

Boyer-Tillamook Access Road Improvement Project

Preliminary Environmental Assessment

September 2013



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Appendix B: Cultural Resources Maps

Appendix C: NMFS Biological Assessment

Appendix D: USFWS Biological Assessment

Appendix E: Greenhouse Gas Analysis

CHAPTER 1

PURPOSE OF AND NEED FOR PROPOSED ACTION

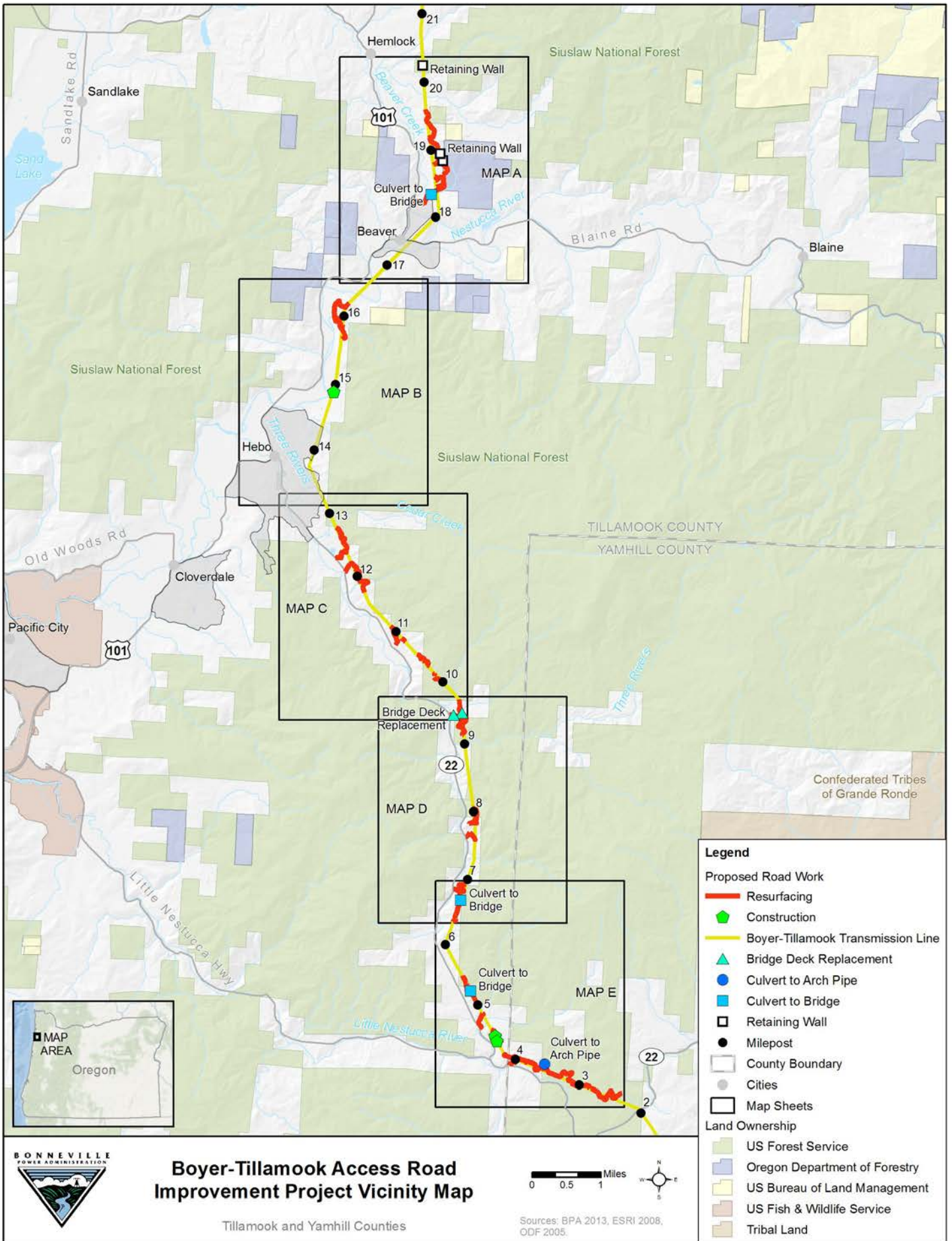
1.1 BACKGROUND

The Bonneville Power Administration (BPA) is proposing to improve portions of the access road system for its existing 115-kilovolt (kV) Boyer-Tillamook transmission line located in Tillamook and Yamhill counties, Oregon (see Figure 1-1). The proposed project would improve a total of about 13.5 miles of access roads at specific sites along an 18-mile portion of the line. The road improvements are proposed because the existing access roads for this transmission line are in poor condition or washed out, making regular maintenance and emergency repairs to the line difficult, time consuming, and dangerous. In addition, improvements to access road stream crossings would facilitate fish passage.

This chapter describes the need for improving the Boyer-Tillamook access road system, identifies the purposes BPA is attempting to achieve in meeting this need, and summarizes the public scoping process conducted for the Environmental Assessment (EA).

BPA is a federal agency that owns and operates more than 15,000 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 a statutory obligation to ensure that its transmission system has sufficient capability to serve its customers while maintaining a system that is safe and reliable. 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]).

This EA was prepared by BPA under the National Environmental Policy Act (NEPA) (U.S.C. 4321 *et seq.*) and its implementing regulations, which requires federal agencies to assess the impacts their actions may have on the environment. Major federal actions significantly affecting the quality of the human environment must be evaluated in an Environmental Impact Statement (EIS). BPA prepared this EA to determine if the Boyer-Tillamook Access Road Improvement Project (**Proposed Action**) would cause effects of a magnitude that would warrant preparing an EIS, or whether it is appropriate to prepare a Finding of No Significant Impact (FONSI).



Date: 8/20/2013 GIS Analyst: NJH Map Document: LocationMap.mxd Project Number: 40268006

FIGURE 1-1. PROJECT VICINITY MAP

1.2 NEED FOR ACTION

BPA needs to ensure safe and reliable access to the Boyer-Tillamook transmission line. The existing access roads are in poor condition, and year-round access for transporting line crews, material, and equipment to each structure of the line is required to sustain routine operations and restore main grid lines in the event of an emergency. Each winter, parts of the Boyer-Tillamook transmission line experience high wind events, many of which result in outages when trees are blown over onto the line. Many of the roads are washed out, with limited access in the summer and no access in the winter, making repairs to the lines from storm damage difficult, time consuming, and dangerous. In order to ensure transmission system reliability as well as public and worker safety, improved and in some cases new access roads to this line are necessary. In addition, several access road stream crossings with culverts currently block or hamper fish passage; road crossing improvements would facilitate fish movement in those streams.

1.3 PURPOSES

In meeting the need for action, BPA would attempt to achieve the following purposes:

- Maintain or improve transmission system reliability to BPA and industry standards.
- Continue to meet BPA's contractual and statutory obligations.
- Minimize environmental impacts.
- Demonstrate cost-effectiveness.

1.4 PUBLIC INVOLVEMENT

1.4.1 SCOPING COMMENT PERIOD

To help determine the scope to the issues to be addressed in this EA, BPA conducted public scoping outreach. To initiate the EA scoping process, BPA mailed letters to potentially interested and affected persons, agencies, tribes, and organizations on March 5, 2013. The public letter provided information about the Proposed Action, gave notice of BPA's intent to prepare an EA, and requested comments on issues to be addressed in the EA. The public letter provided information on how to submit scoping comments by mail, fax, telephone, and the BPA website. BPA also established a project website to provide information about the project and the EA process (see www.bpa.gov/goto/BoyerTillamookAccessRoads).

Two tribes with potential interest in this project were identified: the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz. BPA provided project information to and requested information from the consulting tribes, including information on potential cultural resources in the project area.

Comments received during the scoping period, both written and oral, were considered in the environmental analysis. Fifteen comments from 11 individuals were received during this period. Comments that were received were generally supportive of the Proposed Action. Specific concerns included impacts to the local community, fish, cultural resources, as well as soil erosion and road drainage issues. Comments can be found online at <http://www.BPA.gov/Applications/PublicComments/ClosedCommentListing.aspx>.

1.4.2 PRELIMINARY EA COMMENT PERIOD

BPA is releasing this Preliminary EA for review and comment. The Preliminary EA is posted on the BPA website for this project (www.bpa.gov/goto/BoyerTillamookAccessRoads). During the comment period, BPA will accept comments online, by phone, in person, by e-mail, and by letter. After considering comments received during the Preliminary EA review period, the EA will be revised, if necessary, and then finalized with a decision on how to proceed.

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

This chapter describes the Proposed Action to improve the access roads for the 115-kV Boyer-Tillamook transmission line, as well as the No Action Alternative to rely on existing road maintenance. This chapter also compares the two alternatives by the project purposes and the potential environmental effects.

2.1 PROPOSED ACTION

BPA proposes to improve 13.42 miles of access roads at specific sites within an 18-mile portion of the Boyer-Tillamook transmission line between structures 4/4 and 22/3 (see Figure 2-1). The project area is accessed from Oregon State Route 22 and U.S. Highway 101. The road improvements would occur mostly on existing road easements along 8.90 miles of private lands, 4.06 miles of U.S. Forest Service (USFS) land in the Siuslaw National Forest, and 0.46 mile of Oregon State Department of Forestry (ODF) land. Of those total miles, roughly 1,500 feet of new additional access road easements could be purchased at three sites between structures 4/5 and 5/2. In addition, several miles of a U.S. West fiber optic line easement are located within the roadbed starting at about structure 4/4.

The Boyer-Tillamook transmission line structures are wood poles. Each structure is labeled by mile, as measured from Boyer Substation. Each structure is then numbered sequentially within each mile. For example, Boyer-Tillamook structure 22/3 refers to the third structure in line mile 22.

Improvements would primarily include reconstruction of existing road surfaces, although some work outside of the existing road prism—including road widening and construction of new road segments—would also be done. Work on bridges, culverts, outlet ditches, and retaining walls would also occur. Total new land disturbance under the Proposed Action is estimated to be 3.13 acres. Major components of the Proposed Action would include:

- Roadwork
 - Resurfacing 13.42 miles of roads: placing aggregate (gravel) on the road surface, grading, and constructing water bars (130) and drain dips (62).
 - Widening 3.61 miles of the roads (that would also be resurfaced) from about 10 feet to 14 feet.
 - Constructing 0.1 mile of new access roads (broken into three segments).
 - Repairing two landslide areas with rock fill.
 - Armoring 21 areas with a total of 775 cubic yards of riprap.
 - Constructing 12 outlet ditches (totaling 605 feet long).
- Retaining Walls
 - Constructing three new retaining walls.
- Culvert and Bridge Work
 - Cleaning 24 culverts.

- Replacing one culvert with an arch pipe.
- Replacing three culverts with bridges.
- Replacing two bridge decks with new abutments and decks.
- Tree Removal
 - Removing of a total of 533 trees from 43 locations, with the majority less than 19 inches in diameter at breast height (dbh).
- Gates
 - Installing 14 gates – stockyard gates, pipe and rail gates, and/or cattle guards.

The following sections describe these proposed project activities in further detail.

2.1.1 ROADS

The existing access road system for the Boyer-Tillamook line runs partially along the transmission line within the right-of-way and partially off the right-of-way where it connects with public roads or where terrain makes road siting within the right-of-way too difficult. BPA has road easements from underlying landowners which range from 20 to 25 feet wide. The roads are graded native soils and gravel, have grades ranging from relatively level to as steep as 42 percent, and have road surfaces that range from 10 to 14 feet wide.

Project roads are dirt and gravel roads BPA uses to access the Boyer-Tillamook transmission line to conduct maintenance activities and respond to emergency power outages.

Approximately 13.42 miles of roads would be resurfaced and reshaped to eliminate hazards, improve drainage, and address damaged from surface settlement, rutting, or erosion. During the grading process, gravel would be added and the roadway would be shaped and contoured. Appropriate stormwater drainage, including 130 waterbars and 62 drain dips, would be added to ensure drainage runoff and to maintain the roadbed integrity during storm events. Areas disturbed during construction, including the roadbeds, would be seeded with an appropriate seed mix after the work is completed.

The Proposed Action would also include widening of 3.61 miles of the resurfaced roads to BPA's standard 14-foot width, which would require a 15- to 16-foot road base. The largest concentration of tree removal and road widening and earth work would occur is at an exposed rock hillside midway between structures 5/4 and 5/5 where the rock would be removed (via mechanical means—no blasting) and the steep slope would be reshaped on the adjacent forested hillside. In any areas where earthwork is conducted, the intention would be to balance total cut and fill across the project so no off-site fill would be needed. All crushed rock/gravel used to improve roads, construct retaining walls, stabilize banks, or improve fish habitat during culvert and bridge replacements would be obtained from a local off-site quarry.

Figures 2-1 through 2-4 show the existing conditions found in the project area, including the existing road near structure 11/1 (see Figure 2-1), the area of planned road construction near structure 16/6 (see Figure 2-3), and an example of a finished project road (see Figure 2-4).

The Proposed Action would include construction of 0.1 mile of new project access roads. The construction process for these new roads would be similar to road resurfacing discussed above. New project roads would be built to BPA’s standard 14-foot width, with a 15- to 16-foot road base.



FIGURE 2-1. EXISTING PROJECT ROAD NEAR STRUCTURE 11/1



FIGURE 2-2. EXAMPLE OF AN EXISTING PROJECT ROAD WHERE EARTHWORK, WIDENING AND RECONSTRUCTION WILL BE COMPLETED NEAR STRUCTURE 14/1



FIGURE 2-3. AREA PROPOSED FOR NEW ROAD CONSTRUCTION NEAR STRUCTURE 16/6



FIGURE 2-4. EXAMPLE OF FINISHED PROJECT ROAD STRUCTURE 7/5

A total of 130 water bars would be constructed at 28 locations along project roads. Water bars prevent surface water from flowing along the road surface and causing erosion and ruts. The number of water bars required depends on the length and slope of the road. Under the Proposed Action, the number of water bars to be constructed in any single road segment ranges from 1 to 22.

Water bars are mounds of compacted crushed rock placed diagonally across the road to redirect water draining on the road.

A total of 62 drain dips also would be constructed at 21 locations. The number of drain dips to be constructed in any one road segment of the Proposed Action ranges from 1 to 10.

An estimated 605 linear feet of outlet ditches would be constructed at 12 locations. These ditches would be constructed by placing cuts along the side of the project road and potentially lining portions of them with rock. The ditches are designed to drain water off project roads to reduce the occurrence of “mud holes” and erosion by directing the water to an area where proper infiltration can occur into surrounding soils, without causing additional erosion that could affect the stability of the access road, or water quality in nearby wetlands or streams.

Drain dips are mounds of compacted crushed rock placed along the side of the road to create a high point that directs water to a nearby drain system (i.e., not diagonally across the road like a water bar).

A total of approximately 750 cubic yards of rock fill would be used to repair two existing landslides. An area between structures 5/6 and 6/1 would require an estimated 150 cubic yards of rock fill (see detailed study area maps presented in Figures 2-5 through 2-9). The other area is located between structures 10/5 and 11/4 and would require an estimated 600 cubic yards of rock fill.

In addition to the roadbed work, a number of landslide areas along the uphill side of project roads would be cleared and stabilized. An estimated 775 cubic yards of rip rap would be placed in 21 landslides, streambeds, and other locations. Quantities would range from 5 to 158 cubic yards depending on the location. In addition, riprap would be used to armor streambeds, culvert inlets and outlets, bridge abutments, pilings, and other structures against scour, water, or ice erosion.

