B O N N E V I L L E   P O W E R   A D M I N I S T R A T I O N

Bonneville-Hood River Transmission Line Rebuild Project

Draft Environmental Assessment

September 2016

DOE/EA-1981

This page deliberately left blank

Contents

Figures

Tables

Appendices

Chapter 1
Purpose of and Need for Action

The Bonneville Power Administration (BPA) is a federal agency that owns and operates more than 15,000 circuit miles of high-voltage transmission lines. The transmission lines move most of the Northwest's high-voltage power from facilities that generate the power to users throughout the region. BPA has obligations to ensure that its transmission system is safe, reliable, and has sufficient capability to serve its customers. For example, the Federal Columbia River Transmission System Act directs BPA to construct improvements, additions, and replacements to its transmission system that are necessary to maintain electrical stability and reliability, as well as to provide service to BPA's customers (16 United States Code [U.S.C.] § 838b(b-d)).

One of these existing BPA-owned transmission lines is the Bonneville-Hood River transmission line, which runs east from the Bonneville Dam Powerhouse on the Columbia River to Hood River, Oregon (Figure 1.1-1). Portions of this 23-mile-long, 115-***kilovolt (kV)***[1] transmission line and an associated tap running to Cascade Locks are in poor condition due to normal deterioration and aging. In addition, many of the existing roads and foot trails used to access the existing line are in poor condition, and there currently is not access to all of the line's existing transmission structures. BPA is proposing the Bonneville-Hood River Rebuild Project (Proposed Action) to replace the aged wood and steel lattice H-frame structures and other line components along the line, and improve its access road and trail system.

BPA has prepared this environmental assessment (EA) pursuant to regulations implementing the National Environmental Policy Act (NEPA), to assess the potential impacts of this proposal on the environment. This chapter of the EA further describes the need for action that has led to the proposal, identifies the purposes (i.e., goals) that BPA is attempting to achieve while meeting the need, and summarizes the public scoping process for the EA that has been conducted.

---

[1] Terms defined in the glossary (Chapter 5) are shown in ***bold, italicized*** typeface the first time the word is used.

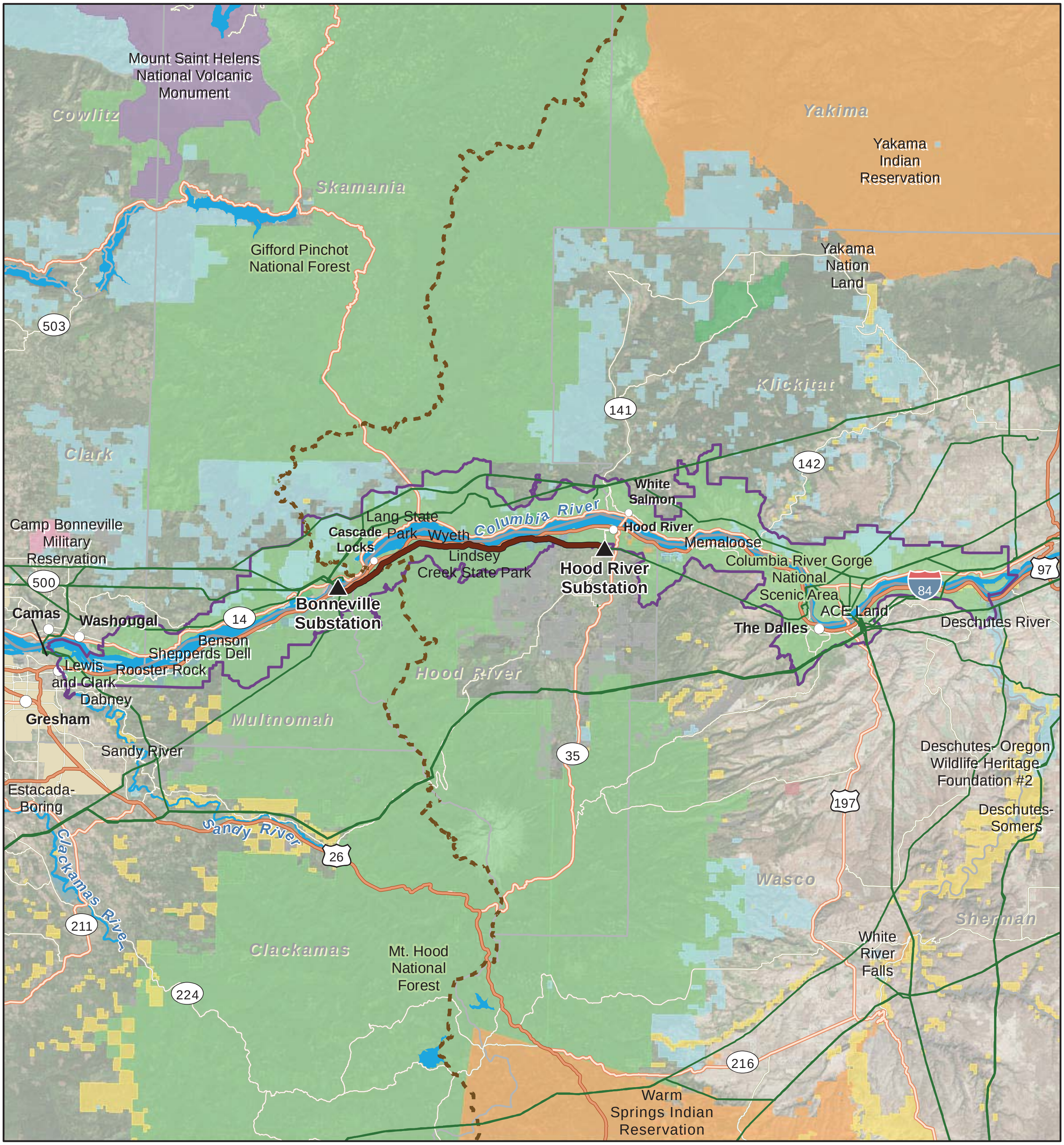


Figure 1-1 Project Vicinity Map

- ▲ BPA Substation
- BPA Transmission Line
- Bonneville-Hood River Transmission Line
- Pacific Crest Trail
- National Scenic Area Boundary

Land Ownership
- Bureau of Land Management
- Tribal
- Department of Defense
- Federal Energy Regulatory Commission
- National Park Service
- US Forest Service
- US Fish & Wildlife
- State Lands
- Oregon Parks and Recreation
- Local Government

WASHINGTON
Project Location
Portland
OREGON

0 3 6 12
Miles

Bonneville POWER ADMINISTRATION

7/15/2016

1.1 Need for Action

BPA needs to ensure the integrity and reliability of the Bonneville-Hood River transmission line, which serves BPA's utility customers, who in turn serve communities in the Columbia River Gorge and eastern Oregon. BPA also needs to ensure the integrity and reliability of an associated tap along this line that runs to Cascade Locks and serves this community.

The Bonneville-Hood River transmission line and tap were constructed in the 1930s. Although some components of the line have been replaced or rebuilt over the years, the majority of the line has not and thus is physically worn and showing normal deterioration due to age. The line was constructed using primarily wood-pole structures but also some lattice-steel structures, as well as other components. In general, wood poles for transmission lines have a service life of 55 to 60 years, while lattice-steel structures typically have a service life of 75 to 100 years. Many of the existing wood pole and steel lattice structures along the line have at least one component of the structure that is reaching or is beyond its service life. In addition, the conductor, hardware, and insulators along portions of the transmission line have reached the end of their service life.

Due to these conditions, portions of the line have begun to fail in recent winter months, resulting in ***outages*** requiring emergency repair. The age, continuing deterioration, and overall poor condition of the line create the risk of additional outages that would adversely affect power deliveries to BPA's customers in the Columbia River Gorge and eastern Oregon and pose safety risks for BPA transmission line workers and the public.

BPA also needs safe and reliable access to the transmission line for transporting line crews, material, and equipment to rebuild the line and for ongoing maintenance and emergency repairs. The existing road and trail system that BPA uses to access the transmission line is in poor condition and does not extend to all structures, making both scheduled maintenance and emergency repairs unsafe.

1.2 Purposes

In meeting the need for action, BPA has identified the following purposes:

- Ensure that transmission system public safety and reliability standards set by the National Electric Safety Code (NESC) and North American Electric Reliability Corporation (NERC) are met
- Continue to meet BPA's contractual and statutory obligations
- Minimize environmental impacts
- Demonstrate cost-effectiveness

1.3 Public Involvement

To help determine the issues to be addressed in the EA, BPA conducted public scoping outreach. The public comment period began on March 4, 2014, and BPA accepted public comments on the project until April 21,

2014. On March 4, 2014, BPA mailed letters to potentially interested and affected persons, agencies, Tribes, and organizations. The public letter provided information about the project and EA scoping period, requested comments on issues to be addressed in the EA, and described how to comment (mail, fax, telephone, the BPA website, and at scoping meetings). The public letter was also posted on a project website established by BPA to provide information about the Proposed Action and the EA process: *www.bpa.gov/goto/HoodRiver*.

BPA determined that six American Indian tribes (Tribes) have a potential interest in this project—Confederated Tribes of the Grand Ronde, Confederated Tribes of Warm Springs Reservation of Oregon, Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe of Idaho, and the Cowlitz Indian Tribe. BPA requested comments on the Proposed Action from the Tribes, as well as on potential ***cultural resources*** to help shape the field investigations.

BPA held one public scoping meeting to describe the project and to solicit comments. The public meeting was held on March 20, 2014, in Hood River, Oregon. Four people attended the scoping meeting.

BPA received 12 written comments during the scoping period and has posted them on the project website (*www.bpa.gov/goto/HoodRiver*). Comments were largely focused on the following:

- Reminder of laws and permits that may be applicable (such as the Endangered Species Act [ESA], Clean Water Act [CWA], Columbia River Gorge National Scenic Area Act, and NEPA), as well as reminders to work with appropriate state agencies and non-governmental organizations.
- Disruption to and visual impacts on recreational and historic resources, such as historic trails, the Pacific Crest Trail, the Historic Columbia River Highway State Trail, Oregon State Parks, federally-managed recreation sites, and Key Viewing Areas.
- Unauthorized use of project access roads and trails and the facilitation of unauthorized vehicle use of nearby resources through the improvement of project access.
- Identification and treatment of noxious and invasive weeds and the disruption to plant and wildlife species and habitat identified in the Management Plan for the Columbia River Gorge National Scenic Area (National Scenic Area Management Plan; Gorge Commission 2011).
- Special landowner requests, such as structure placement or providing old construction materials.
- Expressing project support from local customers.

The scoping comments are addressed in the appropriate sections of the EA as applicable.

Chapter 2
Proposed Action and Alternatives

This chapter describes the Proposed Action (including three different design options), the No Action Alternative, and the alternatives that were considered but eliminated from detailed study. The chapter also compares the alternatives by project purposes and potential environmental effects, and presents potential ***mitigation*** measures.

2.1 Proposed Action

The Proposed Action is to rebuild structures and replace ***conductor*** and/or ***hardware*** along about 22 miles of the existing 23-mile-long Bonneville-Hood River transmission line and the existing approximately 400-foot-long Cascade Locks Tap, and also to improve the access road and foot trail system that allows BPA to get to and from the Bonneville-Hood River transmission line. This section describes the existing transmission line and tap as well as the elements of the proposed Bonneville-Hood River Rebuild Project.

2.1.1 Existing Transmission Line and Tap

Bonneville-Hood River Line

The existing 23-mile-long Bonneville-Hood River transmission line extends in an easterly direction from the existing Bonneville Dam Powerhouse on the Columbia River in Multnomah County, Oregon to BPA's existing Hood River ***Substation*** in Hood River County, Oregon (Figure 2.1-1). The line generally parallels Interstate 84 (I-84) to the south for the first 19 to 20 miles of the line coming out of the Bonneville Dam Powerhouse, before diverging away further south for the remainder of the line to the Hood River Substation. The portion of the line that parallels I-84 crosses very steep terrain that is located south of I-84.

The Bonneville-Hood River transmission line is located in a 150-foot-wide right-of-way that crosses private property, National Forest System lands, and Oregon State Parks-managed lands. About 20 miles of the line is also located within the Columbia River Gorge National Scenic Area (National Scenic Area). BPA has easements or other authorizations with underlying landowners for all of the transmission line right-of-way and for most of the access roads and trails.

The existing structures along the transmission line are mostly wood-pole H-frame structures, but also include lattice-steel H-frame structures where additional strength is needed or access is limited. In addition, the first approximately one mile of the line coming out of the Bonneville Dam Powerhouse – from the

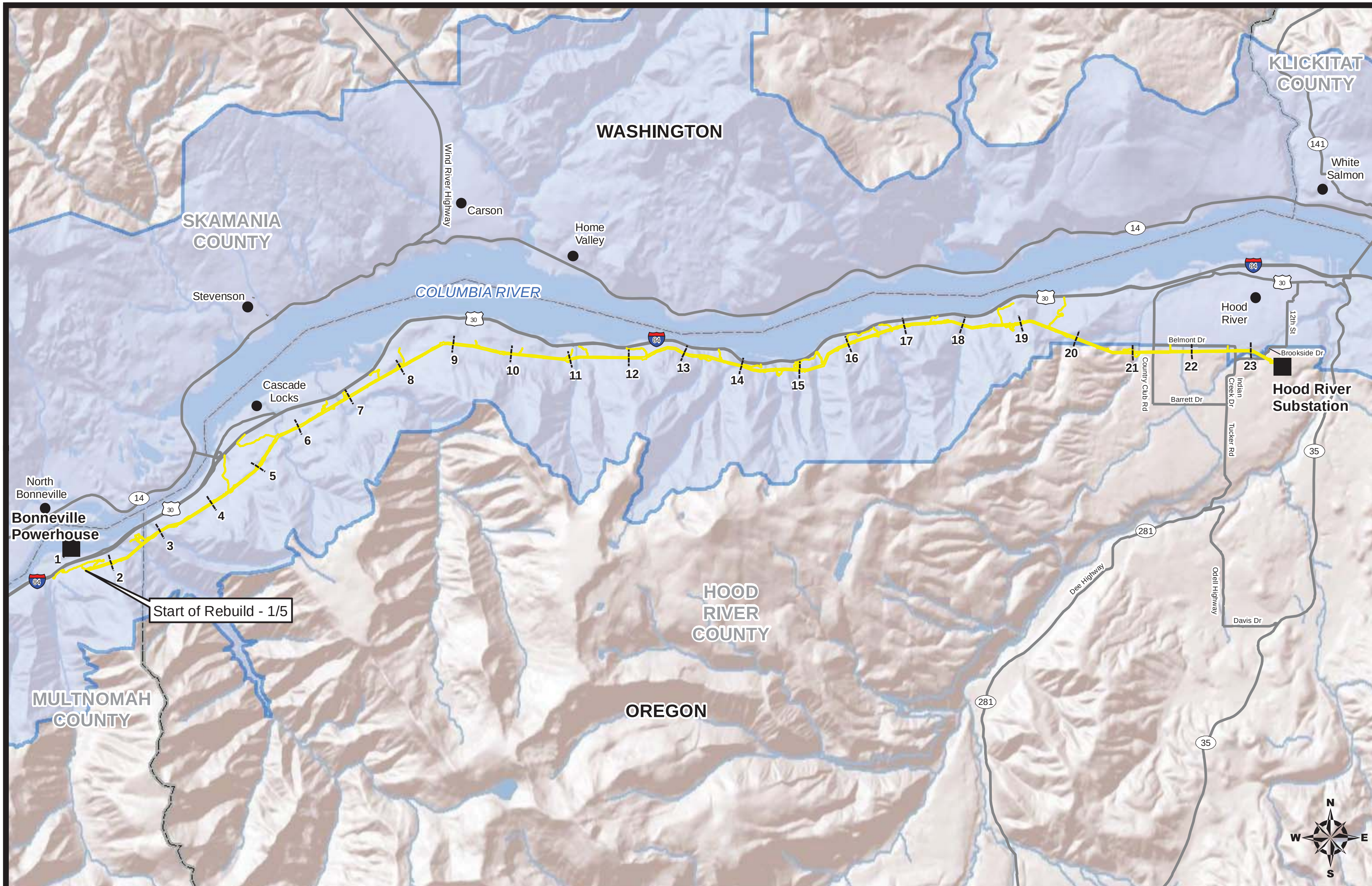
Powerhouse to structure 1/5[2] – is supported by lattice-steel double-***circuit*** structures since these structures also carry conductor for another transmission line.

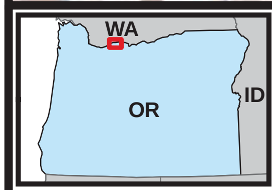
BPA has previously rebuilt some of the wood-pole structures along the line over the years. A total of 49 wood-pole structures were rebuilt in 1999 as part of a reconductoring project along the line. These structures were physically worn and showing normal deterioration. The reconductoring project also replaced conductor along about 11 miles of the line. Conductor was replaced from structures 4/5 to 7/1, from structures 7/2 to 12/4, and from structure 19/11 to the Hood River Substation. ***Counterpoise*** and ***overhead ground wire*** was also replaced in all locations present (about 0.5 mile west of the Hood River Substation) at that time. In addition to the 49 structures rebuilt in 1999, 18 wood-pole structures were rebuilt in 2006, 2012, 2015, and 2016 after wind storms and fallen trees damaged the structures or due to routine maintenance needs.

Access to the portion of the line that parallels I-84 has historically been challenging due to the very steep terrain that it crosses. When the line was built in the 1930s, work crews used mules to haul construction materials on dirt trails to structure sites. Occasionally, the steep terrain required individuals to hand-carry in materials on foot trails to precarious cliffs where the structures were built by hand. Due to the terrain, there is still not a complete access road system for vehicles to reach every structure.

Photos of the existing steel and wood-pole H-frame structures along the line are shown in Figure 2.1-2. The existing steel H-frame structure shown in Figure 2.1-2 is generally located in areas with difficult access when constructed (i.e., those structures were constructed by hand). The wood-pole H-frame structures are generally located in all other areas.

[2] The transmission line structures are individually numbered by line mile and structure within the mile (e.g., structure 1/5 is the fifth structure in mile one). Structure 1/1 is at the Bonneville Dam Powerhouse, and structure 24/3 is at the Hood River Substation.





- Project Area
- Substation
- Line Miles
- County Boundary
- Major Roads
- National Scenic Area Boundary
- Cities

This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: May 03 2016

Bonneville-Hood River Transmission Line Rebuild Project

Figure 2.1-1

Project Area

0 1 2 3 4 Miles

Figure 2.1-2. Photos of Existing Lattice-steel H-frame and Wood-Pole H-frame Structures along the Bonneville-Hood River Line

Cascade Locks Tap

The Cascade Locks Tap connects the Bonneville-Hood River transmission line to the Cascade Locks Substation in the town of Cascade Locks (Figure 2.1-3). This tap begins at a point between structures 7/1 and 7/2 of the Bonneville-Hood River line and extends generally north for about 400 feet to the Cascade Locks Substation. The tap line consists of three structures, conductor, and ancillary components. Two of the tap's structures are located in an overlapping right-of-way with the Bonneville-Hood River line and connects to two disconnect switches on structures (7/2 and 6/11) of the Bonneville-Hood River transmission line. The third structure is a dead end structure within the Cascade Locks Substation.

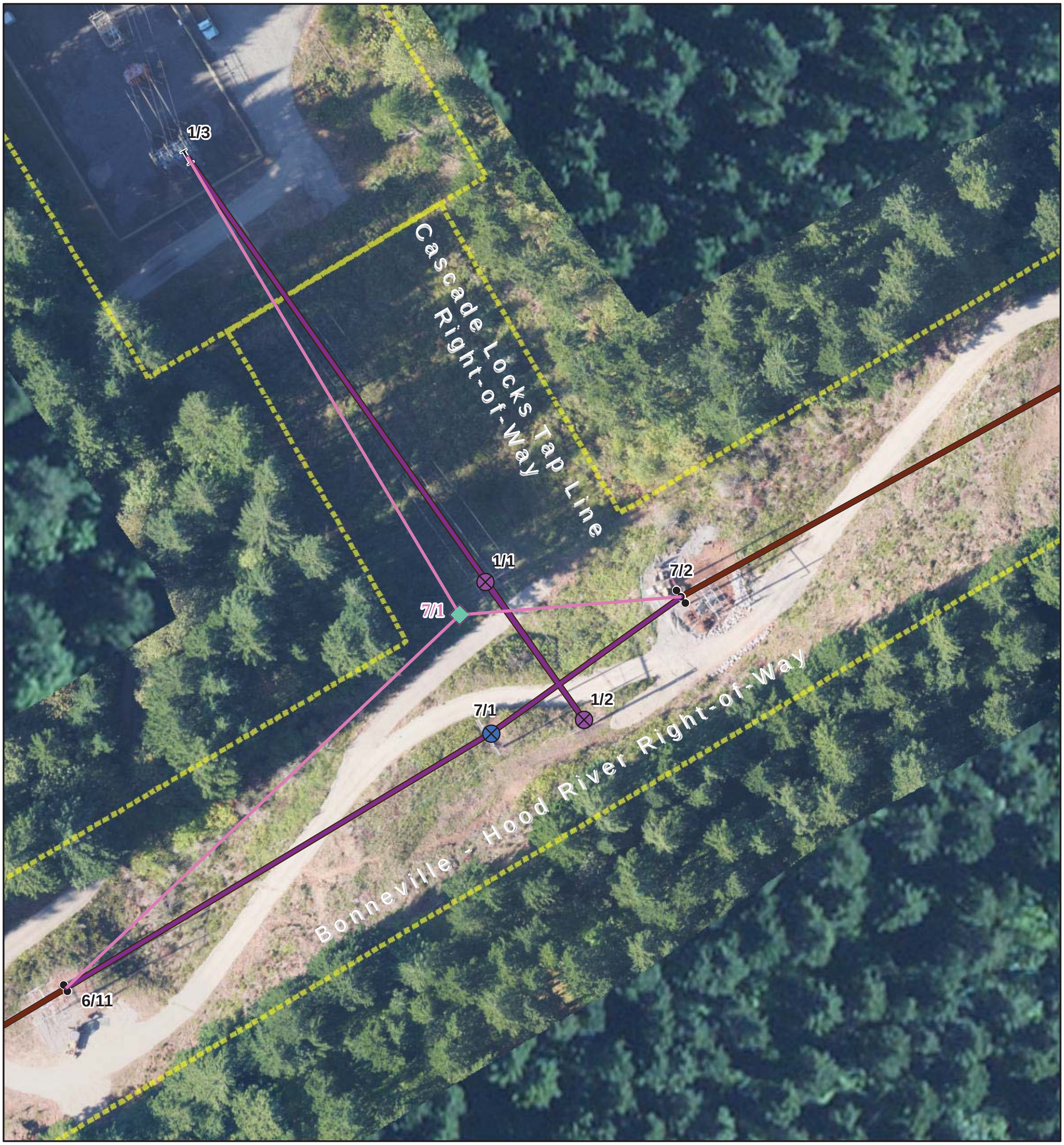
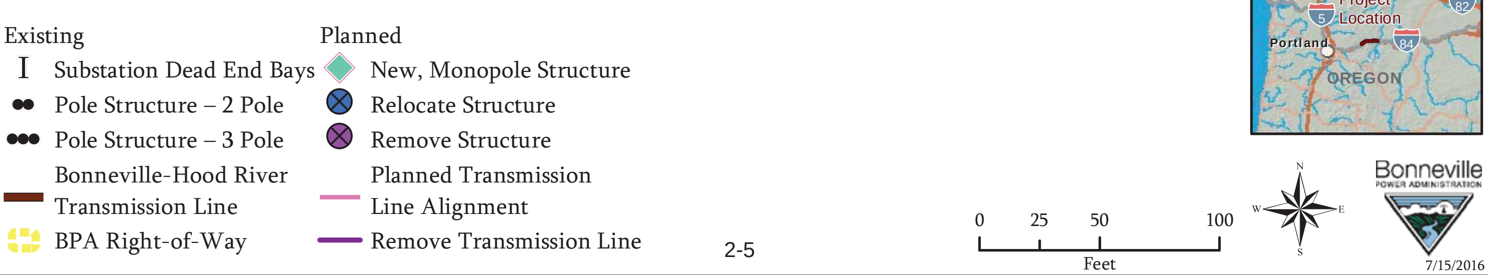


Figure 2.1-3 Cascade Locks Rebuild



2.1.2 Proposed Rebuild Project Overview

The Proposed Action is to: (1) rebuild portions of the Bonneville-Hood River transmission line within the rebuild area for the Project (i.e., the 22-mile-long segment from structure 1/5 to the Hood River Substation); (2) rebuild the Cascade Locks Tap; and (3) improve and extend the access road and trail system that allows BPA access to and from the transmission line. Specifically, the Proposed Action would involve the following components:

- Removal of wood-pole and lattice-steel H-frame transmission line structures constructed prior to 1999 (including cross arms, ***insulators***, ***hardware***, and ***guy wires***) and replacement with a combination of wood-pole H-frame structures and steel-monopole structures.
- Retirement of unnecessary transmission line structures.
- Replacements of conductors and guy wires.
- Replacement of insulators and hardware in locations with no structure or conductor replacement.
- Improvement, reconstruction, and extension of existing access roads and trails.
- Installation or replacement of bridges, fords, ***culverts***, and access road gates.
- Establishment of temporary ***staging areas***, helicopter flight yards, and tensioning sites (for ***pulling and tensioning*** conductors).
- Installation of temporary ***guard structures*** for stringing lines over roads and other utilities.
- Removal of vegetation at various locations along the transmission line right-of-way and access roads.
- Revegetation of areas disturbed by construction activities.

In addition, three different design options are being considered as part of the Proposed Action within line mile 19 (see Section 2.2, *Line Mile 19 Options*). Regardless of which Line Mile 19 Option is selected, the transmission line would remain in the existing transmission line right-of-way and would continue to be operated at 115-kV.

Table 2.1-1 provides details of the structure activities proposed under the Proposed Action. Table 2.1-2 summarizes the access road, trail, and vegetation activities under the Proposed Action. Each of the elements and activities associated with the Proposed Action are described in detail in the following subsections and depicted in the mapping in Appendix A.

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
1/5	--	Lattice Double-Circuit Tower	--	NR	X	X
1/6	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
1/7	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
1/8	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
2/1	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
2/2	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
2/3	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
2/4	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
2/5	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
3/1	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
3/2	--	Wood pole H-frame	--	NR	X	X
3/3	--	Wood pole H-frame	--	NR	X	X
3/4	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
3/5	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
3/6	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
3/7	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
4/1	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
4/2	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
4/3	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
4/4	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
4/5	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
4/6	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
4/7	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
4/8	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
5/1	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
5/2	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
5/3	--	Wood pole H-frame	--	NR	X	X
5/4	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
5/5	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
5/6	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
5/7	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
5/8	--	Wood pole H-frame	--	NR	X	X
5/9	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
5/10	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
5/11	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
6/1	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
6/2	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
6/3	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
6/4	--	Wood pole H-frame	--	NR	X	X
6/5	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
6/6	--	Wood pole H-frame	--	NR	X	X
6/7	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
6/8	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
6/9	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
6/10	--	Wood pole H-frame	--	NR	X	X
6/11	--	Wood pole H-frame	--	NR	X	X
7/1	--	Wood pole H-frame	Steel monopole	Replacement of full structure	X	X
7/2	--	Wood pole H-frame	--	NR	X	X
7/3	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
7/4	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
7/5	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
7/6	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
7/7	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
7/8	--	Wood pole H-frame	--	NR	X	X
7/9	--	Wood pole H-frame	--	NR	X	X
7/10	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
7/11	--	Wood pole H-frame	--	NR	X	X
7/12	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
8/1	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
8/2	--	Wood pole H-frame	--	NR	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
8/3	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
8/4	--	Wood pole H-frame	--	NR	X	X
8/5	--	Wood pole H-frame	--	NR	X	X
8/6	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
8/7	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
8/8	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
8/9	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
8/10	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
8/11	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
8/12	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
9/1	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
9/2	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
9/3	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
9/4	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
9/5	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
9/6	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
9/7	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
9/8	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
9/9	--	Wood pole H-frame	--	NR	X	X
9/10	--	Wood pole H-frame	--	NR	X	X
9/11	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
10/1	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
10/2	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
10/3	--	Wood pole H-frame	--	NR	X	X
10/4	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
10/5	--	Wood pole H-frame	--	NR	X	X
10/6	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
10/7	--	Wood pole H-frame	--	NR	X	X
10/8	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
10/9	--	Wood pole H-frame	--	NR	X	X
10/10	--	Wood pole H-frame	--	NR	X	X
10/11	--	Wood pole H-frame	--	NR	X	X
10/12	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
10/13	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
11/1	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
11/2	--	Wood pole H-frame	--	NR	X	X
11/3	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
11/4	--	Wood pole H-frame	--	Replacement of 1 pole	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
11/5	--	Wood pole H-frame	--	NR	X	X
11/6	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
11/7	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
11/8	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
11/9	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
11/10	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
11/11	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
12/1	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
12/2	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
12/3	--	Wood pole H-frame	--	Replacement of 1 pole	X	X
12/4	--	Wood pole H-frame	--	NR	X	X
12/5	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
12/6	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
12/7	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
12/8	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
12/9	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
12/10	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
12/11	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
12/12	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
13/1	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
13/2	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
13/3	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
13/4	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
13/5	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
13/6	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
13/7	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
13/8	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
14/1	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
14/2	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
14/3	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
14/4	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
14/5	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
14/6	Retired	Steel lattice H-frame	Retire	Retire	X	X
14/7	14/6	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
15/1	Retired	Steel lattice H-frame	Retire	Retire	X	X
15/2	15/1	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
15/3	15/2	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
15/4	Retired	Steel lattice H-frame	Retire	Retire	X	X
15/5	15/3	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
15/6	Retired	Steel lattice H-frame	Retire	Retire	X	X
15/7	Retired	Steel lattice H-frame	Retire	Retire	X	X
15/8	15/4	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
15/9	Retired	Steel lattice H-frame	Retire	Retire	X	X
16/1	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
16/2	Retired	Steel lattice H-frame	Retire	Retire	X	X
16/3	16/2	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
16/4	16/3	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
16/5	Retired	Steel lattice H-frame	Retire	Retire	X	X
16/6	16/4	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
17/1	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
17/2	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
17/3	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
17/4	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	X
17/5	--	Wood pole H-frame	--	Replacement of full structure (3 poles)	X	X
17/6	--	Wood pole H-frame	--	NR	X	
18/1	--	Wood pole H-frame	--	NR	X	
18/2	--	Wood pole H-frame	--	NR	X	
18/3	--	Wood pole H-frame	--	NR	X	
18/4	--	Wood pole H-frame	--	NR	X	
18/5	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	
18/6	Retired	Steel lattice H-frame	Retire	Retire	X	
18/7	18/6	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	
19/1	--	Wood pole H-frame	--	NR	X	X
19/2	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
19/3	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
19/4	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
19/5	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
19/6	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
19/7	--	Steel lattice H-frame	Steel monopole	Replacement of full structure	X	X
19/8	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	X
19/9	--	Steel lattice H-frame	Wood 2 pole H-frame	Replacement of full structure	X	X
19/10	--	Steel lattice H-frame	Wood 3 pole H-frame	Replacement of full structure	X	
19/11	--	Wood pole H-frame	--	NR	X	
19/12	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	
20/1	--	Wood pole H-frame	--	Replacement of 1 pole	X	
20/2	--	Wood pole H-frame	--	NR	X	
20/3	--	Wood pole H-frame	--	NR	X	
20/4	--	Wood pole H-frame	--	NR	X	
20/5	--	Wood pole H-frame	--	NR	X	
20/6	--	Wood pole H-frame	--	NR	X	
20/7	--	Wood pole H-frame	--	NR	X	
21/1	--	Wood pole H-frame	--	NR	X	
21/2	--	Wood pole H-frame	--	NR	X	
21/3	--	Wood pole H-frame	--	NR	X	
21/4	--	Wood pole H-frame	--	NR	X	
21/5	--	Wood pole H-frame	--	Replacement of 1 pole	X	
21/6	--	Wood pole H-frame	--	Replacement of 1 pole	X	

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
21/7	--	Wood pole H-frame	--	NR	X	
22/1	--	Wood pole H-frame	--	NR	X	
22/2	--	Wood pole H-frame	--	NR	X	
22/3	--	Wood pole H-frame	--	NR	X	
22/4	--	Wood pole H-frame	--	NR	X	
22/5	--	Wood pole H-frame	--	NR	X	
22/6	--	Wood pole H-frame	--	NR	X	
22/7	--	Wood pole H-frame	--	NR	X	
22/8	--	Wood pole H-frame	--	NR	X	
22/9	--	Wood pole H-frame	--	NR	X	
22/10	--	Wood pole H-frame	--	NR	X	
22/11	--	Wood pole H-frame	--	NR	X	
22/12	--	Wood pole H-frame	--	NR	X	
23/1	--	Wood pole H-frame	--	NR	X	
23/2	--	Wood pole H-frame	--	NR	X	
23/3	--	Wood pole H-frame	--	NR	X	
23/4	--	Wood pole H-frame	--	NR	X	
23/5	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	
23/6	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	
23/7	--	Wood pole H-frame	--	NR	X	
23/8	--	Wood pole H-frame	--	Replacement of 1 pole	X	
23/9	--	Wood pole H-frame	--	NR	X	

Table 2.1-1. Structure Activities under the Proposed Action

Pre-Project Structure Number	Post-Project Structure Number	Pre-Project Structure Type	Post-Project Structure Type	Structure Rebuild or Replacement Activity	Hardware Replacement	Conductor Replacement
23/10	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	
23/11	--	Wood pole H-frame	--	NR	X	
23/12	--	Wood pole H-frame	--	NR	X	
24/1	--	Wood pole H-frame	--	NR	X	
24/2	--	Wood pole H-frame	--	NR	X	
24/3	--	Wood pole H-frame	--	Replacement of full structure (2 poles)	X	

-- = No change in structure number or type.

NR = No portion of the structure would be rebuilt or replaced.

Table 2.1-2. Access Road and Vegetation Activities under the Proposed Action

Proposed Action Component	Quantity
Access Road Activities[1,2]	
Total length of access road activities	
Extension (miles)	Option 1: 0.2 Option 2: 0.1 Option 3: 0.1
Reconstruction (miles)	Option 1: 0.5 Option 2: 0.5 Option 3: 0.2
Improvement (miles)	22.6
Direction of Travel (miles)	6.2
Total length of trail activities	
Extension (miles)	0.3
Reconstruction (miles)	1.0
Improvement (miles)	1.0
Direction of Travel (miles)	4.9
Gates (replacements and new)	17
Pedestrian Bridges (new)	2
Vehicle Bridges (Temporary)	1
Cross-Drain Culverts (new)	2
Fords (new or repair)	6
Vegetation Removal	
Removal or disturbance of low-growing vegetation within the transmission line right-of-way (acres)	0.3 (permanent) 42.4 (temporary)
Removal of trees along access roads	66
Removal of danger trees adjacent to the transmission line right-of-way	211
Removal of trees under Cascade Locks Tap line	7
Removal of trees within pulling/tensioning work areas[3]	96

Notes:
1 Where only one value is shown, quantity is the same for all Line Mile 19 options. Where quantities differ by option, the value for each Line Mile 19 options is shown.
2 Access road activities would occur between structure 1/4 and the Hood River Substation.
3 Conservative estimate based on a 200-foot by 200-foot pulling/tensioning work area. Tree clearing in these areas are expected to be less than the number depicted.

2.1.3 Replacement of Transmission Structures

Bonneville-Hood River Line

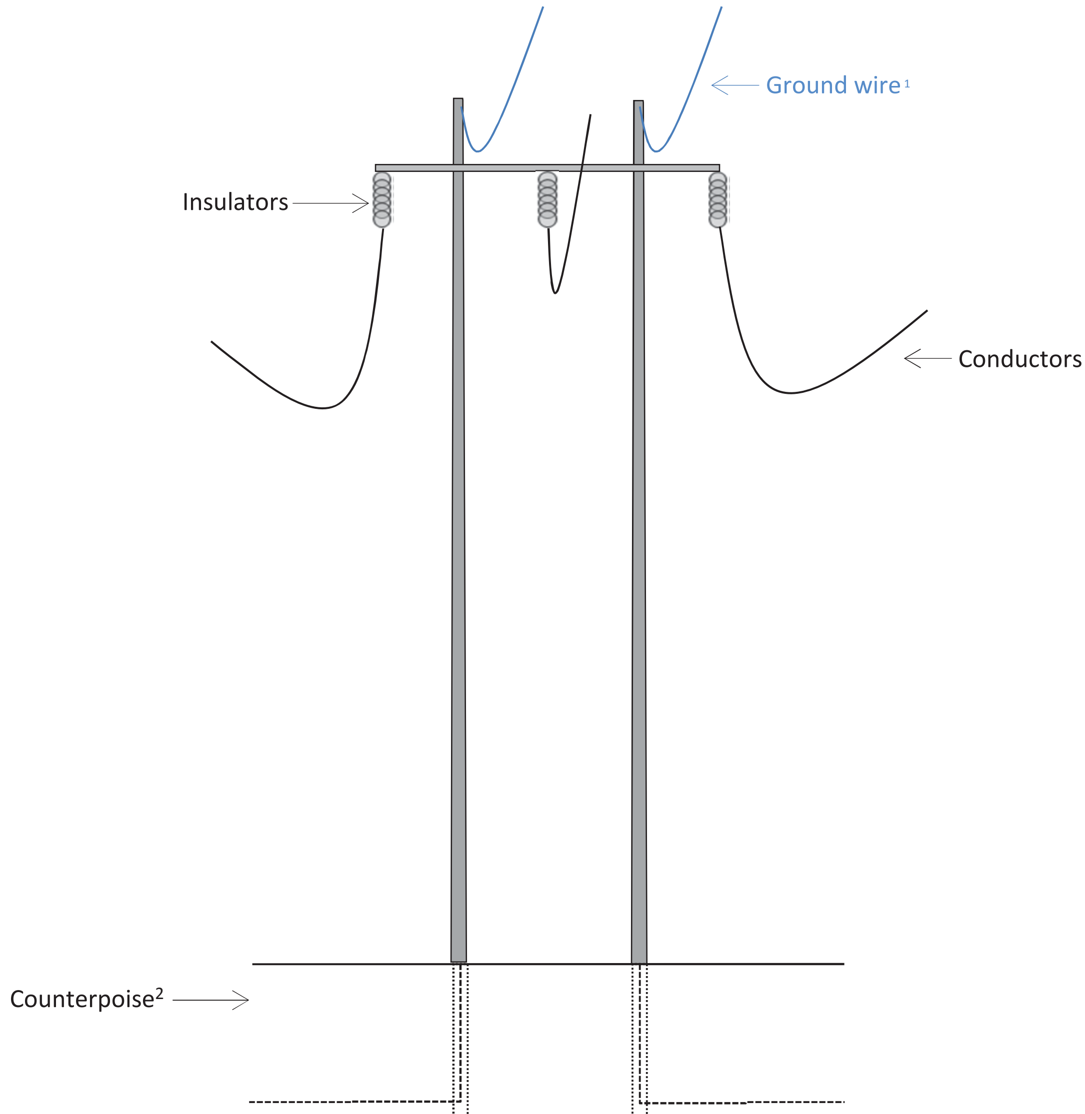
Many (105) of the existing wood and steel H-frame structures would be fully replaced under the Proposed Action (Table 2.1-1). Depending on site access, the existing structures would be replaced either with a new wood, H-frame structure or, for those locations with limited access, a steel monopole structure (Figures 2.1-4, 2.1-5, 2.1-6a and 2.1-6b). At 32 additional existing wood, H-frame structures, one pole would be replaced; the entire structure would not be rebuilt. Nine existing steel, lattice, H-frame structures would be removed and retired. Spans between individual structures would range from about 300 feet up to 2,000 feet.

In locations with vehicle access, wood-pole structures would be used. Two-pole wood structures would be used where the structures are in a straight alignment or where turning angles are small (less than 6 degrees). Two-pole wood structures are the lightest structures because they do not have to withstand the stresses created by angles in the conductors. The three-pole wood structures would be used as suspension structures and as dead end structures. The three-pole dead end structures are stronger than three- and two-pole suspension structures and are placed at intervals along the line to independently hold the weight and tension of the conductors.

The steel monopole structures require less maintenance and would be used where vehicle access is limited. The steel monopoles would be designed to require little maintenance and to also independently hold the weight and tension of the conductors.

BPA would replace steel-lattice and wood-pole H-frame structures in nearly the same locations. Three structures are proposed to be moved more than 20 feet from their current location. Like most wood poles used for utility or telephone lines, the new wood poles would be treated with a preservative called pentachlorophenol (PCP) to lessen wood rot and extend the life of the poles. Use of PCP complies with American Wood Protection Association's standards and is considered to be the industry standard. The height of the new wood structures would be similar to the existing structures in most cases, ranging from 50 to 90 feet above ground depending on terrain, requirements for road crossings, and the distance between the top of vegetation and the conductor. Steel monopole structures would typically range from 70- to 95-feet above ground, depending on terrain and vegetation. Proposed structure heights in some locations would be increased by about 5 to 15 feet to meet NESC clearance requirements.

Wood structures would generally be placed in the holes of the existing wood poles, which would be cleaned-out and re-augured an additional 2 feet deeper to a total depth of 7 to 12 feet. Excess soils excavated from existing wood-pole holes may contain wood preservatives and would be properly handled, removed, characterized, transported, and disposed of according to all applicable regulations at a permitted facility that accepts these materials. In locations where wood structures would be replacing steel lattice structures, new holes would be required. If the existing hole could not be reused or the existing structure cannot be removed, then the new structure would be located as close to the existing hole as feasible. In those locations where the existing structure cannot be removed, the poles would be cut several feet below grade and then covered with soil and revegetated. If possible, pole locations may be changed slightly to avoid or minimize disturbance to sensitive resources, such as sensitive plants, that are identified in the right-of-way. Blasting could be required in some locations where bedrock is present. Blasting would not occur, if possible, near sensitive cultural or biological features.

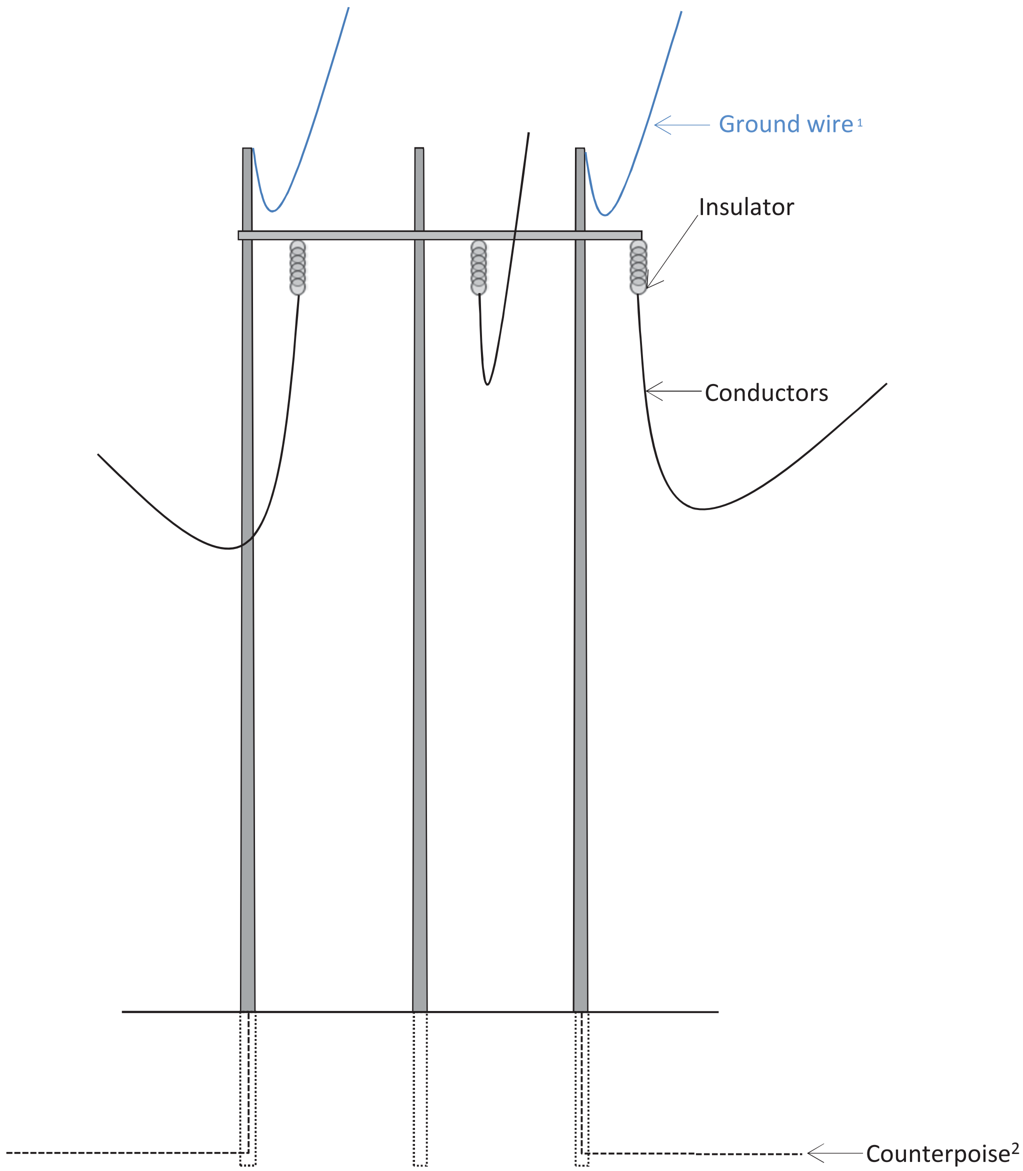


Existing Average
Height:
50 – 95 feet
Proposed Average Height:
65 feet
Proposed Height Range:
50 – 95 feet

Notes:

1. Ground wire is installed approximately 0.5 mile from the Hood River Substation. Ground wire replacement is not proposed for the project.
2. Counterpoise is installed at structures where ground wire is present. Counterpoise replacement is not proposed for the project.

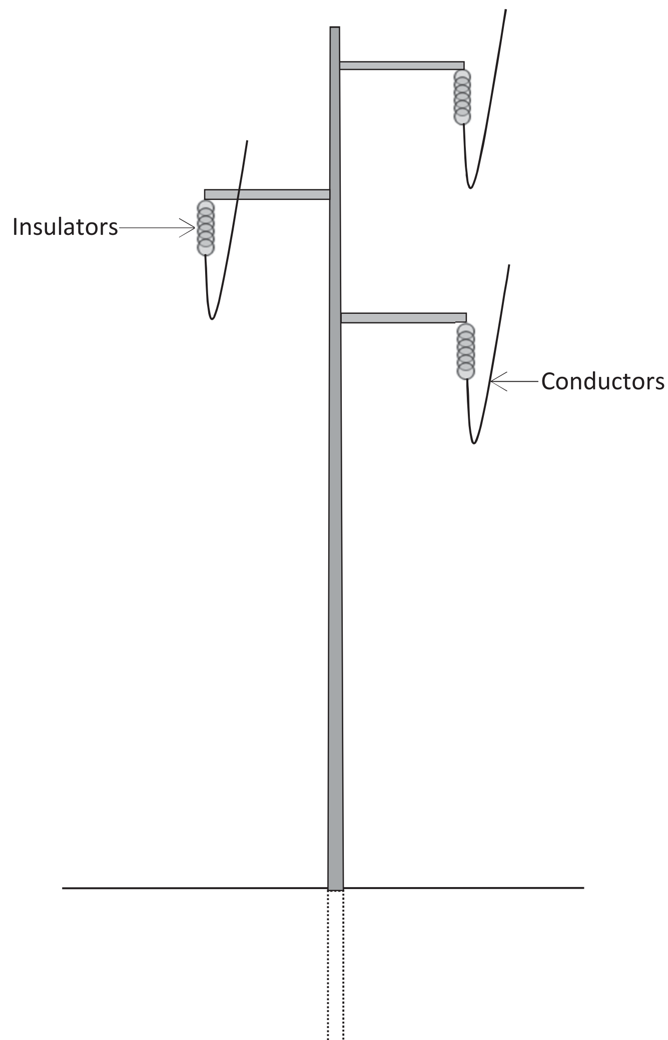
Figure 2.1-4. Proposed Two- Pole Wood Suspension Structure



Existing Average
Height:
50 – 95 feet
Proposed Average Height:
68 feet
Proposed Height Range:
50 – 90 feet

Notes:
1. Ground wire is installed approximately 0.5 mile from the Hood River Substation. Ground wire replacement is not proposed for the project.
2. Counterpoise is installed at structures where ground wire is present. Counterpoise replacement is not proposed for the project.

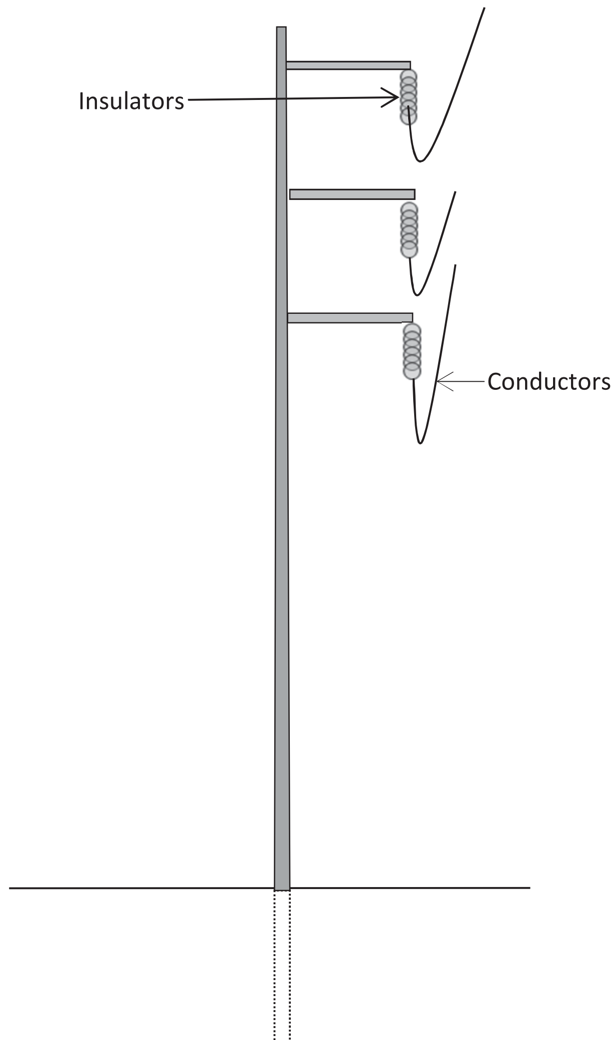
Figure 2.1-5. Proposed Three-Pole Wood Structure



Proposed Average Height:
75 feet
Proposed Height Range:
60 – 105 feet

Notes:
1. Approximately half of the steel monopole structures would have an alternating side arm configuration.

Figure 2.1-6a. Proposed Steel Monopole Structure Alternating Side Arm Configuration



Proposed Average Height:
75 feet
Proposed Height Range:
60 – 105 feet

Notes:
1. Approximately half of the steel monopole structures would have an non-alternating side arm configuration.

Figure 2.1-6b. Proposed Steel Monopole Structure Non-Alternating Side Arm Configuration

Steel monopoles would also be generally located in a similar location as existing structures and would be directly embedded in the ground or would have micropile foundations, depending on site conditions and access. The existing structures and any underground portions would be removed for either installation method. For those steel monopole structures requiring micropile foundations, the micropiles are drilled holes about 5 to 9 inches in diameter and about 5 feet to 50 feet deep, depending on underlying geology and soil types, that are filled with grout, rebar, and cement. Each steel monopole would require about six to eight micropiles secured with a steel or concrete pile cap. Because the steel pole micropile foundations would be used in steep terrain with limited work space, a mobile work surface would be temporarily anchored to the steep hillside to create a flat, stable area from which the drill could be placed and construction could occur (Figure 2.1-7). The steel monopole structures would then be flown in via helicopter and secured to the pile cap. Micropile foundations and steel monopoles installation would take about 4 to 5 days for each structure; multiple structures could be installed simultaneously in an area. For those steel monopole structures that would be directly embedded, installation would generally occur in or near the existing structure locations but would require new holes to be augured to a depth of 8 to 12 feet.

Figure 2.1-7. Example of Temporary Mobile Work Surfaces and Micropile Drill Rig

Some of the existing structures currently have guy wires. Guy wires attach at various points along the structure and are anchored on the ground to lend stability to structures subject to stress. Where guy wires require replacement, the old guy wires would be cut off and the guy anchors would be dug out or remain buried in place if full removal were not practical. As much as practical, BPA would install replacement guy wires and anchors in the same location as they currently exist. Guy wire anchors would be either plate anchors or rock anchors, depending on site conditions and underlying geology. The new guy wire plate anchors would be set in crushed rock about 10 feet deep, and the remainder of the hole would be backfilled. Rock anchors would consist of a drilled, angled casing approximately 6 to 8 inches in diameter that is filled with steel bars and grout. For those new structures not requiring guy wire replacement, the old guy wires would be cut off and dug out about 2 feet below ground surface. The old anchors would be covered with soil and left in place.

Typical structure and pole replacement activities would disturb an area about 100 feet by 100 feet (0.2 acre). For specific circumstances, the disturbance area could be reduced to a 50-foot by 50-foot area to minimize impacts on sensitive resources, such as wetlands, sensitive plants, or sensitive wildlife habitat.

Nine existing steel, H-frame structures would be retired and removed in locations with no vehicle access. In these locations, the structure footings and guy wires would be excavated and removed via helicopter. Depending on type and access, guy anchors would be removed or the soil would be excavated several feet and the guy wires would be cut or disconnected from the anchor. The entire removal area would be recontoured and revegetated in a manner consistent with surrounding conditions. In those locations where structures would be removed, a work area of about 50 feet by 50 feet would be used.

Cascade Locks Tap

To rebuild the Cascade Locks Tap line, structure 7/1 of the Bonneville-Hood River transmission line would be relocated about 75 feet north in the existing right-of-way and rebuilt as a new steel monopole (see Figure 2.1-3). The existing switches for the Cascade Locks Tap that are located back and ahead of existing structure 7/1 of the Bonneville-Hood River line would remain and connect to the new 7/1 monopole structure. The two existing Cascade Lock Tap structures located in the Bonneville-Hood River line right-of-way would be retired and removed. All structure replacement work for the Cascade Locks Tap line would be located where the tap line right-of-way overlaps with the Bonneville-Hood River line right-of-way. The tap line would then be reconductored between the new monopole structure and the Cascade Locks Substation, which is a total distance of about 400 feet.

2.1.4 Conductors, Overhead Ground Wire, and Hardware

Conductors are the wires on the structures that carry the electrical ***current***. The transmission line carries three conductors. The new conductors would be installed with new hardware and ***insulators***, which are bell-shaped devices that prevent electricity from arcing from the conductors to the structures and traveling to the ground. The existing conductors have a diameter of 0.735 inch; the proposed conductors would be less than an eighth of an inch larger, with a diameter of 0.835 inch. This larger conductor also would be heavier, which could increase the sag (and swing) in the line, particularly under warmer conditions. For safety reasons, the NESC has established minimum conductor heights. BPA designs the conductors to be a minimum 24 feet above ground, which exceeds NESC's minimum conductor height for 115-kV construction. Additional clearance would be provided over roadway and river crossings.

Conductor, hardware, and insulators would be removed and replaced from 1/6 to 17/5 and 19/1 to 19/9 (Table 2.1-1). The new conductor would be reattached to structure 1/5 with new hardware and insulators. Twenty-six structures in these spans are not proposed to be rebuilt or have a pole replaced. In those locations where the conductor, insulators, and hardware would be replaced with no accompanying structure replacement, a 50-foot by 50-foot temporary work area would be accessed to facilitate stringing and hardware and insulator change out.

At those structures not requiring structural work nor conductor replacement, hardware and insulator replacement would still occur. Hardware and insulator replacement with no accompanying structural or conductor replacement would occur at 41 structures between line mile 17 and the Hood River Substation (Table 2.1-1). To facilitate hardware and insulator replacement, the conductor would be temporarily removed from the structure, the hardware and insulators would be replaced and the conductor would be reattached. In total, a 50-foot by 50-foot work area would be used temporarily.

2.1.5 Temporary Guard Structures, Staging Areas, and Tensioning Sites

Guard structures are temporary wood-pole structures with cross arms placed on either side of a facility (distribution lines, roads, railroad crossings) to catch conductors or ground wire in the unlikely event that the conductors/wires fall while being removed or installed. Guard structures would be installed during construction and removed after the conductor is strung.

About two or three temporary staging areas would be needed to store and stockpile materials, trucks, and other equipment during construction. Also, some staging areas would be required for helicopters to land and pick up materials to transport to portions of the project right-of-way that are inaccessible to ground-based vehicles. Generally, the staging areas would occupy about 30 acres each, although the staging area size would be based on the area needed to accommodate stored materials and vehicles (trucks and helicopters) used to transport the materials. These staging areas would be within about five to ten miles of the transmission line on existing flat paved, graveled, or cleared lots. Staging areas would be identified by the construction contractor prior to construction, and BPA would conduct the appropriate environmental review and approval of the identified sites.

Tensioning sites are used for pulling and tightening the conductor to the correct tension once they are mounted on the transmission structures. Tensioning sites would be located within the right-of-way where possible or, in rare cases, just outside of the right-of-way where the line would make a sharp turn or angle. For the purposes of this analysis, a conservative estimate of 0.9 acre (200 feet by 200 feet) was used to calculate temporary disturbance impacts for these areas, although typically only a 30-foot by 100-foot area would be disturbed. The sites would be oriented within the 0.9-acre areas to minimize potential vegetation clearing and impacts to sensitive resources as much as practical. The Proposed Action would require pulling and tensioning at up to 14 structure locations. Six of the 14 potential pulling and tensioning sites could be partially located outside of the existing right-of-way.

2.1.6 Access Roads and Foot Trails

BPA currently uses a combination of existing roads and foot trails to access the transmission line. BPA uses primarily multi-use roads (e.g., an interstate highway, residential access, country roads, or Forest Service roads) to access the general vicinity of the transmission line. These roads are used by BPA to access BPA's existing access road system that provides for direct access to transmission line structures, BPA holds permits and access road and foot trail easements for access across public and private land. Through these permits and easements, BPA has previously constructed roads and foot trails to access the transmission line. These access roads and foot trails are primarily located within the transmission line right-of-way, but there are also some access roads and foot trails located outside the right-of-way where required due to terrain constraints or other factors.

In a few locations, BPA currently does not have express easement rights to use some existing roads or foot trails that provide access to the transmission line. At these locations, BPA would acquire about 4.4 miles of easement rights to use various sections of the existing roads and trails. Generally, BPA obtains a 50-foot-wide easement for access road rights and 20-foot-wide easements for foot trails.

BPA's existing access roads for the line are typically 14 feet wide with an additional 3-foot offset from each side for slopes or drainage ditches, resulting in a total disturbance width of about 20 feet. Access road reconstruction and improvement activities associated with the Proposed Action would occur within this prism, except in areas with curves or on steep slopes where work would occur outside of this prism because of necessary cut and fill. In areas with identified sensitive resources, such as wetlands or sensitive habitat, access road widths would be reduced to 12 feet and the offsets on either side would be reduced to 2 feet, for a total area of disturbance of 16 feet to minimize temporary and permanent impacts.

Trail reconstruction or extension activities would result in a typical trail bed width of 18 inches that would require a total clearing area of 2 to 4 feet. For trails crossing steep ***talus*** areas, such as Shellrock Mountain, trail bed widths may be as small as 12 inches due terrain constraints. To provide trail stability in these steep areas, sideboards would be installed with rebar or rocks would be keyed into the hill. On talus slopes, the trail bed would be comprised of compacted course surface material. In non-talus areas, the trail bed would be at grade and would consist of native material. All trail work areas would be accessed by foot and trail improvement, reconstruction, or extension work would be conducted with hand held equipment.

As summarized in Table 2.1-2, the following categories of access road work would be completed for the Proposed Action:

- **Extensions**— Access road extensions would be constructed in certain areas to either connect existing access roads to a structure or to connect segments of existing roads together. The extensions would involve clearing vegetation, grading and developing the road prism, and gravelling. Up to eleven road extensions would be constructed, ranging in length from about 75 to 300 feet. Altogether, the total length of all road extensions would be 0.1 to 0.2 miles, depending on Line Mile 19 design option (see Section 2.2, *Line Mile 19 Options*).
- **Reconstruction**— Access road reconstruction would occur where existing access roads have deteriorated to the point of being unusable by construction equipment. Similar to extensions, road reconstruction would involve vegetation removal, road prism reconstruction, grading, widening to pre-existing conditions, and gravelling. Road reconstruction would occur at up to eleven locations, each ranging in length from about 130 to 465 feet. In addition, an access road retaining walls would be constructed near structure 3/4 of the line and, for line mile 19 Options 1 and 2 (see Section 2.2), in between structures 19/4 and 19/7. These retaining walls would be constructed to provide slope stability and prevent erosion because the access roads at these locations would be located on unstable terrain from steep topography and high erosion probability. The retaining walls would have a maximum exposed height of approximately 10 feet. The retaining wall near structure 3/4 would include a 50-foot-long rockery wall behind the access road and a 90-foot-long mechanically stabilized earth (MSE) wall on the front side of the road. Retaining walls under Line Mile 19 Options 1 and 2 are described in Section 2.2. Altogether, a total of 0.1 to 0.5 miles of roads would be reconstructed, depending on Line Mile 19 option (see Section 2.2, *Line Mile 19 Options*).

- **Improvements**— Road improvements would involve minor adjustments (e.g., cleaning, widening to pre-existing conditions, or gravelling) to existing access roads that provide access to the line. A total of about 22.6 miles of existing access roads would be improved.

In addition to this access road work, a total of 6.2 miles of ***direction of travel*** access roads– existing access roads or routes that do not require improvements – would also be used for construction activities regardless of which design option is chosen. This category includes routes to structures in the middle of farm fields where no permanent access is developed. Trucks and crews would access the structures by driving over the unimproved field surface. If the field is too wet to drive construction vehicles, it is possible that temporary roads would need to be installed along a travel route. Temporary roads would be installed with removable wetland mats or by laying geotextile fabric and topping with gravel. The temporary road would be removed following construction, and the land would be restored to preconstruction conditions.

Some structures are inaccessible by access roads; therefore, foot trails would be used to access the sites (Figure 2.1-8). For foot trails, the following categories of work would be completed (see Table 2.1-1):

- **Extensions**— As with the road extensions, trail extensions would be constructed to either connect existing trails to a structure or to connect segments of existing trails together. Trail extensions would entail vegetation clearing where needed and the establishment of a trail bed. Trail extensions would be constructed at 20 locations spread over the length of the line and would each range from 5 feet to 300 feet in length. Altogether, a total of about 0.3 mile of trail extensions would be constructed.
- **Reconstruction**—Trail reconstruction would occur where the existing trails deteriorated to the point of being unusable or unsafe. Surface improvements such as stairways, ladders, and adjacent vegetation trimming would be conducted to make their use safe during construction. Trail reconstruction would occur at 40 locations, each ranging in length from about 5 to 515 feet. Altogether, a total of about 1.0 miles of existing trails would be reconstructed.
- **Improvements**— Trail improvements would involve minor adjustments, such as surface smoothing, of existing trails that provide access to the line. A total of about 1.0 miles of existing trails would be improved.

In addition to this trail work, a total of 4.9 miles of direction of travel trails – existing trails that do not require improvements – would also be used for construction activities.

All trail work would be conducted by hand and would not involve vehicles accessing the work areas.

Figure 2.1-8. Photo of Existing Foot Trail to Structure Site

2.1.7 Gates, Bridges, Fords, and Culverts

Other access road improvements would include the installation of or improvements to 17 gates at the entrances to access roads to prevent public access to the transmission line right-of-way. Gate locks would be coordinated with appropriate landowners to ensure that both BPA and the landowner can unlock them.

In addition, two new trail bridges would be constructed and five new fords, one replacement ford, and two new culverts would be installed. The new trail bridges would be wood suspension structures that span from bank to bank outside of the stream channels being crossed. Trail bridge designs would conform to Oregon State Parks design standards. All bridge footings would be placed outside of the stream channel. Fords would consist of a hardened surface (rock) buried below the natural stream substrate with stream simulation materials placed at grade. Reconstructed fords would be a similar width as currently present. At one of the ford locations, a temporary bridge would be installed to limit the impacts to the stream from construction vehicles crossing the waterbody. After construction, the bridge would be removed and the ford would remain to facilitate structure access during line operation and maintenance. Two new culverts for access roads would be installed and two existing culverts would be repaired or cleaned.

2.1.8 Vegetation Removal

Trees and vegetation would be removed to facilitate project construction and to ensure the safe operation of the line. Grasses, shrubs, saplings, mature trees, and agricultural trees would be disturbed or cleared in areas subject to ground-disturbing activities, or crushed or cut in areas used for vehicle travel and staging. Approximately 71 acres of vegetation in these areas would be crushed, removed, or cut for rebuild activities. Up to 380 trees would be cut for construction equipment access, pulling and tensioning, changes in conductor alignment for the Cascade Locks Tap, or as ***danger trees***.

About 66 trees would be removed for road construction, existing road widening, or to provide sufficient clearance for construction equipment. BPA would remove these trees so that long construction vehicles, such as trucks with trailers carrying the wood poles for the structures, could navigate turns along the access road system. An additional seven trees would be removed to accommodate the change in conductor alignment at the Cascade Locks Tap.

Danger trees are trees located outside of the transmission line right-of-way that have the potential to fall or grow into or grow too close to the conductor and cause ***flash-overs***, failures, and line outages. Routine vegetation management activities have recently removed danger trees along the transmission line right-of-way. However, 211 additional danger trees have been identified that require removal. Danger trees would be disposed of in accordance with landowner preference. Trees would also need to be removed from the potential tensioning sites, depending on the site location (within the corridor or off) and orientation.

Although the dimensions and locations of pulling and tensioning sites would be determined by the construction contractor based on site-specific needs, it is estimated that a maximum of about 96 trees may need to be removed. There would be pulling and tensioning sites at up to 14 structure locations.

All areas disturbed by tree clearing along access roads and pulling and tensioning sites would be reseeded following construction, and trees within the tensioning sites outside of the right-of-way would be allowed to regrow.

2.1.9 Construction Activities

A typical construction crew for a rebuild project consists of 20 to 50 people, including transmission line and road construction workers, inspectors and administrative personnel, surveyors, and other support personnel.

In locations accessible to vehicles, one bucket truck, one excavator, two cranes, and one dump truck would typically be working at the site. While work is being done on access roads, any combination of dump trucks, rollers, graders, bulldozers, and excavators would be at the site. Structures replaced in locations that are not accessible via access roads would require temporary platforms, portable drill rigs, helicopters to transport materials, and helicopters for conductor stringing.

Where structures or a pole would be replaced, existing conductors, insulators, and attachment hardware would be removed and/or replaced after structure work is completed. The conductor would be strung using either helicopters or bucket trucks.

In those locations where conductor, hardware, and insulators would be replaced with no structure modifications, the workspace would be accessed about three to four times via foot and bucket truck to replace the hardware and insulators and to string the conductor.

In locations where only hardware and insulators would be replaced, the conductors would be supported mid-air by a bucket truck or crane to detach the hardware and insulators and replace them. The conductor would be reattached once the hardware and insulators are replaced. Hardware and insulator replacement activities would require each structure to be accessed one time. Depending on site conditions, up to 0.5 mile per day of insulators and hardware could be replaced.

In those areas where structures would not be replaced in the same location (i.e., structures relocated or retired), structure removal would involve removing the conductor and then excavating around the structure base and either cutting the pole below ground level or fully removing the pole and footings. Pole removal methods would be determined based on site-specific conditions. Full removal of existing structures would use a helicopter to pull the structures out of the ground and transport the poles to an offsite storage area. For those structures containing guy wires, guy wires and anchors would either be fully removed or cut slightly below the ground.

The removed poles, insulators, and hardware would be trucked or flown off site for recycling or disposal at an appropriate facility. Prior to and concurrent with pole replacement, access road construction and other improvements would be implemented.

2.1.10 Transmission Line Outages

To facilitate work that would affect the ability of the transmission line to transmit power, multiple ***outages*** would be required to temporarily take the transmission lines out of service. Two outages for separate portions of the Bonneville-Hood River transmission line would be coordinated with regional entities to ensure that the outages would not disrupt power delivery or generation over the regional electric system.

The city of Cascade Locks is served by the Cascade Locks Tap, which is a ***radial line*** (i.e., power is delivered at one end only via a single line coming from the electrical system). Any outage to the Cascades Locks Tap line would result in a power outage in the city of Cascade Locks. Because work on the line would result in a power outage, BPA would plan work on the tap so that the outages would occur in the early morning (i.e., starting at midnight). BPA anticipates that work on the Cascade Locks Tap would require approximately two midnight outages for the new monopole and to replace conductor. BPA would communicate and coordinate the planned outages with the city (which is the local electricity provider).

Construction timing (see Section 2.1.11, *Anticipated Construction Schedule*) would take into account outage timing and species-specific seasonal restrictions (such as nesting birds).

2.1.11 Anticipated Construction Schedule

The schedule for construction of the Proposed Action depends on the completion and outcome of the environmental review process, including the duration of regulatory agency reviews and timing of permit approvals. If the Proposed Action is implemented, construction would begin as early as spring 2017. Access road work would likely be conducted first with structure work being conducted afterwards. Construction work would be done in phases, with construction occurring on more than one structure at a time in different parts of the transmission line right-of-way. Line construction would occur over two or three construction seasons (late spring to early fall 2018, 2019 and/or 2020; about seven months each season).

2.1.12 Ongoing Maintenance and Vegetation Management

BPA conducts routine periodic inspections, maintenance, and vegetation management of the 15,000 circuit-mile federal transmission system in the Pacific Northwest. BPA has operated and maintained the Bonneville-Hood River transmission line since this line was built in the 1930s. This ongoing operation and maintenance would continue whether or not the Proposed Action was implemented. However, because the Proposed Action is essentially a major maintenance project and includes the replacement of worn parts of the existing transmission line and improvements to the access road and trail system, the need for future maintenance and repairs would be less frequent and on a smaller scale than currently required.

BPA conducts vegetation management along the Bonneville-Hood River transmission line right-of-way every three to five years to keep vegetation a safe distance from the conductor, maintain access to structures, and to control ***noxious weeds***. Vegetation management is guided by BPA's *Transmission System Vegetation Management Program Final Environmental Impact Statement/Record of Decision* (BPA 2000). Depending on the vegetation type, environment, and landowner, a number of different vegetation management methods could be used: manual (e.g., hand-pulling, clippers, chainsaws); mechanical (e.g., roller-choppers, brush-hog); or chemical (e.g., herbicides).

Vegetation management includes keeping tall vegetation and noxious weeds from growing within the transmission line right-of-way, as well as removing select danger trees adjacent to the right-of-way that have the potential to grow or fall into the line. Identifying danger trees includes determining tree height and growth potential, how the tree leans, stability and health (e.g., root pathogen damage), and whether they are located in areas with severe storm damage potential. Vegetation management was most recently conducted in the spring of 2014.

When line and road maintenance or vegetation management is required for a BPA transmission line, BPA conducts environmental review for those site-specific maintenance activities as appropriate.

2.2 Line Mile 19 Options

Three different design options are being considered as part of the Proposed Action within line mile 19. Differences in the design options would include access road configuration, structure type, and construction methods. This section describes each of the three options.

Line Mile 19 Option 1

Under Line Mile 19 Option 1, four steel monopoles would be directly embedded into the ground (i.e. the existing structure would be removed and the new hole would be augured to the appropriate depth into which the new pole would be placed) (see Section 2.1.3, *Replacement of Transmission Structures)*.

Under Line Mile 19 Option 1, BPA would reconstruct about 1,500 feet of the existing access road. Four landings would be constructed using a portion of the existing access road to allow a bucket truck to be staged in a manner that construction and future maintenance crews could access the structure arms, conductor, and hardware. The existing access road would be graded to provide a uniform slope between landings. Due to the steep topography in the area, several MSE retaining walls would be installed on the downslope side of the access road and landings. The MSE wall would use welded, ¼-inch-thick non-galvanized wire (that would rust) on a three- to four-inch square grid. On the upslope sides, soil nail walls would be used. The wall would have anchors drilled into the hillside on a five-inch square grid and a wire mesh would be installed as the facing. The mesh facing would be painted to match the background brown color. The MSE and soil nail walls would be up to 10 feet in height.

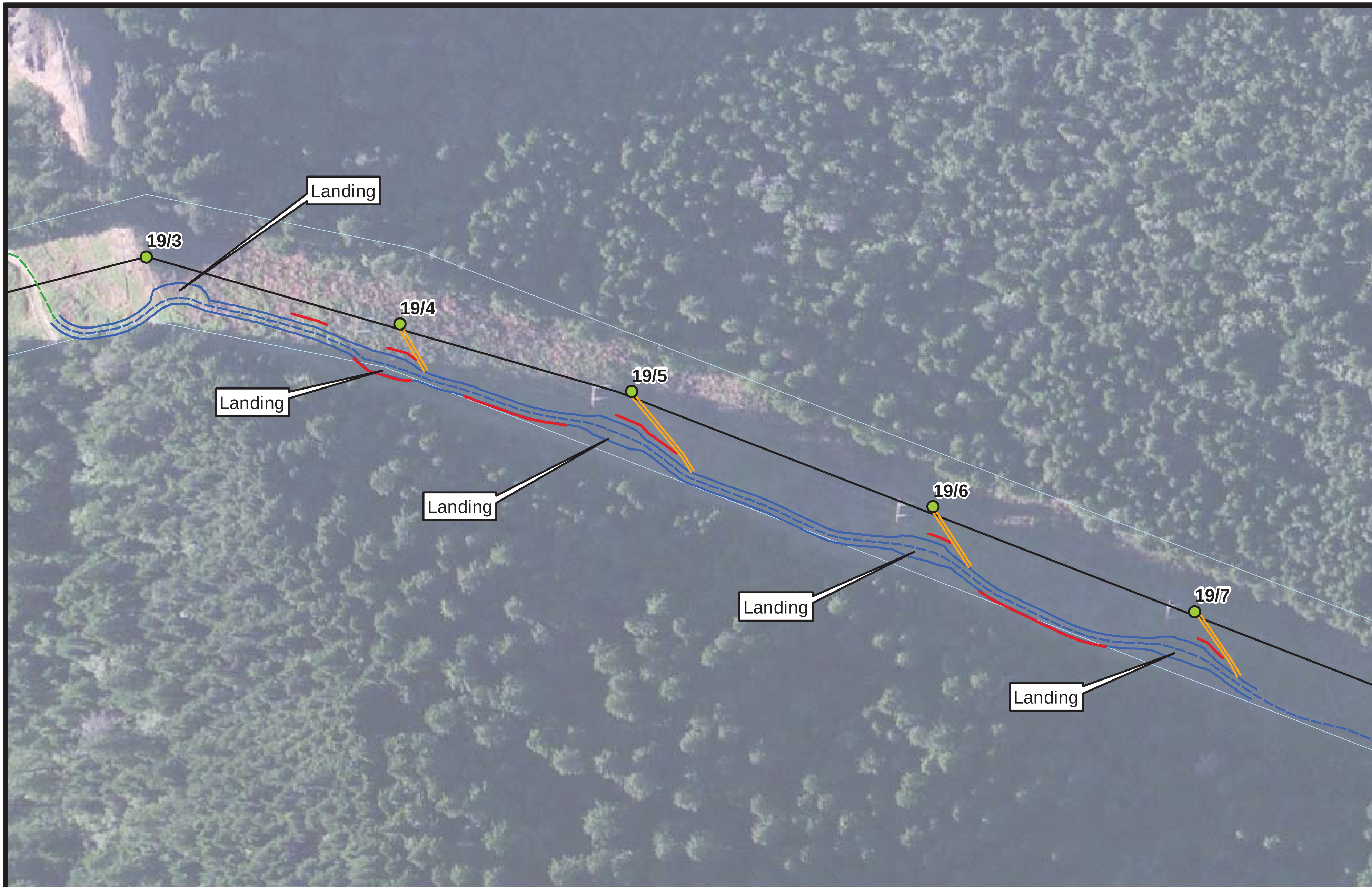
During structure installation, an excavator would travel from the access road to each structure creating a temporary equipment access path. A helicopter would deliver each structure, and the excavator, with the assistance of a bucket truck staged on the access road, would directly embed the structure. The disturbance caused by the excavator would remain after construction for future foot access to the structure. For the purposes of this analysis, it was assumed that the excavator trail would disturb approximately 14 feet during construction and about 6 feet would remain for foot traffic. No prism or ground work would be conducted in support of the excavator trail. Figure 2.2-1 shows the proposed access road and structure design for Line Mile 19 Option 1 between structures 19/4 and 19/7.

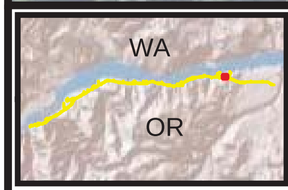
Line Mile 19 Option 2

Under Line Mile 19 Option 2, four steel monopoles would be installed with micropile foundations, which would not require an excavator to access the structure. The use of micropile foundations would require the temporary use of drilling platforms, and helicopters would be used to install and remove the drilling platforms and to deliver the steel structure (see Section 2.1.3, *Replacement of Transmission Structures*).The existing access road, including landings and retaining walls, would be reconstructed in a manner similar to that described under Line Mile 19 Option 1 above. The improvement of the access road would facilitate future maintenance of the arms, conductor, and hardware with vehicles and equipment staged on the access road. Figure 2.2-2 shows the proposed access road and structure design for Line Mile 19 Option 2 between structures 19/4 and 19/7.

Line Mile 19 Option 3

Under Line Mile 19 Option 3, BPA would install four steel monopole structures using micropile footings (see Section 2.1.3, *Replacement of Transmission Structures*). No access road improvements, reconstruction, retaining walls, or landing construction would occur. Therefore, helicopters would install and remove the drilling platforms and deliver the steel structures. Future maintenance could not occur using equipment and bucket trucks staged on the existing access road. Maintenance crews would only have foot access to the structures. Figure 2.2-3 shows the proposed access road and structure design for Line Mile 19 Option 3 between structures 19/4 and 19/7.





This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: November 23 2015

- Structure
- Transmission Line
- Right of Way
- Retaining Wall

Access Roads

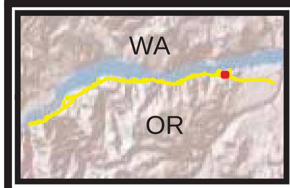
- Improvement
- Reconstruction
- Extension

0 200 400 Feet

Bonneville-Hood River Transmission Line Rebuild Project

Figure 2.2-1

Line Mile 19 - Option 1



This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: November 19 2015

Structure
Transmission Line
Right of Way
Retaining Wall

Access Roads

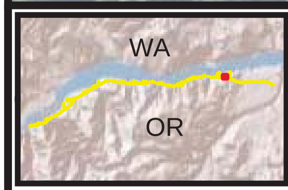
Improvement
Reconstruction

0 200 400 Feet

Bonneville-Hood River
Transmission Line Rebuild Project

Figure 2.2-2

Line Mile 19 - Option 2



Structure
Transmission Line
Right of Way

Access Roads

Improvement

Bonneville-Hood River Transmission Line Rebuild Project

Figure 2.2-3

Line Mile 19 - Option 3

0 200 400 Feet

2.3 No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line or upgrade access roads, trails, bridges, or fords, as a single coordinated project. The planned construction activities associated with the Proposed Action would not occur. However, the reliability and safety concerns that have prompted the need for the Proposed Action would remain. BPA would continue to operate and maintain the existing transmission line in its current condition, accessing and replacing aged and rotting structures as they deteriorate or on an emergency basis when they fail, maintaining access roads to allow access to structures on an as-needed basis, and managing vegetation for safe operation.

Given the current poor condition of the transmission line and its expected continued deterioration, the No Action Alternative would likely result in more frequent maintenance activities than required in the past. Depending on the season, location, and work required, it is possible that emergency repairs could be more disruptive and cause increased environmental impacts than planned maintenance work or rebuild activities. It might be possible to plan some of this maintenance, but some repairs would likely occur on an emergency basis as various parts of the transmission line continue to deteriorate. In addition, BPA may need to make access road and trail improvements and/or construct new access on an emergency basis under the No Action Alternative to allow access to the structures for unplanned or emergency maintenance activities.

2.4 Alternatives Considered but Eliminated from Detailed Study

During early planning meetings and scoping, the Columbia River Gorge Commission asked BPA to relocate the existing transmission line to be adjacent to I-84 or place it underground in certain areas to minimize visual impacts within the National Scenic Area. In addition to evaluating the feasibility of the two suggested alternatives, BPA also evaluated rerouting the transmission line outside of the National Scenic Area to the south. Lastly, BPA also considered additional design options for the access road work and structure placement in line mile 19.

2.4.1 Relocation to Interstate 84 Highway/Railroad Easement

BPA considered relocating the existing line off of the cliffs and down along I-84 and the adjacent railroad tracks. There is not sufficient room along the south side of I-84 without moving the line back onto the cliffs for most of the distance.

BPA also considered moving the line to the median area between I-84 and the railroad tracks. The distance between the interstate and the railroad varies in the project area, but the width is as little as 20 feet in some areas, which is insufficient width for this line. Placing the line within the interstate and railroad easements would be a violation of NESC and BPA design standards (BPA ST-DT-25, which is written to meet NESC), which identifies the minimum required clearances between transmission facilities and objects that can conduct electricity (such as vehicles, railroad tracks, and trains). Routing the line within the median between the interstate and the railroad would not provide enough physical space to meet these minimum required clearances and may result in unsafe, and potentially life-threatening, conditions.

As described in Section 2.1.3, *Replacement of Transmission Structures*, the installation of new structures would require a minimum of a 50-foot by 50-foot work area, so there would not be sufficient space for structure installation in the narrow median locations. Where a wider median is present, the railroad crosses portions of the Columbia River, resulting in much of the median space containing standing water. The presence of standing water would further prohibit sufficient construction space and could result in water quality impacts from nearby ground-disturbing activities associated with line construction. In addition, new bridges would be required to allow for BPA access to the new structures for maintenance.

BPA would also need to obtain rights from the Federal Highway Administration (FHWA) to use the interstate easement and to schedule traffic closures to build and maintain the line. In general, FHWA seeks to accommodate utility facilities within their rights-of-way, when such use and occupancy of the highway right-of-way do not adversely affect highway or traffic safety, or otherwise impair the highway, and do not conflict with the provisions of federal, state, or local laws or regulations (23 Code of Federal Regulations [CFR] 645 subpart B). The new transmission structures would create a new safety hazard for motorists, as described above, and would therefore not meet the FHWA requirements.

Because the route lacked a feasible safe right-of-way for the transmission line, did not have a viable way to create transmission line access roads, would not meet BPA and NESC safety standards, and would create safety concerns to the interstate, this alternative was eliminated from detailed study.

2.4.2 Relocation out of the National Scenic Area

BPA considered rerouting the transmission line south of the National Scenic Area. This rerouting would require construction of a new transmission line corridor across the Mark O. Hatfield Wilderness and the Mount Hood National Forest before heading east through Hood River County to connect to the Hood River Substation. As described further in Section 3.1, *Land Use and Transportation*, the current Bonneville-Hood River transmission line right-of-way is adjacent to the boundaries of the Mark O. Hatfield Wilderness, which is a unit in the National Wilderness Preservation System as designated under the Wilderness Act of 1962 (Wilderness Act). The Wilderness Act generally prohibits most motorized and mechanical access and human infrastructure (including roads and transmission lines) within designated Wilderness Areas. As such, any reroute of the transmission line within the designated Wilderness Area would not be consistent with the Wilderness Act. In addition, constructing a new 150-foot-wide transmission line corridor cleared of trees and developing a new access road system in this heavily forested area in steep terrain would create significantly greater environmental impacts than rebuilding the line within the existing cleared and disturbed corridor. For these reasons, this alternative was not carried forward for detailed analysis.

2.4.3 Undergrounding

BPA considered installing the transmission line underground to reduce impacts on visual resources. While underground installation would eliminate the visibility of the transmission structures, it would still require a cleared right-of-way. As discussed in Section 3.9, *Visual Quality*, the transmission line right-of-way is often the most visible component of the project, and the cleared right-of-way would remain under an underground alternative. Further, underground installation would be economically prohibitive, would result in increased environmental impacts, and would be more difficult to construct and maintain when compared to an aboveground transmission line. Some of the typical difficulties associated with an underground transmission line include the following (based on Xcel Energy 2011):

- Outages are more difficult to isolate, locate, and repair.
- Additional equipment is required along the line to compensate for ***voltage*** changes and forced cooling (higher voltages actually generate heat while transmitting electricity and if not removed, this can lead to failure).
- Construction impacts are much greater for underground lines because the entire facility is placed in a relatively wide trench, which requires more clearing and grading throughout the right-of-way (overhead lines can span steep terrain, whereas an underground line must follow the terrain and clear the entire route). Concrete vaults and manholes are also needed at regular intervals.
- Construction generally takes three to six times longer for underground facilities due to the trenching and vault construction.
- The life expectancy of an underground line is about half of an overhead line of the same voltage.
- Underground lines cost between 4 and 15 times as much as an overhead line of the same voltage.

For these reasons, this alternative was eliminated from further consideration.

2.4.4 Additional Line Mile 19 Options

In addition to the three Line Mile 19 Options that were carried forward for analysis, BPA also considered three additional design options:

- Spur Option 1: Four short access road spurs ranging from about 50 to 75 feet in length leading from the existing access road to each of the four structures.
- Spur Option 2: Two road spurs extending from the east and west that would be about 350 feet and 650 feet in length, respectively.
- Relocation Option: Relocating the transmission line right-of-way and associated access roads north to less steep topography.

Because vehicle access would be provided to each structure under both spur options, four wood, H-frame structures would be installed. Both of the spur options would require the construction of up- and downslope retaining walls up to 15 feet in height. Due to the topography of the area, landings at the structures would not be of sufficient width to allow vehicle turn-arounds; therefore, only drive-in and back-out access would be provided. Due to the lack of turn-arounds that would require large vehicles backing down access road spurs adjacent to large retaining walls, BPA eliminated the road spur options from further consideration due to safety concerns associated with this type of driving conditions.

Under the National Scenic Area Management Plan, the lands around line mile 19 are designated as Special Management Area (SMA) – Open Space (see Section 3.1.1, *Land use*, and Section 3.15.2, *Columbia River Gorge National Scenic Area Management Plan*). BPA evaluated an option that relocated the transmission line and associated right-of-way clearing and access roads to the north a maximum of approximately 350 feet. Relocation of the right-of-way and associated access roads would result in the placement of the transmission structures in flatter terrain that would be subject to less erosion and would aid in transmission line maintenance and access. The relocation area would be located on Oregon State Parks lands and is forested with mature conifers. As such, under a line mile 19 relocation option, approximately 1,700 feet of new 150-foot-wide right-of-way would be cleared of forest vegetation. Further, access roads would be required to be expanded in this area and would likely result in additional forest vegetation clearing. The establishment of a new right-of-way would not be consistent with the land management of SMA-Open Space. Due to the quantity of tree clearing that would be required combined with the activity not fitting with the management objectives for the SMA-Open Space land use designation, BPA eliminated the line mile 19 relocation option from further consideration.

2.5 Consultation, Review, and Permit Requirements

Several federal statutes, implementing regulations, Executive Orders, and other consultation, review, and permit requirements are potentially applicable to this project. Table 2.5-1 identifies and discusses these potential requirements. The organization of this table basically follows that of Chapter 3 of the EA, except that similar resources (e.g., vegetation and wildlife) have been combined when statutes or regulations overlap multiple resource areas.

Table 2.5-1. Potential Statutory, Regulatory, and Other Requirements for the Bonneville-Hood River Rebuild Project

Potentially Applicable Requirement	Relevant Project Information
All Resources	
National Environmental Policy Act (NEPA) of 1969 42 U.S.C. § 4321 *et seq.*	BPA has prepared this EA pursuant to regulations implementing NEPA, which requires federal agencies to assess, consider, and disclose the impacts that their actions may have on the environment before major federal actions are taken.
Land Use	
Columbia River Gorge National Scenic Area Act of 1986 Public Law 99-663	The existing transmission line proposed to be rebuilt is partially located in the Columbia River Gorge National Scenic Area, which was established by the Scenic Area Act. This Act was enacted in 1986 to: (1) protect and provide for the enhancement of the scenic, cultural, recreational, and natural resources of the Columbia River Gorge; and (2) protect and support the economy of the Columbia River Gorge area by encouraging growth to occur in existing urban areas and by allowing future economic development. As required under the Act, a Management Plan has been prepared for the National Scenic Area to guide land use within the National Scenic Area in a manner consistent with the purposes and standards of the Scenic Area Act. For federal actions within the National Scenic Area, the Scenic Area Act requires that these actions be undertaken in a manner consistent with the Scenic Area Act, as determined by the U.S. Forest Service. This requirement does not apply, however, to federal actions that are exempted from the Act's requirements through the Savings Provisions of the Scenic Area Act. One of these savings provisions exempts the operation, maintenance, and modification by BPA of its existing transmission facilities within the National Scenic Area from Scenic Area Act requirements including consistency review requirements. A detailed description of the National Scenic Act and its application to the project is found in Section 3.15, *Consistency with Land Use Plans and Programs*.

