occur within the project area (Table 2).

Monitoring would assess the success of noxious weed treatments and would document any new noxious weed infestations observed. These results would be summarized in annual monitoring reports that describe the treatment success, make recommendations to improve treatment success (if necessary), and note any new target noxious weed species or emergence. Reports would be submitted to the ODOE, ODFW, and Multnomah County annually.

Based on the success of control efforts after the fifth year of annual monitoring, the Applicant would consult with ODOE and ODFW to design a long-term weed control plan. The Applicant would maintain ongoing communication with individual landowners, the Multnomah County Weed Coordinator, and ODOE regarding noxious weeds within the Facility. Landowners may also contact the Applicant directly to report the presence of noxious weeds related to Facility activity. The Applicant would control the noxious weeds on a case-by-case basis and prepare a summary of measures taken for that landowner. During the operational period of the Facility, the Applicant would control noxious weeds as described in the long-term weed control plan.

7.2 Reference Sites

Nearby reference sites, used to approximate pre-construction conditions at the revegetation areas, would be selected as targets toward which revegetation would aim. Reference sites would be chosen to represent each of the habitat types to be revegetated, as feasible. Land use patterns, soil types, terrain, and presence of noxious weeds would also be considered in selection of reference sites. Once reference sites are selected by the Applicant and approved by the ODOE and ODFW, the reference sites shall remain in the same location unless approval for use of a different reference site is obtained by the ODOE and ODFW.

Once the reference sites are approved by the ODOE and ODFW, the Applicant would employ a qualified investigator (botanist or revegetation specialist) to monitor those sites to establish baseline conditions as they relate to the success criteria for revegetation efforts. Documentation of baseline conditions at reference sites shall occur prior to commencement of revegetation efforts. If land use changes, wildfires, or other disturbances occur between the time of selection and monitoring of baseline conditions such that a chosen reference site is no longer representative of target conditions, new reference sites may be chosen. Following the selection of a new reference site, an updated table and latitude/longitudinal data would be provided to ODOE within a 6-month revegetation record report or the annual compliance report, whichever report is submitted first.

7.3 Monitoring Procedures

Following implementation of revegetation efforts, the Applicant would monitor the revegetation areas as described in this section. The Applicant would submit the vegetation monitoring methodology to ODFW and ODOE for approval prior to assessing baseline conditions within reference sites and prior to the first annual monitoring of revegetation areas.

Monitoring of the revegetation areas would be conducted by a qualified investigator annually for 5 years, with the first monitoring period to occur the first growing season following initial seeding. Revegetation areas would be inspected to determine if the area is meeting and/or on track to meeting the success criteria as described in Section 5. The investigator would evaluate the following site conditions during annual monitoring:

- Extent of bare soil;
- Degree of erosion;
- Presence and abundance of noxious weeds;
- Vegetation density;
- Relative proportion of desirable vegetation (desirable vegetation includes those species included in the seed mix or native or native-like species, excluding noxious weeds); and
- Species diversity and structural stage of desirable vegetation.

Following annual monitoring, a monitoring report would be prepared and would include:

- The investigator’s assessment of whether the revegetated areas are trending toward meeting the success criteria;
- Assessments of factors impacting the ability of the revegetated area to trend towards meeting the success criteria;

- Descriptions of appropriate weed control measures as recommended by ODOE, ODFW and the County Weed Department; and
- Recommendations of remedial actions, if any.

The Applicant would report the investigator's findings and recommendations regarding wildlife habitat recovery and revegetation success within 60 days of the inspection to ODOE and ODFW.

7.3.1 Monitoring of Temporarily Disturbed Revegetated Areas

As noted in Section 3, all areas used for work areas of the converter station, HVAC cable placement and work areas, as well as HDD work areas would be temporarily disturbed, and vegetation may be impacted. The Applicant would conduct periodic monitoring within these areas after revegetation to assess the following site conditions:

- Species composition and percent cover of native forbs and grasses;
- Percent cover of bare soil;
- Degree of erosion;
- Percent cover of noxious weeds; and
- Qualitative assessment of overall vigor of vegetation within revegetated areas.

7.4 Success Criteria

In each monitoring report, the Applicant would include an assessment of whether the revegetated areas are meeting or trending toward meeting the success criteria. An area would be deemed successfully revegetated when the habitat quality at a monitoring site is equal to or surpasses the habitat quality at the associated reference site, as follows:

- Vegetation density is equal to or greater than that of the reference site;
- Relative proportion of desirable vegetation is equal to or greater than that of the reference site;
- Species diversity of desirable vegetation is equal to or greater than that of the reference site;
- The presence and density of noxious weeds is equal to or less than that of the reference site.

When ODOE and ODFW find that the condition of a revegetation area satisfies the criteria for revegetation success, ODOE and ODFW would conclude that the Applicant has met its restoration obligations for that area. If ODOE or ODFW finds that the landowner has converted a habitat area to a use that is inconsistent with these success criteria, ODOE and ODFW would conclude that the Applicant has no further obligation to restore the area.

In addition, success of cropland revegetation would have been achieved when production of the revegetated area is comparable to that of adjacent, non-disturbed croplands. Success determination would involve consultation with the landowner or farm operator, and the Applicant would report to ODOE on the success of cropland restoration efforts after the first growing season.

7.5 Remedial Action

After each monitoring visit, the Applicant's qualified investigator would report to the Applicant regarding the revegetation progress of each revegetation area. If applicable, the investigator would make recommendations to the Applicant for reseeding, weed control, or other remedial measures for

areas that are not showing progress toward achieving revegetation success. The investigator would provide a description of factors that may be contributing to the lack of revegetation success. The Applicant would include the investigator's recommendations for remedial actions and the measures taken in that year's monitoring report. ODOE may require reseeding or other remedial measures in cases where success criteria have not been met.

8 Plan Amendment

This Plan may be amended from time to time by agreement of the Applicant and the Oregon Energy Facility Siting Council (EFSC). Such amendments may be made without amendment of the site certificate. EFSC authorizes ODOE to agree to amendments to this plan. ODOE shall notify EFSC of all amendments, and EFSC retains the authority to approve, reject, or modify any amendment of this Plan agreed to by ODOE.

9 References

DiTomaso, J.M., G.B. Kyser et. Al. 2013. Weed Control In Natural Areas in the Western United States. Weed Research and Information Center, University of California. 544pp.

ODA (Oregon Department of Agriculture). 2019. Oregon Noxious Weed Profiles. Available at: https://www.oregon.gov/oda/weeds/oregon-noxious-weeds/pages/default.aspx

Peachey, E., editor. 2024. Pacific Northwest Weed Management Handbook [online]. Corvallis, OR: Oregon State University. https://pnwhandbooks.org/weed