Some of the types of construction equipment that would be used for construction activities under the Proposed Action include:

- Road grader
- Bulldozer
- Heavy truck
- Excavator
- Pneumatic tools
- Chainsaw
- Concrete pump
- Crane

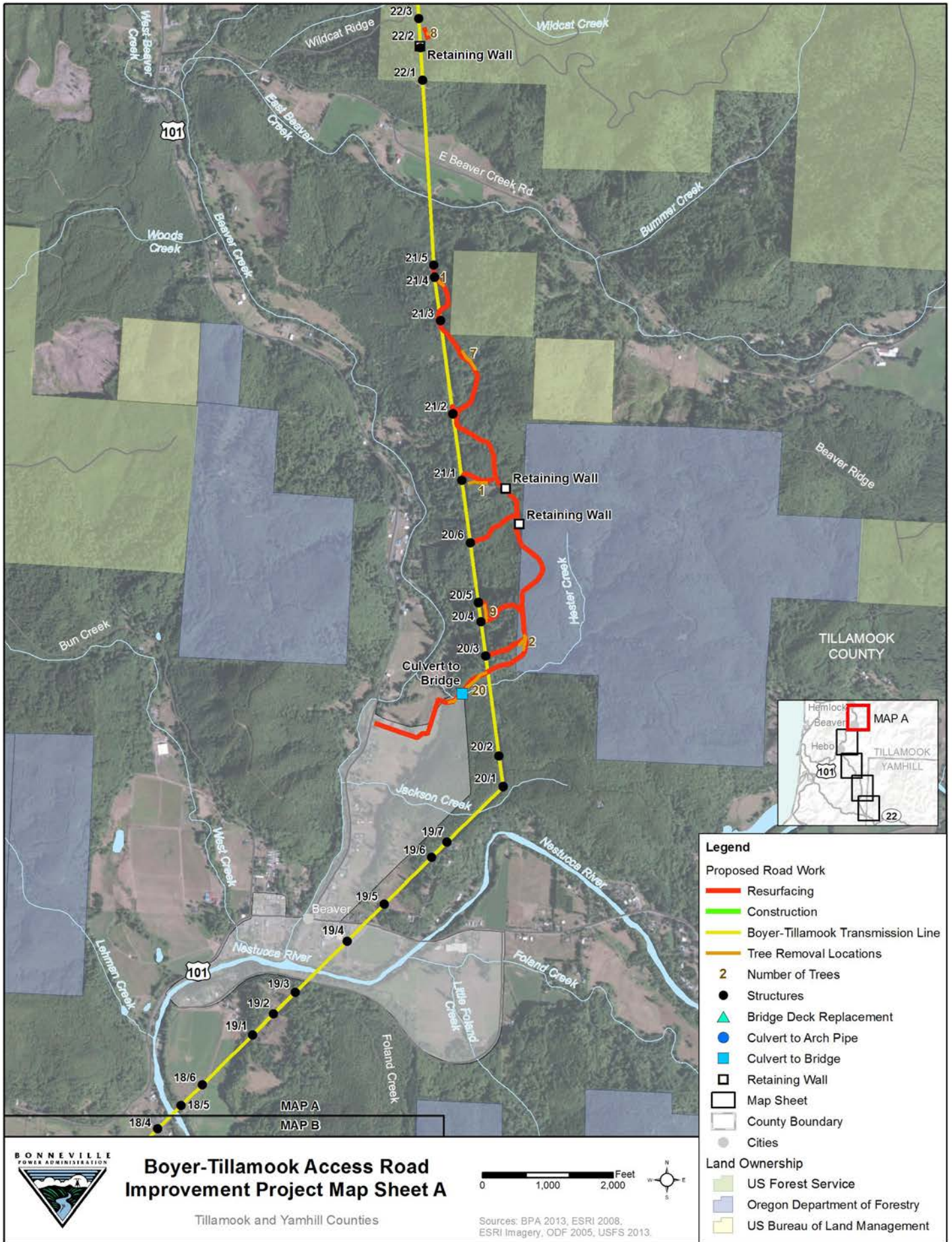


FIGURE 2-5. PROJECT LOCATION MAP A: LINE MILES 22/3 TO 18/5

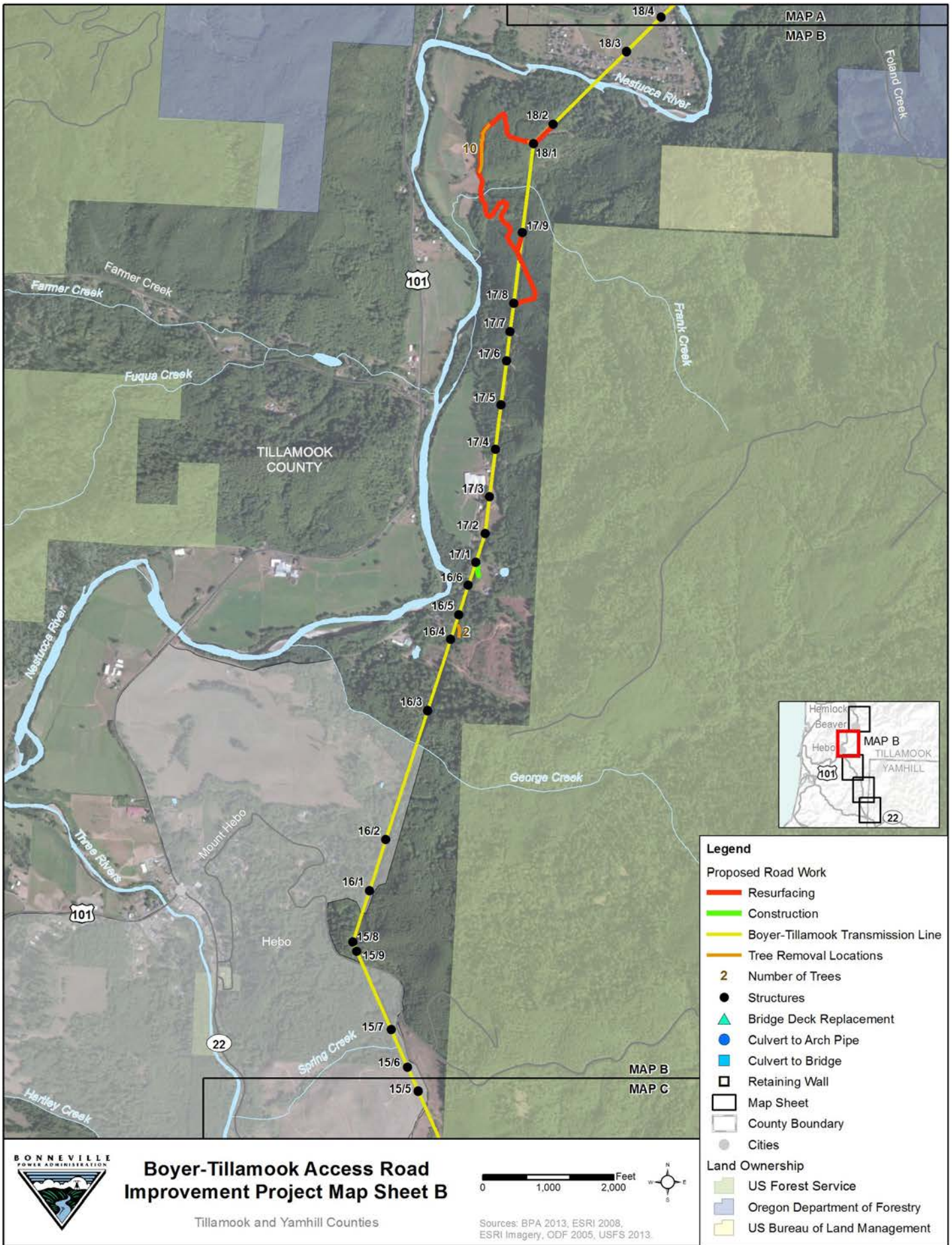


FIGURE 2-6. PROJECT LOCATION MAP B: LINE MILES 18/3 TO 15/6

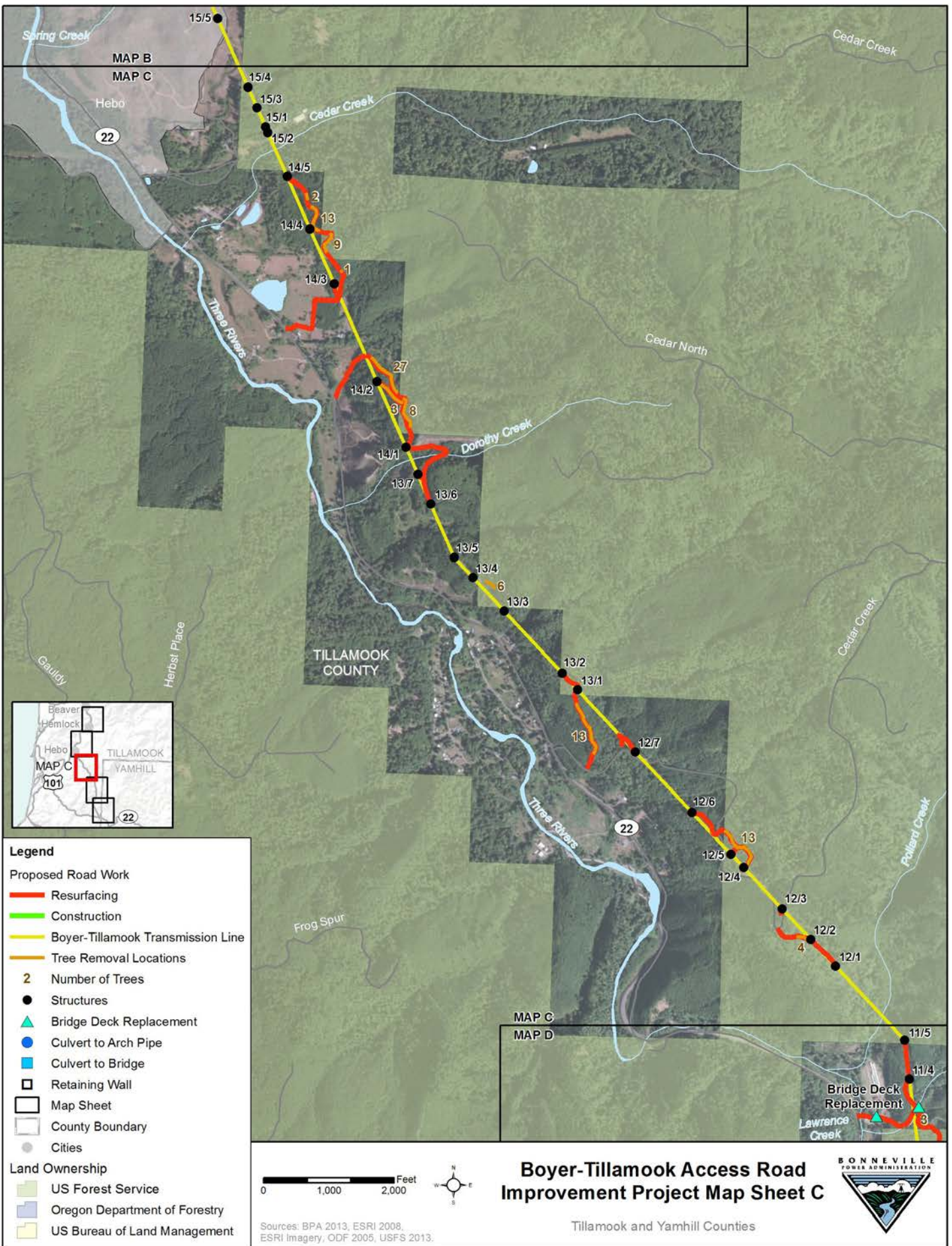


FIGURE 2-7. PROJECT LOCATION MAP C: LINE MILES 15/4 TO 12/1

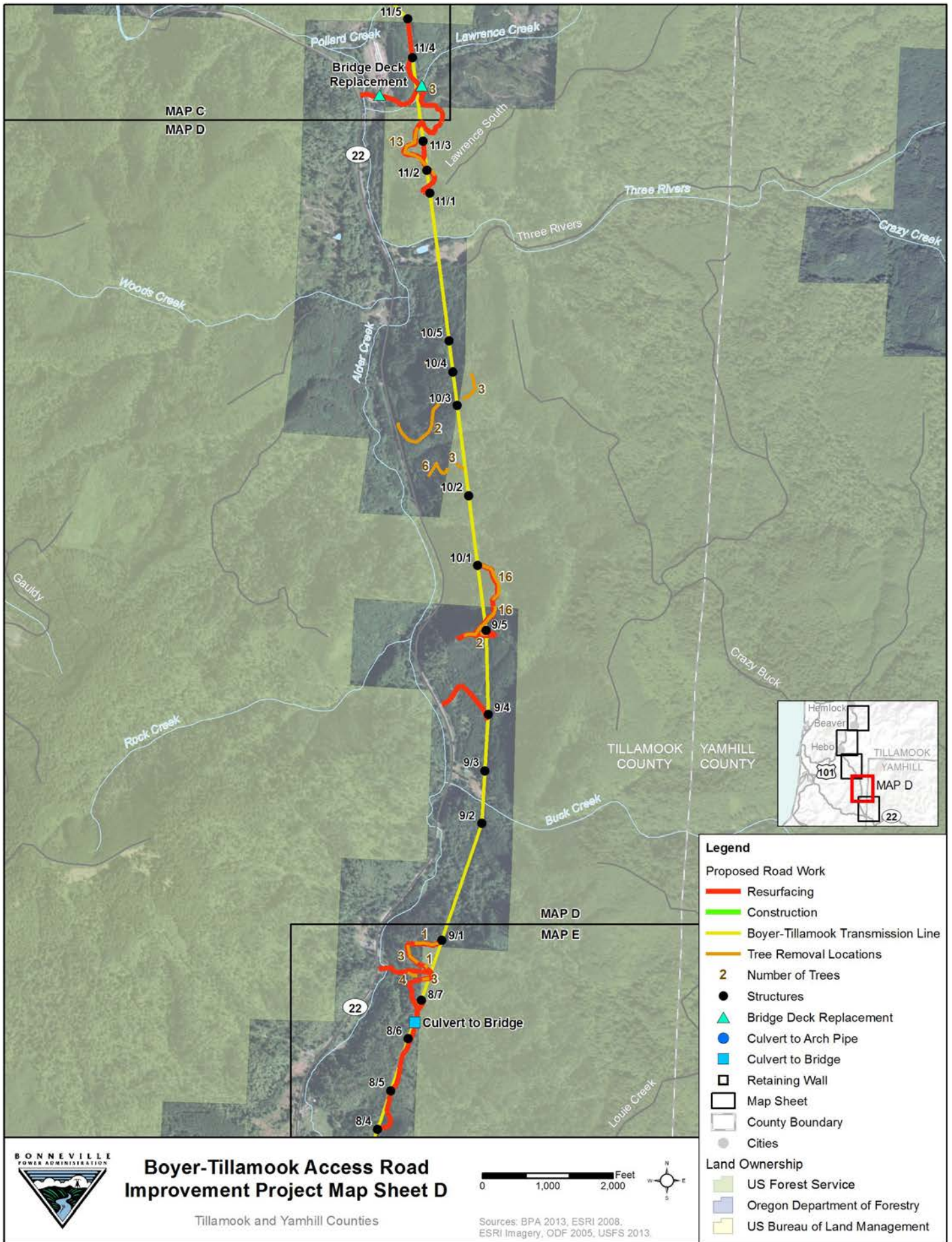


FIGURE 2-8. PROJECT LOCATION MAP D: LINE MILES 11/3 TO 9/2

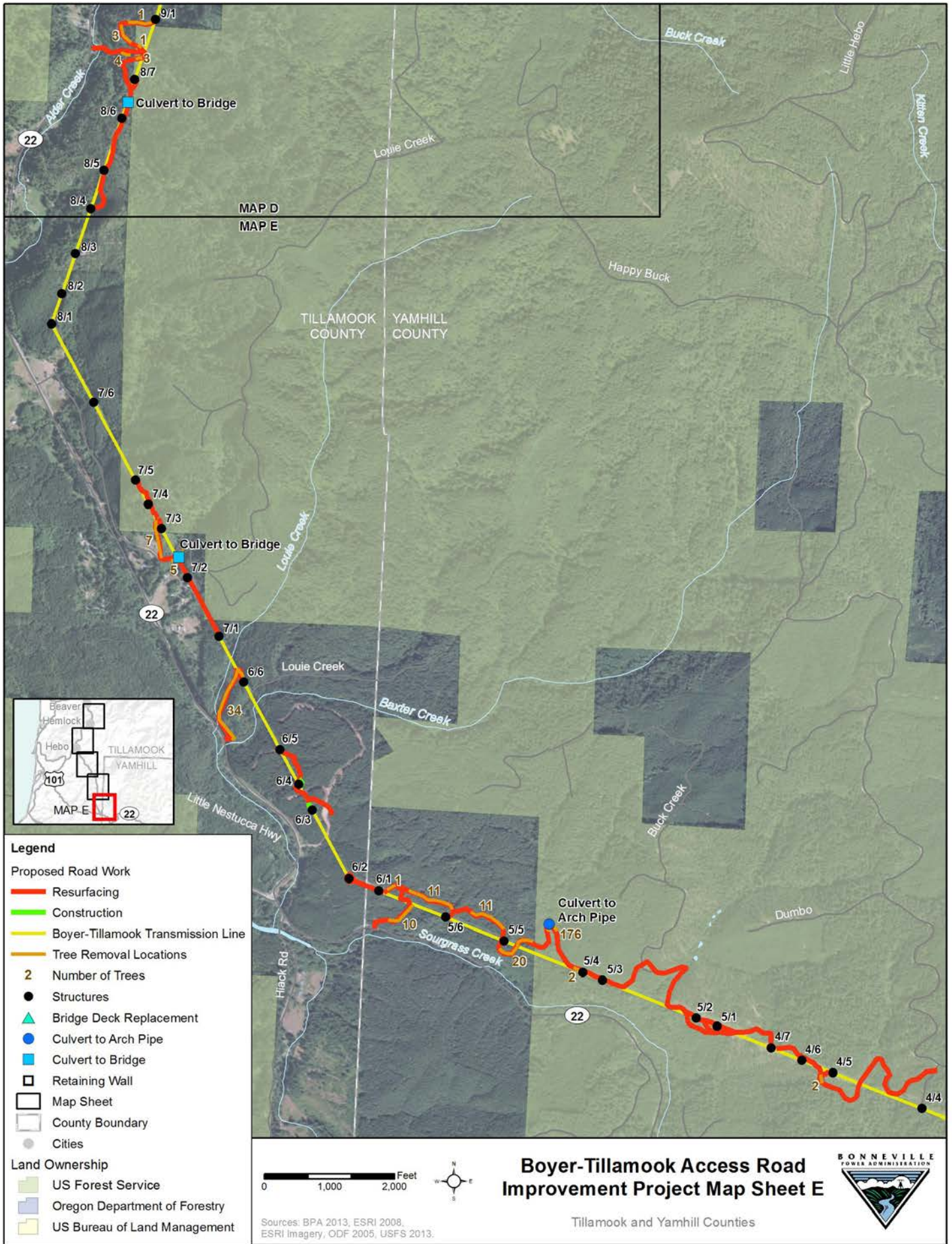


FIGURE 2-9. PROJECT LOCATION MAP E: LINE MILES 8/3 TO 4/4

Much of the transmission line ROW and associated access roads are lined by trees, typically red alder (*Alnus rubra*) and Douglas-fir (*Pseudotsuga menziesii*), most of them less than 19-inches dbh. Some of these trees extend over the access roads and are at risk of falling on the road. These trees could block safe and reliable access to the transmission line and pose a safety hazard to work crews. Others are on eroding slopes adjacent to the roads and would likely fall as a result of ongoing erosion. Lastly, some trees must be cleared to make additional room for the widened road or the altered radius of turns.

An estimated 533 trees would be removed as part of the Proposed Action. The largest area of tree removal would involve 176 trees between structures 5/4 and 5/5; however, most areas would range between 1 to 20 trees. Most of these trees would not be large enough to be used for lumber, but some could be used for household firewood, or to create stream fish habitat or upland wildlife habitat. BPA would clear the trees and determine their best use on a site-specific basis and in cooperation with the landowners providing the easements. Approximately 333 of these trees would be cleared entirely, including roots, in order to make way for project features; approximately 200 trees would be cut to within 2 feet of the finished grade, with roots left intact in order to retain soil stabilization benefits.

The proposed project would include installing 14 pipe and rail gates, stockyard gates, and cattle guards. The pipe and rail guards would be installed and locked to restrict public access to the transmission line roads, to assure public safety and to minimize potential vandalism to the transmission line. Stockyard gates and cattle guards would be installed on private agricultural lands used to access the transmission line roads to assure that cattle remained in the desired fields and for livestock safety.

2.1.2 RETAINING WALL CONSTRUCTION

Three mechanically stabilized engineered (MSE) retaining walls would be constructed to accommodate wider project roads at two sites where the roadbed is too narrow because of steep slopes and/or where erosion has occurred. The first site would occur between structures 20/6 and 21/1, where two MSEs would be built. Together, these walls would include an estimated 752 square feet of vertical area along the road. The second site would occur between structures 22/2 and 22/3 and include one MSE covering 976 square feet.

Retaining walls would be constructed of rebar and rock or concrete. Figure 2-9 presents a photograph of the project area near structure 22/2 where a retaining wall would be constructed. Figure 2-10 provides an example about how the retaining walls would likely be constructed. Loose rock and soil would be cleared to provide room to construct the retaining wall and provide adequate anchor points. A rebar mesh would then be placed the length of where the wall would be located. Rock would be placed between the rebar mesh and the face of the existing slope to complete the retaining wall. Appropriate drainage would be installed to direct runoff around the wall, as needed.



**FIGURE 2-10. AREA WHERE RETAINING WALL
WOULD BE CONSTRUCTED NEAR STRUCTURE
22/2**



**FIGURE 2-11. EXAMPLE OF RETAINING WALL
CONSTRUCTION**

2.1.3 BRIDGE AND ARCH PIPE CONSTRUCTION

The road improvements under the Proposed Action would include installation of an arch pipe (a large, bottomless culvert) and five bridges at the following locations:

- Unnamed tributary to Sourgrass Creek—replace one culvert with an arch pipe.
- Unnamed tributary to Louie Creek—replace three vertically-stacked culverts with a bridge.
- Unnamed tributary to Alder Creek—replace one culvert with a bridge.
- Lower Lawrence Creek—replace an old bridge.
- Upper Lawrence Creek—replace an old bridge.
- Hester Creek—replace one culvert with a bridge.

New bridges would be installed where old bridges would be unable to safely support construction and maintenance vehicles. Culverts would be replaced with bridges and the arch pipe to both improve vehicle access and re-establish historical stream characteristics and fish passage to upstream reaches as a benefit of the Proposed Action. Natural flows and sediment transport would be restored, improving the stream characteristics and fish habitat. Streambed and floodplain improvements would also be done in these areas; all gravels placed in the stream channel to stabilize the improved channels would be fish friendly, and restored streambeds would be graded consistent with SLOPES criteria. At locations where culverts are replaced with bridges or the arch pipe, fish and other aquatic animals would be recovered, transported, and released before construction begins to reduce the risk of injury or mortality from construction activities (see Section 3.7.3, Fish Mitigation). After construction, renewed fish passage would allow fish to access, reside, and spawn in upstream reaches of streams. Additional information about the construction to be conducted at each of these creeks is provided below.

2.1.3.1 Unnamed Tributary to Sourgrass Creek - culvert → arch pipe

Between structures 5/4 and 5/5, an existing 32-foot-long by 4-foot-diameter aluminum culvert would be replaced with an 18-foot arch pipe. The upstream side of the culvert is at stream level, but the downstream side protrudes more than 10 feet above the stream. Upstream sediment that has accumulated as a result of the current culvert design, as well as trees and vegetation growing in that sediment, would be removed to restore the natural stream channel and flow. An 18-foot-wide floodplain would also be created in the creek. To accomplish this, a concrete footing would be placed in the streambed and the new 70-foot-long, 18-foot-wide, and 8-foot-high multi-plate arched pipe would be placed on the footing. At least 2 feet of riprap would be placed on the banks around the arched pipe to protect the inlet and outlet. The road would be widened and reconfigured to a new 60-foot turning radius to accommodate a typical maintenance truck (see Section 2.1.1, Roads).

2.1.3.2 Unnamed Tributary to Louie Creek - culvert → bridge

Between structures 7/2 and 7/3, the access road crosses three vertically-stacked metal culverts. On the upstream side of the road is a pond that was created when the culverts became plugged with sediment and other debris. The three vertically stacked culverts would be removed, and a crane would be used to install precast concrete abutments and a 40-foot bridge. Substantial channel re-grading would occur to turn the pond back into a free-flowing stream.

2.1.3.3 Unnamed Tributary to Alder Creek - culvert → bridge

Between structures 8/6 and 8/7 an existing culvert would be replaced with a bridge. The culvert would be removed, streambed regrading may occur to establish a more natural flow, and a crane would be used to install precast concrete abutments and a 50-foot bridge.

2.1.3.4 Lower (Downstream) Lawrence Creek - bridge replacement

On the access road to structures 11/3 and 11/4, an existing 23-foot-long by 12-foot-wide bridge made from a steel ship hatch would be replaced with a new bridge. The existing deck, as well as associated concrete blocks and riprap, would be removed with a crane. The existing 16-foot-wide creek bed would be widened to 36 feet, resulting in a 27-foot-wide floodplain under the bridge. An estimated 2 feet of riprap would be placed on the streambanks below the bridge for slope stability. New precast concrete abutments and a precast 50-foot-long by 14-foot-wide concrete deck would be installed. This bridge would have 12-inch square curbs on both sides for safety and to direct stormwater runoff away from the creek, and guardrails would be installed on each side.