Table 2.5-1. Potential Statutory, Regulatory, and Other Requirements for the Bonneville-Hood River Rebuild Project

Potentially Applicable Requirement	Relevant Project Information
The Wilderness Act of 1964 16 U.S.C. § 1131-1136, September 3, 1964, as amended 1978	The Wilderness Act established the National Wilderness Preservation System. Wilderness is a federal designation and the highest level of protection for wildlands that are found eligible for inclusion. Wilderness lands are managed under the provisions of the Wilderness Act of 1964 "*for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and to provide for the protection of these areas and the preservation of their wilderness character*" (sec. 2(a)). The project area is adjacent to the Mark O. Hatfield Wilderness Area. The Wilderness Area is located within the National Scenic Area and Mount Hood National Forest, and managed by the U.S. Forest Service. The effects of the Proposed Action and No Action Alternative are described in detail in Section 3.2, *Recreation* and Section 3.13, *Noise, Public Health, and Safety*.
Vegetation, Wildlife, and Fish	
Endangered Species Act (ESA) of 1973 16 U.S.C. § 1531 *et seq.*	In July 2016, BPA submitted a biological assessment in support of informal consultation to address potential impacts on the federally listed northern spotted owl. In an August 2016 letter, the U.S. Fish and Wildlife Service (USFWS) concurred with BPA's determination that the Proposed Action may affect, but is not likely to adversely affect northern spotted owl or northern spotted owl designated critical habitat. BPA is planning to use a programmatic consultation that is in process with the National Oceanic Atmospheric Administration (NOAA) Fisheries to address effects on listed salmon. There would be no effect on other ESA-listed species in the counties crossed by the project.
Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) of 1976 16 U.S.C. 1801 *et seq.*	Pacific salmon Essential Fish Habitat (EFH) is administered under the amended Magnuson-Stevens Act; EFH for coho and Chinook salmon are found within streams in the project area. Compliance with the Magnuson-Stevens Act would be achieved with the programmatic consultation underway with NOAA Fisheries.
Bald Eagle and Golden Eagle Protection Act (Eagle Act) of 1940 16 U.S.C. § 668-668d	Although bald eagles do not nest on the transmission line, bald eagles nest nearby. BPA would comply with the Eagle Act by implementing mitigation measures, such as avoiding construction activities within 0.5 mile of active bald eagle nests during the breeding season and avoiding snag and large tree removal to the extent possible (Table 2.7-1). No golden eagles have been documented near the project area.
Migratory Bird Treaty Act (MBTA) of 1918 16 U.S.C. § 703-712 Responsibilities to Federal Agencies to Protect Migratory Birds Executive Order 13186	Many bird species protected under the MBTA are present within the transmission line right-of-way, and some undoubtedly nest in the project area. Possible impacts on nesting birds are described in Section 3.8, *Wildlife*. BPA would meet its responsibilities under the MBTA with mitigation measures, such as establishing and implementing species-specific spatial and temporal buffers around migratory bird nests during the breeding season and avoiding snag and large tree removal to the extent possible (Table 2.7-1).

Table 2.5-1. Potential Statutory, Regulatory, and Other Requirements for the Bonneville-Hood River Rebuild Project

Potentially Applicable Requirement	Relevant Project Information
Fish and Wildlife Conservation Act 16 U.S.C. § 2901 *et seq.* Fish and Wildlife Coordination Act 16 U.S.C. § 661 *et seq.*	BPA has consulted with the USFWS and Oregon Department of Fish and Wildlife (ODFW) and incorporated recommendations to avoid and minimize potential impacts on fish and wildlife resources. Impacts on fish and wildlife are described in Section 3.7, *Fish,* and Section 3.8, *Wildlife*, and mitigation measures designed to avoid and/or minimize these impacts are presented in Table 2.7-1.
Oregon Fish Passage Law Oregon Revised Statutes (ORS) 509.580 - 509.910 Oregon Administrative Rules (OAR) 635, Division 412	BPA has consulted with ODFW and incorporated the ODFW biologist's recommendations to avoid and minimize potential impacts to fish resources. Two ford crossings and two pedestrian bridges would be installed or replaced in waterbodies identified as fish bearing. As a federal agency, BPA is not required to comply with state and local approvals or permits; however, BPA strives to meet or exceed these substantive standards and policies of state and local plans and programs to the maximum extent practicable. As such, BPA has prepared fish passage plans for ODFW review to ensure that the project components located in fish-bearing waterbodies do not present a fish passage issue.
Farmland Protection Policy Act 7 U.S.C. § 4201 *et seq.*	Evaluation of the project according to the criteria set forth in the Farmland Protection Policy Act indicates that the Proposed Action would be in compliance with this policy and have no long-term impact on area farmlands (see Section 3.1, *Land Use and Transportation*).
Waters, Wetlands, and Floodplain Protection	
Clean Water Act 33 U.S.C. § 1251 *et seq*. Floodplain/Wetlands Environmental Review Requirements 10 CFR 1022.12 Floodplain Management Executive Order 11988 Protection of Wetlands Executive Order 11990	Wetland management, regulation, and protection are addressed in several sections of the Clean Water Act, including Sections 401, 402, and 404. Project area wetlands were delineated in 2014 and 2015 (Turnstone 2015a). Potential impacts on floodplains and wetlands from the Proposed Action and mitigation for these impacts are described in detail in Section 3.6, *Wetlands and Floodplains* and Table 2.7-1. BPA will obtain the necessary permits for this project. For federal facilities in Oregon, the U.S. Environmental Protection Agency (EPA) has delegated National Pollutant Discharge Elimination System (NPDES) enforcement and permitting authority to the State. BPA, being a government agency, obtained and maintains an agency NPDES General Storm Water 1200-CA Permit (File No.: 111769; EPA No.: ORR10-4145) from the Oregon Department of Environmental Quality (ODEQ). Authorized agency permits as of December 31, 2005 were administratively extended by ODEQ. Until the permit extension is terminated, modified, or revoked, BPA or BPA's contractor is authorized to construct, install, modify, or operate erosion and sediment control measures and stormwater treatment and control facilities, and to discharge stormwater to public waters in conformance with all the requirements, limitations, and conditions set forth within the NPDES permit. Applicants receiving a Section 404 permit from the Corps of Engineers are required to obtain a Section 401 water quality certification from ODEQ through a joint application process. BPA anticipates submitting the joint application in the winter before the first construction season, if needed.
Air Quality and Greenhouse Gases	
The Clean Air Act, as revised in 1990 42 U.S.C. § 4701	Air quality impacts of the Proposed Action would be low, localized, and temporary, as described in Section 3.10, *Air Quality and Greenhouse Gases*.

Table 2.5-1. Potential Statutory, Regulatory, and Other Requirements for the Bonneville-Hood River Rebuild Project

Potentially Applicable Requirement	Relevant Project Information
Final Mandatory Reporting of Greenhouse Gases Rule 40 CFR 98 State of Oregon Greenhouse Gas Reduction Targets Executive Order 13423 Federal Leadership in Environmental, Energy, and Economic Performance Executive Order 13514	Greenhouse gas emissions were calculated for the Proposed Action construction activities that would produce greenhouse gas emissions: construction of the transmission line and permanent vegetation removal. The impact of the Proposed Action on greenhouse gases is described in Section 3.10, *Air Quality and Greenhouse Gases*.
Cultural and Historic Resources	
Antiquities Act of 1906 16 U.S.C. § 431-433 Historic Sites Act of 1935 16 U.S.C. § 461-467 National Historic Preservation Act (NHPA), as amended, inclusive of Section 106 16 U.S.C. § 470 *et seq.* Archaeological Data Preservation Act of 1974 (16 U.S.C. § 469 – 469-1) Archaeological Resources Protection Act of 1979, as amended 16 U.S.C. § 469 a-c Native American Graves Protection and Repatriation Act 25 U.S.C. § 3001 *et seq.* Indian Sacred Sites Executive Order 13007 American Indian Religious Freedom Act of 1978 (42 U.S.C. § 1996)	BPA identified and documented cultural resources in the project area and evaluated them for eligibility for listing in the National Register of Historic Places. BPA's compliance with these regulations is described in Section 3.12, *Cultural Resources*. If previously unidentified cultural resources that would be adversely affected by the Proposed Action are found during construction, BPA would follow the procedures set out in Table 2.7-1 and in compliance with applicable regulations.
Noise, Public Health, and Safety	
Noise Control Act of 1972 42 U.S.C. § 4901 *et seq.*	As described in Section 3.13, *Noise, Public Health, and Safety*, the Proposed Action would have temporary and low noise impacts. Mitigation measures (Table 2.7-1) are identified to further reduce noise impacts and ensure compliance with the Noise Control Act.

Table 2.5-1. Potential Statutory, Regulatory, and Other Requirements for the Bonneville-Hood River Rebuild Project

Potentially Applicable Requirement	Relevant Project Information
Spill Prevention Control and Countermeasures Rule 40 CFR 112 Comprehensive Environmental Response, Compensation, and Liability Act 42 U.S.C. § 9601 *et seq.* Resource Conservation and Recovery Act 42 U.S.C. § 6901 *et seq.*	Small amounts of hazardous waste such as fuels, motor and lubricating oils, herbicides, and solvents may be generated by the Proposed Action or used during construction work. Use of materials would be controlled via implementation of a Spill Prevention Plan. Any generated waste material would be disposed of according to state law and the Resource Conservation and Recovery Act. Solid wastes would be disposed of at an approved landfill or recycled.
The Toxic Substances Control Act 15 U.S.C. 2601 *et seq.*	BPA adopted guidelines to ensure that polychlorinated biphenyls (PCBs) are not introduced into the environment. Equipment used for the Proposed Action would not contain PCBs. Any equipment removed that may have PCBs would be handled according to the disposal provisions of the Toxic Substances Control Act.
The Safe Drinking Water Act 41 U.S.C. § 300f *et seq.*	BPA would comply with state and local public drinking water regulations. The Proposed Action would not adversely affect any sole source aquifers or other critical aquifers, or any surface water supplies (see Section 3.5, *Waterways and Water Quality*).
Federal Communications Commission	There would be no interference with radio, television, or other reception as a result of the Proposed Action. BPA would comply with Federal Communication Commission requirements relating to radio and television interference from the Proposed Action if any such interference occurs (see Section 3.13, *Noise, Public Health, and Safety*).
Federal Aviation Administration	While the Proposed Action does not appear to be within any of the specified distances from airports, final locations of structures, structure heights, and conductor heights would be submitted to the Federal Aviation Administration for approval.
Environmental Justice	
Federal Actions to Address Environmental Justice in Minority and Low-Income Populations Executive Order 12898	The Proposed Action would not cause disproportionately high and adverse impacts on minority and low-income populations (see Section 3.11, *Socioeconomics and Public Services*).
State, County, and Local Plan Consistency	
Multnomah County Comprehensive Framework Plan Hood River County Comprehensive Land Use Plan Cascade Locks Comprehensive Plan	BPA strives to meet or exceed the substantive standards and policies of state and local plans and programs to the maximum extent practical. As the Proposed Action is replacement in kind and in place of an existing line and would be completed within the existing right-of-way, only minor impacts on land use would result, and the project would generally be consistent with the area's land use plans. A detailed description of Local plans and their application to the project is found in Section 3.15, *Consistency with Land Use Plans and Programs*.

2.6 Comparison of Alternatives

Table 2.6-1 compares the Proposed Action and the No Action Alternative by the purposes of the project described in Section 1.2, *Purposes*. Table 2.6-2 summarizes the potential environmental impacts of these two alternatives, based on the full analysis presented in Chapter 3.

Table 2.6-1. Comparison of the Proposed Action and No Action Alternative

Purpose of Project	Proposed Action	No Action Alternative
Meet transmission system public safety and reliability standards set by NESC and NERC	The Proposed Action would result in a line rebuilt to current industry standards for operational reliability and safety. Replacement of the existing structures would increase system reliability by reducing unplanned outages and emergency repairs from failing components. A system of improved access roads and trails would facilitate access to make emergency repairs and maintain the line. Under Line Mile 19 Options 1 and 2, the reconstruction of the access road and installation of the vehicle landings would allow truck access to conduct emergency repairs and maintenance. Under Line Mile 19 Option 3, the existing access road would not be sufficient to allow repair vehicles to work on the structures; therefore, any emergency repair or maintenance would be conducted by crews accessing the structures via foot and climbing the structures with equipment. Emergency repair time may be increased, depending on the nature of the event, under Line Mile 19 Option 3.	The reliability of the line would be compromised as the risk of outages for repairs of worn structures and equipment would increase. Increased amounts of maintenance work (routine and emergency) would be required for BPA to attempt to maintain reliability on an access system that is not up to industry standards, which further increases response time and difficulty in making repairs.
Continue to meet BPA's contractual and statutory obligations	A rebuilt line would be more reliable than the existing line and, therefore, allow BPA to continue to meet contractual and statutory obligations to its customers.	Decreased reliability would be associated with the necessary repairs as the line continued to fail at an increasing rate, which would impair BPA's ability to meet its statutory and contractual obligations.
Minimize environmental impacts	The environmental impacts (see Table 2.5-2 for a detailed comparison of impacts from the alternatives) due to rebuilding the line would be minimized by designing the Proposed Action to avoid sensitive resources, where possible, and to minimize potential adverse impacts through the mitigation measures and best management practices (BMPs) (see Table 2.7-1).	While the No Action Alternative would not have the effects of the Proposed Action over the 2017, 2018, 2019 and possibly 2020 construction seasons, over time structures would fail at increasing rates as they aged. BPA would be forced to either replace them in smaller segments or on an emergency basis. Working under emergency conditions may reduce BPA's ability to coordinate with landowners or avoid sensitive habitats (e.g., talus slopes [a slope formed by the accumulation of rock debris], streams, etc.), times of year (owl or eagle nesting season), or saturated soil conditions. Therefore, impacts on resources could be greater over time with the No Action Alternative than with the Proposed Action.
Demonstrate cost-effectiveness	Overall, the Proposed Action is estimated to cost about $18 to $22.5 million in construction costs (both material and labor), depending on Line Mile 19 option selected. Under Line Mile Option 1, the Proposed Action construction would cost about $18 to $20 million. Line Mile 19 Option 2 would be the highest cost of about $20.5 to $22.5 million, while Line Mile 19 Option 3 would cost about $20 to $22 million for construction. Implementation of the Proposed Action would reduce the maintenance costs for the transmission line because the new structures and equipment would require less maintenance than the aged ones.	The No Action Alternative would not require the expenditure of funds to rebuild the transmission line at this time. Repairs would require an ongoing outlay of funds to replace failed structures, rebuild roads, and replace and re-string failed conductors. The rate of maintenance spending would likely increase as aging structures fail at increasing rates. An as-needed approach would likely increase the cost associated with multiple mobilizations and would likely be less efficient, when compared to the Proposed Action.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Land Use and Transportation	
No Action	Replacement of structures and structure components, and access road work would not occur so there would be no construction impacts on land use and transportation at this time. Replacement of structures would increase, and landowners could be disrupted by noise and dust more often than under normal line maintenance conditions. Emergency repairs could be needed and if conditions prevent access along existing access roads, new impacts on land use and transportation (such as vegetation removal and traffic delays) could occur. Overall, this alternative could result in **no** to **high** impacts on land use and transportation, depending on the duration and location of the maintenance and emergency actions.
Proposed Action	**Land Ownership** Underlying land ownership and surrounding land uses would not change. The Project would have **no** to **low** impacts on land ownership. **Land Use** Construction activities would temporarily disturb up to approximately 71 acres of land for structure replacement, access roads and trails. Structures would be replaced in the same location, if possible, and construction would be temporary, localized, and underlying land uses would not change; therefore, impacts would be **low** for land uses along the transmission line right-of-way. A total of 0.3 mile of easements for access roads would be acquired. In the context of the land uses in the two counties, and with mitigation measures applied (Table 2.7-1), the permanent and temporary impacts on land use associated with access roads would be **low** regardless of which option in line mile 19 is selected. **Transportation** The Proposed Action would result in short-term, site-specific transportation impacts from construction-generated traffic related to rebuilding the transmission line, as well as building, rebuilding, and improving access roads. Short-term impacts could be **high**, which would be reduced to **moderate** with the implementation of mitigation, in some site-specific areas from traffic congestion or delays and an increase in truck traffic. Traffic delays and disruptions to the pedestrian and bicycle network associated with lane/road closures would be temporary and would shift based on the construction schedule such that no one location would experience traffic increases or closures for more than a few days at a time. Construction activities would not close/block access to residences or businesses. L**ow** long-term impacts are anticipated regardless of which option in line mile 19 is selected.
Recreation	
No Action	Replacement of structures and structure components, and access road work would not occur so there would be no construction impacts on recreation at this time. Replacement of structures would increase, and recreation users could be disrupted by noise and dust more often than under normal line maintenance conditions. Emergency repairs could be needed, and if conditions prevent access along existing access roads, new impacts on recreation (such as traffic delays) could occur. Recreation activities could also be affected by temporary increases in traffic through campgrounds, and noise and dust that would be generated under emergency conditions. Overall, this alternative could result in **low** to **high** long-term impacts on recreation, depending on the duration and location of the maintenance and emergency actions.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Proposed Action	Construction activities would create additional traffic through campgrounds, result in temporary trail and road closures, and create localized noise and dust that could disturb recreational uses; impacts would range from **low** to **moderate**, depending on the site, but all would be temporary. During construction, BPA would coordinate with the U.S. Forest Service and Oregon State Parks to minimize access-related impacts on recreation users in the project area, such as limiting construction in recreation areas to weekdays (when recreation is typically lower), and maintaining access to recreation sites. A **low,** long-term effect on recreation is anticipated from unauthorized use of non-public trails and access roads.
Geology and Soils	
No Action	Replacement of structures and structure components, and access road work would not occur so there would be no construction impacts on geology and soils at this time. Increases in the number of visits to repair deteriorating structures could lead to more erosion and compaction than is currently experienced, especially if emergency repairs require access to portions of the line during wet or muddy conditions. A combination of aging structures, minor land movement, and increased wet-season repair work would have **moderate** impacts on geology and soils.
Proposed Action	Project activities could result in soil contamination from PCP-treated poles; soil excavation from transmission line structure replacements; and soil compaction related to transmission line structure replacements, overland vehicle travel, and access road construction. Construction activities for structure replacement would temporarily disturb up to about 71 acres, which would be revegetated or allowed to return to previous land use. An estimated 22 acres would be temporarily disturbed for access road and foot trail work. By reusing structure sites and implementing design features and mitigation measures (Table 2.7-1), soil impacts would be **low**. The Proposed Action would not impact geological resources, and the likelihood of the project area to be affected by geologic hazards is **low**.
Vegetation	
No Action	Replacement of structures and structure components, and access road work would not occur so there would be no construction impacts on vegetation at this time. Current levels of disturbance to vegetation would increase as repairs to existing deteriorating structures increase. Emergency maintenance could not be planned for, potentially requiring work during winter and limiting the ability to avoid sensitive plant species or sensitive habitats. Both conditions could result in damage to vegetation and impacts on sensitive plants and habitats. Emergency repair activities could also require unplanned movement of personnel and vehicles through existing noxious weed infestations, which could allow the spread of noxious weeds. Because avoidance of sensitive resources may not be feasible, impacts on vegetation from this alternative could range from **low** to **high**, depending on the nature of the required work. Emergency repair activities could also require unplanned movement of personnel and vehicles through existing noxious weed infestations, which could allow the spread of noxious weeds. In an emergency situation, it may not be feasible to establish blow/wash stations. Therefore, the establishment and spread of noxious weeds in the project area under the No Action Alternative would be **low** to **moderate**, depending on location and nature of work required.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Proposed Action	Construction activities would directly affect vegetation through vegetation removal and crushing. Permanent impacts would occur where the site would be modified so that it no longer supported vegetation, or where native plant communities would be permanently altered as a result of activities. Construction would temporarily remove or crush up to about 71 acres of vegetation. Up to 0.4 acre of vegetation would be permanently removed to allow for project access. Impacts to general vegetation would be **low**. Some of these impacts would occur in sensitive habitats where the Proposed Action could temporarily affect a sensitive habitat present in the project area which could translate into a long-term loss of sensitive plants if reseeding is not effective in re-establishing high-quality native plant communities. With implementation of mitigation measures (Table 2.7-1) and allowing vegetation to recolonize disturbed areas impacts to special-status plants would be **low** levels for all Line Mile 19 Options. Impacts from the potential spread of noxious weeds would be **low** because noxious weed infestations already exist throughout the transmission line and BPA would implement mitigation measures (Table 2.7-1) to prevent further spread of weeds; therefore, the Proposed Action would not be expected to cause a major effect on the productivity of adjacent vegetation communities through noxious weed invasion.
Waterways and Water Quality	
No Action	Under the No Action Alternative, no construction activities or construction-related impacts on surface or groundwater resources would occur. As the existing structures and roads deteriorate, the frequency of maintenance activities would increase, as would the potential for unplanned emergency maintenance activities. Even though emergency repairs to roads and structures could occur when soils are saturated and erosion and runoff risks are high, standard erosion control measures and BMPs are expected to prove effective at controlling erosion. Overall, impacts on streams, water quality, and groundwater resources, including runoff, erosion, and sedimentation in streams, would be **low**. There would be **no** impacts on surface water intakes, groundwater recharge, groundwater Drinking Water Source Areas, or springs under the No Action Alternative.
Proposed Action	Four structures would be replaced within 100 feet of streams; all of these structures would be replaced at or within 20 feet of their existing location in already disturbed areas. Therefore, there would be **no** new permanent disturbance areas associated with structures near streams. There would be about 1.8 acre of temporary disturbance associated with access road and foot trail work that would occur within 100 feet of streams. The implementation of mitigation measures (Table 2.7-1) would reduce and minimize temporary and permanent impacts on streams and water quality from siltation and sedimentation from the structure, access road, and bridge work. A total of 23 trees would be removed within 100 feet of streams. The majority of the impacts on streams and water quality from these activities are expected to be localized and temporary, and are not expected to affect stream hydraulic, hydrologic, or habitat functions, or result in water quality parameters being exceeded. Therefore, impacts on streams would be temporary and **low.** There are no surface water Drinking Water Source Areas within 150 feet of the project area, and no work areas proposed near the Cascade or Oxbow fish hatchery intakes. Two structures rebuilt and two retired within the Starvation Creek State Park Drinking Water Source Area. The Proposed Action would involve about 0.5 acres of temporary (construction-related) impacts on groundwater Drinking Water Source Areas in the project area, including the Herman Creek Well #1 and #2, Starvation Creek Park, and Viento State Park Drinking Water Source Areas. Soil compaction during structure, access road, and trail work could temporarily impact groundwater flows by reducing infiltration capacity and increasing surface runoff to streams. However, these impacts are expected to be minor, temporary, and overall have a **low** level of impact on groundwater resources for all Line Mile 19 Options. The Proposed Action would involve the use of some hazardous substances, such as PCP, that could have an effect on water quality. However, with the implementation of the measures regarding the handling and disposal of creosote-treated wood poles and creosote-contaminated soils; spill prevention, containment, and cleanup; and wood pole storage methods, the risk to streams and groundwater from the accidental release of hazardous materials would be **low.**

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Wetlands and Floodplains	
No Action	Because there are no delineated wetlands at structure locations and small wetlands near access road stream crossings, implementation of the No Action Alternative would likely have **no** to **low** impact on wetlands. The timing of emergency repairs would not be preplanned, and construction work required during the wet season may result in an increased potential to impact wetlands through runoff from construction sites if work occurs during inundated, saturated, or unstable soil conditions. Overall, the No Action Alternative would have **no** to **low** impacts on wetlands and floodplains, depending on where emergency or maintenance work occurred.
Proposed Action	None of the existing transmission line structures in the project area are located within delineated wetlands. Therefore, their replacement within the same or adjacent upland locations would have **no** permanent or temporary wetland impacts. Access road and trail improvements would have minor temporary impacts on less than 0.1 acre of wetland. The risks of potential impacts would be minimized through avoidance of wetlands, installation of erosion and sediment control BMPs, revegetation of exposed soil, re-planting temporarily impacted areas with native species, and adherence to fueling guidelines and implementation of spill prevention measures during the construction activities, resulting in a temporary, **low** impact. Hardware and insulator replacement is proposed in the only floodplain crossed by the project area. There would be a **low** temporary impact on floodplains from the Proposed Action.
Fish	
No Action	No construction-related impacts would occur under the No Action Alternative. However, maintenance activities would likely increase as existing structures and access roads continue to deteriorate, and emergency structure repair and replacement would be required. These maintenance and emergency repair activities could impact fish and wildlife. Unlike regular maintenance, emergency repairs could occur at any time of year with no time for the implementation of avoidance or minimization measures. Emergency repairs could occur in areas or during times of year when impacts on spawning fish could occur from road repairs. Overall, these factors could result in **low** to **moderate** levels of impact on fish depending on location and timing of the emergency or maintenance activity.
Proposed Action	Fish habitat loss is not expected. One structure work area would be within 100 feet of a fish-bearing stream. Access road improvement and reconstruction, including work on foot trails used to access the transmission line, would occur within 100 feet of eight fish-bearing streams. No new roads would be constructed near streams. Work in fish-bearing streams would be limited to repair of an existing road ford in Dry Creek and construction of a new ford in Harphan Creek. Construction would not occur in EFH and streams that support ESA-listed Chinook salmon, coho salmon, chum salmon, and steelhead. However, access road improvement and reconstruction, as well as trail construction, improvement, and reconstruction, would occur within 1,000 feet of 15 streams with special-status fish. Because limited work would occur within or near fish-bearing streams, no long-term impacts are anticipated, and construction within 100 feet of fish-bearing streams and 1,000 feet of streams with special-status fish could result in the temporary minor input of sediment to streams and increase in turbidity, the Proposed Action would have a **low** impact on fish.
Wildlife	
No Action	No construction-related impacts would occur under the No Action Alternative. However, maintenance activities would likely increase as existing structures and access roads continue to deteriorate, and emergency structure repair and replacement would be required. These maintenance and emergency repair activities could impact wildlife. Unlike regular maintenance, emergency repairs could occur at any time of year with no time for the implementation of avoidance or minimization measures. Emergency repairs could occur in areas or during times of year when vegetation removal could result in the loss of nesting birds or construction noise could disturb wildlife during critical periods (such as nesting/breeding or winter habitat use). Overall, depending on the nature of the emergency repairs required, the No Action Alternative could result in **low** to **high** levels of impact on wildlife depending on timing or location.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Proposed Action	Only up to 0.1 acre of priority habitats would be permanently impacted. In addition to temporary disturbance and permanent loss of wildlife habitat, potential impacts on wildlife include noise disturbance from construction and blasting, disruption of wildlife movement and foraging, habitat fragmentation, incidental mortality of less mobile species, and the potential risk for bird collision. Noise disturbances from helicopters, heavy equipment, and construction crews working in the right-of-way may cause wildlife to move away from the construction zone. The northern spotted owl is the only ESA-listed wildlife species that is either documented within or could potentially occur in the project area. No resident northern spotted owl individuals were detected during 2014, 2015, and 2016 surveys. Mitigation measures would reduce many potential effects from the project on wildlife (Table 2.7-1). However, removal of vegetation in priority wildlife habitat and noise effects would have a **moderate** impact on wildlife. There would be **low** to **no** impacts to the northern spotted owl.
Visual Quality	
No Action	The existing visual conditions of the project area would not change under the No Action Alternative. Existing visual conditions in the Key Viewing Areas (KVAs) that result from ridgeline and steel structures, and the managed right-of-way would remain unchanged. Replacement would be necessary on both a planned and emergency basis, which would temporarily degrade local visual resources. Over time, the entire transmission line would likely be replaced, but this process would take more time with incremental construction-related impacts occurring on a more frequent basis. For this reason, the short-term construction-related impacts on visual resources could extend for years, but because they would be highly localized and not visible from multiple KVAs at one time, the impact would be **moderate**.
Proposed Action	In the short term there could be a **moderate** level of impact from the Proposed Action from new structures, construction-related vegetation clearing, and road and trail improvements that result in some changes to visual conditions as viewed from certain KVAs. Overall, the slight improvements to some features (e.g., steel structure replacement with weatherized monopoles and movement off of ridgelines) from the incorporation of mitigation measures (e.g., revegetation; see Table 2.7-1), and when compared against the existing visibility of the existing structures, the installation of the new structures would have **low** impact on the landscape as viewed from the KVAs. The level of impact on visual resources would be the same for all Line Mile 19 Options due to blending with the surrounding landscape, vegetation screening, viewing angle, and duration of view.
Air Quality and Greenhouse Gas	
No Action	Under the No Action Alternative, continued operation of the aging transmission line would likely result in increased equipment operation and vehicle transport on access roads during emergency repair and maintenance activities. Air quality impacts and impacts on greenhouse gas emissions from emergency repair and maintenance activities would be **low** due to the temporary and localized nature of the activity.
Proposed Action	Construction of the Proposed Action would result in short-term, temporary air quality impacts during earthmoving activities and from the operation of on-road vehicles, off-road equipment, and helicopters. Construction activities would generate criteria pollutant emissions, predominately in the form of ozone, carbon monoxide, particulate matter, and dust within the project area airshed. However, because these emissions would be short term and localized, the level of emissions generated would be **low** and would not have the potential for exceeding regulatory air quality standards or significantly contributing to visibility reduction or regional haze. Implementation of the mitigation measures would reduce these impacts (Table 2.7-1). For these reasons, construction-related air quality impacts would be **low.** Emissions of greenhouse gases from the Proposed Action would be minimal and temporary. Greenhouse gas generation would be **low**.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Socioeconomics and Public Services	
No Action	Replacement of structures and access road work would not occur so there would be no construction impacts on socioeconomics, public services, or environmental justice populations at this time. Employment and income benefits of construction activities would not occur, and there would be no need for temporary housing for construction workers. Residents and businesses along the transmission line right-of-way would experience noise or air quality impacts from construction equipment as structures deteriorate on a more frequent basis and require repair. The structures have already exceeded their expected life span, and as they continue to deteriorate, the transmission line's reliability would be reduced. This could lead to negative impacts on the social and economic vitality of communities that rely on power supplied by the transmission line. Adverse impacts on all local residents, public facilities, community services, and businesses could include power outages, and voltage fluctuations. Depending on the duration of the power loss, impacts on public health and safety from the No Action Alternative could range from **low** if no emergency outages are realized to **high** if a prolonged emergency outage occurred.
Proposed Action	The scale or duration of construction is not expected to alter the population in Hood River or Multnomah counties because the temporary and short-term nature of the work would not typically require workers to change their permanent residences. For these reasons, the Proposed Action would have **no** to **low** impact related to temporary or permanent increases in population within the project area. The Proposed Action would have a small, positive impact on the regional economy during construction; this impact would be temporary and **low**. Temporary access roads and structure replacement would occur in the vicinity of orchards, potentially resulting in crop damage. BPA would coordinate with local farmers and landowners to minimize potential construction-related disruptions, and temporary roads would be restored to pre-project conditions after construction is complete (Table 2.7-1). BPA would compensate landowners for revenue losses they would incur, which would ameliorate the impacts of displaced crop production. Because the disruptions would be temporary and landowners would be compensated for revenue losses, the economic impact would be **low.** The Proposed Action would not affect the amount of taxes collected by the counties crossed by the project transmission line. Property value impacts would likely be **no** to **low.** There are no minority or low-income populations in the project area that are greater than 50 percent of the population. The Hispanic population in a part of the project area is more than two times greater than the average state population. However, all persons, regardless of race or income, would experience the same minor impacts associated with construction within the transmission line right-of-way. Therefore, there would be **no** short- or long-term disproportionately high and adverse effects on environmental justice populations. The Proposed Action would not hinder the ability of any agency or organization to provide public services to communities near the project area, including police, fire, and medical. Work on the Cascade Locks Tap would result in two midnight power outages to the city of Cascade Locks. Overall, the Proposed Action is expected to have up to **moderate** short-term and **no to low** long-term impacts on the provision of public services in the project area.
Cultural Resources	
No Action	Replacement of the existing structures and access road work would not occur. No construction-related impacts on cultural resources would occur at this time. Emergency maintenance actions, including repairs, could occur in areas or during times of year where impacts on cultural resources may occur, if any are present. Impacts on resources from emergency repairs could range from **low** to **high** depending on the location, disturbance area, and eligibility status of sites within emergency repair or maintenance construction areas.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Proposed Action	**Archaeological Resources** Impacts on archeological resources would be the same, regardless of which option in line mile 19 is selected. The identified archaeological sites would not be disturbed by the Proposed Action. The Proposed Action would result in **no** to **low i**mpacts on archaeological resources. **Built Resources** Impacts on built resources would be the same, regardless of which option in line mile 19 is selected. Project construction would avoid the Wygant Trail, a stone building, Pacific Crest Trail, and a Farmers Ditch. The Historic Columbia River Highway would be crossed by project access roads or traveled upon to access several parts of the transmission line for project construction. Measures would be used to minimize effect of the increased traffic and weight of the equipment on the highway. The project would result in a change of several of the existing structure types along the Bonneville-Hood River transmission line, thus making the line not eligible for listing in the National Register under Criterion C. The line would still be eligible for listing in the National Register under Criteria A and D. Because of the continued eligibility of the line, the mitigation for adverse effects on the line under Criterion C that would be implemented as a result of the Section 106 consultation process, and the avoidance of disturbance to other built resources, the Proposed Action would have a **moderate** impact on built resources.
Noise, Public Health, and Safety	
No Action	**Noise** Under the No Action Alternative, continued operation of the aging transmission line would likely result in increased equipment operation and vehicle transport on access roads during emergency repair and maintenance activities. Noise impacts resulting from emergency repair and maintenance activities for the No Action Alternative are expected to be **no** to **moderate** due to the temporary and localized nature of activity. **Radio and Television Interference** The No Action Alternative would have **no** to **low** impacts to radio and television interference. **Public Health and Safety** Continued operation of the aging transmission line would result in potential public safety hazards due to the operation of older, less reliable structures and associated equipment. Depending on the duration of the power loss, impacts on public health and safety from the No Action Alternative could range from **low** if no emergency outages are realized to **high** if a prolonged emergency outage occurred. **Electromagnetic Fields** The No Action Alternative would not change the parameters that affect electromagnetic fields (voltage, current loading, or line configuration and routing); therefore, there would be no changes in emissions, and the transmission line would continue to have **no** to **low** impact.

Table 2.6-2. Comparison of the Direct and Indirect Environmental Impacts on Resources from No Action Alternative and Proposed Action

Proposed Action	**Noise** Noise impacts due to construction would be **low** to **moderate** because they would be temporary, construction equipment noise would be similar to machinery noise from regular agricultural practices in the Hood River area, and corona noise from the transmission line would not change from current levels. Blasting would be required in some locations; related noise impacts would be temporary and reduced to a **low** level with the implementation of mitigation measures (Table 2.7-1). **Radio and Television Interference** The Proposed Action is expected to either not change or slightly improve radio and television interference along the affected line sections. Therefore the Proposed Action is expected to have a **no to low** beneficial effect on radio and television interference. **Public Health and Safety** Potential public health and safety impacts resulting from construction of the Proposed Action could include wildfire ignition from heavy equipment operation; worker vehicle accidents during transport to/from work site; worker incident during operation of heavy equipment; aircraft hazards; blasting; worker exposure to hazardous materials used or waste generated during construction; worker proximity to high voltage lines; and rockslide dangers during upslope activities. Potential public health and safety risks would be **moderat**e but these impacts would be reduced to **low** with implementation of the mitigation measures listed in Table 2.7-1. **Electromagnetic Fields (EMF)** The primary factors that can alter EMF levels produced by a power line are line voltage, current loading, line configuration, and line routing. The Proposed Action would not substantively change these parameters. Therefore, there would be no changes in EMF emissions and the rebuilt transmission line would have **no** impact.

2.7 Mitigation Measures

Table 2.7-1 lists mitigation measures that have been identified for the Proposal Action. Some of these measures are design features that have been incorporated into the original design of the proposed project, as well as ***best management practices (BMPs)*** that are typically implemented by BPA as appropriate for its proposals. Other measures were identified as a result of the NEPA process and are intended to reduce or eliminate potential impacts from the Proposed Action on resources discussed in this EA.

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
Compensate landowners at fair market value for any new land rights acquired for access road easements.	•									•		
Plan and conduct construction activities to minimize temporary disturbance, displacement of crops, and interference with agricultural activities.	•											
Compensate landowners for damage to property or crops, as appropriate.	•									•		
Contact and provide a schedule of construction activities to all potentially affected landowners and managers. Coordinate with individual landowners to ensure that access roads and gates and construction and maintenance activities would minimize disruptions to commercial and recreational operations.	•									•		•
Restore compacted soils in agricultural areas as close as possible to pre-construction conditions.	•		•									
Remove and stockpile topsoil separately in croplands. Where backfill is used around pole structures, cover in native topsoil to the extent possible. Use stockpiled topsoil for site contouring and restoration.	•		•	•								
Revegetate disturbed areas after construction, with the exception of areas required to remain clear of vegetation to ensure the safety of the transmission line and access to structures.	•		•	•				•				
Develop a SWPPP that requires the use of erosion control BMPs, such as silt fencing,	•		•	•	•	•	•					

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
mulching, and revegetation, before and during ground-disturbing activities as much as practical to limit erosion off site and into sensitive areas and the spread of noxious weeds.												
Delineate construction limits within 100 feet of streams with a sediment fence, straw wattles, or a similarly approved method to eliminate sediment discharge into waterways. Leave erosion and sediment control devices in place until all disturbed sites are revegetated and erosion potential has returned to pre-project conditions.	•		•	•	•	•	•					
Inspect seeded sites to verify adequate growth and reseed or implement contingency measures, as needed.	•		•	•	•	•	•					
Conduct noise-generating construction activities only during daytime hours (i.e., between the hours of 7:00 a.m. to 5:00 p.m., Monday to Friday), to the extent possible. Limit construction activities within 0.5 mile of overnight use recreation facilities to weekdays between 8 a.m. and 5 p.m.	•	•					•					•
Ensure that access to recreation sites (campgrounds, trails/trailheads, day use areas) is maintained.	•	•										
Avoid trail closures unless necessary to maintain public safety. If closures are necessary, work with the land manager to temporarily reroute trails, if possible, and provide appropriate signage and notification in advance of trail closures.		•										
Develop a plan that outlines coordination of construction activities and timing with the U.S. Forest Service, Oregon State Parks, Hood River County Forestry Department, and special event coordinators to ensure that recreationists are minimally affected and interpretive activities at campgrounds and special events are not affected.		•								•		
Ensure that access to the Pacific Crest Trail is maintained at all times and that a reroute of the trail around construction activities is provided (likely via other trails that provide access to the Pacific Crest Trail) if closures last longer than 2 hours, and coordinate with the U.S. Forest Service and the Pacific Crest Trail Association to ensure appropriate noticing and signing of any trail reroutes.		•										
Employ flaggers when public trails are temporarily closed for construction crossings.		•										•

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
Coordinate construction activities and timing with management of the Indian Creek Golf Course to minimize impacts on golfers.		•								•		
Develop a plan to coordinate the routing and scheduling of construction traffic with the Oregon Department of Transportation (ODOT), the U.S. Forest Service, Oregon State Parks, and county/municipal road staff. Address the following activities in the plan: • Use of traffic-control flaggers and posting of signs warning of construction activity and merging traffic for short interruptions of traffic during construction. • Coordination with emergency responders (law enforcement, fire, and emergency medical services) regarding road/lane closures to ensure continued service.	•	•										•
Avoid and minimize construction disturbance areas on steep or unstable slopes, if possible.			•					•				
Conduct peak construction activities during the dry season, as much as possible, to minimize erosion and soil compaction. Do not conduct construction activities in unstable soil conditions, such as after a large rain or snowmelt event.			•		•	•	•					
Repair existing access roads that show signs of slumping or erosion.	•		•									
Retain existing low-growing vegetation where possible, and minimize the use of clearing/grubbing to preserve the roots of these plants.			•	•								
Locate material storage and temporary staging areas in flat, previously disturbed, or graveled sites outside of sensitive areas to minimize soil and vegetation disturbance, where practicable.			•		•							
Use local rock sources for road construction where practicable.			•									
Limit leaching of PCP treatment chemicals from poles stored in staging areas into surrounding soils.			•	•	•	•	•					•
Prepare a site-specific Public Safety Plan to address measures to ensure public safety			•									•

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
from landslide and rockfall risks generated during construction. The plan should address measures to take in design and construction to minimize slope failure from project-generated landslide and rockfall if geotechnical investigations indicate high levels of risk or new landslides or rockfall occur during construction.												
Develop and implement a blasting plan that identifies blasting procedures such as safety, use, storage, and transportation of explosives where blasting is needed, if necessary. The blasting plan would specify the locations where blasting is needed and require the use of a registered licensed blaster who would be required to secure all necessary permits and comply with regulatory requirements in connection with the transportation, storage, and use of explosives, and blast vibration limits for nearby structures, utilities, and wildlife.			•									•
Clearly identify sensitive areas (e.g., wetlands, riparian areas, culturally sensitive areas, streams, etc.) prior to construction so that construction crews can avoid unintentional impacts on these areas.				•		•	•					
Clearly mark trees identified for removal.				•								
Minimize the construction area to the extent practicable within native plant communities and sensitive habitats.				•		•	•					
Locate temporary access roads and overland travel routes to avoid native plant communities and priority habitats, as practical.	•			•		•	•					
Avoid removing Oregon white oak trees to the extent possible. For each mature tree removed, replant at 1:10 ratio. Replanted trees would be in 5-gallon containers at a minimum.				•			•					
Minimize the removal of mature trees at pulling/tensioning sites and along access roads to the extent practicable to minimize impacts on forest habitats.				•			•	•				
Clearly identify the location of long-bearded hawkweed and other sensitive plant populations and minimize construction work areas that would overlap populations.				•								

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
Conduct pre-disturbance surveys during spring and early summer before construction to determine whether populations of additional sensitive plant species are present in project impact areas.				•								
Coordinate with the U.S. Forest Service botanist for work on U.S. Forest Service-managed lands to allow for the relocation of sensitive plants that cannot be avoided during construction.				•								
Identify noxious weed infestations at construction sites and avoid these areas during construction, as practical.				•								
Minimize ground disturbance in proximity to existing noxious weed populations during construction.				•			•					
Flag all weed populations that need to be avoided during construction				•	•	•	•					
Use water or compressed air and hand tools to remove seeds, roots and rhizomes from equipment used to move vegetation and topsoil before moving the equipment off site				•	•	•	•					
Provide vehicle and equipment washing stations for daily use before apparatus enters or leaves a project area with known weed infestation.				•	•	•	•					
Inspect equipment and vehicles for drips or leaks of fluids or fuel prior to first entry into project area. Continue inspections on a weekly basis. If drips or leaks are detected, promptly make repairs and then wash equipment or vehicle at an approved wash station.				•	•	•	•					
Use weed-free straw, hydromulch, or similar ground cover for erosion control during construction and restoration activities in areas that cannot be immediately revegetated.			•	•	•		•					
Use weed-free rock when rock is required for construction activities.				•			•					
Treat noxious weeds to minimize their potential to colonize disturbed areas. Design treatment programs to avoid adverse effects on non-target native plant species, particularly sensitive plant species and native populations in sensitive habitats.				•			•					

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
Avoid siting new structures and access roads within 100 feet of surface waters during the design process, where possible. Where this is not possible, restrict structure work spaces to 50 feet by 50 feet per structure to the extent possible.	•	•	•	•	•	•						
Identify stream and stream buffer locations to restrict vehicles and equipment to designated routes and workspaces in these areas.	•	•	•	•	•	•						
Locate pulling/tensioning sites at least 100 feet away from surface waters, where possible.					•		•					
Design and construct access roads to minimize drainage and erosion from the road surface directly into surface waters; size and space cross drains and water bars properly to accommodate flows and direct sediment-laden waters into vegetated areas.	•	•	•		•	•	•					
Review required BMPs, water quality mitigation measures, and other permit requirements with construction contractors and inspectors during a pre-construction meeting covering environmental requirements.					•							
Prohibit side casting of road grading materials within 100 feet of streams.	•	•			•		•					
Conduct in-water work during the low flow period (in-water work window) in both fish-bearing and non-fish-bearing streams to reduce turbidity.	•	•			•		•					
If water is present in Dry or Harphan Creeks at the time the fords are constructed, provide downstream fish passage and isolate the in-water work area. Perform fish salvage within the isolation area before in-water construction activities are initiated.							•					
Restore stream channel bed and banks after in-water work if necessary.			•	•	•		•					
Reseed and recontour disturbed areas after construction activities are complete, at the appropriate time period for germination, with a native seed mix, a seed mix recommended by ODFW, or as agreed upon with landowners/land managers for use on their property.			•	•	•	•	•	•				
Revegetate and recontour disturbed areas in stream buffers following specific revegetation guidelines in permits; reseed pastures with an appropriate seed mix, as			•	•	•		•	•				

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
determined through discussions with the landowner.												
Prepare and implement Spill Prevention and Response Procedures (SPRP) to contain potentially leaching preservatives, petroleum products, or hazardous materials. In the event of a spill, immediately contain the spill, eliminate the source, and deploy appropriate measures to clean and dispose of spilled materials in accordance with the SPRP and federal, state, and local regulations. Provide spill response kits at designated locations on the project site.			•		•	•	•					•
Restrict vehicle refueling and servicing to locations a minimum of 100 feet away from natural or human-made drainage conveyances (e.g., ditches, catch basins, ponds, wetlands, streams, and pipes) and use pumps, funnels, absorbent pads, and drip pans when fueling or servicing vehicles.					•	•	•					
Reduce erosion at stream crossings with no culverts by installing stable drive-through fords and rolling dips.			•		•		•					
Identify active raptor nest sites by consulting with ODFW and/or the USFWS and conduct raptor nest surveys, if necessary, prior to construction. Avoid tree removal or construction work within a buffer around the active nest as identified for the specific species in *Guidelines for Raptor Conservation in the Western United States* (USFWS 2008) unless otherwise authorized by ODFW and/or the USFWS.							•					
Avoid blasting within 0.5 mile of active bald eagle, peregrine falcon, or other sensitive raptor species nests during the nesting period**,** unless otherwise authorized by ODFW and/or the USFWS.							•					

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
If an active eagle, falcon, or other sensitive raptor nest is identified prior to construction, a 330-foot construction buffer from the nest would be maintained until the young have fledged, unless otherwise authorized by ODFW and/or the USFWS.							•					
Schedule tree removal (and other vegetation removal as much as possible) between September 15 and March 1 to minimize impacts on migratory birds. If tree clearing is needed outside of that time, conduct a pre-construction nesting bird survey prior to the tree removal. If active nests are found, do not remove trees until the young have fledged.							•					
Avoid snag and large tree removal to the extent possible.							•					
Leave small portions of cut and felled trees in upland areas as additional habitat/ structure for wildlife where appropriate, if acceptable to the landowner/ land manager, and not a fire risk.							•					
Top or trim danger trees to create snags where practical and not a hazard to other resources (e.g., recreational users, roads, structures, etc.).	•	•					•					
Conduct pre-construction biological surveys for Oregon slender salamander, Larch Mountain salamander, and American pika in all proposed work areas on cliffs and talus slopes; for red tree voles in areas where clumps of five or more trees would be removed; for aquatic mollusk and amphibians in areas where in-water work is proposed; and for the northern spotted owl in suitable habitat. Surveys would be conducted by a qualified biologist. If surveys show no evidence of these special-status wildlife species, no additional conservation measures shall be required. If they are found, implement the following species-specific measures: • Establish a 330-foot buffer zone around active pika breeding areas in talus fields as well as adjacent meadows that pikas use for foraging (Beever, pers. comm., U.S.Geologic Survey [USGS], Nov. 14, 2014); the buffer should be maintained until the end of the breeding season (March to July). • Relocate identified Larch Mountain and Oregon slender salamanders and establish a 25-foot radius buffer around identified breeding site in talus and							•					

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
moist microclimate features (e.g., down logs, rocks).												
Avoid construction activities in designated big game winter range that is outside of the influence of interstate and train development (0.25 mile) from December 1 to March 1 or as determined through consultation with ODFW.							•					
Prepare and implement a Fugitive Dust Control Plan.	•	•	•						•			•
Encourage construction vehicles to travel at low speeds on access roads and construction sites to minimize dust.	•	•	•				•		•			•
Use staging areas based on proximity to active construction sites, to the extent feasible and practical, to minimize vehicle miles travelled between staging areas and construction sites.									•			
Site equipment staging areas away from sensitive receptors, such as residences and schools, to reduce health risk exposure to temporary increases in criteria pollutants and dust during equipment and vehicle operations.									•			•
Initiate discussions with local fire districts prior to construction and work with the districts and other appropriate emergency response entities to develop appropriate fire and emergency response plans.				•			•			•		•
Equip all vehicles with mufflers maintained in good operating condition.							•					•
Locate equipment as far away as practical from noise-sensitive areas.												•
Comply with all fire safety laws, rules, and regulations of Oregon and prepare a Fire Prevention and Suppression Plan to meet BPA, local authority, and land manager requirements.				•						•		•
Obtain a permit for operation of power-driven machinery on forested lands from Oregon Department of Forestry and comply with fire prevention permit requirements.				•			•		•			•
Implement fire prevention measures including use of spark arrestors, water tenders, bulldozers, and a watch person to secure work areas at end of day if required.												•
Minimize rockslide hazards during upslope activities, including the implementation of slope stabilization measures and installation of flow drainage materials prior to			•		•							•

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
construction activities.												
Develop and implement rockslide emergency response procedures for use in the event of rockslide.			•									•
Minimize vegetation clearing in areas visible to KVAs to the extent possible.								•				
Minimize extending and improving access roads in areas visible to KVAs to the extent practical.								•				
Use Permeon or a similar product to advance the weathering of fresh road cuts that expose light-colored rock in areas visible to KVAs.								•				
Locate material and helicopter staging areas as close to construction sites as practicable to minimize travel distances between staging areas and work areas.									•			
Locate staging areas in previously disturbed or graveled areas to minimize soil and vegetation disturbance where practicable.			•	•	•				•			
Minimize mature tree clearing in pulling/tensioning work areas, as practical.				•			•		•			
Encourage the use of the proper size of equipment for the job to maximize energy efficiency.									•			
Use locally sourced materials and local disposal areas, as practical, to reduce vehicle travel distances.									•			
Conduct cultural resource consultation and investigations on previously unsurveyed areas prior to ground disturbance.											•	
Avoid siting access roads across historic properties during the design process, where possible.											•	
Minimize the size of construction disturbance areas and removal of vegetation near cultural resource sites, to the greatest extent possible. Limit construction near cultural site boundaries where possible.				•							•	
Explain cultural resource-related mitigation measures to construction contractors and inspectors, including field marking for avoidance, during preconstruction meetings. Depict cultural sites as “sensitive areas to be avoided” in construction documents and											•	

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
on construction maps.												
Prepare and implement a mitigation plan for unavoidable adverse impacts on cultural resources eligible for listing in the National Register in consultation with the State Historic Preservation Offices (SHPOs) and consulting Tribes.											•	
Implement an Inadvertent Discovery Plan for cultural material (e.g., structural remains, Euro-American artifacts, or tribal artifacts) that details construction crew member responsibilities for reporting in the event of a discovery of cultural material during construction; requires work to stop immediately and notification of local law enforcement officials (as required), appropriate BPA personnel, SHPOs, land managers, and affected Tribes if cultural resources or human remains are discovered during construction activities.											•	

Table 2.7-1. Potential Mitigation Measures

Measure	Land Use and Transportation	Recreation	Geology and Soils	Vegetation	Waterways and Water Quality	Wetland and Floodplains	Fish and Wildlife	Visual Quality	Air Quality and Greenhouse Gases	Socioeconomics and Public Services	Cultural Resources	Noise, Public Health and Safety
Implement an Inadvertent Discovery Plan for human remains, suspected human remains, or items suspected to be related to a human burial (i.e., funerary items, sacred objects, or objects of cultural patrimony) that follows the National Scenic Area Management Plan. This would include the following procedures: • **Halt activities**. All survey, excavation, and construction activities shall cease. The human remains shall not be disturbed further. • **Notification**. Local law enforcement official, the local government, the U.S. Forest Service, the Gorge Commission, and the Indian tribal governments shall be contacted immediately. • **Inspection**. The county coroner, or appropriate official, shall inspect the remains at the project site and determine if they are prehistoric, historic, or modern. Representatives from the Indian tribal governments shall have an opportunity to monitor the inspection. • **Jurisdiction**. If the remains are modern, the appropriate law enforcement officials shall assume jurisdiction and the cultural resource protection process may conclude. • **Treatment**. In Oregon, prehistoric/historic remains of Native Americans shall generally be treated in accordance with the in accordance with the procedures set forth in ORS 97.740 to 97.760.											•	

Chapter 3
Affected Environment and Environmental Consequences

This chapter includes an analysis of the potential impacts of the Proposed Action and the No Action Alternative on the human and natural environment. The following sections are organized by resource area. Each of these sections includes a description of the affected environment in the project area (generally the area in the immediate vicinity of the Bonneville-Hood River transmission line) for a specific resource and an analysis of the potential impacts on that resource. Mitigation measures that would lessen or avoid impacts on the environment have been developed for each resource area and are presented in Chapter 2 (Table 2.7-1). A discussion of potential cumulative impacts is provided at the end of this chapter, as is a discussion of project consistency with regional, state, and local land use plans and programs.

Because the Cascade Locks Tap rebuild disturbance areas largely overlap with the Bonneville-Hood River line right-of-way (see Figure 2.1-3), in each resource section in this chapter, the affected environment and impacts associated with the Cascade Locks Tap are discussed together with those associated with the Bonneville-Hood River Line.

3.1 Land Use and Transportation

This section describes the affected environment and potential impacts related to land use, including land ownership, uses of land, and lands with special designations. This section also describes the affected environment and potential impacts related to the transportation system in the area and its use. While this section also identifies some of the more significant recreational resources in the project vicinity, Section 3.2, *Recreation,* describes these resources in more detail and provides an analysis of potential impacts on recreational uses in the project vicinity.

3.1.1 Affected Environment

Land Ownership

The project area crosses a mix of private and public land ownership, as summarized in Table 3.1-1 and shown in Figure 3.1-1. The majority of land in the project area is public land managed by the U.S. Forest Service, Oregon State Parks, and Oregon Department of Fish and Wildlife (ODFW). The largest public land system crossed is National Forest System lands. Lands managed by Oregon State Parks are within eight park units: Starvation Creek State Park, Viento State Park, Wygant State Natural Area, Vinzenz Lausmann Memorial State Natural Area, Seneca Fouts Memorial State Natural Area, Lindsey Creek State Park, Lang State Park, and the John B. Yeon State Scenic Corridor. A small portion of the project crosses lands managed by ODFW for the Oxbow Fish Hatchery.

The transmission line right-of-way passes through 76 privately owned parcels. Many of these private parcels are located near the City of Hood River at the eastern end of the project. Most of the parcels are owned by different landowners (66 owners in total).

Table 3.1-1. Land Ownership in the Project Area

Landowner Type	Transmission Line (miles)	Access Roads (miles)	Trails (miles)
Private	4.8	6.5	0.0
Public			
Federal (U.S. Forest Service)	11.2	14.6	3.1
State (State Parks, ODFW)	5.8	6.8	2.6
Total	**21.9**	**27.9**	**5.7**

Land Use

The project area crosses lands that are designated or zoned for various subcategories of agricultural, forest land, or developed uses. Below is a description of the various land use classifications in the project area.

Agricultural

There are about 25,817 acres of farm land in Hood River County, representing about 7.7 percent of the 335,285-acre county (USDA 2012b, c). Most (84.9 percent) of this area is in orchards, with the main orchard crop being pears (USDA 2012a, b). Along the project area, most of the agricultural lands are at the eastern end near the city of Hood River (Figure 3.1-2). In this area, most of the agricultural lands within the transmission line right-of-way include orchards and vineyards. Other agricultural uses include row crops, pastures, plant nurseries, ornamental horticulture, and confined feeding operations. Interspersed with these uses are homes and residential developments. The project crosses about 33 acres of lands designated or zoned as agricultural lands (U.S. Forest Service 2012; Hood River County 2014a).

The Farmland Protection Policy Act (FPPA) requires federal agencies to minimize the extent to which their programs contribute to the unnecessary and irreversible conversion of prime farmland, unique farmland, and farmland of statewide or local importance to non-agricultural uses. Farmland subject to the FPPA requirements do not have to be currently used for cropland, and therefore is not a subset of the agricultural land described above. There are 7.4 acres of prime farmland, 48.7 acres of farmland of statewide importance, and 6.9 acres of prime farmland if irrigated within the project area (NRCS 2014).

Forest

Forested lands are natural, open space landscapes with a mix of conifer and deciduous forest, and scrub/shrub vegetation used primarily as wildlife habitat and for human recreation. The project area crosses about 343 acres of lands designated or zoned as forest lands (U.S. Forest Service 2012; Hood River County 2014a). The majority of forested lands (326 acres) are located on National Forest System lands and within the state park units crossed by the project (Figure 3.1-2). The remaining acreage (17 acres) of forested lands is in private ownership. The private forestlands are used primarily for residential sites. Tall, mature trees are not present within the existing transmission line right-of-way or along most existing access roads. The vegetation within the right-of-way has been frequently cut to allow for safe and reliable operation and maintenance of the line.

Developed

The project area crosses about 64 acres of developed lands (U.S. Forest Service 2012; Hood River County 2014a). Developed lands are mostly located west of the Hood River Substation between line miles 20 and 24 and include commercial businesses, industrial and commercial complexes, residential development, low-density rural residences, transportation corridors, and utility infrastructure, including the existing transmission line. In addition, the project crosses about 4 acres of land designated for public recreation. The project passes south of the city limits of Hood River, but within a small portion of the Urban Growth Boundary in the Indian Creek Golf Course area (line mile 23). In addition, two access roads for the project pass through the southern edge of the Cascade Locks city limits and Urban Growth Boundaries. In the Hood River area, residential and commercial development abuts the existing transmission line corridor.

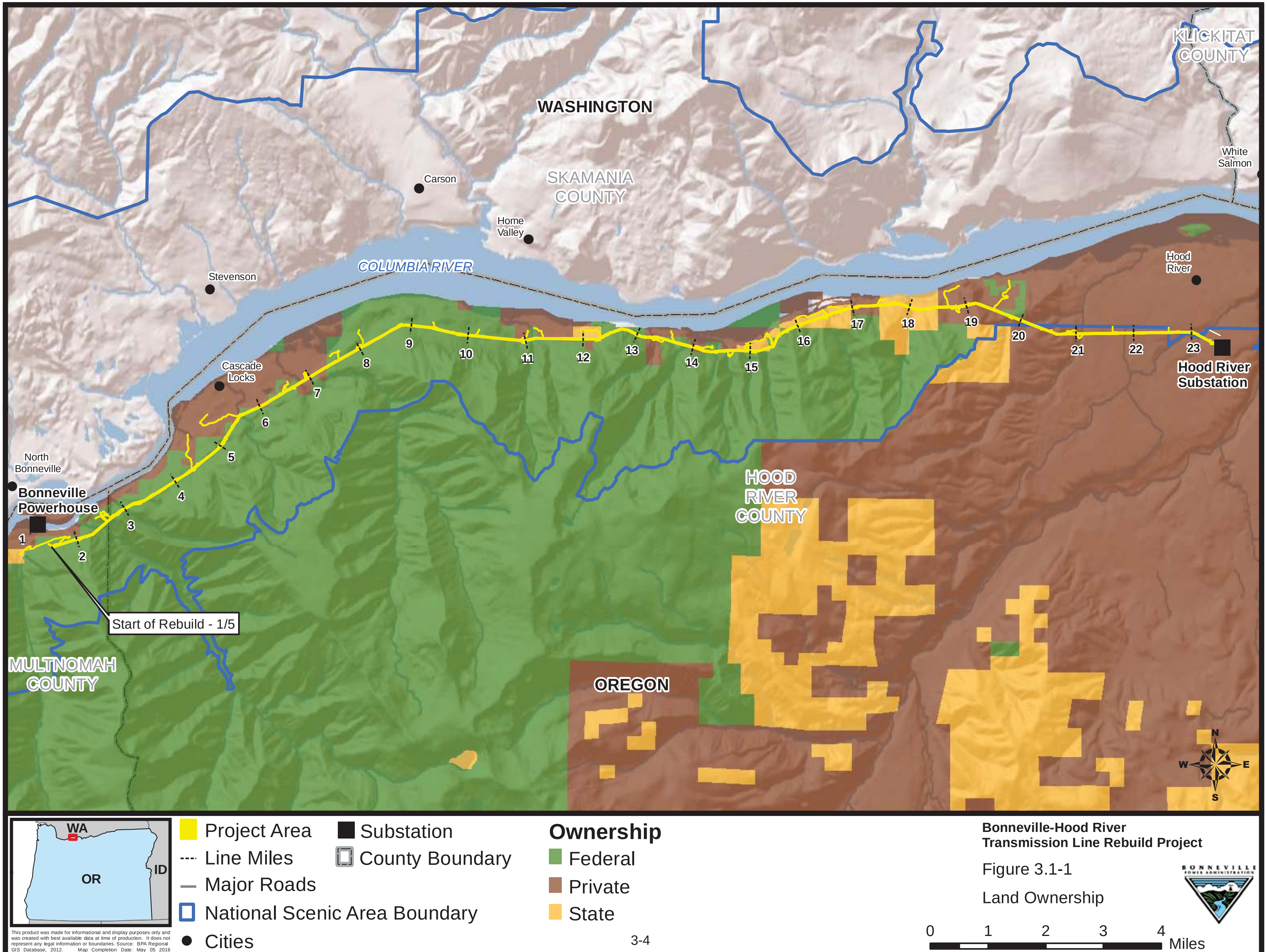
Special Land Use Designations

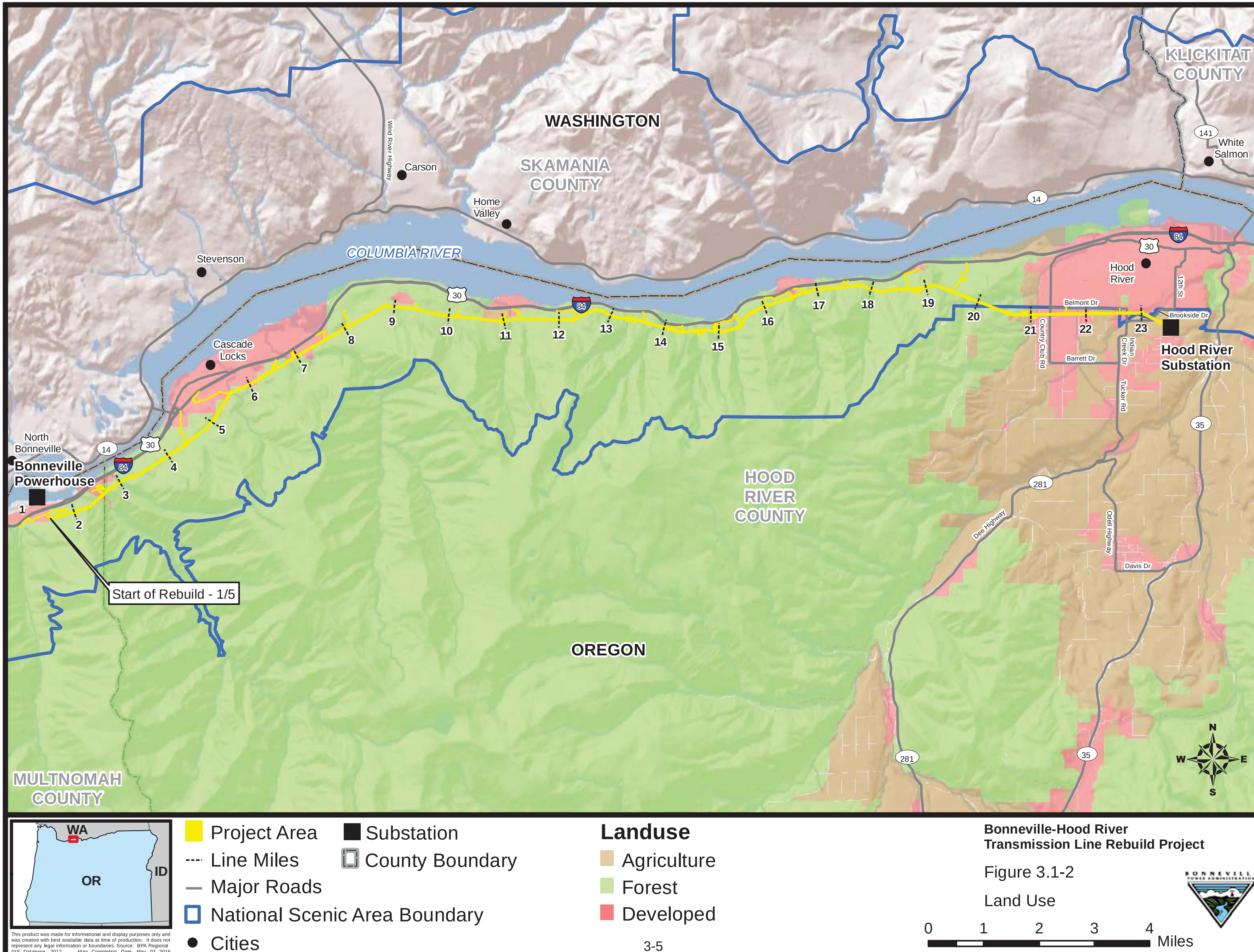
Columbia River Gorge National Scenic Area

The National Scenic Area was designated to protect and enhance the scenic, natural, cultural, and recreation resources of the Columbia River Gorge, while encouraging new growth to occur in existing urban areas. Public lands within the National Scenic Area are managed according to the Management Plan for the National Scenic Area (Gorge Commission 2011). The National Scenic Area is managed on a partnership basis by the Columbia River Gorge Commission, the states of Oregon and Washington, the six counties with land in the National Scenic Area, and the U.S. Forest Service. About 19 miles of the existing transmission line is within the National Scenic Area. In the National Scenic Area, the project crosses lands designated as General Management Area (GMA) and Special Management Area (SMA) including Agriculture, Forest, Open Space, and Public Recreation. The existing transmission line also crosses lands within the Urban Area designation. Please see Section 3.15.2, *Columbia River Gorge National Scenic Area Management Plan* for additional information about the National Scenic Area Act and the National Scenic Area Management Plan.

Wilderness Areas

The transmission line right-of-way is adjacent to the Mark O. Hatfield Wilderness for about 9 miles, 2 miles of which (between line miles 2 and 4), the right-of-way directly abuts the Wilderness boundary (see Figure 3.2-1). The Mark O. Hatfield Wilderness is a unit in the National Wilderness Preservation System as designated under the Wilderness Act of 1962 (Wilderness Act) and amended in 2009. The Wilderness Act generally prohibits most motorized and mechanical access, and human infrastructure (e.g., roads and transmission lines) within designated Wilderness Areas. The Wilderness Area boundary within the project area has been identified, but not yet fully mapped beyond a coarse scale; the U.S. Forest Service is currently drafting legal descriptions of the Wilderness Area as per the 2009 Wilderness Act (16 U.S.C. 546b–1). All project components near the Wilderness Area were constructed prior to the Wilderness Area designation. The existing transmission line or access system is not within the currently designated Wilderness Area.


WASHINGTON
SKAMANIA COUNTY
KLICKITAT COUNTY
White Salmon
Carson
Home Valley
Stevenson
COLUMBIA RIVER
Hood River
Cascade Locks
North Bonneville
Bonneville Powerhouse
Hood River Substation
HOOD RIVER COUNTY
MULTNOMAH COUNTY
OREGON
Start of Rebuild - 1/5
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
N
S
E
W
WA
OR
ID
Project Area
Line Miles
Major Roads
National Scenic Area Boundary
Cities
Substation
County Boundary
Ownership
Federal
Private
State
Bonneville-Hood River
Transmission Line Rebuild Project
Figure 3.1-1
Land Ownership
0
1
2
3
4
Miles
This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: May 05 2016



Bonneville-Hood River Transmission Line Rebuild Project

Figure 3.1-2

Land Use

Land and Water Conservation Fund Lands

The Land and Water Conservation Fund (LWCF) is a federal program to conserve lands and improve outdoor recreation opportunities throughout the nation. The program works in partnership with state and local efforts to acquire and protect inholdings and expansions in national parks, national wildlife refuges, national forests, national trails, and Bureau of Land Management (BLM) areas. LWCF grants to states support for the acquisition and development of state and local parks and recreational facilities. Section 6(f) of the LWCF Act requires that no property acquired or developed with LWCF assistance shall be converted to other-than-public outdoor recreational uses without the approval of the Secretary of the Department of the Interior. The right-of-way crosses a total of approximately 60 acres of lands funded by the LWCF between line miles 15 and 18, and again in line miles 19 to 20. Lands funded by the LWCF are located in Viento State Park, Vinzenz Lausmann Memorial State Natural Area, and Wygant State Natural Area.

Transportation

I-84/US 30 is the primary vehicular transportation roadway in the project area (Figure 3.1-2). I-84 is the major east/west interstate highway in Oregon and consists of a four-lane freeway (two lanes each direction) through the Columbia River Gorge. US 30 shares an alignment with I-84 throughout most of the gorge. Traffic volumes along I-84/US 30 between the Bonneville Dam Interchange and the 2nd Street Interchange in Hood River range between 18,100 and 23,200 vehicles daily as accounted for in the annual ***average daily traffic*** statistics. Traffic volume is slightly higher at the interchanges to Hood River than between the dam and Hood River (ODOT 2012).

The project also crosses multiple local roads, particularly in the Cascade Locks and Hood River areas. A few local roads are currently used as access roads to the right-of-way, such as Dry Creek Road in Cascade Locks and Tyler Drive in Hood River. The project crosses three of the eight county roads that Hood River County has identified as critical "due to their function of providing connectivity and agricultural farm-to-market access, as well as access to recreational areas" (Hood River County 2011). These eight critical roads are also estimated to carry the highest volume of daily traffic of all county roads (Hood River County 2011). The three critical county roads crossed by the project include Country Club Road (line mile 21), Indian Creek Road (line mile 23), and Brookside Drive (line mile 23), all of which are within the general Hood River area. Bicyclists and pedestrians also use several of the local roads crossed by the project.

Transportation in the project area is generally guided by the Hood River County Transportation System Plan (Hood River County 2011), which covers ***unincorporated*** areas of Hood River County. Transportation in the Urban Growth Boundary of Hood River is guided by the city of Hood River Transportation System Plan (City of Hood River 2011). Transportation in the Cascade Locks Urban Growth Boundary is guided by the City of Cascade Locks Transportation System Plan (City of Cascade Locks 2001a). These transportation system plans address street classification standards, design standards, access management, modal plans, transportation demand, and plan implementation. Bicycle facilities are addressed by the Hood River County Bicycle Plan (Hood River County 2010), which is incorporated by reference into the county's Transportation System Plan. Bicycle facilities are also addressed by the two city transportation system plans.

Outside of established recreational areas, project access roads within the National Forest System lands and the eight state park units are generally not open to the public; however, a low level of unauthorized vehicular, mountain biking, and pedestrian use of the access roads does occur, despite the presence of gates and signage.

3.1.2 Environmental Consequences–Proposed Action

Land Ownership

A total of 0.3 mile of easements for existing access roads would be acquired under the Proposed Action (0.1 mile on National Forest System lands and 0.2 mile on lands owned by the State of Oregon), regardless of Line Mile 19 Option. No new right-of-way easements would be needed for the transmission line. Underlying land ownership and surrounding land uses would not change; therefore, acquisition of new easements would have **no** to **low** impact on land ownership.

Land Use

Impacts on land use in the project area would include the permanent removal of land from existing uses within the permanent footprint of the relocated structures and the footprint of extended access roads and trails. Impacts also would include the removal of landscaped or agricultural vegetation and the disruption of uses and traffic during construction activities, which would be considered temporary impacts. Tables 3.1-2 and 3.1-3 provide a detailed breakdown of the number of acres of permanent and temporary project impacts by land use category. A number range is depicted in the impact tables when the temporary and permanent project component impacts vary by Line Mile 19 Option. Under the Line Mile 19 Options, there would be minor differences (0.1-acre difference between options) in impacts associated with access road extensions and reconstruction within forest lands. Impacts on all other land use categories would be the same regardless of Line Mile 19 Option.

Table 3.1-2. Summary of Permanent Project Impacts on Land Use[1]

Land Use Categories	Structure Impacts (Acres)	Access Roads	Trails	Total (Acres)
		Extension (Acres)	Extension (Acres)	
Agriculture	0.0	0.0[2]	0.0	**0.0**
Forest	0.1	0.2 - 0.3	0.1	**0.3 - 0.4**
Developed	<0.1	0.0	0.0	**<0.1**
Total[3]	**<0.1**	**0.2- 0.3**	**0.1**	**0.3 - 0.4**

Notes:
[1] Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, a range is shown. More detail regarding impacts by option is included in the accompanying text.
[2] Routes of travel may require the orchard or vineyard clearing, but would not preclude the use of the land for other low-growing agricultural uses. Vineyard and orchard clearing may occur at up to 0.7 acre.
[3] Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.

Table 3.1-3. Summary of Temporary Project Impacts on Land Use[1]

Land Use Categories	Structure Impacts (Acres)	Access Roads				Trails			Total (Acres)
		Extension (Acres)	Reconstruction (Acres)	Improved (Acres)	Direction of Travel – Overland (Acres)	Extension (Acres)	Reconstruction (Acres)	Improve (Acres)	
Agriculture	1.9	0.0	0.0	0.9	1.0[2]	0.0	0.0	0.0	**3.8**
Forest	41.4	0.1	0.1 - 0.3	13.1	0.1	0.3	0.9	0.8	**56.8 - 57.0**
Developed	6.1	0.0	0.1	2.3	1.3	0.0	0.0	0.0	**9.8**
Total[2]	**49.3**	**0.1**	**0.2 - 0.4**	**16.3**	**2.4**	**0.3**	**0.9**	**0.8**	**70.4 - 70.6**

Note:
[1] Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, a range is shown. More detail regarding impacts by option is included in the accompanying text.
[2] Routes of travel may require the orchard or vineyard clearing, but would not preclude the use of the land for other low-growing agricultural uses. Vineyard and orchard clearing may occur at up to 0.7 acre.
[3] Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

Agriculture

There are no agricultural lands within Line Mile 19; therefore, impacts on agricultural lands would be the same for all Line Mile 19 Options. Impacts on agricultural lands include temporary disturbance to soils, crops, and animals, as well as inconvenience to farmers, from the replacement of structures and improvements of access roads and trails. Livestock and other farm animals that are present during construction activities would be temporarily displaced. Construction activities that occur during the growing season could temporarily damage or remove non-orchard or vineyard agricultural crops. Fruit tree and grape vine clearing would be required to access sites for structure, hardware, and/ or conductor replacement. Orchard and vineyard clearing in Direction of Travel would be maintained and not replanted, but these areas could be used for other low-growing agricultural uses. Landowners would be compensated for any crops lost for the project (see Table 2.7-1). There would be no permanent removal of lands available for agricultural land use, though about 0.7 acre would be cleared of orchard trees and vineyards and would require low-growing crops in the future (Table 3.1-2). About 3.8 acres of temporary impacts to lands with agricultural land uses (Table 3.1-3) would occur for project construction.

No prime and high-value farmlands would be permanently impacted. During construction, temporary impacts to prime and high-value farmlands would include approximately 1.5 acres at structures and 3.7 acres at access roads. Given the temporary nature of construction-related impacts, the mitigation measures proposed (e.g., compensating landowners for damaged crops, restoring compacted soils, use of BMPs to limit the spread of noxious weeds, separating topsoil in croplands, and minimizing disturbance to agricultural activities; see Table 2.7-1), and the small area of disturbance, the Proposed Action would result in **low** impacts on agricultural lands.

Forest

Overall, during construction, 56.8 to 57 acres of forest land (depending on Line Mile 19 Option) would be temporarily impacted by structure removal and replacement, hardware or conductor replacement, as well as access road and trail improvements and reconstruction (Table 3.1-3). The area impacted would be small when compared to the total of 343 acres of forest land within the project area, and construction would primarily occur on existing access roads and trails, and within the existing right-of-way, resulting in minimal clearing of actual trees. Disturbed vegetation or areas cleared of vegetation within lands designated as forest lands would be allowed to re-grow or be re-seeded with low-growing vegetation.

Construction of structures and extension of the access road and trail system would result in permanent impacts on 0.3 to 0.4 acre of forest land, depending on Line Mile 19 Option. Five structures would be moved to a new location within designated forest land, though in the existing cleared right-of-way resulting in 0.1 acre of permanent impacts from structures. Trail and access road extensions would result in a total permanent impact between 0.2 and 0.4 acre, depending on Line Mile 19 Option selected.

Impacts to forest land would be similar between the Line Mile 19 Options. The overall project would have the least temporary (56.8 acre) and permanent (0.3 acre) impact to forest land uses under Line Mile 19 Option 3 as the line mile 19 access road extensions and road reconstruction would not occur. The overall project with Line Mile Options 1 and 2 would have very similar land use impacts and would deviate slightly (0.1 acre) in the quantity of access road extensions that would permanently impact the area.

Since the temporary and permanent impacts on lands designated or zoned as forest land are generally confined to small areas within the existing transmission line right-of-way and access roads and trails and would not preclude other uses, the impacts on forest land from the Proposed Action would be **low**, regardless of Line Mile 19 Option selected.

Developed

There are no developed lands within the Line Mile 19 Option area; therefore, impacts on developed lands would be the same for all Line Mile 19 Options. A small amount (about 10 acres) of developed land would be temporarily disrupted by improvement and reconstruction of access roads, replacement of structures, or replacement of hardware or conductor. During construction, project activities would be evident to people living, working, and traveling near the project area. Residents would experience construction-related noise, dust, and traffic delays. Impacts would vary depending on the density and type of development in each area and proximity to transmission lines and access roads. Temporary construction impacts at any one structure location would only occur for a few days and thus would be short term in duration. The Proposed Action would have less than 0.1 acres of long-term, permanent impacts on developed lands.

Due to the temporary and intermittent nature of the impacts within developed land and urban areas, and mitigation measures to address construction noise and activities (e.g., limiting noise-generating construction activities to daytime hours and providing a schedule of activities to all potentially affected landowners; see Table 2.7-1), the Proposed Action would result in a **low** impact on developed land.

Special Land Use Designations

Columbia River Gorge National Scenic Area

The Proposed Action would include activities on lands designated as SMA and GMA within the National Scenic Area, as well as Urban Areas within the National Scenic Area. Overall, between about 66.2 and 66.4 acres would be temporarily disturbed within the National Scenic Area, with between 54.2 and 54.4 acres (depending on Line Mile 19 Option) of this disturbance occurring in SMA, 4.2 acres in GMA, and 7.8 acres in Urban Areas. About 0.3 and 0.4 acre (0.1 percent of the project area) of land would be permanently altered within the National Scenic Area by structures, access roads, and foot trails. Due to the temporary nature of project disturbance and the very limited extent of permanent alteration to an already existing transmission facility located within the National Scenic Area, the Proposed Action would not expected to result in any significant changes in land use within the National Scenic Area. Accordingly, the project would be expected to have a **low** impact on land use within the National Scenic Area. See Section 3.15.2, *Columbia River Gorge National Scenic Area Management Plan*, for a more detailed discussion of project activities within the National Scenic Area and the consistency of these activities with the National Scenic Area Management Plan.

Wilderness Areas

The proposed project would be located parallel to, but not within designated Wilderness Area for about 9 miles. Because the project would not result in any ground disturbance in the Wilderness Area, there would be **no** change in land use in the Wilderness Area as a result of construction of the project. Potential impacts to recreational users of the Wilderness Area are discussed in Section 3.2, *Recreation*.

Land and Water Conservation Fund Lands

The Proposed Action would include temporary disturbance from access road and structure work on 2.7 acres and 4.9 acres, respectively, on lands funded by the LWCF. These impacts would be the same regardless of Line Mile 19 Option. As described further in Section 3.2, *Recreation*, project construction would temporarily disrupt recreational activities in some locations due to increases in traffic, noise, and dust. While the project would result in a temporary disruption to uses in these areas, the project would not result in the permanent conversion of any of these recreation lands to a non-recreation use. As temporary disruptions are allowed under the terms of the LWCF, project activities would not result in these lands not meeting the requirements of the LWCF; therefore, the project would have a **low** impact on use of LWCF lands for all Line Mile 19 Options.

Transportation

The Proposed Action would result in short-term, site-specific transportation impacts from construction-generated traffic related to rebuilding the transmission line, as well as building, rebuilding, and improving access roads and trails. Transportation impacts would remain similar under the Line Mile 19 Options. During construction, there would be minor increases in traffic on roadways needed to access the right-of-way for rebuilding and road work efforts. These would include traffic increases on I-84 and local roads, primarily within the general Cascade Locks and Hood River areas. The increase in daily traffic volume on roads would be low; 20 to 50 construction employees are expected to be working along the entire right-of-way at one time (see Section 2.1.9, *Construction Activities*). In addition, a few roads that provide access to the right-of-way would need to be improved; however, these roads are not heavily used and are generally not public roads; thus, construction activities would result in only negligible traffic delays on these roadways and **low** impacts on transportation.

Traffic entering access roads and/or parking areas off I-84 (or the associated Frontage Road) would also increase as there are limited vehicular access points in the gorge, and most project roads or trails would be accessed via existing access roads or parking areas off the interstate/Frontage Road. Increased traffic at some parking areas and/or associated access roads, particularly those at recreation sites with small parking areas (e.g., Starvation Creek Trailhead), may result in delays/traffic congestion for visitors entering/exiting the parking areas or visitors using the access roads to reach nearby recreation sites (campgrounds, trailheads, etc.), resulting in temporary **moderate** impacts on transportation. BPA would coordinate and schedule construction traffic with the Oregon Department of Transportation (ODOT), the U.S. Forest Service, and Oregon State Parks (see Table 2.7-1). Please see Section 3.2, *Recreation,* for additional information on impacts from project access roads and trails.

Construction activities may also necessitate lane or road closures near transmission line segments adjacent to or at road crossings, primarily within the Hood River area and potentially along I-84 to provide rock fall safety during micropile installation. Traffic delays and disruptions to the pedestrian and bicycle network associated with lane/road closures would be temporary (likely spring to fall in 2018, 2019, and possibly 2020) and would shift based on the construction schedule such that no one location would experience traffic increases or road closures for more than a week at a time. Construction activities would not close/block access to residences or businesses.

Construction activities would not be expected to substantially alter the pedestrian and bicycle network, or degrade traffic flow in the area, except on the three roads identified as critical by Hood River County: Country Club Road, Indian Creek Road, and Brookside Drive. For the pedestrian and bicycle networks and for roadways except for Country Club Road, Indian Creek Road, and Brookside Drive, construction-related traffic may result in short-term traffic slowing/congestion or delays, which would be a **moderate** impact. For Country Club Road, Indian Creek Road, and Brookside Drive, there could be a **high** short-term (over the course of a day or two) traffic impact without implementation of any mitigation, as these three roads carry a high volume of traffic within the general Hood River area . However, impacts on Country Club Road, Indian Creek Road, and Brookside Drive would be reduced to **moderate** through the implementation of various mitigation measures (e.g., coordinating routing and scheduling with ODOT, employing traffic-control flaggers and posting signs, and coordinating with emergency responders; see Table 2.7-1), which would also reduce impacts on other roadways from lane/road closures.

BPA would acquire additional easements for access roads and trails. Acquisition of these easements would have a **low** effect on future transportation planning in the area because most of the access roads and all of the trails already exist and provide necessary access to public or private lands.

Access roads and trails within the right-of-way are generally for BPA use only, and public access/use is discouraged through the placement of gates and appropriate signage, although some access roads have shared rights with the underlying landowner. Access road and trail extensions would largely be located within the right-of-way and would not be open for public use. Project access roads and trails could attract unauthorized vehicular, pedestrian, or bicycle use, resulting in associated resource damage and noise. To prevent this unauthorized use, BPA would install or improve gates at the entrances to access roads to prevent public access to the transmission line right-of-way. However, despite the gates and signage, unauthorized public use of project access roads is likely to occur based on known unauthorized use of roads and trails within the project area. BPA does use public trails for project access as well. Improvement of trails open to the public would result in a long-term beneficial impact on trails and trail use. Because BPA would discourage unauthorized use of trails and roads through gates and signage, and public trails used to access the Project would be improved, the long-term impact of project access road and trail work would be **low.** BPA would work with Oregon State Parks and the U.S. Forest Service to determine if other deterrents are needed on a site-specific basis depending on site-specific needs and management requirements (see Table 2.7-1).

3.1.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on land use and transportation are identified in Table 2.7-1 in Chapter 2 of this EA.

3.1.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line, and no access roads or trails would be improved, reconstructed, or extended. Since there would be no planned construction occurring, BPA would continue operations and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing land uses thus would be the same as existing conditions, with **no** or **low** impact on land use. Unauthorized use of project access roads and trails also would continue at the existing **low** level.

Over time, as the condition of the transmission line continues to deteriorate, the frequency and magnitude of maintenance activities would increase and some repairs would likely occur on an emergency basis. Access road improvements may also be required to allow access to structures for planned and emergency maintenance activities. Increased maintenance activities could result in intermittent traffic/congestion, delays, or lane/road closures; and disturbance to residential and agricultural land uses. These disturbances and closures would be similar to those required for the Proposed Action. Because emergency work cannot be scheduled and failure at multiple locations simultaneously is possible as the line ages, disruptions to land uses or road closures may not be coordinated with the underlying land owner or manager. Further, emergency actions may be required during peak use of lands or roadways, such as weekends, which would result in increased delays or disruptions of uses. Overall and in the long term, the No Action Alternative could result in **low** to **high** impacts on land use and transportation, depending on the duration, location, timing, and urgency.

3.2 Recreation

3.2.1 Affected Environment

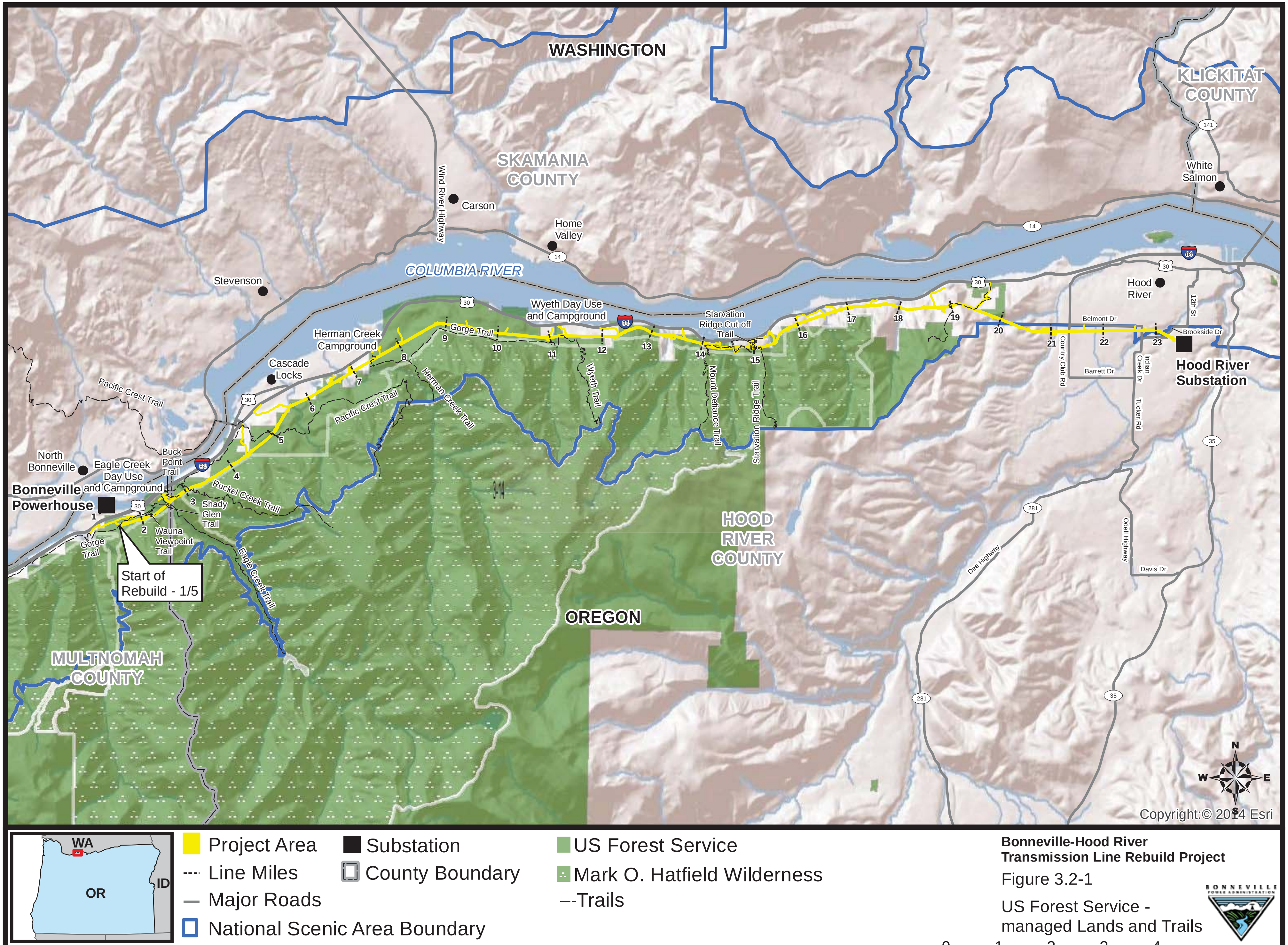
The project area is located within or near several public recreation sites and trails, many of which are located within the Columbia River Gorge National Scenic Area. The following describes the recreation facilities and resources in the project vicinity on lands managed by the U.S. Forest Service, Oregon State Parks, and ODFW. Other important recreation resources within and near the project area are also described.

Recreation Lands Managed by the U.S. Forest Service

The existing transmission line and access roads pass through or are located near several recreation facilities on lands within the National Forest System managed by the U.S. Forest Service; these facilities are described from west to east below (Figure 3.2-1). The names of recreation sites/facilities are noted in *italicized text* in this section for ease of reference.

The westernmost recreation facilities within the project area are at *Eagle Creek* (near line mile 2) and include the *Eagle Creek Campground*, *Eagle Creek Trail*, *Buck Point Trail*, *Shady Glen Trail*, *Wauna Viewpoint Trail*, and *Eagle Creek Day Use Area/Trailhead*.

- The *Eagle Creek Campground* is located near line mile 2. It is open during the summer season (May 1 through September 30) and is heavily used during this period. Interpretive talks are offered throughout the summer.
- The *Buck Point Trail #439* is accessible from the Eagle Creek Campground and is lightly used (U.S. Forest Service 2014a). The Buck Point Trail intersects the transmission line at line mile 2.
- *The Eagle Creek Day Use Area/Trailhead* offers two picnic sites and four group picnic sites, as well as trailheads for the *Eagle Creek*, *Shady Glen*, and *Gorge* trails. The site receives heavy use (U.S. Forest Service 2014c). The day use area/trailhead is located about 300 feet north of the transmission line near line mile 3.
    - *The Shady Glen Trail #402A* is a lightly used, short loop trail beginning at the Eagle Creek Day Use Area (U.S. Forest Service 2014k). The trail intersects the transmission line near line mile 3.
    - The historic *Eagle Creek Trail #440* (U.S. Forest Service 2014b) is also accessible from the day use area/trailhead and is one of the most popular trails in the gorge (U.S. Forest Service 2014d). Rebuild of the transmission line would begin east of the *Eagle Creek Trail;* the trail crosses the transmission line right-of-way near line mile 3.
    - *The Gorge Trail #400* provides hiking and some mountain biking opportunities on limited segments of the trail (U.S. Forest Service 2014e) and is accessible from the day use area. The Gorge Trail primarily parallels the right-of-way anywhere from 600 to 2,100 feet north between line miles 1.5 and 5, and crosses the right-of-way at a few locations in line mile 2.
    - Also in the Eagle Creek area is the *Wauna Viewpoint Trail #402*, a 1.8-mile trail that climbs through the Eagle Creek valley and ends near the middle of line mile 2. This trail is lightly used (U.S. Forest Service 2014n). This trail would be used as a project access trail.


WASHINGTON
KLICKITAT COUNTY
SKAMANIA COUNTY
Wind River Highway
Carson
Home Valley
White Salmon
Stevenson
COLUMBIA RIVER
Wyeth Day Use and Campground
Starvation Ridge Cut-off Trail
Hood River
Belmont Dr
12th St
Brookside Dr
Herman Creek Campground
Cascade Locks
Gorge Trail
Pacific Crest Trail
Herman Creek Trail
Wyeth Trail
Mount Defiance Trail
Starvation Ridge Trail
Country Club Rd
Barrett Dr
Indian Creek Dr
Tucker Rd
Hood River Substation
North Bonneville
Eagle Creek Day Use and Campground
Buck Point Trail
Bonneville Powerhouse
Ruckel Creek Trail
Shady Glen Trail
Wauna Viewpoint Trail
Gorge Trail
Start of Rebuild - 1/5
Eagle Creek Trail
HOOD RIVER COUNTY
OREGON
Dee Highway
Odell Highway
Davis Dr
MULTNOMAH COUNTY
Copyright:© 2014 Esri
N
E
S
W
Project Area
Substation
US Forest Service
Line Miles
County Boundary
Mark O. Hatfield Wilderness
Major Roads
Trails
National Scenic Area Boundary
Cities
WA
OR
ID
This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: June 29 2016
Bonneville-Hood River Transmission Line Rebuild Project
Figure 3.2-1
US Forest Service - managed Lands and Trails
0 1 2 3 4 Miles

After passing through the Eagle Creek area, the transmission line crosses *Ruckel Creek Trail #405* near line mile 3. The trail receives light use and provides access to the Pacific Crest Trail (U.S. Forest Service 2014j).

East of the Ruckel Creek Trail, the transmission line crosses the *Pacific Crest Trail* at line mile 5. Hiking and horseback riding are allowed on the Pacific Crest Trail, which is a designated National Scenic Trail and popular for long-distance hiking/backpacking as the trail runs from Canada to Mexico. Some illegal bike riding occurs in this segment of the trail (Pacific Crest Trail Association 2014).

The transmission line passes about 650 feet south of *Herman Creek Campground/Horse Camp* near line mile 7. This campground contains seven campsites and receives light use. The campground is normally open during the summer season; however, it is currently closed because root rot has created hazard trees in the campground area (U.S. Forest Service 2014f). An existing project access road intersects with the campground access road. The campground also provides trailheads for the *Pacific Crest Trail* and *Herman Creek Trail #406*. The *Herman Creek Trail #406* trail receives light use (U.S. Forest Service 2014g) and crosses the transmission line at line mile 7.

East of the Herman Creek area near line mile 11 is the *Wyeth Campground*. The campground is located about 0.1 mile north of the transmission line right-of-way and is heavily used during the summer season (May 1 to September 30). Interpretive talks are sometimes provided at the campground during the summer (U.S. Forest Service 2014p). *The Wyeth/Gorton Creek Trailhead* is located at the campground and provides access to the Wyeth and Gorge Trails (U.S. Forest Service 2014o). The *Wyeth/Gorton Creek Trailhead* is located directly under the transmission line. An existing access road intersects with the campground access road and the *Wyeth/Gorton Creek Trailhead*. The *Wyeth Trail #411* receives light use (U.S. Forest Service 2014q). The transmission line crosses the *Wyeth Trail #411* about 600 feet south of the campground.

The Wyeth Trail ends at the *Mount Defiance Trail #413*, a portion of which is located within the transmission line right-of-way at line mile 14. The *Mount Defiance Trail #413* begins at the Starvation Creek Rest Area on I-84 and is a difficult hiking trail up to the top of Mount Defiance, the highest point in the gorge at 4,960 feet (U.S. Forest Service 2014i). The *Mount Defiance Trail #413* intersects the *Starvation Ridge Trail*, two main sections of which are also located within the transmission line right-of-way at line mile 15: from the Mount Defiance intersection east to the top of a ridge, and from the Starvation Ridge Cut-Off Trail east to the top of a ridge. The *Starvation Ridge Trail #414* passes by Warren Creek waterfall, and receives light hiking use (U.S. Forest Service 2014m). A nearby short trail also crossed by the transmission line at line mile 15 is the *Starvation Ridge Cut-Off Trail #414B*, which also receives light hiking use (U.S. Forest Service 2014l).

Aside from recreation use at developed recreation sites and on trails in the project area, there is also likely a low level of dispersed recreation use, including visitor participation in activities including, but not limited to, photography, fishing, wildlife viewing, and hiking within this general area.

South of the transmission line for about 9 miles is the *Mark O. Hatfield Wilderness Area*, which is managed by the U.S. Forest Service. As discussed in Section 3.1, *Land Use and Transportation,* the project does not include areas within the Wilderness Area. The Wilderness Act generally prohibits most motorized and mechanical access, and human infrastructure (i.e., roads and transmission lines) within designated Wilderness Areas.

Recreation Lands Managed by Oregon State Parks

The project area crosses portions of four state parks, three state natural areas, and one state scenic corridor, all managed by Oregon State Parks (Figure 3.2-2). These eight recreation areas are described below.

At the western end of the project area, an existing project access road begins within the far eastern corner of the *John B. Yeon State Scenic Corridor* and provides access to line mile 1. The scenic corridor is 219 acres in size and provides trail access to the Elowah Falls and McCord Creek Falls, as well as trailhead access for the *Gorge Trail #400* and *Nesmith Point Trail #428* (Oregon State Parks 2014d, e; U.S. Forest Service 2014h).

East of the Wyeth Campground area, the transmission line passes through *Lang State Park* (line mile 11) and then farther east passes through *Lindsey Creek State Park* (line mile 13). Neither of these state parks contains any developed recreation facilities (Historic Columbia River Highway Advisory Committee 2012; Historic Columbia River Highway Advisory Committee and Friends of the Historic Columbia River Highway 2009).

Located off I-84 and east of Lindsey Creek State Park is the popular 147-acre *Starvation Creek State Park*. Visitors can hike or bike on the Historic Columbia River Highway State Trail, which runs from Starvation Creek State Park east to Viento State Park (Oregon State Parks 2014h, i). An estimated 188,000 people visit *Starvation Creek State Park* per year (Oregon State Parks 2014h). The transmission line (line mile 15) and an existing access trail are within the state park.

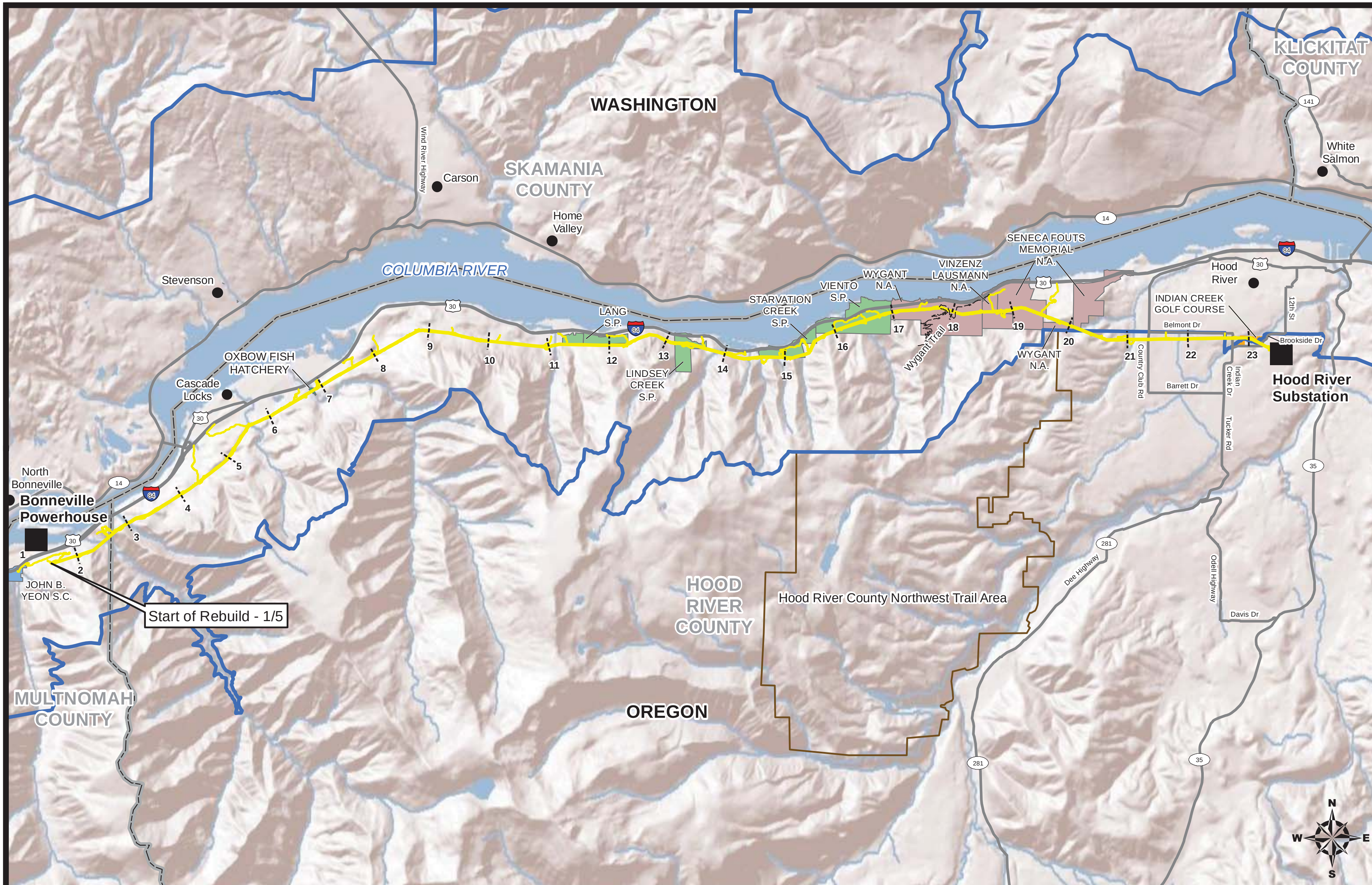
East of Starvation Creek State Park is *Viento State Park*; the project area crosses through this park between line miles 16 and 17. The 270-acre state park contains a 55-site campground that is open April 14 to October 31. Day use is available at the park year round, and over 61,000 people visit the park annually; over 15,000 stay at the park overnight (Oregon State Parks 2014j, k).

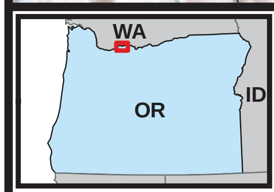
Continuing east, the transmission line passes through the 667-acre *Wygant State Natural Area* near line miles 16 to 18 and the beginning of line mile 20. This area contains the *Wygant Trail*, which is available for hiking year round (Oregon State Parks 2014n, o). Several segments of the trail are within the transmission line right-of-way.

Farther east near line mile 18, the transmission line passes through the *Vinzenz Lausmann Memorial State Natural Area*. This 126-acre area contains a steep hiking trail that leads to Mitchell Point (a portion of the *Wygant Trail*) with spectacular gorge views and is open year round (Oregon State Parks 2014l, m).

The easternmost state park unit crossed by the project located near line mile 19 and the beginning of line mile 20 is the *Seneca Fouts Memorial State Natural Area*. This 426-acre area receives over 64,000 visitors annually and includes the Mitchell Point viewpoint (Oregon State Parks 2014f, g).

Oregon State Parks manages the *Historic Columbia River Highway State Trail*, which was designated as a National Recreation Trail in 2002 (Oregon State Parks 2014b). The 12-mile trail consists of three disconnected sections of the historic highway and is limited to non-motorized uses (Oregon State Parks 2014c). There are plans to restore the highway/create additional trail mileage between Wyeth and Hood River, as described in the Historic Columbia River Highway State Trail Plan – Wyeth to Hood River (Oregon State Parks 2010).





This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: May 03 2016

Project Area
Line Miles
Major Roads
National Scenic Area Boundary
Cities
Substation
County Boundary
State Natural Area
State Park
State Scenic Corridor
Golf Course
Hood River County NW Trails Area
Trails

Bonneville-Hood River Transmission Line Rebuild Project

Figure 3.2-2

State, County and Private Recreational Facilities

0 1 2 3 4 Miles

A final draft comprehensive plan for state parks in the gorge was released in October 2014. The plan will guide future resource management and recreation uses within the 15 parks, 6 natural areas, 3 scenic viewpoints, and 6 scenic corridors within the National Scenic Area (Oregon State Parks 2014a).

Lands Managed by the Oregon Department of Fish and Wildlife

A small portion of the transmission line (less than 0.1 mile) crosses a parcel of land managed by ODFW near the end of line mile 6, which contains the *Oxbow Fish Hatchery*. The hatchery is used for egg incubation and early rearing of coho, spring-run Chinook, and sockeye salmon. The public can visit the fish hatchery year round to see juvenile salmon (ODFW 2014).

Other Important Recreational Resources

Recreation Lands Managed by Hood River County

East of the Seneca Fouts Memorial State Natural Area near line mile 19, the transmission line passes north of the *Seven Streams Staging Area* and *Hood River County Northwest Trail Area*. The transmission line right-of-way crosses Post Canyon Drive, which provides access to several motorized and non-motorized county trails in the *Northwest Trail Area* near line mile 20. The *Northwest Trail Area* is the most heavily used area in the County's trail system and includes motorized and non-motorized trails within a 10,800-acre area. The *Seven Streams Staging Area* is one of three staging areas along Post Canyon Drive and provides a kiosk, trail signage, and parking for users entering the *Northwest Trail Area* (Hood River County Forestry Department 2010).

Recreation on Private Lands

Near the city of Hood River, the transmission line crosses the *Indian Creek Golf Course* (line mile 23), a private, 18-hole golf course. The transmission line passes through two holes of the course.

The transmission line also crosses the *Fruit Loop* in Hood River, which is a scenic drive and route to visit many of the local farm stands. The project area crosses Country Club Road (line mile 21) on the Fruit Loop drive and passes through the *Marchesi Vineyards and Winery* (line mile 22) on the northwestern side of the *Fruit Loop*.

The Columbia River

The Columbia River is directly north of the project area; distances from the transmission line right-of-way range from less than 0.2 mile to approximately 1.5 miles. The Columbia River is a major recreation resource, and water activities in the gorge include fishing, swimming, boating, kayaking, and windsurfing. A public boat launch is located at the Wyeth Campground area. Fishing, motorized and non-motorized boating, kite surfing, and wind surfing are common in the summer from public recreation sites.

Special Events

Several annual festivals and special events occur from spring to fall near the project area, as listed and described in Table 3.2-1.

Table 3.2-1. Annual Gorge Festivals and Events near the Project Area

Event	Date	Description
Hood River Valley Blossom Festival	April	Several events throughout April in the gorge area including the Hood River Hard-pressed Cider Festival, Columbia Gorge Wine Passport, Gorge Artists Open Studios, and Apple Valley Blossom Festival.
Hood 2 River Relay	Last Saturday in May	Race from Mount Hood down to the Columbia River in Hood River, Oregon.
National Trails Day at Bonneville Dam	First Saturday in June	Guided trail walk along the historic Fort Cascades trail near Bonneville Dam.
Tour de Hood Ride	Third Sunday in June	Several bicycle course races surrounding Mount Hood.
Sternwheeler Days	Last weekend in June	Annual celebration including arts and crafts, vendors, music, parade, and Sternwheeler rides in Cascade Locks, Oregon.
Bridge of the Gods Run	Second Sunday in August	Course passes between Washington and Oregon over the Bridge of the Gods, Historic Columbia River Highway State Park Trail, Moffat Creek Trail, Cascade Locks, and finishes at Thunder Island.
Roy-Webster Cross Channel Swim	First Monday in September	At dawn on Labor Day over 500 participants swim across the Columbia River.
Hood River Fly-In	Second weekend in September	Features hundreds of visiting airplanes, food, and activities in Hood River, Oregon.
Columbia Gorge Marathon	Last Sunday in October	Begins on the Historic Columbia River Highway and ends in Hood River, Oregon.
Source: Skamania Coves 2015		

3.2.2 Environmental Consequences–Proposed Action

Construction activities associated with pole replacement, reconductoring, road and trail improvements, and other rebuild activities would primarily occur within existing BPA right-of-way through or near recreational areas, although noise from equipment and helicopters may be heard outside of the immediate area. Impacts on recreational uses adjacent to the right-of-way from these construction activities would be limited to temporary inconveniences associated with traffic delays, access closures to portions of the parks, reductions of on-street parking, and dust and noise from construction activity. Noise, dust, and the presence of machinery, including helicopters, during the construction period could disturb and discourage people from visiting recreation areas because they could interfere with peoples' use or enjoyment of the environment. Road closures, traffic delays, and helicopter activity associated with project construction could also affect the scheduled festivals and special events in the project area listed in Table 3.2-1. Temporary and permanent visual impacts to recreationists are discussed in Section 3.9.4, *Visual Quality*.

Construction activities also would result in impacts that would occur outside of existing BPA easements. Project construction would create additional traffic through campgrounds, result in temporary, intermittent trail and road closures, and create localized, short-term noise and dust. These construction-related impacts could result in brief, temporary disturbances to recreational uses (such as walking, biking, jogging, picnicking, camping, hiking, environmental education and interpretation, photography, and wildlife/wildland observation) near the transmission line right-of-way, access roads, and trails.

Mitigation measures, including actions to limit construction in recreation areas to weekdays (when recreation is typically lower), maintain access to recreation sites and trails, and coordinate construction activities and timing with the U.S. Forest Service, Oregon State Parks, and festival and special event coordinators, would reduce the magnitude of effects (Table 2.7-1). Overall, based on the types of activities proposed and the level of recreational use of the area, project construction would result in **low** to **moderate** impacts from noise, dust, congestion, and temporary closures of the recreational resources of the area. The magnitude of effect from project construction on each recreational resource in the project area is summarized below (Table 3.2-2).

After construction, the improvements to portions of public trails, totaling approximately 0.5 mile, would improve the recreational experience in some locations and would be a long-term beneficial improvement associated with the Proposed Action. While trail and access road improvement would be a beneficial effect in public areas, the improvement of the access system may result in increased unauthorized use of non-public access facilities, which may result in the subsequent unauthorized use of adjacent lands. BPA has proposed new gates in several locations to discourage unauthorized access and BPA would work with land managers to identify additional measures to limit unauthorized access (Table 2.7-1). Additionally, the maximum length that any trail or road would be extended is approximately 300 feet (less than 0.1 of a mile); therefore, the Proposed Action would not provide new access to any additional areas that do not already have access. Because only small portions of public trails would be improved and BPA would work with the underlying land manager to reduce the unauthorized use of non-public trails and access roads, the project would result in a **low**, permanent effect on recreation.

The Line Mile 19 Options would result in a similar impact to recreationists in the area. The Line Mile 19 area is not directly used by recreationists, though it is near (and visible) from the backside of the Mitchell Point hiking trail. Line Mile 19 Options 1 and 2 would result in increased noise in the area for approximately 1 to 2 months during access road and retaining wall work. Access road construction noise would generally be limited to the immediate project area (see Section 3.13, *Noise, Public Health, and Safety)*. Structure installation work under Line Mile 19 Option 1 would occur over a few days. Line Mile 19 Options 2 and 3 would have increased, intermittent helicopter access of the area and micropile foundation drilling would last up to 5 days per structure (a maximum of about 20 days for the area). Increased use of helicopters to support micropile drilling would result in helicopter noise that would occur further outside of the immediate project area (up to 0.5 mile) (see Section 3.13, *Noise, Public Health, and Safety)*. A discussion of the visual differences to recreationists, including those near the Line Mile 19 under the options can be found in Section 3.9, *Visual Quality.*

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
U.S. Forest Service Managed Lands			
Eagle Creek Campground	Campground road would be used for access to the right-of-way	Moderate, temporary	Temporary disturbances to campground visitors, including additional traffic and delays and noise, would result from using the campground road as access to the right-of-way, particularly if weekend work is required. These disturbances would result in **moderate** impacts on recreation because the campground is heavily used during the period when construction would occur, and, therefore, a large number of recreationists could be affected.

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
Buck Point Trail	Direction of travel route to access the right-of-way, potential tensioning site	Low, temporary	Use of the trail as a direction of travel route would increase trail use and potentially displace users to other area trails, many of which would also be affected by construction activities. Further, the trail may be intermittently closed for short periods of time (a few minutes to a few hours at a time) during line tensioning activities should the tensioning site that crosses the trail be used. Because the trail receives light use and may only be closed for a few hours at a time, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Wauna Viewpoint Trail	Access trail improvement	Low, temporary	Temporary closure of the end portion of the trail to improve access to the project right-of-way would have a **low** impact on recreation as it is a lightly used trail and only a portion of the trail would be temporarily closed for a few minutes to hours at a time.
Eagle Creek Trail	Line stringing	Moderate, temporary	Over a span of up to 3 days, the trail may be temporarily closed for as little as a few minutes up to a few hours while the line is strung over the Eagle Creek canyon. Safety flaggers would be employed to stop hikers as the conductor is strung over the trail. As this trail is popular and a large number of visitors would be affected, the project would result in a **moderate** impact on recreation due to the brief periods of time the hikers would be delayed. In addition, most of the other trails in the area, including those originating at the Eagle Creek Day Use Area/Trailhead, would need to be temporarily closed during stringing in the area, requiring visitors to travel to a different area to participate in uninterrupted trail opportunities. BPA would schedule construction to occur on weekdays and work with Oregon State Parks to post announcements of trail work in advance to minimize recreation impacts.
Shady Glen Trail	Line stringing	Low, temporary	The trail may need to be temporarily closed (minutes to hours) while the line is strung over the Eagle Creek canyon. Because the trail receives light use and may only be closed intermittently over a maximum of 3 days, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Eagle Creek Day Use Area/ Trailhead	Line stringing	Moderate, temporary	The day use area/trailhead may be intermittently closed while the line is strung over the Eagle Creek canyon. As this site is heavily used, a large number of visitors could be affected by delays and would need to travel to a different area to participate in uninterrupted trail opportunities. However, since recreation would only be interrupted for a few minutes up to a couple of hours at a time, over the course of up to 3 days, the impacts would be of short duration. Therefore, the project would result in a **moderate** impact on recreation in this area.

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
Gorge Trail	Line stringing, access road improvements	Low, temporary	The portion of the trail at the Eagle Creek Day Use Area/ Trailhead may need to be intermittently closed for up to a few hours at a time while the line is strung. Road improvements near or adjacent to the trail could also require temporary closure of the trail during construction for safety reasons. Because the trail may be intermittently closed, and several access points and most trail mileage would not be affected by construction, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Ruckel Creek Trail	Access road improvements, rebuilding activities	Low, temporary	Performing transmission line rebuilding activities as well as access road improvements near or adjacent to the trail could require temporary closure of the trail during construction for safety reasons. Because the trail receives light use and may only be closed anywhere from a few hours to a few days, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Herman Creek Trail	Access road improvements, access road reconstruction, rebuilding activities	Low, temporary	Transmission line rebuilding activities, as well as road improvements and road reconstruction activities near or adjacent to the trail could require temporary closure of the trail during construction for safety reasons. Because the trail receives light use and may only be closed anywhere from a few hours to a few days, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Wyeth Trail	Access road improvements, rebuilding activities	Low, temporary	Transmission line rebuilding activities, as well as road improvements near or adjacent to the trail could require temporary closure of the trail during construction for safety reasons. Because the trail receives light use and may only be closed anywhere from a few hours to a few days, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Pacific Crest Trail	Access road improvements, line tensioning site, rebuilding activities	Moderate (with mitigation), temporary	Construction activities may necessitate temporary closure or rerouting of a portion of the trail for safety reasons. The trail is a major national north/south trail and there are limited detour options if the trail is temporarily closed. Trails that could be used as detours could be temporarily closed at the same time due to construction activities. Closure or extensive detouring could stop hikers from reaching their camping destination and maintaining their hiking schedule and logistics, an important concern on long distance hikes. Therefore, closure of the trail could result in a **high** impact. Mitigation measures identified in Table 2.7-1 would reduce this impact to **moderate** by ensuring that access to the Pacific Crest Trail is maintained at all times and that intermittent trail closures last only up to a couple of hours. A trail closure plan would be developed in coordination with the U.S. Forest Service.

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
Herman Creek Campground	Access road improvements	Moderate, temporary	If the campground remains closed during construction, there would be **no** impact on recreation. If the campground were to reopen before construction started, temporary disturbances to campground visitors, including additional traffic and delays and noise, would result from construction. These disturbances would result in **moderate** impacts on campers requiring horse facilities because this is the only horse campground in the area; thus, users would be displaced to a completely different area of the gorge. For campers not requiring horse facilities, the impact would be **low**.
Wyeth Campground	Access road improvements	Moderate, temporary	Temporary disturbances to campground visitors, including additional traffic and delays and noise, would result from construction. These disturbances would result in **moderate** impacts on campers because the campground is heavily used during the construction period; thus, a large number of visitors would be affected.
Wyeth/Gorton Creek Trailhead	Access road improvements, potential line tensioning site, rebuilding activities	Low, temporary	Construction activities may require temporary closure of the trailhead site for safety reasons because the trailhead is located at a potential tensioning site and area of road improvements. Closure of the trailhead would result in the temporary loss of access to the Wyeth and Gorge trails from this location. There are other Gorge Trail access points and the Wyeth Trail is lightly used. Therefore, temporary closure of the trailhead would have a **low** impact on recreation.
Mount Defiance Trail	Access trail improvements, rebuilding activities	Moderate, temporary	Portions of the trail would be used as a project trail to access the right-of-way in steep areas inaccessible by vehicle. It is unlikely that the trail would need to be closed during construction. Trail improvements would not require closure of the trail, but may necessitate small trail reroutes or increased trail congestion. Construction use of this trail would result in additional traffic and delays at the trailhead/parking areas and additional noise, traffic, and disturbance for visitors on the trail. Although the trail is lightly used, collectively all of the trails in this area would be disturbed, likely at the same time, resulting in in **moderate** impacts on recreation.
Starvation Ridge Trail	Access trail improvements, rebuilding activities	Moderate, temporary	Portions of the trail would be used as a project trail to access to several structures adjacent to the trail, and a tensioning site would be located around/within the trail. Thus, portions of the trail may need to be temporarily closed for construction activities. Trail improvements would not require closure of the trail, but may necessitate small trail reroutes. Construction use of this trail would result in additional traffic and delays at the trailhead/parking areas and additional noise, traffic, visual disturbance, and possible closure of portions of the trail. Although the trail is lightly used, collectively all of the trails in this area would be disturbed, likely at the same time resulting in **moderate** impacts on recreation.

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
Starvation Ridge Cut-off Trail	Access trail	Moderate, temporary	A small portion of the trail would be used as a project trail to access the right-of-way in steep areas inaccessible by vehicle. It is unlikely that the trail would need to be closed during construction. Construction use of this trail would result in additional traffic and delays at the trailhead/parking areas and additional noise, traffic, and disturbance for visitors on the trail. Although the trail is lightly used, collectively all of the trails in this area would be disturbed, likely at the same time resulting in in **moderate** impacts on recreation.
Dispersed Recreation Use	Construction activities	Low, temporary	General dispersed recreation use within the gorge would be affected by noise and visual disturbances and changes in informal/ unauthorized access routes as new gates are installed in the general area. A **low** impact on dispersed recreation use would result because of the likely low level of dispersed recreation use within the area.
Mark O. Hatfield Wilderness Area Recreation Use	Construction activities	Low, temporary	Although the Proposed Action would not enter the Mark O. Hatfield Wilderness Area, the Proposed Action would be located parallel to the wilderness boundary for over 9 miles (directly abutting for approximately 2 miles). Wilderness uses, such as hiking, backpacking, wildlife viewing, and viewing scenery, may be temporarily disrupted in some specific locations from construction noise. These impacts would most likely occur on the Ruckel Creek Trail (see discussion above) at the northern edge of the Wilderness Area, as this is the only access to the Wilderness Area adjacent to the project area. Because this trail is not frequently used and would likely be impacted by noise generated by intermittent, weekday temporary helicopter use, the project-related impacts on recreation use within the Wilderness Area would be **low**.
State Parks Managed Lands			
Starvation Creek State Park	Access to right-of-way, rebuilding activities	Moderate, temporary	Construction use of trails in the park and general construction use of the park could result in additional temporary traffic and delays at trailheads and the main state park parking area. General construction activities in the park would also affect dispersed recreation in the park through temporary noise and visual disturbances. **Moderate** impacts on recreation would result because of the popularity of these trails and potential increase in traffic at the main parking area, which would increase congestion and decrease the quality of visitor experiences in the park, particularly if Viento State Park were simultaneously affected.

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
Viento State Park	Access trail improvement, access road improvement, rebuilding activities, access road construction, access road reconstruction, tensioning sites	Moderate, temporary	Construction use of trails in the park and general construction use of the park could result in additional temporary traffic and delays at trailheads and the main state park parking area. General construction activities in the park would also affect dispersed recreation within the park through temporary noise and visual disturbances. **Moderate** impacts on recreation would result because of the popularity of these trails and potential increase in traffic at the main parking area, which would increase congestion and decrease the quality of visitor experiences in the park, particularly if Starvation Creek State Park were simultaneously affected.
Historic Columbia River Highway State Trail	Access to right-of-way, trail improvement, access road improvement	Moderate, temporary	The trail would be used to access other portions of project trails and would likely not need to be closed during construction. In general, trail improvements would not require closure but may necessitate small trail reroutes. Additional noise, traffic, and disturbance for visitors on the trail could be generated by construction. **Moderate** impacts on recreation would result because of the popularity of the trail and potential increase in traffic at the main parking areas, which would increase congestion and decrease the quality of visitor experiences.
Wygant State Natural Area	Rebuilding activities, direction of travel routes, access road improvements, potential tensioning site	Low to Moderate, temporary	The Wygant Trail could be temporarily closed during construction (crosses the right-of-way three times). The use level of this trail is unknown. In addition to affecting trail users, construction noise and activities would disturb dispersed recreation users within the natural area. Thus, the Proposed Action could have **low** to **moderate** impacts on recreation, depending on the use of the Wygant Trail.
Seneca Fouts Memorial State Natural Area	Rebuilding activities, direction of travel routes, access road improvements, road extensions, tensioning site	Low, temporary	The portion of the Wygant Trail in this area would not be affected, and thus only dispersed use would be affected by construction noise and activities. Activities required for any of the Line Mile 19 Options adjacent to the Mitchell Point Trail could require temporary closure of the trail near the right-of-way during construction for safety reasons. Mitchell Point viewpoint would experience additional noise during construction from equipment using the nearby Wygant Trail for direction of travel and construction activities for road and structure work near line miles 18 and 19. The retaining walls and other access road work associated with the Line Mile 19 Options would not be visible from the overlook, since it would be located southeast of the lookout and be blocked by Mitchell Point. Additionally, signage directs viewers at Mitchell Point toward the Columbia river to the north, the opposite direction of the road work associated with the Line Mile 19 Options. There would be **moderate**, temporary impacts on Mitchell Point and the Mitchell Point Trail due to construction noise and no permanent impacts.

Table 3.2-2. Summary of Construction-Related Recreation Impacts

Recreation Resource	Proposed Action Activity	Impact	Rationale
Vinzenz Lausmann Memorial State Natural Area	Rebuilding activities, direction of travel routes	Low, temporary	The portion of the Wygant Trail in this area could require temporary closure of the trail during construction for safety reasons. Because the trail may only be closed anywhere from a few hours to a few days, construction-related disturbances (noise, visual, closure) would result in **low** impacts on recreation.
Lang State Park	Construction activities	Low, temporary	Specific level-of-use information is not available, but it is reasonable to expect that a low level of dispersed use occurs in this park. If so, impacts would be **low** due to the lack of facilities and lack of access into the park.
Lindsey Creek State Park	Construction activities	Low, temporary	Specific level-of-use information is not available, but it is reasonable to expect that a low level of dispersed use occurs in this park. If so, impacts would be **low** due to the lack of facilities and lack of access into the park.
John B. Yeon State Scenic Corridor	Access road use	Low, temporary	Use of the access road would not affect access to trailheads or use of trails in the corridor, although there could be some **low** construction-related traffic noise disturbance for recreationists within the corridor.
Oregon Department of Fish and Wildlife Managed Lands			
Oxbow Fish Hatchery	None	No Impact	The transmission line crosses the parcel managed by ODFW south of the Oxbow Fish Hatchery, and therefore would be **no** effect on visitor use of the hatchery.
Other Recreational Resources			
Seven Streams Staging Area	None	Moderate, temporary	Temporary lane or road closures of Post Canyon Drive would affect access to the area via Post Canyon Drive, resulting in a **moderate** impact on recreation due to the popularity of the area.
Northwest Trail Area	None	Moderate, temporary	Temporary lane or road closures of Post Canyon Drive would affect access to the area via Post Canyon Drive, resulting in a **moderate** impact on recreation due to the popularity of the area for recreation.
Indian Creek Golf Course	Rebuilding activities	Moderate, temporary	Construction activities would result in the temporary closure of a portion of the golf course, resulting in a **moderate** impact on golfers due to the popularity of the course.
Fruit Loop Scenic Drive	Construction activities	Low, temporary	Construction activities may necessitate lane or road closures on weekdays near transmission line segments at road crossings, including Country Club Road within the Fruit Loop. This would temporarily affect scenic driving on a small segment of the Fruit Loop; the vast majority of the Fruit Loop would not be affected. Therefore, there would be a **low** temporary impact on the scenic drive.

3.2.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on recreation are identified in Table 2.7-1 in Chapter 2 of this EA.

3.2.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line and no roads or trails would be improved or constructed. Since there would be no planned construction occurring, BPA would continue operations and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing recreational use would be the same as existing conditions, with **no** or **low** impact.

Over time, as the condition of the transmission line continues to deteriorate, the frequency and magnitude of maintenance activities would increase and some repairs would likely occur on an emergency basis. Access road improvements may also be required to allow access to structures for planned and emergency maintenance activities. Increased maintenance activities could result in intermittent traffic/congestion, delays, or lane/road closures; repeated closures of trails or other recreational sites; and periodic noise and visual disturbance to the recreation setting of several recreational sites/trails. These disturbances and closures would be similar to those required for the Proposed Action, but could occur at times of high recreational use. Because emergency work cannot be scheduled and failures at multiple locations simultaneously are possible as the line ages, the experience of a substantial number of visitors to the area could be degraded. Overall, and in the long term, this alternative could result in **low** to **high** impacts on recreation, depending on the duration, timing, and location.

This page deliberately left blank

3.3 Geology and Soils

3.3.1 Affected Environment

Geology

The project area is located in the Middle Cascade Mountains ***physiographic province,*** which includes two volcanic regions (Fenneman and Johnson 1946). Of these two regions, the project area is in the more easterly volcanic region of the High Cascades that includes Mount Hood and has origins from 36 to 40 million years ago. Within the Middle Cascade Mountain province, the project area is in the Columbia River Gorge and within the National Scenic Area. The geologic history of the Columbia River Gorge is complex and has been simplified for this assessment. Numerous geologic investigations have revealed that the Columbia River Gorge was formed and modified by the dynamic interplay of a series of phenomenal geologic events and processes that took place during the last 17 million years (Tolan et al. 2002). The geologic history includes lava flows that formed the Columbia River Basalt Group, volcanic eruptions, major uplift, glacial advances, Missoula floods, and a series of ***landslides*** including the Bonneville slide near Cascade Locks that created a natural dam (Bridge of the Gods) across the Columbia River (Baldwin 1966; Reynolds 2001).

Landscape and Topography

These geologic events formed the project area landscape that includes mountain hillslopes with steep canyon walls, and narrow ravines with elevations ranging from 70 to 800 feet above sea level. The majority of the project area is parallel to the Columbia River and I-84. The western end of the project area travels east on moderate slopes from line mile 1 to 10, where the Columbia River Basalt overlies a distinctive layer of mudflow, ash, and debris called the Eagle Creek Formation (Baldwin 1966). The Eagle Creek Formation has a history of landslides (see the *Landslide Hazard* subsection below). Steeper slopes are present from line mile 10 to 20, where the right-of-way crosses several small steep ravines, exposed high bluffs, cliffs, and rock outcrops including talus and ***colluviums***. Near line mile 12, the right-of-way crosses the north face slope of Shellrock Mountain's bare slopes, covered in deep, unstable talus (Alt and Hyndman 1978). The right-of-way continues east (line miles 20 to 24) over relatively flat terrain and crosses rural residential areas, a golf course, and orchards in the Hood River Valley.

Bluffs, cliffs, and rock outcrops are identified in the National Scenic Area Management Plan as the Gorge Walls, Canyons, and Wildlands landscape setting under scenic resources (Gorge Commission 2011). In addition, cliffs and talus are geologic resources that provide ecological benefits and are identified in the Management Plan as Priority Habitats under natural resources (Gorge Commission 2011), as described in Section 3.4, *Vegetation* and Section 3.8, *Wildlife*. The Gorge Commission has identified talus as a limited resource that provides habitat for unique and dependent species and is highly vulnerable to disturbance (Gorge Commission 2011).

Earthquake and Liquefaction Hazard

The project area is in a relatively low ***seismic*** activity/earthquake zone and crosses two ***faults*** near Hood River, as mapped by the Oregon Department of Geology and Mineral Industries (DOGAMI 2014). These faults are associated with several northwest-striking faults between line miles 18 and 19 that have no recent movement and do not extend deeply enough to be a potential source of significant earthquakes.

Liquefaction is a process in which loose, granular soils below the ***groundwater*** table temporarily lose strength during strong earthquake shaking. The DOGAMI has not mapped the project area as containing any liquefaction hazards (DOGAMI 2014).

Landslide Hazard

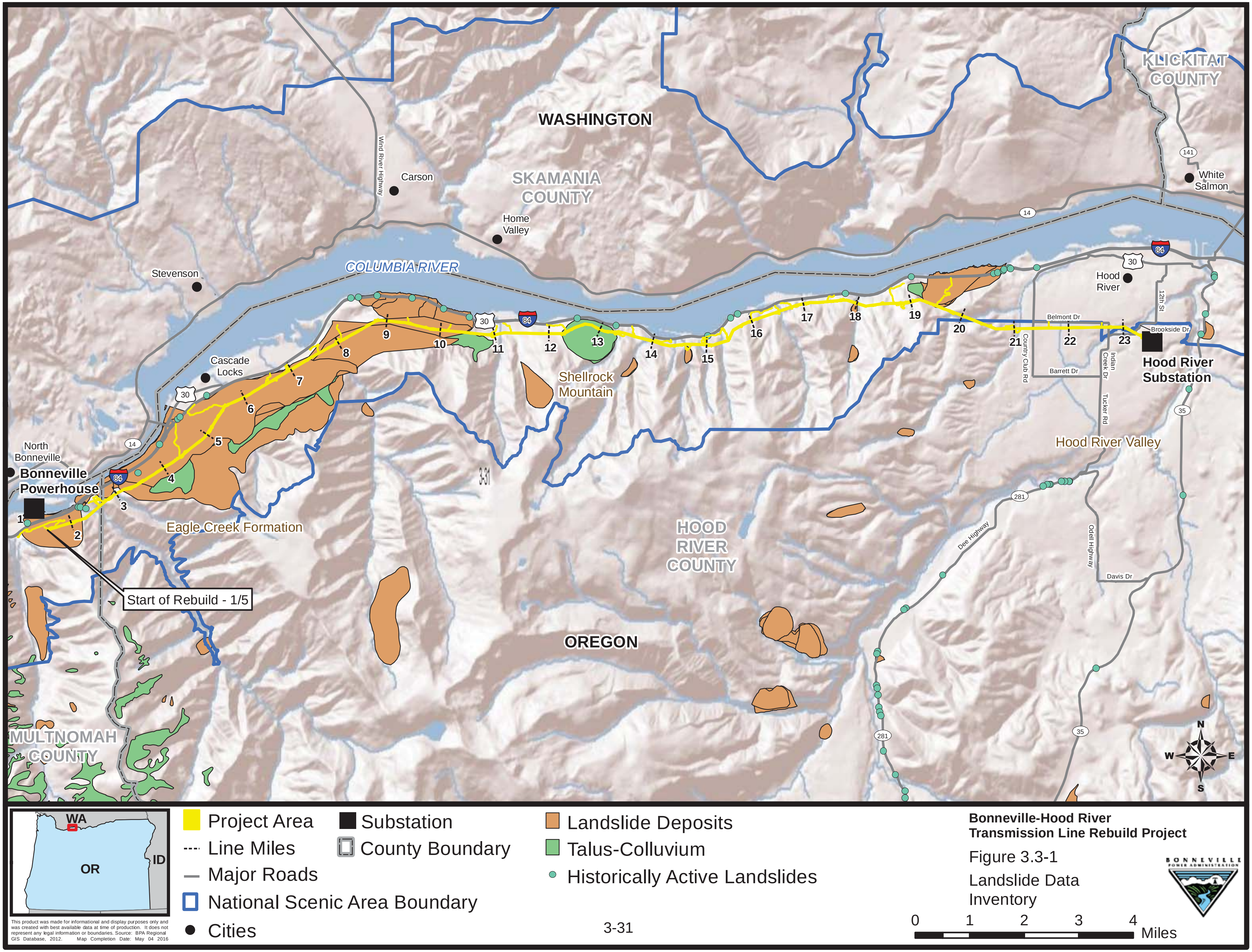
Landslides and landslide processes in the western gorge have been well studied as part of analyses associated with dam location and transportation studies (Waters 1973; Palmer 1977; Sager 1989; Schuster and Pringle 2002). During the 1996/1997 winter, 9,500 landslides were reported in Oregon (DOGAMI 2008) and included a major slide in the Dodson/Warrendale area of the Columbia River Gorge, about 5 miles west of the project area (Hofmeister et al. 2002). The DOGAMI maintains landslide inventory maps that provide basic information for identifying areas of higher and lower hazards (DOGAMI 2010). It is important to note that although areas with mapped landslide deposits are likely to be at higher risk than other areas, areas mapped as landslide deposits would not automatically have problems in the future (DOGAMI 2010). The project area crosses large areas of landslide deposits (DOGAMI 2014), mainly in the first 10 miles (Figure 3.3-1). The project area includes about 197 acres of landslide deposits (includes talus-colluvium). There are 105 existing structures on mapped landslide deposits.

Soils

Project area soil information was collected from the Natural Resources Conservation Service (NRCS) and Mount Hood National Forest. About 65 soil types are present in the project area (U.S. Forest Service 1979, NRCS 2014). Soils from line mile 1 to 3 are primarily the Aschoff-Rock outcrop-Wahkeena soil association (Table 3.3-1) (NRCS 1983, 2014). From line mile 3 to 17, a large portion of the project area is located in the Mount Hood National Forest and includes soils with no NRCS data. Soils on the Mount Hood National Forest were inventoried separately by the U.S. Forest Service specifically for use in forest land management decision making, and are mostly stony clay loams on level to steep slopes (U.S. Forest Service 1979). From line mile 17 to 24, the project area is underlain by the Wind River, Oak Grove-Rockford, Wyeast, and Hood-Van Horn soil associations (NRCS 1981, 2014). These soil types are typical of formations in northern Hood River County on hill slopes and side canyons along the Columbia River, mountainous areas with rock outcrop and rubble land, and farmland terraces (NRCS 1981, 2014).

Table 3.3-1. Summary of Soils in Project Area

Line Mile	Soils	Soil Characteristics
1-3	Aschoff-Rock outcrop-Wahkeena	Deep, well-drained cobbly loams, and rock outcrops, 30 to 60 percent slopes, formed in colluvium weathered from volcanic rock mixed with a small amount of volcanic ash. These soils are not on the hydric soils list.
3-17	No names, primarily stony clay loams. Surveyed by U.S Forest Service.	Shallow to deep, well-drained soils, rock outcrop and rubble land, 0 to 75 percent slopes; soils formed in volcanic ash, ***loess***, and colluvium. No hydric soils information. However, may include soils similar to Xerofluvents, which have hydric soil inclusions.
17 -24	Wind River, Oak Grove-Rockford, Wyeast, and Hood-Van Horn	Deep, well-drained and somewhat poorly drained soils, 0 to 60 percent slopes, formed in glacial outwash and colluvium. Van Horn variant loams are on the hydric soils list.
Source: NRCS 1981, 1983, 2014; U.S. Forest Service 1979.		


WASHINGTON
SKAMANIA COUNTY
KLICKITAT COUNTY
OREGON
HOOD RIVER COUNTY
MULTNOMAH COUNTY
COLUMBIA RIVER
Carson
Home Valley
Stevenson
Cascade Locks
North Bonneville
Bonneville Powerhouse
White Salmon
Hood River
Hood River Substation
Shellrock Mountain
Eagle Creek Formation
Hood River Valley
Start of Rebuild - 1/5
Wind River Highway
Belmont Dr
Brookside Dr
Barrett Dr
Country Club Rd
Indian Creek Dr
Tucker Rd
12th St
Dee Highway
Odell Highway
Davis Dr
Project Area
Line Miles
Major Roads
National Scenic Area Boundary
Cities
Substation
County Boundary
Landslide Deposits
Talus-Colluvium
Historically Active Landslides
WA
OR
ID
This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: May 04 2016
Bonneville-Hood River Transmission Line Rebuild Project
Figure 3.3-1
Landslide Data Inventory
BONNEVILLE POWER ADMINISTRATION
0 1 2 3 4 Miles
N S E W

Soils that are best suited for farmland are present in the project area near Hood River between line mile 20 and 24 (NRCS 2014). Prime Farmland soils are described in detail in Section 3.1, *Land Use and Transportation*.

Slope and soil properties, such as cohesion, drainage, and organic content, are considered when determining soil ***erosion*** hazard classes. The susceptibility to erosion is generally a function of soil type***, soil compaction resistance***, topography, occurrence of ***groundwater*** seepage or surface runoff, and the built environment. Project area soils have low compaction resistance (NRCS 2014). ***Erosion hazard potential*** is described in this analysis as not rated, slight, moderate, or severe, using the NRCS Erosion Hazard (off-road/off-trail) rating. Data on soils with severe erosion hazard indicate significant erosion is likely and expected, facilities require frequent maintenance, and erosion-control measures be implemented for facilities constructed on these. In general, project area soils with moderate erosion hazard occur from line mile 1 to 12, not rated from 13 to 17, severe rating from line 17 to 21, and low rating from line mile 21 to 24 (Figure 3.3-2). About 30 percent of soils in the project area have a severe erosion hazard rating (Table 3.3-2).

Table 3.3-2. Summary of Soil Erosion Hazards

Soil Erosion Hazard Rating	Acres	Percent of Project Area
Not Rated or Not Available	57.2	13.0
Slight	29.2	6.6
Moderate	219.0	49.7
Severe	135.6	30.8
Total[1]	**440.9**	**100.0**

[1] Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.
Source: NRCS 2014; U.S. Forest Service 1979; AECOM 2016 GIS calculations.

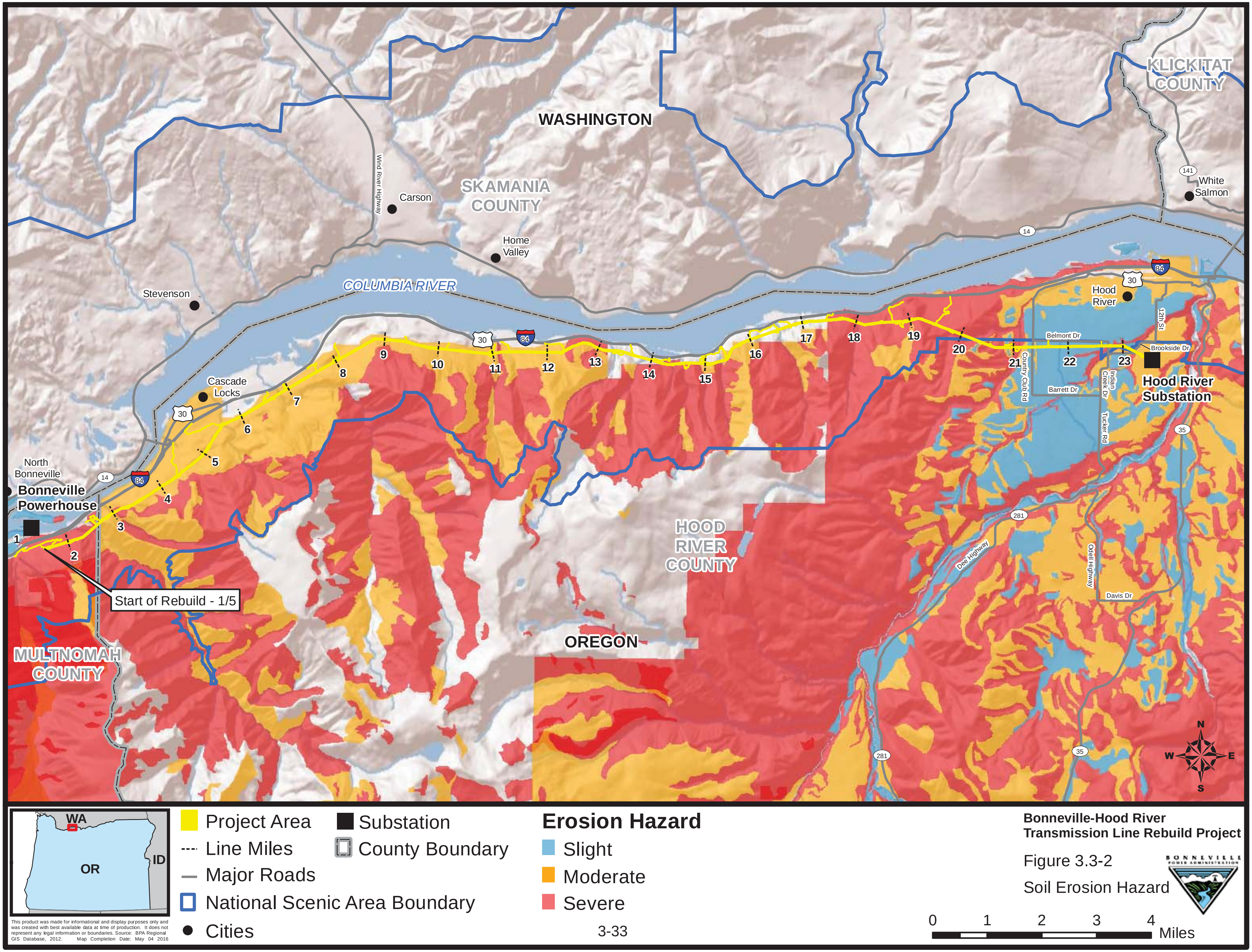
3.3.2 Environmental Consequences–Proposed Action

Construction of the Proposed Action could result in impacts on geology and soils from construction in the transmission line right-of-way, structure removal and replacement, and conductor removal and replacement; and along the access road and trail system from road and trail improvements, reconstruction, and extensions.

Geology

The project area is in a relatively low seismic activity zone, and the Proposed Action is not expected to affect or be affected by earthquakes.

Landslides are unpredictable but are reasonably certain to occur in the gorge; the historically active landslides are almost all associated with major roads (Figure 3.3-1). As described in the affected environment, 105 structures are located on landslide deposits, of which 97 structures would be replaced. Temporary construction for structures would occur within 27.8 acres of landslide deposits for all Line Mile 19 Options.


WASHINGTON
SKAMANIA COUNTY
KLICKITAT COUNTY
COLUMBIA RIVER
HOOD RIVER COUNTY
OREGON
MULTNOMAH COUNTY
Carson
Home Valley
Stevenson
Cascade Locks
North Bonneville
Bonneville Powerhouse
Hood River
White Salmon
Hood River Substation
Start of Rebuild - 1/5
Wind River Highway
Country Club Rd
Belmont Dr
Barrett Dr
Brookside Dr
12th St
Indian Creek Dr
Tucker Rd
Dee Highway
Odell Highway
Davis Dr
14
30
84
35
141
281
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
N
S
E
W
WA
OR
ID
Project Area
Line Miles
Major Roads
National Scenic Area Boundary
Cities
Substation
County Boundary
Erosion Hazard
Slight
Moderate
Severe
This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: May 04 2016
Bonneville-Hood River
Transmission Line Rebuild Project
Figure 3.3-2
Soil Erosion Hazard
0
1
2
3
4
Miles

The majority of structures are in areas where the Eagle Creek Formation layer is below a heavier Columbia River Basalt Group. In a case like this where heavy rock has formed on mudflow, the geology is conducive to mass movement. These areas are potentially unstable but would probably not be destabilized from construction activities such as those associated with the Proposed Action. Additionally, prior to construction, BPA would conduct a geotechnical reconnaissance to ensure that structure replacements would not occur on ***unconsolidated*** landslide debris.

The presence of rock may require drilling and blasting in specific locations. Further, due to limited access, micropile footings would be required in rocky areas. Micropile footings would typically create a small disturbance area, although special drilling equipment is required. Actual cut, fill, and excavation amounts would vary depending on site-specific field conditions. There could be an increased risk of geological hazards where micropiles would be installed, but geotechnical reconnaissance investigations would be conducted. The extent of blasting is expected to be limited to those locations where bedrock cannot be removed by any other means and could affect unstable landforms. BPA would conduct geotechnical reconnaissance investigations in landslide hazard areas, talus slopes, and steep terrain to identify and avoid landslides, which would reduce the risks from geological hazards to **low** levels regardless of which Line Mile 19 Option is selected. The analysis would address whether micropile installation and blasting at transmission pole sites or during road building could destabilize slopes, resulting in increased landslide risk, rockfall, or soil erosion. Rockslide dangers and falling rock from installing micropiles on steep rocky slopes are also addressed in Section 3.13, *Noise, Public Health, and Safety*, which includes a mitigation measure to develop and implement a Public Safety Plan (see Table 2.7-1).

The Line Mile 19 Options would result in a similar impacts associated with geologic hazards. The Line Mile 19 Options are located in an area with mapped landslide deposits, but as previously noted, the area would not necessarily cause problems during construction or in the future. The extension, reconstruction, and improvement of access roads and trails under the Proposed Action with Line Mile 19 Option 1 would temporarily affect 10.3 acres and permanently affect 0.3 acre of landslide deposits. Permanent effects would be 0.1 acre less under Line Mile 19 Options 2 and 3. Temporary effects would be 0.1 acre less for Line Mile 19 Option 2 and 0.2 acre less for Line Mile 19 Option 3 as compared with Option 1. Access road work would occur on the curves or on steep slopes. These activities would be unlikely to trigger large-scale landslides (erosion is described below). Line Mile 19 Options 1 and 2 would include several MSE retaining walls to reduce the risk from geologic hazards and allow future road access to structures 19/4 through 19/7. Under Line Mile 19 Options 2 and 3, helicopters would be used to install transmission line structures and transport equipment, which would also reduce the risk of slides and erosion in that steep area with severe erosion potential.

Overall, the Proposed Action would have a **low** impact on geological resources, and the likelihood of the project area to be affected by geologic hazards is **low** regardless of which Line Mile 19 Option is selected.

Soils

Impacts on soils would result primarily from ground clearing and soil piling, as well as compaction from heavy equipment. Ground that has been cleared of vegetation would be susceptible to erosion. The erosion potential for disturbed soils would be greatest during and immediately after construction before disturbance areas are revegetated. Ground compaction degrades the soil structure and reduces the soil productivity and capability to absorb water. In general, soils would recover from compaction after construction and as vegetation becomes reestablished, organic matter is increased, and the soils' capacity to absorb water is regained.

Table 3.3-3. Summary of Permanent Impacts by Soil Erosion Hazard[1]

Soil Erosion Hazard Rating	Structure Impacts (Acres)	Access Roads: Extension (Acres)	Access Roads: Reconstruction (Acres)	Access Roads: Improved (Acres)	Trails: Extension (Acres)	Trails: Reconstruction (Acres)	Trails: Improve (Acres)	Total(Acres)[2]
Not rated	<0.1	0.0	0.0	0.0	<0.1	0.0	0.0	**<0.1**
Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Moderate	<0.1	0.1	0.0	0.0	<0.1	0.0	0.0	**0.1**
Severe	0.0	0.1 - 0.3	0.0	0.0	<0.1	0.0	0.0	**0.1 - 0.3**
Total (Acres)[2]	**<0.1**	**0.2 - 0.3**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.3 - 0.4**

Notes:
1 Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, a range is shown. More detail regarding impacts by option is included in the accompanying text.
2 Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.
Source: NRCS 2014; U.S. Forest Service 1979

Table 3.3-4. Summary of Temporary Impacts by Soil Erosion Hazard[1]

Soil Erosion Hazard Rating	Structure Impacts (Acres)	Access Roads: Extension (Acres)	Access Roads: Reconstruction (Acres)	Access Roads: Improved (Acres)	Access Roads: Direction of Travel – Overland (Acres)	Trails: Extension (Acres)	Trails: Reconstruction (Acres)	Trails: Improve (Acres)	Total (Acres)[2]
Not rated	7.2	0.0	0.0	1.6	0.0	0.1	0.1	0.5	**9.5**
Slight	0.4	0.0	0.0	0.3	1.5	0.0	0.0	0.0	**2.2**
Moderate	29.7	<0.1	0.1	10.5	0.7	0.1	0.3	0.2	**41.7**
Severe	12.0	0.1	0.1 - 0.3	4.0	0.3	<0.1	0.4	0.2	**17.1 - 17.3**
Total (Acres)[2]	**49.3**	**0.1**	**0.2 - 0.4**	**16.3**	**2.4**	**0.3**	**0.9**	**0.8**	**70.4 - 70.6**

Notes:
1 Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, the range is shown. More detail regarding impacts by option is included in the accompanying text.
2 Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.
Source: NRCS 2014; U.S. Forest Service 1979.

The extension of access roads and trails would result in a permanent loss of between about 0.3 and 0.4 acres of soil, which are small quantities when compared to the 440.9 acres of soil in the project area (Table 3.3-3). BPA has minimized the need for extending the road and trail system by primarily using existing access infrastructure. Work on existing roads and trails is assumed not to result in a new permanent impact on soils because the roads already exist and soils are already compacted and/or covered with gravel. Extending the access system would permanently eliminate the productive capacity of the soils, which would be covered by a layer of gravel and/or compacted. Although the soils beneath the roads and trails would be stabilized from erosion, the road and trail surfaces would compact soils beneath the prism, which could lead to increased surface runoff that could affect soils downgradient of the road and trail.

Erosion associated with the construction and subsequent use of access roads and trails would have the greatest impact in areas where these features are on soils with a severe erosion hazard rating and in areas with steep slopes BPA would design the access roads and trails to account for potentially unstable slopes as appropriate. Access road and trail construction would occur during the dry season and would include installing ***water bars*** and ***drain dips***, and new gravel surfacing. All of these features are designed to reduce erosion and minimize impact on soil resources.

As discussed in Chapter 2, the wood preservative PCP would be used to treat the wood poles for the transmission structures to lessen wood rot and extend the life of the poles. About 36 million wood poles in service have been treated with PCP (EPRI 1997). PCP contains toxic compounds and can move through and leach from the bottom of the pole, contaminating surrounding soils (EPA 2008a). Accordingly, over time, there is the possibility that PCP could leach from the poles for the transmission structures and contaminate the soil near the poles. Soil PCP concentrations at PCP-treated poles decreased by as much as two orders of magnitude between 3 and 8 inches from the pole (EPRI 1997). In most soils in the project area, this short leaching distance of PCP in soils would result in only extremely localized and minor contamination, typical of that around the millions of transmission line wood poles in the United States.

Structure replacements would temporarily disturb 49.3 acres of soils, 12.0 acres of which have a severe erosion hazard rating (Table 3.3-4). The structure replacements in soils rated with a severe erosion hazard would be the same for all Line Mile 19 Options (Table 3.3-4). Structure work areas (including the tensioning sites) would not likely include soil disturbance within the entire area. Activities associated with structure replacements and tensioning that would affect soils include clearing of vegetation and trees that would expose bare soil, heavy equipment staging and lay down of materials that may cause compaction or rutting, and soil piling from excavating structure or guy wire footings and anchors. These temporary impacts would be localized and distributed along the line, with construction activities typically disturbing 0.1 acre or less at each site. Because the footprint and base for the structures and individual poles are small and the new poles are essentially going back into the same location, permanent soil impacts associated with structure replacement were only assumed to occur when poles are moved more than 20 feet from their current location and total less than 0.1 acre of soils to depths of 12 feet.

Impacts on soils would be similar between Line Mile 19 Options. The differences between Line Mile 19 Options would be associated with access road work and landing construction, as impacts associated with structure work would be the similar to those discussed above. Line Mile 19 Option 1 would permanently impact 0.1 acre more soil than Line Mile 19 Options 2 or 3 and temporarily impact 0.1 acre more than Option 2 and 0.2 acre more than Option 3. The MSE retaining walls on Line Mile 19 Options 1 and 2 would reduce the risk from geological hazards and associated erosion of the existing access road as discussed above.

Overall, by largely reusing existing locations for structures, minimizing the need for extending the roads and trails, controlling runoff on access roads and trails, and implementing erosion control and PCP containment mitigation measures, soil impacts would be **low**, regardless of Line Mile 19 Option selected**.**

3.3.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on geology and soils are identified in Table 2.7-1 in Chapter 2 of this EA.

3.3.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line and no roads or trails would be improved or constructed. Since there would be no planned construction occurring, BPA would continue operations and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing geology and soils would be the same as existing conditions, with **no** to **low** impact.

Older structures located within landslide deposits are a concern. Minor land movements have likely occurred since the 1930s when the line was built. These are expected to continue to occur under the No Action Alternative. The cumulative movement may be enough to place added stress on structures and conductors that, when combined with structure age, could cause the structure to fail and jeopardize the transmission line. Unlike regular maintenance, emergency repairs could occur at any time of year. The existing older structures are vulnerable to severe weather conditions and land movement, both of which increase loading stress. Emergency repairs would likely occur in inclement weather during winter storms. If these occur on saturated soils or on soils that have a severe erosion hazard potential rating, slope instability may result in slope failures, especially in saturated conditions. The maintenance activities and emergency repairs would result in impacts on soils, including erosion and compaction. Overall, impacts on geology and soils from the No Action Alternative would be **moderate**.

This page deliberately left blank

3.4 Vegetation

3.4.1 Affected Environment

Vegetation Types

The project area crosses two ***ecoregions***: Western Cascades and Lowlands and Valleys, and Oak/Conifer Foothills (EPA 2011). All but about the eastern 3 miles of the project area is located in the Western Cascades and Lowlands and Valleys ecoregion. This ecoregion includes the western hemlock-Douglas-fir forests of the lower slopes of the Cascades. As elevation decreases to the east, the Western Cascades and Lowlands and Valleys ecoregion transitions into the Oak/Conifer Foothills ecoregion, which contains a diversity of vegetation types, including grasslands, oak woodlands, and coniferous forests dominated by ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*).

Vegetation surveys of the project area were conducted in late July and early August 2014, from April to June of 2015, and April to early July of 2016. A variety of vegetation types were mapped, including conifer stands, Oregon white oak (*Quercus garryana*) stands, grasslands, cliffs and talus slopes, wetlands and ***riparian*** areas, orchards, and pasture (Table 3.4-1). The project area also includes non-vegetated, developed, or landscaped areas associated with roads, residences, and other development, and a golf course. The most prevalent vegetation type in the Western Cascades and Lowlands and Valleys ecoregion is coniferous forest, which occurs adjacent to the transmission line right-of-way for about 10 miles and within the transmission line right-of-way in a small number of locations where the conductor is located above trees such as across steep canyons. The managed right-of-way has been mostly cleared of trees and is primarily dominated by grassland species. In the eastern portion of the project area, as the right-of-way enters the development associated with Hood River and surrounding areas, the majority of the native vegetation has been converted to other uses.

Managed Right-of Way refers to the existing transmission line right-of-way. Much of the vegetation within the existing transmission line right-of-way was cleared for construction and is subject to ongoing vegetation management to prevent the regrowth of trees and keep access routes clear. Vegetation within the managed right-of-way consists primarily of low-growing shrubs, interspersed with dense patches of ***non-native*** plants. This vegetation type accounts for just over half of the project area.

Coniferous Forests are found in about 9 percent of the project area, typically occurring in and adjacent to the transmission line right-of-way in undeveloped areas. Mature forests are characterized by older (over 60 years) Douglas-fir trees, typically with a shrubby, fairly open understory of salal (*Gaultheria shallon*), dull Oregon-grape (*Berberis nervosa*), vine maple (*Acer circinatum*), and sword fern (*Polystichum munitum*). These communities are generally shady, with acidic soils, and associated with one noxious weed (herb Robert; *Geranium robertianum*). ***Mid-seral*** forests typically have younger trees and less structural complexity. Regenerating forests occur in areas that have been subject to a stand-clearing disturbance, and in managed Douglas-fir plantations. Vegetation in regenerating forests is characteristically sparse, often with a limited herbaceous layer of sword fern in the heavily shaded understory.

Table 3.4-1. Vegetation Types within the Project Area

Vegetation Type	Acres in Project Area	Percent of Project Area
Managed Right-of-Way	242.2	55.0
Non-Vegetated/Developed/Agroforestry	75.2	17.1
Coniferous Forest		
Mature	37.8	8.6
Mid-Seral	2.1	0.5
Regenerating	<0.1	<0.1
Talus Slope	40.5	9.2
Pasture	15.5	3.5
Cliff	12.6	2.9
Riparian Habitat	10.2	2.3
Oregon White Oak Woodland	3.4	0.8
Wetland	0.8	0.2
Native Grassland	0.2	<0.1
Total[1]	**440.6**	**100**

[1] Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.
Source: Turnstone 2015b.

Cliffs and Talus Slopes together make up almost 13 percent of the project area. Occurring in steep areas, cliffs and talus slopes are associated with exposed bedrock (see Section 3.3, *Geology and Soils*), and are sparsely vegetated. On talus slopes, mosses and similar plants are often the dominant species where vegetation is present; however, some tree cover can encroach onto these slopes as soil conditions allow. There is also a suite of vascular plants that are closely associated with talus, including orange wallflower (*Erysimum capitatum*), bluehead gilia (*Gilia capitata*), and parsley fern (*Cryptogramma crispa*). Where trees have been able to gain a foothold on talus slopes, organic inputs and shade create microhabitats featuring a mix of forest and talus species. Cliff habitats of the Columbia River Gorge are steep, often vertical exposures of basalt. Vegetation adapted to these areas includes complex communities of encrusting lichen, as well as several species of vascular plants.

Pasture lands have generally been converted from their original plant communities and are dominated by non-native species. Pasture makes up 3.5 percent of the project area and is found mostly from line mile 21 east. Common pasture grasses observed in the project area include bentgrass (*Agrostis* spp.), tall fescue (*Schedonorus arundinaceus*), timothy (*Phleum pratense*), and ryegrass (*Lolium* spp.). Noxious weeds such as thistles (*Cirsium arvense* and *C. vulgare*) and tansy ragwort (*Senecio jacobea*) are prevalent.

Riparian Habitats occur along waterways over about 2 percent of the project area, and are typically comprised of hardwood species, such as red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*). Western red cedar (*Thuja plicata*) is found in cool, shaded canyons. Because the drainage courses in the project area are generally steep and far from access roads and transmission line structures, vegetation is often in a fairly undisturbed state.

Oregon white oak woodlands, which make up almost 1 percent of the project area, are limited to areas where conifer trees are unable to establish in large numbers, typically on sites with thin soil. Oak habitat often feature a diverse mix of herbaceous plant species, including Harford's ragwort (*Packeri bolanderi* var.

harfordii), sea blush (*Plectritis congesta*), wild onions (*Allium* spp.), checker-bells (*Fritillaria affinis*), biscuitroot (*Lomatium* spp.), and arrowleaf buckwheat (*Eriogonum compositum*). Shrubs tolerant of dry, sunny sites, such as serviceberry (*Amelanchier alnifolia*), oceanspray (*Holodiscus discolor*), and poison oak (*Toxicodendron diversilobum*), are fairly common in these woodlands.

Native grasslands are found as small pockets in the project area (less than 0.1 percent), often interspersed between stands of Oregon white oak and other vegetation communities. Plants rare in other portions of the project area are found in modest numbers in native grasslands, including broad-leaf lupine (*Lupinus latifolius*), deltoid balsamroot (*Balsamorhiza deltoidea*), farewell to spring (*Clarkia amoena*), prairie junegrass (*Koeleria macrantha*), and bluebunch wheatgrass (*Pseudoregneria spicata*).

Wetlands make up less than 1 percent of the project area. Vegetation associated with wetlands includes native and non-native grasses and weedy herbaceous plants typical of disturbed mowed habitats. Representative species include bentgrass (*Agrostis* spp.), clover (*Trifolium* spp.), soft rush (*Juncus effusus*), and buttercup (*Ranunculus* spp.). The project area includes both ***riverine*** and ***palustrine wetlands*** (see Section 3.6, *Wetlands and Floodplains*).

Sensitive Habitats and Special-Status Plant Species

The project area contains numerous vegetation community types that are important from a conservation perspective. The National Scenic Area Management Plan (Gorge Commission 2011) identifies these vegetation types and incorporates guidelines for their protection. Riparian areas, wetlands, old-growth forest, Oregon white oak woodlands, native grasslands (prairies and steppe), cliffs, and talus slopes are all priority habitats (see also Section 3.8, *Wildlife*) that should be maintained, protected, and enhanced for integrity and function (Gorge Commission 2011). The Management Plan also has a goal of protecting and enhancing the plant diversity of the gorge (Gorge Commission 2011).

Special-status plant species that are known to occur, or have the potential to occur, in the project area include species that are listed, proposed for listing, or candidates for listing under the ESA; species listed by Oregon as ***threatened***, endangered, or sensitive, and U.S. Forest Service sensitive species. Additionally, the Management Plan is concerned with adverse effects on plant species that are found only in the Columbia River Gorge and vicinity (gorge ***endemic*** species), as well as other sensitive plant species (Gorge Commission 2011). BPA requested data from the Oregon Biodiversity Information Center (ORBIC) for special-status plant species that have been documented within 2 miles of the transmission line right-of-way (ORBIC 2014). Special-status plant species known or suspected to occur within the project area are listed below in Table 3.4-2. A complete list of special-status plant species that includes U.S. Forest Service Sensitive species can be found in Appendix B.

Table 3.4-2. Special-status Plant Species Occurrences within 2 Miles of the Project Area

Common Name	*Scientific Name*	Federal Status	State Status	Other	Habitat	Likelihood of Occurrence
Howell's bentgrass	*Agrostis howeillii*	FS-S SOC	OR-C OR-1	GE	Moist rocks on south side of gorge.	Present. Mapped within project area.
Sickle-pod rockcress	*Arabis sparsiflora* var. *atrorubens*	FS-S	OR-2	--	Open sagebrush and ponderosa pine habitats.	Moderate. Suitable habitat present but no mapped occurrences.

Table 3.4-2. Special-status Plant Species Occurrences within 2 Miles of the Project Area

Common Name	*Scientific Name*	Federal Status	State Status	Other	Habitat	Likelihood of Occurrence
Hood River milk-vetch	*Astragalus hoodianus*	FS-S	--	GE	Dry open areas of east gorge.	Present. Mapped within project area.
Oregon bolandra	*Bolandra oregana*	--	OR-C	--	Moist, shady cliffs, often near waterfalls.	Present. Mapped within project area.
Howell's reedgrass	*Calamagrostis howellii*	--	--	GE	Dry, rocky sites, especially cliffs.	Present. Mapped within project area.
Large-awn sedge	*Carex macrochaeta*	FS-S	OR-2	--	Marshes, shores, and other wet open places.	Moderate. Suitable habitat present but no mapped occurrences.
Cold-water corydalis	*Corydalis aquae-gelidae*	FS-S	OR-C OR-1	--	Riparian habitats with fast-moving, very cold water.	Moderate. Suitable habitat present but no mapped occurrences.
Nuttall's larkspur	*Delphinium nuttallii*	--	OR-2	--	Moist, open ground and on basaltic cliffs. Especially common on gravelly outwash areas.	Moderate. Suitable habitat present but no mapped occurrences.
Smooth-leaf douglasia	*Douglasii laevigata var. laevigata*	--	--	GE	Basalt cliffs and rocky outcrops, low elevation through gorge.	Moderate. Suitable habitat present but no mapped occurrences.
Howell's daisy	*Erigeron howellii*	FS-S SOC	OR-C	GE	Open areas on ridges and rocky areas.	Present. Mapped within project area.
Oregon daisy (Columbia Gorge daisy)	*Erigeron oreganus*	FS-S SOC	OR-C	GE	Moist, shady cliffs and ledges along the Columbia River.	Present. Mapped within project area.
Long-bearded hawkweed	*Hieracium longiberbe*	--	--	GE	Open areas throughout gorge cliffs.	Present. Mapped within project area.
Columbia lewisia	*Lewisia columbiana var. columbiana*	FS-S	--	--	Open rocky areas and balds (areas lacking vegetation coverage).	Present. Mapped within project area.
Suksdorf's lomatium	*Lomatium suksdorfii*	FS-S SOC	OR-C	GE	Dry, open, grassy slopes or open oak woods.	Moderate. Suitable habitat present but no mapped occurrences.
Columbia Gorge broad-leaf lupine	*Lupinus latifolius* var. *thompsonianus*	--	--	GE	Grasslands and open oak and ponderosa pine woods.	Moderate. Suitable habitat present but no mapped occurrences.
White meconella	*Meconella oregana*	FS-S SOC	OR-C	--	Moist vernal swales, basalt cliffs, disturbed soils along trails, on balds, and in clearings in oak woodlands.	Present. Mapped within project area.
Barrett's penstemon	*Penstemon barrettiae*	FS-S SOC	OR-C	GE	Rocky cliffs, talus slopes in east gorge.	Present. Mapped within project area.
Multnomah bluegrass	*Poa gracillima* var. *multnomae*	--	--	GE	Moist cliffs.	Present. Mapped within project area.

Table 3.4-2. Special-status Plant Species Occurrences within 2 Miles of the Project Area

Common Name	*Scientific Name*	Federal Status	State Status	Other	Habitat	Likelihood of Occurrence
White-topped aster	*Sericocarpus rigidus*	FS-S	OR-T	--	Prairie habitats, dry pastures, dry grassy Oregon white oak forests with rocky outcrops.	Moderate. Suitable habitat present but no mapped occurrences.
Kruhsea	*Streptopus streptoides*	--	OR-2	--	Dense coniferous woods.	Moderate. Suitable habitat present but no mapped occurrences.
Violet suksdorfia	*Suksdorfia violacea*	FS-S	--	--	Mossy banks and cliffs, sandy shaded areas that are wet in the spring, and rock crevices.	Present. Mapped within project area.
Oregon sullivantia	*Sullivantia oregana*	FS-S SOC	OR-C	GE	Wet basalt cliffs near waterfalls at low elevations in the west Columbia River Gorge.	Present. Mapped within project area.
Western mountain kittentails	*Synthyris missurica* ssp. *stellata (S. stellata)*	--	--	GE	Moist cliffs and rocky outcrops.	Present. Mapped within project area.

Notes:
Federal
E=Endangered; T=Threatened; C=Candidate; SOC = Species of Concern; FS-S = U.S. Department of Agriculture (USDA) Forest Service Regional Forester's List Sensitive Species.
State
OR-T = Oregon Threatened; OR-E = Oregon Endangered; OR-C = Oregon Candidate; OR-1 = ORBIC List 1; OR-2 = ORBIC List 2; OR-3 = ORBIC List 3; OR-4 = ORBIC List 4.**Other**
GE = Gorge Endemic.
Sources: Slichter 2012; ORBIC 2014; Hitchcock and Cronquist 1973; Flora of North America 1993.

No ESA-listed plant species are located in the project area. Field surveys conducted in 2014, 2015, and 2016 documented five special-status plant species, totaling 54 unique populations distributed through the project area in suitable habitats along the transmission line right-of-way, access roads, and foot trails (Turnstone 2015b). Special-status plant species recorded include five distinct populations of Howell's reedgrass, 33 populations of long-beard hawkweed, one population of Multnomah bluegrass, one population of Oregon coolwart, and 14 populations of western mountain kittentails (Turnstone 2015b).

Noxious Weeds

Noxious weeds are non-native plants classified by the Oregon State Weed Board as injurious to public health, agriculture, recreation, wildlife, or public or private property (ODA 2014). They are a menace to public welfare under Oregon Revised Statute 569-350, and steps leading to their eradication and intensive control are necessary. The Oregon Department of Agriculture (ODA) classifies weeds, based on their economic and environmental significance, into the following categories:

- **Category A-Listed Weed** – of known economic importance and occurring in the state in small enough infestations to make eradication or containment possible; or not known to occur in Oregon, but its presence in neighboring states make future occurrence in Oregon seem imminent. Infestations are subject to eradication or intensive control where found.

- **Category B-Listed Weed** – of economic importance and regionally abundant, but often with limited distribution in some counties. These species are limited to intensive control at the state, county, or regional level as determined on a case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control is the primary control method.
- **Category T-Listed Weed** – selected on an annual basis from the A and B lists as part of a target list of weed species that will be the focus for prevention and control by the Noxious Weed Control Program. The Oregon State Weed Board directs ODA to develop and implement a statewide management plan for species on this list.

The Hood River County Weed and Pest Division has identified a list of "top noxious weeds and plants," which are prioritized for control (Hood River County 2014b). The East Multnomah County Soil and Water Conservation District has identified a list of 11 species that require Early Detection and Rapid Response (EDRR) to prevent their spread into Multnomah County or to contain established populations (East Multnomah Soil and Water Conservation District 2014).

The project area is located in the Columbia Gorge Cooperative Weed Management Area (Gorge Weed Management Area). Management of weeds in the Gorge Weed Management Area is guided by a long-term management plan (Western Invasives Network 2011). The Gorge Weed Management Area management plan categorizes weeds for management, with categories similar to the state rating system, but that reflect the distribution of the weeds within the Gorge Weed Management Area region.

Noxious weed surveys of the project area were completed in late July and early August 2014 and from April to June of 2015. Overall, 17 species of noxious weeds were found during surveys of the project area (Table 3.4-3). Scotch broom (*Cytisus scoparia*), St. Johnswort (*Hypericum perforatum*), and bull thistle (*Cirsium vulgare*) were the most commonly occurring species. Diffuse and meadow knapweed (*Centaurea diffusa* and *C. pratensis*) were prevalent along gravel roads throughout the project area.

Table 3.4-3. Noxious Weeds Present in Transmission Line Right-of-Way and Access Roads

Common Name	*Scientific Name*	ODA Classification	Gorge Weed Mgmt. Area Classification[2]	Other Classification[3]
Butterfly bush	*Buddleja davidii*	B listed	High Importance	None
Diffuse knapweed	*Centaurea diffusa*	B listed[1]	Common	None
Meadow knapweed	*Centaurea pratensis*	B listed[1]	Common	None
Canada thistle	*Cirsium arvense*	B listed[1]	Common	None
Bull thistle	*Cirsium vulgare*	B listed[1]	N/A	None
Poison hemlock	*Conium maculatum*	B listed	Common	None
Field bindweed	*Convovulus arvense*	B, T listed[1]	N/A	None
Yellow nutsedge	*Cyperus esculentus*	B listed	N/A	None
Scotch broom	*Cytisus scoparius*	B listed[1]	Common	None
Herb Robert	*Geranium robertianum*	B listed	N/A	None
English ivy	*Hedera helix*	B listed	Common	None
St. Johnswort	*Hypericum perforatum*	B listed[1]	Common	None
Perennial peavine	*Lathyrus latifolius*	B listed	N/A	None
Yellow toadflax	*Linaria vulgaris*	B listed[1]	N/A	Hood River County list of top weeds
Reed canarygrass	*Phalaris arundinacea*	B, T listed	Common	None
Himalayan blackberry	*Rubus armeniacus*	B listed	Common	None
Tansy ragwort	*Senecio jacobaea*	B, T listed[1]	Common	None

Notes:
1 Targeted for biocontrol by ODA.
2 Includes only "Weeds of Concern"; N/A indicates the species is not on the current Weeds of Concern list.
3 Based on a review of Hood River County Top Weeds and East Multnomah County Soil and Water Conservation District EDRR species.
Sources: ODA 2014; Western Invasives Network 2011; East Multnomah Soil and Water Conservation District 2014.

All of the species encountered during field surveys are ODA B-listed species, meaning that they are fairly common weeds in the state, although field bindweed (*Convovulus arvense*), reed canarygrass (*Phalaris arundinacea*), and tansy ragwort (*Senecio jacobaea*) are also currently T-listed species specifically targeted for prevention and control. The Gorge Weed Management Area management plan classifies most of the encountered noxious weeds as "common," which means that their eradication, containment, or control is not economically feasible. Management focuses on removing them from ecologically, socially, and economically important sites and slowing their spread through prevention actions. Of the weeds encountered during 2014 and 2015 surveys, only butterfly bush (*Buddleja davidii*) is considered a high importance weed by the Gorge Weed Management Area; small, isolated populations must be eradicated and large infestations must be controlled or contained (Western Invasives Network 2011). The butterfly bush plant encountered during surveys is located in a developed area near the city of Hood River, and was likely planted by a landowner.

3.4.2 Environmental Consequences–Proposed Action

Construction activities associated with the Proposed Action would directly affect vegetation through vegetation removal or crushing from temporary staging areas and vehicle and equipment work areas, improvement of the access road and trail system, and backfill of structure replacement or retirement sites with spoil. Permanent impacts would occur where disturbance sites would be modified to no longer support vegetation, or where native plant communities would be permanently altered. Temporary impacts would occur in areas where sites could be revegetated following construction.

Vegetation Types

Construction of the Proposed Action would result in less than 1 acre of permanent impacts associated with long-term loss of vegetation, and just less than 71 acres of temporary vegetation disturbance in the project area (Tables 3.4-4 and 3.4-5). Nearly all of the permanent vegetation removal would be associated with extending the access road and foot trails where vegetation would be removed and gravel would be placed, preventing the regrowth of vegetation. Where structures would be relocated, a negligible amount (approximately 0.1 acre) of additional permanent vegetation loss would occur in previously disturbed areas in the right-of-way. Vegetation types subject to permanent vegetation loss are managed right-of-way, coniferous forest, cliffs, talus slope, and riparian habitat.

Table 3.4-4. Summary of Permanent Impacts on Vegetation[1]

Resource Categories	Structure Impacts (Acres)	Access Roads Extension (Acres)	Trails Extension (Acres)	Total[3] (Acres)
Managed ROW	<0.1	0.1 - 0.2	0.1	**0.3**
Non-Vegetated / Developed / Agroforestry	<0.1	<0.1	<0.1	**<0.1**
Coniferous Forest				
Mature[2]	0.0	<0.1	<0.1	**<0.1**
Mid-Seral	0.0	0.0	0.0	**0.0**
Regenerating	0.0	0.0	0.0	**0.0**
Talus Slope[2,3]	0.0	0.0 - 0.1	<0.1	**<0.1 - 0.1**
Pasture[1]	0.0	0.0	0.0	**0.0**
Cliff[2]	0.0	0.0	<0.1	**<0.1**
Riparian Habitat[2]	0.0	0.0	<0.1	**<0.1**
Oak Woodland[2]	0.0	0.0	0.0	**0.0**
Wetland[2]	0.0	0.0	0.0	**0.0**
Native Grassland	0.0	0.0	0.0	**0.0**
Total[3]	**<0.1**	**0.2 - 0.3**	**0.1**	**0.3 - 0.4**
Total Sensitive Habitats[4]	**0.0**	**<0.1 - 0.1**	**<0.1**	**<0.1 - 0.1**

Notes: ROW = right-of-way.

1 Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, a range has been provided.