2.1.3.5 Upper (Upstream) Lawrence Creek - bridge replacement

Further upstream on Lawrence Creek and between structures 11/3 and 11/4, an existing 23-foot-long bridge made out of a railroad flatcar and abutment logs would be replaced with a new bridge. A crane would be used to remove the existing deck. The two abutment logs, which are 30 and 60 inches long, would also be removed and possibly used as large woody debris in the streambank. The existing 15-foot-wide creek bed would be widened to a 24.5-foot-wide floodplain under the bridge, and an estimated 2 feet of riprap would be placed on the streambanks below the bridge for slope stability. New

precast concrete abutments and a new 50-foot-long by 14-foot-wide precast concrete bridge deck would be installed. The bottom of the bridge deck would be placed at least 2 feet above the streambed. This bridge would have 12-inch square curbs on both sides for safety and to direct stormwater runoff away from the creek.

2.1.3.6 Hester Creek - culvert → bridge

An access road crosses Hester Creek between structures 20/2 and 20/3, where an existing culvert would be removed and replaced with a bridge. New precast concrete abutments and a new 50-foot-long by 18-foot-wide precast concrete bridge deck would be installed. The existing 9-foot-wide streambed would be widened to a 13.5-foot-wide floodplain under the bridge, and an estimated 2 feet of riprap would be placed on the streambanks below the bridge for slope stability. The existing streambed would be regraded to allow proper stream function.

2.1.4 STAGING AREAS

Large staging areas would not be needed for the Proposed Action because the amount of materials needed for river crossings and MSE walls would be small and delivered to construction areas as needed. In addition, the number of construction vehicles needed in an area at any given time would be small, and could be accommodated by parking along the sides of access roads.

2.1.5 ANTICIPATED CONSTRUCTION SCHEDULE

The schedule for construction of the proposed project depends on the completion and outcome of the environmental review process. If the Proposed Action is implemented, construction could occur in 2014 and/or 2015. Construction could take a total accumulated time of 2 to 4 months, although work may need to be spread out over two to three seasons. The construction schedule would allow for possible weather related delays and seasonal restrictions of construction activities if needed for protection of fish and wildlife, as determined during the environmental permitting process.

2.1.6 OPERATION AND MAINTENANCE

Because a number of existing road issues would be addressed by the Proposed Action, fewer maintenance and repair activities would be expected to occur in the future if the project were implemented.

Access roads would continue to be used by BPA personnel at least once a year during annual inspections and maintenance of the Boyer-Tillamook transmission line. Access road maintenance activities would be conducted as needed. Typical road maintenance activities could include grading and graveling road surfaces, replacing riprap, removing downed or encroaching trees, and controlling noxious weeds.

Vegetation maintenance along access roads would be guided by BPA's Transmission System Vegetation Management Program (BPA 2000). The vegetation management program includes consultation with landowners and local weed management agencies concerning vegetation management needs and methods. Vegetation management methods could include manual methods (e.g., chainsaws), mechanical methods (e.g., brush hogs), and chemical methods (i.e., herbicides).

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, access road improvements for the Boyer-Tillamook transmission line would not be implemented and portions of the Boyer-Tillamook transmission line would continue to be inaccessible during inclement weather and much of the winter. Maintenance and ROW vegetation management activities would continue on an as-needed basis, including grading and graveling road surfaces, replacing riprap, removing downed or encroaching trees, and controlling noxious weeds (as described in Section 2.1.6, Operation and Maintenance). Stormwater improvements associated with the Proposed Action would not be made, so poor road drainage would continue to impede access during heavy precipitation. Culverts that are currently fish barriers would remain impassable to aquatic species, including Endangered Species Act-listed species, and hinder the opportunity to increase fish populations.

The No Action Alternative would likely hinder BPA’s ability to conduct emergency line repairs during outages because maintenance and repairs needed to access the line, particularly during heavy precipitation, would not have been completed. This delay could lead to longer outages, affecting BPA’s customers and reducing system reliability. Leaving the access road in its current condition could affect worker safety because the narrow and rutted roads would not be repaired, hazardous trees would not be removed, some slide areas would not be cleared and others might be more prone to develop due to ongoing water runoff and associated erosion along and in the roadbed. In the case of an emergency, obtaining access to the transmission line could result in impacts to natural resources if conditions make access roads impassable and alternate routes must be found quickly and without typical protective measures. Selected culverts would continue to be barriers to fish passage, including ESA species, and hinder the opportunity to increase fish populations.

2.3 COMPARISON OF ALTERNATIVES

Table 2-1 compares the potential of the Proposed Action and the No Action Alternative to meet the purposes of the project (see Section 1.3). Table 2-2 summarizes the anticipated impacts on specific resources that could result from the Proposed Action and No Action Alternative. A detailed analysis of the environmental impacts of the Proposed Action and No Action Alternative is presented in Chapter 3.

Table 2-1. Comparison of Alternatives to Project Purposes

Purpose	Proposed Action	No Action Alternative
Maintain or improve transmission system reliability to BPA and industry standards	Access road work improvements would ensure that emergency transmission line repairs are done quickly and efficiently to maintain transmission system reliability.	Transmission line emergency response times could be increased by access roads that are in poor condition and hinder transmission system reliability. Road repairs more likely would be completed under emergency situations.
Continue to meet BPA’s contractual and statutory obligations	Access road improvements would ensure transmission system reliability and subsequent power delivery to BPA’s customers in western Oregon by allowing quick and efficient repairs.	Existing access roads would continue to deteriorate and threaten BPA’s ability to repair and maintain the transmission line, potentially resulting in disruptions to power delivery.

Purpose	Proposed Action	No Action Alternative
Minimize environmental impacts	Construction-related environmental impacts would be minimized by designing the project to avoid sensitive resources, where possible, and by implementing the mitigation measures prescribed in Chapter 3. Replacement of fish-blocking culverts would reduce current environmental impacts by facilitating fish passage to both the Endangered Species Act (ESA) and non-ESA fish and by improving floodplain function. See Table 2-2 for a comparison of the environmental impacts of the alternatives.	Environmental impacts would occur with future road repairs needed to provide access during operation and maintenance. Impacts would be minimized through the implementation of best management practices (BMPs). Additional impacts could occur during emergency maintenance if alternate routes become necessary due to inaccessible roads, which could preclude the use of BMPs or occur without the benefit of planned environmental review and mitigation. Existing impacts due to blocked culverts and blocked fish passage from existing project features would continue. See Table 2-2 for a comparison of the environmental impacts of the alternatives.
Demonstrate cost-effectiveness	The total estimated cost of the Proposed Action is \$3.6 million. Over the long term, the Proposed Action would reduce repair and maintenance costs.	BPA would incur repair and maintenance costs, the latter of which, over time, could be higher than under the Proposed Action.

Table 2-2. Summary of Impacts by Alternative

Environmental Resource	Proposed Action	No Action Alternative
Land Use and Recreation	<p><u>Land Use</u>: Construction impacts would be low and would include direct impacts to 1.92 acres of private lands and 1.21 acres of U.S. Forest Service lands. Short-term and localized disruptions to land use such as timber harvest could occur. Operation and maintenance impacts would be no-to-low.</p> <p><u>Recreation</u>: Recreation impacts from construction noise and traffic increases would be no-to-low. Operation and maintenance impacts would be no-to-low.</p>	<p><u>Land Use</u>: Infrequent and temporary disruption to land use during operations and maintenance would continue to result in no impacts to land use. Maintenance activities on the existing access roads would likely increase in frequency because existing access roads would remain in poor condition, resulting in a no-to-low impact.</p> <p><u>Recreation</u>: Infrequent and temporary disruptions to recreation during operations and maintenance would continue to result in no impacts to recreation. Maintenance activities on the existing access roads would likely increase in frequency because existing access roads would remain in poor condition, resulting in a no-to-low impact.</p>

Environmental Resource	Proposed Action	No Action Alternative
Geology and Soils	Direct impacts would result from clearing, grading, vegetation removal, and soil compaction. Indirect impacts would be associated with soil erosion. Impacts would be low-to-moderate in the short term and low in the long term.	Direct impacts would result from continued operation and maintenance activities, danger tree removal, and incidental use of roads would result in low-to-moderate impacts that would increase as the deteriorating road requires more maintenance in the future.
Water Resources	Direct impacts would result from ground disturbances, including installing road surfaces with suitable drainage, resulting in erosion and sediment transport to surface waters, and in-stream work for bridges and culverts. Indirect impacts would occur from vegetation removal near surface waters, leading to increased exposure to solar radiation, but mitigated by existing vegetation in most locations. Overall impacts would be low .	Continued levels of operation and maintenance would result in low impacts to water resources; however, if conditions continue to deteriorate, landslides, soil erosion, and blocked culverts could increase impacts to moderate-to-high .
Wetlands	Direct impacts would result from ground disturbances in approximately 0.01 acres of wetlands. Additional clearing and construction in upland areas would also affect soils, vegetation, and hydrology. Improved stormwater treatment and road stability would provide an overall improvement in erosion, water quality, and road stability. Limited wetland areas would be affected by operations and maintenance. Impacts would be low .	Continued levels of operation and maintenance would result in low impacts to wetlands; however, if road conditions aren't improved, emergency road repairs or alternate routes could be needed without time to avoid wetlands or minimize wetland impacts. Stormwater runoff would also continue to affect wetlands with excess suspended sediments and velocities. Resulting impacts could be moderate .

Environmental Resource	Proposed Action	No Action Alternative
Vegetation	Because the area of ground disturbance is relatively small (3.13 acres), and both the ground disturbance and tree removal (533 trees) are distributed throughout the 18-mile corridor where project activities would occur, the overall integrity of the remaining canopy, understory trees, shrubs, and crown sprouts is not expected to change. Additionally, most of the vegetation to be permanently removed is relatively low quality production forest; there would be minimal disturbance to high quality mature forest and wetland vegetation and vegetation that is temporarily impacted would be revegetated with native species. Impacts to vegetation would be low .	Continued levels of operation and maintenance would result in low impacts on vegetation; however, if road conditions aren't improved, emergency road repairs or alternate routes could be needed without time to avoid high quality native forest and wetland vegetation. Since the potential disturbances would occur in isolated areas and since there would not be extensive tree removal, the resulting impacts would be low .
Fish and Wildlife	<u>Fish</u> : Direct adverse impacts resulting from short-term in-water disturbance for culvert and bridge installation and culvert cleaning, and moderate positive impacts from fish habitat improvements, such as improved passage for common fish species and Oregon coast coho salmon, an ESA-listed fish. Impacts would be low . <u>Wildlife</u> : Direct impacts would result from the permanent removal of habitat for common wildlife species and ESA-listed northern spotted owl and marbled murrelet. Habitat impacts would be dispersed along the project corridor such that the integrity of the remaining habitat would be maintained. Impacts would be low-to-moderate .	Continued levels of operation and maintenance, including retention of existing culverts, would continue to have low-to-moderate impacts on fish, including Oregon coastal coho salmon, by restricting passage. Vegetation and danger tree removal would result in low wildlife impacts; however, the number of maintenance activities, and thus the level of impact, could increase as the road deteriorates. Also, if road conditions aren't improved, emergency road repairs or alternate routes could be needed without time to mitigate impacts to fish and wildlife habitat. Resulting impacts could be moderate .
Cultural	Because no historic and archaeological resources have been found during cultural surveys, and any previously undiscovered historic properties would be addressed using BPA's Inadvertent Discovery Protocol (see Section 3.8.3), the project would have no-to-low impacts to historic and archaeological resources. A traditional plant important to Native American culture—native hazelnut (<i>Corylus californica</i>)—could be present as a shrub in the project area and affected, particularly in larger tree removal areas. Because this is a common plant, impact areas are small, and hazelnut would be included in replantings in suitable areas, impacts would be low .	Because no historic and archaeological resources have been found in the APE, and because implementation of mitigation measures include management of previously undiscovered historic properties as required by NHPA, continued levels of operation and maintenance would result in no impacts to cultural resources. Potential impacts to hazelnut would be no-to-low , since large areas of tree removal would not occur, although emergency access could result in damages to hazelnut trees.

Environmental Resource	Proposed Action	No Action Alternative
Socioeconomics and Public Services	<p><u>Socioeconomics</u>: Construction and operations would result in a low impact to local employment and unemployment rates and local spending, and a low impact to socioeconomics during operations from a minimal reduction in county tax revenues due to easements.</p> <p><u>Environmental Justice</u>: Minority and low-income populations would not be disproportionately affected.</p> <p><u>Public Services</u>: The passage of construction vehicles along local roads could temporarily impact landowners, homeowners, businesses, and recreationists. Transportation impacts would be low.</p>	<p>With continued levels of road operation and maintenance, there would be no positive socioeconomic impacts from short-term employment, income, purchases of local goods and services, and temporary housing from the construction workers or activities. There would continue to be a low impact to socioeconomics during operations from the ongoing minimal reduction in county tax revenues due to easements. Landowners could experience difficulty in accessing property if roads continue to deteriorate.</p>
Visual Quality	<p>Because the transmission line and access road are an existing element of the viewshed, and since there are limited views of the project area, construction and operations would have no impacts to visual quality of the viewshed. Additionally, because the bridges are low-profile and the arch pipe would be underground, as the existing bridges and culverts are, they would have no impact on the visual quality in the viewshed.</p>	<p>Because the transmission line and access road are an existing element of the viewshed, and since there are limited views of the project area, continued operation and maintenance would have no impacts on the visual quality of the viewshed. Additionally, because current bridges are low-profile and culverts are underground, they would continue to have no impact on the visual quality in the viewshed.</p>
Air Quality and Greenhouse Gasses	<p>Air quality and greenhouse gas (GHG) impacts from construction, operations, and maintenance would be low since use of motorized equipment and vehicles would occur locally, would be temporary in nature, and would not result in a permanent regional reduction in air quality that would create any risk to human health and safety. GHG emissions would be far below the annual Mandatory Reporting of Greenhouse Gasses threshold of 25,000 metric tons of carbon dioxide equivalent (CO₂e) as outlined by the EPA (see Section 3.11).</p>	<p>Construction-related emissions of criteria pollutants and GHGs would not occur. Air quality and greenhouse gas impacts from operations and maintenance would be low since use of motorized equipment and vehicles would occur locally, would be temporary in nature, and would not result in a permanent regional reduction in air quality that would create any risk to human health and safety. GHG emissions would be far below the annual Mandatory Reporting of Greenhouse Gasses threshold of 25,000 metric tons of CO₂e as outlined by the EPA.</p>

Environmental Resource	Proposed Action	No Action Alternative
Noise, Public Health, and Safety	<p><u>Noise</u>: Noise impacts from construction would be short term and intermittent, resulting in low impacts, except within 500-feet of the project, where they would be moderate impacts for a matter of days.</p> <p><u>Public Health and Safety</u>: The safety of workers and landowners would be improved by improving the stability and conditions of project roads, particularly in the winter. Standard construction safety procedures would be followed so there would likely be no-to-low health and safety impacts.</p>	Leaving the access roads in their current poor condition and with unstable roadsides could affect worker and landowner safety, resulting in low-to-high impacts to public health and safety.

CHAPTER 3

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

3.1 INTRODUCTION

This chapter includes an analysis of the potential impacts of the Proposed Action and the No Action Alternative on the human and natural environment within the project area. Each section of this chapter includes a description of the potentially affected environment for a specific resource, an analysis of the impacts of the Proposed Action on that resource, and the mitigation measures that would be used to reduce those impacts. Cumulative impacts are also considered within each resource section. Cumulative impacts are the potential combined effects of the alternatives and other past, present, and reasonably foreseeable future actions in the project area.

Based on the analysis in this EA, impacts on specific resources were characterized as high, moderate, low, or no impact. In addition, beneficial impacts were noted where applicable.

Each resource section includes the following primary subsections:

- Affected Environment
- Environmental Consequences – Proposed Action
- Mitigation Measures – Proposed Action
- Unavoidable Impacts Remaining After Mitigation
- Cumulative Impacts – Proposed Action
- Environmental Consequences – No Action Alternative

3.2 LAND USE, RECREATION, AND TRANSPORTATION

This section describes the existing land ownership, land use, recreation, and transportation found within the project area, as well as potential impacts of the Proposed Action and No Action Alternative on those resources.

3.2.1 AFFECTED ENVIRONMENT

The project area extends through Yamhill and Tillamook counties in Oregon. Moving from south to north, the transmission line parallels State Route 22—which lies to the west of the transmission right-of-way (ROW)—from approximately structure 4/4 to structure 16/1. From there, the project parallels U.S. Highway 101—also to the west. The nearest communities are the unincorporated towns of Hebo, approximately 1.7 miles from structure 16/5; Beaver, approximately 0.8 mile from structure 20/2; and Hemlock, approximately 1.0 mile from structure 22/2 (see Figure 1-1).

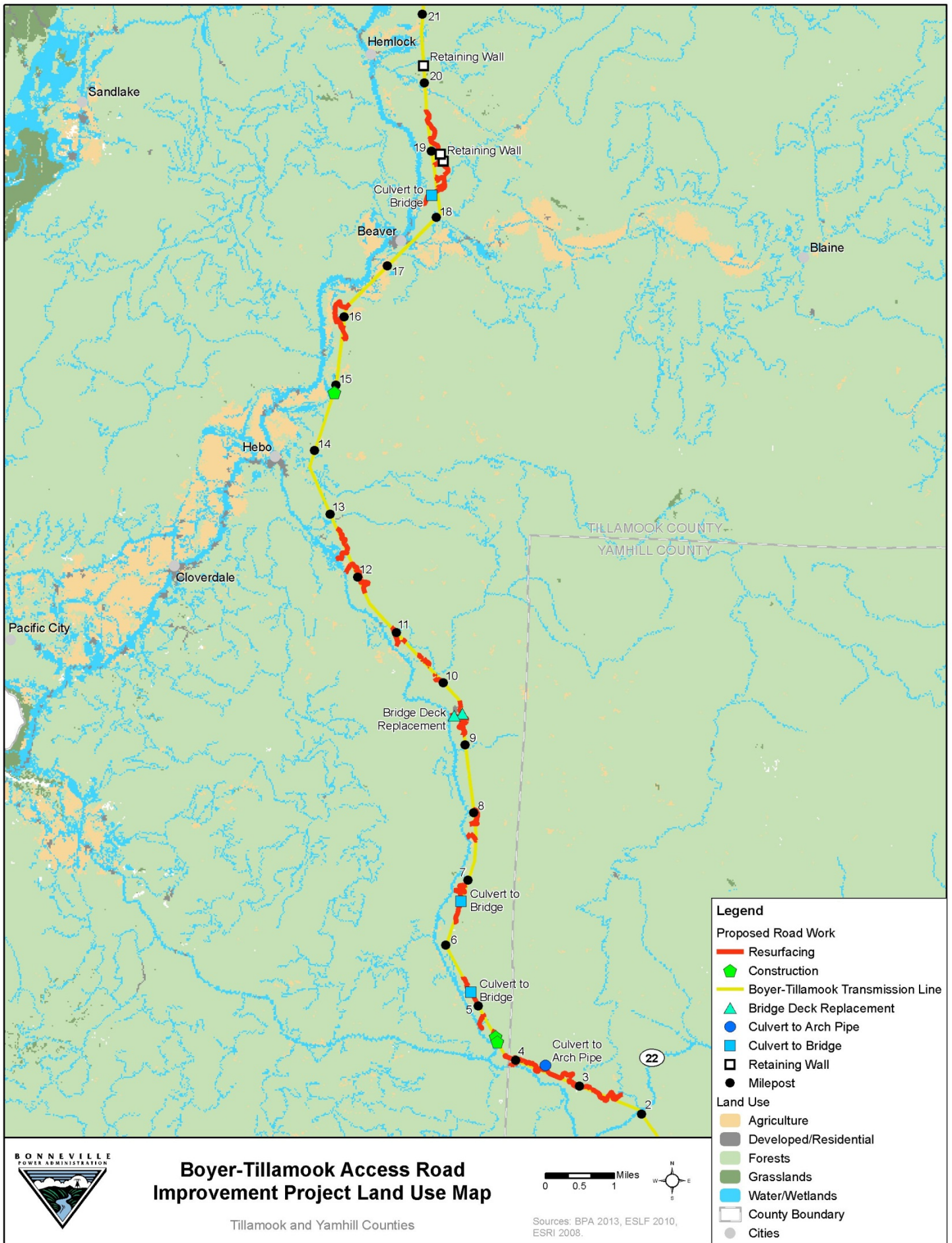
3.2.1.1 LAND OWNERSHIP

The proposed access road improvements would traverse 8.90 miles of private lands, 4.06 miles of federal lands managed by the USFS Siuslaw National Forest, and 0.46 mile of state lands managed by the Oregon State Department of Forestry (ODF) (see Figure 2-1). Land ownership is intermixed throughout the project area, as discussed below.

3.2.1.2 LAND USES

The dominant land use in the project area is mixed-use forest management including timber harvest. One area of new road construction is in an agricultural area used as pasture (shown as agriculture on Figure 3-1). Agricultural land uses near the project area occur along the Nestucca River from Beaver to Hebo, but do not occur within the areas of road resurfacing or widening. Developed and residential land uses near the project area include approximately 25 residences and two businesses within 500 feet of the resurfacing and new construction centerline, including:

- four residences near structure 7/2
- one business near structure 9/1
- one business near structure 11/4
- 13 residences near 14/3
- two residences near structure 17/1
- six residences near structure 20/3 (five of which are in the community of Beaver).



Boyer-Tillamook Access Road Improvement Project Land Use Map

Tillamook and Yamhill Counties



Sources: BPA 2013, ESLF 2010, ESRI 2008.

FIGURE 3-1. LAND USES

County Comprehensive Planning and Zoning

The project traverses areas zoned “Forestry” in Yamhill County (outside of the Siuslaw National Forest); and “Forest,” “Small Farm,” and “Small Farm and Woodlot-20” in Tillamook County (the Forest designation is the largest in the project area) (Yamhill County 1996, 2004; Tillamook County 1982, 2013a). Zoning is not available for mapping in these counties; however, in many cases the zoning categories correspond with the general land uses depicted on Figure 3-1.

The purpose of the Yamhill County Forestry zone is to conserve forest lands (Yamhill County 2004). In the Yamhill County Comprehensive Land Use Plan, this area is designated as commercial forest land (Yamhill County 1996), with the goal of retaining and managing forests in a manner consistent with the Oregon Forest Practices Act and to protect other forest uses, natural resources, recreation, and agriculture.