2 Habitats considered sensitive.

3 Includes all area classified as talus slope during vegetation mapping, including areas that do not support vegetation.

4 Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

Table 3.4-5. Summary of Temporary Impacts on Vegetation[1]

Resource Categories	Structure Impacts (Acres)	Access Roads				Trails			Total[4] (Acres)
		Extension (Acres)	Reconstruction (Acres)	Improve (Acres)	Direction of Travel – Overland (Acres)	Extension (Acres)	Reconstruction (Acres)	Improve (Acres)	
Managed ROW	32.6	0.1	0.2	9.0	<0.1	0.2	<0.1	0.3	**42.4**
Non-Vegetated / Developed / Agroforestry	6.3	<0.1	<0.1	0.7	1.3	<0.1	<0.1	<0.1	**8.4**
Coniferous Forest									
Mature[2]	3.4	<0.1	<0.1	5.3	0.1	<0.1	0.1	0.1	**9.0**
Mid-Seral	0.1	0.0	0.0	0.2	<0.1	0.0	0.0	0.0	**0.3**
Regenerating	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	**<0.1**
Talus Slope[2,3]	4.7	0.0 - 0.1	0.0 - 0.1	0.5	0.0	<0.1	0.7	0.3	**6.2 – 6.4**
Pasture[2]	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	**1.3**
Cliff[2]	1.0	0.0	0.0	<0.1	0.0	<0.1	<0.1	0.1	**1.1**
Riparian Habitat[2]	0.5	0.0	0.0	0.2	0.0	<0.1	0.0	0.0	**0.7**
Oak Woodland[2]	0.7	0.0	0.0	0.1	0.0	0.0	<0.1	<0.1	**0.9**
Wetland[2]	0.1	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	**0.1**
Native Grassland	<0.1	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	**<0.1**
Total[4]	**49.3**	**0.1**	**0.2 - 0.4**	**16.3**	**2.4**	**0.3**	**0.9**	**0.8**	**70.4 – 70.6**
Total Sensitive Habitats[4]	**10.4**	**<0.1 - 0.1**	**<0.0 - 0.1**	**6.4**	**1.1**	**0.1**	**0.9**	**0.5**	**19.3 – 19.4**

Notes: ROW = right-of-way.
[1] Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, a range is provided.
[2] Habitat considered sensitive.
[3] Includes all area classified as talus slope during vegetation mapping, including areas that do not support vegetation.
[4] Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

The majority of temporary impacts would occur in the previously disturbed habitats of managed right-of-way. Temporary impacts on vegetation would occur at structure replacement and retirement sites, where vegetation in the area surrounding the structure would be removed, followed by restoration of the site through reseeding. A temporary loss of vegetation would also occur at pulling and tensioning sites and hardware and conductor replacement sites, where some removal of vegetation would be required to facilitate access and use. In addition to a temporary loss of vegetation, there could be a long-term alteration of plant species composition, depending on the seed mix applied after construction. Other temporary impacts on vegetation would be from the use of heavy equipment at construction sites, staging areas, on temporary access routes, and in work areas along roads and trails. Vegetation in these areas could be crushed or uprooted, and localized areas of soil compaction could affect plant communities by reducing infiltration, altering soil characteristics, and favoring species adapted to compacted conditions.

Within the managed right-of-way and pasture habitats, vegetation would be expected to recover following construction. There could be some lasting effects on species composition, which would be greatest in native plant communities and sensitive habitats. Effects on sensitive habitats are described further in the following subsection.

Hazardous materials, such as fuels and hydraulic fluids used by vehicles and construction equipment, could be accidentally released within the right-of-way, potentially harming vegetation and reducing the vigor of native populations. The risk of spills of hazardous materials would be minimized through mitigation measures, such as developing and implementing Spill Prevention and Response Procedures (Table 2.7-1), and impacts would be localized to areas where construction equipment is used if a spill were to occur. Additionally, growth of vegetation near the PCP-treated wood poles may be inhibited by the toxic compounds that could leach into the soil through the bottom of the pole. However, these impacts would be extremely localized due to the short leaching distance of PCP as discussed previously in Section 3.3.2, *Geology and Soils*. A detailed discussion of potential hazardous materials issues is presented in Section 3.5, *Waterways and Water Quality,* and Section 3.13, *Noise, Public Health, and Safety*.

Construction of Line Mile 19 Options 2 and 3 would result in nearly identical impacts on vegetation when compared with Line Mile 19 Option 1. The primary difference is that Line Mile 19 Option 2 would not include the excavator roads to structures 19/3 through 19/7, which occur in the talus slope and managed right-of-way vegetation types. Consequently, Line Mile 19 Option 2 would have about 0.1 acre less permanent impacts on managed right-of-way and talus slope (Table 3.4-4) and 0.1 acres less temporary impacts on talus slope (Table 3.4-5) compared with Line Mile 19 Option 1. Line Mile 19 Option 3 would not include any road work between structures 19/3 through 19/7. Consequently, Line Mile 19 Option 3 would have the same permanent impacts on vegetation as Line Mile 19 Option 2 (Table 3.4-4), but 0.1 acre less temporary impacts on talus slope (Table 3.4-5).

Based on the small quantity of long-term habitat loss combined with the majority of temporary impacts occurring in previously disturbed habitats of managed right-of-way and the implementation of mitigation measures such as revegetation with native seed mixes (Table 2.7-1), impacts to general vegetation would be **low**, regardless of Line Mile Option 19 selected.

Sensitive Habitats and Sensitive Plant Species

Sensitive Habitats

Permanent impacts through loss of vegetation would occur on about 0.1 acre or less of talus, mature forests, cliffs, and riparian habitats (Table 3.4-4). Wetlands, oak woodlands, and native grasslands would not have permanent vegetation loss. Temporary impacts on sensitive vegetation habitats would occur on up to 19.4 acres, with negligible amounts of wetlands and native grasslands affected (Table 3.4-5). All of the Line Mile 19 Options would occur in areas mapped as talus, which is a sensitive habitat. Therefore, the 0.1 to 0.2 acre difference between options described above would also apply to sensitive habitats.

Within certain sensitive habitats, it is unlikely that the removal of vegetation followed by reseeding would re-establish the same high-quality native plant communities that are currently present, and therefore, could constitute a long-term loss of sensitive habitats. For instance, in mature forest communities, mature over story trees and understory structural components would take decades to recover. While the project would not include the removal of mature Oregon white oak trees, these communities also support a suite of native ***forbs*** that are rare in other portions of the project area that may not recover after site disturbance. Implementation of the mitigation measures described in Table 2.7-1, such as reducing the size of work areas in sensitive habitats, avoiding identified sensitive vegetation, relocating sensitive plants outside of work areas, and revegetating ground disturbance with native seed mixes recommended by the land managers, would reduce the magnitude of the project’s impact on sensitive habitats.

On cliffs and talus slopes, most impacts would be associated with temporary disturbance during work activities. Some temporary work platforms would be located on unvegetated areas; however others would potentially cover and likely damage vegetation on the site. Following project activities, most impacted vegetation would likely recover, and long-term impacts would be minimal. Based on data from the Gorge Commission, about 62,000 acres classified as gorge walls, canyon lands, and wildlands occur in the National Scenic Area (Gorge Commission 2014a). Therefore, the estimated impacts represent a very small fraction of a percent of cliff and talus slope habitats in the region.

In mature forest habitats, most impacts would be associated with temporary disturbances, with a negligible amount of permanent loss of vegetation from access road and trail work, pulling and tensioning sites, and danger tree removal. Up to a total of 9 acres of mature forest (up to 380 trees), comprised primarily of conifers with a diameter at breast height (dbh) ranging from 9 to 99 inches [26 inch average dbh] could be temporarily impacted if all potential pulling and tensioning sites were used. This would include an estimated removal of up to 96 trees removed at pulling and tensioning sites; removal of these trees would be distributed among all of the 14 pulling and tensioning sites. Additionally, 66 trees along access roads, 211 danger trees adjacent to the transmission line right-of-way, and 7 trees under the Cascade Locks Tap line have been identified for removal. Impacts would be minimized by avoiding the removal of mature trees in pulling and tensioning sites to the extent feasible (Table 2.7-1). Based on data from the Gorge Commission, about 65,000 acres of coniferous woodlands occur in the National Scenic Area (Gorge Commission 2014a). Therefore, estimated tree removal from the project represents a fraction of a percent of mature forest habitats in the region.

Only a small amount of riparian habitats (0.7 acre) and Oregon white oak woodland (0.9 acre) would be temporarily impacted by the project, which is about a tenth of the riparian habitat and a quarter of the oak woodland present in the project area. Riparian habitats occur throughout the region in association with stream channels and other waterways. Based on data from the Gorge Commission, about 24,000 acres of oak woodlands occur in the National Scenic Area (Gorge Commission 2014a). Therefore, the estimated impacts represent a fraction of a percent of Oregon white oak woodlands in the region. Furthermore, BPA would likely be able to avoid impacts on Oregon white oaks during trail reconstruction and improvement, and structure replacement activities.

While up to about 19.4 acres of sensitive habitats have been identified as areas that would be impacted by project activities, BPA would be able to avoid long-term impacts on vegetation in most areas by implementing mitigation measures such as avoiding trees and other native vegetation in sensitive habitats during work activities, using existing road systems where practicable, minimizing the construction area to the extent practicable, and locating staging areas in previously disturbed or graveled areas, and reseeding native grasses and forbs with appropriate seed mixes (Table 2.7-1), and could include relocating sensitive plants. With these measures in place, impacts would be **low** in all sensitive habitat types.

<u>Special-Status Plant Species</u>

During the 2014, 2015, and 2016 vegetation surveys, populations of Howell's reedgrass, long-bearded hawkweed, Multnomah bluegrass, Oregon coolwort, and western mountain kittentails were identified within the project area. Based on geographic information system (GIS) mapping of these populations, 12 populations of special-status plants overlap areas that would be permanently or temporarily impacted by the Proposed Action. Overall, the project would temporarily impact 0.3 acre of special-status plants (Table 3.4-6). None of the Line Mile 19 Options would contain work areas that overlap with the location of special-status plant species. As discussed above for sensitive habitats, it is possible that the temporary removal of vegetation followed by reseeding would not be effective in re-establishing the same high-quality native plant communities that are currently present, and therefore, could constitute a long-term loss of sensitive plants.

Table 3.4-6. Temporary Impacts to Sensitive Plant Species

Species	Structure Impacts (Acres)	Access Roads			Trails			Total[1] (Acres)
		Extension (Acres)	Reconstruction (Acres)	Improvement (Acres)	Extension (Acres)	Reconstruction (Acres)	Improvement (Acres)	
Howell's reedgrass	<0.1	0.0	0.0	0.0	0.0	<0.1	0.0	**0.1**
Long-bearded hawkweed	0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	**0.1**
Multnomah bluegrass	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	**<0.1**
Western mountain kittentails	0.1	0.0	0.0	<0.1	<0.1	<0.1	0.0	**0.1**
Total[1]	**0.2**	**0.0**	**0.0**	**<0.1**	**<0.1**	**<0.1**	**0.1**	**0.3**

Note:
[1] Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

The Management Plan identifies a 1,000-foot buffer around sensitive plants within the National Scenic Area (Gorge Commission 2011). Undisturbed buffer zones should be established within 200 feet around sensitive plants, although this buffered area could be reduced if adequate justification is provided (Gorge Commission [2011]).

The Proposed Action would result in up to 0.3 acre of permanent impacts to vegetation located within the 1,000-foot buffer around sensitive plant populations (Table 3.4-7). Permanent impacts on sensitive plant buffers from Line Mile 19 Options 2 and 3 would be the 0.1 acre less than Line Mile 19 Option 1. The majority of the permanent impacts within 1,000 feet of special-status plant populations would be associated with extending the access road and foot trails where vegetation would be removed and gravel would be placed, preventing the regrowth of vegetation.

Table 3.4-7. Permanent Vegetation Loss within 1,000 Feet of Sensitive Plant Species

	Structure Replacement (Acres)	Access Road Extension (Acres)	Trail Extension (Acres)	Total[1] (Acres)
Howell's reedgrass	0.0	0.0	0.0	**0.0**
Long-bearded hawkweed	<0.1	0.0 - 0.1	0.1	**0.2**
Multnomah bluegrass	0.0	<0.1	0.0	**<0.1**
Oregon coolwort	0.0	0.0	<0.1	**<0.1**
Western mountain kittentails	<0.1	0.0	0.1	**0.1**
Total[1]	<0.1	**<0.1 - 0.2**	**0.1**	**0.2 – 0.3**

[1] Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

BPA would coordinate with the Oregon Natural Heritage Program, the U.S. Forest Service, and State Parks regarding the location of project impacts within 1,000 feet of special-status plant populations, which would involve the preparation of protection and rehabilitation plans for the species. Special-status plant species populations would be avoided to the maximum extent possible and construction areas reduced in size to the extent practicable. With these measures in place and the negligible amount of permanent impacts, overall impacts to special-status plants would be **low**.

Noxious Weeds

Site preparation and construction activities under the Proposed Action could contribute to the establishment and spread of noxious weeds within the project area. As indicated by the results of the noxious weed surveys, established populations of numerous noxious weeds are already present in the right-of-way. Because noxious weeds are widespread in the project area, their propagules and seeds are also widely distributed. Removal of vegetation and soil disturbance along access roads, trails, and at structure replacement and retirement sites would create site conditions likely to favor the establishment of noxious weeds. Additionally, construction vehicles and equipment could transport weed seeds and propagules along roads and other travel routes, potentially leading to the establishment of new populations of these species. Extending the access road system could provide sites for noxious weeds to colonize. Potential impacts would be greatest in previously uninfested areas and in areas with a large component of native vegetation.

No weed populations were identified along the road extensions under Line Mile 19 Option 1. Nor were weeds identified at the structure locations. The existing access road that would be reconstructed under Line Mile 19 Options 1 and 2 do have noxious weeks identified along the road shoulders. Therefore, the reconstruction of the access road and installation of landings under Options 1 and 2 have the same potential for disturbing identified weeds. No weeds were identified at the Line Mile 19 structure sites and Option 3 would not alter the existing access road; therefore, Line Mile Option 3 would not disturb identified weeds.

BPA would limit the establishment and spread of noxious weeds by minimizing ground disturbance in proximity to existing noxious weed populations, using weed-free materials during construction and restoration activities, and implementing measures to minimize the introduction and broadcast of weed seeds/propagules (e.g., vehicle inspections and wash or blow stations at key access points) (see Table 2.7-1). With these mitigation measures in place, impacts on native vegetation associated with the establishment and spread of noxious weeds would be **low**.

3.4.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on vegetation are identified in Table 2.7-1 in Chapter 2 of this EA.

3.4.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line and no roads or trails would be improved or constructed. BPA would continue operations and maintenance activities similar to those currently being performed such as periodic maintenance of the line, including routine vegetation clearing and danger tree removal. These activities would maintain plant communities along the right-of-way as predominantly disturbed herbaceous communities or shrub lands. Initially, the impacts on vegetation associated with these ongoing activities would have **low** impacts.

Some planned maintenance of structures and lines might occur, but it is expected that the majority of repairs would occur on an emergency basis following structure failure. Repair activities would impact vegetation in localized areas along the route in much the same way that construction activities under the Proposed Action would impact vegetation. Most loss of vegetation would be temporary. Under emergency repair conditions, avoidance of sensitive plants and habitats may not be feasible and could result in a **low** to **high** level of impact on these resources over time, depending on the location and activity type.

Populations of noxious weeds in the right-of-way would continue to spread and increase in size. New populations would establish as a result of natural processes of seed dispersal, as well as through the transport of seeds and propagules on maintenance and construction equipment needed for emergency or other spot repairs. It is expected that BPA would continue to implement existing noxious weed control measures as existing conditions, although, if there were an emergency situation, it may not be feasible to establish blow/wash stations. Therefore, the establishment and spread of noxious weeds in the project area under the No Action Alternative would be **low** to **moderate**, depending on location and nature of work required.

3.5 Waterways and Water Quality

3.5.1 Affected Environment

Surface Water Resources

This section describes existing ***surface water*** resources in the project area (generally defined for the purposes of this section as within 100 feet of the transmission line right-of-way and access roads), including rivers and streams, as well as, surface water Drinking Water Source Areas. This section also describes other surface water intakes downstream from the project area that could potentially be affected by the project.

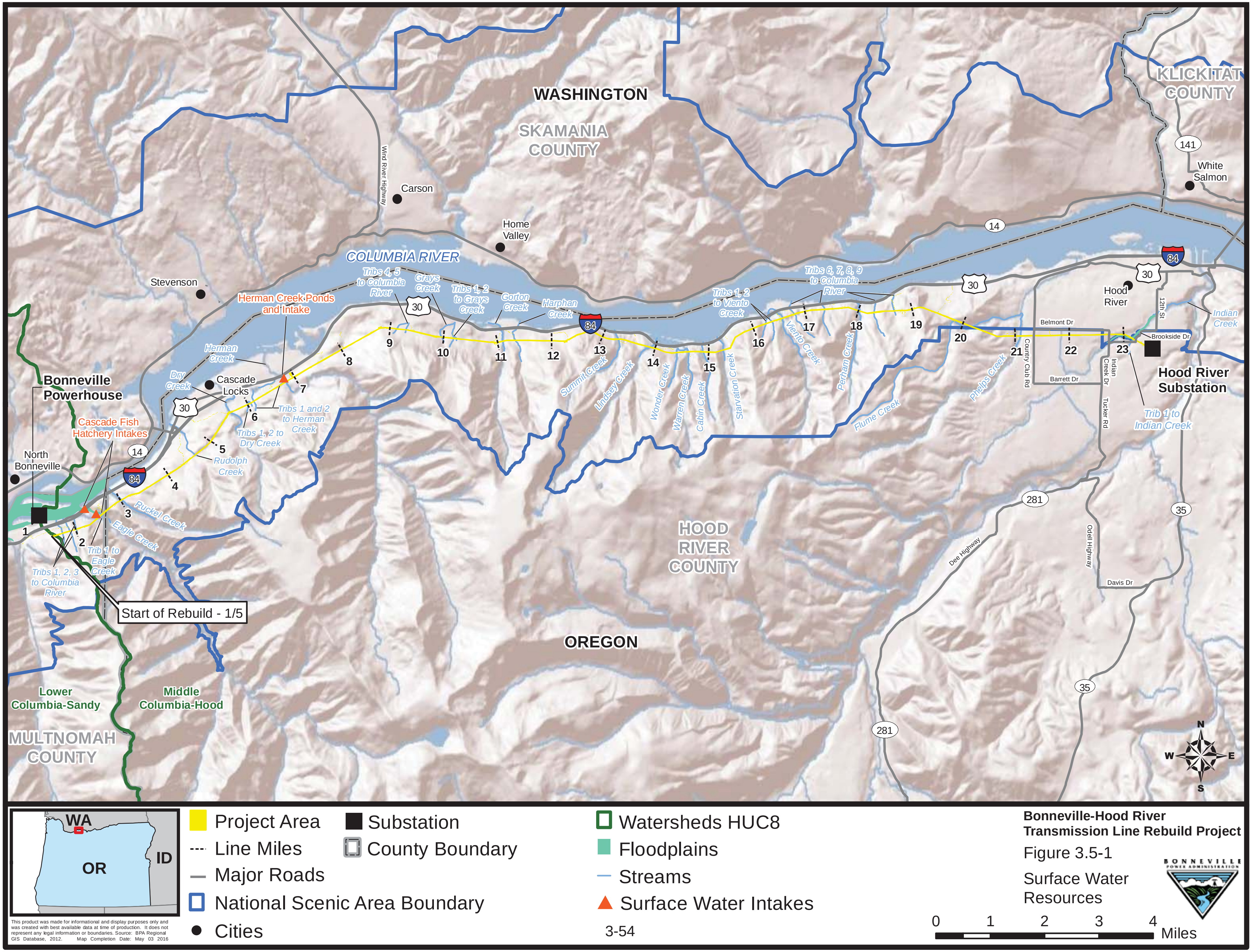
Streams and Water Quality

The project area is located within the Lower Columbia-Sandy and Middle Columbia-Hood River ***Watersheds*** (Hydrologic Unit Code [HUC] 8), within the following six subbasins (HUC12): Tanner Creek-Columbia River, Carson Creek-Columbia River, Eagle Creek, Herman Creek, Grays Creek-Columbia River, and Indian Creek-Columbia River. The transmission line right-of-way and access roads cross 39 streams, as mapped by the U.S. Geological Survey (USGS 2014) (Figure 3.5-1). These streams range widely in size: large, fish-bearing ***perennial*** streams (such as Eagle, Herman, Indian, and Harphan creeks); named and unnamed ***tributaries*** to those streams; and smaller, ephemeral drainages. Some streams are crossed more than once, or by more than one project feature (e.g., transmission line and an access road).

Every 2 years, the Oregon Department of Environmental Quality (ODEQ) is required to assess water quality and report to the U.S. Environmental Protection Agency (EPA) on the condition of Oregon's waters. ODEQ prepares an integrated report that meets the requirements of the federal CWA for Section 305(b) and Section 303(d). CWA Section 305(b) requires a report on the overall condition of Oregon's waters. CWA Section 303(d) requires states to develop lists of impaired waters, which are waters that are too polluted or otherwise too degraded to meet water quality standards set by the state. CWA section 303(d) requires states to establish priority rankings for impaired waters and develop ***Total Maximum Daily Loads (TMDLs)***; a TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards.

Oregon categorizes water bodies in the state as Category 1 through Category 5. Category 4 and Category 5 waters are those that do not meet water quality standards for one or more pollutants. Category 4A waters are those that need a TMDL to attain applicable water quality standards. Category 5 waters comprise the Section 303(d) list and are those for which a TMDL still needs to be developed.

The Columbia River is on the 303(d) list as impaired and is not within the project area, although it receives runoff from the project area via smaller tributaries. Indian Creek (line mile 23) is also listed in Category 5 with TMDLs needed for Chlorpyrifos (an insecticide) and E.coli (Table 3.5-1). The other streams in the project area are in Category 2 or 3, indicating that they are attaining some criteria/uses (Category 2) or that there is some potential concern or an unknown pollutant, but insufficient data exist to place the stream in another category (Category 3).



Bonneville-Hood River Transmission Line Rebuild Project

Figure 3.5-1

Surface Water Resources

The Management Plan requires that a 100-foot-wide undisturbed buffer be preserved around waterbodies and wetlands (see also Section 3.6, *Wetlands and Floodplains*) to protect and enhance waterbody functions and associated uplands (Gorge Commission 2011). Ground disturbance areas within these buffer zones should be revegetated with native species that replicate the original vegetation community (Gorge Commission 2011).

Table 3.5-1. Surface Waters in or near the Project Area with Impaired or Limited Water Quality Parameters

Surface Water Name	Assessment Category[1]	Pollutant[2]	Affected Uses[3]
Columbia River (RM 98 to 142)	5/303(d)	Zinc	Resident fish and aquatic life, anadromous fish passage, drinking water
Columbia River (RM 0 to 319.3)	4	Chromium	Aquatic life, human health
Indian Creek (RM 0 to 7.8)	5/303(d)	Chlorpyrifos	Aquatic life, anadromous fish passage, Salmonid fish rearing, resident fish life,
	5/303(d)	E. Coli	Not specified

Notes: RM = river mile.
[1] Category 5 are on the 303(d) list, Category 4 do not meet water quality parameters for one or more pollutants and need a TMDL to attain applicable water quality standards.
[2] Pollutant = A pollutant or condition that may impair water quality and that has an Oregon water quality standard.
[3] Affected Use = A beneficial use protected by the water quality standard.
[4] Changes in resident biological communities of freshwater macroinvertebrates (insects, crustaceans, snails, clams, worms, mites, etc.) are a form of pollution.
Source: ODEQ 2010.

Drinking Water Source Areas and Other Surface Water Intakes

ODEQ and Oregon Department of Human Services' Drinking Water Program maintains information on Drinking Water Source Areas, from surface water and groundwater, and for community and non-transient non-community public water systems. This information does not include information on private water supplies. There are no surface water Drinking Water Source Areas within 150 feet of the project area (ODEQ 2013) (Figure 3.5-1).

The Cascade Fish Hatchery, located 2.5 miles west of the city of Cascade Locks on Eagle Creek (Figure 3.5-1), has two surface water intakes on Eagle Creek downstream from the right-of-way. There is a 36-inch-diameter water line intake about 1,300 feet upstream from the hatchery and a pump intake about 800 feet downstream from the hatchery beneath a railroad bridge between the separated I-84 travel lanes (M. Trainer, pers. comm., ODFW Cascade Fish Hatchery, October 21, 2014). The Oxbow Fish Hatchery (also described below under groundwater resources) includes two satellite facilities (Upper and Lower Herman Creek ponds) with surface water intakes on Herman Creek. The Upper Herman Creek Pond is on the east side of Herman Creek, about 200 feet downstream from the transmission line right-of-way. A dam and intake for this facility are located on Herman Creek about 300 feet upstream from the transmission line right-of-way. A pipeline conveying water from the intake to the Upper Herman Creek Ponds is aligned roughly parallel to the creek and buried beneath an access road crossing the transmission line right-of-way (S. Richardson, pers. comm., ODFW Oxbow Fish Hatchery, October 21, 2014). The Lower Herman Creek Pond is near the mouth of Herman Creek about 0.5 miles downstream from the transmission line right-of-way. The surface water intake for this facility is north of I-84, about 600 feet north of NW Forest Lane Road

(S. Richardson, pers. comm., ODFW Oxbow Fish Hatchery, October 21, 2014). No other surface water intakes have been identified downstream from the project area.

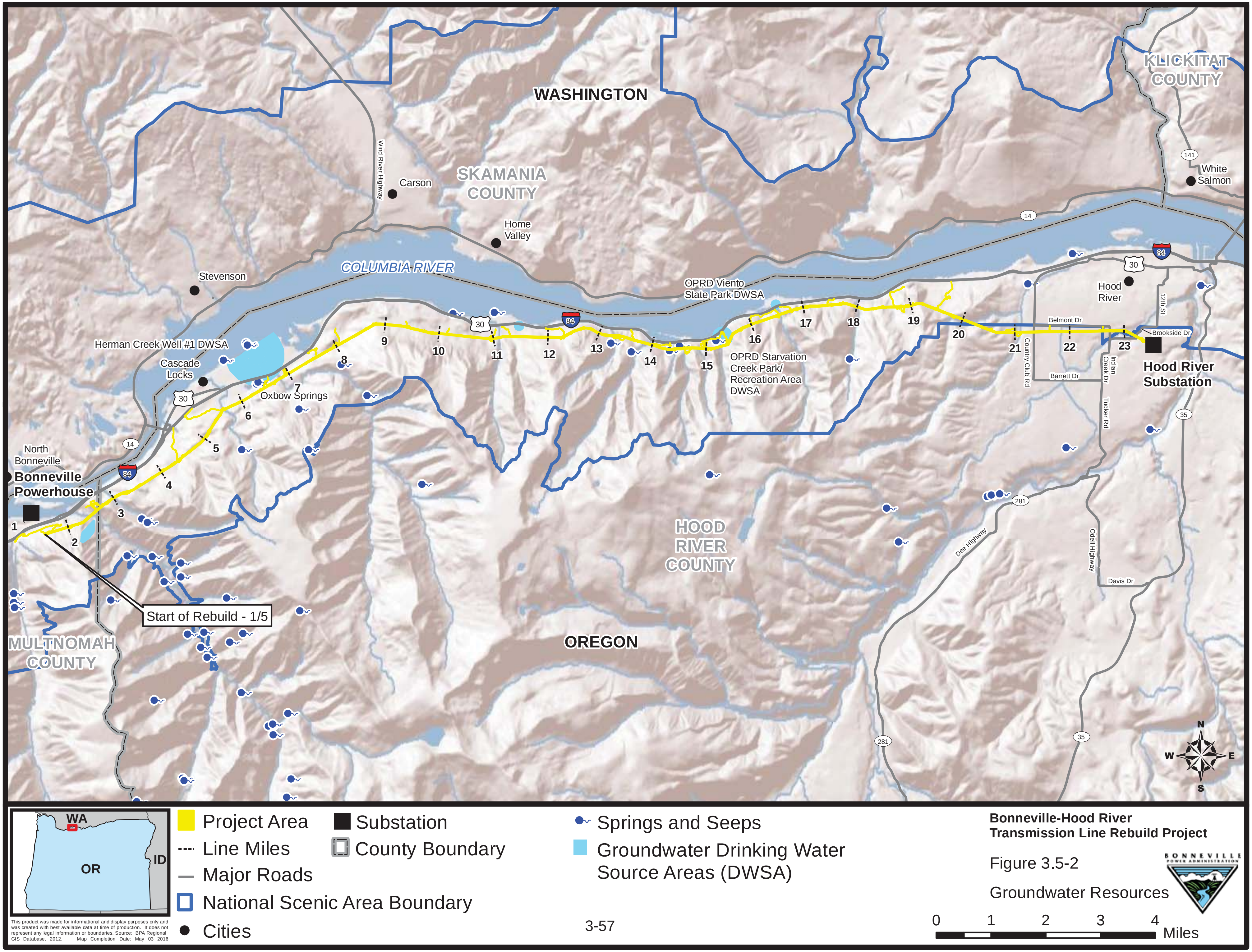
Groundwater Resources

Groundwater resources include regional and local ***aquifers***, groundwater Drinking Water Source Areas (groundwater wells), and known springs within 150 feet of the project area.

EPA designates ***sole source aquifers*** in areas where there are few or no alternative water sources aside from groundwater and where, if contamination were to occur, using an alternative source would be extremely expensive. Sole source aquifers are those that supply at least 50 percent of the drinking water consumed in the area overlying the aquifer. The closest Sole Source Aquifer is the Troutdale Aquifer System on the Washington side of the Columbia River, almost 20 miles from the western end of the project area; there are no designated Sole Source Aquifers in the project area (EPA 2008b).

The project area crosses three groundwater Drinking Water Source Areas (Figure 3.5-2). In line mile 6, an access road identified as needing improvement crosses the Herman Creek Well #1 Drinking Water Source Area on the north side of the right-of-way. This groundwater Drinking Water Source Area provides drinking water to the city of Cascade Locks. In the beginning of line mile 15, the transmission line right-of-way and the Starvation Creek Trail cross the Oregon State Parks Starvation Creek Park/Recreation Area Drinking Water Source Area. This groundwater Drinking Water Source Area provides drinking water to the Starvation Creek State Park. In line mile 16, two access roads cross the Viento State Park Drinking Water Source Area. This groundwater Drinking Water Source Area provides drinking water to the Viento State Park Campground.

Oxbow Springs provides water for hatchery operations at the Oxbow Fish Hatchery near Herman Creek (Figure 3.5-2). ODFW holds the water rights to the spring. Nestle is proposing to build a water bottling plant in the city of Cascade Locks and obtain water from the spring by having the city engage in a water rights exchange with ODFW, and buying the spring water from the city. BPA has not proposed project work near this spring.



Bonneville-Hood River Transmission Line Rebuild Project

Figure 3.5-2

Groundwater Resources

3.5.2 Environmental Consequences–Proposed Action

Impacts on surface water and groundwater resources under the Proposed Action would be the same, regardless of which Line Mile 19 Option is selected, as there are no surface water resources near the Line Mile 19 Options. These potential impacts are discussed below.

Surface Water Resources

Streams and Water Quality

Under the Proposed Action, four structure work areas would be located within 100 feet of streams. Of the structures replaced, all would be replaced at or within 20 feet of their existing location in already disturbed areas. Therefore, there would be no new permanent disturbance areas near streams. Structure work would involve the temporary disturbance of vegetation and soils in a larger area (a temporary disturbance area) around the structure, which could include the clearing or crushing of vegetation, excavation of structure holes, and soil compaction from heavy equipment.

Overall, 1.8 acres of existing vegetation within 100 feet of streams would be temporarily disturbed during project construction (Table 3.5-2). Within this area, up to twenty-three trees would be removed within 100 feet of streams, distributed among 12 different streams. Up to four trees would be removed within 100 feet of any one stream, with only one or two trees potentially removed within 100 feet of most streams. BPA would, however, attempt to avoid tree clearing for pulling and tensioning near streams (and all areas) to the maximum extent practical (see Table 2.7-1). Given the limited potential tree clearing, the potential tree removal, if needed, would not alter water temperatures in project area streams.

Table 3.5-2. Temporary Disturbance Areas from Structure Work within 100 Feet of Streams under the Proposed Action

Stream	Line Mile	Temporary Disturbance (Acres)[1]
Rudolph Creek	4	0.2
Dry Creek	5[2]	0.6[3]
Tributary 1 to Dry Creek	6	0.1
Tributary 2 to Dry Creek	6	0.1
Tributary 2 to Herman Creek	6	0.2
Tributary 1 to Grays Creek	10[2]	0.2
Tributary 2 to Grays Creek	10	<0.1
Summit Creek	12 and 13	0.2
Warren Creek	14	<0.1
Indian Creek and Tributary 1 to Indian Creek	23	0.2
Total[1]		**1.8**

Notes:
[1] Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.
[2] The typical 100-foot x 100-foot temporary disturbance area of a potential pulling/tensioning site for structure work encroaches on the stream channel at this location. Mitigation to minimize stream impacts would include configuring the work site to avoid working in undisturbed areas near the stream channel that pose erosion and sedimentation risk or where removal of riparian vegetation would be required.
[3] Includes temporary disturbance associated with a potential tensioning/pulling site.

When exposed soils are subject to runoff (rain, snowmelt, etc.), erosion of soil could reach nearby streams and increase ***turbidity***, degrade water quality, and deposit sediments into the channels. Each structure would have a small area of exposed soils for a few weeks that is unlikely to be a substantial source of sediment to nearby streams. Most construction work would occur during the dry season, which would reduce the potential for runoff and erosion. Soil excavated from structure holes that is not used to backfill the hole would be disposed of in ***upland*** areas away from streams. Overall, only about 1.8 acres of temporary disturbance to vegetation and soils associated with structure work and potential tensioning and pulling sites would occur within 100 feet of streams. In a few areas, the typical 100-foot by 100-foot temporary disturbance area for structure work activities would closely encroach or encompass the nearby stream channel. Work sites in these areas would be reduced to 50 feet by 50 feet and would be configured to avoid working in undisturbed areas near the stream channel.

Access road and trail improvement and reconstruction would occur within 100 feet of 25 streams. No road extensions would be constructed near streams. All access road improvement work would occur within already disturbed areas (e.g., the original road prism), so there would be no new permanent disturbance areas near streams associated with access road work. Road work would require the construction of new fords across streams in five locations, one at a ***tributary*** to Grays Creek in line mile 10, one at Harphan Creek in line mile 11, two on an unnamed tributary to the Columbia River in line mile 18, and a fifth on a tributary to Phelps Creek in line mile 20. One existing ford would be repaired at Dry Creek in line mile 5. Fords are designed to be about 20 feet wide and of varying lengths to accommodate the channels and ensure they are stable through time. All work would be within the existing road prism at existing crossings and not require the removal of riparian or streamside vegetation. No alterations to stream channels are planned that would affect biological criteria in these streams and no water quality concerns are documented for these streams. If flow is present during installation, work areas would be isolated; there may be a minor turbidity pulse upon rewatering. Ford installations would occur during the in-water work window when flows are lowest, which would reduce the magnitude and duration of any sediment pulse. During construction, vehicle use of the fords may introduce some sediment when crossing waterbodies, if water is present at the time of crossing. To minimize instream disturbance associated with ford use during construction, the largest stream crossings (i.e. Dry and Harphan Creeks) would have additional mitigation measures implemented to limit the quantity of sediment introduced during construction. A temporary bridge would be installed at Harphan Creek and the ford at Dry Creek would only be used for construction during the in-water work window (the low flow period).

Two new culverts would be constructed at East Springs in line mile 6 and an unmapped ditch in line mile 21. These culverts would be constructed during the dry season to avoid in-water work and associated impacts on stream water quality.

The Proposed Action would include the installation of two log pedestrian bridges on existing trails. One bridge would be 45 feet long over Summit Creek (line mile 13), and the other would be 35 feet long over Warren Creek (line mile 14). Both of these bridges would free-span the creeks, thereby not requiring in-water work or removal of riparian vegetation. A small amount of soil adjacent to the bridge sites would be disturbed to create solid footings for the new structures. The new structures would be transported to the sites by helicopter and installed by hand.

Near Summit Creek (line mile 13), two small segments of foot trail would be extended. Some foot trails may need to be expanded beyond the existing footprint and a gravel surface applied to accommodate access, which would result in new permanent disturbance near streams. Similar to structure work, access road and foot trail work would involve the temporary disturbance of vegetation and soils on both sides of the existing disturbance footprint. Temporary disturbance to vegetation and soils associated with access road or foot trail work near streams would have impacts similar to those associated with structure work (i.e., increased turbidity, degraded water quality, and deposited sediments).

Overall, less than 0.1 acre of permanent disturbance and 1.1 acres of temporary disturbance associated with access road and foot trail work would occur within 100 feet of streams (Table 3.5-3). At each location where temporary disturbance would occur, only 0.1 acre or less would be disturbed. For the Proposed Action as a whole, structure, bridge, access road, and foot trail work combined would result in less than 0.1 acre of permanent disturbance and 3.0 acres of temporary disturbance within 100 feet of streams.

While work would occur within 100 feet of several streams (Table 3.5-2 and Table 3.5-3), existing water quality issues are a concern only in Indian Creek (Table 3.5-1). In Indian Creek, the Proposed Action would not be a potential source of Chlorpyrifos or *E.coli*, the two pollutants of concern for this stream, as the Proposed Action would not include the application of herbicides (Cholorpyrifos source) nor produce untreated animal or human waste (*E.coli* source).

PCP from wood poles could reach receiving surface streams. However, PCP concentrations decrease rapidly with distance from wood poles by as much as two orders of magnitude within 3 to 8 inches from the pole and none of the structures would intersect surface water or shallow groundwater in the project area. Additionally, materials storage sites and temporary staging areas where PCP-treated wooden poles would be temporarily stored would generally be located on existing level, cleared sites in commercial or industrial areas with runoff containment, such that potential impacts from PCP-treated wood polls to surface streams would be **low**.

Table 3.5-3. Permanent and Temporary Disturbance from Access Road and Trail Work within 100 Feet of Streams under the Proposed Action

Stream	Line Mile	Permanent Disturbance (Acres)[1]	Temporary Disturbance (Acres)[1]	Number of Stream Crossings[2]
Tributary 1 to Columbia River	1	0.0	<0.1	2
Tributary 2 to Columbia River	1	0.0	<0.1	2
Tributary 3 to Columbia River	2	0.0	<0.1	1
Rudolph Creek	4	0.0	0.1	1
Dry Creek	5	0.0	<0.1	1
Tributary 1 to Dry Creek	6	0.0	<0.1	1
Tributary 2 to Dry Creek	6	0.0	<0.1	2
Tributary 1 to Herman Creek	6	0.0	0.1	2
Tributary 2 to Herman Creek	6	0.0	<0.1	0
Tributary 4 to Columbia River	9	0.0	<0.1	1
Tributary 5 to Columbia River	9	0.0	<0.1	1
Grays Creek	9 and 10	0.0	0.1	2
Tributary 1 to Grays Creek	10	0.0	0.1	3
Tributary 2 to Grays Creek	10	0.0	<0.1	1
Harphan Creek	11	0.0	0.1	1
Summit Creek[3]	12 and 13	<0.1	<0.1	1
Warren Creek[3]	14	<0.1	<0.1	1

Table 3.5-3. Permanent and Temporary Disturbance from Access Road and Trail Work within 100 Feet of Streams under the Proposed Action

Stream	Line Mile	Permanent Disturbance (Acres)[1]	Temporary Disturbance (Acres)[1]	Number of Stream Crossings[2]
Viento Creek	16	0.0	<0.1	0
Tributary 6 to Columbia River	16	0.0	0.1	1
Tributary 7 to Columbia River	17	0.0	<0.1	1
Tributary 8 to Columbia River	18	0.0	<0.1	1
Tributary 9 to Columbia River	19	0.0	<0.1	3
Flume Creek	20	0.0	<0.1	1
Phelps Creek	21	0.0	0.1	1
Indian Creek	23	0.0	<0.1	0
Total[4]		**<0.1**	**1.1**	**31**

Notes:
1 Includes bridge work.
2 This column identifies stream crossings on access roads that are being improved or reconstructed for the purpose of identifying the need for stream protection BMPs during construction. It does not represent proposed in-water work.
3 Work consists of or includes work on trails.
4 Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

The implementation of mitigation measures (Table 2.7-1) would reduce and minimize temporary and permanent impacts on streams, buffers, and water quality from the structure, bridge, access road, foot trail, and bridge work described above. The majority of the impacts on streams and water quality from these activities would be localized and temporary, and are not expected to affect stream hydraulic, hydrologic, or habitat functions, or result in water quality parameters being exceeded. Additionally, all temporary disturbance areas from structure, bridge, access road, foot trail, road ford reconstruction, and bridge work would be restored to pre-construction conditions to the extent possible, which would include reseeding with an appropriate native upland, riparian, or wetland seed mix or other seed mix agreed to by the landowner. The only permanent impacts would be those associated with foot trail improvements and bridge work, which combined totals less than 0.1 acre at Summit and Warren creeks (Table 3.5-3). Overall, impacts on streams and water quality from implementation of the Proposed Action would be **low**.

Drinking Water Source Areas and Other Surface Water Intakes

There are no surface water Drinking Water Source Areas within 150 feet of the project area. The Proposed Action would not involve any structure, access road, foot trail, bridge, or culvert work on or in the vicinity of Eagle or Herman creeks, so there would be no impact on water intakes for either the Cascade or Oxbow fish hatcheries. For these reasons, there would be **no** impact on surface water Drinking Water Source Areas or surface water intakes from the Proposed Action.

Groundwater Resources

None of the Line Mile 19 Options would be located near Drinking Water Source Areas. No structures would be rebuilt in the Herman Creek Well #1 or the Viento State Park Drinking Water Source Areas. Two structures would be rebuilt in the Starvation Creek State Park Drinking Water Source Area and one would be retired (Figure 3.5-2). Construction areas would temporarily disturb a total of about 0.5 acres of vegetation.

These work areas would not result in a permanent net increase in impervious surfaces, so there would be no permanent impact on groundwater recharge associated with structure work.

No new access roads would be constructed in groundwater Drinking Water Source Areas. About 70 feet of trail extension would be built in the middle of line mile 15 within the Starvation Creek Drinking Water Source Area. No new impervious surfaces would be added as a result of this new segment. Access road and foot trail improvements and reconstruction would not result in a permanent net increase in impervious surfaces; therefore, there would be no permanent impact on groundwater recharge associated with access road or trail work.

Access road and foot trail work would temporarily disturb less than 0.1 acre in the Herman Creek Well #1 and Well #2 Drinking Water Source Areas, about 0.2 acre in the Starvation Creek State Park Drinking Water Source Area, and less than 0.1 acre in the Viento State Park Drinking Water Source Area. Combined, about 0.5 acre of temporary disturbance would occur within groundwater Drinking Water Source Areas. No work is planned near Oxbow Springs. Soil compaction during structure, access road, and trail work could temporarily impact groundwater flows by reducing infiltration capacity and increasing surface runoff to streams. However, these impacts are expected to minor, temporary, and are spread out over a wide area; therefore, there would be a **low** level of impact on groundwater resources.

Existing wood poles treated with creosote are used throughout the transmission line right-of-way. Six structures are located within 100 feet of streams and two structures are located within groundwater Drinking Water Source Areas. Creosote-treated wood poles removed as part of the Proposed Action would be hauled off-site and disposed of in accordance with federal and state laws. Soil excavated from around creosote-treated wood poles within 100 feet of streams would also be removed and disposed of off-site in accordance with federal and state laws.

As discussed in chapter 2 and Section 3.3, *Geology and Soils,* new wood poles and cross arms would be treated with PCP, which contains toxic compounds that can leach into soil or water (EPA 2008a). However, PCP degrades rapidly in the environment, and concentrations decrease rapidly with distance from wood utility poles (EPA 2008a; EPRI 1995). The EPA concluded that because PCP adsorbs to soils and degrades relatively rapidly in the environment, PCP usage on utility poles is not likely to contaminate groundwater, except in situations where the bottom of the pole is directly in contact with the water table or where leaching occurs from multiple poles in a wood storage area (EPA 2008a). None of the structures would intersect shallow groundwater in the project area. As described in Chapter 2, *Proposed Action and Alternatives*, materials storage sites and temporary staging areas would generally be located on existing level, paved sites in commercial or industrial areas where leaching into groundwater areas would be prevented. BPA's specification for wood poles exceeds the Western Wood Preservers Institute's BMPs for the use of PCP-treated wood in aquatic environments (WWPI 2012).

Hazardous materials used during construction (e.g., fuels, lubricants, solvents) could be released into the environment where they could enter waterways. BPA would immediately contain and clean up spills and dispose of regulated materials as identified in the spill prevention, containment, and cleanup procedures (Table 2.7-1).

Overall, with the implementation of the measures described here regarding the handling and disposal of creosote-treated wood poles and creosote-contaminated soils; spill prevention, containment, and cleanup; and wood pole storage methods, the risk to groundwater from the accidental release of hazardous materials would be **low.**

3.5.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on waterways and water quality are identified in Table 2.7-1 in Chapter 2 of this EA.

3.5.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line or access infrastructure. No project-related construction activities or impacts on surface or groundwater resources would occur and, initially, impacts on water resources would be limited those **no** to **low** impacts occurring as part of BPA's current operation and maintenance activities.

As the existing structures and roads deteriorate, the frequency of maintenance activities would likely increase, as would the potential for unplanned emergency maintenance activities. Even though emergency repairs to roads and structures could occur when soils are saturated and erosion and runoff risks are high, standard erosion control measures and BMPs are expected to prove effective at controlling erosion. Overall, impacts on streams, water quality, and groundwater resources, including runoff, erosion, and sedimentation in streams, would be **low**. There would be **no** impacts on surface water intakes, groundwater recharge, groundwater Drinking Water Source Areas, or springs as these resources are not located within the project area.

This page deliberately left blank

3.6 Wetlands and Floodplains

3.6.1 Affected Environment

Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3, 40 CFR 230.3) (Environmental Laboratory 1987). The National Scenic Area Management Plan identifies wetlands as one of seven natural resource priority habitats whose integrity and function should be maintained, protected, and enhanced (Gorge Commission 2011). Criteria identified that make wetlands priority habitat include: high species diversity and density, important wildlife breeding habitat and seasonal ranges, limited availability, and high vulnerability to alteration.

A wetland delineation of the project area was conducted in 2014 and 2015. These field surveys resulted in the identification of four small ***palustrine*** and two ***riverine wetlands*** in the project area, representing about 0.3 acre and 0.2 acre, respectively, in total area (Table 3.6-1) (Turnstone 2015a).

A depressional temporarily flooded ***Palustrine Emergent (PEM)*** wetland (5/7-1, less than 0.1 acre) was delineated within the transmission right-of-way near existing access roads near line mile 6. A seasonal PEM wetland (10/13-1, approximately 0.2 acre) was delineated within the right-of-way near structure 10/13. A seasonal riverine flow-through wetland/stream complex representing less than 0.2 acre was delineated within the right-of-way near line mile 18 (18/5-1, 18/5-2, 18/6-3). This wetland complex is associated with an unnamed tributary to the Columbia River. A seasonally flooded/saturated depressional PEM wetland (approximately 0.1 acre) was delineated within the right-of-way near line mile 19 (19/2-1). Additional information regarding waterways in the project area is presented in Section 3.5, *Waterways and Water Quality,* and Section 3.7, *Fish*.

Table 3.6-1. Riverine and Palustrine Wetlands Delineated within the Project Area

Wetland ID[1]	Classification	Acres in Project Area	Percent of Project Area
5/7-1	Palustrine Emergent Wetland	<0.1	<0.1
10/13-1	Palustrine Emergent Wetland	0.2	<0.1
18/5-1	Riverine Intermittent Streambed	0.1	<0.1
18/5-2	Riverine Intermittent Streambed	<0.1	<0.1
18/6-3	Palustrine Forested Wetland	<0.1	<0.1
19/2-1	Palustrine Emergent Wetland	0.1	<0.1
Total[2]		**0.8**	**<0.1**

Notes:
[1] Wetland IDs are based on the nearest structure number (e.g., 5/7) followed by a unique identifier.
[2] Totals may not match summation of column because of rounding, but are based on the actual unrounded acreage values.
Source: Turnstone 2015a,c

The Management Plan identifies an undisturbed wetland buffer width to protect and enhance wetland functions and associated uplands (Gorge Commission 2011). Ground disturbance areas within these buffer zones should be revegetated with native species that replicate the original vegetation community (Gorge Commission 2011).

The following buffer zone widths for wetlands and waterways are identified in the Management Plan:

- Wetlands with forest vegetation communities (palustrine forested wetlands): 75 feet
- Wetlands with shrub vegetation communities (palustrine scrub/shrub wetlands): 100 feet
- Wetlands with herbaceous vegetation communities (PEM wetlands): 150 feet
- Waterways: 100 feet (see Section 3.5, *Waterways and Water Quality*)

Floodplains

The Federal Emergency Management Agency (FEMA) identifies areas with a 1 percent chance of being flooded in a given year as ***100-year floodplains***. Encroachment on ***floodplains***, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. The transmission line right-of-way crosses the 100-year floodplain of Indian Creek, a tributary to Hood River (Figure 3.5-1). About 2.1 acres of the Indian Creek floodplain falls within the project area. One existing structure near the end of line mile 23, on the Indian Creek Golf Course, is within this floodplain. The base flood elevation and flood hazard risk for FEMA's Special Flood Hazard Zone A have not been determined for Indian Creek.

3.6.2 Environmental Consequences–Proposed Action

No wetlands or floodplains would be affected within line mile 19; therefore, impacts on wetlands and floodplains under the Proposed Action would be the same regardless of which Line Mile 19 Option is selected. Buffered areas around wetlands and waterways could be disturbed within line mile 19; however, buffer disturbance would be the same regardless of which option is selected. Potential impacts on wetlands and floodplains that could occur under the Proposed Action are described below.

Wetlands

None of the existing structures in the project area are located within wetlands. Therefore, their replacement within the same or adjacent upland locations would not result in permanent wetland fill or disturbance.

Less than 0.2 acre of delineated wetlands would be temporarily disturbed by project construction. Of this temporary disturbance, less than 0.1 acre of wetland would be located in the workspace associated with structure 5/8. Work at structure 5/8 would not require replacement of the structure itself nor associated ground disturbance. Vehicles accessing structure 5/8 to install new conductor and hardware would crush vegetation and may create soil ruts within the wetland. In these areas, wetland vegetation would be crushed or removed and wetland soils would be crossed by heavy equipment that could result in soil compaction. While no access road or foot trail extensions are proposed in wetlands, proposed access road improvements, such as water bars and drain dip installation would occur adjacent to delineated wetlands. These access road improvements would result in minor temporary disturbance of less than 0.1 acre to adjacent wetland areas in line mile 18.

A total of 2 acres of temporary disturbance would occur within the wetland buffers under the Proposed Action (Table 3.6-2). Of this total, 1.6 acres would be due to replacement of structures, hardware, and/or conductor near two wetlands and 0.4 acre would be due to access road improvement near four wetlands.

Table 3.6-2. Temporary Work Spaces in Wetland Buffers

Wetland ID[1]	Structure Impacts (Acres)	Access Roads Improve (Acres)	Total (Acres)[2]
5/7-1	1.1	0.1	**1.2**
10/13-1	0.5	0.1	**0.6**
18/5-1	0.0	0.1	**0.1**
18/5-2	0.0	<0.1	**<0.1**
19/2-1	0.0	0.1	**0.1**
Total[2]	**1.6**	**0.4**	**2.0**

Notes:
[1] Wetland IDs were based on the nearest structure number at the time of delineation (e.g., 5/7) followed by a unique identifier where WW indicates a waterway and a number alone indicates a wetland.
[2] Totals may not match summation of column because of rounding, but are based on the actual unrounded acreage values.
Source: Turnstone 2015a,c.

Vegetation and soil disturbance would occur within the buffered upland areas around wetlands (Tables 3.6-2). Potential impacts could occur through buffer vegetation removal and soil compaction from ground equipment and machinery operation which could somewhat reduce infiltration. ***Stormwater run-off*** from temporarily exposed soils could result in the sedimentation of the adjacent wetland and aquatic areas. Reduced water quality could occur from temporary increases in turbidity if runoff is substantial enough to move sediment. The accidental release of hazardous materials, such as fuels and hydraulic fluids used by vehicles and construction equipment in buffers, could also be harmful to wetlands. The risks of these potential wetland impacts from the temporary disturbance in wetland buffers would be minimized through installation of erosion and sediment control BMPs, revegetation of exposed soil, and adherence to fueling guidelines and implementation of spill prevention measures during the construction activities (Table 2.7-1). The Proposed Action would have no permanent fill of wetlands and minimal temporary disturbance to wetlands and associated buffers. Based on the minimal level of temporary disturbance combined with the implementation of BMPs, such as installing erosion control structures and revegetating disturbance areas, the Proposed Action would have a temporary, **low** impact on wetlands in the project area.

Floodplains

No structure or conductor replacement nor road work is proposed in the Indian Creek floodplain. Existing roads and managed areas within the Indian Creek Golf Course would be used for temporary equipment transport. Vehicles would access the existing structure located in the floodplain to replace the hardware and insulators. No ground disturbance associated with accessing the structure would result in floodplain fill at this location. Vehicles staged at the structure for work may result in a minor alteration of infiltration due to soil compaction; this would be localized, temporary, and likely not observable based on the limited work area relative to the overall size of the floodplain. Thus, there would be **no** to **low** impact on floodplains from the Proposed Action.

3.6.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on wetlands and floodplains are identified in Table 2.7-1 in Chapter 2 of this EA.

3.6.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, the existing transmission line would not be rebuilt nor would access roads or trails be improved or constructed. Since there would be no planned construction occurring, BPA would continue operations and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing wetland resources and floodplains thus would be the same as existing conditions, with **no** or **low** impact.

Maintenance activities would likely increase as existing structures and access roads continue to deteriorate, and emergency structure repair and replacement would be required. These activities could impact wetlands and floodplains. Unlike regular maintenance, emergency repairs could occur at any time of year with no time for the implementation of avoidance or minimization measures. While there may be additional disturbance of wetlands, buffers, and floodplains under the No Action Alternative, these impacts are expected to remain **no** or **low** based on the small quantity of wetlands and floodplains within the project area.

3.7 Fish

3.7.1 Affected Environment

The largest stream drainages in the project area are Eagle, Phelps, and Herman creeks. Most project area streams have sheer side slopes and are contained in steep V-shaped valleys (Northwest Power Planning Council 2004). Streams are described in Section 3.5, *Waterways and Water Quality.* Fish-bearing streams in this project area are listed below in Table 3.7-1. ***Anadromous fish*** that use streams in the project area include steelhead (*Oncorhynchus mykiss*), coho salmon (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus nerka*), and Chinook salmon (*Oncorhynchus tshawystscha*) (StreamNet 2012) (Table 3.7-1). Chum salmon (*Oncorhynchus keta*) are present in the Columbia River but are not expected in most streams in the project area. This is because few adult chum salmon pass Bonneville Dam annually (65 in 2012 and 163 in 2013; WDFW 2011). Those chum salmon that do pass Bonneville Dam primarily spawn in streams on the Washington side of the Columbia River (65 Federal Register [FR] 7764). However, during ODFW's Oregon Adult Salmonid Inventory and Sampling Project surveys, chum were observed in Eagle Creek in 2009 and 2010 (B. Walczak, pers. comm., ODFW, Nov 10, 2014). The upstream limit of chum salmon ***critical habitat*** is Bonneville Dam (65 FR 7764), which is downstream of the project area.

Table 3.7-1. Fish-bearing Streams in the Project Area

Stream (and associated tributaries)	Chinook Salmon – Fall Run	Chinook Salmon – Spring Run	Coho Salmon	Steelhead – Summer and Winter Run	Chum Salmon	Coast Cutthroat Trout
Dry Creek				•		•
Eagle Creek	•	•	•	•	•	•
Flume Creek						•
Gorton Creek						•
Harphan Creek						•
Herman Creek	•	•	•	•		•
Indian Creek						•
Lindsey Creek		•	•	•		•
Perham Creek				•		•
Phelps Creek						•
Ruckel Creek						•
Summit Creek						•
Starvation Creek				•		•
Viento Creek			•	•		•
Warren Creek				•		•
Source: StreamNet 2012; ORBIC 2014.						

Other fish species present in the project area include coastal cutthroat trout (*Oncorhynchus clarki*), longnose dace (*Rhinichthys cataractae*), redside shiner (*Richardsonius balteatus*), prickly sculpin (*Cotus asper*), and western brook lamprey (*Lampetra richardsoni*) (U.S. Forest Service 1995). Two fish hatcheries are located near the project area: Cascade (Eagle Creek) Fish Hatchery on Eagle Creek, and Oxbow Fish Hatchery associated with Herman Creek.

ESA-listed Fish

ESA-listed fish and ***critical habitats*** potentially occurring in the project area were determined from the USFWS Information, Planning, and Conservation (IPaC) system (USFWS 2014) and information from NOAA Fisheries (NOAA Fisheries 2014). Bull trout (*Salvelinus confluentus*) was identified in the USFWS list, but suitable habitat is not present and this species are not likely to occur in the project area. ESA-listed fish species that are either documented within or could potentially occur in the project area include Chinook salmon, coho salmon, and steelhead (Table 3.7-1).

Essential Fish Habitat

The Pacific Fishery Management Council (PFMC) has designated Essential Fish Habitat (EFH) for the Pacific salmon fishery, ground fish, and coastal pelagic fisheries (PFMC 2014). Of these, only species associated with the Pacific salmon fishery occur within and near the project area. The Pacific salmon fishery in this designation includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Oregon, except above the impassable barriers identified by PFMC. The Pacific salmon fishery includes Chinook, coho, and pink salmon (*O. gorbuscha*) in its designation, of which Chinook and coho salmon are present in the project area (ORBIC 2014; StreamNet 2012).

Fish Special-Status Species

Special-status fish species were evaluated from the list of fish species with historic or suspected range in the National Scenic Area (Gorge Commission 2006), ORBIC data of known fish species within 2 miles of the project area (ORBIC 2014), and the U.S. Forest Service's regional forester ***special-status species*** list (U.S. Forest Service 2011) (Table 3.7-2). A comprehensive special-status species list for the project is provided in Appendix B.

Table 3.7-2. Fish Special-Status Species Potential Occurrence in the Project Area

Common Name Scientific Name	Status	Usual Habitats in Oregon	Potential for Occurrence in the Project Area
Bull trout *Salvelinus confluentus* Columbia River DPS Hood River Recovery Unit	T, OR-SC, OR-1	Spawns and rears in cold streams/lakes. Adults will disperse and/or migrate in warmer systems such as the Columbia River.	Not expected. Bull trout designated critical habitat is not in project area. Bull trout use the Columbia River (designated critical habitat) and are potentially able to enter and use the mouths of tributaries in the watershed, but there are no known populations in the streams crossed by the project.
Chinook salmon *Oncorhynchus tshawytscha* Lower Columbia River ESU	T, OR-SC, OR-1	Anadromous: Spawns and rears within Columbia River tributaries between the mouth of the Columbia River east to Hood River.	Present. Documented in Eagle Creek, Herman Creek, and Lindsey Creek. Critical habitat is designated in Eagle Creek and Herman Creek.
Coho salmon *Oncorhynchus kisutch* Lower Columbia River ESU	T, OR-E, OR-1	Anadromous: Spawns and rears within Columbia River tributaries between the mouth of the Columbia River east to Hood River. Use low velocity streams and have a moderate threshold to degraded habitat.	Present. Documented in Eagle Creek, Herman Creek, Lindsey Creek and Viento Creek. Proposed critical habitat is present in the project area in Eagle Creek, Herman Creek, Lindsey Creek, and Viento Creek.
Chum salmon *Oncorhynchus keta* Columbia River ESU	T, OR-SC, OR-1	Anadromous: Spawns and rears in several locations on the Columbia River shoreline as well as within low gradient Columbia River tributaries, in both Oregon and Washington. Historically documented spawning run as far east as the Umatilla/Walla Walla systems, but present population is largely below Bonneville Dam.	Present. Chum are documented in Eagle Creek. Designated critical habitat does not include the project area.
Steelhead *Oncorhynchus mykiss* Lower Columbia River DPS	T, OR-SC, OR-1	Anadromous: Spawns and rears within Columbia River tributaries between the mouth of the Columbia River east to Hood River, in both Oregon and Washington.	Present. Documented in Eagle Creek, Herman Creek, Lindsey Creek, Viento Creek, and Perham Creek. Designated critical habitat is present in Eagle Creek and Herman Creek.
Green sturgeon *Acipenser medirostris* Northern DPS Southern DPS	Northern – Not listed Southern – T, OR-3	Anadromous: Historically found in Columbia River up to Cascade Rapids. Now found up to Bonneville Dam, with greater concentrations farther downstream.	Not expected. Green sturgeon can be found in the Columbia River, but the listed Southern DPS generally only uses the river downstream of Bonneville Dam. Green sturgeon designated critical habitat is not in the project area.
Pacific eulachon *Thaleichthys pacificus* Southern DPS	T, OR-2	Anadromous: Spawns in mainstem Columbia River and lower reaches of rivers, often within the tidal influence. Historically migrated as far east as Hood River prior to construction of Bonneville Dam.	Not expected. While found in the Columbia River and occasionally upstream of Bonneville Dam, the upstream limit of eulachon spawning in Oregon is the Sandy River (Gustafson et al. 2010), downstream of the project area. Eulachon designated critical habitat is not in project area.

Table 3.7-2. Fish Special-Status Species Potential Occurrence in the Project Area

Common Name Scientific Name	Status	Usual Habitats in Oregon	Potential for Occurrence in the Project Area
Coastal cutthroat trout *Oncorhynchus clarki*	SOC, OR-SV, OR-1	Found in the western portion of the gorge in low to moderate gradient streams.	Present. Documented in Eagle Creek, Ruckel Creek, Dry Creek, Herman Creek, Gorton Creek, Harphan Creek, Lindsey Creek, Warren Creek, Starvation Creek, Viento Creek, Perham Creek, an unnamed tributary to Phelps Creek, Phelps Creek, and Indian Creek.
Pacific lamprey *Entosphenus tridentata*	SOC, OR-SV, OR-2	Anadromous: Documented in the Columbia River Gorge. Information on current distribution and abundance is developing. Low gradient streams with gravel deposits.	Moderate. Likely present but no documented occurrences in the project area. Suitable habitat in Eagle Creek, Herman Creek, and Lindsey Creek.

Notes: DPS = Distinct Population Segment; ESU= Evolutionarily Significant Unit.
Status Abbreviations:
Federal
ESA status: T=Threatened, SOC = Species of Concern;
State
OR-T = Oregon Threatened; OR-E = Oregon Endangered; OR-C = Oregon Candidate; OR-SC = Oregon Sensitive Critical; OR-SV = Oregon Sensitive Vulnerable; OR-1 = ORBIC List 1; OR-2 = ORBIC List 2; OR-3 = ORBIC List 3; OR-4 = ORBIC List 4.
Oregon status: SC=Sensitive Critical, SE = State Endangered, SV=Sensitive Vulnerable, SP=Sensitive Peripheral or naturally rare.
Potential for Occurrence: Not Expected = No suitable habitat or documented occurrence in project area within 2 miles of the project area; Low = Suitable habitat barriers for fish or wildlife are present, no documented occurrence within 2 miles of the project area; Moderate = Suitable habitat present, no barriers for fish or wildlife, and documented occurrence within 2 miles of the project area but not in the project area; Present = Suitable habitat and documented occurrence in the project area or observed during project-related surveys.
Sources: USFWS 2014; ORBIC 2014; Gorge Commission 2011; StreamNet 2012; NOAA Fisheries 2014.

3.7.2 Environmental Consequences–Proposed Action

Work at four structures would occur within 100 feet of waterbodies; one of these structures would be within 100 feet of a fish-bearing stream. Structure work would result in less than 0.1 acre of permanent impact and 1 acre of temporary impacts within 100 feet of the fish-bearing stream. Access road improvement and reconstruction, including work on foot trails used to access the transmission line, would occur within 100 feet of 25 streams, eight of which are fish bearing. This work would result in minor changes to local vegetation but would not include in-water work or the removal of riparian habitat. No access road extensions would be constructed near streams. In addition, line mile 19 is not in the vicinity of any streams, so impacts on fish would be the same for all Line Mile 19 Options.

Tree removal adjacent to the stream may have an effect on fish and fish habitat by removing shade and increasing stream temperatures. Review of aerial photos indicates that tree removal in general would be minimal adjacent to streams; minimizing the total amount of forest cover removed within 100 feet of streams would reduce negative effects on fish (Table 2.7-1). As there would be no more than four trees removed from any single stream's 100-foot-wide buffer, there would not be a large enough reduction of tree canopy to result in a measurable increase in solar loading at any of the fish-bearing waterbodies. For a detailed discussion of vegetation and tree removals near waterways, see Section 3.5, *Waterways and Water Quality*.

Fish passage plans have been prepared and submitted to ODFW for water-crossings (fords and pedestrian bridges) in fish-bearing streams. Two new trail bridges are proposed over Warren Creek and Summit Creek, both of which are fish-bearing streams. However, the proposed bridge locations are upstream of mapped fish-bearing reaches and large waterfalls. The footings for the bridges on Warren and Summit Creeks would span the ordinary high water mark and would not require work within the stream channels. The footprint of the two pedestrian bridges would cross less than 0.1 acre of the stream channels. Any minor quantity of sediment disturbed during installation of the footings is not anticipated to reach fish-bearing segments in quantities great enough to affect downstream fish.

Of the five new fords proposed, one would be installed in a fish-bearing stream, Harphan Creek, and one ford would be replaced in Dry Creek, which is also fish-bearing. Both of these fish-bearing streams could support coastal cutthroat trout. All work in these two locations would be within the existing road prism at existing crossings and not require the removal of riparian or streamside vegetation. If flow is present during installation, work areas would be isolated; there may be a minor turbidity pulse upon rewatering, which may temporarily degrade downstream fish habitat. Ford installations would occur during the in-water work window when flows are lowest and fish are most likely to not be present within the work area. If water is present, the work area would be dewatered and any fish present would be salvaged.

During construction, vehicle use of the fords may introduce some sediment and fish disturbance when crossing waterbodies, if fish and/or water are present at the time of crossing. To minimize instream and fish disturbance associated with ford use during construction, the Dry and Harphan creeks would have additional mitigation measures implemented. A temporary bridge would be installed at Harphan Creek and the ford at Dry Creek would only be used for construction during the in-water work window (the low flow periods).

Potential impacts on fish habitat resulting from accidental oil or fuel spills into streams from construction equipment used adjacent to streams would be low because the BMPs listed and described in Table 2.7-1 would be implemented, including setback distances for fueling and staging areas from water bodies to minimize spills.

Sediment input during construction from adjacent activities could reduce feeding efficiency and food availability, clog gillrakers, and erode gill filaments of downstream fish; therefore, erosion control devices (Table 2.7-1) would be installed in work areas near waterbodies to limit the introduction of sediment to waterbodies from structure and access road work. If sediment does reach fish habitat, sediment inputs are expected to be a small pulse and temporary in duration. The aquatic noise and vibration disturbance generated by the removal and replacement of the structure within 100 feet of the fish-bearing stream would not exceed background ambient underwater noise levels.

Overall, because of the small quantity of work proposed within 100 feet of fish bearing streams when combined with the mitigation measures (Table 2.7-1), such as completing in channel work during the in-water work window, the installation of erosion control devices and revegetation, and limiting the use of fords by construction traffic, the Proposed Action would have a **low** impact on fish. These fish impacts would primarily be a result of the possible temporary minor input of sediment to streams from adjacent upland construction and ford construction.

ESA-listed Fish and Essential Fish Habitat

Construction would not take place in EFH; therefore, project-related impacts on EFH would not occur. Temporary effects on ESA-listed fish and habitat would be similar to impacts previously described for common fish species in the Fish subsection above. Construction would not occur in streams that support ESA-listed fish species, and direct impacts on Chinook salmon, coho salmon, and steelhead are not expected. Indirect impacts on ESA-listed fish could include potential sedimentation and turbidity as a result of construction-related erosion from work sites near streams. Any indirect effect to ESA-listed fish species would be covered under a Section 7 programmatic consultation between BPA and NMFS.

Fish Special-Status Species and Habitat

Temporary effects on special-status fish and habitat would be similar to impacts previously described for common fish species in the Fish subsection above. As discussed above, two ford crossings would occur within fish-bearing streams that support coastal cutthroat trout, a species of concern, which may result in a possible temporary minor input of sediment to streams. Less than 0.1 acre of permanent impacts would result from bridge, structure, and trail work within a 1,000-foot buffer of special-status fish-bearing streams. There would be about 10 acres of temporary impacts within 1,000 feet of special-status fish-bearing streams (Table 3.7-3). Access road improvement and reconstruction, as well as foot trail extension, improvement, and reconstruction, would occur within 1,000 feet of eight streams with special-status fish (Table 3.7-3); this work would result in minor changes to vegetation but would not include in-water work, with the exception of ford installation. No road extensions would be constructed near streams. Standard erosion control measures at work areas would be designed to prevent sediment from entering fish habitat. If sediment does reach fish habitat, sediment inputs are expected to be a small pulse and temporary in duration. The aquatic noise and vibration disturbance generated by the removal and replacement of structures within 1,000 feet of fish-bearing streams would not exceed background ambient underwater noise levels.

Table 3.7-3. Proposed Acreages of Temporary Impacts within 1,000 Feet of Fish-Bearing Streams

Stream	Structure Impacts (acres)	Access Roads				Trails		
		Extension (acres)	Reconstruction (acres)	Improvement (acres)	Direction of Travel – Overland (acres)	Extension (acres)	Reconstruction (acres)	Improvement (acres)
Dry Creek	2.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Eagle Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1
Herman Creek	3.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Lindsey Creek	0.9	0.0	0.0	0.3	0.0	<0.1	0.1	<0.1
Perham Creek	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Starvation Creek	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Viento Creek	0.5	0.0	0.0	0.4	0.0	0.0	0.0	<0.1
Warren Creek	0.7	0.0	0.0	0.1	0.0	<0.1	<0.1	0.0
Total[1]	**8.3**	**0.0**	**0.0**	**1.6**	**0.0**	**0.1**	**0.1**	**0.1**

Notes:
[1] Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.

Overall, due to the small quantity of work directly in special-status fish-bearing waterbodies and the implementation of erosion control devices to minimize sediment input, the Proposed Action would have a **low** impact on special-status fish.

3.7.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on fish and their habitat are identified in Table 2.7-1 in Chapter 2 of this EA.

3.7.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, the existing transmission line would not be rebuilt and access road and trail system improvements would not occur. Since there would be no planned construction occurring, BPA would continue operations and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing fish thus would be the same as existing conditions, with **no** or **low** impact.

Maintenance activities would likely increase as existing structures, access roads, and trails continue to deteriorate, and emergency structure repair and replacement would be required. These activities could impact fish. Unlike regular maintenance, emergency repairs could occur at any time of year with no time for the implementation of avoidance or minimization measures. Emergency repairs could occur in areas or during times of high runoff and erosion potential that may enter adjacent waterbodies and may cause increased disruption to fish. Overall, depending on the nature of the emergency repairs required, the No Action Alternative could result in **low** to **moderate** levels of impact on fish depending on timing or location.

This page deliberately left blank

3.8 Wildlife

3.8.1 Affected Environment

The abrupt topographic and climate changes in the gorge have created a patchwork of diverse habitats in closer proximity to each other than found elsewhere in the Cascades (U.S. Forest Service 1998). These habitat conditions are responsible for the large number of sensitive plants and animals (Northwest Power Planning Council 2004).

Biologists recorded wildlife habitats, including National Scenic Area priority habitats, and incidental wildlife observations during field surveys in late July and early August 2014 and from April to June of 2015. Two-year northern spotted owl protocol surveys were also completed in 2014 and 2015 and an annual spot check was completed in 2016. American pika surveys were conducted in late spring and early summer of 2016. All field survey protocols were reviewed by biologists from the U.S. Forest Service, State Parks, and/or USFWS (depending on target species and location).

Habitat in the project area is primarily managed right-of-way (see Section 3.4.1, *Vegetation*). The managed right-of-way, in most areas, is a swath cut out of the adjacent forested areas that currently supports low-growing shrubs and grasses. The managed right-of-way fragments habitat for wildlife species dependent on intact mature forest areas; however, transmission line corridors provide early successional habitat in forested landscapes and thus play an important role in biodiversity conservation (Komonen et al. 2013). The managed right-of-way likely supports a diverse array of early successional wildlife species including pollinators, grassland and shrubland birds, and mammals (Wagner et al. 2014). Notable wildlife observed in the right-of-way during fieldwork in 2014 and 2015 included bald-faced hornets (*Dolichovespula maculata*), forest scorpion (*Uroctonus mordax*), rubber boa (*Charina bottae*), ringneck snake (*Diadophis punctatus*), wild turkey (*Meleagris gallopavo*), and great horned owl (*Bubo virginianus*).

Across steep ravines, where the transmission line is high above the tree canopy and vegetation management is not necessary, mature coniferous forest is present. Species associated with intact mature forest, including northern goshawk (*Accipiter gentilis*), pileated woodpecker (*Dryocopus pileatus*), and pine marten (*Martes americana*), have all been documented in larger subbasins on the Oregon side of the Columbia River Gorge. Snags and log areas are also present, interspersed with mature forest in the project area. Dead standing trees or snags are widely recognized as an essential forest component for numerous wildlife species (Johnson and O'Neil 2001).

Grasslands, riparian habitats, and a few wetlands are scattered across the project area; oak woodlands are found primarily on the eastern end of the project area near Hood River. Riparian and wetland habitats typically have a high degree of wildlife diversity because of transport of organic matter and nutrients by surface runoff, seasonal saturation and surface water retention, microclimate, and proximity to water (Johnson and O'Neil 2001). Aquatic wildlife associated with wetlands and riparian areas include the northern red-legged frog (*Rana aurora*), Pacific giant salamander (*Dicamptodon ensatus*), and Cascade torrent salamander (*Rhyacotriton cascadae*), all of which have been observed in Starvation Creek (U.S. Forest Service 1995). Oregon white oak woodland stands provide important food and cover for a range of wildlife species (Gucker 2007; Manuwal 2003). Key food sources associated with Oregon white oak include acorns, leaves, and invertebrates living in the vicinity of trees (Devine et al. 2013).

The project area also includes urban and agriculture areas and rural residential areas, orchards, vineyards, and a golf course near Hood River. Most wildlife species found in the urban and agricultural areas are birds and small mammals. Typical birds found in the project area are ground-foraging species like the European starling (*Sturnus vulgaris*), house sparrows (*Passer domesticus*), and rock pigeons (*Columba livia*). Because of the proximity to the Columbia River, gulls (*Larus* spp.) are common. Small mammals in these urban environments include squirrels (*Sciurus* spp.), raccoons (*Procyon lotor*), and opossums (*Didelphis virginana*). The orchard areas favor cavity nesters, primarily house sparrows, starlings, and occasionally northern flickers (*Colaptes auratus*) and violet-green swallows (*Tachycineta thalassina*). The maintained lawn on the golf course provides habitat for flock-feeding species like American robin (*Turdus migratorius*), Brewer's blackbird (*Euphagus cyanocephalus*), and starling.

The National Scenic Area Management Plan (Gorge Commission 2011) lists 11 priority habitats, which are sensitive or rare wildlife habitats within the National Scenic Area. Priority habitats comprise about 28 percent of the overall project area. Talus and mature forest are the most prevalent priority habitats in the project area, but these habitats represent a relatively small quantity of acreage compared to that of the entire project area (Table 3.8-1). Cliffs, pastures, and riparian areas represent 2 to 3 percent of the project area, while all other priority habitats represent a small (less than 1 percent) portion of the overall project area.

Table 3.8-1. National Scenic Area Priority Habitats within the Project Area

Priority Habitat	Acres in Project Area	Percent of the Project Area
Cliffs	12.6	2.9
Old Growth (Mature) Forest	36.2	8.2
Oregon White Oak Woodland	3.4	0.8
Snags and Logs[1]	1.6	0.4
Pastoral (Pasture)	15.5	3.5
Riparian	10.2	2.3
Wetlands	0.8	0.2
Talus	40.5	9.2
Total	**120.8**	27.5

[1]Snags and logs priority habitat is within the mature forest vegetation type.
Source: Gorge Commission 2011; Turnstone 2015b.

The project area contains American pika (*Ochotona princeps*) in talus and cliff habitats. The American pika was petitioned to be listed as threatened; however, the USFWS concluded that the American pika did not meet the criteria for listing under the federal Endangered Species Act (75 FR 6438). The pika population in the Columbia River Gorge (gorge population) is unique as it is the lowest-elevation pika population in the U.S. (E. Beever, pers. comm., USGS, Nov. 14, 2014). Until recently, American pikas were considered obligate inhabitants of alpine talus and require deep snow cover (Smith and Weston 1990). However, Simpson (2009) found that in the Columbia River Gorge, pika exist year round in talus areas in a short-winter climate at low elevations with little or no snow cover. Pikas also are found in man-made habitats such as road cuts and rock quarries (Manning and Hagar 2011). Pikas were observed in the project area during vegetation and noxious weed surveys in 2014 and 2015 (Turnstone 2015d). Potential suitable pika habitat was identified in

6.9 acres of the project area and pika presence was detected in about 2.6 acres of the potential habitat surveyed in spring 2016.

Big game (elk and deer) movement patterns are dependent on adequate summer and winter range habitat. Big game use most forest types in the project area. Shrub and herbaceous plants in the managed right-of-way provide limited forage or cover. The project area is located in the Hood Big Game Management Unit and winter range is mapped in the project area contiguously from west of the Bonneville Dam to nearly line mile 21 (Northwest Power Planning Council 2004, Gorge Commission 2014b, ODFW 2013). Typically, winter range habitats are those areas occupied from December to April (ODFW 2013).

The project area is also located in the Pacific Flyway and located along the Columbia River, which supports large concentrations of waterfowl (Pacific Flyway Council 2014). The current bird checklist for Hood River County includes over 250 species of birds (East Cascades Audubon Society 2014). The USFWS IPaC system lists 13 migratory birds of conservation concern located in or near the project area (USFWS 2014). Migratory birds of conservation concern (in addition to those birds considered species of concern, see Table 3.8-2) that likely occur in the project area include olive-sided flycatcher (*Contopus cooperi*), purple finch (*Carpodacus purpureus*), rufous hummingbird (*Selaphorus rufus*), and willow flycatcher (*Empidonax traillii*). Osprey (*Pandion haliaetus*) nests were observed on seven structures during field surveys in 2014. Six bald eagle (*Haliaeetus leucocephalus*) and three peregrine falcon (*Falco peregrinus*) nests are documented within 2 miles of the project area (ORBIC 2014). Owl species recorded during the 2014 and 2015 northern spotted owl surveys included barred owl (*Strix varia*) and northern saw-whet owl (*Aegolius acadius*) (Turnstone 2015d).

ESA-Listed Wildlife Species

ESA-listed wildlife species and ***critical habitats*** potentially occurring in the project area were determined from the USFWS IPaC system (USFWS 2014). Canada lynx (*Lynx canadensis*) was identified in the USFWS list, but suitable habitat is not present in the project area and this species is not likely to occur in the project area. The threatened northern spotted owl is the only ESA-listed wildlife species that is either documented within or could potentially occur in the project area. The USFWS originally listed the northern spotted owl as threatened on June 26, 1990 (55 FR 26114). Subsequent 5-year reviews in 2004 (Courtney et al. 2004) and 2011 (USFWS 2011) did not change its status. The USFWS designated critical habitat for the northern spotted owl on January 18, 1992 (57 FR 1796), and revised the designated critical habitat on December 4, 2012 (77 FR 71875).

Northern spotted owl suitable habitat includes forests with a dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops (Courtney et al. 2004). Spotted owl habitat includes priority habitats of mature forest and snags and logs. No designated critical habitat is present in the project area. There are two records of northern spotted owl activity centers within 1.2 miles of the project area (ORBIC 2014; Turnstone 2015d).

The species' nesting period is from March 15 to September 30 (USFWS 2012). Suitable habitat for the northern spotted owl was identified during the nesting period using protocols recommended by the USFWS. Surveys for northern spotted owl were conducted in 2014 and 2015, following the 2-year USFWS survey protocol (USFWS 2012). No northern spotted owl individuals responded during the survey effort in 2014 and a non-resident northern spotted owl responded in 2015. No northern spotted owls responded during the 2016 spot check surveys.

Forest Service and National Scenic Area Sensitive Wildlife Species

The Forest Service provided a consolidated list of sensitive or special-status species potentially occurring with the National Scenic Area (Appendix B). The list included sensitive endemic wildlife in the National Scenic Area (Gorge Commission 2006) and the Forest Service's Regional Forester special-status species list (U.S. Forest Service 2011). Based on review of ORBIC data of known wildlife species within 2 miles of the project area (ORBIC 2014), species life-history characteristics, and wildlife habitats identified during the project field surveys, Table 3.8-2 lists those species with the highest potential for occurrence within the project area. The comprehensive list of all identified wildlife species listed for the National Scenic Area and their potential for occurrence within the project area is included in Appendix B. The Management Plan identifies a 1,000-foot buffer around special-status wildlife species occurrences.

Table 3.8-2. National Scenic Area Sensitive or Special-Status Wildlife Identified as Potentially Occurring in the Project Area

Common Name Scientific Name	Status	Usual Habitats in Oregon	Potential for Occurrence in the Project Area
Reptiles and Amphibians			
Western pond turtle *Actinemys marmorata*	SOC, FS-S, OR-SC, OR-2	Found in wetlands priority habitats. Most common near marshes and small lakes (breeding sites in midspring); can travel readily overland and be found along streams/seeps.	Not expected. One occurrence documented in 1994, in pond near the project area. No pond habitat is in project area.
Oregon slender salamander *Batrchoseps wrighti*	SOC, OR-SV, OR-4	Found in talus priority habitat. Forests with large down logs and moist talus with abundant wood debris. Forests with large down logs and moist talus with wood debris are preferred habitats.	Present. There are three documented occurrences in the project area.
Larch Mountain salamander *Plethodon larselli*	SOC, OR-SV, OR-2	Found in talus priority habitat. Largely in moss-covered talus slopes, or other rocky substrate, at low-mid elevation.	Present. There are five documented occurrences in the project area. Talus slopes and rocky substrates are their preferred habitat.
Painted turtle *Chrsemys picta*	FS-S, OR-SC, OR-2	Found in wetlands priority habitat. Slow water ponds, marshes, and rivers below 3,000 feet elevation.	Not expected. One occurrence documented in 1986 in ponds near Oxbow Fish Hatchery. No pond habitat in project area.
Birds			
Northern spotted owl *Strix occidentalis caurina*	T, OR-T, OR-1	Found in mature forest priority habitat. Mature coniferous forest generally used for nesting, roosting, and foraging. Dispersal habitats include young forests.	Moderate. Suitable habitat is present. Critical habitat is not designated in the project area. Two known activity centers within 1.2 miles (home range) of the project area. Known activity centers are outside the 0.5-mile disturbance zone for project helicopter use. No detections during the 2014 survey of the project area, and 2015 detections were determined to be non-resident owls.
American peregrine falcon *Falco peregrinus anatum*	FS-S, OR-SV, OR-2	Found in cliffs priority habitat. Open areas, cliffs, tall buildings, and bridges. Prey base are birds.	Present. There are five documented occurrences within 0.2 mile of the project area. Detected during 2014 surveys near line mile 15. Suitable nesting habitat (cliffs) is present.

Table 3.8-2. National Scenic Area Sensitive or Special-Status Wildlife Identified as Potentially Occurring in the Project Area

Common Name Scientific Name	Status	Usual Habitats in Oregon	Potential for Occurrence in the Project Area
Bald eagle *Haliaeetus leucocephalus*	FS-S, OR-T, OR-4	Found in mature forest and riparian priority habitat. Mature forest near water, shorelines.	Present. Known nest sites in the project area. Suitable habitat, mature trees near water, is present.
Black swift *Cypseloides niger*	FS-S, OR-SP, OR-2	Found in cliffs priority habitat. Nests behind waterfalls, on steep cliffs, and in damp caves out of direct sunlight.	Moderate. Suitable nesting habitat (cliffs behind waterfalls) is not present in the project area, but this habitat is in close proximity and swifts may forage in the project area.
Harlequin duck *Histrionicus histrionicus*	SOC, FS-S, OR-2	Found in riparian priority habitat. Winters on coast. Breeds in the Columbia River Gorge, close to fast-moving tributaries of the Lower and Middle Columbia River, often on rocky islands and banks.	Moderate. Not documented in the project area but suitable habitat (fast-moving streams) is present.
Purple martin *Progne subis*	SOC, FS-S, OR-SC, OR-2	Cavity/crevice nester, often near water. Forages over open water/fields/ forest canopy. Winters in South America.	Moderate. Not documented in project area, but suitable habitat is present.
Invertebrates			
Columbia Gorge Oregonian (snail) *Cryptomastix hendersoni*	FS-S	Found in mature forest and riparian priority habitats. Found within 300 feet of streams, seeps, and springs (low elevation) in steppe communities. May also be present in mid-elevation mature closed canopy forests among moist talus, leaf litter, or shrubs, or under logs or other debris.	Moderate. Suitable habitat is present, but the species is not documented in project area. Two known locations in the National Scenic Area, in scattered locations near seeps and streams along both sides of the Columbia River, from near The Dalles to near Rufus, Oregon; and from upland locations in the Mount Hood National Forest (Gorge Commission 2006).

Notes:
Status Abbreviations:
Federal
ESA status: T=Threatened, C = Candidate, SOC = Species of Concern;
FS-S = USDA Forest Service Regional Forester's List Sensitive Species.
State
OR-T = Oregon Threatened; OR-E = Oregon Endangered; OR-C = Oregon Candidate; OR-SC=Oregon Sensitive Critical, OR-SV=Oregon Sensitive Vulnerable, OR-SP=Oregon Sensitive Peripheral or naturally rare; OR-1 = ORBIC List 1; OR-2 = ORBIC List 2; OR-3 = ORBIC List 3; OR-4 = ORBIC List 4.
Potential for Occurrence: Not Expected = No suitable habitat or documented occurrence in project area within 2 miles of the project area; Low = Suitable habitat barriers for wildlife is present, no documented occurrence within 2 miles of the project area; Moderate = Suitable habitat present, no barriers for wildlife, and documented occurrence within 2 miles of the project area but not in the project area; Present = Suitable habitat and documented occurrence in the project area or observed during project-related surveys.
Sources: USFWS 2014; ORBIC 2014; Gorge Commission 2011.

The *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northwest Spotted Owl* (1994) (the Northwest Forest Plan), which was developed and adopted to coordinate land management by the U.S. Forest Service and BLM within the range of the northern spotted owl includes a set of standards and guidelines called Survey and Manage (BLM 2015). Survey and Manage Standards are applicable to the U.S. Forest Service and BLM lands in western Washington, western Oregon, and northwestern California, including the National Forest lands within the project area. Survey and Manage standards are intended to reduce or mitigate potential effects from agency actions to approximately 300 flora and fauna species. Management elements of the Survey and Manage standards include management of known sites, survey prior to habitat-disturbing activities, and conducting strategic landscape-scale surveys (USFS and BLM 2001).

Survey and Manage wildlife species with potential to occur in the project area include red tree vole (*Arborimus longicaudus*) and Larch Mountain salamander (*Plerhodon larselli*). The red tree vole is listed as a Category 'C' Survey and Manage species, where the direction is to manage known sites and conduct pre-disturbance and strategic surveys. The red tree vole is an arboreal rodent whose habitat is closely associated with mature to old growth conifer-dominated forests, especially those hosting Douglas-fir. Tree voles use the discarded resin ducts, fine branches and other materials to create a nest that is generally located within the live crown of a tree. The Larch Mountain salamander is also a Forest Service Region 6 Sensitive Species and a species identified as sensitive on the National Scenic Area list of species and is described further in Table 3.8-2.

3.8.2 Environmental Consequences–Proposed Action

Short-term noise disturbance and long-term habitat modification, loss, and degradation would be the most notable impacts on wildlife from the Proposed Action. Most vegetation clearing and habitat modification would occur on managed right-of-way (see Tables 3.4-4 and 3.4-5 in Section 3.4, *Vegetation*). The small quantity of extended access roads and foot trails would also fragment wildlife habitat by removing vegetation and introducing a graveled or compacted surface that lacks vegetation habitat features. Some species would be more sensitive to this type of habitat fragmentation than others. The spread of noxious and invasive plant species during construction could also have a long-term effect on wildlife habitat quality through degradation and fragmentation (Westbrooks 1998). Noxious weeds are already widely distributed in the project area, but further expansion of infestations could result from ground disturbance from the Proposed Action (see Section 3.4.2, *Vegetation*).

The Proposed Action with Line Mile 19 Option 1 would temporarily disturb up to 19.4 acres of priority wildlife habitats, and permanently remove up to 0.1 acre (Tables 3.8-3 and 3.8-4). Impacts on priority habitats from structure, hardware, and/or conductor replacement, structure retirement, and access road construction may include tree removal, understory vegetation removal or crushing, and temporary noise disturbance. Restoration and revegetation (such as retaining cut trees as down logs following construction and using native seed mixes) and reducing tree removal to the extent possible would minimize impacts on these habitats (see Table 2.7-1). Under Line Mile 19 Options 2 and 3, permanent impacts associated with access road extensions would be the same and would be 0.1 acre less than the project under Line Mile 19 Option 1. Line Mile 19 Option 3 would not have access road impacts in line mile 19 and would have the same temporary structure workspace footprint as Options 1 and 2.