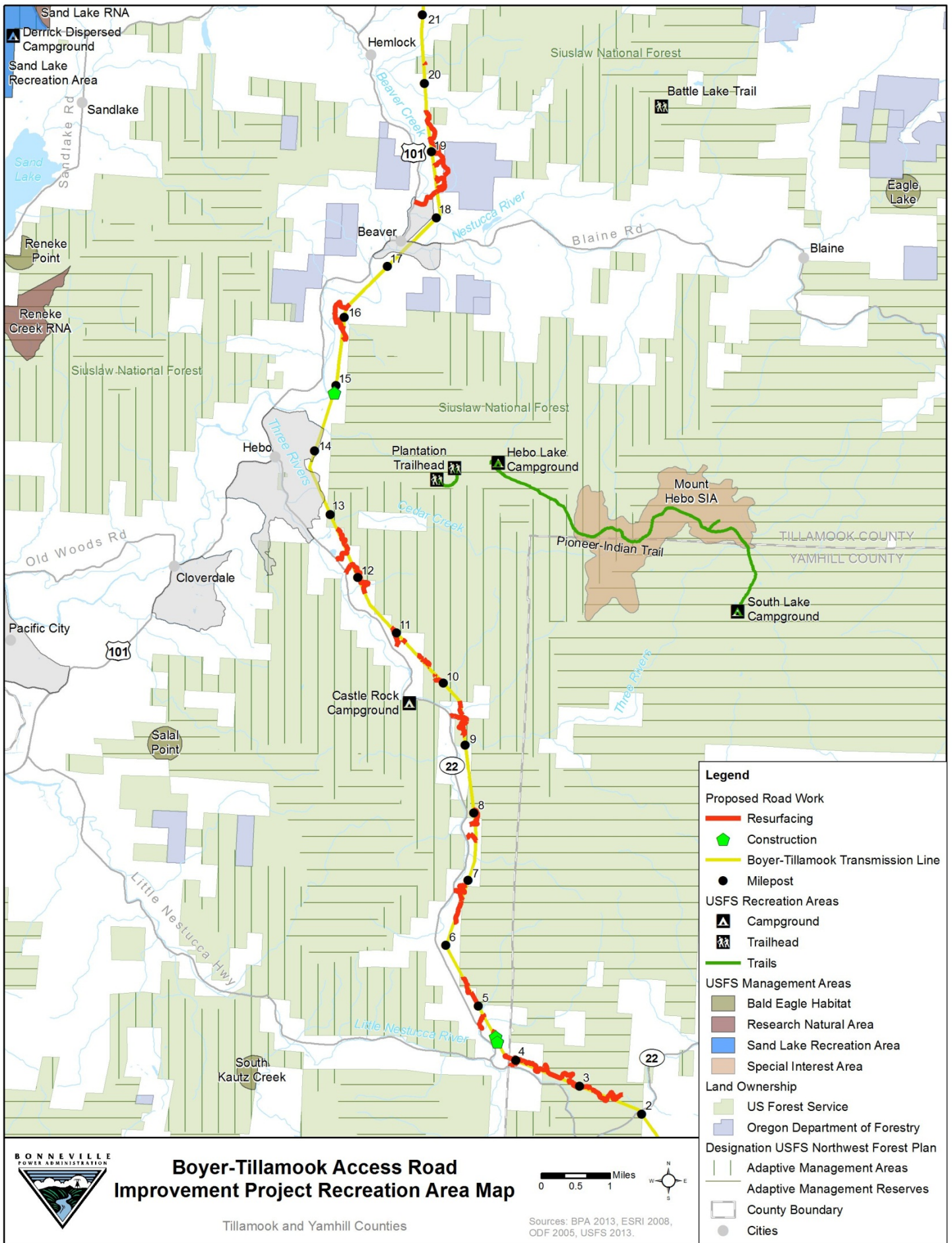
The Tillamook County Forest zone has a purpose of retaining and managing forest consistent with the Oregon Forest Practices Act, along with protecting other forest uses including natural resource use, recreation, and agriculture. The goal of the Small Farm zone is to identify and protect local agricultural land. The goal of the Small Farm and Woodlot–20 Zone is to protect forest and agricultural property that is smaller in size, has conflicting adjacent uses, or has adverse physical features (Tillamook County 2013a). These zoning designations are also described in the county’s comprehensive plan under the land use plan element (Tillamook County 1982).

Siuslaw National Forest – Northwest Forest Plan

The 4.06 miles of project access road that cross the Siuslaw National Forest are on lands managed according to the Northwest Forest Plan (USFS 2003). Specific management areas within the Siuslaw National Forest include adaptive management areas (AMA), adaptive management reserves (AMR), bald eagle habitat areas, natural areas, recreation areas, and special interest areas. Lands designated as AMA are traversed by 1.39 miles of the project, and lands designated as AMR are traversed by 2.67 miles (see Figure 3-2 and Table 3-1). AMA lands are used to test alternative approaches to achieving ecological and social goals. Timber harvests can be scheduled in lands designated AMA. Lands designated as AMR are Late Successional Reserves within AMA lands and are intended to protect and enhance habitat for old-growth-related species, including the northern spotted owl. Within AMR lands, harvests are only allowed in stands younger than 80 years with the goal of thinning so that they can contribute to the old-growth structure (USFS 2008a). Other nearby management areas within approximately 2 to 6 miles of the Proposed Action include the Salal Point, South Kautz Creek, and Reneke Point Bald Eagle Habitat areas; the Reneke Creek and Sand Lake Research Natural Areas; the Sand Lake Recreation Area; and the Mount Hebo Special Interest Area (USFS 2013). These areas occur within AMA and AMR lands.

Oregon Department of Forestry

The project area traverses state lands managed by the Oregon Department of Forestry (ODF) between structures 20/3 to 20/6. ODF lands are designated as Board of Forestry lands. Timber harvest is allowed in these lands, which were primarily acquired by the state in the 1940s to manage, rehabilitate, and reforest previously cut-over or burned lands from private owners (ODF 2013).



Boyer-Tillamook Access Road Improvement Project Recreation Area Map

Tillamook and Yamhill Counties



Sources: BPA 2013, ESRI 2008, ODF 2005, USFS 2013.

Legend

- Proposed Road Work
 - Resurfacing
 - Construction
 - Boyer-Tillamook Transmission Line
- Milepost
- USFS Recreation Areas
 - Campground
 - Trailhead
 - Trails
- USFS Management Areas
 - Bald Eagle Habitat
 - Research Natural Area
 - Sand Lake Recreation Area
 - Special Interest Area
- Land Ownership
 - US Forest Service
 - Oregon Department of Forestry
- Designation USFS Northwest Forest Plan
 - Adaptive Management Areas
 - Adaptive Management Reserves
- County Boundary
- Cities

FIGURE 3-2. RECREATION AREAS

3.2.1.3 RECREATION

No designated recreation areas would be crossed by the Proposed Action. Seven Siuslaw National Forest recreation areas (see Figure 3-2) are located 0.5 to 6 miles from the Proposed Action (USFS 2013):

- South Lake Campground is located approximately 4 miles east of structure 11/5 on Forest Service Road 1428 in the Mount Hebo Area.
- Castle Rock Campground is located approximately 0.5 mile southwest of structure 12/2, adjacent to State Route 22 and Three Rivers.
- Hebo Lake Campground is located approximately 2.5 miles east of structure 14/4 on Forest Service Road 14 in the Mount Hebo Special Interest Area.
- Pioneer-Indian Trail is accessible at the Hebo Lake Campground, the South Lake Dispersed Area, and the Mount Hebo Horse Trailhead.
- Plantation Trail is located approximately 1.6 miles east of structure 14/4 on Forest Service Road 1400.
- Battle Lake Trail is located approximately 3.4 miles east of structure 21/2 and off of Blaine Road.
- The Derrick Dispersed Campground is located on the northern part of the Sand Lake Recreation Area, approximately 6 miles west of structure 21/3.

Recreational opportunities such as sightseeing, walking, hiking, bicycling, fishing, hunting, wildlife viewing, picnicking, camping, and outdoor recreational vehicle use could occur outside of designated management areas within the national and state forests, and near communities and waterbodies in the project area. The Oregon Resident Outdoor Recreation Demand Analysis provides information about recreational use and the percentage of the population participating in various recreational activities in Yamhill and Tillamook counties (OPRD 2011). In both counties, sightseeing/driving or motorcycling for pleasure had the most user occasions and the largest percentage of the population participating. Other popular recreational uses in both counties include picnicking, bird watching, nature observation, collecting (rocks, plants, mushrooms, and berries), car camping, fishing, and hiking.

3.2.1.4 TRANSPORTATION

Moving from south to north, the transmission line parallels State Route 22, which lies to the west, from approximately structures 4/4 to 16/1. From there, it parallels U.S. Highway 101, also to the west. Existing and project roads would all be connected to these highways directly or via an intermediate paved or gravel road.

State Route 22 (Three Rivers Highway No. 032) is classified as a Rural Minor Arterial with a 2011 annual average daily traffic (ADT) of 1,800 recorded at the county line. An ADT of 1,400 was recorded near the intersection with Little Nestucca Highway. At the juncture with Hebo and the terminus of State Route 22, U.S. Highway 101 (Oregon Coast Highway No. 009) is classified as Other Rural Principle Arterial with an ADT of 4,300. U.S. Highway 101 had an ADT of 4,400 at the juncture with Beaver and Blaine Road. On the northern end of the project area at the Beaver Creek crossing, the ADT for U.S. Highway 101 was 4,000 (ODOT 2013a, b).

A total of 28 crashes were recorded in 2010 within the project area (ODOT 2010). There were approximately 10 crashes within 0.5 mile of the intersection of State Route 22 and Little Nestucca Highway, and seven leading up to the intersection with U.S. Highway 101 at Hebo. From Hebo along U.S. Highway 101, eight accidents occurred up to Beaver and three up to the Beaver Creek crossing near the Proposed Action. These crash incidents in the project area were 8 percent of the total 343 crashes that occurred in Tillamook County in 2010 (ODOT 2010).

3.2.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The following sections describe the potential land use and recreational impacts from construction, operation, and maintenance of the Proposed Action.

3.2.2.1 CONSTRUCTION IMPACTS

Impacts to land use and recreation during construction of the project would mostly be temporary, with construction expected to last from 2 to 4 months. Construction would be expected to proceed at an average rate of about 1 mile per week, with bridges and culverts taking the longest to construct. Potential impacts from construction of the Proposed Action could include temporary and localized disruption of adjacent land uses. Depending on the activity, construction would involve the operation of a variable amount of construction equipment – such as a road grader and dump truck with gravel for road resurfacing; or an excavator, dump truck, and crane for bridgework. Approximately 4,000 truckloads of soil and rock would be needed for the entire project, the transportation of which would make up a substantial portion of the construction traffic over the life of the project. Construction equipment would be parked out of the way along project roadsides when not in use (versus transported to and from staging areas daily), and passenger vehicles would be kept at a minimum due to restricted work space. This would temporarily increase traffic on public and private roads and could potentially disrupt local access to landowners, homeowners, or businesses for brief periods of time as construction vehicles pass through. In some cases, vehicles and equipment would pass close to residences and farms and could temporarily affect landowner activities, due to nuisances such as noise and movement of equipment through the area. Because project activities would take place on roads beyond the primary transportation routes for residences and businesses, emergency vehicles, school buses, and other public service vehicles should not be affected by road blockages during construction (also see Section 3.9.2.1).

Impacts to recreation near the proposed access roads could include temporary traffic delays and a minimal amount of noise from construction activity at the nearest campground to the project, Castle Rock campground, located approximately 0.5 mile away from a project road. Some construction is anticipated during the summer months, when campground use would be highest; however, the project activities nearest the campground would be limited to road resurfacing which would be completed quickly. No other established recreational areas are close enough to the project area to experience effects from the project (see Figure 3-2). Private landowners could experience temporary disruption or disturbance to recreational activities, such as hiking or fishing, on their properties, due to noise, dust, or limited access in construction areas.

During construction, there could be a temporary increase in short-term traffic delays on State Route 22 and U.S. Highway 101 from construction vehicles delivering construction equipment and materials to the project area. Impacts on transportation would be *low* as these impacts would be temporary in nature and

traffic delays would generally be localized to a particular construction area on access roads away from State Route 22 and U.S. Highway 101.

Potential long-term project impacts would include removing about 3 acres of land from current uses, cutting forestry trees before scheduled harvest, and possible increased access for unauthorized users. Land removed from current use due to road widening and new road construction would include 0.10 acre of agricultural land used as pasture. On USFS forest land, 0.45 acre would be located in AMA designated lands, which are eligible for harvest under the Northwest Forest Plan (NWFP), and 0.76 acre in AMR designated lands, where only limited thinning is allowed. The remaining 1.82 acres of new land disturbance would occur on forested private lands with rural residential land use; one small area of road construction would occur on agricultural land that is used as pasture (see Table 3-1).

Clearing the estimated 533 trees along project roads would remove those trees from use as wildlife habitat or timber. Most tree clearing would occur in AMR designated USFS lands (see Table 3-1). Of the 213 trees removed from AMR lands, the largest would be 36 inches. The sizes of the 61 trees cleared from AMA areas would range from less than 8 to 36 inches in diameter. (Tree clearing is further discussed in Section 3.6, Vegetation).

Impacts to overall land use and recreation within the project area would be *low* since long-term changes in land use or land ownership would be minimal and dispersed in small amounts along project roads, road construction and tree clearing would be consistent with existing land management plans and complementary to ongoing land uses, recreation impacts would be limited to short-term construction noise disruptions to the Castle Rock campground, and/or noise and construction equipment disruptions to private landowners' recreational uses. Measures would be taken to reduce the likelihood of trespass on private property.

Table 3-1. Proposed Action Land Ownership and Impacts

Line Structures	Land Ownership / Management	Northwest Forest Plan Designation	Project Activity	Impact Area (acres)	Tree Removal (number)	Tree Diameter Range
4/4-5/5	USFS	AMR	New Arch Pipe, Road Resurfacing, Widening	0.59	180	<8" – 27"
5/5-7/3	Private	-	New Bridge, Road Construction, Resurfacing, Widening	0.49	92	<8" – 37"
7/3-7/5	USFS	AMR	Resurfacing	-	7	<8" – 17"
7/5-9/1	Private	-	New Bridge, Road Resurfacing, Widening	0.20	8	8" – 26"
8/7-9/1	USFS	AMR	Road Resurfacing, Widening	0.06	4	8" – 18"

Line Structures	Land Ownership / Management	Northwest Forest Plan Designation	Project Activity	Impact Area (acres)	Tree Removal (number)	Tree Diameter Range
9/1-9/5	Private	-	Road Resurfacing, Widening	0.17	18	<8" – 15"
9/5-10/5	USFS	AMR	Road Resurfacing, Widening	0.14	22	<8" – 31"
10/2-10/5	Private	-	Tree Removal	-	8	10" – 24"
10/5-11/3	USFS	AMA	Road Resurfacing, Widening	0.06	13	10" – 30"
11/3-11/5	Private	-	New Bridge, Road Resurfacing, Widening	0.31	3	14" – 18"
11/5-12/5	USFS	AMA	Road Resurfacing, Widening	0.14	17	10" – 34"
12/5-13/1	Private	-	Road Resurfacing, Widening	0.10	13	<8" – 23"
13/1-13/2	USFS	AMA	Road Resurfacing	-	0	-
13/2-14/5	Private	-	Road Resurfacing, Road Widening	0.47	46	<8" – 13"
13/3-13/4	USFS	AMA	Tree Removal	-	6	14" – 36"
14/1-14/4	USFS	AMA	Road Widening	0.18	17	10" – 26"
14/5-15/4	USFS	AMA	None	-	0	-
15/4-22/1	Private	-	New Bridge, MSE Walls, Road Construction, Resurfacing, Widening	0.19	58	<8" – 28"
20/3-21/2	ODF	-	Road Resurfacing	-	2	8" – 10"
22/1-22/3	USFS	AMA	Road Widening	0.03	8	14" – 28"
22/3-22/5	Private	-	Tree Removal	0.00	11	8" – 24"
Subtotals	Private	-	-	1.93	257	<8" – 37"
	USFS	AMA	-	0.41	61	<8" – 36"
		AMR	-	0.79	213	<8" – 31"
	ODF	-	-	0.00	2	8" – 10"
TOTALS	-	-	-	3.13	533	-

3.2.2.2 OPERATION AND MAINTENANCE IMPACTS

Project operation activities would include infrequent vehicle access by transmission line maintenance crews (annually plus any emergency repair work). Road maintenance activities would occur as needed and include primarily grading and graveling of the road surface, clearing of vegetation or woody debris from the roadbed, and infrequent removal of trees adjacent to the road. Improved road conditions could increase access to private property in the project area by unauthorized users. However, gates would be installed in cooperation with landowners to minimize unauthorized use. Since any temporary disruptions to local traffic, land use, or recreation would be minimal and occur infrequently, and impacts from operation and maintenance would be *no-to-low* since these activities would occur infrequently and be of short duration. There would be *no-to-low* transportation impacts during operation of the Proposed Action because the traffic associated with annual or emergency maintenance activities along project roads would be similar to existing conditions.

3.2.3 MITIGATION – PROPOSED ACTION

The following mitigation measures were identified to avoid or minimize impacts to land use and recreation from the Proposed Action:

- Distribute, post, and publicize the construction schedule so landowners and recreational users know when potential construction-related disruptions might occur.
- Employ traffic-control flaggers and post warning signs of construction activities and merging traffic, when necessary, for short interruptions of traffic.
- Maintain access to residences, farms, and businesses during construction.
- Limit access road widths to 14-foot wide except where topography and/or curves necessitate a wider roadbed, and reduce tree removal to the extent possible.
- Repair any damage to non-project roads caused during project construction.
- Passenger vehicles would be kept at a minimum due to restricted work space.

3.2.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

With implementation of the recommended mitigation measures, unavoidable impacts to land use, transportation, and recreation could still include brief disruptions to land use activities, due to noise, dust, worker presences, and brief periods of traffic disruptions, particularly on private roads. In addition, small amounts of land would be removed from other uses due to widened and new roads. Unavoidable impacts to transportation would include short-term traffic delays during construction of the Proposed Action, particularly on roads leading to homes and farms that are near construction sites.

3.2.5 CUMULATIVE IMPACTS – PROPOSED ACTION

No current or future projects have been identified that would cumulatively impact land use and recreation in the project area. There are no known land use applications or planned major developments near the project area in either Tillamook or Yamhill county at this time (K. Friday and B. Sheets, pers. comm., Tillamook and Yamhill counties, April 1, 2013), and ODF is not aware of any planned timber sales (M. Maine, pers. comm., ODF, April 1, 2003). Past and ongoing land use activities along the Proposed Action include

timber harvest and associated logging roads, agriculture, residences, and a nearby campground. Small future changes in land use and ownership within the county zoning designations would be expected. Since the amount of land use and ownership affected by the Proposed Action is minimal and there are no identified current or future projects, the Proposed Action is expected to have *no* cumulative impact on land use and recreation.

3.2.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, potential temporary impacts to land use and recreation from construction and long-term impacts from road expansion and tree removals would not occur. However, without the Proposed Action, the existing roads would continue to provide BPA inadequate and unsafe access to the Boyer-Tillamook transmission line for routine and emergency activities. Maintenance activities on the existing access roads would likely increase in frequency because existing access roads would remain in poor condition. In addition, if emergency repairs are needed on the transmission line and conditions prevent access along existing access roads, new impacts to land use and recreation, such as vegetation removal and traffic delays, could occur if alternate routes need to be found.

3.3 GEOLOGY AND SOILS

This section describes the existing geology and soils found within the project area, as well as potential impacts of the Proposed Action and No Action Alternative on those resources.

3.3.1 AFFECTED ENVIRONMENT

The project area for geology and soils consists of the existing and proposed access roads. The project area includes the area where proposed new, widened, or reconstructed roads and proposed culvert replacement, bridge construction, and retaining wall installations would occur.

3.3.1.1 GEOLOGY

The project area lies within the Oregon Coast Range, a subprovince of the Pacific Border geographic province. This area is within a structural arch plunging to the northeast of the volcanic and sedimentary rocks of the Oregon Coast Range. The bedrock geology in the vicinity of the Proposed Action is dominated by two types of deposits mapped by the United States Geological Survey (USGS) and Oregon Department of Geology and Mineral Industries (DOGAMI): the Tillamook Volcanics Formation, north of structure 17/4, and the Yamhill Formation, south of structure 17/4. The Tillamook Volcanics bedrock consists of submarine basalt tuff (consolidated volcanic ash) and breccia (cemented angular to subangular rock fragments in fine-grained matrix). This formation is thick-bedded to massive tuff interbedded with pillow basalt, basaltic sandstone, mudstone, and mudflow breccia (USGS 1994). The Yamhill Formation bedrock consists of thin-bedded to massive siltstone containing thin tuff beds, sandstone beds, and concretions (hard, compact sedimentary rock cemented by mineral precipitation). Locally, the Yamhill Formation contains a combination of thin “oil shale” and Tillamook Volcanics. Both of these deposits developed between 56 to 34 million years ago (USGS 1994).

Twenty-three to five million years ago, these submarine deposits were uplifted to form the Oregon Coast Range (USGS 1994). Subsequent erosion and deposition developed the drainages of the area. The project area is located on several faults that are likely associated with the uplift of the Oregon Coast Range (USGS 1994). An active fault system has been mapped from the Oregon Coast near Tillamook Bay running toward the southeast approximately 12 miles north of the project area. Portions of the project area are mapped as subject to severe earthquake shaking hazards and moderate earthquake soft soil hazards due to potential seismic activity along the Cascadia Subduction Zone (DOGAMI 2013). The Cascadia Subduction Zone occurs along the convergence of the North American and Juan de Fuca tectonic plates. Violent energy releases along the subduction zone can cause earthquake. The estimated probability of a magnitude 9.0 earthquake occurring within the next 50 years is 7 to 12 percent, based on the historical record of similar events (DOGAMI 2013).

The topography along the Proposed Action consists of moderately–to–steeply rolling hills with a maximum slope of 27 percent near structures 5/4, 8/4, and 9/5. The elevation varies from about 72 feet near structure 17/9 at the Frank Creek crossing, to 984 feet at structure 9/5. Mass wasting, ranging from soil creep to landslides, has historically occurred within the project area, as evidenced in Figure 3-3. Numerous landslide deposits are mapped throughout the Yamhill Formation and Tillamook Volcanics Formation. Weathering of the parent rocks has produced silty clay soils that can become unstable if they are located on steep slopes and become saturated with water. Landslide hazard areas are mapped along sections of the project area by DOGAMI (2013). Figure 3-4 shows the landslide susceptibility of topography in the project

area. There are no active or inactive landslides in the project area; however, much of the topography in the area is susceptible to landslides.

3.3.1.2 SOILS

Soils in the project area include silt loams, silty clay loams, and gravelly loams derived from weathering of bedrock (NRCS 2013). Silty clay loams and silt loams are composed of a mix of fine-grained silt, clay, and sand, and are the most abundant soil type in the project area. Due to wet conditions in the Oregon Coast Range, the soils within the project area are primarily at risk of erosion by water, particularly when protective vegetative cover is removed.



FIGURE 3-3. LANDSLIDE EVIDENCE ON A PROJECT ROAD NEAR STRUCTURE 14/1

Much of the soil where work would occur has already been disturbed by the existing transmission lines and road network. Soils near structures and within roadbeds (which are presently mostly dirt roads) have been compacted and are often unvegetated, making them vulnerable to erosion.

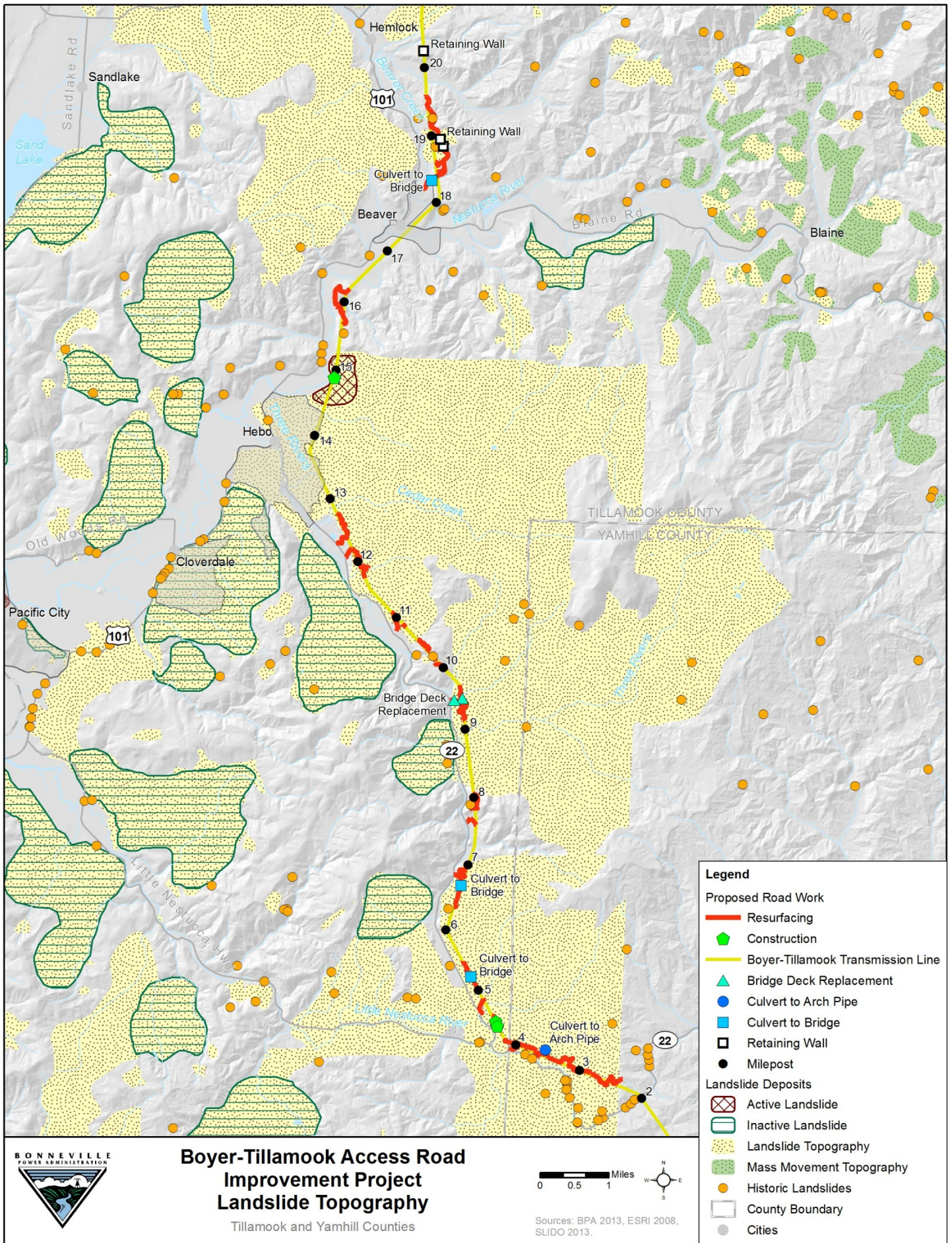
3.3.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The following sections describe the potential geology and soil impacts from construction and operation and maintenance of the Proposed Action.

3.3.2.1 CONSTRUCTION IMPACTS

Impacts to soils from construction of the Proposed Action would occur as a result of road widening, construction of new roads, use of construction travel routes by heavy equipment and trucks, construction of three new retaining walls, and installation of bridges and culverts. The total acreage impacted by these activities would be 3.13 acres. These activities could remove topsoil and vegetation, compact soils, and damage soil structure. Indirect effects could include soil erosion and reduced soil productivity.

Due to the wet climate, soils in the project area are prone to erosion from moving water, particularly along project roads occurring on steep slopes. Erosion of disturbed soils would be greatest during and immediately after ground disturbance. Afterwards, soils would stabilize as they settle and as vegetation becomes reestablished. Reseeding of all disturbed areas, including the roadbed, would reduce erosion. Therefore, soils affected by construction activities along roadsides and at culvert and bridge sites could recover with mitigation, but would take several years to fully stabilize. Stabilization of slopes using rip rap and rock fill, as well as including drainage features to remove stormwater from the road surface would reduce the risk of triggering mass wasting events during or shortly after construction.



Date: 8/21/2013 GIS Analyst: NJH Map Document: LandslideMap.mxd Project Number: 40268006

FIGURE 3-4. LANDSLIDE TOPOGRAPHY MAP

In addition, soils compacted within roadbeds would result in the long-term loss of soil productivity. Total long-term impacts from road widening and new road construction are expected to occur on 3.13 acres. These areas would be impacted by grading, shaping, compacting, and placing crushed rock as a road base.

A total of 533 trees would be cleared from 40 different areas adjacent to project roads. Trees that would be removed to make way for the wider road or other project improvements would be cleared entirely, including roots. Other trees that would be cleared to allow for safe passage of vehicles would be cut to within two feet of finished earth grade, and stumps would remain. Based on the locations of road widening and tree removal, approximately 335 trees would be fully removed, including stumps (this is a high estimate of stump removal, as some tree stumps would remain in these areas). Removal of trees and stumps could increase the risk of soil erosion, particularly in those areas where more trees would be removed. Tree roots can add cohesion to soils to the depth that the roots penetrate. Trees also contribute to slope stability through evapotranspiration through their root systems, which decreases soil water content and reduces soil pore pressure resulting in increased root cohesion. This additional cohesion provides stability for areas that could be prone to shallow landslides. The potential for increased erosion, however, would be mitigated by the construction of project features in these areas.

Approximately 200 trees would be removed with roots left intact. In these cases, the potential for increased soil erosion would be partially mitigated because the roots would remain in place, but the benefits of evapotranspiration would be temporarily eliminated. In the long term, low-growing vegetation such as grasses and shrubs would return and provide soil stability. In addition, a total of 490 trees would be replanted at four of the stream crossing construction sites (see Section 3.4.2, Water Resources). Once roadside slopes are stabilized, replanting would begin to improve slope stability once the trees become established. The levels of root cohesion would increase as the newly planted forest matures.

Temporary and permanent soil compaction, damage to soil structure, and the risk of erosion would occur as a result of the Proposed Action. However, since a small amount of land would be affected outside of the existing road prism and at bridge and culvert sites, and mitigation measures would be used to minimize the risk of soil erosion and aid in soil recovery, impacts to soil from construction activities would be **low** in the long term and **low-to-moderate** in the short term until permanent stabilization efforts take effect.

3.3.2.2 OPERATION AND MAINTENANCE IMPACTS

Operation and maintenance activities that could disturb soils include intermittent travel along access roads and vegetation management. Impacts from work vehicles would mainly be limited to compaction of the roadbed, although some off-road parking or truck turnaround areas could temporarily impact adjacent soils in isolated areas. Vegetation management would primarily involve mowing roadside vegetation. Tree removal would also occur if trees begin to encroach on the roadway. In some situations, the stumps would be left in place, reducing the risk of erosion. If stump removal were required for reasons of roadbed integrity, soils would be stabilized to reduce the risk of erosion to the extent practicable.