Table 3.8-3. Summary of Permanent Impacts on Priority Habitats (Acres)[1]

Priority Habitats	Structure Impacts (Acres)	Access Road Extension (Acres)	Trail Extension (Acres)	Total (Acres)
Cliffs	0.0	0.0	<0.1	**<0.1**
Old Growth Forest	0.0	<0.1	<0.1	**<0.1**
Oregon White Oak Woodland	0.0	0.0	0.0	**0.0**
Snags and Logs	0.0	0.0	0.0	**0.0**
Pastoral	0.0	0.0	0.0	**0.0**
Riparian	0.0	0.0	<0.1	**<0.1**
Wetlands	0.0	0.0	0.0	**0.0**
Talus	0.0	**0.0 - 0.1**	<0.1	**<0.1 - 0.1**
Total (Acres)[2]	**0.0**	**<0.1 - 0.1**	**<0.1**	**<0.1 - 0.1**

Notes:
1 Where only one value is shown, quantity is the same for all Line Mile 19 options. Where quantities differ by option, the value range for the Line Mile 19 options is shown. Line Mile Option 1 is the highest and Line Mile Option 3 is the lowest value.
2 Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.

Table 3.8-4. Summary of Temporary Impacts on Priority Habitats[1]

Priority Habitats	Structure Impacts (Acres)[2]	Access Roads: Extension (Acres)	Access Roads: Reconstruction (Acres)	Access Roads: Improve (Acres)	Access Roads: Direction of Travel – Overland (Acres)	Trails: Extension (Acres)	Trails: Reconstruction (Acres)	Trails: Improve (Acres)	Total (Acres)
Cliffs	1.0	0.0	0.0	<0.1	0	<0.1	<0.1	0.1	**1.1**
Old-Growth Forest	3.0	<0.1	<0.1	5.1	0.1	<0.1	0.1	0.1	**8.4**
Oregon White Oak Woodland	0.7	0.0	0.0	0.1	0.0	0.0	<0.1	<0.1	**0.9**
Snags and Logs	0.4	0.0	0.0	0.2	0.0	0.0	<0.1	<0.1	**0.6**
Pastoral	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	**1.3**
Riparian	0.5	0.0	0.0	0.2	0.0	<0.1	0.0	0.0	**0.7**
Wetlands	0.1	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	**0.1**
Talus	4.7	0.0 - 0.1	0.0 - 0.1	0.5	0.0	<0.1	0.7	0.3	**6.2 – 6.4**
Total (Acres)[3]	**10.4**	**<0.1 - 0.1**	**<0.1 - 0.1**	**6.4**	**1.1**	**0.1**	**0.9**	**0.5**	**19.3 – 19.4**

Notes:
1 Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, the value range for the Line Mile 19 Options is shown. Line Mile Option 1 is the highest and Line Mile Option 3 is the lowest value.
2 Includes conservative estimates associated with potential pulling and tensioning sites.
3 Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.

In addition to habitat loss, degradation, and modification, the impacts on wildlife from the Proposed Action would include noise disturbance, disruption of wildlife movement, and incidental mortality. Wildlife would likely avoid the immediate construction area and use alternative routes, resulting in a temporary disruption of local wildlife movement by the Proposed Action. In the long term, wildlife would continue to use the surrounding area for breeding, foraging, and dispersal.

Noise disturbances from heavy equipment and construction crews working in the right-of-way and along access roads may cause wildlife to move away from the construction zone. As described in Section 3.13, *Noise, Public Health, and Safety*, wildlife habitats are noise-sensitive areas. Helicopters used to install transmission line structures, string conductor, and transport equipment into steep, road less areas would generate noise disturbance to wildlife. As described in Section 3.13, *Noise, Public Health, and Safety,* helicopters may generate noise levels of 89 to 99 ***A-weighted decibels (dBA)*** as measured at a distance of 50 feet when in flight at 200 feet in elevation. Other large construction equipment and vehicles would also cause temporary, intermittent noise during structure installation and access road work. Because wildlife habitats in the project area are well connected to other similar habitats, most mobile wildlife species (e.g., deer, birds, etc.) would relocate from these temporary disturbance areas to nearby areas during construction. Wildlife species with limited mobility would not be able to move away quickly from construction noise sources, although reptiles, amphibians, and small mammals do not seem to be adversely affected by road noise in rights-of-way (FHWA 2004), which presumably would be similar to their response to project construction-related noise. For those animals not able to relocate out of the project disturbance area, general construction noise could temporarily disrupt or mask communication necessary for mating and predator avoidance, but noise would not likely reach thresholds for mortality. Noise disturbance would be temporary and intermittent and would end with the completion of project construction. The use of micropiles and drilling platforms and the additional helicopter trips under Line Mile 19 Options 2 and 3 would include additional noise disturbance effects associated with helicopter use on wildlife when compared to conventional structure installation as proposed under Line Mile 19 Option 1. Access road work under Line Mile 19 Options 1 and 2 would result in increased access road construction noise for several months, when compared to Line Mile 19 Option 3.

Blasting may be required to install some structures where bedrock prevents the use of augers. As described in Section 3.13, *Noise, Public Health, and Safety*, ground vibration and audible noise could reach up to 140 dBA at the blast location; however, blasting is a relatively short duration event compared to rock removal methods such as using drill rigs or jackhammers. Slow-moving or immobile wildlife species within the blast area may be injured or killed, and adjacent wildlife may be temporarily dispersed or experience behavioral changes due to the brief increase in noise.

The project noise and construction disturbance would have a limited effect on big game using winter range habitat. Project construction would not occur during the peak use of the winter range (December 1 to March 1) (Table 2.7-1). Any big game present within the project area outside of the peak winter range use would likely disperse to adjacent suitable habitats. Most big game, such as elk and deer, are more active at night or during the early morning or late evening hours. However, some individual animals may be active during the day. Although the majority of construction activities would take place during daylight hours when these species are less active, some wildlife traveling along or crossing the right-of-way or access roads would be disrupted along segments where construction activities are taking place. Disrupted game would likely be displaced to adjacent suitable habitat. Construction activity would occur in the same geographic area, regardless of Line Mile 19 Option, so impacts on big game would be the similar regardless of Line Mile 19 Option. However, Line Mile 19 Options 2 and 3 would result in increased helicopter access to the area that may result in noise generated further from the project right-of-way. Line Mile 19 Options 1 and 2 would result in access road construction activity over a longer duration than the helicopter noise associated with Line Mile 19 Option 3. Despite these differences, due to the avoidance of construction activities during peak game use of the project area (i.e., winter/early spring) and the large quantity of suitable big game habitat in the general project vicinity to which big game would escape disturbance, the project would have a **low** impact on big game.

Mobile wildlife and birds may temporarily relocate to nearby areas during construction, and foraging would not be substantially limited. Ground disturbance related to transmission line structure replacement, vegetation clearing, heavy equipment staging, overland vehicle travel, access road construction, lay down of materials, and soil piling could result in the incidental mortality of individual reptiles, amphibians, or small mammals that have limited mobility or occupy burrows, such as ground squirrels (*Spermophilus* spp.) and pika, particularly during the breeding season (Hickman et al. 1999; Trombulak and Frissell 2000). The threat of incidental mortality to most species would be limited to the duration of construction and those small areas where ground disturbance occurs or vehicles travel.

In addition to potential incidental mortality to pika during construction, pika habitat and food sources, specifically talus substrate or the moss mats covering the talus could be altered during ground-disturbing activities. Up to 0.1 acre of potential pika habitat would be permanently altered for access road extensions. There would be no permanent impacts to habitat that was found to be occupied by pika during the summer 2016 field surveys. The Proposed Action would temporarily impact up to 0.9 acre of potential pika habitat. Approximately 0.2 acres of temporary impacts would result from road improvement and extension work, 0.7 acre from structure work, and 0.1 acre from trail improvement and reconstruction work. Of the potential pika habitat that would be temporarily impacted, 0.4 acre was found to be occupied by pika during the summer 2016 field surveys. Approximately 0.1 acre of temporary impacts to pika occupied habitat would result from road improvement work, 0.3 acres from structure work, and less than 0.1 acre from trail improvement and reconstruction work. Work spaces associated with access road and structure work would be reduced as much as practical (Table 2.7-1) to further reduce pika impacts. Field surveys did not identify any pika potential habitat within Line Mile 19; therefore, impacts to pika would be the same regardless of which Line Mile 19 option is selected.

In those areas with suitable pika habitat, although the project construction activity would be short in duration, effects on moss-covered talus may be long term as moss mats can take decades to regenerate (J. Varner, pers. comm., University of Utah, Nov. 13, 2014). The majority of these impacts would result from structure replacement activities and improvement and reconstruction of existing roads and trails; or in other words, in or immediately adjacent to previously disturbed areas where the moss mats are likely to have been previously altered. Tree removal near appropriate habitat would also impact pika, as tree cover can provide air temperature moderation favorable to pika. Tree removal near talus habitat would primarily be removal of one or two trees, rather than clusters of multiple trees such that changes to the air temperature moderation would be minimal. Moss-covered talus would be identified prior to construction and avoided to the extent practicable and disturbance of occupied habitat would occur outside of the pika breeding season to limit incidental mortality (Table 2.7-1).

Construction equipment and helicopter noise and vegetation removal could result in disturbance of nesting birds or nest mortality if work in or adjacent to occupied suitable habitat were to occur during the nesting season. Construction noise could disrupt bird nesting and result in nest abandonment. Birds in noisy environments may compensate for decreased auditory cues by increasing vigilant behavior, such as visual scans from the nest entrance or flushing from the nest, leading to changes in energy allocation or extended periods away from the nest during incubation. This behavior seems to be followed, at a high rate, by nest abandonment (Strasser and Heath 2013). Destruction of active bird nests, eggs, or nestlings could result from vegetation clearing, grubbing, and other site preparation and construction activities. However, most bird species presumed to be nesting in the project area are relatively common and are not considered sensitive species. Because of this, disruption of nesting or the loss of nests of common birds is not a biologically adverse effect in the context of these species' local populations. This impact would be avoided as much as practical by conducting vegetation removal and tree clearing outside of the nesting season or following a pre-construction nesting bird survey of suitable habitat for these species in and immediately adjacent to work areas (Table 2.7-1). Pre-construction raptor nest surveys would be conducted and appropriate buffers and timing restrictions would be implemented in locations around identified nests (Table 2.7-1).

Migratory waterfowl have the highest incidence of mortality from collision with transmission lines, particularly near wetlands, feeding areas, or open water (Stout and Cornwell 1976). The existing transmission line has been in place since the 1930s, and most resident birds have likely habituated to the location of the existing structures. The potential impact on resident and migratory birds from collision would not change substantially from existing conditions because the Proposed Action would replace existing transmission line structures in generally the same locations. While birds do occasionally collide with transmission lines and structures, research indicates that the risk of collision may be largely related to the location of the line relative to bird concentration areas (APLIC 2006; APLIC and USFWS 2005). Although the project area is in the Pacific Flyway and located along the Columbia River, which supports large concentrations of waterfowl, the existing alignment does not cross any known local waterfowl corridors and is not located between concentrated roosting and foraging sites that would increase the risk of collision. Impacts to migratory birds would be similar for the three Line Mile 19 Options since they would all involve the same amount of tree clearing. As described previously, Line Mile Options 2 and 3 would result in increased helicopter access to the area, which could increase the range of noise disruption to migratory birds. However, seasonal timing restrictions and/or pre-vegetation clearing surveys (see Table 2.7-1) would minimize possible disturbance of nesting migratory birds from work crews entering the area for construction, and thus, the impacts on migratory birds would be **low** under the Proposed Action regardless of Line Mile 19 Option.

While the temporary and permanent impacts of the project on priority habitats would be relatively small compared to the quantity available in the general project area, overall wildlife impacts would be **moderate** in the short term due to the construction-related disturbances occurring over three construction seasons. These construction-related impacts are anticipated to be reduced based on the implementation of mitigation measures to reduce incidental mortality through seasonal timing restrictions, species location identification through pre-construction surveys, and the minimization of work areas in sensitive habitats.

ESA-Listed Wildlife Species

No northern spotted owl critical habitat is designated in the project area. Two northern spotted owl activity centers are located 1 and 1.2 miles southeast of line miles 4 and 7, respectively. Biologists performed two years of protocol surveys and found no resident northern spotted owls within the survey area; although one northern spotted owl and two *Strix* unknown owls were detected in the survey area but determined to be non-resident, likely floaters.

Under the Proposed Action regardless of Line Mile 19 Option, structure replacement, conductor and hardware replacement, and access road construction would clear up to 380 trees (66 trees for road work, 211 danger trees near the transmission line right-of-way, 7 trees under the Cascade Locks Tap Line, and up to 96 trees for pulling and tensioning sites) that could potentially serve as northern spotted owl habitat. No impact on northern spotted owl critical habitat would occur and no nest trees would be removed. The access road and trail work would contribute only a minor amount of habitat fragmentation. Improved roads could allow for increased levels of unauthorized access of certain portions of the project area, but installed and repaired gates would minimize unauthorized use of potentially suitable northern spotted owl habitat.

BPA obtained concurrence from the USFWS that the Proposed Action may affect, but is not likely to adversely affect northern spotted owl or northern spotted owl designated critical habitat. Annual spot checks that follow the USFWS survey protocol (USFWS 2012) would be conducted through the completion of construction. Based on the lack of critical habitat, the extent of tree clearing spread out along the line, and the lack of nesting individuals in the project area, the project would have **no** to **low** impacts on northern spotted owls. Since all Line Mile 19 Options would include the same amount of tree clearing and geographic area for construction, impacts on northern spotted owls would be the same for all options.

Forest Service and National Scenic Area Special-Status Wildlife Species

Temporary effects, such as noise disruption and habitat displacement, and permanent effects, such as minor habitat loss or potential incidental mortality, on Forest Service and National Scenic Area special-status wildlife would be similar to impacts previously described for common wildlife species in the subsection above. As discussed above, the Proposed Action would temporarily disturb up to 19.4 acres of priority wildlife habitats, and permanently remove up to 0.1 acre (Tables 3.8-3 and 3.8-4). These priority habitats, such as old growth, cliffs, and talus, serve as habitat for many of the special-status species.

Although Forest Service and National Scenic Area special-status wildlife discussed in this section are presumed to be present in the project area for the purposes of this impact analysis, additional species-specific surveys for aquatic mollusks and amphibians, Larch Mountain salamander, raptor nesting, and red tree voles will be conducted during the appropriate season in 2016 through up to 2020 (the last construction season) to more specifically identify species presence. Red tree vole, mollusks, and amphibian surveys will occur in late summer 2016. The red tree vole surveys will be conducted on National Forest System lands only, as red tree voles are not included on the National Scenic Area list of sensitive species (Table 3.8-2 and Appendix B). Pre-construction surveys will be conducted for Larch Mountain salamander prior to construction in potential habitat. Due to the dynamic nature of bird nesting locations, raptor nest surveys will not be completed until the spring prior to the start of construction. Raptor nest surveys will continue annually through the end of construction.

In addition, several mitigation and minimization measures similar to those described above and some unique to the Forest Service and National Scenic Area Special-Status wildlife species would be employed to minimize potential project related impacts (Table 2.7-1). Some of these minimization measures would include using the results of pre-construction species-specific surveys to avoid and minimize project disturbance within 1,000 feet of sensitive species; relocation of some species, such as Larch Mountain salamander and aquatic amphibians and mollusks, out of work areas; implementation of timing restrictions to limit impacts to breeding and reproduction; and minimizing ground disturbance and tree clearing as much as practical to limit habitat disruption. Due to the limited quantity of habitat disturbance relative to available habitat in the area potentially occupied by these special-status wildlife species combined with the mitigation measures, project-related impacts on the sensitive wildlife species are anticipated to also be **moderate** in the short-term.

3.8.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on wildlife are identified in Table 2.7-1 in Chapter 2 of this EA.

3.8.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, the existing transmission line would not be rebuilt and access road and trail system improvements would not occur. Since there would be no planned construction occurring, BPA would continue operation and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing wildlife resources thus would be the same as existing conditions, with **low** impact.

Maintenance activities would likely increase as existing structures, access roads, and trails continue to deteriorate, and emergency structure repair and replacement would be required. These activities could impact wildlife. Unlike regular maintenance, emergency repairs could occur at any time of year with no time for the implementation of avoidance or minimization measures. Emergency repairs could occur in areas or during times of year when vegetation removal could result in the loss of nesting birds or construction noise could disturb wildlife during critical periods (such as nesting/breeding or winter habitat use). Overall, depending on the nature of the emergency repairs required, the No Action Alternative could result in **low** to **high** levels of impact on wildlife depending on timing or location.

3.9 Visual Quality

3.9.1 Affected Environment

The analysis area for scenic resources includes lands within 5 miles of the centerline for the right-of-way and associated trails and roads, and includes lands within the National Scenic Area, the City of Cascade Locks, and Hood River County. While this section addresses all lands within the analysis area, additional details on visual quality and scenic resources within the National Scenic Area in particular are provided in Appendix C, *National Scenic Area Visual Resources Analysis*.

A 5-mile radius surrounding the Proposed Action was selected for the scenic resource analysis area, based on a study showing that 500 kV monopole structures are noticeable to casual observers at a distance of 5 miles (Sullivan et al. 2014). This is assumed to be conservative, since this project involves 115 kV structures (wooden H-frame and steel monopoles) and 115 kV monopole structures would be shorter and smaller in diameter and stature than a 500 kV monopole structure.

Existing landscape character was evaluated from standard locations representing both common and unique viewer areas, including both stationary viewing platforms and travel corridors. For areas within the National Scenic Area, these locations correspond to KVAs identified in the Management Plan for the National Scenic Area (Gorge Commission 2011). Because only minor changes to structures are proposed, the existing transmission line was assessed to determine extent of visual contrast and conformance of the existing structures to applicable scenic standards. This information was used to inform the impact assessment. ***Photosimulations*** demonstrating the appearance of the updated transmission structures were produced for a subset of KVAs and also used to inform the impact determination (Appendix C). The following indicators were used to determine visibility and dominance of the existing transmission line and right-of-way:

- The approximate number and types of transmission structures and/or right-of-way visible from each KVA.[3]
- The degree of existing vegetation providing screening.
- The distance from the project area to the KVAs from which it is visible.[4]

The transmission line and right-of-way's influence on existing scenic resources were assessed by determining the expected visual contrast of project components against the existing natural landscape, and assessing whether the expected level of contrast would alter existing landscape character and if so, to what extent. Visual contrast was rated as either none, weak, moderate, or strong:

- **None** – The element contrast is not visible or perceived.
- **Weak** – The element contrast can be seen but does not attract attention.

[3] Approximate number defined as the number of structures visible to the casual observer based on field observations. The approximate number visible is summarized as: None: 0; Low: 1–5; Moderate: 6–15; High: >15.

[4] Foreground (FG): 0 to 0.5 mile; Middleground (MG): 0.5 to 3 miles; Background (BG): > 3 miles.

- **Moderate** – The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong** – The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

Potential visibility and the determination of contrast were made with consideration of the following visibility limiting factors:

- **Vegetation Screening (VS)** – Limiting or blocking of views by vegetation**.**
- **Topographic Screening (TS)** – Limiting or blocking of views by topographic features.
- **Scale(S)** – The proportional relationship between project elements and the surrounding landscape.
- **Distance (D)** – Attenuation of visual contrast due to increasing distance from project elements.
- **Viewer Geometry (VG)** – The spatial relationship of the viewer to the viewed object. Viewing geometry is described as vertical or horizontal.
- **Object's Visual Characteristics** – The extent to which form, line, color or texture of the object is consistent with the surrounding environment.
- **Backdrop (B)** – The degree to which characteristics of the backdrop reduce the visibility of project features.
- **Viewer Duration (VD)** – The duration of time or space that the project is in view from a linear platform.
- **Natural Vegetation Openings (O)** – The extent to which natural openings in vegetation reduce visual contrast of right-of-way clearing.

Lands within the National Scenic Area

The Management Plan for the National Scenic Area identified goals, objectives, and policies for scenic resources located within the GMA and SMA (Appendix C; Gorge Commission 2011). Scenic standards apply to new development within the SMA based on land use designation and landscape setting (U.S. Forest Service 2005). Applicable standards for portions of the National Scenic Area crossed by the project include the following:

- Not Visually Evident – Development is not noticeable and is easily overlooked.
- Visually Subordinate – New projects or development must not noticeably contrast with the surrounding landscape. A development can be visible, but should not be the first thing one notices, or the last thing one remembers about the scene.

The landscape of the National Scenic Area is steep, rugged, and forested. Scenic character is influenced by the Columbia River, steep topography, waterfalls, natural forest vegetation, rocky cliffs, and talus slopes (Gorge Commission 2011). Colors are dominated by the dark greens of evergreen and deciduous trees, and the dark browns and greys of exposed basalt cliffs. Water features, including the Columbia River and the numerous waterfalls of its tributaries, add variety and movement to the landscape. Although the Columbia River Gorge is recognized for its natural scenery, manmade development is not uncommon. Development includes Bonneville Dam, the communities of Cascade Locks and Hood River, recreation sites, transmission line corridors (including the existing Bonneville-Hood River transmission line), railroads, I-84, and radio towers. Viewers within the National Scenic Area include residents, recreational visitors, and highway travelers.

The existing project right-of-way is situated at the toe slope of the steep uplands, where topography flattens as it approaches the Columbia River floodplain. From Key Viewing Areas (KVAs) as identified in the Management Plan (Gorge Commission 2011), the existing transmission line produces low contrast against the natural setting and generally meets either the “Not Visually Evident” or “Visual Subordination” scenic standard from KVAs within the visual resources analysis area. However, there are a few locations where the existing transmission line and right-of-way appears visually dominant and does not meet either of those two standards, particularly as viewed from Dog Mountain on State Route (SR) 14 and from Starvation Creek Trailhead and Viento State Park on I-84.

The typical low visibility of the line from the KVAs is due to several factors. The scale of the landscape is large compared to both the structures and the right-of-way, which makes them easy to overlook. The thin vertical lines of structures blend with the existing vertical lines of the tall, mature evergreens, particularly as the distance of the viewer from the existing Bonneville-Hood River transmission line project increases. Trees are generally as tall as, or taller than, transmission line structures. Tall vegetation and varied topography screen much of the structures and transmission line from view, resulting in intermittent views of the structures and right-of-way. The angle of view is steep, particularly from KVAs on the Oregon side of the gorge, and typically directed away from focal features such as the river or steep canyon walls. The cleared right-of-way and structures blend with the existing surroundings due to the color and texture of the backdrop, natural breaks and openings in vegetation, and existing development.

To establish a baseline that allows a comparison of alternatives, a GIS-based ***viewshed*** analysis and field investigation were conducted. This analysis determined that the existing line could be seen from nine KVAs identified in the Management Plan (Appendix C). The landscape setting of KVAs located within or near the project area is summarized in Table 3.9-1.

Visible portions of the existing Bonneville-Hood River transmission line are classified as: None (no transmission structures visible); Low (1–5 transmission structures visible); Moderate (6–15 transmission structures visible); and High (>15 transmission structures visible). Distance zones were defined as the following: Foreground (FG, 0 to 0.5 mile); Middleground (MG, 0.5 to 5 miles); and Background (BG, >5 miles). State Route 14 and the Columbia River are distinct KVAs; however, they are grouped for this analysis because of the similar viewer conditions relative to the project. More detailed information on KVAs can be found in Appendix C.

Table 3.9-1. Visibility Metrics and Existing Scenic Conditions

KVA	Landscape Character Elements	Visible portions of Existing Bonneville-Hood River Transmission Line[1]	Distance Zone (FG, MG, BG)[2]	Visibility Limiting Factors (VS, TS, …)[3]	Visual Contrast[4]
Bonneville Dam Visitor Area	**Hydropower facility; transmission structures; visitor/ recreation areas**	**Low number of steel lattice structures**	**FG, MG**	**VS, TS, S,O**	**M**
State Route 14/ Columbia River	**Columbia River; steep canyon walls; rock outcrops; I-84; talus slopes**	**High number of steel lattice / wooden H-frame** **Highest visibility from Drano Lake to Wind River Road**	**MG**	**VS, TS, S, O, VC, VD, D**	**S**
I-84	**Columbia River, railroad, waterfalls, steep canyon walls, thick vegetation, side canyons**	**Moderate number of steel lattice / wooden H-frame structures** **Highest visibility near Starvation Creek, Viento State Park, Lindsey State Park**	**FG, MG**	**VS, TS, VG, VD, VC**	**N, M, S**
Historic Columbia River Highway	**Enclosed by tall, dense vegetation; waterfalls, steep canyon walls**	**No visibility except from Viento State Park which can be accessed from the highway**	**FG**	**VS, TS, VD**	**N, W**
Wyeth Road	**Dense forest; meadows; recreational trails**	**Low number of structures visible from near the Old Wyeth Ranch area and Gorton Creek Trailhead**	**FG**	**VS, S, VG, B**	**M**
Dog Mountain	**Expansive views; Columbia River; steep canyon walls, rock outcrops, highways, railroad, transmission line corridors**	**Moderate number of steel lattice structures visible from near the summit of Dog Mountain, right-of-way visible**	**MG**	**S, O, VG**	**M, S**
Pacific Crest Trail	**Enclosed views; dense vegetation; existing transmission line right-of-way**	**Moderate number of wooden H-frame structures**	**FG**	**VD**	**N, S**
Panorama Point	**Expansive views, existing transmission line (not the Bonneville-Hood River line) is dominant**	**Low number of steel lattice H-frame structures**	**MG**	**B, D**	**W**

Notes: Approximate number defined as the number of structures visible to the casual observer based on field observations.

1 **The approximate number visible is summarized as: None: 0; Low: 1–5; Moderate: 6–15; High: >15.**

2 **Distance Zone: Foreground (FG): 0 to 0.5 mile; Middleground (MG): 0.5 to 5 miles; Background (BG): > 5 miles.**

3 **Visibility Limiting Factors (see full definitions in Section 3.9.1): Vegetation Screening (VS); Topographic Screening (TS), Scale (S), Distance (D); Viewer Geometry (VG); Object Visual Characteristics (VC); Backdrop (B), Viewer Duration (VD); and Natural Vegetation Openings(O).**

4 **Visual Contrast: None (N); Weak (W); Moderate (M); Strong(S).**

Lands Outside of National Scenic Area

The City of Cascade Locks

The city of Cascade Locks is designated as an Urban Area within the National Scenic Area, and consequently is not managed by provisions in the National Scenic Area Management Plan. The city is bordered to the north by the wide, flat Columbia River. Lands to the south are characterized by the steep ascending and forested slopes of the Columbia River Gorge. Existing infrastructure includes roads, buildings, retail, commercial, and residential development. Two radio towers on a ridgeline south of Cascade Locks are visible. Views were assessed from Wa Na Pa Street, Marine Park, and a parking area beneath the Bridge of the Gods.

The existing Bonneville-Hood River transmission line is not visible from the majority of the city of Cascade Locks due to screening by mature evergreen and deciduous trees. A low[5] number of structures are intermittently visible in the middleground distance zone while traveling eastbound through Cascade Locks on Wa Na Pa Street. A low number of structures and the right-of-way to the west of town are visible in the middleground distance zone from a viewing platform under the Bridge of the Gods. The structures appear subordinate to the existing landscape character due to screening, intermittent viewing (i.e., the project comes in and out of view), and other existing infrastructure (such as other transmission lines, structures, and associated rights-of-way, radio towers, the Bridge of the Gods, and buildings) that appear larger in scale and more dominant due to proximity to viewing platforms. Viewers are primarily residents and recreational visitors in this viewer area.

Hood River County and City of Hood River

The Bonneville-Hood River transmission line exits the National Scenic Area just east of line mile 20. This area is within Hood River County and includes a small area within the Hood River city limits. Landscape character is rural residential, consisting of rolling terrain, tall vegetation, small farms, orchards, vineyards, and a golf course. Existing infrastructure in this area includes residential areas, small farms, roadways, and utility structures.

As the transmission line approaches the City of Hood River from the west, the characteristically steep sidewalls of the Columbia River Gorge flatten, opening to the broad rural residential area. The existing transmission line and associated structures, although visible to the south of Belmont Drive, appear consistent with existing development and do not deviate from the landscape character. Views are generally limited to the foreground in this viewer area due to the amount of existing development. Agriculture and farming occurs within the right-of-way, thereby reducing the visual contrast of the existing right-of-way.

3.9.2 Environmental Consequences - Proposed Action

An impact determination of negligible, low, moderate, or high was made based on the expected level of visual contrast, geographic and temporal extent of resulting impact, and the degree to which existing landscape character would be altered by the Proposed Action. For portions of the project within the National Scenic Area, a determination of conformance with applicable SMA scenic standards was made based on the identified level of impact.

The Proposed Action includes replacing existing galvanized steel lattice and wood H-frame structures with a combination of wood H-frame structures and weatherized steel monopoles (See Section 2.1.2, *Proposed*

---

[5] Approximate number defined as the number of structures visible to the casual observer based on field observations. The approximate number visible is summarized as: None: 0; Low: 1–5; Moderate: 6–15; High: >15.

Rebuild Project Overview). Impacts on scenic resources from construction activities would primarily be associated with vegetation clearing and the presence and movement of large construction equipment. Impacts on scenic resources from operational activities could result from higher structure heights, change in structure material color, and permanent vegetation clearing and grading associated with access roads and trails.

National Scenic Area

It is expected that the majority of temporary and permanent vegetation removal associated with the right-of-way, pulling and tensioning sites, and access roads and trails (newly extended areas, reconstructed, and improved) would be short term and not noticeable to the casual observer, due to the minimal amount of vegetation proposed for removal (an average of 10 trees removed per mile of right-of-way in forested areas). Most cleared areas would be screened from view by surrounding tall vegetation or topographic features. Any visible cleared areas would appear small in scale compared to the larger scale of the surrounding landscape. Temporary visual contrast created by construction activity would be moderate to strong in areas where actions were observed in the foreground and vegetation screening is limited (in particular, the Pacific Crest Trail, Columbia River, portions of SR 14 and I-84, Dog Mountain); however, viewer duration would be limited from linear viewing areas such as SR 14, I-84, and the Pacific Crest Trail. Construction-related visual contrast would be none to weak where construction-related actions were viewed in the middleground or background, where vegetation removal would be screened by topography, or where cleared areas blended with existing natural openings in the vegetation or the existing right-of-way (Historic Columbia River Highway). Construction-related impacts on scenic resources are not expected to be visible from the Bonneville Dam, Wyeth Road, or Panorama Point KVAs due to the limited visibility of the existing project area. Areas subject to ground disturbance and vegetation and tree clearing would be stabilized and revegetated upon the completion of project construction (Table 2.7-1), which would limit the duration of exposed soil would produce a visual contrast. Therefore, the overall short-term impact on scenic resources from construction activities would be **moderate** because the project clearing would not be visible from most KVAs, and the majority of remaining KVAs would have short duration views of the project and would be revegetated upon completion of construction.

Permanent change in structure height, location, and type associated with the Proposed Action would result in weak visual contrast that would not alter the existing landscape character of the National Scenic Area. Appendix C includes visual simulations depicting the appearance of the Proposed Action from select KVAs. Structures in the National Scenic Area are not expected to elevate the level of visual contrast above what is currently observed in existing structures. The structure height would remain lower than the typical tree height for the area and therefore would not result in increased visibility where structures are currently screened by vegetation. The brown color, coarse texture, and non-reflective finish of the wooden and weatherized steel monopoles is similar to colors found in the surrounding natural environment. However, the weatherized steel monopoles would be somewhat higher in contrast than the existing structures when viewed against the lighter colored backgrounds of the non-vegetated talus slopes such as Shellrock Mountain (line mile 12) or the skyline. Conversely, the vertical lines introduced by H-frame and monopole structures would more closely align with the natural vertical lines of surrounding trees in forested areas. Overall, when compared against the visibility of the existing structures, the installation of the new structures would have **low** impact on the landscape as viewed from the KVAs.

Impacts on visual resources would have minor differences, depending on which Line Mile 19 Option is selected. As described in Section 2.2, *Line Mile 19 Options,* the Line Mile 19 Options would differ in design between structures 19/3 and 19/7, which is visible from the I-84, the Columbia River, and SR 14 KVAs. I-84 is the closest KVA, running approximately 0.5 mile south of line mile 19 at its closest point. The retaining walls associated with Line Mile 19 Options 1 and 2 would be visible; but since they would be constructed in natural openings and not involve vegetation removal in line mile 19, and would use rock with similar color to the natural rock outcrops in the landscape, they would not be noticeable and would be easily overlooked. The excavator roads to structures 19/4 through 19/7 would not be apparent from the KVAs; therefore, impacts on visual resources from Line Mile 19 Options 1 and 2 would appear the same. Under Line Mile 19 Option 3, the existing road between structures 19/3 and 19/7 would be used in a similar manner, and its visibility would remain similar to the existing conditions. Replacement of steel lattice structures with steel monopole structures within line mile 19 would result in a decrease in visual contrast associated with structures for all three Line Mile 19 Options. The cleared right-of-way would continue to be the most noticeable aspect of the transmission line in this area, regardless of which Line Mile 19 Option is selected. The Line Mile 19 Options are located just southeast of Mitchell Point, an overlook with a trail that is not a KVA but is an important recreation resource in the National Scenic Area (see Section 3.2, *Recreation*). The Line Mile 19 Options would not be visible from the overlook due to screening from topography, but would be visible from the trail leading to the overlook if the viewer were to look to the southeast.

Views of line mile 19 from the I-84 and SR 14 KVAs would be intermittent and of short duration due to the speed that vehicles travel on those roads; the lack of turn offs in view of the Line Mile 19 Options; the dense, tall roadside vegetation that blocks views to the south; and steep viewing angle from I-84 toward the right-of-way. Impacts on viewers from SR 14 would be similar to those from I-84, but project features would be less visible due to the farther distance from the right-of-way of approximately 2 miles. Viewers on the Columbia River would have longer duration, more unobstructed views of the project area, but from a further distance. Although Line Mile 19 Option 3 would result in less visual contrast, the difference would be minor and likely not noticeable. See Appendix C for additional analysis and photosimulations for Line Mile 19 Options 1, 2, and 3.

Collectively, the project structures would maintain weak to moderate contrast against the existing landscape, particularly where viewed from middleground or background distance zones. Although Line Mile 19 Option 3 would result in slightly less visual contrast when compared with Line Mile 19 Options 1 and 2, the differences would be minor and likely not perceivable to the casual observer. Therefore, overall impacts on scenic resources in the National Scenic Area from the Proposed Action, regardless of Line Mile 19 Option, would be **low**.

Based on the expected level of weak contrast of the replacement structures, the screening of structures by vegetation and topography, and limited amount of tree removal- no change to the existing landscape character of the National Scenic Area is expected. The Proposed Action's conformance to scenic standards would be the same as that of the existing transmission line (Appendix C).

Temporary and permanent visual impacts to recreational opportunities that are not coincident with KVAs would also occur. Generally, impacts would be similar to those described for the KVAs above. Proposed retaining walls, roads, and tree removal would be the most visible project features. Due to the small amount of road extensions (0.3 mile), the design of the retaining walls to blend with surroundings, dispersed vegetation removal, and steep viewing angles and tall mature trees would block views, these project features would not appear dominant from recreational areas within the National Scenic Area and would easily be overlooked by the casual viewer.

City of Cascade Locks

As with the National Scenic Area, permanent and temporary vegetation removal for the project right-of-way, pulling and tensioning sites, and access roads and trails would likely not be noticed from this viewer area. Contrast would be weak due to the scale and dominance of other larger transmission line rights-of-way. Therefore, impacts on Cascade Locks scenic resources from construction activities would be **low.**

Existing structures range from 50 to 95 feet tall, and would increase in height by approximately 5 to 15 feet, visual contrast would remain weak as transmission structures would repeat existing vertical lines observed in trees, distribution lines, and buildings. The structure type would appear similar in scale to the existing transmission structures, and is not expected to result in increased visibility within foreground and middleground despite a small increase in structure height. The height of the new structures would also remain smaller in scale compared to surrounding mature evergreen trees, which can reach heights of over 200 feet.

The brown color of the replacement structures would be consistent with the existing natural brown colors of the landscape, thereby improving compatibility of the structures with the landscape features in the backdrop. New structures would result in a weak level of visual contrast against the existing natural landscape that would not alter the existing landscape character of the city or the surrounding forested hills and cliffs to the east, south, and north. Therefore, impacts on Cascade Locks scenic resources from the rebuilt structures would be **low.**

Hood River County and City of Hood River

The amount of temporary and permanent vegetation removal required in the Hood River County and City of Hood River viewer area would be minimal due to the relatively low vegetation coverage in the existing landscape. Access roads within the viewer area would primarily be classified as direction of travel or overland travel routes, thereby requiring minimal grading. Temporary impacts on scenic resources from access roads, trails, and pulling and tensioning sites would primarily consist of vegetation trampling and rutting, resulting in weak to moderate contrast of the disturbed areas against the surrounding landscape. The presence and movement of construction equipment could produce strong visual contrast when viewed from nearby residences located in the foreground. However, the activity and associated visual contrast would be temporary, and cease upon completion of construction activities. Therefore, impacts on Hood River County scenic resources from construction activities would be temporary and **moderate.**

Although new structures would increase in height by approximately 5 to 15 feet, visual contrast would remain weak as transmission structures would repeat existing vertical lines observed in trees, distribution lines, and buildings. The structure type would appear similar in scale to the existing transmission structures, and is not expected to result in increased visibility within foreground and middleground despite a small increase in structure height. The portion of the Bonneville-Hood River transmission line within the City of Hood River and outside of the National Scenic Area would be within developed areas such that the Proposed Action would not detract from the natural scenic qualities of the Columbia River Gorge. Therefore, long-term impacts on Hood River County scenic resources from the rebuilt structures would be **low.**

3.9.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on visual quality are identified in Table 2.7-1 in Chapter 2 of this EA.

3.9.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, the existing transmission line would not be rebuilt and access road and trail system improvements would not occur. Since there would be no planned construction occurring, the visual nature of the right-of-way, access roads, and transmission line would not deviate from existing conditions. BPA would continue operations and maintenance activities similar to those currently performed on the transmission line. Initially, impacts on visual resources would remain largely the same - varying in the visual dominance of the facilities with the existing visual condition ranging from **low** to **high** impact, depending on the viewer location.

As the facilities continue to age and fail, replacement would be necessary on an emergency basis. This would lead to the intermittent replacement of structures and associated road work similar to that described for the Proposed Action. Although similar, construction-related impacts would be more localized, affecting fewer viewer platforms at one time. This would result in a lower level of contrast than with the Proposed Action since construction areas would be smaller and spaced farther apart; however, the temporal extent of the impacts would be longer since they would gradually occur over time. Therefore, impacts on scenic resources for areas within and outside of the National Scenic Area from construction would be **moderate.**

This page deliberately left blank

3.10 Air Quality and Greenhouse Gases

3.10.1 Affected Environment

Air Quality

The EPA has identified and established ground-level concentration criteria for seven common air pollutants known to have been harmful to human health. These "criteria pollutants" include carbon monoxide (CO), ozone, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) less than 10 microns in diameter (PM_{10}), fine particulate matter less than 2.5 microns ($PM_{2.5}$), and lead. Criteria pollutants are typically generated during combustion activities; however, particulate matter also forms as dust from solid particles in the soil that become suspended in air by wind action and human activity, resulting in a significant nuisance if not reduced with available control measures (CARB 2007). The EPA, under the federal Clean Air Act (CAA), is charged with establishing National Ambient Air Quality Standards (NAAQS) for each criteria pollutant based on the concentration required to protect public health and welfare. When an area's air quality exceeds these standards, it is designated a "***nonattainment area***." If a nonattainment area meets the EPA standards for the criteria pollutant in question, then the area is designated a "maintenance area" after a maintenance plan has been established to keep the area within the standards approved by the EPA. Attainment areas are those areas where primary or secondary air quality standards are being met without the need for a maintenance plan.

The project area is located within maintenance areas for CO and ozone, and attainment for PM_{10}, $PM_{2.5}$, NO_2, and SO_2. Additionally, the project area is located between two areas (Mount Hood and Mount Adams) with visibility impairment from regional haze.

Carbon monoxide is a colorless, odorless gas formed through the process of incomplete combustion of ***fossil fuels***. Primary sources of CO emissions within the project area include vehicle exhaust emissions from highway transport, such as I-84, as well as other local roads. Wood-burning activities are also a source of CO emissions. The closest CO monitoring station to the project area is in Portland, about 36 miles southwest of the western edge of the project area. Measured concentrations of CO have been in attainment of the NAAQS since 1996 (ODEQ 2004). Prior to 1996, the Portland area airshed was classified as a nonattainment area for CO (ODEQ 2004).

Ozone, sometimes referred to as ground-level smog, is a highly reactive and unstable gas formed when volatile organic compounds (VOCs) and nitrogen oxides, both byproducts of internal combustion found in engine exhaust, undergo slow photochemical reactions in the presence of heat and sunlight. Adoption of the Ozone Maintenance Plan for the Portland-Vancouver Air Quality Maintenance Area (AQMA) in 1998 implemented strategies for reducing ozone, which have so far proved successful (ODEQ 2007). Since 2004, eight exceedances of the NAAQS for ozone were reported for the Portland-Vancouver AQMA (ODEQ 2014a).

Particulate matter is generated by industrial emissions, residential wood combustion, motor vehicle engines, and dust from roadways and unpaved surfaces. $PM_{2.5}$ has a greater health effect than PM_{10} at locations far from the emitting source, because it remains suspended in the atmosphere longer and travels farther. PM_{10} includes both fine and coarse liquid and solid particles. $PM_{2.5}$ is a complex mixture of extremely small particles and liquid droplets made up of a number of components, including acids such as nitrates and sulfates, organic chemicals, metals, and soil and dust particles. Because regional haze (see below) and

$PM_{10}/PM_{2.5}$ are air quality concerns within the National Scenic Area, ambient air quality monitoring is conducted in The Dalles, which is the closest PM monitoring station to the project area, about 17 miles southeast of the Hood River Substation. Since 2010, there have been no exceedances of the NAAQS for $PM_{10}/PM_{2.5}$ measured at this monitoring station (ODEQ 2014a).

Regional Haze

Regional haze is air pollution that is transported long distances into scenic areas and subsequently affects visibility (i.e., the scenic view). Sources of regional haze include tailpipe emissions from motor vehicles, road dust, and fire (wildfires, agricultural burning, and woodstoves). Areas where visibility has been identified as an important value, such as national parks and wilderness areas of a certain size (over 5,000 acres) have been designated by EPA as “Class I” areas. Section 160 of the CAA (42 U.S.C. 7470(2) *et seq*.) requires the preservation, protection, and enhancement of air quality in specific areas of national or regional natural, recreational, scenic, or historic value.

The closest Class I area to the project area is the Mount Hood Wilderness Area, about 20 miles south of the project area midpoint. The project area is predominately located within the National Scenic Area, which is not designated as a Class I area, but is located between two Class I areas (Mount Hood and Mount Adams). Further, the National Scenic Area Act of 1986 includes measures to protect the National Scenic Area from regional haze. Strategies to reduce regional haze and improve visibility within the National Scenic Area are the responsibility of the Gorge Commission. While management of air quality in the National Scenic Area is technically the responsibility of the Gorge Commission, the Gorge Commission delegated air quality monitoring and planning to ODEQ, the Southwest Clean Air Agency, and the U.S. Forest Service (ODEQ and Southwest Clean Air Agency 2011).

Greenhouse Gases

Greenhouse gases are chemical compounds found in the Earth’s atmosphere that absorb and trap infrared radiation as heat. Global atmospheric greenhouse gas concentrations are a product of continuous emission (release) and removal (storage) of greenhouse gases over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. When plants decay or are burned, the stored carbon is released back into the atmosphere, available to be taken up again by new plants (Ecological Society of America 2008). Productive and long-lived forests play an important role in carbon capture and storage in that they act as temporary carbon reservoirs by storing carbon for extended periods of time. In forests, the carbon can be stored for long periods of time, and because they are so productive and long-lived, forests have an important role in carbon capture and storage and can be thought of as temporary carbon reservoirs. There is also a large amount of greenhouse gases stored deep underground in the form of fossil fuels. Soils store carbon in the form of decomposing plant material and serve as the largest carbon reservoir on land.

Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the greenhouse gas emission rate over the storage rate, which results in a net increase of greenhouse gases in the atmosphere. When forests are permanently converted to cropland, for instance, or when new buildings or roads displace vegetation, the greenhouse gas storage capacity of the disturbed area is diminished. Carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions increase when soils are disturbed (Kessavalou et al 1998), and burning fossil fuels releases greenhouse gases that have been stored underground for thousands of years and cannot be readily replaced. The resulting build-up of heat in the atmosphere due to increased greenhouse gas levels increases temperatures, which causes warming of the planet through a greenhouse-like effect (U.S. Energy Information Administration [EIA] 2009).

The principal greenhouse gases emitted into the atmosphere through human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (EPA 2013a).

- **Carbon dioxide** is the major greenhouse gas emitted (EPA 2013c; Houghton 2010). Carbon dioxide enters the atmosphere as a result of such activities as land use changes, the burning of fossil fuels (e.g., coal, natural gas, oil, and wood products), and the manufacturing of cement. Carbon dioxide emissions resulting from the combustion of coal, oil, and gas constitute 84 percent of all U.S. greenhouse gas emissions (EPA 2013c). Before the industrial revolution, carbon dioxide concentrations in the atmosphere were roughly stable at 280 parts per million. By 2010, carbon dioxide levels had increased to 390 parts per million, a 40 percent increase, as a result of human activities (EPA 2013b).
- **Methane** is emitted during the processing and transport of fossil fuels, through intensive animal farming, and by the degradation of organic waste. Concentrations of methane in the atmosphere have increased more than 2.5 times of preindustrial levels (EPA 2013b).
- **Nitrous oxide** is emitted during agricultural and industrial activities and during the combustion of fossil fuels and solid waste. Atmospheric levels of nitrous oxide have increased 18 percent since the beginning of industrial activities (EPA 2013b).
- **Fluorinated gases**, including hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, are synthetic compounds emitted through industrial processes. They sometimes replace ozone-depleting compounds such as chlorofluorocarbons in insulating foams, refrigeration, and air conditioning. Fluorinated gases, particularly sulfur hexafluoride, are often used in substation equipment. Sulfur hexafluoride is used as an electrical insulator in high-voltage substation equipment such as circuit breakers, transformers, and ground switches. Although fluorinated gases are emitted in small quantities, fluorinated gases have the ability to trap more heat than carbon dioxide and are considered gases with a high global warming potential (EPA 2013a).

Total human-caused greenhouse gas emissions were the highest in human history from 2000 to 2010 and reached 49 gigaton of ***carbon dioxide equivalent*** (CO_2e)[6] per year in 2010 (Intergovernmental Panel on Climate Change [IPCC] 2014). Annual greenhouse gas emissions grew on average by 1.0 gigaton of CO_2e (2.2 percent) per year from 2000 to 2010 compared to 0.4 gigaton (1.3 percent) increase per year from 1970 to 2000. Increasing levels of these greenhouse gases could increase the Earth's temperature by between 2.0 and 11.5 degrees Fahrenheit by 2100 (EPA 2013a). In the Pacific Northwest Region, an increase in annual temperature between 3.3 and 9.7 degrees Fahrenheit may be realized between 2070 and 2099, depending on future total global emissions of greenhouse gases (Mote et al. 2014).

---

[6] CO_2e is a unit of measure used by the Intergovernmental Panel on Climate Change that takes into account the global warming potential of each of the emitted GHGs using global warming potential factors.

Increases in Earth's temperature may result in accelerated melting of artic sea ice and glaciers, decreased periods of ice cover on lakes and rivers, changes in hydrology associated with early melting and decreased snow packs, changes in growing seasons and plant hardiness zones, changes in surface water characteristics, and increased extreme weather (Melillo et al. 2014). All of these changes could have a ripple effect on agricultural production, human health, public infrastructure, water supplies, hydropower generation, and terrestrial, aquatic, and marine ecosystems. While models predict that atmospheric concentrations of all greenhouse gases and temperatures will increase over the next century due to human activity, the extent and rate of change resulting from an individual project or action is difficult to predict, especially on a global scale.

To lessen BPA system's contribution to greenhouse gas emissions, BPA developed a climate change roadmap (BPA 2008), which included the adoption of a new Strategic Business Objective and a Key Agency Target related to climate change. The climate change roadmap identified measuring BPA's overall greenhouse gas emissions as a key starting point for BPA to manage its overall greenhouse gas footprint. As a result, BPA started collecting greenhouse gas data in 2009 to complete an inventory of existing greenhouse gas emissions. The greenhouse gas reporting serves as a benchmark for quantifying reductions in greenhouse gas emissions from various activities and functions and helps BPA in quantifying the value of potential remedies for reducing emissions, estimating the costs of changing current practices and prioritizing future greenhouse gas emission reduction actions. In 2009, BPA became a founder and member of The Climate Registry, a nonprofit collaboration that sets standards to calculate, verify and report greenhouse gas emissions. BPA has completed and published a greenhouse gas inventory for the years of 2009, 2010, 2011, and 2012. The Climate Registry has been third-party verified and is publically available.

In 2014, BPA's system-wide direct emissions from stationary and mobile combustion and fugitive sources totaled 48,140 tons of CO2e (The Climate Registry 2015). These direct emissions were calculated from the use of vehicles, air transportation, building operation, and transmission line operation. The greenhouse gas emissions reported to The Climate Registry also includes a quantification of the sulfur hexafluoride emissions from BPA facilities. In addition to reporting sulfur hexafluoride emissions associated with total greenhouse gas emissions to The Climate Registry, BPA joined the USEPA's sulfur hexafluoride Emission Reduction Partnership in 1999, which includes voluntarily reporting of sulfur hexafluoride emissions.

3.10.2 Environmental Consequences–Proposed Action

Air Quality

Construction of the Proposed Action would result in short-term, temporary air quality impacts during earthmoving activities and from the operation of on-road vehicles, off-road equipment, and helicopters. Due to the disturbance of soil particles from anticipated vehicle and equipment transport on unpaved roadways and access roads, and earthmoving activities, such as grading and excavation at structure rebuild sites, increased emissions would be in the form of PM_{10}, $PM_{2.5}$, and dust, all of which would contribute to changes in visibility. With the exception of some road work (i.e., road work under Line Mile 19 Options 1 and 2), transmission line work and most access road and trail work involving mobile and aerial (helicopter) equipment would progress along the transmission line alignment and would not operate in any one location for more than a maximum of a few weeks. Because pollutant emissions would be limited to specific locations where construction work would generate them for short periods of time, the overall amount of pollutants created by the Proposed Action is expected to be small, localized, and short-lived. Therefore, construction activities would not produce PM_{10}, $PM_{2.5}$, or dust to the extent that air quality standards would be violated, or contribute to an increase of regional haze. Implementation of dust suppression measures listed in Table 2.7-1 would further minimize these impacts.

In addition to increased emission levels of PM_{10}, $PM_{2.5}$, and dust, the operation of on-road vehicles, off-road equipment, and helicopters during construction of the Proposed Action would result in emissions of CO and ozone precursor emissions (NO_2 and VOCs). However, because these emissions would be produced over a temporary timeline and would be localized to the project area, the level of emissions generated would be low and, therefore, the temporary increase in emissions would not have the potential for exceeding the NAAQS or significantly contributing to visibility reduction or regional haze. Implementation of the mitigation measures such as reductions in idling times, vehicle maintenance, and speed limits for off-road travel would reduce these impacts (Table 2.7-1).

Road reconstruction and retaining wall construction under both Line Mile Options 1 and 2 would require that heavy equipment be present within the same general location for up to two months. While the equipment would be present for a prolonged period of time, dust and emissions generation would still be temporary and limited to a few vehicles and pieces of equipment at any one time. Use of the micropile foundations under Line Mile 19 Options 2 and 3 would also result in increased use of helicopters, which would temporarily increase air emissions over Line Mile Option 1. Air quality standards would not be violated under any of the Line Mile 19 Options.

Because emissions generated by construction of the Proposed Action would be highly localized, temporary, and relatively minor, construction-related air quality impacts would be **low**, regardless of which Line Mile 19 Option is selected.

Greenhouse Gases

Global atmospheric greenhouse gas concentrations are a product of emissions and removal over time. Greenhouse gas emissions, primarily in the form of carbon dioxide, N_20, and methane, would be generated under the Proposed Action through the use of vehicles, heavy equipment, and helicopters during project construction. Detailed assumptions used to derive these estimates are provided in Appendix D.

Vegetation and soil disturbance could also result in an increase in greenhouse gas concentrations. Research has shown that emissions as a result of soil disturbance are short lived and return to background levels within several hours (Kessavalou et al. 1998; IPCC 2006). Carbon that would be stored in removed vegetation would be offset in time by the growth and accumulation of carbon in soils and new vegetation. For these reasons, the temporary increase in greenhouse gas concentrations as a result of temporary soil and vegetation disturbance are not quantified below.

Direct Emissions

Direct greenhouse gas emissions resulting from the Proposed Action were calculated using the assumptions described in the greenhouse gas appendix (see Appendix D). Calculations were done to estimate the greenhouse gas emissions from rebuilding the transmission line.

The Proposed Action could result in an estimated total of 8,841 metric tons of CO_2e emissions through the use of vehicles, equipment, and helicopters during construction activities. As described further in Appendix D, greenhouse gas emissions associated with equipment operation and vehicle use were overestimated to account for all potential construction activities and associated material deliveries to and from the construction site. As stated above, Line Mile 19 Options 1 and 2 would produce slightly more vehicle emissions and associated CO_2e than Line Mile 19 Option 3, due to access road reconstruction and retaining wall installation between structures 19/3 and 19/7. Use of the micropile foundations under Line Mile 19 Options 2 and 3 would also result in increased use of helicopters, which would temporarily increase greenhouse gas emissions over Line Mile 19 Option 1. These differences in vehicle and helicopter trips between options are within the conservative estimates for the overall project and would not meaningfully deviate from the overall project greenhouse gas emission estimate.

To provide context for these levels of emissions, the EPA mandatory reporting threshold for large emission sources of greenhouse gases is 25,000 metric tons of CO_2e emitted annually (74 FR 56260). This threshold is approximately the amount of CO_2e generated by 5,263 passenger vehicles per year (EPA 2015). Comparatively, the emissions during project construction would be equivalent to the emissions generated by about 861 passenger vehicles per year (EPA 2015). Given the low contributions, the impacts of the Proposed Action on greenhouse gas concentrations would be **low**.

3.10.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on air quality are identified in Table 2.7-1 in Chapter 2 of this EA.

3.10.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line nor improve the access road and trail system. As there would be no planned construction, BPA would continue operations and maintenance activities similar to those currently performed on the transmission line, such as replacing aged and rotting structures and maintaining vegetation, access roads, and trails. Initially, impacts on existing air quality and greenhouse gas generation would be the same as existing conditions, with a **low** impact.

Maintenance activities would likely increase as existing infrastructure continues to age and deteriorate, and emergency structure repair and replacement would be required. Increased maintenance and emergency repairs would likely result in emissions generation from equipment operation and vehicle transport on access roads and at structure sites during the emergency repair and maintenance activities. Air quality impacts from emergency repair and maintenance activities would largely be temporary and localized to the site of the work activities; therefore, due to the temporary and localized nature of the emissions, the No Action Alternative would have a **low** impact on air quality and greenhouse gas generation.

3.11 Socioeconomics and Public Services

3.11.1 Affected Environment

Population

Multnomah County encompasses 465 square miles. The county is bound by Oregon/Washington State border on the north, Clackamas County on the south, Hood River County on the east, and Washington County on the west. Multnomah County includes 8 incorporated cities and 13 unincorporated communities. The county population was 735,334 in 2010 (U.S. Census Bureau 2000, 2010). The City of Portland is the county seat and is the largest city within the county. About 1.3 miles of the project is located in Multnomah County, and the transmission line does not cross any incorporated cities in Multnomah County.

Hood River County encompasses 534 square miles in north-central Oregon. The Oregon/Washington State border forms its northern boundary, Clackamas and Wasco counties share its southern border, and Multnomah County lies to the west. Hood River County includes two incorporated cities, Hood River and Cascade Locks, and eight unincorporated communities. The county population was 22,346 in 2010 (U.S. Census Bureau 2000, 2010). The City of Hood River is the county seat and is the largest city within the county. A little over 21 miles of the project is located in Hood River County. A portion of the transmission line passes through the City of Cascade Locks, and the remainder of the line crosses unincorporated portions of Hood River County.

Economic Characteristics

In 2013, the workforce in Hood River County consisted of 10,490 people. That same year, Hood River County had a seasonally unadjusted unemployment rate of 6.1 percent (Oregon Employment Department 2014a). Agriculture, natural resources, and recreation are Hood River County's major sources of revenue and employment. There were more than 12,000 acres of commercial orchards with pears, apples, cherries, and peaches in 2012. The leading nonfarm employment sectors in 2013 were leisure and hospitality; trade, transportation, and utilities; education and health services; manufacturing; and government (Oregon Employment Department 2013a).

In 2013, the civilian labor force in Multnomah County included 458,800 people. That same year, Multnomah County had a seasonally unadjusted unemployment rate of 6.9 percent (Oregon Employment Department 2014b). The main industries in Multnomah County are manufacturing, transportation, wholesale and retail trade, and tourism. The Portland metropolitan area is the main population and employment center in the county.

Agricultural Resources

Agriculture is a major industry in Hood River County, with fruits, tree nuts, and berries the leading agricultural commodity (USDA 2014). A portion of the transmission line crosses agricultural land in Hood River County south of the Hood River city limits. The project passes through agricultural lands that consist mainly of vineyards, including the Marchesi Vineyards and Winery at the end of line mile 22, and pear orchards.

Tourism and Recreation

Situated between Mount Hood and the Columbia River in the middle of the Columbia River Gorge, Hood River County is a popular destination for outdoor recreation. Popular recreational uses include windsurfing, mountain biking, skiing, hiking and camping, sightseeing, fishing, and kayaking. The transmission line crosses or is located near several public recreation sites and trails within lands managed by the U.S. Forest Service, Oregon State Parks, and ODFW. Near the City of Hood River, the project transmission line crosses the Indian Creek Golf Course near the end of line mile 23. This is a private, 18-hole golf course. A detailed discussion of recreational resources, including annual festivals and events, that occur in and near the project is included in Section 3.2, *Recreation*.

Forestry and Timber Resources

In Hood River County, about 45 million board feet of timber was harvested in 2012 (ODF 2012). Of that total, about 51 percent was harvested from National Forests and other public lands, and 49 percent was harvested from private lands. In Multnomah County, about 22 million board feet of timber was harvested in 2012, with about 70 percent of the timber harvested from private lands and the remainder harvested from BLM lands (ODF 2012). Forest land includes lands owned and managed by the state within Lindsey Creek State Park, Starvation Creek State Park, Viento State Park, Vinzenz Lausmann Memorial State Park, Seneca Fouts Memorial State Park, and Wygant State Park; by the U.S. Forest Service within the Mount Hood National Forest; as well as private timber land. (See Section 3.1, *Land Use and Transportation*, and Section 3.4, *Vegetation*, for additional information.)

Property Taxes and Values

Federal, state, and local government real property is exempt from paying property taxes. When BPA acquires an easement across private property, the landowner continues to pay property taxes, but often at a lesser value, based on any limitation of use created by the encumbrance. If BPA acquires new easements on private land, landowners are offered fair market value for the land as established through the appraisal process. The appraisal accounts for all factors affecting property value, including the impact the transmission line easement or access road would have on the remaining portion of the property. Each property is appraised individually using neighborhood-specific data to determine fair market value. Where existing easements accommodate new transmission facilities and/or existing access roads are used to access the project transmission line, and no new acquisition would be made, no additional compensation for property value loss is paid.

Environmental Justice Populations

All projects involving a federal action (funding, permit, or land) must comply with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed by President Clinton on February 11, 1994. This Executive Order directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on the health or environment of ***minority populations*** and ***low-income populations*** (collectively, the ***environmental justice populations***) to the greatest extent practicable and permitted by law.

The environmental justice setting data presented below represent the geographic extent in which project-specific effects on proximate and adjacent minority and low-income populations could occur. Census Tract

(CT) data are used for the environmental justice analysis since CT data provide the smallest geographic area where U.S. Census data are available and have been applied to assess the effects specific to the populations in the vicinity of the right-of-way. The right-of-way crosses CTs 9501 and 9502 in Hood River County, and CT 105 in Multnomah County. In addition, to provide a basis for comparison of the localized project area, environmental justice demographic data are also provided for Hood River and Multnomah counties and Oregon.

Minority Populations

Guidelines provided by the Council on Environmental Quality (CEQ) (1997) and EPA (1998) indicate that a minority community may be defined where either: (1) the minority population comprises more than 50 percent of the total population, or (2) the minority population of the affected area is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison.

The CEQ defines minority individuals as persons from any of the following U.S. Census categories for race: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. Additionally, for this analysis, minority individuals also include all other nonwhite racial categories that were added in the most recent census, such as “some other race” and “two or more races.” The CEQ also mandates that persons identified through the U.S. Census as ethnically Hispanic, regardless of race, should be included in minority counts (CEQ 1997).

No minority populations in CTs 9501 and 9502 are greater than 50 percent of the population or are proportionally larger than Hood River County (Table 3.11-1). The percentages of people identifying themselves as Hispanic in CT 9501 are generally similar to the county population (29.5 percent) but are more than two times greater than the state population identified as Hispanic. In CT 9502, the Hispanic population percentage is smaller than the overall county population but larger than the state Hispanic population.

Table 3.11-1. Racial Composition and Ethnicity Percentages in the Affected Area, 2010

	Race (Percent)							Ethnicity (percent)
Geographic Area	**Caucasian (White)**	**Black or African-American**	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian and Other Pacific Islander**	**Other race**	**Two or more races**	**Hispanic (any race)**
CT 9501 [1]	77.6	0.5	1.6	1.3	0.3	15.2	3.6	28.9
CT 9502 [1]	88.3	0.3	0.5	2.0	0.1	6.2	2.7	15.2
CT 105 [2]	92.7	0.7	0.6	1.3	0.0	1.3	3.4	3.5
Hood River County	83.1	0.5	0.8	1.4	0.2	10.9	3.2	29.5
Multnomah County	76.5	5.6	1.1	6.5	0.5	5.1	4.6	10.9
Oregon	83.6	1.8	1.4	3.7	0.3	5.3	3.8	11.7

Notes: CT = Census Tract
1 CTs 9501 and 9502 are within Hood River County.
2 CT 105 is within Multnomah County.
Source: U.S. Census Bureau 2010.

Low-Income Populations

Guidelines provided by the CEQ (1997) and EPA (1998) indicate that a low-income community may be defined where either: (1) the low-income population comprises more than 50 percent of the population below the poverty level in the affected area, or (2) the low-income population of the affected area is meaningfully greater than the low-income population in the general population of an appropriate benchmark region used for comparison. Income thresholds vary by family size and composition to determine which families are living in poverty. Poverty thresholds do not vary geographically but are updated annually for inflation using the Consumer Price Index. According to the U.S. Census Bureau, the poverty threshold in 2013 was $12,119 for an individual and $23,624 for a family of four (U.S. Census Bureau 2013). Table 3.11-2 presents the median household income, per capita income, and proportions of families and individuals living below the poverty threshold. Median household income in the project area is above the state average for all CTs. Per capita income is above the state average for all CTs except CT 9501. The percent of families below the poverty level is smaller than the state average for all CTs. The number of individuals below the poverty level is higher than the state average for all CTs except 9502.

Table 3.11-2. Median Household Income, Per Capita Income, and Poverty Levels for the Affected Area, 2012

Geographic Area	Median Household Income ($)	Per Capita Income ($)	Percent Below Poverty Level	
			Families	Individuals
CT 9501 [1]	53,589	22,874	5.9	11.6
CT 9502 [1]	66,324	30,336	3.2	4.9
CT 105 [2]	65,938	27,804	5.3	13.4
Hood River County	56,355	25,167	15.5	10.1
Multnomah County	51,582	29,984	12.1	17.1
Oregon	50,036	26,702	10.8	6.2

Notes: CT = Census Tract
[1] CTs 9501 and 9502 are within Hood River County.
[2] CT 105 is within Multnomah County.
Source: U.S. Census Bureau 2012.

Public Services

The primary electrical service providers in the area are Pacific Power, which serves Hood River; Cascade Locks Electric, which serves the City of Cascade Locks; and Portland General Electric, which serves portions of Multnomah County. Northwest Natural Gas is the primary natural gas provider.

Fire protection and emergency services are provided by fire departments, rural fire districts, and the state. The West Side Volunteer Fire Department provides fire protection to unincorporated rural areas outside of the City of Hood River. The Hood River Fire Department provides mutual aid to surrounding rural and municipal departments in Hood River County as requested. The Multnomah County Fire District 14 provides fire protection and emergency services within unincorporated areas of western Multnomah County.

The Oregon Department of Forestry (ODF) Fire Division protects private and public forestland from fire, including wildland-urban interface areas (i.e., forest lands with residences and other structures within the reach of wildfires), through a coordinated system of fire prevention, suppression, and fuels management. Fire and Aviation Management is a cooperative effort between the BLM and U.S. Forest Service in close collaboration with the Pacific Northwest Wildfire Coordinating Group. In addition, through an agreement between the ODF and the Oregon State Police (OSP), the Wildland Arson Division patrols high-risk fire areas within the wildland-urban interface in an effort to prevent arson-related fires and responds to calls from ODF for assistance outside their immediate areas.

Police protection is provided by local police departments, county sheriff's departments, and OSP. The Hood River County Sheriff's Office serves the unincorporated portions of the county, provides contract services to the City of Cascade Locks, and provides support services to local police departments. The Multnomah County Sheriff's Office provides law enforcement services to unincorporated areas of Multnomah County. The OSP provides patrol services to rural areas throughout the state and assists local city police and sheriff's departments.

Students within the Hood River County portion of the project area are located within the Hood River County School District boundaries. Portions of the transmission line right-of-way within Multnomah County are within the Corbett School District boundaries.

3.11.2 Environmental Consequences–Proposed Action

Population

Construction typically consists of 20–50 personnel, including transmission line and road construction crew members, surveyors, inspectors, and other support staff. Overall project construction personnel and duration would remain similar under the Line Mile 19 Options. Construction of the Proposed Action is expected to take two to three construction seasons, with each construction season lasting approximately 7 months.

The scale or duration of construction is not expected to alter the population in Hood River or Multnomah counties. The origin of the work force is likely to be from the local commuting area. In 2013, about 310 workers in Hood River County and 18,900 workers in Multnomah County were employed in the construction industry (Oregon Employment Department 2013a,b).

Even if a relatively small number of workers were to come from outside the local area, sufficient housing capacity (e.g., rental housing and apartment vacancies), as well as hotels and recreation vehicle parks/campgrounds exist in Hood River and Multnomah counties to accommodate workers during construction. Furthermore, the temporary and short-term nature of the work supports the conclusion that these workers would not typically change their permanent residences. For these reasons, the Proposed Action would have **no** to **low** increase of temporary or permanent population within the project area, regardless of which Line Mile 19 Option is selected.

Economic Characteristics

The Proposed Action would have a small, positive impact on the regional economy during construction. The economic benefits would be the same regardless of which Line Mile 19 Option is selected. Local purchases would likely include fuel for vehicles and equipment, staging area rental, and other incidental materials and supplies. The temporary construction workforce would bring new income to the region as construction workers spend their money in the local area, resulting in revenues for some local businesses, such as hotels, restaurants, gas stations, and grocery stores. Local expenditures would support jobs and incomes for these businesses and their employees, who would in turn spend their money in the local economy, creating a multiplier effect. Because the majority of the construction workers would likely be hired from the local labor force, it is not anticipated that the construction workforce would result in a large increase in new spending. Overall, spending related to construction of the Proposed Action would be short term (14- to 21-month construction period) and is likely to have **low** beneficial socioeconomic impacts on employment and income in the project area. No adverse impacts are expected, although some minor beneficial impacts on the local economy may result from increased spending in the local community during construction.

The project would include the replacement of structures on the Indian Creek Golf Course. BPA recognizes the potential for disruption to the golf course operations, and would work with the golf course management to schedule construction to minimize disruptions as best as possible.

As the above analysis indicates, estimated local project-related expenditures, employment, and construction-related earnings are small relative to the total amount of economic activity, employment, and income in the two counties. Economic effects of construction would also be temporary and short term in nature. As a result, the overall impact of construction-related activities on the local and regional economies, while beneficial, is expected to be temporary and **low**. No new employment would be anticipated for the operation of the transmission line; therefore, there would be **no** long-term beneficial effects on the regional economy in Hood River and Multnomah counties. The Proposed Action would help provide a reliable long-term stable source of electricity to the region, a benefit to employers, employees, and the economy in general.

Agricultural Resources

Temporary access roads and structure work would occur in the vicinity of orchards and vineyards, potentially resulting in crop damage. As described in Section 3.1, *Land Use and Transportation,* a total of about 3.8 acres of agricultural lands (Table 3.1-3) would be temporarily impacted by structure or associated conductor or hardware removal and replacement and road improvements. No agricultural lands would be permanently removed from agricultural production. There are no agricultural lands within line mile 19, so impacts on agriculture would be the same regardless of which Line Mile 19 Option is selected. Construction activities could occur during the growing season, thus temporarily displacing crops and other farming activities within the right-of-way. Temporary travel routes across agricultural fields would be used with the least impact necessary to allow for travel during construction.

BPA would coordinate with local farmers and landowners to minimize potential construction-related disruptions, and temporary roads would be restored to pre-project conditions after construction is complete (Table 2.7-1). In addition, BPA has committed to compensating landowners for revenue losses they would incur as a result of the Proposed Action. Such compensation would ameliorate the impacts of displaced crop production. Because the disruptions would be temporary and landowners would be compensated for revenue losses, the adverse economic impact would be **low**.

Tourism and Recreation

Tourism and recreation are important to the economy of the project area and the National Scenic Area in general. Construction activities would be visible from many vantage points within the National Scenic Area. Construction may temporarily disrupt hiking, biking, and other outdoor recreation opportunities in the immediate vicinity of the right-of-way. BPA would coordinate construction to ensure that alternate routes are available for trails that are temporarily closed. The Proposed Action would not result in the removal or permanent closure of recreational or tourism facilities. Construction would be short term and temporary;

after construction, recreational and tourism facilities would be the same as they are now, and the Proposed Action would have similar effects on the existing transmission line. As discussed in Section 3.2, *Recreation,* the use of micropiles and drilling platforms and the additional helicopter trips under Line Mile 19 Options 2 and 3 would include additional noise disturbance effects associated with helicopter use when compared to conventional structure installation as proposed under Line Mile 19 Option 1. Access road work under Line Mile 19 Options 1 and 2 would result in increased access road construction noise for several months, when compared to Line Mile 19 Option 3. However, these impacts would still be temporary. Additionally, as described in Section 3.9, *Visual Quality,* while there would be slight differences in visual impacts in the National Scenic Area associated with the different Line Mile 19 Options, the overall visual impact would be low for all options. Therefore, impacts on tourism and recreation would be temporary and **low** for all Line Mile 19 Design Options.

Transmission line work activities would affect the northeastern portion of the Indian Creek Golf Course and may require the temporary closure of a portion of the course. Construction activities would be coordinated with the course owners to minimize operational effects, and compensation (if necessary) would be negotiated. Because the disruptions would be temporary and the Indian Creek Golf Course owners would be compensated for revenue losses, the economic impact would be **low**. The Indian Creek Golf Course is not within line mile 19; the Line Mile 19 Options would have no effect on the area.

A more detailed description of the effects of the Proposed Action on recreation can be found in Section 3.2, *Recreation*.

Forestry and Timber Resources

During construction, a total of approximately 57 acres of lands designated as forest would be temporarily affected by the Proposed Action for structure and/or hardware and conductor removal and replacement, as well as access road and trail improvements, construction, and reconstruction (Table 3.1-3). Forest land within the project area is mostly National Forest System lands managed for ecosystem management and forest health. For the 380 trees proposed to be removed, landowners would be compensated for marketable trees. No tree removal would be required for any of the Line Mile 19 Options. Compared to the overall quantity of timber in the region, and because BPA may compensate for the removal of trees, the overall impacts on forest lands and timber resources are expected to be **low**, regardless of which Line Mile 19 Option is selected.

Property Taxes and Values

The Proposed Action involves replacing an existing transmission line with similar structures that would generally be replaced near the existing locations. Therefore, no appreciable impacts on property values are expected to occur over the long term.

If necessary, BPA would obtain new easements or permits for access roads and trails to operate and maintain the transmission line (see Section 2.1, *Proposed Action*). BPA would pay the landowners for new easements, and the underlying land ownership would not change nor would the assessed land value. Property owners would continue to pay property taxes in accordance with existing valuations, and no property devaluations would be likely. BPA would not need to obtain any new easements within line mile 19; therefore, impacts on property taxes and values would be the same regardless of which Line Mile 19 Option is selected. Therefore, the Proposed Action would not affect the amount of taxes collected by the counties crossed by the project transmission line. Property value impacts would likely be **no** to **low.**

Environmental Justice Populations

During construction, the area adjacent to the transmission line would experience short-term disturbances, including noise and exhaust from construction equipment and activities, temporary changes in travel routes due to lane closures, and potential roadside parking delays from construction vehicles and work areas.

Based on the data presented above, there are no minority or low-income populations that are greater than 50 percent of the population. Although not greater than 50 percent, the Hispanic population within CT 9501 (28.9 percent) and Hood River County (29.5 percent) are more than two times greater than the average state population identified as Hispanic (11.7 percent; Table 3.11-1). These CTs consist mainly of rural residences and commercial orchards within the unincorporated area south of the City of Hood River. However, all persons, regardless of race or income, would experience the same minor impacts associated with construction within the transmission line right-of-way, regardless of which Line Mile 19 Option is selected. Therefore, there would be **no** short-term or long-term disproportionately high and adverse effects on environmental justice populations.

Public Services

Construction workers would be hired from the local labor force, and there would be no long-term increase in the local population that would subsequently increase the demand for public facilities and services (i.e., law enforcement, fire protection, medical services, schools, and utilities).

During construction, public services such as police, fire, and medical facilities would be needed only in cases of emergency (e.g., construction accidents). The potential for emergencies would be similar under the Line Mile 19 Options. Standard safety procedures would be followed at all times during construction, and the potential for accidents is expected to be low (see Section 3.13, *Noise, Public Health, and Safety*). The Proposed Action would likely be constructed during the drier months of the year, and as such, there could be a higher risk for fire. BPA's construction crews and contractors would coordinate with the local and state fire departments and implement all fire protection measures identified by those departments to ensure adequate fire protection during construction. Therefore, the Proposed Action is expected to have **low** short-term effects on fire protection services, regardless of which Line Mile 19 Option is selected.

During construction, there would be short-term, low impacts from increased construction traffic, temporary lane closures, and/or traffic delays on nearby communities (see Section 3.1, *Land Use and Transportation*). These impacts would be the same under the Line Mile 19 Options. Access to all properties, including public facilities, schools, and social service agencies, would be maintained during construction, and local agencies and residents would be notified of upcoming construction activities and potential disruptions to transportation facilities.

To facilitate work that would affect the ability of the transmission line to transmit power, multiple outages would be required to temporarily take the transmission lines out of service. Two outages for separate portions of the Bonneville-Hood River transmission line would be coordinated with regional entities to ensure that the outages would not disrupt power delivery or generation over the regional electric system. Any outage to the Cascade Locks Tap line would result in a power outage in the City of Cascade Locks. Because work on the line would result in a power outage to the City of Cascade Locks, BPA would plan work on the tap so that the outages would occur in the early morning (i.e., starting at midnight). BPA anticipates that work on the Cascade Locks Tap would require approximately two midnight outages to install the new monopole and to replace conductor. BPA would communicate and coordinate the planned outages with the city (which is the local electricity provider) to minimize short-term impacts to the community to **moderate** levels.

Overall, the Proposed Action is expected to have up to **moderate** short-term and **no** to **low** long-term impacts on the provision of public services in the project area.

3.11.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on socioeconomics and public services are identified in Table 2.7-1 in Chapter 2 of this EA.

3.11.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, BPA would not rebuild the transmission line and would continue to operate and maintain the existing transmission line in its current state. The short-term positive project-related employment and income benefits of construction activities would not occur.

The No Action Alternative could also result in other socioeconomic impacts. The structures have already exceeded their expected life span, and as they continue to deteriorate, the transmission line’s reliability would be reduced. This could lead to adverse impacts on the social and economic vitality of communities that rely on power supplied by the transmission line as outages become more frequent. Adverse impacts on local residents, public facilities, community services, and businesses could include power outages and voltage fluctuations. In addition, there may be more frequent disruption of service, as the existing transmission line would likely require increased maintenance. Depending on the duration of the power loss, impacts on public health and safety from the No Action Alternative could range from **low** if no emergency outages are realized to **high** if a prolonged emergency outage occurred.

This page deliberately left blank

3.12 Cultural Resources

Cultural resources are those physical remains, objects, places, historic records, and traditional cultural practices or beliefs that connect people to their past. ***Historic properties***, as defined by 36 CFR 800, the implementing regulations of the National Historic Preservation Act (NHPA; 16 U.S.C. 470 *et seq*.), are a subset of cultural resources that includes any prehistoric or historic district, site, building, structure, or object that meets defined eligibility criteria for the National Register of Historic Places (National Register). Historic properties can include artifacts, records, and remains that are related to and located within sites and properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization (also known as ***Traditional Cultural Properties***). No Traditional Cultural Properties were identified within the project's ***Area of Potential Effect (APE)*** and are not discussed further.

The NHPA requires that cultural resources be inventoried and evaluated for eligibility for listing in the National Register and that federal agencies evaluate and consider effects of their actions on such resources. Cultural resources are evaluated for eligibility of listing in the National Register using four criteria commonly known as Criteria of Eligibility A, B, C, or D, as identified in 36 CFR Part 60.4(a-d). These criteria include an examination of the cultural resource's age, integrity (of location, design, setting, materials, workmanship, feeling, and association), and significance in American culture, among other things. A cultural resource must meet at least one criterion to be eligible for listing in the National Register and to be considered a historic property.

3.12.1 Affected Environment

Prior to 12,500 years before present (BP), the people of the Northwest were likely highly mobile foragers who used various types of available resources and little food storage. Between 12,500 and 9,500 BP, the subsistence focus of the Northwest people was on high-yield resources (e.g., salmon and berries) that were obtained as the resources were encountered. Foraging ranges during this time were rather large but populations were small and sparse. After 8,500 BP, large side-notched and leaf-shaped projectile point artifacts are found throughout the Northwest. Food procurement was still believed to be a highly mobile system. Sites dating to this time period are commonly found in in the Portland Basin and near The Dalles, but none have been found within the project area (Gilmour et al. 2014).

During the middle period (7,600 to 3,800 BP), major changes took place that distinguish this period from the previous period. It was during this period that human settlement and resource exploitation patterns continued to focus on a generalized diet. In some areas, high-mobility systems continued to be used while in other areas evidence of lower mobility is seen, including the presence of ***housepits*** dating to 5,000 BP. Direct evidence of food storage is still not seen, but there is evidence of intensive food processing (Gilmour et al. 2014). Housepits are found in areas with optimal access to multiple resources. By 4,000 BP, site type diversity can be seen in that task-oriented sites begin to appear, as well as the presence of groundstone (Gilmour et al. 2014). Middle period sites are rare near the project area, but sites are found in the vicinity of The Dalles (Gilmour et al. 2014).

The late prehistoric period (after 3,800 BP) is characterized by a rise in storage-based, sedentary land uses. During this period, semi-subterranean houses are common, appear in large clusters, and support higher populations. A diversification in site types, several being task oriented, and an intensification on resources including, but not limited to, salmon, roots, deer, and elk, are seen. Between 3,800 and 2,500 BP, small pithouse villages were established near resource locations. Field camps and task-oriented sites are commonly found during this time as well. After 2,000 BP, clusters of housepits are even larger than previously seen and located in optimal fishing locations. Around 1,000 BP, house styles become diversified with the appearance of longhouses and mat lodges. Housepit sites dating between 600 and 250 BP have been found near The Dalles and the Portland area, as well as closer to the project area. Sites near Bonneville Dam have been found with 11 housepits with several occupations (Gilmour et al. 2014).

The project area is in the traditional homeland of the Wasco, Wishram, and Cascades people. While the majority of the project area lies in the ***ceded lands*** of the Confederated Tribes of the Warm Springs Reservation, it is also recognized as an area of traditional affiliation and interest to the Confederated Tribes of Grand Ronde, Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, and Nez Perce Tribe of Idaho. Along the Columbia River, the people of these Tribes engaged in social, economic, and spiritual activities, which helped create bonds that were often reinforced by marriage and shared ancestry.

Villages and households were the basis for control of certain resources, especially fish. Salmon were one of the most important resources available, but sturgeon, suckers, smelt, and lamprey were also taken. Spearing fish from platforms at falls and rapids, as well as using nets in the open water, were some of the methods for catching fish. Plant resources were another important food source. Acorns, hazelnuts, pine nuts, huckleberries, blueberries, strawberries, blackberries, and a variety of tubers are a few of the plant resources utilized. Other food sources included deer, elk, mountain goats, mountain sheep, antelope, bear, rabbits, birds, mussels, seals, and sea lions (Gilmour et al. 2014). The National Park Service Lewis and Clark National Historic Trail map shows the trail as following the historical channel of the Columbia River. Plamondon's (2004) reconstruction of this stretch maps three campsites, all of which are on the north bank of the Columbia River, opposite the project area.

Members of the Lewis and Clark Expedition were some of the first European Americans to explore the Columbia River corridor. The expedition passed near the project area in October of 1805 and in April of 1806, and their journals mention spotting 14 houses scattered along the bank near the present-day location of the city of Hood River. From 1805 to 1850, the Columbia River corridor was well traveled by fur traders and explorers. In 1810, John Jacob Astor established the Pacific Fur Company, and in 1811, Fort Astor in Astoria, Oregon was established. Several short-lived posts were established in The Dalles area between 1829 and 1830. Between 1848 and 1855, several forts were established near the project area to defend the portages and served as supply depots for the troops involved in the Indian wars of the Pacific Northwest (Gilmour et al. 2014). The National Park Service Lewis and Clark National Historic Trail map shows the trail as following the historical channel of the Columbia River. Plamondon's (2004) reconstruction of this stretch maps three campsites, all of which are on the north bank of the Columbia River, opposite the project area.

Permanent European settlement began in the region in the 1830s with the establishment of missions within the region. The closest mission to the project area was the Wascopam Mission in The Dalles, which was established in 1838. By 1840, an increasing number of immigrants were traveling to Oregon via the Oregon Trail. The route of the Oregon Trail followed I-84 from Idaho to The Dalles and then headed south around Mount Hood. No visible tracks of the Oregon Trail are identified within the project area. Some travelers made their wagons into rafts and braved the Columbia River (Gilmour et al. 2014).

The effects of introduced disease on Native American populations were seen as early as the 1770s when there was a smallpox epidemic. By the early 1800s, disease had drastically reduced populations throughout the Columbia River Gorge, and in the 1830s, a malaria epidemic is believed to have killed 75 to 90 percent of the Native American population of the lower Columbia.

The establishment of Oregon Territory in 1848 and the Donation Land Act in 1850 encouraged development of the area along the Columbia River. The 1855 treaties with the Tribes of the Willamette Valley and Central Oregon resulted in the cession of Native American lands on the south side of the Columbia River. The surviving Native American people of the area were relocated to the Grand Ronde, Yakama, and Warm Springs reservations after the treaties were signed.

Transportation through the Columbia River Gorge was a difficult task and an impediment to the development of the region. Throughout the 1800s, small portages were established to get around the dangerous rapids in the river. In 1857, the Oregon Portage Railroad was built from Cascade Locks to Bonneville to maneuver around the Cascade Rapids. By 1882, the Oregon Railway and Navigation Company had completed a single railroad that ran from Walla Walla to Portland. The construction of the Columbia River Highway began in 1913 between Portland and Hood River, and by 1922 had reached Pendleton. Eventually, this highway was realigned and became what is now I-84 (Gilmour et al. 2014).

Dam construction along the Columbia River began in the 1930s. Completion of the Bonneville Dam occurred in 1938, the McNary Dam was completed in 1953, and The Dalles Dam was completed in 1957. BPA was created in 1937 as a part of President Franklin Roosevelt's "New Deal" to transmit and market hydropower from the Columbia River to underserved areas and to support the development of industry in the Pacific Northwest (Kramer 2010b). In 1940, the first Public Utility District was created in Tillamook County, Oregon. The Public Utility District was one of BPA's earliest customers, and design and construction of the necessary transmission line infrastructure began almost immediately after its formation. Constructed in 1939, the Bonneville-Hood River transmission line is one of BPA's earliest transmission lines.

Archaeological Resources

In compliance with NHPA, BPA has identified and documented archaeological resources in the APE and evaluated them for eligibility for listing in the National Register. BPA conducted a literature review of known sites within 1 mile of the Proposed Action. This literature review (Gilmour et al. 2014) identified a total of 80 archaeological resources (sites and ***isolates***) within a 1-mile search buffer of the APE. Of the archaeological resources identified during the background research, 11 historic archaeological sites were located within the APE (Table 3.12-1). No previously recorded prehistoric sites were identified within the APE.

BPA conducted cultural resource field surveys within the APE to locate previously unrecorded archaeological sites, as well as to revisit previously recorded sites to further evaluate their location relative to the project components. Surveys were conducted for the entire project right-of-way and potential tensioning/pulling sites. With the exception of a limited number of areas where BPA has not yet obtained landowner permission to enter the property, all project access road where improvements, reconstruction, and routes of travel are proposed were surveyed. Any portions of the APE not surveyed would be surveyed prior to construction (see Table 2.7-1).

The cultural resource survey identified seven new archaeological resources (three sites and four isolates), and the survey relocated ten of the 11 previously recorded sites within the APE (Table 3.12-1). All identified resources were historic; no prehistoric sites were identified during field surveys. Of the seven new sites identified during the survey, none of the sites was determined eligible for listing in the National Register, although the abandoned segment of the Mt. Defiance Trail is unevaluated and more research may be needed to properly evaluate the trail. Similarly, the isolates are generally not eligible for listing in the National Register because they were isolated finds, often single artifacts, which have broad temporal associations and being unlikely to yield any information beyond what was documented (Gilmour et al. 2014). The identified sites were not determined eligible because they do not meet the minimum requirements for the Criteria of Eligibility found in National Register regulations 36 CFR 60.4.

Table 3.12-1. Historic Archeological Resources Identified within the Project APE[1]

Site	Date Recorded	Type	Site Description	National Register Eligibility Determination[2]
35HR128	Previously Recorded	Site	Sandy-The Dalles Wagon Road	Eligible
35HR98		Site	Refuse Scatter	Unevaluated
Site C[3]		Site	Possible Kiln	Recommended Not Eligible
35HR86		Site	Civilian Conservation Corps and Civilian Public Service camp	Unevaluated
Site D		Site	Trench	Recommended Not Eligible
35HR131		Site	Homestead/Farm	Unevaluated
35HR127		Site	Homestead/Farm	Unevaluated
35HR198		Site	Cabin	Unevaluated
35HR95		Site	Homestead/Farm	Unevaluated
VSP-2		Site	Refuse Scatter	Unevaluated
35HR154		Site	Refuse Scatter	Unevaluated
14-29-2	2014	Site	Road and springbox	Recommended Not Eligible
14-29-5-ISO	2014	Isolate	Springboard cut tree stump	Recommended Not Eligible
14-29-6-LF	2014	Site	Abandoned trail segment (Mt. Defiance Trail)	Unevaluated
14-29-11-ISO	2014	Isolate	Springboard cut tree stump	Recommended Not Eligible
14-29-14-ISO	2014	Isolate	Metal Tank	Recommended Not Eligible
14-29-17-ISO	2014	Isolate	Plate fragment and marble	Recommended Not Eligible
14-29-301	2014	Site	Refuse scatter	Recommended not Eligible

Notes:
1 No prehistoric cultural resources were identified during project surveys.
2 Cultural resources listed in, or eligible for listing in, the National Register are referred to as historic properties. Unevaluated sites are considered in the same manner as eligible resources until an eligibility recommendation has been determined.
3 Site not relocated during project's 2014 survey.

Built Resources

BPA also conducted research to identify ***built resources*** (built environment that includes historic sites, buildings, structures, objects, districts, and landscapes). The background research identified one previously recorded built environment resource, the Historic Columbia River Highway, within 1 mile of the project area and the Cascade Locks Substation within the project area. The Historic Columbia River Highway was identified as being eligible for listing in the National Register.