Drainage improvements including water bars, drain dips, and new outlet ditches would reduce the risk of soil erosion by controlling and dispersing water runoff. The overall risk of landslides from roads would be reduced due to improved road stability and drainage improvements. In addition, cleaning culverts and replacing undersized culverts would provide additional stability to the ground adjacent to stream crossings by reducing potential flooding and soil erosion from blocked culverts or culverts that are unable to accommodate stream flows. In addition, 775 cubic yards of riprap would be used to armor streambeds,

culvert inlets and outlets, bridge abutments, pilings, and other structures, and three retaining walls would be constructed as part of the road widening activities. These features would result in limited impacts to the soils, but would provide protection from future erosion of the road. Based upon the small, localized disturbance areas and the infrequent nature of these operation and maintenance activities, impacts on soils from operation and maintenance would be **low**. In addition, the reduction in soil erosion as a result of road improvement measures would have a positive impact on soils, because the improved roads would be more stable and better capable of handling stormwater, thus would be less likely to erode or be subject to mass wasting, particularly during a storm event.

3.3.3 MITIGATION – PROPOSED ACTION

If the Proposed Action is implemented, the following mitigation measures would minimize impacts to soils:

- Minimize the ground disturbance footprint, particularly in areas prone to erosion, such as along steep slopes.
- Limit soil exposure times by using stabilization and revegetation measures (also see Section 3.6, Vegetation).
- Reseed all disturbed areas, including the roadbed.
- Design roads to limit water accumulation and install appropriate access road drainage (e.g., ditches, water bars, cross drainage, or roadside berms) to control and disperse runoff and reduce the risk of mass wasting.

3.3.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

Removal of topsoil and vegetation, compacted soils, and damaged soil structure would still occur after mitigation at construction sites. Temporary compaction would affect roadsides and turn-around sites from heavy construction vehicles. In addition, the permanent compaction and loss of productivity would occur within the roadbeds of expanded and new roads.

3.3.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Neither Tillamook nor Yamhill counties reported any planned developments in the project area in the foreseeable future. Reasonable foreseeable future BPA activities in the project area would include ongoing maintenance of the Boyer-Tillamook transmission line. Past and ongoing land use activities along the Proposed Action include timber harvest and associated logging roads, agriculture, residences, and a nearby campground. The amount of soil that would be affected by the Proposed Action is small compared to the area affected by other ongoing activities in the area. Therefore, the Proposed Action would have a **low** cumulative impact on soil.

3.3.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, the access roads for the Boyer-Tillamook transmission line would not be improved, and maintenance would be completed as needed for access. If emergency situations arise involving the transmission line, fast action would be required and increased environmental impacts could occur if roads are inaccessible and alternate routes or rapid road repairs become necessary.

Without the road improvements from the Proposed Action, the road conditions under the No Action Alternative would continue to contribute to potential environmental impacts such as an increased risk of landslides and soil erosion. In areas of poor stability and drainage, erosion and landslides would be likely to continue to occur, with the potential for blocked culverts to further contribute to mass wasting related to poor drainage during storm events.

3.4 WATER RESOURCES

This section describes the existing water resources (streams and groundwater) within the project area, as well as the potential impacts of the Proposed Action and No Action Alternative on those resources. (See Section 3.5 for a discussion of Wetlands and Floodplain impacts.)

3.4.1 AFFECTED ENVIRONMENT

The project area for water resources includes all surface waters located within 30 feet of either side of any proposed new, widened, or reconstructed roads. The project area also extends 150 feet from any proposed culvert replacement, bridge construction, or retaining wall installation.

3.4.1.1 SURFACE WATER

The Proposed Action crosses through five watersheds between structures 4/4 and 22/3 (PNWHF 2012):

- Upper Little Nestucca River
- Three Rivers
- Farmer Creek-Nestucca River
- Beaver Creek

The streams located between structures 4/4 and 7/5 ultimately drain into the Little Nestucca River, which drains directly to the Pacific Ocean. Streams between structures 8/4 and 14/5 eventually discharge into Three Rivers, a tributary of the Nestucca River, which also drains directly to the Pacific Ocean. Between structures 16/4 and 18/2, the streams also drain to the Nestucca River. Streams between structures 20/1 and 22/3 drain into Beaver Creek, another tributary to the Nestucca River.

Based on the field survey of waterbodies conducted for the Proposed Action and the 1:24,000 digital dataset of stream locations developed by the Pacific Northwest Hydrography Framework (PNWHF 2012), there are 20 perennial and 19 intermittent waterways within the project area (see Table 3-2). Field surveys reported that perennial streams in the project area are generally incised and have moderate to high channel gradients. The channel widths at the ordinary high water marks ranged from 1.5 to 36 feet for perennial streams and 0.5 to 2 feet for intermittent streams. Many of the streams exhibited a braided channel; substrate material consisted of boulders, cobble, and gravel for perennial streams, and gravel and sand for intermittent streams. Substantial quantities of large woody debris were noted in the perennial streams. The project area between structures 20/2 and 21/5 and between structures 22/2 and 22/3 lies within the surface drinking water-source area for the Beaver Water District, which means that area lies within the watershed from which drinking water for this water district, which serves approximately 500 people, is obtained (ODEQ 2012).

The naming convention established for the wetland and waters field survey is also used within this section. It is based upon the type of feature (stream [S] or wetland [W]), the nearest transmission line structure, and the location of the waterway relative to other waterways along the ROW. For example, the two streams between structures 5/4 and 5/5 would be called S-5/4-1 and S-5/4-2 going from south to north.

The named perennial streams in project area include Louie Creek (S-6/5-1), Alder Creek (S-8/7-2), Lawrence Creek (S-11/3-3), Three Rivers (S-11/3-4), Dorothy Creek (S-13/7-1), Frank Creek (S-17/9-1), and Hester Creek (S-20/2-1). All streams located within the project area are listed in Table 3-2.

Table 3-2. Streams within the Affected Environment of the Boyer-Tillamook Access Road Improvement Project

Stream ID	Stream Name	Type	Proposed Activity*
S-4/4-1	(unnamed) ^{a,b}	Perennial	Road resurfacing near stream
S-5/2-1	(unnamed) ^{a,b}	Perennial	Road widening near stream
S-5/2-2	(unnamed) ^{a,b}	Perennial	Road widening near stream
S-5/2-3	(unnamed) ^a	Intermittent	Road widening near stream
S-5/4-1	Unnamed Tributary to Sourgrass Creek ^{a,b}	Perennial	Replace the 4-foot diameter culvert with an 18-foot arch pipe in stream, tree removal
S-5/4-2	(unnamed) ^a	Perennial	Located immediately downstream of the culvert to arch pipe crossing improvement at S-5/5-1
S-5/6-1	(unnamed) ^a	Perennial	Road resurfacing and culvert cleaning. This stream originates at the base of the existing culvert.
S-5/6-2	(unnamed) ^a	Perennial	Road resurfacing and tree removal near stream
S-5/6-3	(unnamed) ^a	Intermittent	Road resurfacing and tree removal near stream
S-5/6-4	(unnamed) ^a	Perennial	Road resurfacing and tree removal near stream
S-6/5-1	Louie Creek ^b	Perennial	Road resurfacing near stream
S-7/1-1	(unnamed) ^a	Intermittent	Road resurfacing near stream
S-7/2-1	Unnamed tributary to Louie Creek ^{a,b}	Perennial	Replace three stacked culverts with a 40-foot bridge in stream; tree removal near stream
S-8/6-1	Unnamed tributary to Alder Creek ^{a,b}	Perennial	Replace a culvert with a 50-foot bridge in stream
S-8/7-1	(unnamed) ^{a,b}	Perennial	Road widening and tree removal near stream
S-8/7-2	Alder Creek ^{a,b}	Perennial	Road widening near stream
S-9/4-1	(unnamed) ^a	Perennial	Road resurfacing near stream
S-9/4-2	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-9/4-3	(unnamed) ^b	Perennial	Road resurfacing near stream
S-11/3-1	(unnamed) ^b	Intermittent	Road widening
S-11/3-2	Lawrence Creek ^{a,b}	Perennial	Replace a 23-foot long bridge with a 50-foot long bridge in stream

Stream ID	Stream Name	Type	Proposed Activity*
S-11/3-3	Lawrence Creek ^{a,b}	Perennial	Replace a 23-foot long bridge with a 50-foot long bridge in stream; tree removal near stream
S-11/3-4	Three Rivers ^{a,b}	Perennial	Road resurfacing near stream
S-11/4-1	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-12/2-1	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-12/7-2	(unnamed) ^b	Perennial	Road resurfacing near stream
S-13/7-1	Dorothy Creek ^{a,b}	Perennial	Road widening near stream
S-14/2-1	(unnamed) ^a	Intermittent	Road resurfacing near stream
S-14/2-2	(unnamed) ^{a,b}	Intermittent	Road widening and tree removal near stream
S-17/8-1	(unnamed) ^a	Intermittent	Road resurfacing near stream
S-17/9-1	Frank Creek ^{a,b}	Perennial	Road resurfacing near stream
S-20/2-1	Hester Creek ^{a,b}	Perennial	Replace a culvert with a 50-foot bridge in stream; tree removal in and near stream
S-20/2-2	(unnamed) ^a	Intermittent	Road resurfacing and tree removal near stream
S-20/6-1	(unnamed) ^{a,b}	Intermittent	Retaining wall installation, road widening in stream
S-20/6-2	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-21/1-1	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-21/1-2	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-21/2-1	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-21/2-2	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-21/2-3	(unnamed) ^b	Intermittent	Road resurfacing near stream
S-21/2-4	(unnamed) ^b	Intermittent	Road resurfacing near stream

The naming convention established for the field survey is also used within this section. It is based upon the type of feature stream (S)), the nearest transmission line structure, and the location of the waterway relative to other waterways along the ROW. For example, the two streams between structures 5/4 and 5/5 would be called S-5/4-1 and S-5/4-2 going from south to north.

Sources: ^a BPA 2013a, ^b PNWHF 2012.

*Near stream work would occur within about 50 feet of the waterbody.

3.4.1.2 GROUNDWATER

The bedrock in the project area consists of volcanic and marine sedimentary rocks with low permeability such that there is not a lot of groundwater storage (Woody 2007). These geological units may produce enough water for domestic use in places, while localized pockets of productive aquifers are usually found in fractures and faults in the marine sedimentary rocks (Woody 2007). The most productive aquifers in the basin are generally formed by loosely deposited soils (i.e., unconsolidated alluvium) along rivers (Woody 2007). Although groundwater drinking water-source areas occur in the watersheds traversed by

the Boyer-Tillamook transmission line, no long-term or short-term recharge areas occur within the project area (ODEQ 2012).

3.4.1.3 IMPAIRED WATERS

The Oregon Department of Environmental Quality (ODEQ) periodically prepares a list of all surface waters in the state that are impaired because they do not meet water quality standards under Section 303(d) of the Clean Water Act (33 USC 1251 *et seq.*). The most recent assessment showed that a number of streams receiving flows from project area tributaries appear on the 303(d) list for impairments affecting the beneficial use of aquatic life (ODEQ 2010):

- Little Nestucca River, listed for biological criteria
- Nestucca River, for low dissolved oxygen and biological criteria
- Three Rivers, for biological criteria
- Beaver Creek, for biological criteria

When a total maximum daily load (TMDL) is established by the ODEQ for a pollutant in a stream, input of the parameter causing the water quality problem are managed and monitored by the ODEQ. Two project area streams have established TMDLs: the Nestucca River for summer temperatures for the beneficial use of salmonids and East Beaver Creek for excess sedimentation for the beneficial use of salmonid rearing and spawning.

3.4.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

Higher than normal water temperatures adversely affect the migration, rearing, and spawning of fish, including salmonids. Activities in the watershed that can increase stream temperatures include clearing of vegetation in riparian corridors for timber harvest, agricultural use, residential development, and road construction and maintenance. Loss of riparian vegetation decreases stream shading and also affects a number of processes and functions controlled by hydraulic roughness in the channel and on the floodplain.

Bank erosion widens the channel and increases the wetted area exposed to solar radiation while decreasing the shading potential of bank vegetation. Sedimentation is part of the natural processes of erosion and sediment transport in streams. Changes to the quantity of sediment delivered to a stream—or to the flow characteristics related to erosion, transport, or deposition of sediment—can increase cloudiness of the water (i.e., turbidity) or substrate particle size. Excess fine-grained sediment accumulation and turbidity can interfere with spawning and foraging of fish including salmonids, and can lower the productivity of aquatic ecosystems. Activities that can increase erosion and sedimentation include soil disturbances such as clearing and grading, tree removal, and culvert placement.

The following sections describe the potential impacts to water resources in the project area from construction and operation of the Proposed Action.

3.4.2.1 CONSTRUCTION IMPACTS

The Proposed Action would result in direct and indirect impacts to surface water as a result of construction activities in or directly adjacent to waterbodies, which includes bridge and culvert removal and replacement

with bridges or an arch pipe (which also includes riprap placement and tree removal), MSE wall installation, and culvert cleaning. Activities occurring near streams (within 50 feet) or within watersheds that may impact waterbodies are road resurfacing and widening, riprap placement, vegetation removal, and MSE wall installation. Potential impacts include causing sedimentation or turbidity through in-water work or adjacent road work and water diversion, modifying stream channels or water flow, reducing shading and possible water temperature increases through tree removal, and accidental spills of equipment fluids.

Permanent direct impacts to surface waters include 8 square feet (<0.01 acre) to repair a slide and install a retaining wall (see Table 3-3). These impacts would affect a proportionally small amount of the stream channel, and would create a long-term improvement in habitat and stormwater function.

The proposed improvements to six culverts and bridges, which would also involve widening stream channels, armoring banks with fish-friendly riprap, and increasing the size of the floodplain (see Section 2.1.3, Proposed Action and Alternatives, Bridge and Arch Pipe Construction), directly impact 2,030 square feet (0.04 acre) of streams but would have several effects on water resources (see Table 3-3). Over the long-term, stream conditions would be improved by the enhanced stream crossings. The replacement of undersized culverts with bridges or an adequately sized arch pipe would accommodate a wider range of flows and would prevent excess sediment accumulation upstream. Widening of the channel and floodplain where road crossings had previously constrained the streams would allow more natural geomorphic processes to resume. Riprap used to armor streambeds, bridge abutments, pilings, and other structures would reduce the potential for erosion of the channel bed and banks, and prevent the introduction of excess fine sediments into the streams. All riprap used in streams would be fish friendly and consistent with SLOPES design criteria.

The improvements could have some adverse impacts as well. Some trees would need to be removed to make way for the new crossing structures or to allow for proper channel grading, including the following:

- At unnamed tributary to Sourgrass Creek where a culvert would be replaced with an arch pipe, removal of a total of 176 trees would allow for the wider turn radius needed for proper road construction, stream crossing improvements, stream restoration, and to allow the safe passage of vehicles. This would be the largest concentration of tree removal within the project area of the Proposed Action, some of which would occur adjacent to this stream. Removal of stumps would be done only in areas where it would interfere with construction, such as to widen the approach radius of a bend in the road, and to complete the stream crossing improvement and associated stream restoration work. Trees removed at this location to allow passage of vehicles would be cut but roots would be left intact to retain slope stability and reduce erosion. Approximately 15 riparian trees would be removed, including stumps. These trees would be primarily alders and Douglas firs. All but three trees are between less than 8 and 19 inches dbh; three are alders between 20 and 27 inches dbh.
- At the unnamed tributary to Louie Creek where the ponded and stacked culverts would be replaced with a bridge, a total of 5 riparian tree alders ranging from less than 8 inches to 15 inches dbh located in the channel would be removed, including the stumps.
- The replacement bridge crossing at Upper Lawrence Creek would require removal of 3 riparian tree alders from 14 to 18 inches dbh.
- At the Hester Creek culvert to bridge site, a total of 20 trees would be removed over approximately 150 feet along the improved road, and most stumps would remain. These trees range from less than 8 to 22 inches dbh and include alders and Douglas firs. The 2 existing trees on top of the culvert would be removed, including their roots (see Figure 3-5).

Removal of these trees has the potential to reduce riparian shading at these locations. Riprap added to the channel at all locations could constrain the natural processes by which gravel and large woody debris is introduced into a stream. In addition, all construction activities could temporarily increase water turbidity. To mitigate for this possibility, construction in the channel at the unnamed tributary to Sourgrass Creek and Hester Creek would occur when streams are dry (i.e., construction would occur when there was no flow present or the flow would be diverted and the channel would be de-watered). All crossings would be completed during Oregon Department of Fish and Wildlife's (ODFW) in-water work window, and all appropriate BMPs would be implemented to protect water resources. Additionally, a total of 490 trees would be replanted at four of the stream crossings to provide streambank protection and restore the riparian buffer. These are described in Table 3-4 below.