Field studies were conducted to locate previously undocumented built environment resources within the APE. The field inventory identified seven new resources within the APE (Table 3.12-2). Of these resources, three are recommended not eligible for listing on the National Register and four are recommended as eligible. The features recommended as eligible for listing include the Pacific Crest Trail, the Bonneville-Hood River transmission line, Cascade Locks Substation, and Hood River Substation.

BPA's historic transmission infrastructure received a determination of eligibility for listing in the National Register (August 2012) based on the submission of a Multiple Property Documentation form (a thematic group of listing of similar resources to the National Register). Under the listing, it was determined that the BPA system is eligible for listing, but individual system components are evaluated as projects specific to those elements arise. Even though the system as a whole is eligible, the various parts of the system have to be evaluated on a case-by-case basis. The existing Bonneville- Hood River transmission line, Cascade Locks Tap line, Cascade Locks Substation, and Hood River Substation are part of BPA's transmission infrastructure and were constructed during the period of significance (1938 to 1974) for the BPA transmission system. Therefore, BPA has determined that these substations and line are eligible for listing in the National Register for their association with the design, construction, and operation of the BPA Transmission System in the Pacific Northwest during the period 1938 to 1974 (Criterion A). These BPA transmission components also are significant under Criterion C based on their specific design characteristics and their association with particular technological improvements related to the transmission of electrical energy during the period of significance (Kramer 2010a).

Two segments of the Pacific Crest Trail are located within the APE. The segments are not historic in age, having been built between 1968 and 1979; however, the segments are part of the trail system recognized for national significance in terms of recreation and historic importance. The Pacific Crest Trail is a federally listed National Scenic Trail.

Table 3.12-2. Built Resources Identified within the Project APE

Site	Date Recorded	Year Constructed	Description	National Register Eligibility Determination
Wygant Trail	2014	1940s	Hiking Trail	Recommended Not Eligible
Stone Building	2014	Undetermined	Stone Building	Recommended Not Eligible
Historic Columbia River Highway	Previously Recorded	1912	Highway	Eligible
Pacific Crest Trail	2014	1968–1979	Hiking Trail	Recommended Eligible
The Farmers Ditch	2014	1897	Ditch	Recommended Not Eligible
Bonneville - Hood River Transmission Line	2014	1939	Transmission Line	Recommended Eligible
Cascade Locks Substation	2014	1959	Substation	Eligible
Hood River Substation	2014	1939	Substation	Recommended Eligible

3.12.2 Environmental Consequences–Proposed Action

In this analysis, the significance of effects on cultural resources is determined by considering context and intensity. Context is the geographic, biophysical, and social context in which the effects would occur. Intensity is the severity of the impact within the context. Under NEPA, impacts may include adverse effects on historic properties as outlined under NHPA or on cultural resources that may not be eligible for listing in the National Register.

With avoidance of known resources, as described further below, the project, including all Line Mile 19 Options, is not expected to affect known cultural resources, except for the Bonneville-Hood River transmission line. BPA is completing their determinations of eligibility and project effects analysis in the context of NHPA Section 106 consultation. Any changes in information as a result of the NHPA Section 106 consultation process will be updated in the Final EA, as needed.

Disturbance or damage to identified sites could result from physical ground disturbances caused by material and equipment staging, replacement of structures, construction of access roads, access road upgrades, and vehicle and heavy equipment access to and from work areas. Sites 14-29-2 and Site C would not be located near project work areas and would be avoided during project construction. Site 14-29-6-LF (Mt. Defiance Trail) would be within 20 feet of project work areas, but this site would be demarcated in the field and would be avoided during construction. Sites 35HR86, 35HR95, 35HR98, 35HR127, 35HR128, 35HR131, 35HR198, 14-29-301, VSP-2 and Site D would be located adjacent to project access roads. All construction activities would be restricted to the existing road prisms that currently bisect these sites; therefore, the project would not affect these resources. 35HR154 would be located at a pulling and tensioning site at structure 19/1. The site is located in and around the existing structure and has been disturbed by the previous construction and maintenance of the line. Most activities associated with the tensioning and pulling would be located outside of the site boundary; however, some pulling and tensioning equipment would be located on the existing access road and landing within the site. As the existing access road and landing have been used for years, the continued use of these areas to facilitate pulling and tensioning would not affect this site. By avoiding these sites, the Proposed Action would not adversely affect the cultural resources. Overall, project impacts on known archeological resources would be minimized through avoidance or via the mitigation measures (Table 2.7-1). Therefore, the Proposed Action would result in **no** to **low** impacts on archeological resources, depending on the level and amount of disturbance.

Project construction would avoid the Wygant Trail, the stone building, Pacific Crest Trail, and the Farmers Ditch. The Historic Columbia River Highway would be crossed by project access roads or traveled upon to access several parts of the transmission line for project construction. Measures would be used to minimize any effect of the increased traffic and weight of the equipment on the highway. Minimization measures may include, but not be limited to, the use of protective mats, limiting the use of tracked vehicles, or using alternative means of transportation (i.e., helicopter) (Table 2.7-1).

The Lewis and Clark Trail and Oregon Trail do not have visible rut marks within the project area. As such, there would be no physical disturbance of these trails. The Proposed Action would result in a similar visual effect to the viewshed from these trails, regardless of the Line Mile 19 Option selected. When compared to the existing transmission line, the Proposed Action, regardless of the Line Mile 19 Option selected, would result in the same visual ratings and long-term effect as current conditions. A full analysis of the visual effects associated with the Proposed Actions is included in Section 3.9, *Visual Quality*, and Appendix C, *Columbia River Gorge National Scenic Area Visual Resource Analysis*.

Increased access to lands within the project area from project access road improvement could result in vandalism and looting of cultural resource sites. To minimize the potential for unauthorized use of BPA access roads, BPA would install gates to prohibit access to unauthorized areas (see Section 3.1, *Land Use and Transportation*, and Table 2.7-1 for additional discussion of unauthorized entry).

The Bonneville-Hood River transmission line, the Cascade Locks Substation, and the Hood River Substation are eligible for listing in the National Register. The Proposed Action would have no adverse effect on the Cascade Locks Substation or the Hood River Substation because no project construction would occur within these facilities. The Multiple Property Documentation states that "Normal, in kind repair, and maintenance and upgrades of transmission lines still owned and operated by BPA that are part of functionality do not necessarily affect integrity of the associations" (Kramer 2010a). The Proposed Action would have an adverse effect on the Bonneville-Hood River transmission line resulting from structure design changes (steel lattice H-frame structures changed to wood H-frame or steel monopole structures) in several locations along the line. Based on these design changes, the integrity of the line would be affected under Criterion C (distinctive characteristics of a type, period, or method of construction or that represent the work of a master). Per BPA's Multiple Property Documentation, the "entire replacement of one type of tower for another diminishes integrity and reduces or entirely eliminates eligibility depending upon visual impact and the percentage of the whole that is effected" (Kramer 2010a). The replacement of a large percentage of the transmission line with different structures would adversely impact the character of the line; therefore, making the line not eligible for listing in the National Register under Criterion C (Kramer 2010a). While the project would result in a change of several of the existing structure types, thus making the line not eligible for listing in the National Register under Criterion C; the line would still be eligible under Criteria A and D. The continued eligibility of the line when combined with the implementation of the mitigation outlined in Table 2.7-1 would result in the project having a **moderate** impact on built resources.

During project design, BPA surveyed the transmission right-of-way and access roads to determine if cultural resources are present and, if so, the project was designed to avoid them where possible. While BPA conducted a thorough inventory of cultural resources in the project area, construction activities, including replacement of existing structures and access road work, have the potential to damage cultural resources, including human remains, not currently known to exist in the APE. Implementation of the mitigation measures (Table 2.7-1) would ensure that any previously undiscovered resources found during project construction would be managed properly as required by NHPA, and would minimize any inadvertent disturbance or destruction of cultural resources from the Proposed Action.

3.12.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on cultural resources are identified in Table 2.7-1 in Chapter 2 of this EA.

3.12.4 Environmental Consequences–No Action Alternative

Under the No Action Alternative, the existing transmission line would not be rebuilt and impacts related to project construction would not occur. Operations and maintenance activities would continue and would be similar to existing practices; however, the frequency and scope of maintenance activities would likely increase as existing structures deteriorate, and more structural repairs and replacements would be required. This could in turn result in additional ground disturbance that would have the potential to affect cultural resources. Impacts associated with continued routine maintenance of the existing line, as well as emergency additional repairs, could range from **low** to **high**, depending on the level and amount of disturbance, the location of the disturbance, and the eligibility of other resources for listing in the National Register.

This page deliberately left blank

3.13 Noise, Public Health, and Safety

3.13.1 Affected Environment

Noise

Noise is defined as unwanted or objectionable sound. Sound is usually considered unwanted when it interferes with normal activities, when it causes physical harm, and when it has adverse health effects. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment.

Audible noise is usually measured in ***decibels (dB)*** on the ***A-weighted decibel scale (dBA).*** This scale models sound as it corresponds to human perception. Exceedance levels refer to the A-weighted noise level that is exceeded for a specified percentage of the time. An L10 exceedance level refers to the noise level that is exceeded only 10 percent of the time, whereas L50 exceedance level refers to the noise level that is exceeded 50 percent of the time. Table 3.13-1 shows typical noise levels for common sources expressed in dBA. Noise exposure depends on how much time an individual spends in different locations.

Table 3.13-1. Common Noise Levels

Sound Level (dBA)	Noise Source or Effect
110	Rock-and-roll band
80	Truck at 50 feet
70	Gas lawnmower at 100 feet
60	Normal conversation indoors
50	Moderate rainfall on foliage
40	Refrigerator
25	Bedroom at night
Source: Adapted from BPA 1986, 1996.	

Ambient Noise Environment

The noise environment within the project area is typical of remote forestland and rural settings with generally very low ***ambient noise*** levels, except at locations more directly affected by transportation or agricultural noise sources. Motor vehicles traveling on I-84 and other arterial roadways contribute to transportation-related noise, along with occasional aircraft overflights. Intermittent noise from outdoor activities at the surrounding residences (e.g., people talking, operation of agricultural equipment, car doors slamming, and dogs barking), although minor, also influences the ambient noise environment. Ambient daytime noise levels in low-density rural areas, such as those in the transmission line corridor, range from 35 to 45 dBA (EPA 1978, FTA 2006).

The existing noise environment is also comprised of "***corona***," an electric field generated in the air surrounding high-voltage transmission line conductors. Corona-generated noise can be characterized as a hissing, crackling sound that is accompanied by a 120-Hertz hum under certain conditions. Corona noise from transmission lines generally occurs during foul or wet weather. Typically, audible noise from 115-kV lines is so low as to be not noticeable (due to the low amount of ***corona activity*** generated at this voltage level) and is usually well below other ambient noise levels in the area. BPA designed these 115-kV transmission lines to meet applicable state and federal noise regulations. Historically, public complaints/inquiries of transmission line audible noise at this voltage level are extremely rare. BPA has established a design criterion for corona-generated audible noise from transmission lines of 50 dBA for L50 (during rainy season for wet conductors) at the edge of the right-of-way.

Noise-Sensitive Areas

This assessment considered Noise-Sensitive Areas that could be affected by the project. Noise Sensitive Areas near the project area include scattered residences, schools, churches, and recreational areas, including several U.S. Forest Service recreation sites, Oregon State Parks, and the Pacific Crest Trail, as well as wildlife habitat areas within the National Scenic Area and the Mark Hatfield Wilderness Area. Additional Noise Sensitive Areas within the range of project helicopter-related noise and vibration or construction equipment include residences in the City of Cascade Locks located about 1,500 feet northwest of the transmission line right-of-way (between line mile 5 and line mile 6), and rural residences in Hood River County located within 50 feet of the transmission line right-of-way (line miles 20, 21, and 22).

Electromagnetic Fields

All electric devices produce ***electromagnetic fields (EMF)***. ***Current***, the flow of electric charge in a wire, produces the magnetic field. ***Voltage***, the force that drives the current, is the source of the electric field. The strength of EMF depends on the design of an electrical line and distance from it. EMF is found around any electrical wiring, including household wiring, electrical appliances, and equipment.

Electric Fields

Electric fields are measured in volts per meter or kilovolts per meter (kV/m). Throughout a home, the average electric field strength from wiring and appliances is typically less than 0.01 kV/m. Electric field levels in public buildings such as shops, offices, and malls are comparable with residential levels. Outdoor electric fields in publicly accessible places can vary widely from less than 0.01 kV/m to 12.0 kV/m; the higher fields are present only in limited areas along high-voltage transmission line rights-of-way. Electric field strength is reduced by intervening objects such as walls and vegetation.

The International Committee on Electromagnetic Safety has established a public exposure guideline of 5.0 kV/m for electric fields, except on power line rights-of-way where the limit is 10.0 kV/m (ICES 2002). However, there are no national guidelines or standards for electric fields from transmission lines (EPA 2013c). The NESC does specify a 5-milliampere criterion for maximum permissible induced shock current from large vehicles traveling under any transmission line. BPA designs transmission line projects to meet the NESC exposure criterion within and outside the transmission corridor right-of-way. BPA designs new transmission lines to meet its electric-field guidelines of 9.0 kV/m maximum on the right-of-way, 2.5 kV/m maximum at the edge of the right-of-way, 5.0 kV/m for road crossings, and 2.5 to 3.5 kV/m in parking lots.

Magnetic Fields

Magnetic fields are measured in units of gauss (G) or milligauss (mG). The strength of an average magnetic field in most homes (away from electrical appliances and home wiring) is typically less than 2 mG. Very close to appliances that carry a high current, fields of tens or hundreds of mG are present. Unlike electric fields, magnetic fields from outside power lines are not reduced in strength by trees or building material.

Therefore, transmission lines and distribution lines can be a major source of magnetic field exposure throughout a home located close to the line. There are no national guidelines or standards for magnetic fields in the United States, and Oregon does not have a limit for magnetic fields from transmission lines.

Radio and Television Interference

Radio and television interference from high voltage power lines can be produced from two general sources: conductor ***corona activity*** and ***spark-discharge activity*** on connecting hardware. Conductor corona activity is primarily a function of the operating line voltage, while spark-discharge activity on connecting hardware is usually associated with the aging condition of hardware (i.e., over time, hardware connections can become loose and corroded causing small spark-gaps). Historically, public complaints of radio and television interference from BPA transmission lines operating at this voltage are rare.

Public Health and Safety

Hazardous Materials/Hazardous Waste

A records search of ODEQ's Facility Profiler (ODEQ 2014b) revealed the presence of sites within 10 miles of the project area with known, potential, or cleaned-up hazardous materials contamination; however, none of these sites were within the project area (the closest being about 1,000 feet from the project area). The eastern portion of the transmission line, from line miles 20 to 24, is located within rural residential and agricultural land uses. Agricultural land use is a potential source of unknown contamination as old or inactive underground storage tanks are common for this land use. Additionally, agricultural land uses within the project area could result in the use of hazardous materials and/or generation of hazardous waste, including the use of diesel fuel for agricultural equipment operation, and application of pesticides and/or herbicides. Therefore, subsurface contaminants and associated hazardous materials could be present within the right-of-way from agricultural land uses.

Fire Protection

The project area is predominately located within forested areas, resulting in wildfire hazards. The U.S. Forest Service Gorge Fire Patrol, Multnomah County Rural Fire District 14, Hood River Fire Department, West Side Volunteer Fire Department, Cascade Locks Fire Department, and ODF Fire Division are the primary providers of fire suppression, emergency medical care, disaster preparedness coordination, hazard mitigation, and fire prevention services within the project area (see also Section 3.11.1, *Socioeconomics and Public Services*).

Public Safety

The project area is predominately located within forested areas, with wildfire representing the predominant public safety hazard. Additional hazards to public health in the project area include motor vehicle operation, motor vehicle collision, rockslides, and agricultural equipment operation. Law enforcement is provided by local police departments, county sheriff's offices, and OSP (see also Section 3.11.1, *Socioeconomics and Public Services*).

3.13.2 Environmental Consequences–Proposed Action

Noise

Construction activities associated with material and equipment staging, site preparation, danger tree removal, construction of access roads and transmission line structures including tensioning, and construction-related traffic would temporarily increase noise levels above ambient conditions as construction progresses along the right-of-way. Construction noise could result in short-term, intermittent, and transitory increases in noise levels that may affect nearby sensitive receptors. Typical noise levels generated by construction equipment that would likely be used for the Proposed Action range from about 74 to 90 dBA (Table 3.13-2).

Table 3.13-2. Equipment Noise Levels at 50 Feet

Equipment Type	50-ft Noise Level (Leq[1]) dBA
Excavator	89
Crane	83
Roller	74
Grader	85
Bulldozer	85
Excavator	87
Bucket Truck	88
Dump Truck	88

Notes:
[1] Leq = equivalent continuous noise level.
Source: FTA 2006.

Use of conventional construction equipment is estimated to produce a maximum sound level of 92 dBA at 50 feet from the site (this assumes that several pieces of the noisiest equipment are operating at the same time). Construction equipment is typically considered to be stationary noise sources when calculating noise levels. For point sources, levels attenuate (or drop off) at a rate of 6 dBA for each doubling of the distance. Table 3.13-3 shows estimated construction sound levels at different distances between the noise source (the construction site) and noise receptors based on this attenuation rate.

As described above, Noise Sensitive Areas in proximity to the project transmission line right-of-way and access roads include residences, schools, and recreational areas, some of which are within 50 feet of proposed construction activities and could be exposed to daytime noise levels greater than the daytime noise level threshold of 60 dBA as defined by the Oregon Administrative Rules (OAR 340-035-030). However, construction activities would be limited to the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday to the extent practical (Table 2.7-1), and construction noise is exempt from applicable noise regulations. While construction activities at any single location would be short term and temporary, this would be a **moderate** impact, but would be reduced to **low** with implementation of the mitigation measures. Please see Section 3.2, *Recreation,* for more information regarding impacts from construction noise on recreational uses and facilities.

Noise from truck traffic and increased worker trips would temporarily contribute to existing traffic noise on local roads and highways. Traffic noise is expected to result in a **low** impact on average traffic noise levels because construction activities are linear in nature and would not take place at any single location for a long period of time.

Table 3.13-3. Construction Noise

Distance between Source and Receiver (feet)	Calculated Sound Level (dBA Leq)[1]
50	92
100	86
200	80
300	76
400	74
500	72
600	70
800	68
1600	62
3200	56
6400	50
12800	44

Notes:
[1] Leq refers to average noise level occurring over a 1-hour period. This calculation does not include effects, if any of ground surfaces, or local shielding from topography, walls, or other barriers that may reduce sound levels further.
Source: FHWA 2006; FTA 2006.

Helicopters may be used to transport construction equipment and materials to locations inaccessible by vehicles and install conductors along the entire right-of-way. Specific locations where helicopter use may be needed will be identified during final engineering; however, areas where mobile transport and access may be limited would likely occur where the project area is predominately forestlands with rocky outcrops and potentially in proximity to designated recreational sites and the Mark O. Hatfield Wilderness Area. The effect of noise on recreation in the Mark Hatfield Wilderness Area is found in Section 3.2, *Recreation*. At this time, helicopters would be used for all stringing activities and the transport of micropile installation equipment and materials. A larger helicopter (such as a sky crane) would be needed to transport steel monopoles into areas with no road access (line miles 12, 13, and 15), and in line mile 19 if Line Mile 19 Option 2 or 3 is selected. For structures that would be fully removed, helicopters would also pull structures out of the ground and transport them to an offsite storage area. Helicopters generally fly at low altitudes; therefore, potential temporary increases to ambient sound levels would occur in the area where helicopters are operating, as well as along their flight path. Typically, helicopters may generate noise levels of 89 to 99 dBA (as measured at 50 feet) when in flight at 200 feet. Noise associated with helicopter use would be temporary and intermittent in any given line mile along the transmission line.

In addition to several days (less than a week) for structure installation, Line Mile 19 Options 1 would result in increased noise in the area associated with access road work that would take place over several months. Line Mile 19 Option 2 would have similar access road work noise and would also have noise associated with increased helicopter use in the area and foundation drilling over a period up to 20 days to support micropile installation. Line Mile 19 Option 3 would only have the 20 days of noise associated with helicopter use and micropile foundation installation, but would not have the access road work noise. Helicopter noise is expected to produce noise at a greater distance, while access road work would result in noise for a longer duration. Overall, noise levels generated would likely result in a **moderate** impact on ambient noise levels, but would be reduced to lower levels for some noise sensitive receptors, such as recreationists, with implementation of the mitigation measures, such as implementing weekday construction as much as practical (Table 2.7-1).

Blasting could be required in some locations where bedrock is present and cannot be removed by any other means to complete subsurface excavation for pole installation. In general, the structures through line mile 10 would not require blasting. From line mile 11 through 18, blasting is expected to be necessary for many of the structures on bedrock. From line mile 19 to the end of the line, blasting is not expected unless a structure is located on a rocky ridge. Blasting would require drilling holes in the area to be excavated. Conventional or plastic explosives would be packed into the holes. Safeguards, such as blasting mats, may be used as necessary to protect adjacent property. Depending on the charges used and site-specific conditions, ground vibration and audible noise are expected to be minimal for properly placed charges. Noise could reach up to 140 dBA at the blast location or over 90 dBA for Noise Sensitive Areas within 500 feet during blasting activities and could cause concern for people in nearby Noise Sensitive Areas; however, blasting is a relatively short duration event compared to rock removal methods such as using drill rigs or jackhammers. Therefore, blasting is expected to result in a **moderate** impact on ambient noise levels but would be reduced to **low** with implementation of the mitigation measures (Table 2.7-1), regardless of which Line Mile 19 Option is selected.

Electromagnetic Fields

The primary parameters that impact the EMF levels produced by a power line are line voltage, current loading, line configuration, and line routing. The Proposed Action would not appreciably change any of these parameters. Therefore, no significant changes to the ***electric and magnetic field*** environment in the vicinity of the line are expected. In a few isolated cases, pole heights would be increased slightly to raise the conductor-to-ground clearances. In these areas, ground-level EMF would decrease slightly within the right-of-way. No changes are expected beyond the right-of-way. Therefore, **no** changes to EMF in the vicinity of the line are expected.

BPA has calculated electric and magnetic levels for the Proposed Action (Tables 3.13-4 and 3.13-5). The data illustrate that the Proposed Action would not significantly change either the electric or magnetic field environment on the right-of-way. Overall, EMF emissions from the Proposed Action are expected to conform to BPA and NESC criteria and there would be **no** change in EMF emission impacts from the Proposed Action.

Table 3.13-4. Representative Right-of-Way Electric Fields[1]

		Northern Edge (kV/m)	Maximum (kV/m)	Southern Edge (kV/m)
Typical Right-of-Way Section	Existing Conditions	0.2	1.5	0.2
	Proposed Action	0.2	1.5	0.2

Notes:
[1] Values developed from BPA modeling programs. This is based on a 150-foot right-of-way with 115-kV line(s).

Table 3.13-5. Representative Right-of-Way Magnetic Fields[1]

		Northern Edge (mG)		Maximum (mG)		Southern Edge (mG)	
		Annual Average	Annual Peak	Annual Average	Annual Peak	Annual Average	Annual Peak
Typical Right-of-Way Section	Existing Conditions	2.4	7.6	11.1	78.2	2.4	7.6
	Proposed Action	2.4	7.6	11.1	78.2	2.4	7.6

Notes:
[1] mG based on 2013-2014 line load statistics.
[2] Values developed from BPA modeling programs. Based upon a 150-foot right-of-way with 115-kV lines.

Radio and Television Interference

No changes to the operating line voltage (i.e., 115 kV) of the transmission line are included in the Proposed Action. The project would result in new, properly installed connecting hardware that would reduce any risk associated with aging hardware spark-discharge activity. As a result, the Proposed Action is expected to either not change or slightly improve radio and television interference along the affected line sections. Based on past performance, interference complaints are not expected. In any case, any legitimate radio or television interference complaint received by BPA would be investigated. If BPA facilities are determined to be the cause of the interference, BPA would take corrective action to eliminate the interference. Because conditions are anticipated to improve under the Proposed Action, it would have **no** to **low** beneficial effect on radio and television interference regardless of which Line Mile 19 Option is selected.

Public Health and Safety

Construction work on steep talus slopes creates the possibility that the Proposed Action could contribute to rockfall. Should this occur above recreational facilities or roads, the public could be at risk. To minimize this, the Proposed Action would use temporary work platforms placed above talus slopes to install structures. Road and trail improvements could generate rockfall as work is done to stabilize these access routes. The construction of retaining walls associated with Line Mile 19 Option 1 and 2 would increase danger for potential rockfall during construction, but would reduce the danger of rockfall and landslides during operation. Line Mile 19 Option 3 would not involve any roads in that section of the project, also reducing danger for rockfall and landslides during operation.

Additional potential public health and safety impacts resulting from construction of the Proposed Action include wildfire ignition during heavy equipment operation; worker incident during transport to/from work site; worker incident during operation of heavy equipment, aircraft hazards, and blasting; worker exposure to hazardous materials used or waste generated during construction; worker proximity to high voltage lines; rockslide dangers during upslope activities; and falling rock from installing micropiles on steep rocky slopes. Potential impacts associated with PCP contamination and leaching are described in Section 3.5, *Waterways and Water Quality*. Potential public health and safety risks are **moderate**, but would be reduced through the creation of a Public Health and Safety Plan that includes measures to control public access, use appropriate control measures, and generally limit the risk of rockfall (see Table 2.7-1) to a **low** level of impact on public safety, regardless of which Line Mile 19 Option is selected.

3.13.3 Mitigation Measures

Mitigation measures to reduce or avoid potential impacts on noise, public health, and safety are identified in Table 2.7-1 in Chapter 2 of this EA.

3.13.4 Environmental Consequences–No Action Alternative

Noise

Under the No Action Alternative, BPA would not rebuild the transmission line or access road and trail facilities; therefore, without additional planned construction activities, BPA would continue operation and maintenance activities similar to those currently occurring along the line. Initially, noise impacts would remain similar to existing conditions with **no** to **moderate** noise impacts, depending on location and type of activities.

Under the No Action Alternative, continued operation and maintenance of the aging transmission line would likely result in increased equipment operation and vehicle transport on access roads during emergency repair and maintenance activities. Emergency repairs could expose Noise Sensitive Areas to noise from work required to put the line back in service at times outside normal work periods. Noise impacts resulting from emergency repair and maintenance activities for the No Action Alternative are expected to typically be **low** due to the temporary and localized nature of activity, but the temporary noise effect may range up to **high**, depending on the nature and location of the emergency activity.

Electromagnetic Fields

Under the No Action Alternative, EMF exposure would remain essentially unchanged from current conditions. Continued operation of the existing transmission line would have **no** increase in EMF impacts when compared to the existing condition.

In the short term, BPA would not continue operation and maintenance activities similar the existing condition. **No** television and radio interference would occur, similar to existing conditions. As the line continues to age, spark-discharge activity on connecting hardware that becomes loose or corroded could result in small spark-gaps that may result in **no** to **low** numbers of incidences of radio or television interruptions (generally, reports of interruptions are rare, even among aged 115-kV lines).

Public Health and Safety

Under the No Action Alternative, BPA would not rebuild the transmission line or the access roads and trails; therefore, public health and safety impacts during construction activities would not occur, and worker/public risk of exposure to hazards and/or hazardous materials would be avoided. BPA would continue operations and maintenance activities similar to those currently performed on the transmission line. Initially, impacts on public health and safety would remain largely the same as the existing condition ranging from **no** to **low**.

Continued operation of the aging transmission line would result in potential public safety hazards due to the operation of older, less reliable structures and associated equipment. Further, depending on the location of and magnitude for the need for emergency repair, power to the Cascade Locks Tap could be restricted, resulting in the town of Cascade Locks losing power for a period of hours to days. Depending on the duration of the power loss, impacts on public health and safety from the No Action Alternative could range from **low** if no emergency outages are realized to **high** if a prolonged emergency outage occurred.

This page deliberately left blank

3.14 Cumulative Impacts

Cumulative impacts are the effects on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or non-federal), organization, or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The effects of past and current actions in the vicinity of the project area are considered to form a part of the affected environment baseline for each resource. According to a 1998 U.S. Forest Service Watershed Analysis, three major changes have impacted the watershed since European settlement: (1) damming of the Columbia River, (2) development of the Columbia River Gorge as a major transportation route (Union Pacific Railroad and I-84), and (3) suppression of the natural wildfire regime (U.S. Forest Service 1998). In addition to these major alterations, smaller actions including forest land conversion (to other uses or other vegetation communities), timber harvest, fire suppression, fragmentation by roads and utility corridors, and wetland and stream alteration have impacted natural resources in this subbasin of the Columbia River (Northwest Power Planning Council 2004).

The human environment has also been affected by a variety of factors, many stemming from population growth. Between 2000 and 2012, the population of Multnomah County increased by about 15 percent and the Hood River County population by about 10 percent (City-Data.com 2015). An increase in the number of people generally results in increased urbanization through the conversion of agricultural lands to developments and infill redevelopment. This in turn generates increased traffic loads and demands on utilities and public services (e.g., electricity, water, sewer, fire protection, law enforcement, hospitals, and schools). More people in the area coupled with the recreational opportunities in the Columbia River Gorge have led to an increase in recreational use, from camping and hiking to windsurfing and nature viewing. Oregon State Parks estimated that in 2012 recreational use of their facilities in the gorge included 3.5 million visits and generated about $50 million in visitor spending, contributing greatly to the local economy (White and Goodding 2013).

3.14.1 Reasonably Foreseeable Projects

In order to identify potential reasonably foreseeable projects to consider in the cumulative effects assessment, planned work by BPA, U.S. Forest Service, and ODOT was reviewed, as were county planning documents and other publically available planning information sources. The planning departments for Hood River and Multnomah counties also were contacted. The list below of reasonably foreseeable projects primarily includes planned work by BPA, U.S. Forest Service, and ODOT, since county and other sources provided little in the way of specific projects that could be considered reasonably foreseeable.

Reasonably foreseeable projects are those where some form of planning (environmental or engineering) has been initiated or a planning document (e.g., transportation plan; forest management plan) exists that describes specific potential projects. Reasonably foreseeable future actions in the project's region of influence include:

- BPA is planning four projects in the National Scenic Area in Multnomah or Hood River counties at the Bonneville-Hood River Transmission Line, Big Eddy-Troutdale Transmission Line, Wautoma-Ostrander Transmission Line, and the Bonneville Dam. The other proposed BPA transmission line projects in the National Scenic Area would occur on the north side of the Columbia River and east of The Dalles and are, therefore, not anticipated to contribute to cumulative impacts for the Proposed Action.

- Bonneville-Hood River Transmission Line Wood Pole Replacements – This is a routine maintenance project that would include replacement of five deteriorating wood-pole structures in-kind. Poles would be placed in the same holes and all access road work would be contained within the existing road prisms. The structure replacement project is anticipated to occur in 2016. This 2016 project would occur within the project area of the Proposed Action, but the construction period would not overlap with the Proposed Action.
- Big Eddy-Troutdale Transmission Line - This project would include insulator replacement and road work on the Big Eddy-Troutdale Transmission Line, which is located over 20 miles west of the Bonneville-Hood River project area near the town of Troutdale. This construction period is proposed to occur in 2018, which would overlap with the timeline for the Bonneville-Hood River Transmission Line Rebuild project.
- Wautoma-Ostrander Transmission Line – This project would include spacer replacement and road work along 2.4 miles of the line. The eastern terminus of the Wautoma-Ostrander Transmission Line is located at the Bonneville Powerhouse, and construction would begin in 2018, likely overlapping with the Bonneville-Hood River Transmission Line Rebuild project.
- Bonneville Dam Powerhouse – This project would include replacement of less than 1 mile of fiber optic cable. The construction period for this project has not yet been determined.

- BPA would continue to operate and maintain the Bonneville-Hood River transmission line after the proposed rebuild (the Proposed Action), as well as other lines near the existing right-of-way. Routine work may include hardware replacement, vegetation management, danger tree removal, and minor access road work.
- The U.S. Forest Service is analyzing the effects of the Government Flats fire on two stewardship sales in the North Fork of Mill Creek watershed, about 5 miles east of the city of Hood River. Their analysis includes an assessment in changes in road, vegetation, and fuels management, as well as changes in forest product availability on over 1,000 acres (U.S. Forest Service 2014r). All of these actions would likely affect natural resources, scenic qualities, and possibly recreational uses.
- ODOT started construction in 2016 to develop a segment of the Historic Columbia River Highway State Trail that is over 0.2 mile long between Lindsey Creek and Starvation Creek State parks. The trail would be 16 feet wide, fully accessible, and used for non-motorized recreation. The project would reconstruct and reconnect abandoned portions of the historic highway near Warren Creek, adjacent to I-84, on undeveloped U.S. Forest Service land within the SMA of the National Scenic Area (ODOT 2014a). This project would likely result in the permanent conversion of vegetated lands to impervious trail surfaces, but would also increase trail accessibility and trail user safety. Construction is anticipated to be completed by the end of 2016.
- ODOT has studied the need for improvements to three I-84 exits in Hood River (exits 62, 63, and 64). The study indicated that changes are necessary at these and surrounding interchanges to manage increased traffic loads while providing for pedestrian, vehicular, and bicycle safety (DKS Associates 2011a, b). According to ODOT, only one of these actions, improvements to the intersection of Country Club Road and Cascade Avenue, has been completed (K. Stallman, pers.

comm., ODOT, October 2014). Even though these planning studies were completed late in 2011, it does not seem that any additional recommended improvements have been implemented at this time.

- Between 2012 and early 2014, ODOT in cooperation with numerous stakeholders completed the Mount Hood Multimodal Transportation Plan (MHMTP) study to identify projects in the Mount Hood highway corridor that would improve visitor safety and enhance travel options (David Evans and Associates, Inc. 2014). The outcome of this was a list of 38 projects that met the goals of the MHMTP, of which 14 were selected for early implementation (ODOT 2014b). One of the 14 projects is in Hood River and involves improvements at the intersection of Oregon State Highway 35 and the Columbia River Highway (East State Street) to improve bicycle safety.
- ODOT is planning the Hood River Rockfall Repair project, which involves the repair of a hillside west of Hood River at I-84 milepost 61 to reduce the chance of future rockfalls. The right eastbound lane of I-84 would be closed for approximately three months and bikes would travel on a temporary shoulder of I-84. Construction is scheduled to occur (both day and night) from September 2016 to May 2017 (ODOT 2016).
- Four bicycle route improvement projects are planned for roads in Hood River County that are crossed by the project, including shoulder improvements on Brookside Drive, bike lanes on Indian Creek Road, and several connector trails from west of Country Club Road to Brookside Drive (Hood River County 2010).
- General and routine road and bridge maintenance activities. These include maintenance on both paved and unpaved roads in the vicinity of the Proposed Action. Types of actions would include filling potholes, cleaning culverts and ditches, road resurfacing, upgrades to guard rails, restriping, maintaining non-paved roads, and other types of general road maintenance by ODOT, the U.S. Forest Service, Multnomah and Hood River counties, and the cities of Cascade Locks and Hood River.
- Agriculture and forest management activities would continue into the foreseeable future adjacent to and in the immediate vicinity of the Proposed Action. This includes agricultural conversions (from one use to another) in Hood River, vegetation and fuels management within the Mount Hood National Forest, and small-scale ranching on pasture lands near Hood River.

3.14.2 Cumulative Impacts by Resource

The Proposed Action, in combination with past, present, and reasonably foreseeable future actions, could potentially result in cumulative impacts on the natural, physical, and socioeconomic resources described in Sections 3.1 through 3.13 of this EA. The effects remaining after avoidance and minimization measures are the effects that could contribute to cumulative impacts. The following analysis describes these potential cumulative impacts from the remaining effects of the Proposed Action, organized by resource topic. Topics are generally presented in the order that they were previously presented in this chapter.

As discussed in the previous sections of Chapter 3, there are some differences among the potential impacts associated with the Line Mile 19 Options. Line Mile 19 Option 1 would have the largest disturbance area: 0.1 acres more permanent disturbance than both Design Options 2 and 3 and 0.1 acre and 0.2 acre more temporary disturbance than Design Options 2 and 3, respectively. These small differences between the Line Mile 19 Options did not constitute a difference in the impact level finding (i.e., no, low, moderate, or high) and are not anticipated to result in a different level of impact when combined with past, present, and reasonably foreseeable future actions.

Land Use and Transportation

The Proposed Action would not change the underlying land ownership, but new easements would be required. There would be a permanent removal of forest from existing uses for structure removal and replacement, access road and trail improvements and reconstruction, danger trees, and work at the Cascade Locks Tap. Other reasonably foreseeable future projects could affect land ownership and uses, but any change in combination with the Proposed Action would be minor and would not result in a noticeable change in land uses or opportunities for future land uses in the area. Overall, the project's contribution to cumulative impacts on land use is expected to be **low**.

The principal past, ongoing, and future activities that can reasonably be assumed to cumulatively affect transportation are improvements to roads and major construction projects within the project area. Construction-related traffic from the proposed intersection improvements or bicycle route projects described previously may result in short-term traffic slowing/congestion or delays on Country Club Road, Indian Creek Road, Brookside Drive, and other locations within and near Hood River. Further, if ODOT's construction of the bike trail along the Historic Columbia River Highway extended beyond 2016 and the ODOT rockfall repair extended beyond the spring of 2017and there was construction overlap between this work and the Proposed Action in 2017 there could be an increase in construction vehicles and associated traffic and rolling slowdowns on I-84 and associated frontage roads.

The Proposed Action could contribute to temporary traffic slowdowns on I-84, frontage roads, and roads in Hood River and may close some roadway crossings for short durations of time during construction. However, project mitigation (Table 2.7-1) such as coordination of the routing and scheduling of construction traffic with county/municipal road staff should minimize these potential impacts. These measures would also reduce any potential short-term cumulative traffic impacts in the event that the Proposed Action occurred at the same time as other planned projects. Therefore, the Proposed Action would contribute to **low** to **moderate** cumulative impacts on transportation, depending on the extent of the overlap among projects.

Recreation

Recreational development proposed in the general area is primarily related to the development of the Historic Columbia River Highway State Trail and bicycle route improvements. Additional construction projects, such as BPA or ODOT construction projects, occurring in the National Scenic Area would cause noise, dust, traffic generation, visual disturbances, and trail closures that could diminish the recreational experience. Future vegetation management by BPA and the Forest Service could also result in short-term impacts on recreation related to visual and noise disturbances, access delays, and potential temporary trail closures.

The Proposed Action would temporarily affect many of the recreation sites and trails within the National Scenic Area and State Park units between Cascade Locks and Hood River. The reasonably foreseeable future actions described in Section 3.14.1 are not located near Line Mile 19 and therefore, are not expected to cumulatively increase the noise levels near recreation sites in that area. Typically, recreational disruption associated with the Proposed Action would occur over a period of days to weeks and mitigation measures such as constructing during week days and employing flaggers would be implemented to minimize recreational impacts. Based on the short-term nature of the Proposed Action's impact on recreation in areas near other planned projects combined with the implementation of the Proposed Action's minimization measures, there could be up to a short-term **moderate** level of cumulative impacts on recreation if one or more of these project timelines overlaps with implementation of the Proposed Action. If the Proposed Action and the other projects were to occur at different times, the Proposed Action would have **no** contribution to cumulative impacts on recreation as the potential recreational use disruption in this area would occur at different times and would not be lasting beyond construction.

Geology and Soils

The major ongoing activities that are expected to cumulatively affect soils and result in erosion in the project area, such as timber harvest and agricultural practices would continue. Agricultural activities in the Hood River valley area continually disturb soils during the planting and harvest cycle. Landslides and wildfires, which leave soils unvegetated and barren, have occurred in the general area and will likely continue. BPA projects and the other road construction projects would cause soil erosion until successful soil stabilization.

The residual effects associated with the Proposed Action on soil resources are largely limited to increased erosion from disturbed soils until successful stabilization. The sediment contribution of the Proposed Action would be greatest immediately after construction and would gradually taper returning to existing conditions as vegetation matures and soils stabilize. While the Proposed Action may contribute to the cumulative disturbance of soil and geology, the implementation of the minimization measures described in Section 3.3, *Geology and Soils*, would largely limit the project's contribution to cumulative soil and geology impacts. Further, it is anticipated that other ground disturbing construction projects in the area would implement appropriate erosion control devices, similar to the Proposed Action to limit impacts to soil. It is anticipated that the Proposed Action when considered in addition to past, present, and other reasonably foreseeable projects in the area would result in a **low** cumulative impact on soils and geology.

Vegetation

Vegetation communities in the project area have been converted to other uses by past development projects in the region. These include the conversion of some native habitats to pasture and other agricultural uses, as well as conversion to developed land uses (e.g., residential, commercial, transportation, energy supply uses). These activities have resulted in the permanent loss and modification of native vegetation. Past disturbances and clearing along the Bonneville-Hood River right-of-way have contributed to the spread of noxious weeds, which are prevalent throughout the project area. Ongoing maintenance of the line, including vegetation management and the removal of danger trees, is expected to maintain disturbed habitats within the right-of-way for the foreseeable future. Populations of noxious weeds within the right-of-way are expected to continue to persist, although ongoing efforts to control noxious weeds by BPA would help control the rate of spread. Other planned construction projects in the area would result in vegetation clearing and disturbance, though adherence to the National Scenic Area Management Plan would be expected to minimize project construction impacts to sensitive plants and habitats.

Impacts on vegetation under the Proposed Action would result in the permanent loss of vegetation and a minor long-term alteration in plant communities through project-related disturbances that permanently change vegetation communities (i.e., road construction). These residual effects of the Proposed Action would be similar to impacts associated with other BPA activities within the National Scenic Area, most of which would consist of minor construction work and minimal loss of vegetation. Residual impacts on vegetation would also contribute to the overall impacts occurring from other reasonably foreseeable future actions in the region near the project area. Because a relatively small amount of vegetation would be permanently converted to other uses or vegetation communities, the contribution of the Proposed Action's residual effects to adverse changes in vegetation communities when considered in addition to past, present, and other reasonably foreseeable projects would be **low**.

Waterways and Water Quality

Although currently limited in the National Scenic Area, past timber harvest activities in the entire project area, including forest roads and agricultural activities in the Hood River Valley have impacted streams and water quality. Future forest management activities and associated road construction and maintenance are expected to continue to contribute to stream and water quality impacts, and forest roads could contribute to localized decreases in groundwater infiltration rates. Past and ongoing development and agricultural land uses in the Hood River Valley have impacted streams and water quality throughout the area. Agricultural land uses are ongoing and are expected to continue to contribute moderately to these impacts.

The Proposed Action could temporarily disturb streams and water quality during construction from runoff, erosion, and sedimentation, and could temporarily interfere with localized groundwater infiltration from soil compaction. A small quantity of riparian clearing would have temporary impacts associated with the installation of new bridges but would largely regrow (<0.1 acre of permanent impact). Overall, the short-term and long-term residual impacts on streams and water quality from the Proposed Action would be relatively small and localized, and would have no measurable impact on overall resource function in the project area. The Proposed Action would have no impact on surface or groundwater Drinking Water Source Areas, surface water intakes, or groundwater resources, including springs. Therefore, the Proposed Action's contribution to the past, ongoing, and future impacts on these resources in the project area would be **low.**

Wetlands and Floodplains

Wetlands have been impacted by past and ongoing development and ditching and draining to accommodate pasture land and agricultural uses. Modifications to riparian areas and the loss of wetlands have isolated some drainage areas from their original floodplains. Future construction projects may contribute to additional wetland disturbance and fill, though planned projects would be required to secure appropriate permits and implement mitigation.

The Proposed Action would have limited temporary impacts on wetlands or floodplains associated with structure work and access road improvements. There would be no loss of wetlands under the Proposed Action. Due to the very limited quantity of wetland impacts under the Proposed Action, the Proposed Action would have **no** to a very **low** contribution to cumulative impacts on wetlands or floodplains when considered with past, present, and reasonably foreseeable future actions.

Fish

Activities in the vicinity of the project area have the potential to impact fish and fish habitat through erosion and overland transport of suspended sediments to streams downstream of these operations. These activities include past, present, and future agricultural operations, forest management, ongoing road maintenance and improvement, and BPA maintenance projects and vegetation management in the area.

Under the Proposed Action, limited riparian clearing would occur and in-water work (ford installation or replacement) is proposed at two fish-bearing streams. Through the implementation of minimization measures such as reduction of workspaces to limit riparian clearing, conducting in-water work during ODFW's in-water work window, and ensuring appropriate fish passage, the Proposed Action would further limit impacts on fish. Overall, the incremental contribution of the Proposed Action, when combined with the impacts of other past, present and reasonably foreseeable future actions, to cumulative impacts on fish and fish habitat would be **low**.

Wildlife

The past and present development have reduced the biodiversity in the Columbia River Gorge through the direct loss and fragmentation of sensitive native habitats through clearing and land conversion for forest management, agriculture, utility infrastructure, and transportation. Most of the proposed future projects would occur within established transportation or utility corridors or would be located in previously-disturbed lands such as agricultural fields or burned forest areas.

Impacts from the Proposed Action would generally be limited to temporary noise disturbance and habitat clearing. The permanent alteration of vegetation communities from extended access roads and foot trails and structures replaced in new locations would comprise most of the permanent impacts but this impact would be negligible. Some incidental mortality and nesting/breeding impacts may occur, but generally, residual impacts would not affect regional populations of wildlife (e.g., wildlife movement pathways or bird populations). Accordingly, the cumulative effect would be **low** to **moderate** when considering the Proposed Action in combination with other past, ongoing, and reasonably foreseeable future actions.

Visual Quality

The Columbia River Gorge is a working landscape, as well as a natural one. The river is continually in use as a major freight corridor, as well as being a prime recreation destination. The public forests along both sides of the river are managed for a multitude of uses (including some timber production), and development continues within the gorge. Even though land uses in the gorge are actively managed and expected to remain protective of visual resources for the foreseeable future, the landscape is not static nor is the scenery.

The residual effects of the Proposed Action are the long-term and gradual shifts in small spots of background color as wooden structures naturally weather and vegetation matures in temporarily affected construction areas and along roads. The replacement of steel lattice structures with steel monopoles would also represent a permanent change in the visual character of the area. The reasonably foreseeable projects and general land uses anticipated for the area will not likely have much impact on the KVAs that are mostly affected by the Proposed Action. When reasonably foreseeable future projects are considered in conjunction with the KVAs affected by the project, ODOT's proposal to develop additional sections of the Historic Columbia River Highway as a trail may allow additional viewing of the project area by more people from new places, but will not appreciably change scenic conditions being viewed.

Overall, the rebuilt transmission line would be similar in visual character to the existing line. There would be minor improvements to the visual character of the area (through slightly relocated structures and changes to weatherized steel monopoles) as a result of the Proposed Action. For these reasons, and when considered over the long term, the Proposed Action's contribution to cumulative impacts on visual resources would be **low** when considered in the context of past, present, and reasonably foreseeable future actions.

Air Quality and Greenhouse Gases

Cumulative air quality impacts would result from construction and operation of the Proposed Action combined with reasonably foreseeable future projects. Cumulative air quality impacts within the project area would also result from continued operation of existing emission sources including on-road vehicles, agricultural activities, residential wood burning, and other commercial and industrial activities. Cumulative air quality impacts are not expected to contribute to or result in a violation of the NAAQS goals, measures, and programs established in the CO and ozone maintenance plans for the Portland area airshed, or significantly contribute to existing regional haze. Therefore, cumulative impact on air quality would be **low** when considering the Proposed Action in combination with other past, present, and reasonably foreseeable future actions.

As described above in Section 3.10.2, *Air Quality and Greenhouse Gases*, the impacts of the Proposed Action on greenhouse gas concentrations would be low. Impacts would be further reduced through implementation of the mitigation measures identified in Table 2.7-1. Although any amount of greenhouse gas emissions contribute to global greenhouse gas concentrations and climate change, given the small amount of contribution from the Proposed Action, the project's incremental impact on greenhouse gas concentrations would be **low**. This would also be the case when combined with the other independent reasonably foreseeable future projects and activities proposed for the project area.

Socioeconomics and Public Services

The Proposed Action would have a small, short-term beneficial impact on the regional economy during construction through the local procurement of materials and equipment and spending by construction workers at local businesses. Reasonably foreseeable future projects could affect socioeconomics, environmental justice populations, and public services. While many of these projects would bring temporary workers to the area, these projects would be constructed at various intervals, thereby reducing the potential overlap of project construction with construction of the Proposed Action. When considered collectively with other actions in the project area, the workers associated with the Proposed Action would not result in a large increase in the number of workers or spending. However, the small influx of revenue and taxes associated with the temporary increased spending related to the Proposed Action could combine with the spending associated with workers employed on other projects occurring at the same time, which would result in **low** beneficial cumulative impacts on the economy in the project area.

Cultural Resources

Cultural resources in the APE have likely been cumulatively affected by past and present development activities. Most impacts have likely occurred as a result of inadvertent disturbance or destruction during ground-disturbing activities such as road work and facility construction. Other reasonably foreseeable future projects in the vicinity of the APE have the potential to disturb previously undiscovered cultural resources. Implementation of the mitigation measures described in Table 2.7-1 would minimize potential proposed impacts from the Proposed Action and would reduce the potential for construction activities to contribute incrementally to the adverse cumulative impact on cultural resources in the APE. In the event that previously undiscovered historic properties were encountered, potential cumulative impacts would be **low** to **moderate**, depending on the level and amount of disturbance and the eligibility of the resource for listing in the National Register.

Noise, Public Health, and Safety

Cumulative construction noise impacts would be generated from the Proposed Action combined with the construction of reasonably foreseeable future projects. Noise impacts within residential and recreational Noise Sensitive Areas located in proximity to construction activities would be short term and temporary, and would return to existing levels after construction; therefore, the project's contribution to cumulative noise impacts are expected to be **low**. If construction of the bike trail along the Historic Columbia River Highway extended beyond 2016 and there was construction overlap in 2017, there could be a cumulative increase in noise levels in the Starvation Creek area. The reasonably foreseeable future actions described in Section 3.14.1 are not located near Line Mile 19 and therefore, are not expected to cumulatively increase the noise levels in that area during construction of the various options. Therefore, cumulative noise impacts would be the same regardless of which Line Mile 19 Option is selected. The **moderate** level of cumulative noise would be limited to week days and would be temporary.

Cumulative hazards and risk to public health and safety would be generated during the construction of the Proposed Action along with reasonably foreseeable future projects. Land use and associated hazards and risks of reasonably foreseeable future projects are similar to the Proposed Action and are expected to use mitigation measures designed to reduce and control public health and safety impacts, similar to those proposed for the Proposed Action. Therefore, cumulative impacts on public health and safety are expected to be **low**.

This page deliberately left blank

3.15 Consistency with Land Use Plans and Programs

3.15.1 State and Local Plans and Programs

BPA, as a federal agency, is generally not required to comply with the requirements associated with obtaining state and local land-use approvals or permits, because Congress has not waived federal sovereign immunity over these areas. As a federal agency, BPA only obtains those state and local permits for which Congress has clearly and unambiguously waived sovereign immunity. Nonetheless, BPA is committed to planning its proposed projects – including the Proposed Action –to meet or exceed the substantive standards and policies of state and local land use plans and programs to the extent practicable. BPA also works with local jurisdictions to provide project information relevant to their plans and programs.

This section discusses the consistency of the Proposed Action with relevant local plans and programs for portions of the project area located outside of the National Scenic Area boundary as well as within Urban Areas under the National Scenic Area Management Plan. Consistency of lands designated as SMA and GMA under the Management Plan are discussed in Section 3.15.2, *Columbia River Gorge National Scenic Area Management Plan*.

Multnomah County Comprehensive Framework Plan

The Multnomah County Comprehensive Framework Plan describes the policies that guide decisions made by the county's Land Use Planning Division. While standards outlined in Policy 37, Utilities, do not directly address the rebuild of existing transmission facilities, Policy 37 does state that "…modifications to existing facilities are required to meet the public need for energy due to population growth, conservation of energy, changes in energy source, and consumption and reliability requirements." There would be no change in existing uses (i.e., no new right-of-way, access roads, or trails) in Multnomah County under the Proposed Action and the Proposed Action would provide increased reliability to electric customers and would generally be consistent with the intent of the Multnomah County Comprehensive Framework Plan.

Multnomah County Zoning Ordinance

About 280 feet of access road improvement area is located within the North Bonneville Urban Area. Multnomah County has zoned this area as CFU-3, a commercial forest zone.

The purpose of the forest classification is to conserve those lands suited to the production of wood fiber by virtue of their physical properties and the lack of intensive development. In areas where the lands are suitable and the use does no impact existing forestry uses, other uses are allowed. Non-public access roads are not explicitly addressed under commercial forest zoning in the plan. The Proposed Action would only improve existing access roads in the area subject to this plan. Because the land use of the subject area would not change and would not preclude adjacent forestry land uses, the access road improvements would be consistent with the intent of the Multnomah County zoning ordinances.

City of Cascade Locks Comprehensive Plan

The purpose of the Cascade Locks Comprehensive Plan is to provide an overall guide for future growth and development in the city. The comprehensive plan does not specifically address non-city infrastructure, though Section II. D., Utilities and Services, has an overall goal to provide timely, orderly, and efficient maintenance and improvement of public facilities and services within the Urban Growth Boundary to keep up with the city's growth rate and needs. The Proposed Action would improve reliability of the Bonneville-Hood River transmission line and Cascades Locks Tap that provides service to Cascade Locks and would meet this overall planning goal.

City of Cascade Locks Community Development Code

The proposed project is located within the City of Cascade Locks Urban Growth Boundary (UGB) in several locations. The City of Cascade Locks Community Development Code addresses development of roads and other public facilities in Article III – Land Use Districts, Chapter 8 (General Provisions). Public facilities, including transportation facilities and other public facilities, such as electrical distribution lines (*8-6.16.020, D)* are permitted in all districts and are exempt from development permit requirements. Non-distribution transmission lines are not specifically addressed in the City of Cascade Locks Community Development Code. Only road maintenance, which is a permitted use, is proposed to occur outside of the existing BPA right-of-way within the Cascade Locks UGB. While an electric transmission line is not specifically covered in the community development code, there would be no change in existing uses (i.e., no new right-of-way, access roads, or trails) within the Cascade Locks UGB and the project would be consistent with the intent of the Cascade Locks Community Development Code.

Hood River County Comprehensive Land Use Plan

The Hood River County Comprehensive Land Use Plan is used to control and direct the use and development of land use activities on private lands within the county. While Goal 11, Public Facilities and Services, does not specifically address electric transmission lines, one of the strategies under the goal does state that where possible, utility lines shall either share existing utility rights-of-way, be underground or be out of sight from I-84. The Proposed Action would use existing transmission right-of-way and access road footprints and would not change existing land uses; therefore, while the Hood River County Comprehensive Land Use Plan does not specifically address electric facilities, the project would generally be consistent with the intent of the Hood River County Comprehensive Land Use Plan.

Hood River County Zoning Ordinance

The proposed project crosses Forest 1, Rural Residential with 2.5 acres (RR-2.5), and Exclusive Farm Use (EFU) zones within Hood River County (outside of the National Scenic Area). In the Forest 1 zone, new utility transmission lines and roads are not allowed uses. However, proposed project activities outside of the existing BPA easement are limited to road maintenance, which is a permitted use. Project activities within the existing BPA right-of-way could be classified as maintenance of existing facilities (Section 65.30, A) under the plan. No additional lands would be removed from future forest as project activities would occur within the previously-cleared transmission right-of-way and access road footprints.

In the RR-2.5 zone, new utility transmission lines and their accessory uses are permitted uses (Section 15.10). Roads necessary to service the line could be defined as accessory uses. No new roads or transmission line right-of-way are proposed in this zone; therefore, the project would not further limit residential land uses.

In the EFU zone, utility facilities necessary for public use are allowed uses (Section 7.07, A). Transmission lines fit within this definition (See Oregon Revised Statutes [ORS] 469.300 and ORS 215.275-283). Roads necessary to service the line could be included within this definition. No new roads or transmission line right-of-way are proposed in this zone; therefore, the project would not further limit farming land uses.

Overall, because the line and associated access roads would not preclude future forestry land and rural residential uses and is allowed in the EFU zone, the Proposed Action would be consistent with the intent of the Hood River County Comprehensive Land Use Plan.

City of Hood River Comprehensive Plan

The goal of the Comprehensive Plan is to protect and enhance the public health, safety and welfare of the citizens of Hood River. Under Goal 5, Open Spaces, Scenic and Historic Areas, and Natural Resources, and Goal 11, Public Facilities and Service, the plan identifies implementation strategies that pertain to utility lines. Specifically, the plan calls for the location of utility lines within public rights-of-way and the avoidance of natural features. While the Proposed Action would not be located within a public right-of-way, the project would be located within an existing right-of-way. Because BPA largely does not own the underlying land, public access would be allowed based on the underlying land use and ownership. As described throughout Chapter 3 of this EA, BPA has worked to minimize and avoid natural features as much as practicable. To further reduce environmental impacts, BPA would also implement numerous mitigation measures (Table 2.7-1). Overall, the Proposed Action would be generally consistent with the intent of the City of Hood River Comprehensive Plan. City of Hood River Zoning Ordinance

The Proposed Action includes elements within the City of Hood River Urban Low Density Residential (R1) and Office/Residential (C1) zones. The zoning ordinance of the City of Hood River (Title 17) does not appear to address transmission lines or related access roads. Proposed Action work in the City of Hood River would be limited to the replacement of conductor and/or hardware and access road improvements. The project facilities' footprint would not be expanded and would not preclude future land uses; therefore, the Proposed Action would be consistent with the intent of the Hood River zoning ordinances.

3.15.2 Columbia River Gorge National Scenic Area Management Plan

Below is a summary of the relevant portions of the National Scenic Area Act and Management Plan. This discussion is BPA's interpretation of the National Scenic Area Management Act and Management Plan for NEPA purposes. BPA will continue to coordinate with the U.S. Forest Service on National Scenic Area consistency issues.

National Scenic Area Act

The Scenic Area Act (16 U.S.C. 544–544p) was enacted in 1986 to: (1) protect and provide for the enhancement of the scenic, cultural, recreational, and natural resources of the Columbia River Gorge; and (2) protect and support the economy of the Columbia River Gorge area by encouraging growth to occur in existing urban areas and by allowing future economic development. The Scenic Area Act established the National Scenic Area, which covers nearly 293,000 acres in six Washington and Oregon counties along the Columbia River Gorge. The National Scenic Area extends along the Columbia River from about the confluence of the Columbia and Sandy Rivers to just past the village of Wishram, Washington, about 85 miles to the east.

The Scenic Area Act also set up the mechanism by which the Columbia River Gorge Commission was established in 1987 by the states of Oregon and Washington through an interstate compact, the Columbia River Gorge Compact. Consistent with the Scenic Area Act, the Gorge Commission was created to develop and implement policies and programs that protect and enhance the scenic, natural, cultural and recreational resources of the National Scenic Area, while encouraging growth within the existing urban areas. Accordingly, the National Scenic Area is managed on a partnership basis by the Gorge Commission, the states of Oregon and Washington, the six counties with land in the National Scenic Area, and the U.S. Forest Service. As required under the Scenic Area Act, a Management Plan has been prepared for the National Scenic Area to guide land use within the National Scenic Area in a manner consistent with the purposes and standards of the Scenic Area Act.

For federal actions within the National Scenic Area, the Scenic Area Act requires that these actions be undertaken in a manner consistent with the Scenic Area Act, as determined by the U.S. Forest Service. The U.S. Forest Service thus coordinates with federal agencies proposing activities in the National Scenic Area and conducts consistency reviews of these activities as appropriate.

Although the Scenic Area Act provides a comprehensive scheme for regulation of development within the National Scenic Area, the Scenic Area Act does provide several express exemptions from its provisions for certain uses, activities, and rights. Relevant to the Proposed Action, the Scenic Area Act states that:

> Nothing in [this Act] shall . . . affect or modify the ability of the Bonneville Power Administration to operate, maintain, and modify existing transmission facilities. (See 16 USC 544o[a][5]).

Consistent with this exemption, none of the provisions of the Scenic Area Act, Management Plan, or any other National Scenic Area regulations can be applied in such a way as to affect BPA's operation and maintenance of its existing transmission lines and associated facilities, or any planned or proposed modification by BPA of these facilities. The BPA exemption in the Act is reflected in the Management Plan, which states:

> The operation, maintenance, and modification of existing transmission facilities of the Bonneville Power Administration shall be exempt from regulation under the Management Plan or land use ordinances adopted by the counties or the Gorge Commission pursuant to the Scenic Area Act.

In addition to this BPA-specific exemption, the act states that:

> Nothing in [this Act] shall . . . establish protective perimeters or buffer zones around the scenic area or each special management area. The fact that activities or uses inconsistent with the management directives for the scenic area or special management areas can be seen or heard from these areas shall not, of itself, preclude such activities or uses up to the boundaries of the scenic area or special management areas. (See 16 USC 544o[a][10].)

Accordingly, the provisions of the Management Plan and other National Scenic Area regulations are considered to apply only to lands actually within the boundaries of the National Scenic Area.

Management Plan Land Use Designations

As indicated above, a National Scenic Area Management Plan has been developed that contains the land use and resource protection standards, non-regulatory programs, and actions for protecting and enhancing

National Scenic Area resources, as well as a description of roles and relationships of governments and agencies responsible for implementation of the National Scenic Area Act. The Gorge Commission has several responsibilities under the Scenic Area Act related to the Management Plan, including planning for the National Scenic Area, implementation of the Management Plan, and monitoring and hearing appeals of land use decisions. The local counties and the Gorge Commission also are responsible for drafting and enforcing land use ordinances to implement the Management Plan, and for administering development on GMA lands in the National Scenic Area. The primary role of the U.S. Forest Service in the National Scenic Area is administering SMA lands, managing 71,000 acres of national forest land, and determining consistency of proposed federal actions in the National Scenic Area with the Scenic Area Act and Management Plan.

As explained in the Management Plan, the National Scenic Area is divided into Urban Areas, SMA (which generally are managed by the U.S. Forest Service or other public agencies), and GMA (which encompasses a mix of land ownership). About 19 miles of the existing transmission line is within the National Scenic Area. The portion of the project area for the transmission line within the National Scenic Area includes about 328.1 acres within the SMA, 21.0 acres within the GMA, and 38.5 acres within Urban Areas. The Management Plan provides the following general information on these three areas:

> "Congress designated 13 cities and towns as Urban Areas: North Bonneville,7 Stevenson, Carson, Home Valley, White Salmon, Bingen, Lyle, Dallesport, and Wishram on the Washington side of the river and Cascade Locks, Hood River, Mosier, and The Dalles on the Oregon side. The Urban Areas are exempt from the Management Plan. [North Bonneville, Cascade Locks and Hood River emphases added.]
>
> The SMA includes approximately 40 percent of the region's most sensitive lands, concentrated primarily in the western half of the National Scenic Area. The U.S. Forest Service prepares land use designations and guidelines for the SMA. In some instances, the Act directs that the SMA lands be managed more stringently than those in the GMA. For instance, land divisions are prohibited, new homes are not allowed on parcels less than 40 acres in size, and forest practices are regulated for scenic, cultural, natural, and recreation concerns.
>
> About half of the National Scenic Area makes up the GMA, including the Columbia River. These lands blanket most of the eastern Gorge and are scattered in the central and west end of the Gorge. They are predominantly devoted to agricultural and forestry uses, but also contain scattered areas of existing residential development."

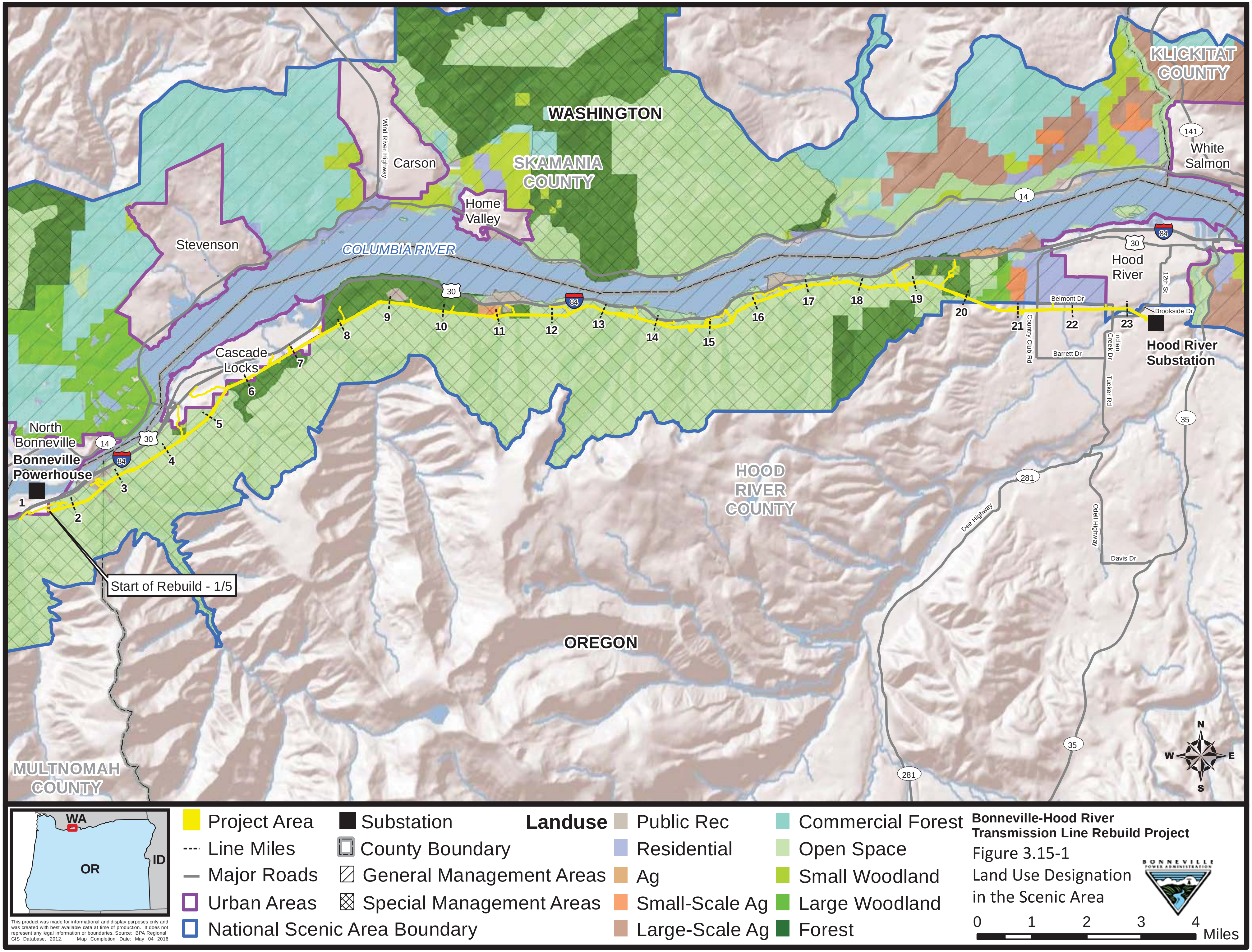
The Management Plan includes six basic land use designations within the National Scenic Area: Agriculture, Forest, Open Space, Residential, Commercial, and Recreation. Within these six basic designations are sub designations, such as Public Recreation and Commercial Recreation within the Recreation designation. The land use designations provide information on how a parcel of land may be developed and for which land use a parcel is best suited. For instance, Commercial lands are suitable for new businesses while Agricultural lands are suitable for raising livestock. Eight land use designations are found within the project area, and

[7] The North Bonneville urban area designation extends across the Columbia River into Oregon.

the acreage of each of these ranges from over 260.9 acres of Open Space to 0.5 acre of Small Woodland (Table 3.15-1). A majority of the project area within the National Scenic Area is in SMA designations (Table 3.15-1).

Because the Proposed Action is a federal project, the U.S. Forest Service is the responsible entity for carrying out any required review of the project under the Scenic Area Act. BPA and the U.S. Forest Service are currently reviewing the Proposed Action to determine which, if any, of the project components would be subject to consistency review. If a project consistency review is required, the U.S. Forest Service will make a determination concerning the consistency of the portion of the Proposed Action located in the National Scenic Area with the Scenic Area Act, as well as with applicable provisions of the Management Plan, and any other applicable National Scenic Area regulations.

Below is a summary of the relevant portions of the National Scenic Area Management Plan for each land use designation crossed by the project. This analysis is BPA's view of the National Scenic Area Management Plan for NEPA purposes and BPA will continue to coordinate with the U.S. Forest Service on consistency issues. Figure 3.15-1 depicts the location of the project relative to each land use designation. Note that for many of the below discussed land use designations, utility facilities may be allowed (either outright or via expedited or full consistency review) upon showing that there is no alternative location with less adverse impacts and the facilities are the smallest size necessary. Section 2.4 (specifically, Sections 2.4.1 and 2.4.2), *Alternatives Considered but Eliminated*, discusses potential routing alternatives evaluated to reduce impacts to the National Scenic Area. To make the project the smallest size necessary, BPA has reduced the project design to only rebuild those structures and components that are aged and beyond their service life, minimized the quantity of access road and trail extensions to those needed to rebuild the line or for future maintenance, and proposes to retire nine structures (see Section 2.1.3, *Replacement of Transmission Structures*, and Section 2.1.6, *Access Roads and Foot Trails*).



WASHINGTON
SKAMANIA COUNTY
KLICKITAT COUNTY
Carson
Home Valley
Stevenson
White Salmon
Wind River Highway
COLUMBIA RIVER
Cascade Locks
North Bonneville
Bonneville Powerhouse
Hood River
Hood River Substation
Start of Rebuild - 1/5
HOOD RIVER COUNTY
OREGON
MULTNOMAH COUNTY
Belmont Dr
Brookside Dr
Barrett Dr
Country Club Rd
Indian Creek Dr
Tucker Rd
12th St
Dee Highway
Odell Highway
Davis Dr
14
30
84
141
35
281
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
N
S
E
W
WA
OR
ID
Project Area
Line Miles
Major Roads
Urban Areas
National Scenic Area Boundary
Substation
County Boundary
General Management Areas
Special Management Areas
Landuse
Public Rec
Residential
Ag
Small-Scale Ag
Large-Scale Ag
Commercial Forest
Open Space
Small Woodland
Large Woodland
Forest
Bonneville-Hood River Transmission Line Rebuild Project
Figure 3.15-1
Land Use Designation in the Scenic Area
0
1
2
3
4
Miles
This product was made for informational and display purposes only and was created with best available data at time of production. It does not represent any legal information or boundaries. Source: BPA Regional GIS Database, 2012. Map Completion Date: May 04 2016

Table 3.15-1. Project Area Acreage by Land Use Designation

Land Use Designations	GMA (acres[1])	SMA (acres[1])
Open Space	15.6	245.3
Forest	4.6	70.1
Large Woodland	0.8	0.0
Small Woodland	0.0	0.5
Public Recreation	0.0	3.8
Agriculture	0.0	5.1
Small-Scale Agriculture	0.0	3.3
Total[2]	**21.0**	**328.1**

Notes:
[1]Acreages are calculated based on the project area, which includes the transmission line, access roads, and trails.
[2]Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.

The overall number of acres temporarily and permanently impacted by the Proposed Action within each of the land use designations is provided in Tables 3.15-2 to 3.15-4. Note that there would be no permanent project impacts in GMA designations. All Line Mile 19 Options would be located in open space designation; therefore, the options are only discussed under the open space designation discussion.

Table 3.15-2. Summary of Permanent Impacts by Land Use Designation in the SMA and GMA[1]

Resource Categories	Structure Impacts (Acres)	Access Road Extension (Acres)	Trail Extension (Acres)	Total (Acres)[2]
SMA				
Open Space	<0.1	0.1 - 0.3	0.1	**0.2 - 0.4**
Forest	<0.1	<0.1	0.0	**<0.1**
Large Woodland	0.0	0.0	0.0	**0.0**
Small Woodland	0.0	0.0	0.0	**0.0**
Public Recreation	0.0	0.0	0.0	**0.0**
Agriculture	0.0	0.0	0.0	**0.0**
Small-Scale Agriculture	0.0	0.0	0.0	**0.0**
GMA				
All	0.0	0.0	0.0	**0.0**
Total[2]	**0.1**	**0.2 - 0.3**	**0.1**	**0.3 - 0.4**

[1] Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, the value range for the Line Mile 19 Options is shown. Line Mile 19 Option 3 would have the smallest permanent impact while Line Mile 19 Option 1 would have the greatest reported impact.
[2] Total reflects sum of actual values including specific values less than 0.1 acre and not the rounded numbers presented in this table.

Table 3.15-3. Summary of Temporary Impacts by Land Use in the SMA[2]

Resource Categories	Structure Impacts (Acres)	Access Roads: Extension (Acres)	Access Roads: Reconstruction (acres)	Access Roads: Improve (Acres)	Access Roads: Direction of Travel – Overland (Acres)	Trails: Extension (Acres)	Trails: Reconstruction (Acres)	Trails: Improve (Acres)	Total (Acres)[2]
Open Space	28.1	0.1	0.1 - 0.3	7.3	0.1	0.3	0.9	0.8	**37.6 – 37.9**
Forest	10.3	<0.1	<0.1	4.1	0.0	0.0	0.0	0.0	**14.4**
Large Woodland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Small Woodland	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**0.1**
Public Recreation	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**0.1**
Agriculture	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0	**1.0**
Small-Scale Agriculture	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0	**0.9**
Total[2]	**39.8**	**0.1**	**0.1 – 0.3**	**12.1**	**0.1**	**0.3**	**0.9**	**0.8**	**54.2 – 54.4**

Notes:
1 Where only one value is shown, quantity is the same for all Line Mile 19 Options. Where quantities differ by option, the value range for the Line Mile 19 Options is shown. Line Mile 19 Option 3 would have the smallest temporary impact while Line Mile 19 Option 1 would have the greatest reported impact.
2 Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

Table 3.15-4. Summary of Temporary Impacts by Land Use in the GMA[1]

Resource Categories	Structure Impacts (Acres)	Access Roads: Extension (Acres)	Access Roads: Reconstruction (acres)	Access Roads: Improve (Acres)	Access Roads: Direction of Travel – Overland (Acres)	Trails: Extension (Acres)	Trails: Reconstruction (Acres)	Trails: Improve (Acres)	Total (Acres)[2]
Open Space	2.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	**2.9**
Forest	1.0	0.0	<0.1	0.3	0.0	0.0	0.0	0.0	**1.3**
Large Woodland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Small Woodland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Public Recreation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Agriculture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Small-Scale Agriculture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total[2]	**3.0**	0.0	**<0.1**	**1.2**	0.0	0.0	0.0	0.0	**4.2**

Notes:
1 Line Mile 19 is located entirely in SMA; therefore, there is no impact range for the Line Mile 19 Options in this table.
2 Acreages are displayed rounded to one decimal place. The total is calculated based on the original (not rounded) acreages.

Open Space: The majority (59.2 percent) of the lands in the portion of the project area within the National Scenic Area are designated as Open Space under the Management Plan (Table 3.15-1). The Open Space designation is used to protect the scenic, cultural, natural, and recreation resources within some of the most significant and sensitive resources in the National Scenic Area.

Between 37.6 and 37.9 acres, depending on Line Mile 19 Option selected (Option 3 smallest followed by Option 2 and then Option 1), in SMA open space would be temporarily disturbed during structure, access road, or trail work (Table 3.15-3). Structure work and access road improvement would also temporarily disturb about 2.9 acres of GMA open space (Table 3.15-4). A vast majority of project construction would occur within the existing BPA right-of-way - all structure work would occur within the existing, cleared right-of-way and a majority of access road and trail work would be located within the existing, cleared right-of-way. Upon completion of construction, between 0.2 and 0.4 acre, depending on Line Mile Option 19 selected (Option 3 smallest followed by Option 2 and then Option 1), of open space would be permanently occupied by project components. Of this, less than 0.1 acre would be associated with structure relocations that would occur within the existing right-of-way. About 0.2 to 0.4 acre, depending on Line Mile 19 Option, would be attributed to trail and access road extensions spread over multiple locations.

Utility facilities for public service may be allowed in open space upon showing that: (1) There is no alternative location with less adverse effect on Open Space land; and (2) The size is the minimum necessary to provide the service. Work within existing right-of-way and access facilities (roads and trails) would largely not change the pre-project nature or condition of the impacted lands. All Line Mile 19 Options would occur on lands designated as open space within the existing cleared right-of-way. Under all options, overall, the Proposed Action would result in a small (0.2 to 0.4 acre) quantity of open space lands being converted from a previous use to an expanded trail or access road; all remaining project lands would remain in a use similar to existing conditions (transmission right-of-way or existing access road or foot trail).

As discussed throughout this EA and summarized below under Scenic, Natural, Cultural, and Recreation subsections, the project has been planned in a manner to minimize project construction, avoid impacting sensitive resources to the maximum extent practical, and would generally be consistent with the resource requirements of open space under the Management Plan.

Forest/Woodland: In total, 74.7 acres of the project area are within lands designated as Forest under the Management Plan (Table3.15-1). The transmission line also crosses a small amount of land designated as Large Woodland (0.8 acre) and Small Woodland (0.5 acre). National Forest System lands within the Forest designation are managed for ecosystem management and forest health. Policies and guidelines in the Management Plan serve to protect Forest land (including large and small woodlands) from conflicting uses and conversion (Gorge Commission 2011).

About 14.5 acres of temporary impacts to SMA forest and woodlands (Table 3.15-3) and 1.3 acres of temporary impacts in GMA forest designation (Table 3.15-4) would occur from structure and access road work. No trail work is proposed in forest or woodland designations. Upon completion of construction, less than 0.1 acre of SMA forest land would be permanently impacted by structure relocation or access road extensions.

In both GMA and SMA forest land use designations, utility facilities for public service are allowable if there are no practicable alternative location with less adverse effect and the size is the minimum necessary to provide service. All structure work would occur within the cleared, existing transmission right-of-way and access road improvement and reconstruction would occur where road prisms were previously present and would not further preclude forest health or management activities. Less than 0.1 acre of forest land would be subject to access road extension, which may be allowed with consistency review (if the actions do not fall under the BPA Savings Provision). The project has been planned in a manner to minimize project construction, avoid impacting sensitive resources to the maximum extent practical, and would generally be consistent with the resource requirements of the forest/woodland designations under the Management Plan.

Public Recreation: The project area includes a small amount of land designated as Public Recreation (0.9 percent) in SMA (Table 3.15-1). The Public Recreation designation within the National Scenic Area is designed to protect and enhance lands that are suitable for public recreation.

Overall, the Proposed Action would improve about 0.1 acre of access roads in lands designated as SMA public recreation (Table 3.15-3). No structure or trail work is proposed in public recreation designated lands. Also, no permanent impacts to lands designated as public recreation would occur (Table 3.15-2).

In SMA public recreation designated land uses, road construction and reconstruction is allowed and utility facilities for public service is allowable upon showing there is no alternative location with less adverse effect on public recreation land and the minimum necessary size to provide service.

Road improvement activities may result in a temporary disturbance to recreational use (see Section 3.2, *Recreation,* and the Recreation subsection below), but there would be no permanent removal of lands available for public recreational use. Therefore, the portions of the Proposed Action proposed in public recreation land designation would generally be consistent with the Management Plan.

Agriculture/Small-Scale Agriculture: The project area includes small amounts of land designated as Agriculture (1.1 percent) and Small-Scale Agriculture (0.8 percent) in SMA (Table 3.15-1). The lands designated as Agriculture within the SMA must be used or suitable for agricultural purposes. Lands interspersed among lands used or suitable for agricultural purposes can also be designated Agriculture to protect against conflicting uses (Gorge Commission 2011).

About 1.9 acres of lands designated for SMA agriculture or small-scale agriculture would be temporarily impacted by structure or access road improvement work (Table 3.15-3). No additional work types would occur within the land use designation. Further, no temporary GMA or permanent impacts to agriculture or small-scale agriculture land use designations would occur for the Proposed Action (Tables 3.15-2 and 3.15-4).

SMA agricultural/small-scale agriculture land use designations allow utility facilities for public service as a review use as long there is no practicable alternative location with less adverse effect on agriculture and that the size is the minimum necessary to provide the service. All project construction activities would occur within the existing right-of-way or access road footprints. No loss of agricultural lands within this designation would occur under the Proposed Action. Further, most agricultural use would be allowed within the right-of-way after project construction. Because no project activities would result in a permanent loss of lands available for agricultural uses in agriculture/small-scale agriculture land designations, the Proposed Action would generally be consistent with the Management Plan.

Urban Area: Under the Scenic Area Act, 13 cities and towns were designated by Congress as Urban Areas. These 13 Urban Areas are exempt from the Management Plan, and will be the focus of future growth and economic development within the National Scenic Area (Gorge Commission 2011). The project area includes a small portion of the North Bonneville, Cascade Locks, and Hood River Urban Areas. About 8.7 percent of the project area is located within these three designated Urban Areas. Generally, the land use within the portions of the Cascade Locks and Hood River Urban Areas crossed by the project is residential. The area within the North Bonneville Urban Area crossed by the project is forested. See Section 3.15.1, *State and Local Plans and Programs*, for a discussion of project consistency with zoning and land planning requirements in crossed urban areas.

Scenic Resources

For scenic resources, the goal of the Management Plan is to protect and enhance the scenic resources of the Scenic Area. Several provisions are included that pertain to utility infrastructure.

New utility transmission lines and transportation facilities shall be visually subordinate as seen from key viewing areas to the maximum extent practicable. Appendix C provides a full analysis of the potential project-related impacts to visual resources in the National Scenic Area. It is important to note that the project would not be a new utility transmission line and that the visual condition of the existing transmission line varies from inconspicuous and meeting the retention standard, to visually subordinate, and in a few places visually dominant. Generally, the western third of the project area is less visible from KVAs while the central third is more visible and at times visually dominant (the eastern third is located outside of the National Scenic Area and discussed in Section 3.9, *Visual Quality*), and the cleared right-of-way is the most visually conspicuous aspect of the Bonneville-Hood River transmission line. When compared to the existing transmission line, the Proposed Action, regardless of the Line Mile 19 Option selected, would result in the same visual ratings and long-term effect, ranging from visually dominant to inconspicuous, and averaging visually subordinate from the KVAs that are most exposed to the project area.

The Management Plan also calls to encourage utility companies to place powerlines underground where such features are visually dominant and detract from the visual quality of scenic travel corridors. Unlike lower-voltage distribution cables used to deliver power to individual homes, it is impracticable to underground high-voltage transmission cables. For a 115-kV line, the conductor that would be manufactured and installed would be 10 times the cost of an overhead design. In addition, the costs of maintaining an underground high-voltage line is much greater and more difficult, and the environmental impacts are typically greater than impacts from an overhead line. Please see Section 2.4, *Alternatives Considered but Eliminated from Detailed Study*, for more information about undergrounding.

Lastly, the Management Plan encourages utility companies to use colors that are visually subordinate on existing equipment along scenic travel corridors. As discussed further in Section 3.9, *Visual Quality*, several mitigation measures, such as the use of weatherized steel poles and Permeon coloration on visible access roads and cuts (see Table 2.7-1) would reduce the visual contrast of project components in many locations.

Overall, the Proposed Action would result a visual and scenic condition that is similar to pre-project existing conditions and would be generally consistent with the intent of the Management Plan.

Natural Resources

The Scenic Area Act directs the Gorge Commission and the U.S. Forest Service to inventory, protect, and enhance natural resources. The Management Plan provides guidelines and regulates uses for the protection of wetlands; streams, ponds, lakes, and riparian areas; wildlife habitat; rare plants; and natural areas.

Overall, several measures , including reduced work spaces, timing restrictions, erosion control measures, and pre-construction surveys (see Table 2.7-1) would be implemented to reduce project impacts on identified sensitive resources and their buffers that are identified in the Management Plan. Identification of natural resources prior to construction and implementation of the various minimization measures would result in the project being generally consistent with the intent of the Management Plan.

Wetlands. See Section 3.6, *Wetlands and Floodplains*, for a full description of potential project-related impacts on wetlands and associated minimization measures. Up to about 0.2 acre of wetlands may be temporarily disturbed by structure work areas and access road improvements. No structures or new access roads or trails would be located within wetlands and there would be no permanent project impacts on wetlands. A total of 2 acres of temporary disturbance would occur within the wetland buffers under the Proposed Action. Of this total, 1.6 acres would be due to replacement of structures, hardware, and/or conductor near two wetlands and 0.4 acre would be due to access road improvement near four wetlands.

Streams, Ponds, Lakes, and Riparian Areas. See Section 3.5, *Waterways and Water Quality*, for a full description of potential project-related impacts to water resources and associated minimization measures. No structures or access road or trail extensions would be placed in waterbodies. Overall, 1.8 acres of existing vegetation within 100 feet of streams would be temporarily disturbed during project construction. Within this area, up to 23 trees would be removed within 100 feet of streams, distributed among 12 different streams. Up to four trees would be removed within 100 feet of any one stream, with only one or two trees potentially removed within 100 feet of most streams. Access road and trail improvement and reconstruction would occur within 100 feet of 25 streams. All access road improvement work would occur within already disturbed areas (e.g., the original road prism), so there would be no new permanent disturbance areas near streams. Road work would require the construction of new fords across streams in five locations, one at a tributary to Grays Creek in line mile 10, one at Harphan Creek in line mile 11, two on an unnamed tributary to the Columbia River in line mile 18, and a fifth on a tributary to Phelps Creek in line mile 20. One existing ford would be repaired at Dry Creek in line mile 5.

Wildlife Habitat. See Section 3.8, *Wildlife*, for a full description of potential project-related impacts to wildlife habitat and wildlife species. The project would temporarily disturb up to 19.4 acres of priority wildlife habitats and permanently remove up to 0.1 acre of priority wildlife habitat. Field surveys have been completed in 2014 and 2015 and will continue in 2016 through 2020 to more specifically identify certain sensitive wildlife species such as aquatic mollusks and amphibians, northern spotted owls, raptor nesting, red tree voles, Larch Mountain salamander, and American pika prior to construction. In those areas where sensitive wildlife species are found, BPA would implement mitigation measures, such as timing or work space restrictions to minimize potential impacts.

Rare Plants. See Section 3.4, *Vegetation*, for a full description of potential project-related impacts to vegetation, sensitive vegetation communities, and special-status plants. Temporary impacts on sensitive vegetation habitats would occur on up to 19.4 acres. Permanent impacts through loss of vegetation would occur on about 0.1 acre or less of talus, mature forests, cliffs, and riparian habitats, which are all sensitive vegetation communities. Wetlands, oak woodlands, and native grasslands would not have permanent vegetation loss. During the 2014, 2015, and 2016 vegetation surveys, populations of Howell's reedgrass, long-bearded hawkweed, Multnomah bluegrass, Oregon coolwort, and western mountain kittentails were identified within the project area. Twelve populations of special-status plants overlap areas that would be permanently or temporarily impacted by the Proposed Action. Overall, the project would temporarily impact 0.3 acre of special-status plants. The Proposed Action would result in up to 0.3 acre of permanent impacts to vegetation located within the 1,000-foot buffer around these sensitive plant populations.

Natural Areas. The project crosses Starvation Creek State Park and Warren Creek, both of which have been designated as Natural Areas under the Management Plan. Vegetation would be cleared within 100 feet of Warren Creek for structure work and the proposed pedestrian bridge (see in Section 3.5, *Waterways and Water Quality* for further information). Impacts to at Starvation Creek State Park are further discussed in Sections 3.2, *Recreation*, Section 3.5, *Waterways and Water Quality*, and Section 3.7, *Fish*.

Cultural Resources

One purpose of the Scenic Area Act is to "protect and provide for the enhancement of the …cultural…resources of the Columbia River Gorge." Cultural resources include archaeological resources, historic buildings and structures, and traditional cultural properties. As a federal agency, BPA will comply with Section 106 of the Historic Preservation Act of 1966 (see Section 3.12, *Cultural Resources*). As part of this compliance, BPA conducted cultural surveys and is in consultation with the appropriate tribes, the Oregon State Historic Preservation Office, the US Forest Service, and Oregon State Parks. Known cultural sites would be avoided where feasible and mitigation would be implemented where appropriate so that the project would be consistent with the general intent of the Management Plan.

Recreational Resources

The Scenic Area Act has a directive to protect and enhance the recreation resources of the Columbia River Gorge. A full description of potential project-related impacts on recreational resources and associated mitigation is contained in Section 3.2, *Recreation*. The Proposed Action would temporarily disrupt some function of and access to recreational resources. While there would be some temporary disruption to recreational use or access, there would also be a long-term benefit to recreational access through the improvement of some public trails in the area. The Proposed Action would result in some visual impacts to recreationists associated with temporary construction, vegetation and ground disturbance, and changes in some structure types (see Sections 3.8, *Visual Quality*, and Appendix C). Overall, disruption to recreationists would largely be temporary and should resume to near pre-project condition upon completion of construction. Overall, the Proposed Action's impact on recreational resources would be consistent with the general intent of the Management Plan.

Chapter 4
Persons, Tribes, and Agencies Consulted

The project mailing list contains contacts for Tribes; local, state, regional, and federal agencies; public officials; interest groups and businesses; and potentially interested or affected landowners. These groups of stakeholders have directly received or have been given instructions on how to receive all project information made available so far, and they will have an opportunity to review the Draft EA. Specific entities (other than private persons) receiving the scoping notifications and this Draft EA are listed below by category.

Federal Agencies

U.S. Army Corps of Engineers, Portland District

U.S. Environmental Protection Agency, Region 10

National Ocean and Atmospheric Administration, National Marine Fisheries Service

U.S. Department of Energy

U.S. Geological Survey

U.S. Department of Agriculture

- Natural Resources Conservation Service
- U.S. Forest Service, Mount Hood National Forest
- U.S. Forest Service, Columbia River Gorge National Scenic Area
- Farm Service Agency

U.S. Department of the Interior

- National Park Service
- U.S. Fish and Wildlife Service

U.S. Senate (Ron Wyden, Jeff Merkley)

U.S. House of Representatives (Greg Walden [District 2] and Earl Blumenauer [District 3])

Tribes and Tribal Groups

Confederated Tribes of the Grand Ronde

Confederated Tribes of Warm Springs Reservation of Oregon

Confederated Tribes and Bands of the Yakama Nation

Confederated Tribes of the Umatilla Indian Reservation

Nez Perce Tribe of Idaho

Cowlitz Indian Tribe

State Agencies and Officials

Oregon Governor (Ruchi Sadhir)

Oregon State Senate (Chuck Thomsen [District 26] and Mark Johnson [District 52])

Oregon Department of Agriculture

Oregon Department of Economic and Community Development

Oregon Department of Fish and Wildlife

Oregon Department of Forestry

Oregon Department of Parks and Recreation

Oregon Department of Transportation

Oregon Department of State Lands

Oregon Department of Energy

Oregon Department of Environmental Quality

Oregon Department of Land Conservation and Development

Oregon Department of Water Resources

Oregon State Land Board

Oregon Historic Trails Advisory Council

Business Oregon

Regional Commission

Columbia River Gorge Commission

Local Government

City of Cascade Locks

- Tom Cramblett, Mayor
- Keith Terry, Electrical Superintendent
- Gordon Zimmerman, City Administrator

City of Hood River

- Arthur Babitz, Mayor
- Ed Weathers, City Council President
- Cindy Walbridge, Planning Department

Multnomah County

- Deborah Kafoury, Chair of Board of Commissioners

Hood River County

- Hood River Planning Commission
- Mike Benedict, Hood River County Planning Director
- Ron Rivers, Chair of Board of Commissioners

Hood River Soil and Water Conservation District

Multnomah Soil and Water Conservation District

Local Utilities

Hood River Electric Cooperative (John Gerstenberger)

Businesses, Interest Groups, and Libraries

Indian Creek Golf Course

Friends of the Columbia River Gorge

Columbia Gorge Economic Development District

Nature Conservancy Oregon

Oregon-California Trails Association

Hood River County History Museum

Hood River Landmarks Review Board

Lewis and Clark Trail Heritage Foundation

Audubon Society of Portland

East Cascades Audubon Society

Pacific Crest Trail Association

Clark College Biology Department

Hood River County Library

Cascade Locks Library

Troutdale Library

North Bonneville Community Library

Oregon State Library

Washington State Library

This page deliberately left blank

Chapter 5
Glossary and Acronyms

5.1 Glossary

100-year floodplain – areas with a 1 percent chance of being flooded in a given year, as designated by FEMA.

Ambient noise – background noise generated by existing noise sources in the surrounding area.

Anadromous – Fish species that breed in fresh water but live their adult life in the sea.

Aquifer – underground bed or layer of permeable rock, sediment, or soil that contains groundwater.

Area of Potential Effects (APE) – The portion of the project area in which the project may impact historic properties.

Average daily traffic – the average number of vehicles that pass a specific point going both directions over a 24-hour period.

A-weighted decibel scale — the scale used to measure and describe volume that corresponds to human perception.

Best management practices (BMPs) – typically state-of-the-art technology designed to prevent or reduce impacts. They represent physical, institutional, or strategic approaches to environmental problems.

Built resources – the built environment, which includes historic sites, buildings, structures, objects, districts, and landscapes.

Carbon dioxide equivalent (CO_2e) – a measurement used to compare the global warming potential of a typical GHG, based on concentrations of carbon dioxide.

Ceded lands – lands given up to the federal government during treaty signings.

Circuit – the pathway for an electrical current.

Colluvium – loose deposit of unconsolidated sediments accumulated through the action of gravity at the base of a cliff or slope.

Conductor – the wire cable strung along a transmission line through which electricity flows.

Corona – an electrical field around the surface of a conductor, insulator, or hardware caused by ionization of the surrounding air.

Corona activity (Corona) — the electrical breakdown of air molecules in the vicinity of high-voltage conductors.

Counterpoise – Typically underground wires that extend horizontally from each structure and that connect with ground wire to provide lightning protection.

Critical habitat – as defined by the ESA, a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery.

Cultural resources – a general term, not defined in federal law, which includes historic resources as well as a larger universe of resources including archaeological, Native American graves, and traditional uses.

Culvert – a device used to carry or divert water from a drainage area to prevent erosion.

Cumulative impacts – impacts on the environment that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions.

Current – the flow of an electrical charge through the transmission line conductor.

Danger trees – trees located off the transmission line right-of-way that are a current or future hazard to the transmission line.

Decibel – Unit of measure for audible noise.

Direction of travel – either routes through farm fields or cross-country (overland travel route) or existing non-public roads in good condition that do not require surface improvements before use.

Drain dip – mounds of crushed rock that create a high point directing water from the road to a nearby drain system (i.e., along the side of or off of a road, not diagonally across the road like a water bar).

Ecoregion – An area defined by its geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology**.**

Electric and magnetic field (EMF) – the physical field around the electric wire or conductor that is produced when electric transmission is occurring.

Endemic species – an animal, plant, fungus, or microorganism unique to a defined geographic area and whose habitat is restricted.

Environmental justice populations – low-income and minority populations protected under Executive Order 12898 from disproportionate adverse effects of federal projects.

Erosion – the movement of soil and surface sediments caused by wind or water.

Erosion hazard potential – the ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments. The hazard is described as "slight," "moderate," or "severe."

Farmland – an NRCS farmland classification that identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. This classification identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops.

Fault – A fracture or zone of fractures along which there has been displacement of the adjacent blocks relative to one another. There are three major types of faults: normal, reverse, and strike-slip.

Flash-over – A disruptive discharge through the air around or over the surface of an insulator produced by the application of a voltage of sufficient magnitude to result in an electric arc or fault.

Floodplain – the flat land that is adjacent to a surface water that is periodically flooded.

Forb – herbaceous vascular plant including ferns and their allies that is not a grass, sedge, or rush.

Fossil fuels – fuels derived from hydrocarbon deposits in the Earth's crust; typically combusted for energy (e.g., natural gas, oil, and coal).

Global warming potential – a relative measure of how much heat a greenhouse gas (GHG) traps in the atmosphere that compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.

Greenhouse gas (GHG) – chemical compounds that absorb and trap infrared radiation as heat (e.g., carbon dioxide, nitrous oxide, methane, and fluorinated gases).

Ground wire – wires placed above the conductors to route lightning-strike electricity to the ground.

Groundwater – water that is stored beneath the Earth's surface in soil pores or rock formations.

Guy wire – a tensioned cable that anchors a structure to the ground to provide extra stability.

Hardware – Physical components of the transmission system, including but not limited to insulators, guy wires, cables, nuts, and bolts.

Historic properties – a subset of cultural resources that includes any prehistoric or historic district, site, building, structure, or object that meets defined eligibility criteria for the National Register of Historic Places.

Housepit – A depression in the ground representing the former location of a semi-subterranean structure.

Insulator – a component made of non-conductive materials that connects the conductor to the suspension structure and prevents the transmission of electrical current from the conductor to the ground.

Isolate—an archeological find found away from others.

Kilovolt (kV) – one thousand volts of electrical power.

Landslide – the movement of surface soil and other matter down a steep slope.

Liquefaction – The transformation of loose sediment or soil into a fluid state as a result of increasing the pressure of the fluid in between the grains due to strong ground shaking. Liquefaction typically occurs in poorly consolidated, water-saturated sediment, and can cause significant earthquake-related damage because structures located on ground that liquefies can collapse or sink into the ground.

Loess – Windblown silty material. In Oregon, glaciers scoured volcanic rock into fine silt and as glaciers retreated, wind whipped the silt into drifts of rich soils called loess.

Low-income population – a group of low-income residents who live in geographic proximity that could be disproportionately affected by a federal action.

Micropile – a small diameter hole drilled into the ground into which reinforcing rebar and concrete are placed; several micropiles together are used to anchor the base of steel monopoles.

Mid-seral – a stage in the progressive changes in a plant community following stand-initiating disturbance. Mid-seral communities have a similar amount of pioneering species and species that will be maintained on the site in the absence of disturbance.

Minority population – a group of minority persons who live in geographic proximity that could be disproportionately affected by a federal action.

Mitigation – measures that would reduce the impacts of the Proposed Action on a resource by reducing the impact, avoiding it completely, or compensating for the impact.

Nonattainment area – an air basin that is not in compliance with applicable air quality standards for a specific pollutant.

Non-native – a species that has been introduced and has acclimated to an area outside of its normal distribution range.

Noxious weeds – nonnative plants that have been identified by state law as damaging to natural or human resources.

Outage – the loss of electric power to an area caused by a natural or human disturbance to the electrical system.

Palustrine – marshes, wet meadows, fens, playas, potholes, pocosins, bogs, swamps, and small shallow ponds.

Palustrine emergent wetland (PEM) – palustrine wetland that supports primarily emergent vegetation (e.g., herbaceous marsh, fen, swale, wet meadow).

Perennial – refers to streams or waterways with continuous, year-round water flow.

Photosimulation – A simulation of a future conditions created by placing project-specific features (e.g., structures, roads, or areas of vegetation clearing) into a photograph taken from a specific location.

Physiographic province – a geographic region with broad-scale subdivisions based on terrain texture, rock type, and geologic structure and history.

Pulling and tensioning – the process of installing and tightening new conductors.

Radial Line – A single line coming from the electrical system provided the only source of power to an area.

Riparian –vegetation or habitat situated on the banks of rivers and streams.

Riverine wetland – wetland associated with rivers or streams.

Seismic – vibrations of the earth and its crust.

Soil compaction resistance – compaction resistance rating class terms indicate the extent to which the soils are made suitable by all of the soil features that affect the suitability of soil material for chaining. "High resistance" indicates that the soil has features that are favorable to resisting compaction. "Moderate resistance" indicates that the soil has features that are favorable to resisting compaction. "Low resistance" indicates that the soil has one or more features that favor the formation of a compacted layer.

Sole Source Aquifer – defined by the EPA as an underground water source that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer.

Spark-discharge activity — electric sparks between electrical separations (gaps) in the metal parts of a transmission line. Spark discharges can create noise and possible electromagnetic interference. Spark-discharge activity with transmission lines is often associated aging connecting hardware.

Special-status species – plant or wildlife species that have been identified for protection and/or management under federal or state law.

Staging area – the area cleared and used to store and assemble materials and equipment.

Stormwater runoff – precipitation water that runs off non-permeable surfaces into a drainage, sewer, or stormwater system.

Substation – the fenced site that contains the terminal switching and transformation equipment that transforms voltage.

Surface water – open water bodies such as streams, rivers, and lakes.

Threatened species – a plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Total Maximum Daily Load (TMDL) – the maximum amount of a pollutant that can be introduced to a water body while still being compliant with water quality standards.

Traditional Cultural Property – a property identified by an existing community as being important to that community's historical and current identity and traditional knowledge and culture.

Tributary – a stream or river that flows into a main stem (or parent) river or a lake. A tributary does not flow directly into a sea or ocean.

Turbidity – the amount of particulate matter, such as suspended sediment, per unit volume of water.

Unconsolidated sediments – sediments such as soil, sand, or organic matter that are not bound together and are susceptible to wind and water erosion.

Unincorporated land – land that is not part of or governed by a municipality.

Upland – land above the floodplain that supports precipitation-dependent vegetation.

Viewshed – an area visible from a defined location.

Voltage – the force that drives the flow of electric charge in a wire.

Water bar – a channel across the road surface that diverts surface water that would otherwise flow down the whole length of the road, used to prevent erosion on sloping roads, cleared paths through woodland, or other access ways by reducing flow length.

Watershed – a geographic area that is drained by a river and its tributaries. Separated from other watersheds by an elevated boundary such as a mountain.

Wetland –for regulatory purposes, wetlands are defined by the U.S. Army Corps of Engineers and the Environmental Protection Agency as “areas where surface water or groundwater saturates the sols for sufficient duration during the growing season, and at a frequency to support vegetation adapted to saturated soil conditions” [Clean Water Act, 40 CFR 230.3](Environmental Laboratory 1977).

5.2 Acronyms and Abbreviations

APE	area of potential effects
AQMA	Air Quality Maintenance Area
BG	Background
BLM	Bureau of Land Management
BMP	best management practice
BP	Before Present
BPA	Bonneville Power Administration
C	Candidate
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CT	Census Tract
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted decibel
dbh	Diameter at breast height
DOGAMI	Department of Geology and Mineral Industries
DPS	Distinct Population Segment
E	Endangered
EA	environmental assessment
Eagle Act	Bald and Golden Eagle Protection Act
EDRR	Early Detection and Rapid Response
EFH	Essential Fish Habitat
EFU	Exclusive Farm Use
EMF	electric and magnetic fields
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FG	Foreground
FPPA	Farmland Protection Policy Act
FR	Federal Register
G	Gauss

GE	Gorge Endemic
GHG	greenhouse gas
GIS	geographical information system
GMA	General Management Area
HUC	Hydrologic Unit Code
I-84	Interstate 84
IPaC	Information, Planning, and Conservation
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolt
kV/m	kilovolts per meter
KVA	Key Viewing Area
L_{10}	noise level that is exceeded 10 percent of the time
L_{50}	noise level that is exceeded 50 percent of the time
LWCF	Land and Water Conservation Fund
Leq	equivalent continuous noise level
MBTA	Migratory Bird Treaty Act
mG	Milligauss
MG	Middleground
MHMTP	Mount Hood Multimodal Transportation Plan
MSE	mechanically stabilized earth
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
OSP	Oregon State Police
PCBs	polychlorinated biphenyls

PCP	Pentachlorophenol
PEM	Palustrine Emergent (wetland type)
PFMC	Pacific Fishery Management Council
PM	Particulate Matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
RM	river mile
SC	Sensitive Critical
SHPO	State Historic Preservation Office
SMA	Special Management Area
SO_2	sulfur dioxide
SOC	Species of Concern
SPRP	Spill Prevention and Response Procedures
SR	State Route
SV	Sensitive Vulnerable
T	Threatened
TMDL	Total Maximum Daily Load
UGB	Urban Growth Boundary
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound

This page deliberately left blank

Chapter 6
References

6.1 Printed References

Alt, D., and D.W. Hyndman. 1978. *Roadside Geology of Oregon*. Missoula, MT: Mountain Press Publishing Company.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested practices for avian protection on power lines: State of the art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Available at: http://www.aplic.org/mission.php. Accessed June 24, 2014.

Avian Power Line Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS). 2005. Avian protection Plan (APP) guidelines. Edison Electric Institute. Washington.

Baldwin, E.M. 1966. Geology of the Columbia River Gorge. Department of Geology, University of Oregon. *Northwest Science* 40: 121-128.

Bash, J., C. Berman, and S. Bolton. 2001. Effects of Turbidity and Suspended Solids on Salmonids. Center for Streamside Studies, University of Washington, Seattle, WA.

Beever, E., C. Ray, P.W. Mote, and J.L. Wilkening. 2010. Testing alternative models of climate-mediated extirpations. Ecological Applications, 20(1), 2010, pp. 164–178.

Bonneville Power Administration (BPA). 1986. Electrical and biological effects of transmission lines: a review. (DOE/BP 524.) Portland, OR.

Bonneville Power Administration (BPA). 1996. Electrical and biological effects of transmission lines: a review (DOE/BP 2938.) Portland, OR.

Bonneville Power Administration (BPA). 2000. Transmission System Vegetation Management Program. Final Environmental Impact Statement. Cooperating agencies include U.S. Forest Service, Bureau of Land Management. DOE/EIS-0285. May 2000.

Bonneville Power Administration (BPA). 2008. Climate Change: BPA's Initial Roadmap. DOE/BP-3959. December 2008. Available at: http://www.bpa.gov/news/pubs/GeneralPublications/rpt-whitepaper-Climate%20Change.pdf.

Bureau of Land Management (BLM). 2015. Survey and Manage History and Update. Updated September 2015. Available at: http://www.blm.gov/or/plans/surveyandmanage/history.php. Accessed July 12, 2016.

California Air Resources Board (CARB). 2007. Fugitive Dust Control Self-Inspection Handbook. Available at: http://www.arb.ca.gov/pm/fugitivedust_large.pdf. Accessed October 21, 2014.

City-Data.com. 2015. Summary statistics for Multnomah and Hood River counties. Available online at: www.city-data.com. Accessed 2-12-2015.

City of Cascade Locks. 2001a. City of Cascade Locks Transportation System Plan. November 2001. Available at: http://www.cascade-locks.or.us/vertical/sites/%7BCBA69777-87EC-4CCE-94AE-A171F7FE7A86%7D/uploads/%7BFBED4498-05D3-488B-A41C-AFC85A749F57%7D.PDF.

City of Cascade Locks. 2001b. City of Cascade Locks Comprehensive Plan. May 2001. Available at: http://www.cascade-locks.or.us/vertical/sites/%7BCBA69777-87EC-4CCE-94AE-A171F7FE7A86%7D/uploads/%7BC67912A9-7BCB-49A0-9B4D-CAE6EA2F7231%7D.PDF.

City of Hood River. 2011. City of Hood River Transportation System Plan. October 2011. Available at: http://centralpt.com/upload/375/15021_HoodRiverTSPAdopted2011.pdf.

City of Hood River. 2012. City of Hood River Comprehensive Plan. April 2012. Available at: http://centralpt.com/upload/375/16471_ComprehensivePlan4-09-12.pdf.

Columbia River Gorge Commission (Gorge Commission). 2006. Columbia River Gorge National Scenic Area Management Plan, Sensitive Wildlife and Plant Species, Species with Historic or Suspected Range in the CRGNSA.

Columbia River Gorge Commission (Gorge Commission). 2011. Management Plan for the Columbia River Gorge National Scenic Area. Revisions to the Management Plan adopted in 2004 and all other amendments and updates approved through September 2011. Available at: http://www.gorgecommission.org/managementplan.cfm. White Salmon, Washington.

Columbia River Gorge Commission (Gorge Commission). 2014a. Landscape Setting Acreage. Available at: http://www.gorgecommission.org/Landscapesetting.cfm. Accessed December 2014.

Columbia River Gorge Commission (Gorge Commission). 2014b. Habitat Plan GIS data. Available at: http://www.gorgecommission.org/GIS-files.cfm. Accessed September 17, 2014.

Columbia River Gorge Commission (Gorge Commission). 2015. About the National Scenic Area. Available at: http://www.gorgecommission.org/about_scenic_area.cfm. Accessed 2-18-2015.

Council on Environmental Quality (CEQ). 1997. Environmental Justice: Guidance under the National Environmental Policy Act. Executive Office of the President, Washington, DC.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutierrez, J.M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the northern spotted owl. Sustainable Ecosystems Institute (SEI), Portland, OR.

David Evans and Associates, Inc. 1997. Bonneville-Hood River Line Right-of-Way Threatened, Endangered, and Sensitive Plant Species Survey. Prepared by BPA, Portland, OR, by DEA, Portland, OR. October 31, 1997.

David Evans and Associates, Inc. 2014. Mt. Hood multimodal transportation plan, 2014-2029. Prepared for Oregon Department of Transportation.

Department of Geology and Mineral Industries (DOGAMI). 2008. Landslide Hazards in Oregon, Oregon Geology Fact Sheet. Oregon State Department of Geology and Mineral Industries.

Department of Geology and Mineral Industries (DOGAMI). 2010. Understanding Landslide Deposit Maps, Oregon Geology Fact Sheet. Oregon State Department of Geology and Mineral Industries.

Department of Geology and Mineral Industries (DOGAMI). 2014. Statewide Landslide Information Database of Oregon (SLIDO) Release 3.1. Updated June 24, 2014. Oregon State Department of Geology and Mineral Industries.

Devine, W., A. Bower, J. Miller, and C. Aubry. 2013. Oregon White Oak Restoration Strategy for National Forest System Lands East of the Cascade Range. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.

DKS Associates. 2011a. Interstate 84 Exit 62 Interchange area management plan: Interstate 84/Cascade Avenue (Historic Columbia River Highway). Prepared for Oregon Department of Transportation and Hood River County.

DKS Associates. 2011b. Interstate 84 Exit 63 & 64 Interchange area management plan: Interstate 84/2nd Street & Interstate 84/Button Bridge Road. Prepared for Oregon Department of Transportation and Hood River County.

East Cascades Audubon Society. 2014. Hood River County Full Checklist. Primary Editors D. Anderson and S. Johnston. https://drive.google.com/file/d/0BwlY-wfLN-fERkpWb2hodDYwNjA/edit?pli=1. Accessed December 17, 2014.

East Multnomah Soil and Water Conservation District. 2014. Weeds to Report (EDRR). Information downloaded from http://emswcd.org/on-your-land/weeds/weeds-to-report/. Accessed September 12, 2014.

Ecological Society of America. 2008. Jan-Peter Mund (Topic Editor). Soil Carbon Sequestration Fact Sheet. In C. J. Cleveland (ed.), Encyclopedia of Earth. Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment. Available at: http://www.eoearth.org/article/Soil_carbon_sequestration_fact_sheet.

Electrical Power Research Institute (EPRI). 1995. Interim report on the Fate of Wood Preservatives in Soils Adjacent to In-Service Utility Poles in the United States. TR-104968. June.

Electrical Power Research Institute (EPRI). 1997. Pole Preservatives in Soils Adjacent to In-Service Utility Poles in the United States. TR-108598.

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

Federal Highway Administration (FHWA). 2004. Synthesis of Noise Effects on Wildlife Populations. Publication No. FHWA-HEP-06-016.

Federal Highway Administration (FHWA). 2006. Road Construction Noise model, Version 1. February 2, 2006.

Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. (DOT-T-95-16.) Washington, D.C.: Office of Planning. Prepared by Harris, Miller, Miller & Hanson, Inc., Burlington, MA. Available at: http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf. Accessed October 1, 2014.

Fenneman, N.M., and D.W. Johnson. 1946. Physiographic Divisions of the United States, U.S. Geological Survey Water Resources Maps and GIS Data, Washington, D.C.

Flora of North America Editorial Committee, eds. 1993. Flora of North America North of Mexico. 19+ vols. New York and Oxford.

Gilmour, D., P. Solimano, M. Goodwin, B. Taylor, M. Daniels, C. Wichlacz, and D. Ellis. 2014. Cultural Resources Survey for the Bonneville-Hood River Rebuild Project, Multnomah and Hood River Counties, Oregon. Prepared for the Bonneville Power Administration by Willamette Cultural Resources Associates, LTd., Report Number 14-29.

Gucker, C.L. 2007. *Quercus garryana*. In: Fire Effects Information System [Online]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). http://www.fs.fed.us/database/feis/ (21 February 2013).

Gustafson, R.G., M.J. Ford, D. Teel, and J.S. Drake. 2010. Status review of eulachon (*Thaleichthys pacificus*) in Washington, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-105, 360 p.

Hickman, G.R., B.G. Dixon, and J. Corn. 1999. Small Mammals. Pg. 4.1-4.16 in The Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana. (G. Joslin and H. Youmans, coordinators.) Committee on Effects of Recreation on Wildlife, Montana Chapter of the Wildlife Society.

Historic Columbia River Highway Advisory Committee. 2012. Historic Columbia River Highway and State Trail Progress Report 2012. Available at: http://www.oregon.gov/ODOT/HWY/HCRH/docs/HCRHBROCUREWEB.pdf.

Historic Columbia River Highway Advisory Committee and Friends of the Historic Columbia River Highway. 2009. Mile Post 2016 Reconnection Projects: Segment 2 – Wyeth to Shellrock Mountain. Available at: http://www.oregon.gov/ODOT/HWY/HCRH/docs/reconnection_seg2.pdf

Hitchcock, C.L., and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle, WA.

Hofmeister, R.J., D.J. Miller, K.A. Mills, J.C. Hinkle, and A.E. Beier. 2002. GIS Overview Map of Potential Rapidly Moving Landslide Hazards in Western Oregon. Oregon Department of Geology and Mineral Industry. Portland, OR.

Hood River County. 2004. Goal 5 – Open Spaces, Scenic and Historic Areas, and Natural Resources. Adopted February 17.

Hood River County. 2010. Hood River County Bicycle Plan. February 2010. Available at: http://www.co.hood-river.or.us/vertical/sites/%7B4BB5BFDA-3709-449E-9B16-B62A0A0DD6E4%7D/uploads/HRC_Bike_Plan_02-24-10_web.pdf.

Hood River County. 2011. Hood River County Transportation System Plan. As amended November 21, 2011. Available at: http://www.co.hood-river.or.us/vertical/sites/%7B4BB5BFDA-3709-449E-9B16-B62A0A0DD6E4%7D/uploads/Final_HRC_TSP_11-21-11.pdf

Hood River County. 2014a. Land Use Zoning Data for Hood River County. Prepared by Hood River County Planning Department.

Hood River County. 2014b. Hood River County Weed and Pest/Code Enforcement Division Top Noxious Weeds and Plants. Information downloaded from http://www.co.hood-river.or.us/index.asp?Type=B_BASIC&SEC=%7BCDFBC692-74C2-4EBB-87CF-F43073B3CE57%7D. Accessed on September 12, 2014.

Hood River County Forestry Department. 2010. Recreation Trail System Master Plan. December. Available at: http://www.co.hood-river.or.us/index.asp?Type=B_BASIC&SEC={7B5DE3FE-544E-44B1-8CD9-9FDB1CA42C9E}.

Houghton, R. 2010. *Understanding the Carbon Cycle.* Carbon Researcher, The Woods Hole Research Center. Available at: http://www.whrc.org/carbon/index.htm.

Intergovernmental Panel on Climate Change (IPCC). 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

Intergovernmental Panel on Climate Change (IPCC). 2014. Summary for Policymakers, In: Climate Change 2014, Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlomer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

International Committee on Electromagnetic Safety (ICES). 2002. IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields 0 to 3 kHz C95. 6-2002. Piscataway, NJ: IEEE.

Jahn, O.W. 2014. Letter to K. Kratz, Director NOAA Fisheries initiating formal consultation under the Endangered Species Act for Operations and Maintenance actions implementing of Standard Local Operating Procedures for Endangered Species consultation.

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

Kessavalou, A., J.W. Doran, A.R. Mosier, and R.A. Drijber. 1998. Greenhouse Gas Fluxes Following Tillage and Wetting in a Wheat-fallow Cropping System. Journal of Environmental Quality 27:1105–1116.

Komonen, A., T. Lensu, and J.S. Kotiaho. 2013. Optimal timing of powerline rights-of ways management for the conservation of butterflies. Insect Conserv. Diversity 6, 522–529.

Kramer, George. 2010a. Bonneville Power Administration Transmission System National Register Multiple Property Submittal. Prepared for Bonneville Power Administration. Copies on file at Bonneville Power Administration, Portland.

Kramer, George. 2010b. Corridors of Power: The Bonneville Power Administration Transmission Network Historic Context Statement. Kramer & Company. Submitted to Bonneville Power Administration, Master Agreement No. 38010. Copies on file at Bonneville Power Administration, Portland, OR.

Manning, T., and J.C. Hagar. 2011. Use of Nonalpine Anthropogenic Habitats by American Pikas (*Ochotona princeps*) in Western Oregon. Western North American Naturalist (71). Pp. 106-112.

Manuwal, D.A. 2003. Bird communities in oak woodlands of southcentral Washington. Northwest Science. 77(3): 194-201.

Melillo, J.M., T.C. Richmond, and G.W. Yohe, Eds. 2014. Highlights of Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 148 pp. Available at: www.nca2014.globalchange.gov.

Moskowitz, David. 1976. Wildlife of the Pacific Northwest: tracking and identifying mammals, birds, reptiles, amphibians, and invertebrates. Published in 2010 by Timber Press field guide. Portland, OR.

Mote, P., A.K. Snover, S. Capalbo, S.D. Eigenbrode, P. Glick, J. Littell, R. Raymondi, and S. Reeder. 2014. Ch. 21: Northwest. Climate Change Impacts in the United States: The Third National Climate Assessment, J.M. Melillo, T.C. Richmond, and G.W. Yohe, Eds., U.S. Global Change Research Program, 487-513. doi:10.7930/J04Q7RWX.

National Oceanic Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries). 2014. West Coast Region Species Lists. http://www.westcoast.fisheries.noaa.gov/protected_species/species_list/species_lists.html. Accessed October 10, 2014.

Natural Resources Conservation Service (NRCS). 1981. Soil Survey Report of Hood River County, Oregon (scanned version of the original archived text). NRCS formerly Soil Conservation Service. Department of Agriculture.

Natural Resources Conservation Service (NRCS). 1983. Soil Survey report of Multnomah County, Oregon, By George L. Green, Soil Conservation Service Fieldwork by Richard T. Smythe and Calvin T. High, Soil Conservation Service, United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with Oregon Agricultural Experiment.

Natural Resources Conservation Service (NRCS). 2014. Web Soil Survey. Department of Agriculture. Available at: http://websoilsurvey.nrcs.usda.gov/. Accessed September 17, 2014.

Northwest Power Planning Council. 2004. Hood River Subbasin Plan including Lower Oregon Columbia Gorge Tributaries. Writer/editor Holly Coccoli, Hood River Soil and Water Conservation District.

Oregon Biodiversity Information Center (ORBIC). 2014. OBRIC data, maintained by Portland State University. Available at: http://orbic.pdx.edu/data.html.

Oregon Department of Agriculture (ODA). 2014. Noxious Weed Policy and Classification System 2014. Noxious Weed Control Program. Salem, Oregon.

Oregon Department of Environmental Quality (ODEQ). 2004. Portland Area Carbon Monoxide Maintenance Plan – State Implementation Plan, Volume 2, Section 4.58. Available at: http://www.deq.state.or.us/aq/planning/docs/pdxCOplan.pdf. Accessed September 17, 2014.

Oregon Department of Environmental Quality (ODEQ). 2007. Portland-Vancouver Air Quality Maintenance Area (Oregon Portion) and Salem-Keizer Area Ozone Maintenance Plan. Available at: http://www.deq.state.or.us/aq/planning/docs/portlandSalemOzone.pdf. Accessed September 17, 2014.

Oregon Department of Environmental Quality (ODEQ). 2010. Water Quality Streams GIS Data. Available at: http://oregonexplorer.info/.

Oregon Department of Environmental Quality (ODEQ). 2013. Surface Water Drinking Water Source Areas in Oregon Data. Available at: http://www.deq.state.or.us/wq/dwp/results.htm.

Oregon Department of Environmental Quality (ODEQ). 2014a. 2014 Oregon Annual Ambient Air Quality Monitoring Network Plan. Available at: http://www.deq.state.or.us/aq/forms/2014AQMonNetPlan.pdf. Accessed October 21, 2014.

Oregon Department of Environmental Quality (ODEQ). 2014b. Facility Profiler 2.0. Available at: http://deq12.deq.state.or.us/fp20/. Accessed September 18, 2014.

Oregon Department of Environmental Quality (ODEQ) and Southwest Clean Air Agency. 2011. Air Quality Report: Columbia River Gorge Air Study and Strategy, September 15, 2011 - Final. Prepared for Columbia River Gorge Commission.

Oregon Department of Fish and Wildlife (ODFW). 2014. Oxbow Fish Hatchery webpage. Available at: http://www.dfw.state.or.us/resources/visitors/oxbow_hatchery.asp. Accessed October 2, 2014.

Oregon Department of Forestry (ODF). 2012. Western Oregon Harvests. Calendar Year 2012. Report downloaded from: http://www.oregon.gov/odf/pages/RESOURCE_PLANNING/2012timberharvestreport.aspx#Harvest_Data Accessed June 17, 2014.

Oregon Department of Transportation (ODOT). 2012. 2012 Traffic Volumes on State Highways Table. Available at: http://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/TVT_2012.pdf.

Oregon Department of Transportation (ODOT). 2014a. Historic Columbia River Highway State Trail, Lindsey Creek to Starvation Creek USFS National Scenic Area Application. Available at: http://www.oregon.gov/ODOT/HWY/HCRH/Pages/documents.aspx Accessed October 22, 2014.

Oregon Department of Transportation (ODOT). 2014b. Final approved project list for the Mt Hood multimodal transportation plan. Available at: http://www.oregon.gov/ODOT/HWY/REGION1/pages/MHMTP.aspx Accessed October 22, 2014.

Oregon Department of Transportation (ODOT). 2016. I-84 Construction Projects webpage. Available at: http://www.oregon.gov/ODOT/HWY/REGION1/Pages/I84Construction.aspx/?utm_source=Historic+Highway+Newsletter+-+May+2016+&utm_campaign=May+2016+newsletter&utm_medium=email. Accessed June 29, 2016.

Oregon Employment Department. 2013a. Oregon Labor Marker Information Center. Hood River County Annual Average Nonfarm Employment. Report downloaded from: http://www.qualityinfo.org/olmisj/CES?dataseries=or&areacode=41040000270&action=summary&submit=Continue. Accessed: June 17, 2014.

Oregon Employment Department. 2013b. Oregon Labor Marker Information Center. Multnomah County Annual Average Nonfarm Employment. Report downloaded from: http://www.qualityinfo.org/olmisj/CES?dataseries=or&areacode=41040000510&action=summary&submit=Continue. Accessed June 17, 2014.

Oregon Employment Department. 2014a. Business Information Center. Report for Hood River County. Report downloaded from:

http://www.qualityinfo.org/olmisj/BIC?action=report&naics3=&querystring=&rpt=g01&rpt=g03&rpt=i16&rpt=i14&rpt=e11&rpt=e12&rpt=e15&areacode=4104000027. Accessed June 17, 2014.

Oregon Employment Department. 2014b. Business Information Center. Report for Multnomah County. Report downloaded from: http://www.qualityinfo.org/olmisj/BIC?action=report&naics3=&querystring=&rpt=g01&rpt=g03&rpt=i16&rpt=i14&rpt=e11&rpt=e12&rpt=e15&areacode=4104000051. Accessed June 17, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2010. Historic Columbia River Highway State Trail Plan – Wyeth to Hood River. Fall 2010. Available at: http://www.oregon.gov/ODOT/HWY/HCRH/docs/statetrailplan_complete.pdf.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014a. Gorge Park Plan webpage. Available at: http://gorgeparksplan.com/about/. Accessed September 4, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014b. Historic Columbia River Highway State Trail – History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=113. Accessed September 5, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014c. Historic Columbia River Highway State Trail – Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=113. Accessed: September 5, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014d. John B. Yeon State Scenic Corridor – History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=114. Accessed October 2, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014e. John B. Yeon State Scenic Corridor – Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=114. Accessed October 2, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014f. Seneca Fouts Memorial State Natural Area – History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=120. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014g. Seneca Fouts Memorial State Natural Area – Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=120. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014h. Starvation Creek State Park – History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=122. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014i. Starvation Creek State Park – Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=122. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014j. Viento State Park – History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=123. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014k. Viento State Park - Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=123. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014l. Vinzenz Lausmann Memorial State Natural Area - History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=124. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014m. Vinzenz Lausmann Memorial State Natural Area - Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=124. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014n. Wygant State Natural Area – History/FAQ webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkHistory&parkId=125. Accessed September 3, 2014.

Oregon State Parks and Recreation Department (Oregon State Parks). 2014o. Wygant State Natural Area – Park Info webpage. Available at: http://www.oregonstateparks.org/index.cfm?do=parkPage.dsp_parkPage&parkId=125. Accessed September 3, 2014.

Pacific Crest Trail Association. 2014. Scoping Letter from Dana Hendricks to BPA. April 21.

Pacific Fishery Management Council (PFMC). 2014. Habitat and Communities: Habitat, Pacific Fishery Management Council Web Site. Available at: http://www.pcouncil.org/habitat-and-communities/habitat/. Accessed October 11, 2014.

Pacific Flyway Council. 2014. Pacific Flyway Management Plans. Available at: http://www.pacificflyway.gov/Management.asp. Accessed December 17, 2014.

Palmer, L. 1977. Large landslides of the Columbia River Gorge, Oregon and Washington, *in* Coates, D.R. ed., Landslides: Geological Society of America, *Reviews in Engineering Geology*. 3. P 69-84.

Plamondon, M. 2004. Lewis and Clark Trail Maps , A Cartographic Reconstruction. Vol III. Washington State University Press.

Reynolds, N.D. 2001. Dating the Bonneville Landslide with Lichenometry. Washington Geology 29 (3/4): 11–16.

Sager, J.W. 1989. Bonneville Dam, in Galster, ed., Engineering Geology *in* Washington, Volume I: Washington Division of Geology and Earth Resources Bulletin 78, p. 337-346.

Schuster, R.L., and P.T. Pringle. 2002. Engineering history and impacts of the Bonneville Landslide, Columbia River Gorge, Washington-Oregon, USA, *in* Rybar, J., Steberk, J., and Wagner, P., eds., Landslides: Proceedings of the first European conference on landslides, Prague, 24-26 June 2002: Lisse, The Netherlands, A.A. Balkema, p. 689-699.

Simpson, W.G. 2009. American pikas in habit low-elevation sites outside the species' previously described bioclimatic envelope. Western North American Naturalist 69:243–250.

Skamania Coves. 2015. 2015 Local Gorge Events Calendar. Available at: http://www.skamaniacoves.com/local-events.php. Accessed on November 23, 2015.

Slichter, P. 2012. Columbia River Gorge Wildflowers from Bonneville East. On-line Library available at http://science.halleyhosting.com/nature/gorge/index.htm. Accessed October 3, 2014.

Smith, A.T., and M.L. Weston. 1990. *Ochotona princeps*. Mammalian Species 352:1–8.

Stout, I.J., and G.W. Cornwell. 1976. Nonhunting mortality of fledged North American waterfowl. Journal of Wildlife, Management 40:681–693.

Strasser, E.H., and J.A. Heath. 2013. Reproductive failure of a human-tolerant species, the American kestrel, is associated with stress and human disturbance. Journal of Applied Ecology.

StreamNet GIS Data (StreamNet). 2012. Complete Generalized Fish distribution layer for all species in the StreamNet database. Published February 2012. Available at: http://www.streamnet.org/mapping_apps.cfm. Accessed September 22, 2014.

Sullivan, R., J.M. Abplanalp, S. Lahti, K.J. Beckman, B.L. Cantwell, and P. Richmond. 2014. Electric Transmission Visibility and Visual Contrast Threshold Distances in Western Landscapes. Argonne National Laboratory and U.S. Bureau of Land Management.

The Climate Registry. 2015. CRIS: Climate Registry Information System: Entity Emissions Detailed report Bonneville Power Administration.

Tolan, T.L., M.H. Beeson, and K.A. Lindsey. 2002. The Effects of Volcanism and Tectonism on the Evolution of the Columbia River System. Northwest Geological Society.

Trombulak, S.C., and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14:18-30.

Turnstone Environmental Consultants, Inc. (Turnstone). 2015a. Wetland Delineation Report for Bonneville Power Administration, Bonneville to Hood River Transmission Line Rebuild Project. In preparation as of November 2015.

Turnstone Environmental Consultants, Inc. (Turnstone). 2015b. Botanical Resources for the Bonneville-Hood River Transmission Line Rebuild Project Report. Prepared for Bonneville Power Administration. In preparation as of November 2015.

Turnstone Environmental Consultants, Inc. (Turnstone). 2015c. GIS data from 2014 vegetation surveys of the Bonneville-Hood River project area, conducted by Turnstone Environmental, Portland, OR.

Turnstone Environmental Consultants, Inc. (Turnstone). 2015d. Wildlife Resources for the Bonneville-Hood River Transmission Line Rebuild Project Report. Prepared for Bonneville Power Administration. In preparation as of November 2015.

U.S. Census Bureau. 2000. DP-01. Profile of General Demographic Characteristics, Census 2000 Summary. Profile downloaded from http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t. Accessed June 18, 2014.

U.S. Census Bureau. 2010. DP-01. Profile of General Demographic Characteristics, Census 2010 Summary. Profile downloaded from http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t. Accessed June 16, 2014.

U.S. Census Bureau. 2012. DP-03. 2008-2012 Community Survey Selected Economic Characteristics, 5-Year Survey. Profile downloaded from http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t. Accessed June 16, 2014.

U.S. Census Bureau. 2013. Poverty Thresholds for 2013 by Size of Family and Number of Related Children under 18 Years. Poverty thresholds downloaded from https://www.census.gov/hhes/www/poverty/data/threshld/index.html. Accessed June 16, 2014.

U.S. Department of Agriculture (USDA). 2012a. Hood River County Profile Summary. National Agricultural Statistics Service. Available at: http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Oregon/cp41027.pdf.

U.S. Department of Agriculture (USDA). 2012b. Table 1. County Summary Highlights: 2012. National Agricultural Statistics Service. Available at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Oregon/st41_2_001_001.pdf.

U.S. Department of Agriculture (USDA). 2012c. Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007. National Agricultural Statistics Service. Available at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Oregon/st41_2_008_008.pdf.

U.S. Department of Agriculture (USDA). 2014. 2012 Census of Agriculture, Oregon. State and County Data. U.S. Department of Agriculture, National Agricultural Statistics Service. County profile downloaded from http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/California/. May. Accessed June 17, 2014.

U.S. Energy Information Administration (EIA). 2009. Energy and the Environment. Greenhouse Gases Basics. Available at: http://tonto.eia.doe.gov/energyexplained/index.cfm?page=environment_about_ghg.

U.S. Environmental Protection Agency (EPA). 1978. Protective Noise Levels. Condensed Version of EPA Levels Document. (No. PB82-138827). U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 1998. *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis.*

U.S. Environmental Protection Agency (EPA). 2008a. Registration Eligibility Decision for Pentachlorophenol. EPA-739-R-08-008. September 25, 2008.

U.S. Environmental Protection Agency (EPA). 2008b. Map of Designated Sole Source Aquifers in EPA Region 10, Idaho, Oregon, Washington. July 21, 2008.

U.S. Environmental Protection Agency (EPA). 2011. Level III and IV ecoregions of the continental United States. U.S. EPA, National Health and Environmental Effects Research Laboratory, Corvallis, Oregon, Map scale 1:3,000,000. Available at: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm. Accessed September 17, 2014.

U.S. Environmental Protection Agency (EPA). 2013a. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011. Available at: http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

U.S. Environmental Protection Agency (EPA). 2013b. Climate Change Science Overview. Available at: http://www.epa.gov/climatechange/science/overview.html.

U.S. Environmental Protection Agency (EPA). 2013c. Electric and Magnetic Fields (EMF) Radiation from Power Lines. Available at URL=http://www.epa.gov/radtown/power-lines.html. Accessed June 18, 2013.

U.S. Environmental Protection Agency (EPA). 2015. Greenhouse Gas Equivalencies Calculator. Available at: http://www.epa.gov/cleanenergy/energy-resources/calculator.html) accessed on April 11, 2016.

U.S. Fish and Wildlife Service (USFWS). 2008. Guidelines for raptor conservation in the western United States. USFWS, Division of Migratory Bird Management, Washington DC.

U.S. Fish and Wildlife Service (USFWS). 2011. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). U.S. Fish and Wildlife Service, Portland, OR.

U.S. Fish and Wildlife Service (USFWS). 2012. Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls. (Revised January 2012).

U.S. Fish and Wildlife Service (USFWS). 2014. IPaC - Information, Planning, and Conservation System Initial Project Scoping Trust Resources List. Accessed September 22, 2014. Available at: http://ecos.fws.gov/ipac/.

U.S. Forest Service. 1979. Soil Resource Inventory and Report for the Mount Hood National Forest. Prepared by Steve Howes, Soil Scientist, USDA Pacific Northwest Region. January 1979.

U.S. Forest Service. 1982. Pacific Northwest Region. Comprehensive Management Plan for the Pacific Crest National Scenic Trail.

U.S. Forest Service. 1994. Mt. Hood National Forest Data Library: Riparian Reserves. April 13, 1994. USDA Forest Service, Mt. Hood National Forest. Available at: http://www.fs.fed.us/r6/datalibrary/ gis/mthood/index.shtml. Accessed on October 2, 2014.

U.S. Forest Service. 1995. Eagle Creek Watershed Analysis. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Mt. Hood National Forest.

U.S. Forest Service. 1998. Columbia Tributaries East Watershed Analysis. Columbia River Gorge National Scenic Area and Hood River Ranger District Watershed Analysis Team. Kevin Slagle, Team Leader, Thomas Turck, Writer/Editor.

U.S. Forest Service. 2005. Building in the Scenic Area: Scenic Resources Implementation Handbook.

U.S. Forest Service. 2011. FINAL Region 6 Regional Forester Special Status Species List, Includes Federal TEP Species and Region 6 Regional Forester Sensitive Species.

U.S. Forest Service. 2012. National Scenic Area land use data, R6 Data Library. Available at: http://www.fs.fed.us/r6/data-library/gis/columbia-gorge/. Accessed September 2, 2014.

U.S. Forest Service. 2014a. Buck Point Trail #439 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29888&actid=50. Accessed September 12, 2014.

U.S. Forest Service. 2014b. Eagle Creek Campground webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/camping-cabins/recarea/?recid=29906&actid=29. Accessed September 3, 2014.

U.S. Forest Service. 2014c. Eagle Creek Day Use/Picnic Area/Trailhead webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29910&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014d. Eagle Creek Trail #440 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29912&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014e. Gorge Trail #400 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29920&actid=50. Accessed: September 3, 2014.

U.S. Forest Service. 2014f. Herman Creek Campground/Horse Camp webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/camping-cabins/recarea/?recid=29926&actid=29. Accessed September 3, 2014.

U.S. Forest Service. 2014g. Herman Creek Trail #406 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29928&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014h. John B. Yeon Trailhead webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recarea/?recid=29938. Accessed October 2, 2014.

U.S. Forest Service. 2014i. Mount Defiance Trail #413 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29950&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014j. Ruckel Creek Trail #405 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29970&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014k. Shady Glen Trail #402A webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=30068&actid=50. Accessed September 12, 2014.

U.S. Forest Service. 2014l. Starvation Ridge Cut-off Trail #414Bb webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29982&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014m. Starvation Ridge Trail #414 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29984&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014n. Wauna Viewpoint Trail #402 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=30000&actid=50. Accessed September 12, 2014.

U.S. Forest Service. 2014o. Wyeth/Gorton Creek Trailhead webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=29916&actid=50. Accessed: September 3, 2014.

U.S. Forest Service. 2014p. Wyeth Campground webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/camping-cabins/recarea/?recid=30008&actid=29. Accessed September 3, 2014.

U.S. Forest Service. 2014q. Wyeth Trail #411 webpage. Available at: http://www.fs.usda.gov/recarea/crgnsa/recreation/hiking/recarea/?recid=30010&actid=50. Accessed September 3, 2014.

U.S. Forest Service. 2014r. Schedule of Proposed Actions for Region 6 and Mt. Hood National Forest. Available online at: http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110606 Accessed October 7, 2014.

U.S. Forest Service (USFS) and Bureau of Land Management (BLM). 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. USDA Forest Service and USDI Bureau of Land Management, Survey and Manage Program of the Northwest Forest Plan, Oregon.

U.S. Geological Survey (USGS). 2014. Hydrography; National Hydrography Dataset, Watershed Boundary Dataset. Available at: http://nhd.usgs.gov/. Accessed October 2014.

Varner, J., and M.D. Dearing. 2014a. Dietary plasticity in pikas as a strategy for atypical resource landscapes. Journal of Mammalogy, 95(1):000–000, 2014. DOI: 10.1644/13-MAMM-A-099.1.

Varner, J., and M.D. Dearing. 2014b. The Importance of Biologically Relevant Microclimates in Habitat Suitability Assessments. PLoS ONE 9(8): e104648. doi:10.1371/journal.pone.0104648.

Wagner, D.L., K.J. Metzler, S.A. Leich-Young, and G. Motzkin. 2014. Vegetation composition along a New England transmission line corridor and its implication for other trophic levels. Forest Ecology and Management 327:231-239.

Washington Department of Wildlife (WDFW). 2011. Columbia Upper Gorge Fall Chum. Available at: https://fortress.wa.gov/dfw/score/score/species/population_details.jsp?stockId=2757 Accessed 11-10-2014.

Waters, A.C. 1973. The Columbia River Gorge: basalt stratigraphy, ancient lava dams and landslide dams, in Geologic Field Trips in Northern Oregon and Southern Washington: State of Oregon Department of Geology and Mineral Industries Bulletin 77, Portland, OR. p 133-162.

Westbrooks, R.G. 1998. Invasive Plants, Changing the Landscape of America, the Fact Book, Federal Interagency Committee for the Management of Noxious and Exotic Weeds, Washington D.C.

Western Invasives Network. 2011. Columbia Gorge Cooperative Weed Management Area Long Term Management Plan. Report downloaded from http://www.cascadepacific.org/shop/wpimages/columbia-gorge-cwma-documents.pdf. Accessed September 12, 2014.

Western Wood Preservers Institute (WWPI). 2012. Best Management Practices for the use of treated wood in aquatic and wetland environments. Available at: http://www.wwpinstitute.org/aquatics.html.

White, E.M., and D. Goodding. 2013. Spending and economic activity from recreation at Oregon State Park Properties – Columbia River Gorge Management Unit. Available at: http://www.oregon.gov/oprd/PLANS/docs/scorp/2013-2018_SCORP/Gorge_Economic_Impact%20Report.pdf. Accessed 2-12-2015.

Xcel Energy. 2011. Overhead vs. Underground: Information about undergrounding high-voltage transmission lines. Available at: http://www.xcelenergy.com/staticfiles/xe/Regulatory/Transmission/OverheadvsUnderground.pdf Accessed June 9, 2014.

6.2 Personal Communications

Beever, E. 2014. Personal communication with Erik Beever, PhD, Research Ecologist, USGS, with Glen Mejia, Biologist, AECOM regarding the American pika. November 14, 2014.

Hoff, R. 2014. Email from R. Hoff (BPA Forester) to K. Grange (BPA NEPA Lead) regarding estimates of trees that may need to be removed at pulling/tensioning sites. Sent October 2, 2014.

James, S. 2014. Personal communication with Stephanie James, Biologist Turnstone with Glen Mejia, Biologist AECOM regarding wildlife observations. September 16, 2014.

Richardson, Sean. Oregon Department of Fish and Wildlife, Oxbow Fish Hatchery, Cascade Locks, Oregon. October 21, 2014. Personal communication with Linda Howard, AECOM, regarding hatchery water intake locations on Herman Creek.

Stallman, K. 2014. Email communication from K. Stallman, ODOT, to D. Ebert, AECOM Project Manager regarding status of I-84 Exit 62, 63, and 64 IAMPs. October 23, 2014.

Trainer, Mark. 2014. Oregon Department of Fish and Wildlife, Cascade Fish Hatchery, Cascade Locks, Oregon. October 21, 2014. Personal communication with Linda Howard, AECOM, regarding hatchery water intake locations on Eagle Creek.

Varner, J. 2014. Personal communication with Johanna Varner, PhD Candidate, Biology, University of Utah, with Glen Mejia, Biologist, AECOM regarding the American pika. November 13, 2014.

Walczak, B. 2014. Personal communication from Ben Walczak, Oregon Department of Fish and Wildlife, Assistant District Fish Biologist, North Willamette Watershed District, to Glen Mejia, Biologist AECOM, regarding chum sightings in 2009 and 2010 in Eagle Creek during ODFW's Oregon Adult Salmonid Inventory and Sampling Project surveys. November 10, 2014.

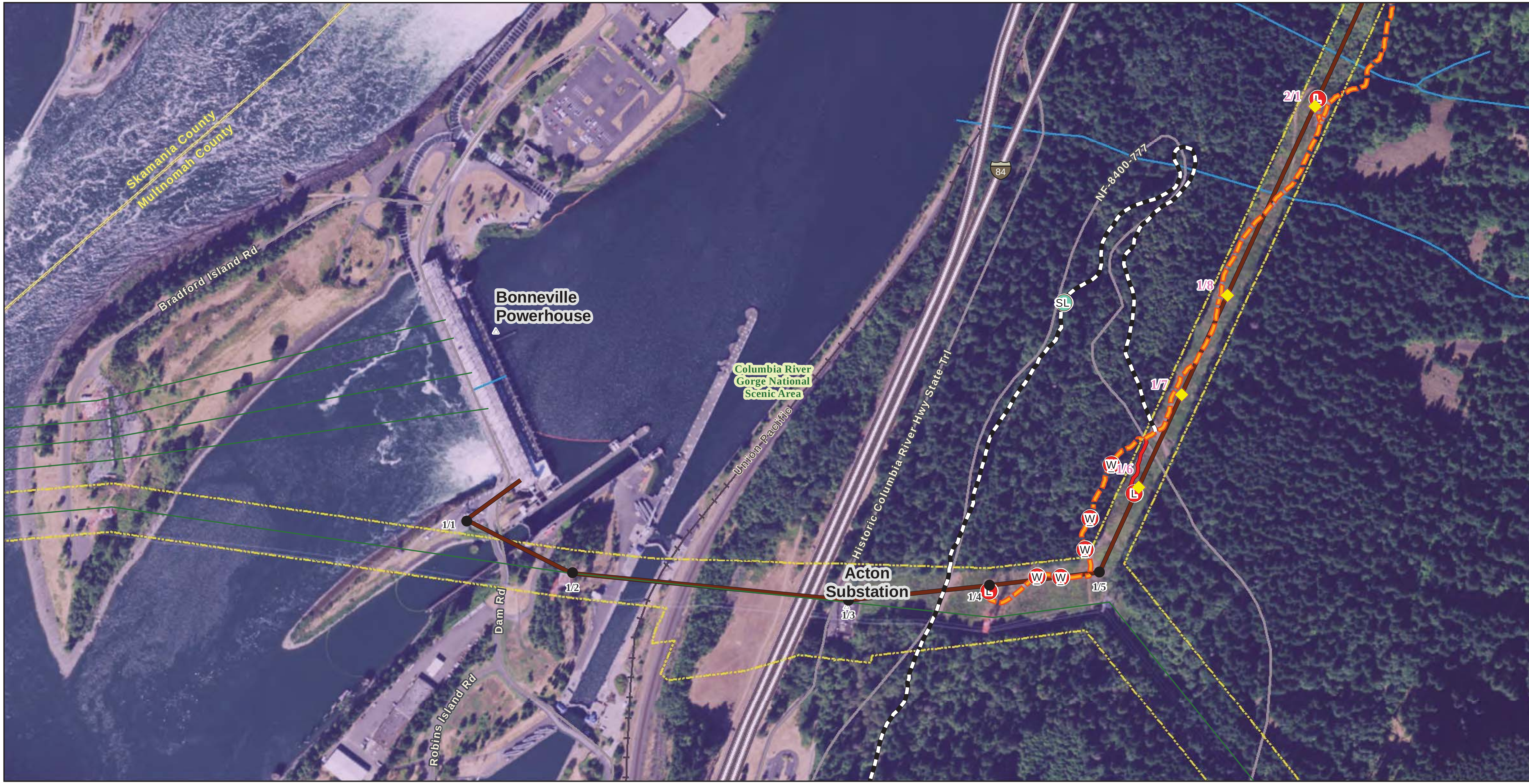
Appendix A

Detailed Project Mapping

This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

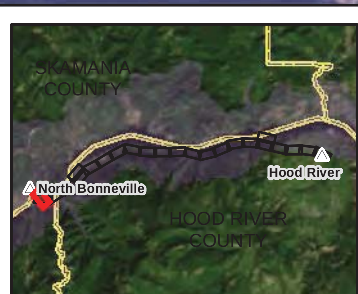
Multnomah County, OR



Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- BPA Transmission Line
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- L Landing
- SL Slide-Stabilization
- W Waterbar

- Install New
- Repair

- Extension
- Improvement
- Direction of Travel

- Replace, Wood Structure

Feet
0 200 400

Operating Mile 1

Map 1 of 27

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

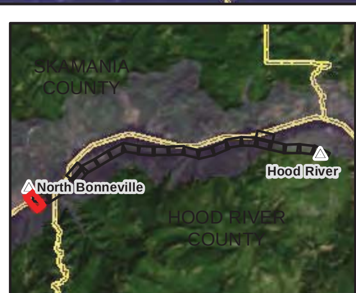
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Multnomah County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- BPA Transmission Line
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- G Gate

Existing

Direction of Travel

Operating Mile 1a

Map 2 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

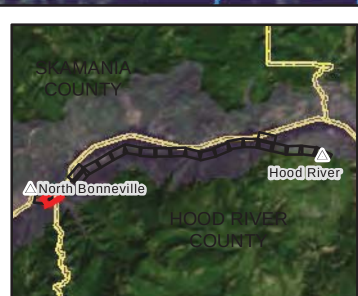
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Multnomah & Hood River Counties, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- G Gate
- L Landing
- ? Other
- SL Slide-Stabilization
- TA Turn-Around
- W Waterbar

- Existing
- Install New
- Repair

- Extension
- Reconstruction
- Improvement
- Direction of Travel

- New, Wood Structure
- Replace, Wood Structure
- Relocate Structure

Operating Mile 2

Map 3 of 27

Feet 0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

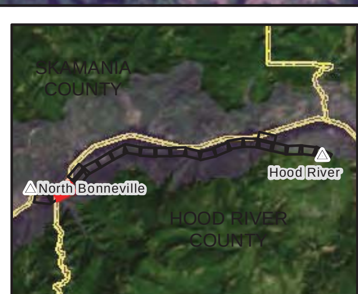
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DR Ditch Relief
- DD Drain Dip
- L Landing
- ? Other
- SL Slide-Stabilization
- SR Spot Rock
- W Waterbar

- Install New
- Repair

- Extension
- Reconstruction
- Improvement
- Direction of Travel

- New, Wood Structure
- Replace, Wood Structure
- Relocate Structure

Operating Mile 3

Map 4 of 27

Feet 0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

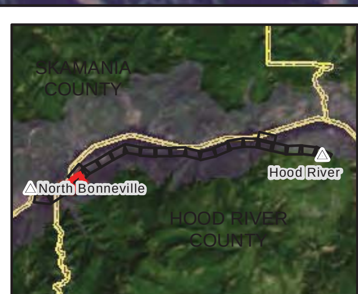
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- C Culvert
- DR Ditch Relief
- DD Drain Dip
- G Gate
- L Landing
- SR Spot Rock
- W Waterbar

- Existing
- Install New
- Repair
- Replace

- Improvement

- New, Wood Structure
- Replace, Wood Structure
- Relocate Structure

Operating Mile 4

Map 5 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

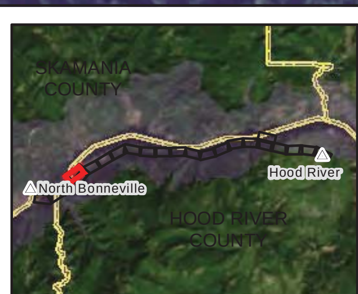
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville Power Administration



GIS Analyst: RRP

National Scenic Area Boundary

Planned

SR Spot Rock

Install New

Improvement

Direction of Travel

Operating Mile 4a

Map 6 of 27

Feet

0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

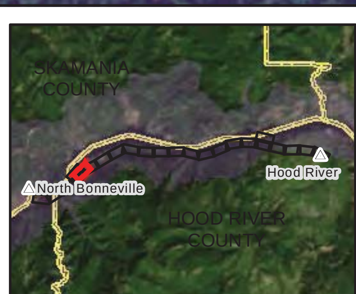
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- FO Ford
- G Gate
- L Landing
- SR Spot Rock
- W Waterbar

- Existing
- Install New
- Repair
- Replace

- Improvement
- Direction of Travel

- Replace, Wood Structure

Operating Mile 5

Map 7 of 27

Feet 0 200 400

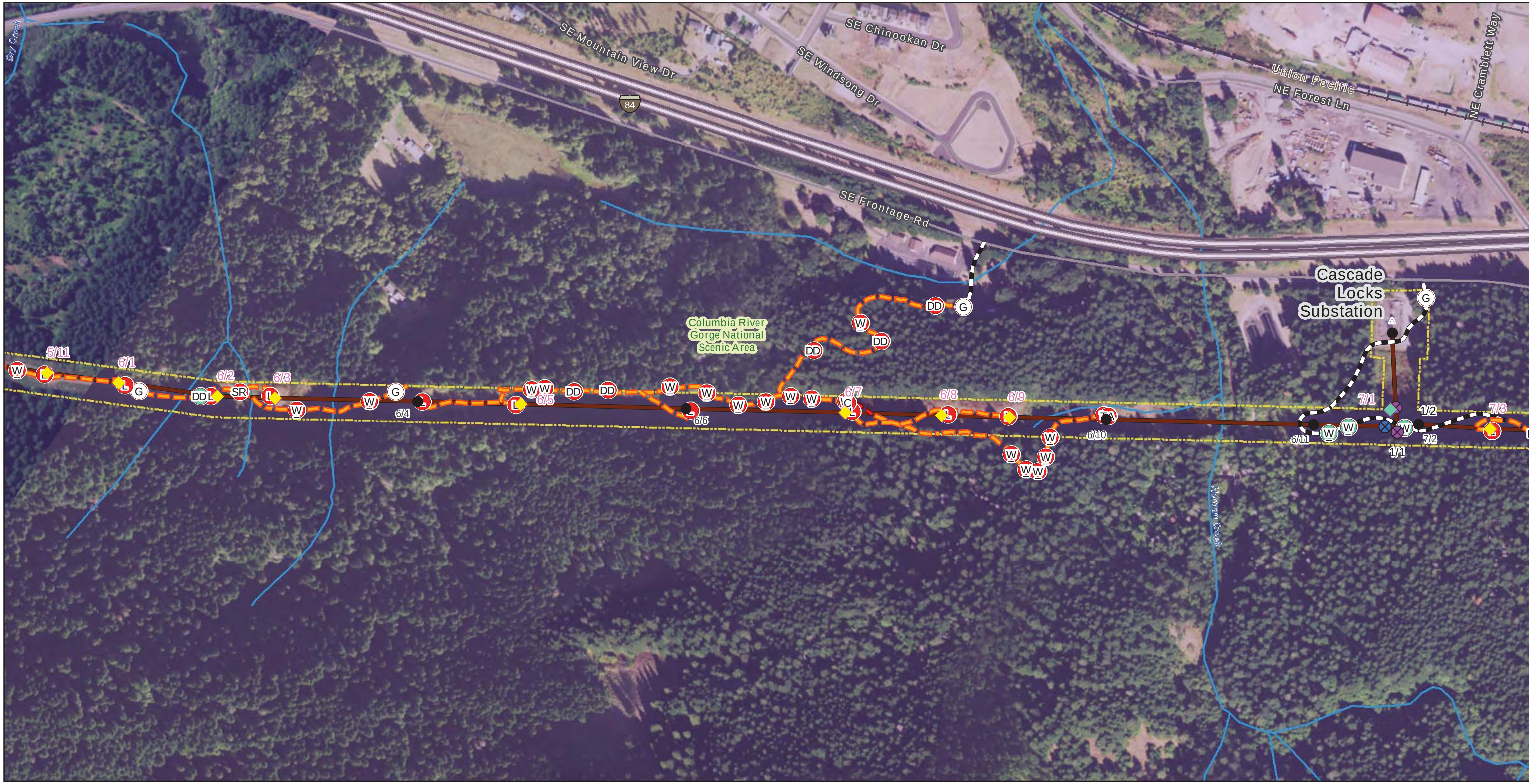
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

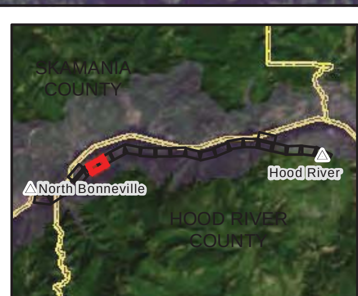
Hood River County, OR



Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- C Culvert
- DD Drain Dip
- G Gate
- L Landing
- SR Spot Rock
- TA Turn-Around
- W Waterbar

- Existing
- Install New
- Repair

- Reconstruction
- Improvement
- Direction of Travel

- New, Monopole Structure
- Replace, Wood Structure
- Relocate Structure
- Remove Structure

Operating Mile 6

Map 8 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

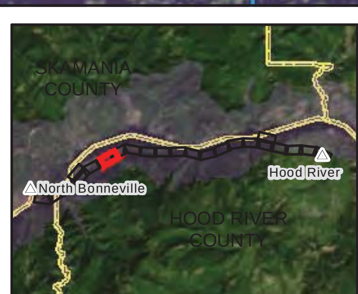
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- G Gate
- L Landing
- W Waterbar

- Existing
- Install New
- Repair

- Reconstruction
- Improvement
- Direction of Travel

- New, Monopole Structure
- Replace, Wood Structure
- Relocate Structure
- Remove Structure

Operating Mile 7

Map 9 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

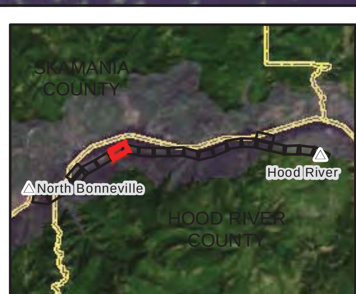
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- G Gate
- L Landing
- ? Other
- SR Spot Rock
- W Waterbar

- Clean
- Existing
- Install New

- Extension
- Improvement

- Replace, Wood Structure

Operating Mile 8

Map 10 of 27

Feet
0 200 400

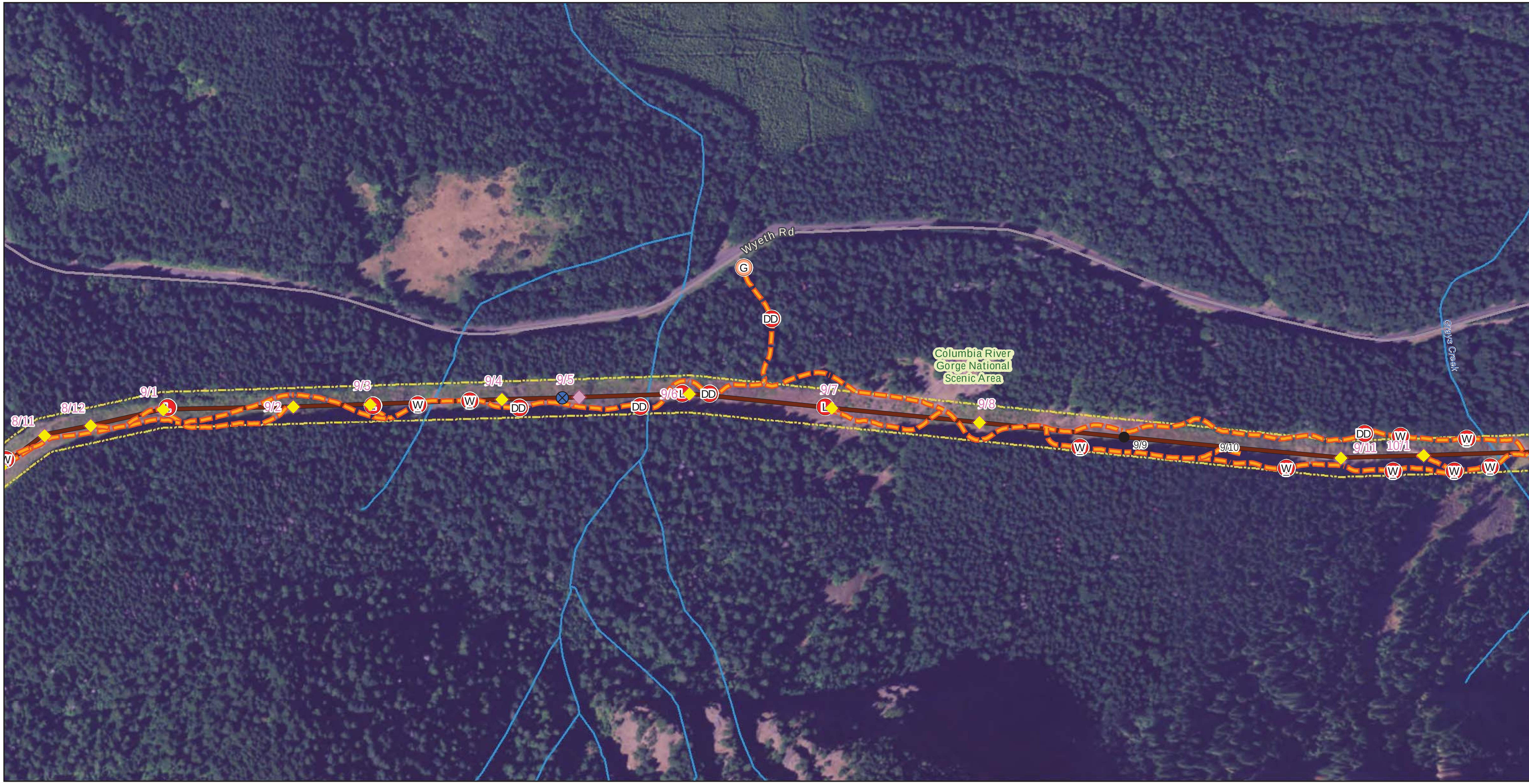
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

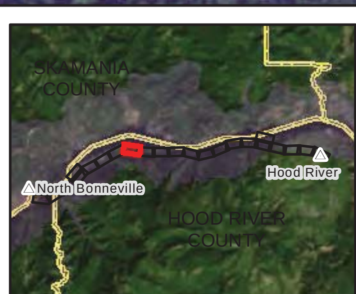
Hood River County, OR



Date: 7/18/2016

Bonneville
POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- G Gate
- L Landing
- W Waterbar
- Install New
- Replace
- Improvement
- New, Wood Structure
- Replace, Wood Structure
- Relocate Structure

Operating Mile 9

Map 11 of 27

N E S W

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

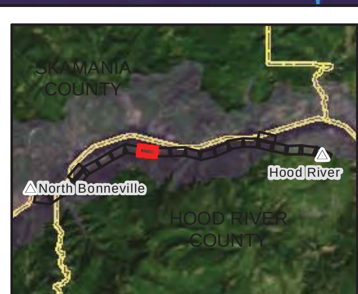
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- FO Ford
- G Gate
- L Landing
- W Waterbar

- Existing
- Install New
- Replace

- Improvement
- Direction of Travel

- New, Wood Structure
- Replace, Wood Structure
- Relocate Structure

Operating Mile 10

Map 12 of 27

N E S W

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

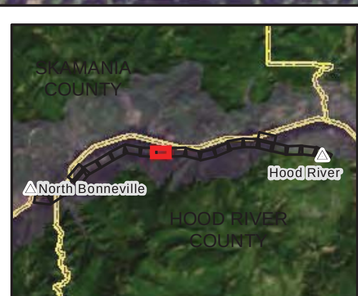
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville
POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- FO Ford
- G Gate
- L Landing
- W Waterbar

- Existing
- Install New
- Replace

- Improvement
- Direction of Travel

- Replace, Wood Structure

Operating Mile 11

Map 13 of 27

N
W E
S

Feet
0 200 400

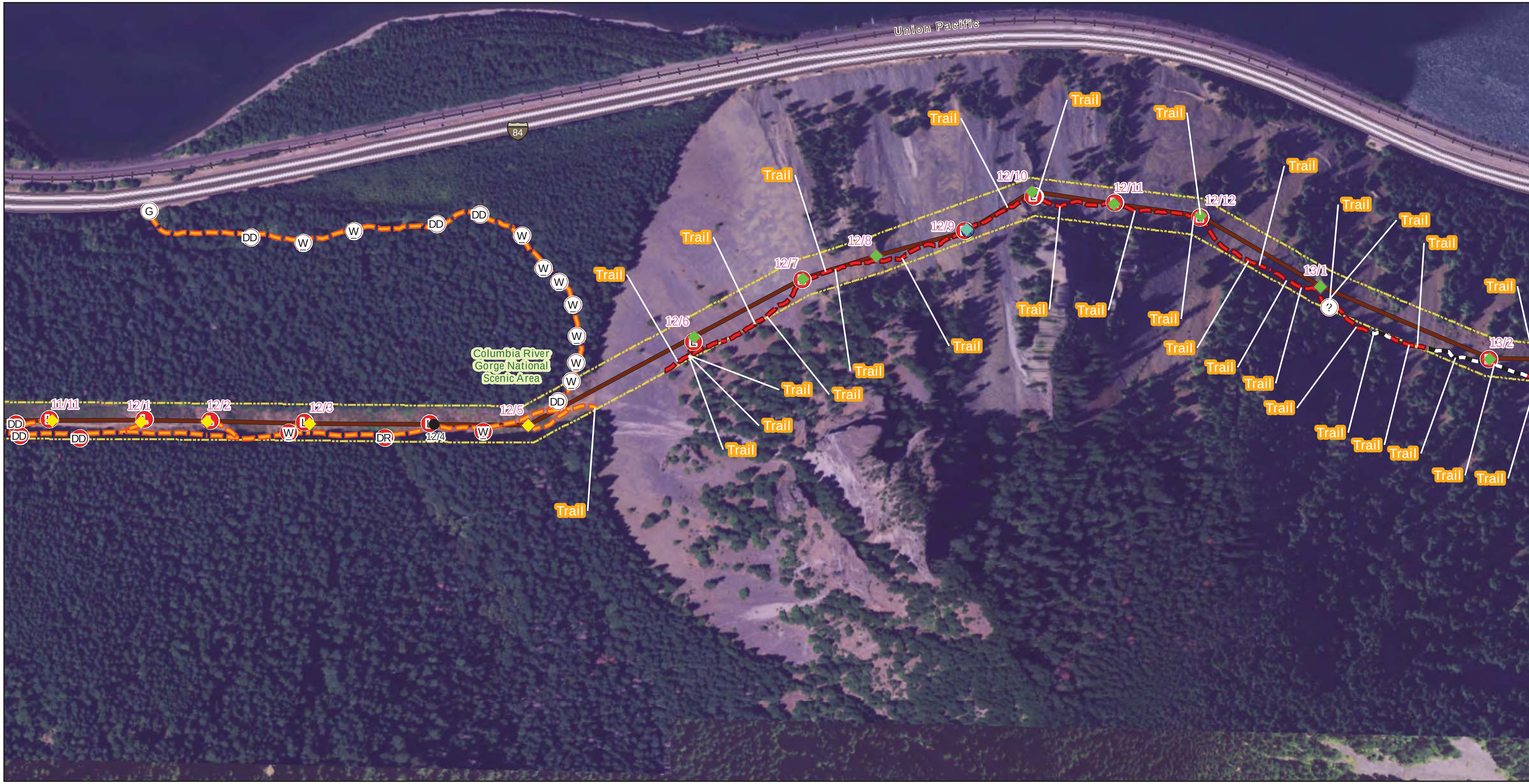
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

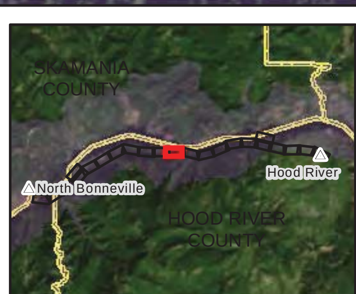
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR



Date: 7/18/2016



Bonneville POWER ADMINISTRATION

GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DR Ditch Relief
- DD Drain Dip
- G Gate
- L Landing
- ? Other
- W Waterbar

- Existing
- Install New

- Reconstruction
- Improvement
- Direction of Travel

- New, Monopole Structure
- Replace, Monopole Structure
- Replace, Wood Structure
- Relocate Structure

Operating Mile 12

Map 14 of 27

Feet 0 200 400

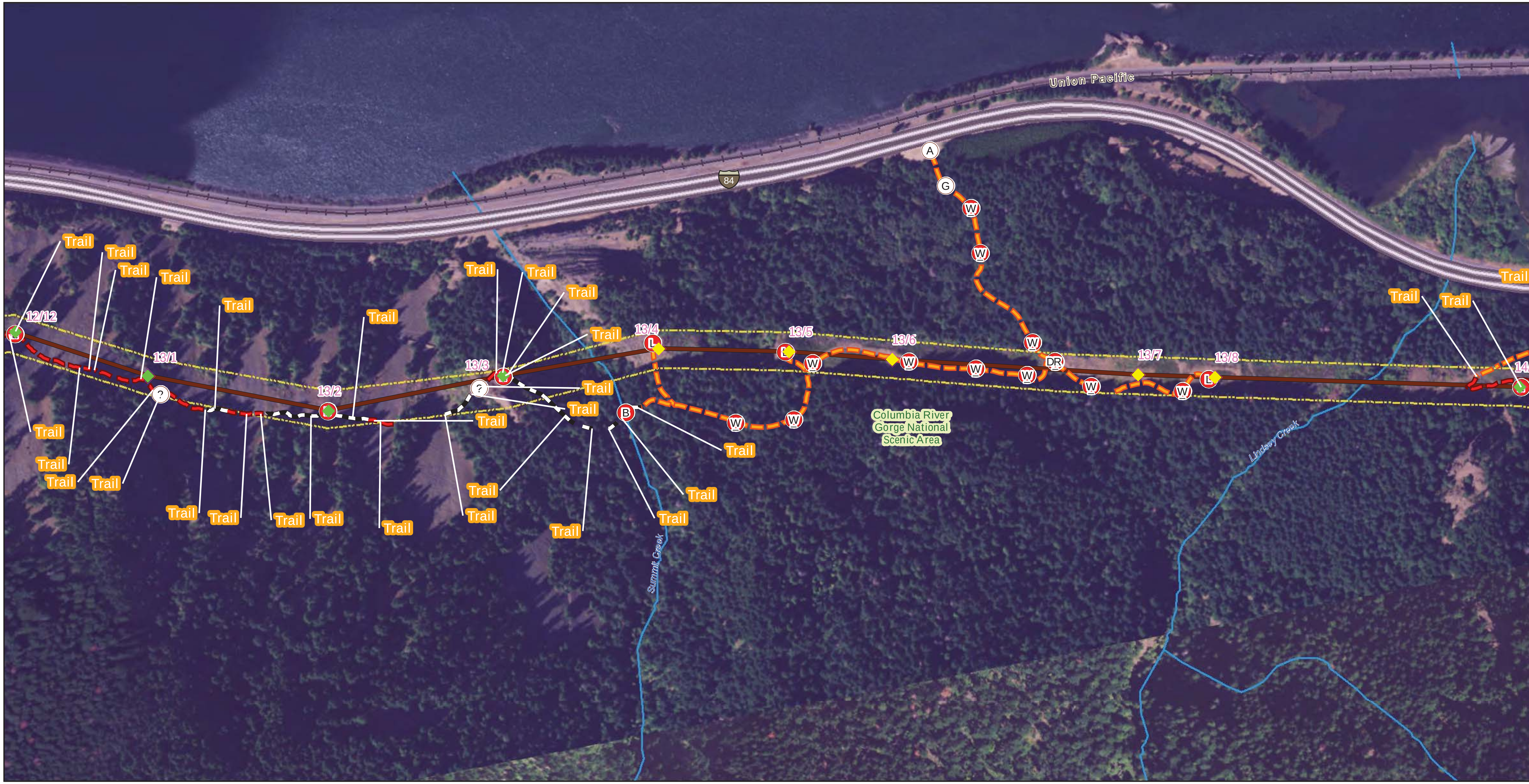
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

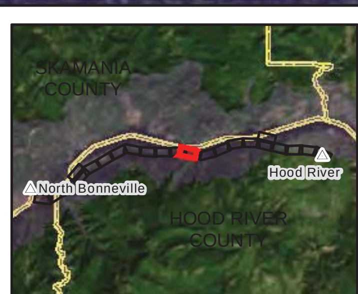
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR



Date: 7/18/2016



Existing

- Bonneville-Hood River Transmission Line
- BPA Right-of-Way
- National Scenic Area Boundary

Planned

- A Approach
- B Bridge
- DR Ditch Relief
- G Gate
- L Landing
- ? Other
- W Waterbar

- Existing
- Install New

- Extension
- Reconstruction
- Improvement
- Direction of Travel

- Replace, Monopole Structure
- Replace, Wood Structure

Operating Mile 13

Map 15 of 27

GIS Analyst: RRP

Feet 0 200 400

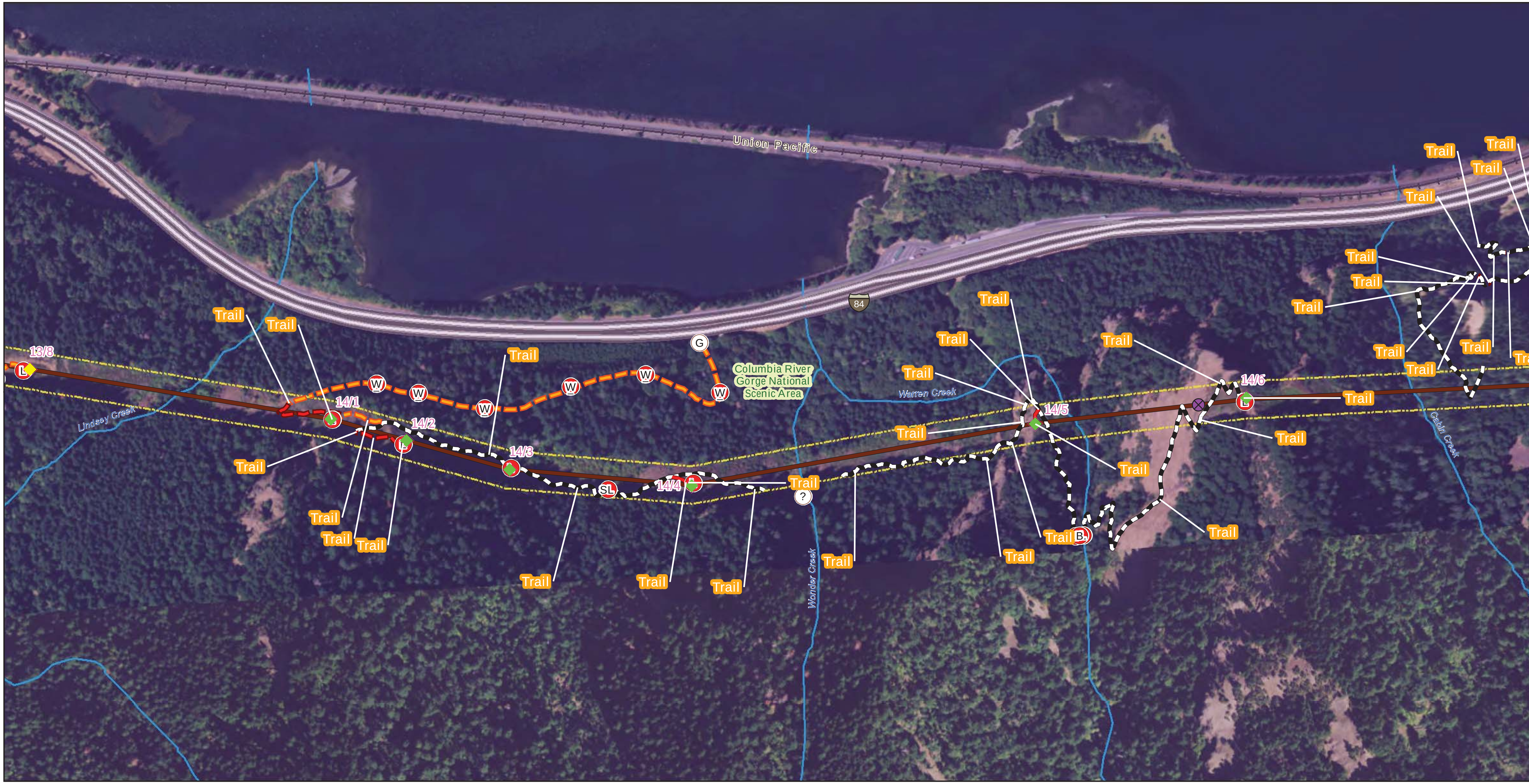
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

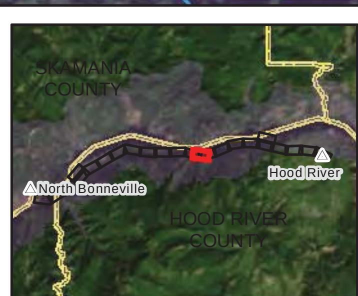
Hood River County, OR



Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
Bonneville-Hood River Transmission Line
BPA Right-of-Way
National Scenic Area Boundary

Planned
B Bridge
G Gate
L Landing
? Other
SL Slide-Stabilization
W Waterbar

Existing
Install New

Extension
Reconstruction
Improvement
Direction of Travel

Replace, Monopole Structure
Replace, Wood Structure
Remove Structure

Operating Mile 14

Map 16 of 27

N S E W

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

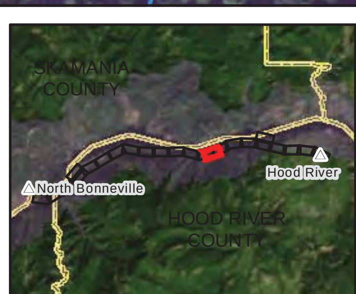
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- L Landing
- Install New
- Extension
- Reconstruction
- Improvement
- Direction of Travel
- New, Monopole Structure
- Replace, Monopole Structure
- Relocate Structure
- Remove Structure

Operating Mile 15

Map 17 of 27

Feet 0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

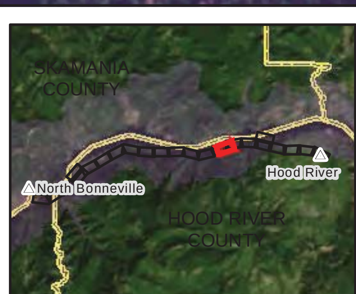
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- G Gate
- W Waterbar
- Existing
- Install New
- Extension
- Improvement
- Direction of Travel
- New, Monopole Structure
- Replace, Monopole Structure
- Relocate Structure
- Remove Structure

Operating Mile 16

Map 18 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

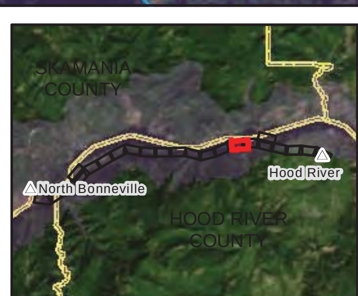
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- G Gate
- L Landing
- W Waterbar

- Existing
- Install New

- Improvement

- Replace, Monopole Structure
- Replace, Wood Structure

Operating Mile 17

N W E S

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

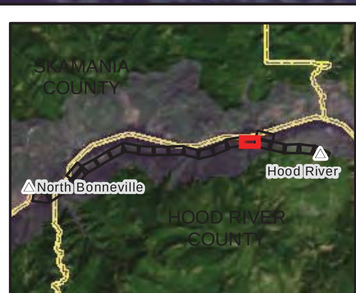
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- FO Ford
- G Gate
- L Landing
- W Waterbar

- Existing
- Install New
- Repair

- Improvement
- Direction of Travel

- Replace, Wood Structure
- Remove Structure

Operating Mile 18

Map 20 of 27

N E S W

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

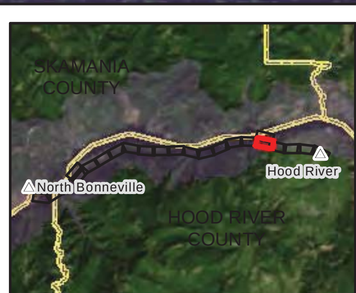
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- C Culvert
- DD Drain Dip
- G Gate
- L Landing
- SR Spot Rock
- TA Turn-Around
- W Waterbar

- Existing
- Install New
- Repair
- Replace

- Improvement
- Direction of Travel

- Replace, Monopole Structure
- Replace, Wood Structure
- Remove Structure

Operating Mile 19

Map 21 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

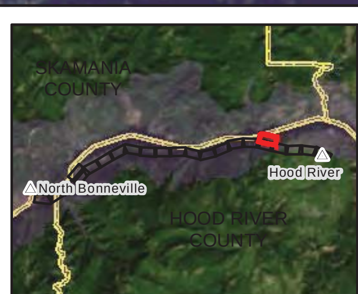
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



National Scenic Area Boundary

Planned

Install New

Improvement

Direction of Travel

W Waterbar

Operating Mile 19a

Map 22 of 27

N S E W

Feet

0 200 400

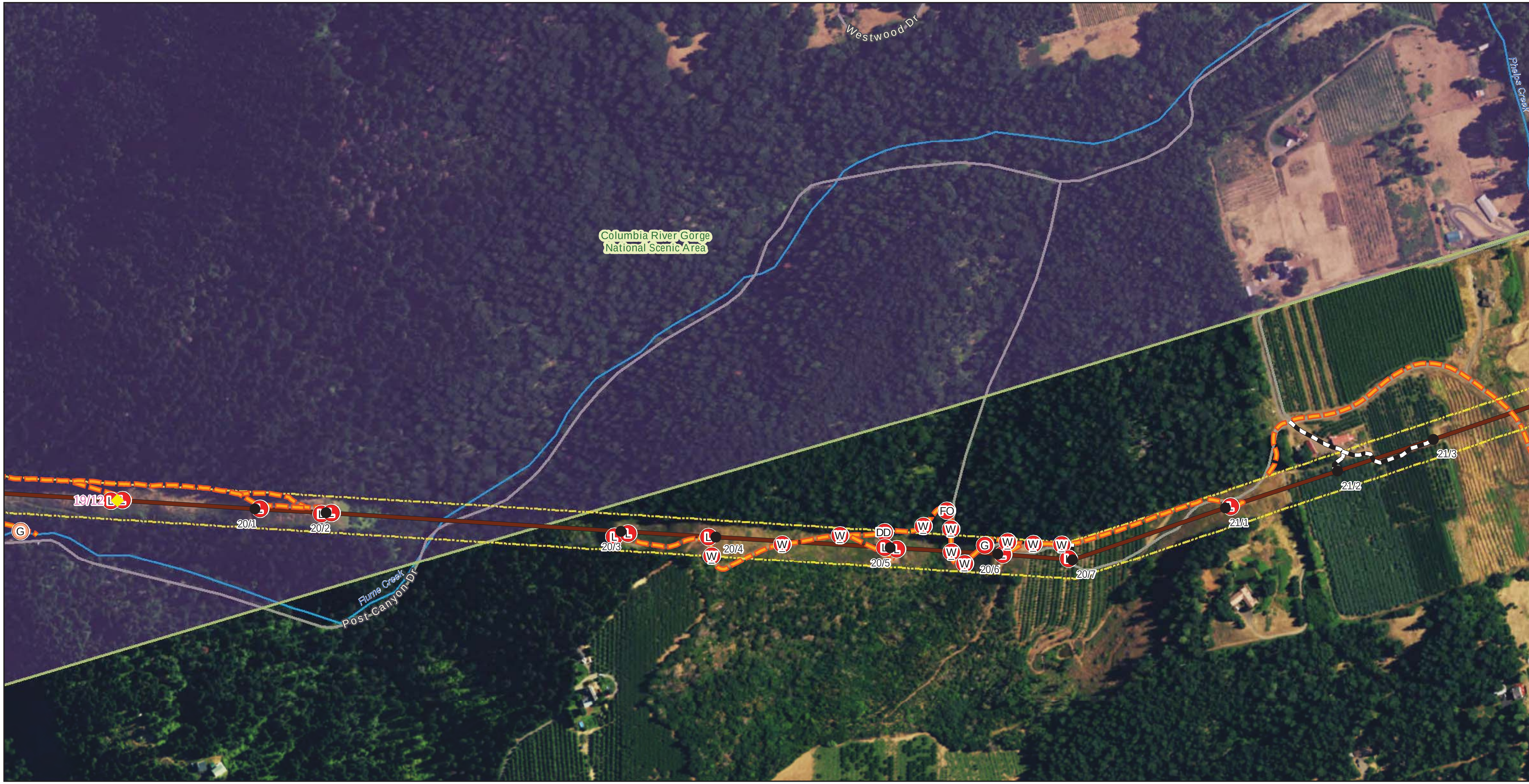
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

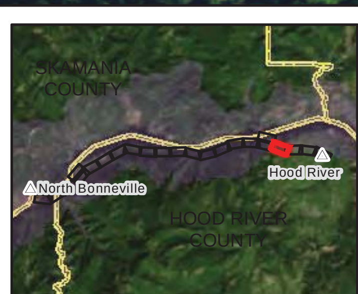
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR



Date: 7/18/2016

Bonneville
POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- DD Drain Dip
- FO Ford
- G Gate
- L Landing
- W Waterbar

- Install New
- Replace
- Improvement
- Direction of Travel
- Replace, Wood Structure

Operating Mile 20

Map 23 of 27

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville Power Administration

GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- A Approach
- DD Drain Dip
- FO Ford
- G Gate
- L Landing
- W Waterbar

- Existing
- Install New

- Improvement
- Direction of Travel

- Replace, Wood Structure

Operating Mile 21

Map 24 of 27

Feet 0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

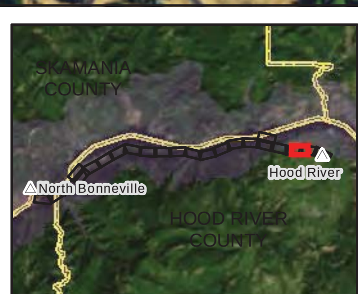
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION

GIS Analyst: RRP



Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- A Approach
- C Culvert
- G Gate

- Existing
- Install New

- Improvement
- Direction of Travel

Operating Mile 22

Map 25 of 27

N E S W

Feet
0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

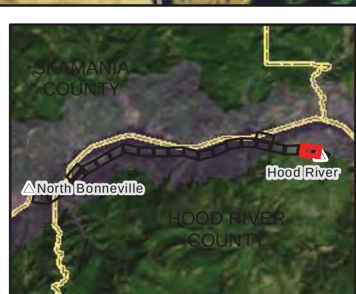
This page deliberately left blank

Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville POWER ADMINISTRATION



GIS Analyst: RRP

Existing
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- A Approach
- G Gate
- L Landing
- SR Spot Rock

- Existing
- Install New

- Reconstruction
- Improvement
- Direction of Travel

- Replace, Wood Structure

Operating Mile 23

Map 26 of 27

Feet 0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

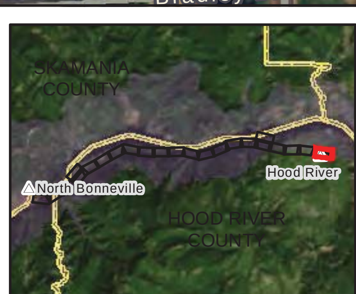
Proposed Bonneville-Hood River Rebuild Project Detailed Mapping

Hood River County, OR

Date: 7/18/2016

Bonneville Power Administration

GIS Analyst: RRP



Existing
- BPA Transmission Line
- Bonneville-Hood River Transmission Line
- Existing, No Pole Work
- BPA Right-of-Way
- National Scenic Area Boundary

Planned
- A Approach
- L Landing
- SR Spot Rock

- Existing
- Install New

Direction of Travel

Replace, Wood Structure

Operating Mile 24

Map 27 of 27

Feet 0 200 400

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS, PORTLAND, OREGON

NOT FOR CONSTRUCTION

This page deliberately left blank

Appendix B

Supplemental Information on Biological Resources

This page deliberately left blank

Special-Status Species and Potential for Occurrence in the Project Area

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
FISH			
Bull Trout *Salvelinus confluentus* (Columbia River)	T, OR-SC	Spawns and rears in cold streams and lakes. Adults will disperse and/or migrate in warmer systems such as the Columbia River mainstem. Currently also documented in Hood River, Drano Lake, and may also use the Klickitat River and Sandy River for migration within the National Scenic Area.	Not Expected
Steelhead *Oncorhynchus mykiss* (Snake River)	T	Anadromous: Habitat and presence within the National Scenic Area limited to migration corridor of the Columbia River. Critical habitat designation limited to Columbia River corridor within the National Scenic Area.	Not Present
Steelhead *Oncorhynchus mykiss* (Middle Columbia River)	T, OR-SC	Anadromous: Spawns and rears within Columbia River tributaries between Mosier and Yakima, in both Oregon and Washington.	Not Present
Steelhead Trout *Oncorhynchus mykiss* (Upper Columbia River.)	E	Anadromous. Habitat and presence within the National Scenic Area limited to migration corridor of the Columbia River. Critical habitat designation limited to Columbia River corridor within the National Scenic Area.	Not Present
Steelhead *Oncorhynchus mykiss* (Lower Columbia River)	T OR-SC,	Anadromous: Spawns and rears within Columbia River tributaries between the mouth of the Columbia River east to Hood River, in both Oregon and Washington. Documented in Eagle Creek, Herman Creek, Lindsey Creek, Viento Creek, and Perham Creek.	Present
Chinook Salmon *Oncorhynchus tshawytscha* (Snake River spring/ summer/fall runs)	T, OR-T	Anadromous. Presence within the National Scenic Area limited to migration corridor of the Columbia River. Critical habitat designation limited to Columbia River corridor within the National Scenic Area.	Not Present
Chinook Salmon *Oncorhynchus tshawytscha* (Lower Columbia River)	T, OR-SC (spring and fall run), WA-C	Anadromous: Spawns and rears within Columbia River tributaries between the mouth of the Columbia River east to Hood River, in both Oregon and Washington. Documented in Eagle Creek, Herman Creek, and Lindsey Creek.	Present
Chinook Salmon *Oncorhynchus tshawytscha* (Upper Columbia River.)	E	Anadromous: Presence within the National Scenic Area limited to migration corridor of the Columbia River. Critical habitat designation limited to Columbia River corridor within the National Scenic Area.	Not Present
Sockeye Salmon *Oncorhynchus nerka* (Snake River)	E	Anadromous. Presence within National Scenic Area limited to migration corridor of the Columbia River. Spawning area typically adjacent to or within lakes, where young rear. Critical habitat designation limited to Columbia River corridor within the National Scenic Area.	Not Present

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Chum Salmon *Oncorhynchus keta* (Columbia River)	T, OR-SC	Anadromous: Spawns and rears in several locations on the Columbia River shoreline as well as within low gradient Columbia River tributaries, in both Oregon and Washington. Historically documented spawning run as far east as the Umatilla/Walla Walla river systems, but present population is found largely below Bonneville Dam. Some incidental spawning known to occur near the mouth of White Salmon River (Washington). Recently documented spawning in Eagle Creek (Oregon).	Present
Coho Salmon *Oncorhynchus kisutch* (Lower Columbia River)	T, OR-E	Anadromous: Spawns and rears within Columbia River tributaries between the mouth of the Columbia River east to Hood River, in both Oregon and Washington. Documented in Eagle Creek, Herman Creek, Lindsey Creek and Viento Creek.	Present
Coastal Cutthroat Trout *Oncorhynchus clarki* (Lower Columbia Coastal Cutthroat Trout SMU/SW Washington/Columbia River)	OR-SV	This population segment is found in the western portion of the gorge. Spawning occurs from December through June and peaks in February. Documented in Eagle Creek, Ruckel Creek, Dry Creek, Herman Creek, Gorton Creek, Harphan Creek, Lindsey Creek, Warren Creek, Starvation Creek, Viento Creek, Perham Creek, an unnamed tributary to Phelps Creek, Phelps Creek, and Indian Creek.	Present
Green Sturgeon *Acipenser medirostris* (Southern)	T	Historically found in Columbia River up to Cascade Rapids. Now found up to Bonneville Dam with greater concentrations found farther downstream. Anadromous, long-lived, bottom feeder. Spawn March –July, juveniles stay in fresh water 1-3 years.	Not Expected
Pacific Lamprey *Lampetra tridentata*	OR-SV	Anadromous. Documented in the CRGNSA. Information on current distribution and abundance is sparse but being developed. Spawns in smaller tributaries to larger rivers.	Present
Western Brook Lamprey *Lampetra richardsoni*	OR-SV	Resident and nonparasitic. Documented in tributaries of White Salmon River and Klickitat River.	Moderate
Pacific Eulachon *Thaleichthys pacificus*	T	Anadromous, with spawning in mainstem Columbia River and lower reaches of rivers, often within tidal influence. Known to spawn in the Sandy River in National Scenic Area. Historically migrated as far east as Hood River prior to construction of Bonneville Dam.	Not Expected
WILDLIFE			
Cope's Giant Salamander *Dicamptodon copei*	FS, OR-SV	Western Washington, northwestern Oregon: Clear, cold mountain streams with rocky substrate.	Moderate
Cascade Torrent Salamander *Rhyacotriton cascadae*	OR-SV	Cascade Mountains of southern Washington and northern Oregon: in and adjacent to cold, fast, mountain streams or seeps w/rocky substrate.	Moderate
Oregon Slender Salamander *Batrachoseps wrightorum*	OR-SV	Northern and Central Oregon Cascades: Forests with large down logs and moist talus with abundant wood debris.	Present
Clouded Salamander *Aneides ferreus*	OR-SV	Associated with stumps and logs in Douglas-fir forests, and in talus and rock outcrops.	Moderate
Larch Mountain Salamander *Plethodon larselli*	FS, OR-SV	Cascades Mountains of Southern Washington/Northern Oregon: Largely in moss-covered talus slopes, or other rocky substrate, at low-mid elevation.	Present

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Coastal Tailed-frog *Ascaphus truei*	OR-SV	Cold, clear, fast moving, rocky streams in mature forest.	Moderate
Columbia Spotted frog *Rana luteiventris*	FS, OR-SV	Columbia Basin (east of Cascades Range): In or near permanent slow ponds, streams, marshes with abundant vegetation. No current occurrences in National Scenic Area.	Not Expected
Foothill Yellow-legged Frog *Rana boylii*	OR-SV	Lives in streams and rivers with off-channel habitat in pools or streams. More likely in western gorge than in the eastern gorge.	Not Expected
Cascade Frog *Rana cascadae*	OR-SV	Found in lake environments. Usually starting over 1,200 feet in elevation. Few lakes/ponds in National Scenic Area at that elevation limit the likelihood of occurrence.	Not Expected
Oregon Spotted Frog *Rana pretiosa*	T, FS, OR-SC	Historically found in the Puget Trough from the Canadian border to the Columbia River and east into the southern Washington Cascades. Typically found in or near large perennial lakes/marshes. Closest extant population at Crane Prairie Reservoir in Deschutes County, Oregon.	Not Expected
Northern Leopard Frog *Rana pipiens*	OR-SC	Found in lowland marsh and ponds with dense vegetation; currently found in Grant County (Washington) only. Likely extirpated in gorge.	Not Expected
Western Toad *Anaxyrus boreas*	OR-SV	Widespread distribution in Washington and Oregon: Most common near marshes and small lakes which are breeding sites in mid-spring; can travel readily overland and be found along streams/seeps. Known within the National Scenic Area near White Salmon, Major, and Catherine creeks. There are currently no known sites within the Oregon portion of the National Scenic Area.	Not Expected
Pacific Pond Turtle *Actinemys marmorata*	FS, OR-SC	Streams, large rivers, slow sloughs, and quiet waters with nesting habitat (typically open meadows) within about a half mile. Occurs at elevations below 3,000 feet.	Moderate
Painted Turtle *Chrysemys picta*	FS, OR-SC	Slow water ponds, marshes, rivers below 3,000 feet in elevation. Widely introduced outside gorge and Columbia River basin.	Moderate
Sagebrush Lizard *Sceloporus graciosus*	OR-SV	Found in sagebrush habitats, possibly on the extreme edge of the National Scenic Area.	Not Expected
California Mtn King Snake *Lampropeltis zonata*	OR-SV	Main population in California and Klamath Mountains, with a separate population in the Klickitat and Skamania county areas of the gorge. Typical habitat is oak/pine woodland, rocky riparian within logs/rocky cover. No confirmed specimens on Oregon side of National Scenic Area, although unconfirmed sightings have been reported at The Dalles and Maupin areas.	Not Expected
Sharptail Snake *Contia tenuis*	OR-SV	East slope of Washington Cascade Mountains, Columbia River Gorge, western Oregon: rocky slopes often in open pine/oak woodland with prey species of small slugs. Often in moist riparian east of Cascade Mountains. Extremely secretive and subterranean habits make it hard to locate.	Moderate

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Bald Eagle *Haliaeetus leucocephalus*	FS, OR-T	Prefers shoreline habitats generally within 1 mile of large water bodies where large trees are available for perching and a prey base of primarily fish can be found. Diet also includes some waterfowl, turtles, and carrion.	Present
Northern Spotted Owl *Strix occidentalis caurina*	T, OR-T	Mature coniferous forest generally used for nesting, roosting, and foraging. Will disperse in early or mid-seral forests. Within the National Scenic Area designated critical habitat includes most Oregon U.S. Forest Service land between Wahkeena Creek and Hood River, as well as headwater areas of the Little Wind River and Brush Creek watershed in Washington.	Moderate. No resident or nesting individuals observed during 2014, 2015, or 2016 surveys.
Swainson's Hawk *Buteo swainsoni*	OR-SV	In summer, found at the eastern edge of the gorge in plains and steppe. Nests in trees or cliff edges.	Low
Ferruginous Hawk *Buteo regalis*	OR-SC	Open prairie and shrub steppe in eastern Washington and Oregon.	Not Expected
American Peregrine Falcon *Falco peregrines anatum*	FS, OR-SV	Tall cliff (nest) sites within 1 mile of water with a prey base of smaller birds.	Present
Northern Goshawk *Accipiter gentilis*	OR-SV	Typically more common east of the Cascade Mountains where it is found in a variety of forest ages, structural conditions, and successional stages. Uses stands of mature forest as nesting sites. Typically found at elevations between 1,900 and 6,100 feet in Oregon.	Low
Burrowing Owl *Athene cunicularia*	OR-SC	Breeds on eastern side of the gorge near small mammal burrows (e.g., ground squirrels) in sparse vegetation. Detected at Dalles Mountain Road area.	Not Expected
Flammulated Owl *Otus flammeolus*	OR-SV	Eastern Cascade Mountains: cavity nester in mature ponderosa pine and mixed conifer forests with open understory at mid-elevations. Winters south of U.S. border.	Not Expected
Horned Grebe *Podiceps auritus*	FS, OR-SP	Common winter resident on Columbia River within National Scenic Area. Breeds in eastern Oregon and Washington lakes/reservoirs with rushes/cattails.	Not Expected
Red-necked Grebe *Podiceps grisegena*	FS, OR-SC	Breeds in extensive clear, deep-water marshy lakes and ponds in timbered regions.	Not Expected
Harlequin Duck *Histrionicus histrionicus*	FS	Winters on coast. Breeds in the National Scenic Area on the ground, usually within 10 meters of fast-moving tributary streams of the Lower and Middle Columbia River, often on rocky islands and banks.	Not Expected
Bufflehead *Bucephala albeola*	FS	Nests in tree cavities and winters in small flocks on lakes and large rivers.	Not Expected
Long-billed Curlew *Numenius americanus*	OR-SV	Found on fields, dry prairie, as well as mudflats. Confirmed only on the Washington side of National Scenic Area, at the east end of gorge just east of Smithville.	Not Expected
American White Pelican *Pelecanus erythrorhynchos*	OR-SV	Gregarious birds that nest in large colonies on islands within shallow water and marshes free of human disturbance and mammalian predators. Post breeders sometimes seen on the Columbia River (such as at the Klickitat and Deschutes river deltas). Winters in southern U.S. through Mexico.	Not Expected

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Sandhill Crane *Grus canadensis*	OR-SV	Riverine wetland, isolated mountain meadows/basins. No current breeding pops in the National Scenic Area; some migration.	Not Expected
Yellow-billed Cuckoo *Coccyzus americanus*	T, OR-SC	Historic range in Washington and Oregon. No reported breeding occurrences since the 1950s, although individuals have been sporadically sighted east of Cascade Mountains. Prefers riparian forests, with abundant cottonwood and thick willow cover. Considered extirpated from Washington and Oregon.	Not Expected
Lewis' Woodpecker *Melanerpes lewis*	FS, OR-SC	Open pine/oak woodland, conifer forests, and riparian woodland. Regionally displays seasonal migration to lower elevations during non-breeding season, although in National Scenic Area, it is often resident year round in same location. In National Scenic Area, the species is found in eastern portions in dry forest types of oak and pine. Cavity nester.	Moderate
White-headed Woodpecker *Picoides albolarvatus*	FS, OR-SC	Central and eastern Washington and Oregon, closely associated with mature and open ponderosa pine forests. Cavity nester. Not currently documented in National Scenic Area.	Not Expected
Black-backed Woodpecker *Picoides arcticus*	OR-SV	Uncommon resident in the mid to high elevation Cascade Mountains; most of the range is in Canada. Scattered and variable distribution because populations are highly associated with post-fire, insect-infested, habitats in mature forests. Dependent on high density of dead and insect-ridden trees.	Not Expected
American Three-toed Woodpecker *Picoides dorsalis*	OR-SV	Found in conifer forests at mid-high elevations. Especially found in burned areas or areas infested with bark beetles.	Not Expected
Pileated Woodpecker *Dryocopus pileatus*	OR-SV	Conifer/mixed conifer forests, as well as deciduous stands in valley bottoms with large dead or live trees for foraging and nesting. Primary cavity nester.	Present
Sage Sparrow *Amphispiza belli*	OR-SC	Eastern Washington and Oregon; flat terrain highly associated with big sagebrush, may also use chaparral, and dry foothills. Found on the extreme eastern edge of the National Scenic Area. No known current populations in the National Scenic Area, although migrants may pass through. Winters in southern Oregon and Southwestern U.S. states.	Not Expected
Loggerhead Shrike *Lanius ludovicianus*	OR-SV	East of Cascades: dry grassland and sagebrush desert habitats. On periphery of habitat in National Scenic Area with sightings in east Klickitat county. Neotropical migrant.	Not Expected
Grasshopper Sparrow *Ammodramus savannarum*	OR-SV	Confirmed in only one area within the National Scenic Area boundary (east end) in Washington at Stacker Butte. Prefers native bunch grass/steppe with no sage.	Not Expected

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	OR-SC	This subspecies found in the lowland valleys of western Washington and Oregon (Willamette, Klamath, Puget Sound) in sparsely vegetated grasslands with scattered tall structures used for song perches, including agricultural lands. On periphery of habitat in National Scenic Area. Ground nester.	Not Expected
Slender-billed White-breasted Nuthatch *Sitta carolinensis aculeata*	OR-SV	A west-side subspecies of the white-breasted nuthatch. Found in open oak and oak/Douglas-fir forests in western Washington (Skamania, Clark, and Cowlitz counties). Decline directly related to loss of this habitat.	Not Expected
Olive-sided Flycatcher *Contopus cooperi*	OR-SV	Breeds only in conifer forests. Found more in fragmented late-seral forests than less fragmented. May utilize lowland mixed riparian in non-breeding time. Prefers edge.	Present
Willow Flycatcher ("Northern") *Empidonax traillii adastus*	OR-SV	Subspecies that exists more in riparian areas (willow thickets) in the eastern gorge and east.	Moderate
Little Willow Flycatcher *Empidonax traillii brewsteri*	OR-SV	Subspecies that exists more in riparian areas (willow thickets) in the western gorge and west.	Moderate
Western Bluebird *Sialia mexicana*	OR-SV	Breeds in heart of wooded gorge (cavity nester) and migrates in eastern gorge. Seen in small groups in fields or open woods.	Present
Streaked Horned Lark *Eremophila alpestris strigata*	T, OR-SC	Nests on sparsely vegetated areas with grasses and forbs. Seen in western gorge on sand/grass islands.	Not Expected
Black Swift *Cypseloides niger*	FS, OR-SP	Nests in waterfalls, steep cliffs, and damp caves out of direct sunlight. Highly suspected to be in National Scenic Area. Neotropical migrant.	High
Purple Martin *Progne subis*	FS, OR-SC	Western Washington/Oregon up through gorge to western Wasco County in Oregon and Bingen in Washington: cavity/crevice nester, often near water. Forages over open water/fields/ forest canopy. Winters in South America.	Low
North American Wolverine *Gulo gulo luscus*	PT, FS, OR-T	Conifer forests. Intolerant of human encounters/ disturbance and requires large home ranges. Locally there has been one confirmed sighting in last several decades from a road-killed juvenile male on I-84, near Starvation Creek (January 1990).	Low
Pacific Fisher *Martes pennanti*	C, FS, OR-SC	Found in low and mid-elevation late successional conifer forest, with high canopy cover and large down logs for nesting. Requires large home ranges. Likely extirpated in National Scenic Area and adjacent forests; undetected in multi-year surveys.	Not Expected
Columbian White-tailed Deer *Odocoileus virginianus leucurus* (Lower Columbia River)	E, OR-SV	Historic distribution in floodplains and bottomland riparian of Willamette and Lower Columbia rivers east to the Klickitat River. Severe riparian habitat loss currently limits this sub-population to a small area between Skamokawa, Washington and Clatskanie, Oregon.	Not Expected
White-tailed Jackrabbit *Lepus townsendii*	OR-SV	East of Cascade Mountains in open areas with native bunchgrass and sagebrush plains; can also be found in coniferous forests and subalpine meadows. On periphery of habitat in National Scenic Area at The Dalles and Dallesport.	Not Expected

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Washington Ground Squirrel *Spermophilus washingtoni*	C, OR-E	Currently found in Columbia Basin of Washington in sagebrush/grassland with sandy soils; also Giliam, Morrow, and Umatilla counties, Oregon. May have historically been found within the eastern edge of National Scenic Area.	Not Expected
Western Gray Squirrel *Sciurus griseus*	OR-SV	Associated with open mixed oak/conifer woodland, typically within a half mile of water sources. Washington is its northernmost range, with core habitat in Klickitat County. Known to occur in Hood River (Oregon) and nearby areas to the east. Easily confused with non-native/ invasive Eastern gray squirrels and fox squirrels.	Low
American Pika *Ochotona princeps*	NS	Talus fields with adjacent meadows for feeding at mid-high elevations.	Present
Townsend's Big-eared Bat *Corynorhinus townsendii*	FS, OR-SC	Found throughout Western U.S. Roost and hibernaculum sites within caves, buildings, mines, and bridge undersides, with exacting temperature, humidity, and physical requirements. Intolerant of human disturbance, which results in loss of critical fat reserves during torpid period.	Low
Spotted Bat *Euderma maculatum*	OR-SV	There is a record from Wasco County on the Deschutes River in dry steppe habitat. Typically found by streams and cliffs. Presence within the National Scenic Area is unknown.	Not Expected
Fringed Myotis *Myotis thysanodes*	FS, OR-SV	Nursery colonies and roosts in mines, caves, oak trees, mesic coniferous forest, and buildings. Intolerant of human disturbance. Subspecies suggested to occur west of the Cascade Mountains in southern Washington, Oregon, and northern California. Documented in Little White Salmon River subbasin in 1996.	Low
Pacific Pallid Bat *Antrozous pallidus*	FS, OR-SV	Arid area specialist east of Cascade Mountains. Roosts in rock crevices, caves (buildings), and sometimes large trees, especially when near open and dry areas. Feeds primarily on the ground on large insects, scorpions, lizards, and other small prey.	Not Expected
California Myotis *Myotis californicus*	OR-SV	Found in coniferous forest, oak, and ponderosa pine woodlands. Roosts beneath loose bark and tree crevices. Maternity colonies in cliff crevices, buildings, and bridges. Winter in mines/caves/buildings.	Low
Long-legged Myotis *Myotis volans*	OR-SV	Maternity roosts include older conifers (over 100 years old), rock crevices, cliffs, and buildings. Prefers edge in areas that get daily sun. Hibernates in winter.	Low
Hoary Bat *Lasiurus cinereus*	OR-SV	Roosts 10–15 feet off the ground in trees along forest borders. Active at night. Migrates south in winter, returning in spring.	Low
Silver-haired Bat *Lasionycteris noctivagans*	OR-SV	Prefers roosting behind loose tree bark in old-growth areas (conifer, mixed, or deciduous). Maternity colonies in tree cavities. Areas with high snag densities utilized. Forages in disturbed areas at low elevation. In clearings, by roadways or water. Hibernates in trees and cliffs.	Low

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Western Ridged Mussel *Gonidea angulata*	FS	Low to mid-elevation cold clean streams and rivers of the Western U.S. Found mainly east of the Cascade Mountains locally. Known stronghold in the larger rivers of the Snake River and Columbia River systems.	Low
Giant Columbia River Limpet or Shortface Lanx *Fisherola nuttalli*	FS	In National Scenic Area, found in the lower Columbia River near Bonneville Dam in Oregon. Also found in the Deschutes River (Oregon). Inhabits cold, unpolluted, medium to large streams with fast-flowing, well-oxygenated water and cobble boulder substrate at edge of rapids.	Low
Great Columbia River Spire Snail or Columbia Pebblesnail *Fluminicola Columbiana* or *F. fuscus*	FS	Confirmed in a few sites along the Columbia, Okanogan, Wenatchee, and Methow rivers in Washington, and the Deschutes River in Oregon. Found in larger tributaries and rivers on upper surfaces of stable rocks in fast current in relatively shallow, cold, oxygenated water.	Low
Puget Oregonian *Cryptomastix devia*	FS	Found in the western Cascade Mountains at low to mid elevations. Prefers moist conifer forests, associated with bigleaf maple. Often found on or under hardwood logs, leaf litter, or under swordfern, moist rocks/talus. Young *devia* may be found under mosses on trunk of bigleaf maple. Known occurrences from the National Scenic Area.	Moderate
Columbia Oregonian *Cryptomastix hendersoni*	FS	Only known from two locations: the Columbia River Gorge in scattered locations near seeps and streams along both sides of the Columbia River, from near The Dalles to near Rufus, Oregon; and from upland locations in the Mount Hood National Forest. Within 100 meters of streams, seeps, & springs in steppe communities. May also be in mid-elevation mature closed canopy forests among moist talus, leaf litter, or shrubs, or under logs or other debris.	Moderate
Evening Fieldslug *Deroceras hesperium*	FS	Low to mid-elevation from the Cascade Mountains to the Pacific Ocean, with majority of the currently documented sites east of the Cascade Mountains. Associated with perennially wet meadows in forested habitat; microsites include a variety of low vegetation, litter, and debris and rocks/talus.	Moderate
Barren Juga *Juga hemphilli hemphilli*	FS	Limited distribution in Columbia River Gorge (Clark and Skamania counties, Washington), Johnson Creek (Oregon), and Mount Hood National Forest. Also suspected to occur in Gifford-Pinchot National Forest. Found in smaller low elevation streams, with low gradient, stable gravel substrate, moderate velocity, and highly-oxygenated, cold water.	Moderate
Purple-Lipped Juga *Juga hemphilli maupinensis*	FS	Suspected to occur in the National Scenic Area on the Oregon side. Documented in Deschutes River drainage. Found at low-elevation large streams in well-oxygenated and minimally impacted gravel-cobble riffles in cold water.	Low

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Dalles Juga *Juga hemphilli dallesensis*	FS	The genus Juga grazes on rock surfaces and deciduous leaf litter, with seasonal migrations both upstream and downstream. Dalles juga found at low elevation, large springs and small-medium streams with a stable gravel substrate and fast-flowing, unpolluted, highly oxygenated cold water. Found about 5 miles west of Hood River to The Dalles in the Columbia River Gorge and Mill Creek.	Not Expected
Columbia Gorge Caddisfly *Neothremma andersoni*	FS	Known only in the Columbia River Gorge in Wahkeena Creek, Multnomah County, Oregon where it is apparently endemic. Larvae and pupa common above gorge escarpment, less so as stream flows out onto the Columbia River floodplain.	Low
Wahkeena Falls Flightless Stonefly *Zapada wahkeena*	FS	Flightless species that disperses only through movement of mature aquatic life-stages. Known only in seeps by waterfalls at Wahkeena Falls on the Oregon side of the National Scenic Area. Water quality important.	Not Expected
Dalles Sideband *Monadenia fidelis minor*	FS	Known from watersheds tributary to the Columbia River Gorge from Hood River east to the vicinity of The Dalles (on both sides of the Columbia River) and in upland sites in watersheds tributary to the lower Deschutes River in Wasco County, Oregon. Typically found within 200 meters of streams, seeps, or springs, in steppe or dry forest plant communities (within talus and moist rocky areas). May be found among rocks, shrubs, and down wood.	Moderate
Crowned Tightcoil *Pristiloma pilsbryi*	FS	Historic range probably from southern Alaska to southern Oregon. Currently known from Clallam and Pacific counties, Washington, suspected in Grays Harbor, Wahkiakum, Cowlitz and Clark counties, Washington and Multnomah, Clatsop, and Columbia counties, Oregon. Found in moist forests, including floodplains, in decaying leaf litter, commonly under dense salal, vine maple, waterleaf, or other deciduous vegetation.	Low
Yuma Skipper Butterfly *Ochlodes yuma*	FS	Main population is found in Great Basin area with outlier populations in central and eastern Oregon/Washington. Typically found near freshwater marshes, streams, and ponds linked with Phragmites reeds. The only record in National Scenic Area was from 1999 when it was found at Maryhill on ornamental Miscanthus.	Not Expected
Johnson's Hairstreak Butterfly *Callophrys[Mitoura] johnsoni*	FS	Found in the Cascade, Coast, Siskiyou, Blue, and Wallowas mountains typically in coniferous forest where it is an old-growth obligate.	Not Expected
Jackson Lake Springsnail *Pyrgulopsis robusta*	FS	Occupies cold water habitats, predominantly large springs, and spring-influenced portions of streams, lakes, and rivers. Found on a variety of substrates, including gravel to cobble-size substrates. Important to maintain perennial water quality.	Not Expected

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Caddisfly *Farula constricta*	FS	Currently known in only four or five small, cold-water streams in the gorge: Eagle Creek (2003); Mist Falls near Wahkeena Creek (1989); Oneonta Creek in Oneonta Gorge (2003); a small unnamed stream 0.9 mile west of Oneonta Creek (1989); and a stream between Multnomah Falls and Oneonta Falls (2003, possibly the same stream as the 1989 record). It is possible that the species is extremely isolated in its distribution and confined to a few short reaches of the above streams. Threats: sedimentation, eutrophication, chemical runoff from road projects.	Present
Mardon Skipper *Polites mardon*	C, FS	Historic distribution unknown. Present known distribution is fragmented. There are populations in Northern California, Puget Sound, and the south Cascade Mountains of Washington. Habitat of open fescue grasslands, riparian, or meadows with nectar plant source. No known populations in the National Scenic Area. Species decline likely due to loss of native grass meadows and prairie habitat throughout northwest.	Not Expected
VASCULAR PLANTS			
Howell's Bentgrass *Agrostis howellii*	OR-C, OR-1, FS, Endemic	Moist rocks on south side of the Columbia River Gorge Multnomah and Hood River counties.	Present
Nevus' Onion *Allium nevii*	OR-3	Vernal moist sites on thin soils.	Moderate
Cascade Rockcress *Arabis furcata*	OR-3	Rocky ridges and outcrops; found at mid to high elevations in the Cascade Mountains.	Not Expected
Sickle-pod Rock Cress *Arabis sparsiflora* var. *atrorubens*	OR-2, FS	Eastside, low elevation. Open areas.	Moderate
Northern Wormwood *Artemesia campestris* spp. *borealis* var. *wormskioldii*	OR-E, OR-1, FS	Gravely beach areas of Columbia River and Miller Island in the Columbia River Gorge.	Not Expected
Hood River Milk-vetch *Astragalus hoodianus*	OR-2, Endemic	Dry open areas of east gorge.	Present
Oregon Bolandra *Bolandra oregana*	OR-C, FS-S	Wet basalt cliffs.	Present
Howell's Reedgrass *Calamagrostis howellii*	Endemic	Rocky banks and crevices of cliffs within the gorge.	Present
Lesser Panicled Sedge *Carex diandra*	OR-S	Bogs/fens.	Not Expected
Large-awn Sedge *Carex macrochaeta*	OR-2, FS	Moist open places, coastal but suspected in gorge.	Moderate
Retrorse Sedge *Carex retrorsa*	OR	Wet thickets, swamps, marshes, lake shores.	Not Expected

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Tall Bugbane *Cimicifuga elata*	OR-1, FS	Hardwood and mixed forest on west side.	Present
Cold-water Corydalis *Corydalis aqua-gelidae*	OR-C, OR-1, FS	Along cold streams on west side of Cascade Mountains at elevations ranging from 2,500 to 3,800 feet.	Moderate
Clustered Lady's-slipper *Cypripedium fasiculatum*	OR-2, FS	Open to closed forested woodlands/forest. East side of Cascade Mountains.	Low
Nuttall's Larkspur *Delphinium nuttallii*	OR-2	West side.	Moderate
Smooth-leaf Douglasia *Douglasii laevigata* var. *laevigata*	Endemic	Basalt cliffs and rocky outcrops, low elevation through the gorge.	Moderate
Short Seeded Waterwort *Elatine brachysperma*	OR-S	Herbaceous wetlands.	Not Expected
Howell's Daisy *Erigeron howellii*	OR-C, OR-1, WA-T, Endemic, FS	Open areas on ridges and rocky areas.	Present
Oregon Daisy (Columbia Gorge Daisy) *Erigeron oreganus*	OR-C, OR-1, FS, Endemic	Moist, shady cliffs and ledges along the Columbia River.	Present
Long-beard Hawkweed *Hieracium longiberbe*	Endemic	Open areas throughout the gorge on cliffs; 30–100 meters in elevation. Found in both Oregon and Washington.	Present
Howellia *Howellia aquatilis*	T OR-1 FS	Low elevation wetlands.	Not Expected
Kellogg's Rush *Juncus kelloggii*	SNR	Wet depressions and temporary pools that are moist to wet in winter and spring and dry in summer. Suitable conditions usually occur in low spots in fields and meadows in oak habitat.	Not Expected
Aristulate Lipocarpha *Lipocarpha aristulata*	OR-1	Shoreline habitats with silty to fine-sandy substrates.	Not Expected
Columbia Lewisia *Lewisia columbiana* var. *columbiana*	OR-2, FS	Open rocks areas in west gorge, generally middle to high elevations.	Present
Smooth Desert Parsley *Lomatium laevigatum*	OR-2, FS, Endemic	Basalt cliffs in east gorge.	Not Expected
Suksdorf's Desert Parsley *Lomatium suksdorfii*	OR-C, OR-2, FS, Endemic	Open wooded or open areas in east gorge.	Moderate
Watson's desert-parsley *Lomatium watsonii*	OR-2, FS	Hood River and Wasco counties.	Low
Columbia Gorge Broad-leaf Lupine *Lupinus latifoius* var. *thompsonianus*	Endemic	Open areas in pine/oak woodlands.	Low

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence
Northern Bog Clubmoss *Lycopodiella inundata*	OR-2, FS	Wet, sandy places, wetlands adjunct to lakes, and swampy ground.	Not Expected
White Meconella *Meconella oregana*	OR-C, OR-1, FS	Oak woodlands in east gorge.	Moderate
Barrett's Penstemon *Penstemon barrettia*	OR-C, OR-1, FS, Endemic	Rocky cliffs, talus slopes in east gorge.	Present
Multnomah Bluegrass *Poa gracillima* var. *multnomae*	Endemic	Mostly on southern side of Columbia River Gorge in rocky, shaded cliff near water falls.	Present
Obscure Buttercup *Ranunculus triternatus*	OR-E, OR-1, FS, Endemic	Open grasslands or open areas in pine/oak woodlands, eastern gorge.	Not Expected
Columbia Yellow Cress *Rorippa columbiae*	OR-1, FS	Mudflats along Columbia River.	Not Expected
Toothcup *Rotala ramosior*	OR	Wet, swampy places; lake and pond margins; along rivers.	Present
Scheuchzeria *Scheuchzeria palustris* var. *americana*	OR-2, FS	Multnomah County.	Not Expected
White-topped Aster *Sericocarpus rigidus*	OR-T, OR-1, FS	Gravelly, glacial outwash soils, deep, poorly drained clayey soils, open, grassy, seasonally moist prairie and savannah habitats, at elevations ranging from about 90–1,250 feet.	Low
Pale Blue-eyed Grass *Sisyrinchium sarmentosum*	OR-1, FS	Wet/dry meadows at mid to high elevations.	Not Expected
Kruhsea *Streptopus streptopoides*	OR-2	Hood River and Multnomah counties. Dense, damp coniferous forests.	Moderate
Violet Suksdorfia *Suksdorfia violacea*	OR-2, FS	Moist cliffs at low elevations in the middle of the gorge.	Present
Oregon Sullivantia *Sullivantia oregana*	OR-C, OR-1, FS, Endemic	Wet basalt cliffs near waterfalls at low elevations in the west gorge. Elevation ranges from 250 to 1,600 feet.	Present
Western Mountain Kittentails *Synthyris stellata*	Endemic	Shaded banks, cliffs and ridges in the western gorge.	Present
Lesser Bladderwort *Utricularia minor*	OR-2	Wasco County.	Not Expected
Dotted Water-meal *Wolffia borealis*	FS, OR-2	Elevation: 350–1,500 feet.	Not Expected
Columbia Water-meal *Wolffia Columbiana*	OR-2	Freshwater lakes, ponds, and slow streams below 650 feet in elevation.	Not Expected

Table B.1. List of Special-Status Species and Potential for Occurrence in the Project Area

Species (population segment)	Status[1]	Usual Habitat in Oregon	Potential for Occurrence

[1] Key:
NS: No Status

E: Federal Endangered
T: Federal Threatened
C: Federal Candidate
PT: Federal Proposed Threatened

WA-E: Washington State Endangered
WA-T: Washington State Threatened
WA-S: Washington State Sensitive
WA-C: Washington State Candidate

OR-E: Oregon State Endangered
OR-T: Oregon State Threatened
OR-C: Oregon State Candidate

FS: Forest Service Sensitive

OR-S: Oregon State Sensitive as follows:
SC: Sensitive Critical
SV: Sensitive Vulnerable
SP: Sensitive Peripheral or naturally rare

Endemic: Endemic to Columbia River Gorge
OR-1: ORBIC List 1: Threatened or Endangered Throughout Range
OR-2: ORBIC List 2: Threatened, Endangered or Extirpated from Oregon, Secure Elsewhere
OR-3: ORBIC List 3: More information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range

Potential for Occurrence: Not Expected = No suitable habitat or documented occurrence in project area within 2 miles of the project area; Low = Suitable habitat barriers for fish or wildlife is present, no documented occurrence within 2 miles of the project area; Moderate = Suitable habitat present, no barriers for fish or wildlife, and documented occurrence within 2 miles of the project area but not in the project area; Present = Suitable habitat and documented occurrence in the project area or observed during project-related surveys.

Sources: USFWS 2014; ORBIC 2014; Gorge Commission 2011; Turnstone 2015b,d.

This page deliberately left blank

Appendix C

Visual Resource Analysis
(Columbia River Gorge National Scenic Area)

This page deliberately left blank

C.1 Introduction

This appendix provides additional information on the Columbia River Gorge National Scenic Area (National Scenic Area), including the scenic environment of the National Scenic Area, regulatory framework, analysis methodology, and potential impacts of the Proposed Action.

C1.1 Definitions

A number of key terms used in scenic resource management within the National Scenic Area are defined below:

- ***Background views***: Background views include what is seen at distances greater than 5 miles. Color and texture are barely noticeable at this distance.
- ***Bare earth GIS analysis:*** A computer-assisted process that determines what parts of a development could be seen from designated viewpoints if there were no vegetation or buildings screening the view.
- ***Foreground view:*** Refers to what is seen near the observer (or Key Viewing Area [KVA]). Generally distances less than a 0.5 mile away. Details, including color and texture, are noticeable at this distance.
- ***Key Viewing Areas (KVAs):*** Important locations that provide public views of the gorge. There are 26 designated KVAs, including roads, trails, parks, viewpoints, and other vantage points.
- ***Landscape settings***: Combination of natural and culturally modified features. Such as landform, vegetation, water, and existing land use patterns of a given area that contribute to scenic beauty.
- ***Middleground views***: What is seen at distances ranging from 0.5 to 5 miles. Details such as color and texture are less important, while form and shape become more important to the viewer.
- ***Open Space:*** A land use designation in the National Scenic Area Management Plan that is intended to preserve the natural, cultural, and recreational resources of the gorge by managing change and fostering stewardship.
- ***Photosimulations (sims):*** Manipulating digital photos to show changes introduced by a development from a specific vantage pint.
- ***Retention*****:** A visual quality objective that provides for development or management activities that, while possibly visible, are not *visually evident* to the casual visitor. Management activities may only repeat form, line, color, and texture that are frequently found in the landscape setting. Changes in their qualities of size, amount, intensity, direction, pattern, etc., shall not be evident.
- ***Scenic standards***: The scenic standard establishes the visual impact limits that apply to development in a given location based on a combination of land use designation and setting. Most of the National Scenic Area must meet the *visually subordinate* scenic standard.
- ***Visually dominant:*** Refers to development that fails to blend in with the landscape setting. It is not only visible, but is the first thing one notices and may be the last thing one remembers about a given scene.

- ***Visually evident***: Means that a project may be seen and readily noticed, but does not dominate over the landscape setting.
- ***Visually subordinate*****:** A description of the relative visibility of a structure where that structure does not noticeably contrast with the surrounding landscape as viewed from a specified vantage point. Vantage points are most often KVAs identified in the National Scenic Area Management Plan. A development, such as a transmission line, can be visually subordinate even though it is partially visible, because it is not be the first thing one notices, or the last thing one remembers about the scene.

C.1.2 Scenic Environment of the Columbia River Gorge National Scenic Area

The existing Bonneville-Hood River transmission line passes through one of the most visually spectacular landscapes in the Pacific Northwest. The qualities of this landscape have long been recognized as special and were among the main reasons the area was set aside for conservation in the National Scenic Area. The goals for managing the National Scenic Area include protection and enhancement of scenic, cultural, natural, and recreation resources. New development is allowed and even encouraged as long as it does not adversely affect these resources (Gorge Commission 2011).

The gorge landscape has been shaped by 40 million years of wind, weather, and geologic events (volcanic flows, earthquakes, erosion, landslides, and floods). As described in the National Scenic Area Management Plan, the valued visual characteristics of the gorge include the Columbia River, steep topography, waterfalls, natural forest vegetation, rocky cliffs and talus, and some cultural features, including farms, railroad tunnels, historic roads, recreation areas, and buildings (Gorge Commission 2011).

The landscape of the project area within the National Scenic Area is mostly steep, rugged, and forested. There are scattered natural cliffs, talus slopes, meadows, and oak woodlands, resulting in a complex mosaic of natural appearing land cover. The project area (defined as the right-of-way and associated access roads and foot trails) occupies the lower part of a steep slope that separates the uplands from the Columbia River and its floodplain. The steeper uplands include deeply incised stream canyons perpendicular to the east-west oriented cliffs, and talus slopes that include local high points like Shellrock Mountain and Mitchell Point. The flatter terrain along the floodplain of the Columbia River includes Interstate-84 (I-84), the town of Cascade Locks, and developed state and federal recreation sites.

The visual experience of the gorge includes the wider context of the landscape. People see the area primarily from “viewer platforms” that include public roads, trails, recreations sites, the Columbia River, and visitor areas and viewpoints.

C.2 Columbia River Gorge National Scenic Area Management Plan Scenic Provisions

Scenic resources within most of the National Scenic Area are protected through land use restrictions and design guidelines described in the National Scenic Area Management Plan (Gorge Commission 2011). KVAs are locations from which scenic conditions are evaluated, monitored, and protected by the U.S. Forest Service and the Gorge Commission, which share oversight responsibility for management. The KVAs include both individual points and entire corridors, some of which run the entire 83-mile length of the National Scenic Area, including as I-84, Washington State Route 14 (SR 14), and the Columbia River itself. The KVAs for the entire scenic area include:

- Historic Columbia River Highway
- Crown Point
- I-84, including rest stops
- Multnomah Falls
- SR 14
- Beacon Rock
- Panorama Point Park
- Cape Horn
- Dog Mountain Trail
- Cook-Underwood Road
- Pacific Crest Trail
- County Road 1230 (Special Management Area [SMA] Only)
- Wyeth Bench Road (SMA Only)
- Rowena Plateau and Nature Conservancy Viewpoint
- Portland Women's Forum State Park
- Bridal Veil State Park
- Larch Mountain
- Rooster Rock State Park
- Bonneville Dam Visitor Center
- Columbia River
- Washington SR 141
- Washington SR 142
- Oregon Highway 35
- Sandy River
- Larch Mountain Road (SMA Only)
- Sherrard Point on Larch Mountain (SMA Only)

The Columbia River Gorge National Scenic Area Act established three basic land divisions within the National Scenic Area:

- Urban areas, which are not regulated by the Management Plan.
- General Management Areas (GMA), which include traditional farm, forestry, and rural residential development areas. These uses are permitted with the GMAs but have restrictions on the type and design of new development. GMA lands have lower visual sensitivity and constitute approximately two thirds of the National Scenic Area.
- Special Management Areas (SMA), which are considered to contain the most sensitive lands and merit a higher level of conservation, sometimes including acquisition.

The existing project area is primarily within SMA lands, which have higher standards for conservation of scenic resources than the GMA areas (see Section 3.15, *Consistency with Land Use Plans and Programs*). Additionally, most of the project area is within lands that are designated as Open Space in the Management Plan (see Section 3.15, *Consistency with Land Use Plans and Programs*). Land designated as Open Space is expected to meet the retention standard.

C.3
Affected Environment

C.3.1 Determination of Affected KVAs

This analysis helps the project planners understand which sections of the line deserve extra attention with respect to scenic resources a bare earth GIS analysis and field investigation were combined to determine the level of visibility of the existing transmission line relative to every KVA within 5 miles of the Project. This distance is considered the background distance because research has shown that beyond 5 miles, transmission structures are usually inconspicuous, especially if they are seen against a landscape as opposed to the sky (Sullivan et al. 2014). The following data were used to develop the analysis:

- Digital elevation models provided by the U.S. Forest Service
- Exact structure locations provided by Bonneville Power Administration (BPA)
- An assumed average structure height of 80 feet (these vary up or down between 55 and 100 feet)
- A viewer height of 5 feet above grade (approximate eye level)

The results of this analysis provide a synthesis of potential visibility of the transmission line (Figure C-1). The analysis places viewers at or along KVAs at frequent intervals and records a “hit” every time a viewer can potentially see the top of an 80-foot-tall transmission structure. The transmission line in Figure C-1 is depicted as multi-color. The yellow sections have fewer “hits” and are thus less potentially visible from KVAs, while the red sections have more hits and are the most potentially visible. Orange sections are in between these highs and lows.

This analysis determined that the top of every structure is potentially visible from one or more KVAs. Some structures are potentially visible from multiple KVAs. Some are visible from foreground distances of less than 0.5 mile, while others are seen from middleground distances of up to 4 miles. After determining potential visibility with the bare earth GIS model, field visits were conducted to determine where vegetation or buildings created a screen between the viewer and the transmission line.

The field investigation determined that the KVAs from which the project area is the most visible, taking screening into account, include; I-84, SR 14, the Columbia River, and Dog Mountain. In the case of Dog Mountain, while the cleared right-of-way is very visible, individual structures are not, probably a result of the viewing distance (over 2 miles).

There is some, but much more limited, visibility from additional KVAs, including: Panorama Point, the Pacific Crest Trail, the Historic Columbia River Highway, Bonneville Dam, Wyeth Road, Cook-Underwood Road, Crown Point, Rooster Rock, Cape Horn, and Women’s Forum State Park. Of these, Wyeth Road, parts of the Historic Columbia River Highway, and the Pacific Crest Trail merit attention because small portions of these KVAs are visually exposed to specific segments of the right-of-way, including one or a few structures.

From some KVAs, including Wyeth Road, parts of SR 14, the Columbia River, and parts of I-84, the existing transmission line is visually evident and does not meet the retention standard. From other locations, including portions of I-84, where the Pacific Crest Trail crosses the right-of-way, and possibly the Columbia River near the Oregon shore, the line is visually dominant and does not meet the lesser visual subordination standard. Viewing distances from these KVAs range from a few hundred yards (near foreground) to 3 to 4 miles (middleground).

Bonneville Dam Visitor Area KVA

There are visitor areas associated with Bonneville Dam on both sides of the Columbia River. These are developed recreation sites, with high visitation and long duration views, meaning that people are stationary and have time to take in the details of what they are viewing. The landscape setting includes Bonneville Dam, landscaped grounds, transmission structures that carry electricity from the dam to the project area and other power corridors, the Columbia River (including both free flowing downstream of the dam and the upstream reservoir), and the densely forested slopes of the central gorge. From the Oregon side of the dam, a tall transmission line structure adjacent to the dam is clearly visible. However, the project area, including the right-of-way that heads east toward Hood River, is visually subordinate because of screening from trees on the slope below the cleared right-of-way and topographic positioning (Figure C-1).

From the Washington side of Bonneville Dam, a small section of cleared right-of-way is visible but not visually dominant because the viewer is 1 to 2 miles away. The right-of-way is linear in shape but blends with natural openings just above it, and is therefore considered visually subordinate.

Columbia River and SR 14 KVAs

The Columbia River and SR 14 KVAs are described together because the visual experience is nearly the same. SR 14 parallels the north bank of the Columbia River for nearly its entire length opposite the project area, with little or no screening between the highway and the river. From the river, closer views of the project area occur with even less screening, but the viewing angle is similar to SR 14. View distances range from about 0.2 miles on the river to 2 miles along SR 14.

Visitors are afforded a nearly continuous panoramic view of the steep, rugged Oregon side of the Gorge from both SR 14 and the Columbia River. The landscape in view is mostly forested, but a number of large and small natural openings, cliffs, outcrops, talus slopes, and meadows add variety and visual interest. The Columbia River itself is an important feature in the foreground from either KVA. Water is a visual element most people find appealing. The narrow floodplain of the Columbia River includes I-84, which is visible in places, but is mostly not conspicuous along the Oregon shore.

The cleared right-of-way is visually evident and dominant from some vantage points. Depending on time of day and shadows from adjacent trees, the clearing appears as a dark or light linear feature through the forest on the lower slopes. Some transmission line structures, especially those made of steel, reflect light and are visually evident, also depending on time of day and season. Towers on high promontories are generally evident. Some of the wooden structures are visible, but most are visually subordinate from SR 14 and the river.

From the west end of Drano Lake, both the right-of-way and structures are visually subordinate (Figure C-2). This is the first point along SR 14 (traveling east to west) where the right-of-way and transmission line area is clearly visible. The view of Mitchell Point near line mile 19 includes a visible right-of-way at the tops of the cliffs, but it mostly blends well with natural openings. A few structures on ridge lines are also visible but not dominant (Figure C-3). The transmission line structures and right-of-way would be most visible during summer mornings or late afternoons when the sun angle illuminates them more directly.

At the SR 14-Cook Road junction, the right-of-way and some structures are visually evident (Figure C-4); however, they are visually subordinate because the project area is generally screened by intervening vegetation. At the Dog Mountain Trailhead along SR 14, the right-of-way is visually evident, and several steel structures are visually dominant when light conditions increase reflection. The project area in its current condition viewed from this location does not meet the visual subordination standard because of the visual dominance of the structures and cleared right of way.

As viewed from the base of Wind Mountain along SR 14, the right-of-way (especially the upper edge) is visually evident low down on the slope of Shellrock Mountain (Figure C-5). Some structures are visible but not visually dominant because the open talus slope of Shellrock Mountain is a dominant visual feature. The existing steel structures can reflect light and stand out against the darker rock and forest backdrop during certain times of day, but are not generally a dominant feature on the landscape.

At the junction of SR 14 with Carson Road, the right-of-way is visible, but the structures are not visually evident. Therefore, the visual subordination standard is met. From the waterfront in the town of Stevenson, the right-of-way is visible to the east, but it is not a dominant feature on the landscape and no structures are visually evident. Generally from Stevenson east, the project area has a low visibility level from SR 14 and the Columbia River, and therefore meets the retention standard.

The Marine Park in Cascade Locks also offers some views of the project area. From this location a portion of the right-of-way going upslope is visually evident and may be visually dominant, thus not meeting the visual subordination standard. This view is similar to views one may get from the adjacent Columbia River KVA.

Overall, as viewed from SR 14 and the Columbia River, the project area in its current condition ranges from not visually evident to visually dominant, depending on the viewer’s location, time of day, and season.

Interstate 84 KVA

Interstate 84 parallels the project area for most of its length, until the right-of-way turns northeast and away from the interstate at line mile 18. The setting is mostly natural appearing, except for the highway itself and the adjacent railroad. Steep, forested slopes, rocky openings, and occasional side canyons and waterfalls create the scenic backdrop south of I-84, while the Columbia River dominates the view to the north. The transmission line is mostly not visible from I-84 in the western part of the project area because the transmission line is positioned topographically out of view from the highway, or the forest and other tall vegetation block views with continuous, dense foreground screening (Figure C-6).

At the Eagle Creek Recreation Area just south of I-84, the transmission conductors pass overhead, but no structures or clearings are visible. From the Eagle Creek Overlook north of I-84 along the Columbia River KVA, one structure perched on a rock outcrop is evident but is visually subordinate because of its position high above the observer and away from the main view direction toward the Columbia River.

The transmission line and structures are not visually evident from most of the town of Cascade Locks, which is just north of I-84 and south of the Columbia River. From I-84 east of Wyeth, structures on an open talus slope are visible but are not visually evident because they are seen against the ground rather than sky and are positioned well above the observer at a distance (Figure C-7). Near Lindsey State Park, the right-of-way and several structures are visually evident. The cleared right-of-way is mostly natural appearing because it blends with natural openings in the area, but falls short of the retention standard because the right-of-way edges are too linear to blend fully into the natural landscape setting.

Two structures are visible on the ridge above the trailhead at Starvation Creek State Park (Figure C-8). These structures are seen against the sky and are visually dominant from some vantage points. The same is true along I-84 at Viento State Park where another structure can be seen against the sky. Just east of Mitchell Point, the cleared right-of-way runs diagonal along a steep hillside, and three structures are visible from I-84, the first being where the right-of-way crosses the ridge just south of Mitchell Point. Due to the speed viewers are traveling on I-84, the steep viewing angle required to see the transmission line, and the roadside vegetation which inhibits continuous views, views of the project near Mitchell Point from I-84 are intermittent and of short duration. This is the last point along I-84 from which the transmission line right-of-way is visible.

Historic Columbia River Highway KVA

The visual setting of the Historic Columbia River Highway is similar to that described for I-84, which the historic highway parallels, but at a slightly higher elevation. As the historic road (or trail in some locations) is much narrower than I-84, the viewer is in closer contact with the natural setting and is more screened by foreground vegetation. With a few exceptions, the project area is either not seen at all, or is not visually evident from the historic highway. At the Vista House, the project area right–of-way is barely visible in the distance, and easily meets the retention standard. A small trail section at Viento State Park has a view of structures to the west and east, similar to that described for I-84 in the same area.

Pacific Crest Trail KVA

The Pacific Crest National Scenic Trail is part of the National Scenic Trail system. National Scenic Trails incorporate both tangible and intangible characteristics (scenic, historical, natural, and/or cultural) that are superior compared to non-National Scenic Trails (U.S. Forest Service 1982). Lands crossed by the Pacific Crest Trail are divided into three categories: A, B, and C. Category C lands are either private or other public (state and county) lands that are devoted to a range of purposes, including power transmission. Category C lands are considered to be of less importance for providing scenic resources of national significance and are used primarily for route continuity (U.S. Forest Service 1982).

The Pacific Crest Trail intersects the Project briefly near project line mile 5. In this area the landscape viewed from the Pacific Crest Trail is generally wooded and rolling, with intermittent views opening up of surrounding forested ridgelines and the Columbia River to the north. As the Pacific Crest Trail approaches the existing Bonneville-Hood River transmission line, the landscape abruptly changes temporarily as a result of the linear, cleared right-of-way and tall, linear, sequential transmission structures that line the right-of-way and an existing access road leading to the structures. Due to the heavily wooded nature of the area, the project is only visible immediately before reaching the right-of-way and while traveling through it on the trail. The transmission line and structures are visually dominant to viewers while travelling immediately within the cleared right-of-way.

Wyeth Road KVA

Wyeth Road winds through a mostly forested setting south of I-84 and east of Cascade Locks. As the road nears the Wyeth Ranch area, a few structures come into view but are visually subordinate. At the Gorten Creek Trailhead, the transmission line conductors pass directly overhead (line mile 11) and structures are visible immediately to the west and east (Figure C-9). Vegetation screening is fairly dense here, and while the transmission line and structures are evident they do not dominate the viewshed.

Dog Mountain KVA

On the Washington side of the Columbia River just east of the town of Stevenson, Dog Mountain is a popular hiking destination that is known for its spring wildflower display and panoramic views of the gorge. The long, steep hike to the top is mostly through dense forest and therefore does not allow many views. As hikers near the top, they come into clearings where the Oregon side of the gorge is visible across the Columbia River. The view takes in both natural and developed settings that include steep, rugged forests, meadows, rock outcrops, the Columbia River, highways, towns, and transmission line rights-of-way.

From the top of the Dog Mountain KVA, the right-of-way is visually dominant about 2 miles away, but structures are not visually evident because of the distance (Figures C-10 and C-11). The right-of-way is a dark linear feature visible for some distance both to the west and east.

C.4 Environmental Consequences – Proposed Action

To estimate impacts on scenic resources, GIS and photosimulations were used to analyze the visual contrast the Proposed Action might introduce to areas seen from KVAs. Two important variables are how visible changes would be and how much they would contrast with the landscape setting. The relative change from the current conditions was taken into account in this analysis.

The Proposed Action, including the three Line Mile 19 Options, was compared to the visual standards for the different land use designations, predominantly Open Space, where the transmission line crosses through the National Scenic Area. Both short and longer-term effects are described, including a discussion of how visual conditions would change over time as disturbed areas recover.

Potential effects of the Proposed Action in the short term include alteration of vegetation and disturbance from construction at structure locations. Access road work would also require clearing and grading required to improve or reconstruct access roads. The right-of-way already exists and the edges would not be changed. When road work requires the removal of trees or vegetation, vegetation clearing and ground disturbance would introduce some short-term visual impacts that could last up to 5 years, depending on the rate at which vegetation recovers.

Most road construction would result in improvements to existing access roads. Areas with noteworthy changes, including retaining walls and forest or woodland clearing, were modeled for potential visibility from KVAs. Highest impacts are expected to occur where steep road cuts or large fills expose light soil or rock visible from KVAs. Exposed soil can be re-vegetated if slopes are not overly steep. Fresh rock cuts can be treated to hasten weathering and allow the color to blend in quickly. For example, Permeon has been successfully used in the National Scenic Area in the past on fresh rock cuts to advance weathering.

Structure replacement includes removing galvanized steel lattice structures and replacing them with weatherized steel monopoles that would darken their color and reduce contrast or wooden H-frame structures. Most wooden H-frame structures are expected to be replaced by near identical designs. The discussion that follows includes each element of the Proposed Action that could have some effect on scenic resources, either positive or negative.

Structure Replacement

The Proposed Action includes replacing 59 existing galvanized steel lattice structures with a combination of 30 wooden H-frame structures and 29 weatherized steel monopoles. Weatherized steel poles would slightly reduce visual contrast from all KVAs from which the existing steel structures are currently viewed when the structures would not be located with a sky or talus backdrop. This is because the dark, non-reflective hue of weatherized steel has proven to be effective at reducing visual contrast on similar projects. This is demonstrated in simulations (Figures C-12 to C-25). Wooden H-frame structures also have less visual contrast than the existing steel structures they would replace. The weatherized steel structures and wood H-frame structures when viewed from KVAs against the skyline or lighter colored rocks may have a more pronounced visual contrast compared to current conditions. In locations where the existing steel lattice structures would be replaced with new wooden or weatherized steel monopole structures, the new structures would be darker than those being replaced. The visual impacts from structure replacement would be the small area of ground disturbance at the each structure locations and those wood and weatherized steel structures viewed against lighter backdrops. The structures would be the same weatherized steel, with the same visual impact regardless of Line Mile 19 Option selected.

Vegetation Clearing

The Proposed Action includes vegetation clearing that would introduce some long-term visual disturbance. The amount of clearing is small relative to the visible landscape, and most of the cleared areas are already managed right-of-way or along existing roadways. Where cleared vegetation is brush, it should recover to the current condition within 5-10 years. In some areas, however, clearing of forest trees is anticipated. This could include of trees for pulling/tensioning sites and to improve access roads for equipment access. Most of the cleared forest or woodland is in small patches, less than an acre, scattered throughout the entire project area. Modeling indicates that cleared forest and woodland may be visible from SR 14, Dog Mountain, and the Columbia River KVAs, primarily in the central section of the project area, approximately from line mile 10 to line mile 18. The simulations do not indicate significant impacts, but may not reflect the most exposed viewpoints (Figures C-12 to C-21). Vegetation clearing would be the similar, regardless of which Line Mile 19 Option is selected, and therefore associated visual impacts would be the same.

Road Construction and Improvements

Most road improvements involve minor disturbance, such as re-grading, surfacing, and installation of water bars, which would have little to no impact on views from KVAs. However, in some areas road extensions or more extensive reconstruction would be required. This could include steep cuts, deep fills, or retaining walls that may be visible from some KVAs. A long, 10-foot-high retaining wall would be built in line mile 3. The retaining wall at line mile 3 would likely be visible from a small (less than 1-mile) portion of the I-84, SR 14, and Columbia River KVAs. The retaining wall would be brown to grey in color and would blend with the surrounding exposed rock, appearing consistent with natural openings in the vegetation. Additionally, views of the retaining wall would be of short duration, since viewers would be traveling along the roadway or the river, and would be experienced from a steep viewing angle. Therefore, views of the retaining wall would be easily overlooked and would not dominate views from KVAs.

Line Mile 19 Options 1 through 3 have different proposed access road designs between structures 19/3 and 19/7 that would result in minor differences in visual impacts. Within Line Mile 19, six retaining walls are proposed for Line Mile 19 Options 1 and 2 between structures 19/3 and 19/7. The tallest retaining wall would be 16 feet at its tallest point, and the longest would be approximately 500 feet long. The retaining walls would be situated immediately adjacent, above or below, the access road in areas already free of vegetation due to steep slopes. Retaining walls would be brown to grey in color and would blend with the surrounding exposed rock, appearing consistent with natural openings in the vegetation. The color of the retaining walls may appear brighter than the natural un-vegetated areas the first few years after construction, but would fade with time, such that they would easily be overlooked by viewers and appear consistent with the existing condition (See Figures C-22 through C-24). Additionally, the access road would be tucked along the southern edge of the right-of-way, which would take advantage of the surrounding vegetation to provide screening and blending of the access road and associated retaining walls. The texture of the retaining walls would appear somewhat rough and granular from the KVAs, and be consistent with the natural outcrops of the surrounding natural landscape, which appear as horizontal, diagonal, and sometimes vertical lines and irregular shapes along the hillside. The additional equipment trails to structures 19/4 through 19/7 associated with Line Mile 19 Option 1 would add some additional visual disturbance from vegetation disturbance, but would recover upon completion of construction.

Line Mile 19 Option 3 would not include any access roads or retaining walls between structure 19/3 and 19/7, and no associated visual impacts. The existing access road between structures 19/3 and 19/7 would not be reconstructed. Visibility of the existing road would remain the same as current conditions.

Visual Simulations

Visual simulations from six KVAs were developed to provide a more detailed view of potential impacts. These were selected to be representative, but do not provide a comprehensive view of effects of the Proposed Action on visual resources from every possible vantage point. The following discussion focuses on the simulations and the visual changes the Proposed Action would likely introduce as well as the differences between the three Line Mile 19 Options.

Simulation 1: Dog Mountain

A comparison of existing and simulated conditions shows that there are no obvious changes to visibility from this viewpoint, primarily because the viewpoint is over 2 miles from the project area (Figures C-12 and C-13).

Simulation 2: Pacific Crest Trail

A comparison of existing and simulated conditions shows that new wooden structures are nearly identical to existing structures and thus have no appreciable visual impact from the structures (Figures C-14 and C-15). However, road improvement and ground disturbance would create a strong temporary visual contrast that would create new impacts that may last up to 5 years, or until vegetation recovery is advanced. Ground disturbance areas would be revegetation and, if needed, the road surface would be treated with Permeon or a similar colorant to conform the road bed to more natural background colors. The Proposed Action is not expected to be visible from additional locations along the Pacific Crest Trail because of heavy vegetation screening along the trail.

Simulation 3: Starvation Creek/I-84

A comparison of existing and simulated conditions shows that the new weatherized steel monopoles would have slightly lower visual contrast as compared to the existing galvanized steel lattice structures when viewed against the hillside (Figures C-16 and C-17). The weatherized steel monopole structure would stand out slightly more than the existing galvanized structure when viewed against the skyline. Due to the viewer distance, the weatherized steel structure is not expected to dominate the view. Road improvement or vegetation clearings would be noticeable from this viewpoint, but would be located in the same location as the existing access road.

Simulation 4: Historic Columbia River Highway at Viento State Park

A comparison of existing and simulated conditions shows that the new weatherized steel monopoles would have slightly lower visual contrast when viewed against the land as compared to the existing galvanized steel lattice structures, thus reducing visual impacts (Figures C-18 and C-19). However, the weatherized steel structure that would be viewed against the sky would be more visually apparent than the existing structure. Proposed road improvement work would accentuate the linear form of the cleared roadway, which further pronounces its visual impact that reduces scenic quality at this location, and fails to be visually subordinate. Few other areas along the Historic Columbia River Highway are expected to be impacted by the Proposed Action in a similar manner.

Simulation 5: SR14 at Drano Lake

A comparison of existing and simulated conditions shows that new wooden structures are nearly identical to existing ones and thus have no appreciable visual impact (Figures C-20 and C-21). Vegetation clearing and road improvements are not noticeable from this viewpoint. However, other areas along SR 14 may be more visually exposed to elements of the Proposed Action, including roads and vegetation clearing.

Simulation 6a: I-84 at Mitchell Point – Line Mile 19 Option 1

Simulations were produced at an I-84 frontage road, approximately 0.5 mile northeast of Line Mile 19 Option 1, representing views from the I-84 KVA in the only short segment of I-84 where Line Mile 19 would be visible. A comparison of existing and simulated conditions shows that the new weatherized steel monopoles would have slightly lower visual contrast as compared to the existing galvanized steel lattice structures. The retaining walls would be visible, but since they would be constructed in natural openings in the vegetation and would use rock with similar color to the natural rock outcrops in the landscape, they would not be noticeable and would be easily overlooked. The cleared right-of-way would continue to be the most noticeable aspect of the transmission line in this area, and since there would be no additional vegetation clearing in this area under the Proposed Action with Line Mile 19 Option 1, the landscape would appear nearly the same as under existing conditions. There are no turn offs or exits along the stretch of I-84 where Line Mile 19 Option 1 is located, so viewers would be traveling at highway speeds when this portion of the project would be visible and; in addition, views from I-84 of the project area are intermittent due to dense vegetation along the I-84 corridor. Therefore, viewers on I-84 would have intermittent, short duration views of Line Mile 19 Option 1, further diminishing noticeable visual changes to the landscape from the I-84 KVA.

Simulation 6c: I-84 at Mitchell Point – Line Mile 19 Option 2

Line Mile 19 Option 2 would appear nearly identical to Line Mile 19 Option 1 from the I-84 KVA. The simulation of this option (Figure C-24) indicates that the short excavator trails would not be noticeable from the I-84 KVA and that Line Mile 19 Options 1 and 2 would appear identical from this location.

Simulation 6c: I-84 at Mitchell Point – Line Mile 19 Option 3

Line Mile 19 Option 3 would appear similar to Line Mile 19 Options 1 and 2 from the I-84 KVA (Figure C-25). The lack of retaining walls and lack of road use and maintenance between structures 19/3 and 19/7 would reduce the visual contrast of these features against the landscape. However, as described above, these features would blend with the surrounding landscape and would be easily overlooked by viewers on I-84 KVA; therefore, while Line Mile 19 Option 3 would result in less visual contrast, the difference would be minor and likely not noticeable from this KVA. The cleared right-of-way would continue to be the most noticeable aspect of the transmission line in this area, which would be the same as Line Mile 19 Options 1 and 2.

Proposed Action Visual Impact Summary

In the short term (5 years), there could be a **moderate** level of impact from the Proposed Action resulting from construction-related vegetation clearing and road improvements. These actions would in turn result in some changes to visual conditions as viewed from certain KVAs, including SR 14, the Columbia River, I-84, the Pacific Crest Trail, and the Historic Columbia River Highway. In the long-term, slight improvements compared to existing conditions would be gained by replacing steel structures that reflect light with darker weatherized steel or wooden structures. In two locations, structures would be moved off prominent ridgelines, and this may improve scenic conditions where these can be viewed. The retaining walls associated with Line Mile 19 Options 1 and 2 would be more visible than Line Mile 19 Option 3. However, overall several visibility factors reduce the visibility, visual contrast, and overall perceived visual change to the landscape from KVAs such that the level of visual impact over the long term is **low** for all three Line Mile 19 Options, and the difference would be minor.

It is important to note that the visual condition of the existing transmission line varies from inconspicuous and meeting the retention standard, to visually subordinate, and in a few places visually dominant. Generally, the western third of the project area is less visible from KVAs while the central third is more visible and at times visually dominant (the eastern third is located outside of the National Scenic Area and discussed in Section 3.9, *Visual Quality*), and the cleared right-of-way is the most visually conspicuous aspect of the Bonneville-Hood River transmission line. When compared to the existing transmission line, the Proposed Action, regardless of the Line Mile 19 Option selected, would result in the same visual ratings and long-term effect, ranging from visually dominant to inconspicuous, and averaging visually subordinate from the KVAs that are most exposed to the project area.

C.5
Representative Photos and Photosimulations

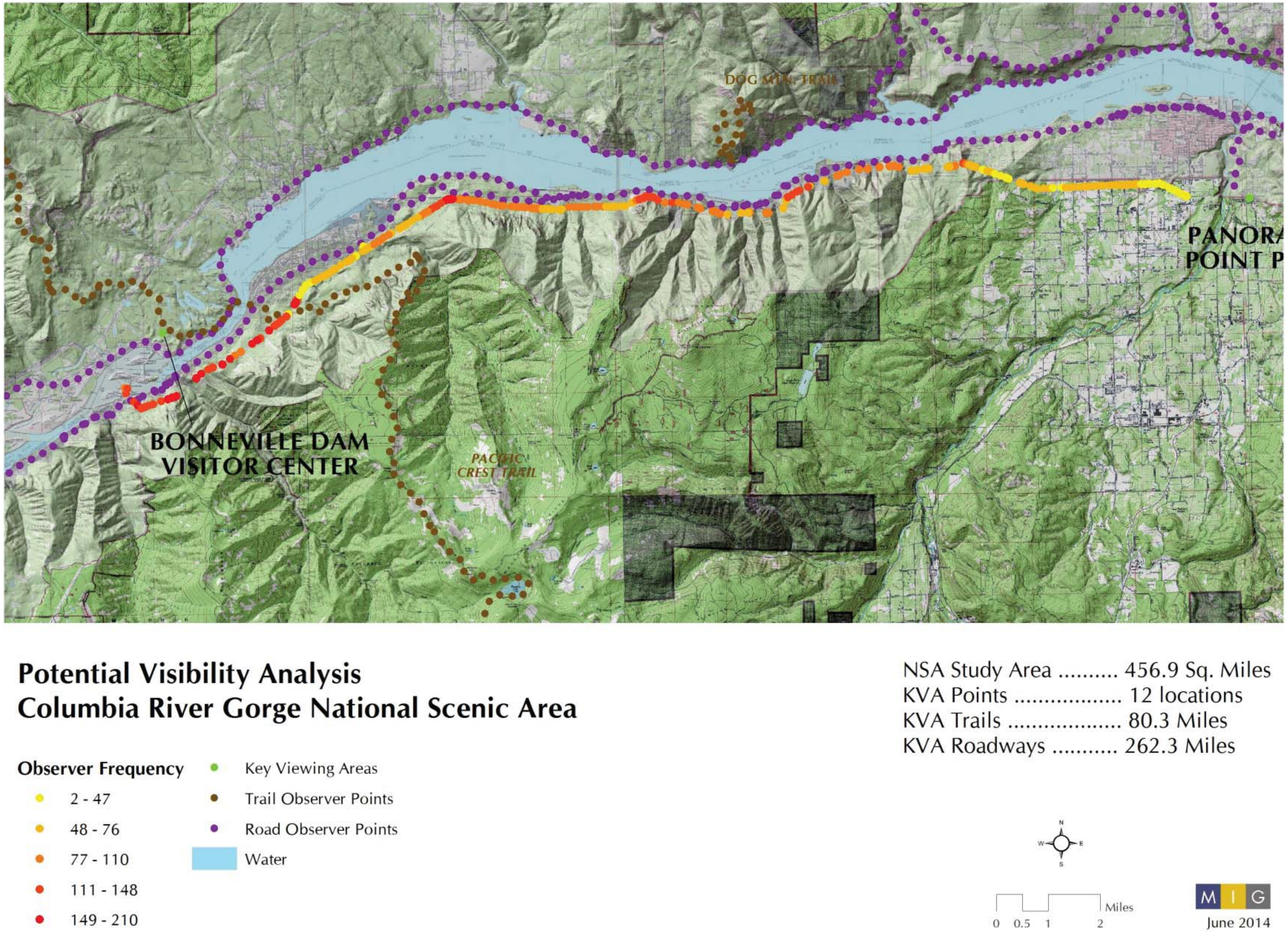


Figure C-1. Cumulative KVA Potential Visibility, I-84, Wyeth Road, SR 14, and Dog Mountain

This page deliberately left blank.

Figure C-2. Project Area Right-of-Way is Visible to the East in Center of Photo Viewed from the Bonneville Dam Visitor Area KVA

This page deliberately left blank.

Figure C-3. The Right-of-Way is Visually Evident looking South from Drano Lake along the SR 14 KVA, and Several Structures can be seen but are not Visually Dominant at this Distance

This page deliberately left blank.

Figure C-4. Looking South at Mitchell Point as seen looking South from SR 14 (a KVA); Note the Structures Visible in Meadow Area

This page deliberately left blank.

Figure C-5. Right-of-Way Line and Some Structures are Clearly Visible to the South from near the Base of Wind Mountain along the SR 14 KVA

This page deliberately left blank.

Figure C-6. Steel Structures are Visually Evident along Talus Slopes of Shellrock Mountain (lower left of photo) as seen from the SR 14 KVA when Looking South

This page deliberately left blank.

Figure C-7. Typical View from Eastbound in the I-84 KVA of the Transmission Line Crossing Talus Slopes; Most of the View from I-84 is Screened by Vegetation

This page deliberately left blank.

Figure C-8. Photo of the Transmission Line from Eastbound in the I-84 KVA near Wyeth State Park

This page deliberately left blank.

Figure C-9. Two Structures are seen against the Sky on the Ridgeline from Eastbound in the I-84 KVA near Starvation Creek State Park

This page deliberately left blank.

Figure C-10. A Few Structures can be seen while Looking East from Wyeth Road (a KVA) on the Talus Slope to the Left and just beyond the Upper Right of the Meadow

This page deliberately left blank.

Figure C-11. The Right-Of-Way is Visually Dominant Looking to the Southeast from the Top of the Dog Mountain KVA as a Horizontal Dark Line or Grassy Opening Depending on the View Angle

This page deliberately left blank.

Figure C-12. Existing Conditions Looking Southwest from the Summit of the Dog Mountain KVA on the North Side of the Columbia River at the Right-of-Way Between Line Mile 9 and Line Mile 13.

This page deliberately left blank.

Figure C-13. Photosimulation of the Proposed Action Looking Southwest from the Summit of the Dog Mountain KVA on the North Side of the Columbia River at the Right-of-Way Between Line Mile 9 and Line Mile 13.

This page deliberately left blank.

Figure C-14. Existing Conditions Looking East Along the Transmission Line at the Location Where the Pacific Crest Trail (a KVA) Crosses the Right-of-Way in Line Mile 5

This page deliberately left blank.

Figure C-15. Photosimulation of the Proposed Action Looking East Along the Transmission Line at the Location Where the Pacific Crest Trail (a KVA) Crosses the Right-of-Way in Line Mile 5

This page deliberately left blank.

Figure C-16. Existing Conditions Looking Southeast from the Starvation Creek Parking Area at the Existing Right-of-Way and Structures in Line Mile 15

This page deliberately left blank.

Figure C-17. Photosimulation of the Proposed Action Looking Southeast from the Starvation Creek Parking Area in Line Mile 15

This page deliberately left blank.

Figure C-18. Existing Conditions Looking West along the Transmission Line from near Viento State Park in Line Mile 16

This page deliberately left blank.

Figure C-19. Photosimulation of the Proposed Action Looking West along the Transmission Line from near Viento State Park in Line Mile 16

This page deliberately left blank.

Figure C-20. Existing Conditions Looking South from the Drano Lake Boat Launch and Parking Area on the North Side of the Columbia River (along the SR 14 KVA) at the Right-of-Way in Line Mile 18

This page deliberately left blank.

Figure C-21. Photosimulation of the Proposed Action Looking South from the Drano Lake Boat Launch and Parking Area on the North Side of the Columbia River (along the SR 14 KVA) at the Right-of-Way in Line Mile 18

This page deliberately left blank.

Figure C-22. Existing Conditions Looking South from the I-84 Frontage Road (Just south of the I-84 KVA) toward the Right-of-Way in Line Mile 19

This page deliberately left blank.

Figure C-23. Photosimulation of the Proposed Action with Line Mile 19 Option 1 looking South from the I-84 Frontage Road (Just south of the I-84 KVA) toward the Right-of-Way in Line Mile 19

This page deliberately left blank.

Figure C-24. Photosimulation of the Proposed Action with Line Mile 19 Option 2 looking South from the I-84 Frontage Road (Just south of the I-84 KVA) toward the Right-of-Way in Line Mile 19

This page deliberately left blank.

Figure C-25. Photosimulation of the Proposed Action with Line Mile 19 Option 3 looking South from the I-84 Frontage Road (Just south of the I-84 KVA) toward the Right-of-Way in Line Mile 19

This page deliberately left blank.

C.6 References

Columbia River Gorge Commission (Gorge Commission). 2011. Management Plan for the Columbia River Gorge National Scenic Area. Revisions to the Management Plan adopted in 2004 and all other amendments and updates approved through September 2011. Available at: http://www.gorgecommission.org/managementplan.cfm. White Salmon, Washington.

Columbia River Gorge Commission (Gorge Commission). 2015. About the National Scenic Area. Available at: http://www.gorgecommission.org/about_scenic_area.cfm. Accessed 2-18-2015.

Sullivan, R.G., Abplanalp, J.M., Beckman K.J., Cantwell, B.L., Richmond, P., and Lahti, S. 2014. Electric Transmission Visibility and Visual Contrast Threshold Distances in Western Landscapes.

This page deliberately left blank.

Appendix D

Assumptions Used to Calculate Greenhouse Gas Emissions and Detailed Results

This page deliberately left blank

Implementation of the Proposed Action could contribute to an increase in greenhouse gas concentrations through the below listed activities. The assumptions and methods used to determine the project's contribution to greenhouse gas levels are described below.

Assumptions

Construction

Project construction would take about 7 months over up to four construction seasons, with peak construction activity, including road and structure installation, occurring during two 4-month-long periods. Non-peak construction activities would include installing and removing BMPs, establishing staging areas, moving equipment and materials into and out of the project area, and site preparation and restoration work.

The transportation components of greenhouse gas emissions were estimated based on the approximate number of vehicles that would be used during project construction and the approximate distance those vehicles would travel. Greenhouse gas emissions were calculated for both the 8-month-long peak construction periods and the 20-month-long non-peak periods based on estimates of vehicle round trips per day.

Overestimating the number of round trips ensures that greenhouse gas emission estimates are conservatively high. The number of round trips was deliberately overestimated using the following assumptions.

- All workers would travel in separate vehicles to and within the project area each day.
- A maximum number of workers would be required to construct the project.
- The round-trip distance to the project area is the distance from Portland, Oregon to the Hood River Substation and back (about 70 miles round trip).
- All workers would travel the full length of the project area each day. Although this is true for some workers, such as inspectors, other workers could be localized.
- Fuel consumption is based on the average fuel economy for standard pickup trucks of 17 miles per gallon (EPA 2013a). Again, this is likely an overestimation as more efficient vehicles may be occasionally used.
- Average helicopter fuel consumption is estimated by BPA pilots at 1 mile per gallon.

Up to 50 construction workers would be at work on the transmission line during the peak construction period (8 months) and an estimated 20 workers could be present during the non-peak construction period (20 months).

BPA staff would travel to the transmission line for various purposes, such as road inspection, work inspection, staff meetings, environmental compliance monitoring, and meetings with landowners. An estimated 1 round trip every 2 weeks from The Dalles Maintenance Headquarters during the 7-month-long construction periods would result in a total of 27 round trips at an estimated 45 miles per trip.

Helicopters may be used to replace the conductor and install the steel monopoles. It was assumed that the helicopter would be used for approximately 4 months (40 work days) to conduct this work. An estimated two round trips from the Troutdale Airport each day would result in a total of 2 round trips at an estimated 50 miles per trip. It is likely that helicopters may also travel from Hood River, which would be less distance.

Fuel consumption and greenhouse gas emissions would also result from operation of on-site heavy construction equipment. Heavy construction equipment may include augers, bulldozers, excavators, graders, heavy-duty trucks, and front-end-loaders. Similar to the transportation activities listed above, increased use of heavy construction equipment would occur during peak construction.

Greenhouse gas emissions associated with equipment operation were overestimated to account for all potential construction activities and associated material deliveries to and from the construction site. Although it is difficult to develop an accurate estimation of total fuel consumption associated with heavy construction equipment operation, the following assumptions were used.

- A maximum of 32 pieces of equipment would be in operation during peak construction and 8 pieces of equipment would be in operation during off-peak construction.
- The average size of the equipment would not exceed 250 horsepower. All equipment would operate at maximum power for 8 hours per day and 5 days per week throughout the construction phase. This is a significant overestimation because equipment commonly operates in idle or at reduced power.
- Equipment would operate at approximately 35 percent efficiency, representing the percentage of productive energy extracted from the diesel fuel relative to the maximum potential energy within the fuel (i.e., 128,450 British thermal units per gallon of diesel) (AFDC 2013).

Detailed Results

The GHG emissions or storage loss are quantified below for each type of activity described above.

Construction Emissions

Table D-1 displays the results of calculations for the construction activities that would contribute to GHG emissions. Construction of the Proposed Action would result in an estimated 8,841.6 metric tons of CO_2e[8] emissions.

[8] CO_2e is a unit of measure used by the IPCC that takes into account the global warming potential of each of the emitted GHGs using global warming potential factors. See Table D-1.

Table D-1. Estimated Greenhouse Gas Emissions from Project Construction

Estimated GHG Emissions of Construction Activities	CO_2 (metric tons)[1]	CH_4 (CO_2e) (metric tons)[2]	N_2O (CO_2e) (metric tons)[2]	Total CO_2e (metric tons)[3]
Peak construction transportation	317.0	256.3	1,193.2	**1,766.5**
Off-peak construction transportation	31.7	25.6	119.3	**176.6**
BPA employee transportation	2.8	2.2	10.4	**15.3**
Helicopter operation	18.1	0.4	0.1	**18.5**
Peak construction: equipment operation	6,411.7	8.0	41.2	**6,460.9**
Off-peak construction: equipment operation	400.7	0.5	2.6	**403.8**
TOTAL[3]	**7,181.9**	**293.1**	**1,366.7**	**8,841.6**

[1] CO_2 emission factors calculated from The Climate Registry (2014).
[2] CH_4 and N_2O emissions have been converted into units of equivalent carbon dioxide (CO_2e) using the IPCC global warming potential (GWP) factors of 25 GWP for CH_4 and 298 GWP for N_2O (The Climate Registry 2014).
[3] The sum of the individual entries may not sum to the total depicted due to rounding.

References

Alternative Fuels Data Center (AFDC). 2013. Alternative Fuels Data Center – Fuel Properties Comparison. Website. Available at: www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf.

International Carbon Bank and Exchange (ICBE). 2000. Calculating Greenhouse Gases. Available at: http://www.icbe.com/emissions/calculate.asp.

Smith, J.E., L.S. Heath, K.E. Skog, and R.A. Birdsey. 2006. Methods for Calculating Forest Ecosystems and Harvested Carbon with Standard Estimates for Forest Types of the United States. USFS General Technical Report NE-343. April 2006.

The Climate Registry. 2014. 2014 Climate Registry Default Emission Factors. Released April 11, 2014. Available at: www.theclimateregistry.org/resources/protocols/general-reporting-protocol/general-reporting-protocol-archive/.

U.S. Environmental Protection Agency (EPA). 2013a. Model Year 2013. Fuel Economy Guide. Available at: http://www.fueleconomy.gov/feg/pdfs/guides/FEG2013.pdf.

EPA. 2013b. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011. Available at: http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

This page deliberately left blank.

This page deliberately left blank

Bonneville Power Administration
DOE/BP-4773 • September 2016