FIGURE 3-5. EXISTING TREES AT HESTER CREEK CULVERT TO BRIDGE SITE

Restoring naturally flowing streams, widening channels and floodplains, and improving stream processes would establish stream drainage and connectivity. These activities would also reduce overall erosion and mass wasting from stormwater through improved drainage and road stability. Because effects on water quality during construction would be temporary and mitigation measures would be implemented to reduce these effects, impacts would be *low* in the long term and *low-to-moderate* in the short term.

Table 3-3. Direct Impacts to Surface Waters

Stream Name (ID)	Type	Impacts from Activities (square feet)	
		Slide Repair or Retaining Wall Construction	Stream Crossings
Unnamed tributary to Sourgrass Creek (S-5/4-1)	Perennial Riverine	0	815
Unnamed Tributary to Louie Creek (S-7/2-1)	Perennial Riverine	0	261
Unnamed Tributary to Alder Creek (S-8/6-1)	Riverine Perennial	0	288
Unnamed (S-11/3-2)	Intermittent Riverine	4	0
Lawrence Creek (S-11/3-3)	Perennial Riverine	0	379
Hester Creek (S-20/2-1)	Perennial Riverine	0	209
Unnamed (S-20/6-1)	Intermittent Riverine	4	0
Subtotals		8	1,952

Stream Name (ID)	Type	Impacts from Activities (square feet)	
		Slide Repair or Retaining Wall Construction	Stream Crossings
TOTAL IMPACTS		2,030 square feet (0.05 acre)	

Table 3-4. Tree Restoration at Surface Water Crossings

Specifications					Number of Plants			
Scientific Name	Common Name	Plant Type	Spacing	Purpose	UT to Sourgrass Creek	Hester Creek	Lower Lawrence Creek	Upper Lawrence Creek
<i>Salix lucida</i>	Pacific willow	Live cuttings	2 foot on center	Streambank protection	49	101	12	13
<i>Alnus viridis</i>	Sitka alder				49	101	12	13
<i>Acer macrophyllum</i>	Big leaf maple	Bare root – 5 foot height	15 foot on center	Riparian buffer	20	7	2	0
<i>Pseudotsuga menziesii</i>	Douglas fir				20	7	2	0
<i>Alnus rubra</i>	Red alder				59	21	2	0
TOTAL TREES PLANTED					197	237	30	26

Road work that would not occur directly in streams could still affect water quality through erosion and sedimentation or shade removal. The actions that have the potential to cause impacts include resurfacing and widening of roads; construction of water bars, drain dips, and outlet ditches; installation of gates and cattle guards; construction of retaining walls; installation of rock (i.e., riprap) on slopes; and the removal of trees. The resurfacing, widening, and construction of roads and road features would temporarily expose soils that could be carried into streams by rain runoff or wind. The stabilization of slopes near roads and the construction of the retaining walls could also temporarily increase erosion.

Including the 204 trees discussed above, a total of 533 trees would be removed for the Proposed Action. Tree removal has the potential to impact streams by temporarily increasing erosion due to exposure of soils and by reducing shading alongside streams. Aside from the locations of bridges and the arch pipe discussed above, tree removal would occur near (within about 50 feet) of streams (see Table 3-2). Other trees removed would be dispersed along the linear project and would not be along streams with a TMDL or on the 303(d) list. In addition, the trees cleared would only be a percentage of the number of trees in the area and the remaining tree canopy, understory trees, shrubs, and crown sprouts would continue to provide shading and hold soils in place. A total of 490 trees would be replanted at four of the stream crossings to provide streambank protection and restore the riparian buffer, as described above.

The reconstructed and newly constructed roads would be surfaced with compacted gravel, which would decrease the long-term potential for soil erosion. Reseeding all disturbed areas, including the roadbed, would also reduce erosion once vegetation becomes established. The compacted gravel surfaces of project roads would reduce groundwater infiltration rates within the roadway. However, water bars, drain dips, and outlet ditches would prevent erosion of the road surface and direct water flows to upland areas for infiltration, thereby limiting the amount of sediment entering surface water resources and reducing water

quality impairments. These features would also facilitate groundwater infiltration into the aquifer. Construction within the surface water drinking source between structures 20/2 and 21/5 as well as structures 22/2 and 22/3 would involve minimal tree removal and would improve stormwater drainage, thus reducing the potential for erosion, sedimentation, and mass wasting in the watershed.

Due to the long-term reduction of soil erosion due to project design, gravel placement, seeding, and erosion control, as well as implementation of the mitigation measures described in Section 3.4.3, resurfacing, widening, and new construction of roads would result in **low** impacts to surface waters from access road and slope stabilization activities.

Accidental spills of fuel, oil, or chemicals during construction could expose surface water resources and groundwater to hazardous materials. Spill Prevention and Response Plan and Procedures would be developed, and spill prevention and response equipment would be present at all construction sites. With these mitigation measures in place to reduce the risks of spills reaching groundwater, impacts to surface and groundwater would be **no-to-low**. The Proposed Action would not involve components that would interact with groundwater, thus there would be **no** effect on groundwater.

3.4.2.2 OPERATION AND MAINTENANCE IMPACTS

The access roads of the Proposed Action would be used at least annually for inspections of the Boyer-Tillamook transmission line. Operation and maintenance activities that could impact streams include occasional trimming or removal of trees near streams, and road maintenance activities, such as culvert cleaning, in or near streams. Implementation of the Proposed Action would benefit water resources in the area by helping to reduce the potential for road, culvert, or bridge failure, or landslides—all of which could inadvertently release large amounts of sediment into adjacent or underlying water bodies. Over the long term, some surface erosion of road surfaces could occur, particularly following the rainy season and large storm events. With the proposed road improvements, sediment carried in stormwater runoff should be diverted away from water resources to areas where the runoff could percolate into the ground or run across upland areas, reducing velocity and sediment loads, before reaching surface water bodies. Road maintenance activities culvert cleaning, riprap repair, road surface repair, and vegetation maintenance would occur as needed, and would have the potential to temporarily affect water resources. Maintenance activities would use the BMPs specified in Section 3.4.3 and vegetation management would follow BPA's Vegetation Management Program (BPA 2000), which includes protocols for herbicide use (i.e., specific herbicides, selective spot treatments, and buffer zones near water bodies). Because the risk of runoff to water resources from road surfaces would be greatly reduced through implementation of the Proposed Action, and maintenance activities would be infrequent, mitigated, and have an overall benefit to water resources, impacts to water resources from operation and maintenance would be **low**.

3.4.3 MITIGATION – PROPOSED ACTION

The following mitigation measures would minimize the potential impacts of the Proposed Action to water resources:

- Construct, widen, and resurface access roads during the dry season when stream flow, rainfall, and runoff are low.
- Replace culverts and install bridges during the dry season when stream flow, rainfall, and runoff are

low or if flows are present, temporarily divert streams around the construction site.

- Prepare a Stormwater Pollution Prevention Plan to reduce erosion and runoff and stabilize disturbed areas.
- Minimize the ground disturbance near waterbodies during construction, particularly in areas prone to erosion.
- Retain vegetative buffers, where possible, to prevent runoff into waterbodies.
- Install sediment barriers and other suitable erosion- and runoff-control devices, prior to ground-disturbing activities at construction sites to minimize offsite sediment movement.
- Park construction vehicles or equipment at least 50 feet from any stream or wetland unless authorized by a permit or on an existing roadway.
- Stabilize approaches to streams and stream crossings with clean rock or steel plates during construction to minimize erosion and sedimentation.
- Plant a total of 490 trees across four stream crossing improvement locations to provide streambank stability and riparian buffer establishment.
- Prepare and implement a Spill Prevention and Response Plan and Procedures to prevent, contain, and report accidental spills.
- Place refueling and servicing operations away from waterbodies so that spilled material could not enter through natural or manmade drainages (e.g., ditches or streams).
- Use pumps, funnels, absorbent pads, and drip pans to avoid or minimize spills during fueling or servicing of vehicles.
- Use herbicides in accordance with BPA's Transmission System Vegetation Management Program Final EIS/Record of Decision (BPA 2000).

3.4.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

Unavoidable impacts from the Proposed Action would include temporary increased turbidity from the in-water work at the six stream crossing construction sites, and the MSE wall near structure 20/6, much of which would be avoided with BMPs. Additionally, BMPs would avoid most, but possibly not all, erosion from upland construction activities including road widening, culvert cleaning, and riprap placement, and MSE wall construction from reaching stream channels and increasing turbidity. Natural stream processes may be constrained by riprap placement; however, fish-friendly riprap and proper channel grading would be implemented consistent with SLOPES criteria to protect fish and water quality. Additionally, solar radiation of stream channels would be increased where streamside trees are removed at the locations discussed above.

3.4.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Neither Tillamook nor Yamhill counties reported any planned developments in the project area in the reasonably foreseeable future. Reasonable foreseeable BPA activities in the project area would include ongoing maintenance of the Boyer-Tillamook transmission line. Past and ongoing land use activities along the Proposed Action include timber harvest and associated logging roads, agriculture, residences, and a

nearby campground. These activities could all impact water quality in the Proposed Action watersheds. The footprint of the Proposed Action is relatively small in relation to the size of the watershed, and would reduce sediment-laden runoff from the existing access road system into water resources. Given the overall reduction in potential impacts to water resources, the Proposed Action's contribution to cumulative impacts on water resources would be expected to be *low*.

3.4.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

The No Action Alternative would not improve the roads and stream crossings along the Boyer-Tillamook transmission line. Under the No Action Alternative, the benefits to water resources brought about by the proposed road and drainage enhancements would not occur and the existing impacts from the undersized culverts and high sediment inputs would continue. Future road maintenance could occur under emergency conditions, and result in greater impacts to water resources than under the Proposed Action. Impacts to water resources from the No Action Alternative would be *moderate-to-high*, because the existing impacts would continue, poor road conditions and drainage could lead to increased problems with runoff and sedimentation, and potential watershed damage from emergency access could cause additional temporary and long-term impacts.

3.5 WETLANDS AND FLOODPLAINS

This section describes the affected environment and potential impacts of the Proposed Action on wetlands and floodplains within the project area.

3.5.1 AFFECTED ENVIRONMENT

The following sections describe the affected environment for wetlands and floodplains within the project area.

3.5.1.1 WETLANDS

Wetlands are areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support (and under normal circumstances do support) a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987). Ten wetlands were field-identified in the project area using the *Routine Onsite Determination Method* (USACE 1987) in November and December 2012 (BPA 2013a). Wetlands in the project area are associated with topographic depressions or riparian areas, and include two wetland types, palustrine emergent and palustrine scrub shrub, as described by Cowardin et al. (1979). All documented wetlands discussed in this section are assumed to be subject to federal jurisdiction under Section 404 of the Clean Water Act.

The identified wetlands classified as PEM are typically located on the fringe of forest lands or in open areas where disturbances from human activities such as logging or vegetation clearing have removed the tree and shrub canopy. Emergent wetland vegetation communities—those with vegetation that is rooted in soil, grows in water, with basal portions growing below the water surface, and with portions of their stems and leaves in the air—inhabit portions of many wetlands within the project area and are dominant in palustrine emergent wetlands. Project area palustrine emergent wetland vegetation communities are typically characterized by a dominance of invasive reed canarygrass (*Phalaris arundinacea*). However, panicked bulrush (*Scirpus microcarpus*), common rush (*Juncus effusus*), American speedwell (*Veronica americana*), and giant horsetail (*Equisetum telmateia*) occur in varying densities within the wetlands as well.

The palustrine scrub shrub wetlands occur in relatively undisturbed riparian corridors abutting perennial and intermittent streams. Although red alder (*Alnus rubra*) is typically dominant in the canopy adjacent to the wetlands, these trees are distributed sporadically and account for less than 30 percent of the cover within the wetlands. Salmonberry (*Rubus spectabilis*) is commonly the dominant species within palustrine scrub shrub wetlands, with varying densities of co-dominant species characteristic of scrub shrub wetland/riparian vegetation communities.

Scrub shrub vegetation communities occupy the majority of the wetlands within the project area. These vegetation communities are characterized by the following species: red alder, willow (*Salix* spp.), Sitka spruce (*Picea sitchensis*), salmonberry, western swordfern (*Polystichum munitum*), vine maple (*Acer circinatum*), American skunkcabbage (*Lysichiton americanus*), youth on age (*Tolmiea menziesii*), Pacific golden saxifrage (*Chrysosplenium glechomifolium*), Pacific waterleaf (*Hydrophyllum tenuipes*), Siberian springbeauty (*Claytonia sibirica*), lady fern (*Athyrium filix-femina*), common rush, and panicked bulrush. In addition to these species, the riparian zones also contain areas dominated by species characteristic of emergent wetland communities, particularly reed canary grass.

3.5.1.2 FLOODPLAINS

The Federal Emergency Management Agency (FEMA) maps 100-year floodplains on its National Flood Insurance Program (NFIP) Rate Maps, and defines floodplains as areas that have a 1 percent chance of being flooded in a given year. The floodplain analysis includes all areas that lie within 200 feet of the mapped extent of the 100-year floodplain in the project area.

FEMA has not yet completed flood hazard analyses on some areas of the United States where population densities are low. This applies to the portion of the project area roughly between structures 19/4 and 20/6 and between structures 6/2 and 12/5. Flooding of the project is not anticipated in these areas because of topography and construction of appropriately sized stream crossing structures. Where NFIP flood data are available, no regulatory 100-year floodplains occur within 200 feet of Proposed Action. Thus, **no** impacts are expected on regulatory floodplains from the Proposed Action and regulatory floodplains are not discussed further in this section. A discussion of the effects of the Proposed Action on the functional floodplains in areas where stream crossing improvements would allow proper floodplain function can be found in Section 3.4, Water Resources and Section 3.7, Fish and Wildlife.

3.5.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

3.5.2.1 CONSTRUCTION IMPACTS

Of the ten wetlands identified in the project area, only two palustrine scrub shrub wetlands would be directly impacted. These impacts would occur at stream crossing improvements, and would result in a total of approximately 592 square feet of impacts spread over two wetland areas.

The replacement of the undersized culvert at the crossing of road AR-6 over an unnamed tributary to Sourgrass Creek would create approximately 405 acres of impacts to wetland W-5/4-1. These impacts would be due to placement of the footings for the new arch pipe and associated riprap. In a wetland survey, both wetlands scored relatively high in function and value for fish and terrestrial support because mature fish are likely present in the adjacent stream and there is a high canopy cover of mature woody vegetation (BPA 2013a).

Wetland W-8/6-1 would have approximately 187 square feet of fill due to replacement of the undersized culvert on the tributary to Alder Creek at AR-41-2 with a bridge. This site is located between structures 8/6 and 8/7. The new bridge abutments would span the functional floodplain. Impacts would occur from placement of the bridge abutment and associated rock fill. This wetland also scored well for function, including fish due to likely fish access to the adjacent stream. It also scored well for watershed function given its potential to provide hydrologic benefits to the watershed due to its geographic position. At locations where trees would be cleared near streams (see Section 3.4.2, Water Resources, Environmental Consequences), these impacts would be near or within wetland areas as well. Impacts to wetlands are similar to impacts to streams from tree clearing, in that erosion potential is increased and shading is decreased. The replanting of 490 trees at four stream crossing locations would aid in restoration of these areas (see Table 3.4).

Indirect impacts would occur from resurfacing 13.42 miles of roads, 3.61 miles of which would be widened, as well as associated activities including tree removal and slope stabilization. These impacts would occur through sedimentation and erosion. Although this in-stream work would be completed during dry periods

with lower stream flow, ground and sediment disturbance would occur in wetland areas during construction activities, potentially causing the temporary indirect effect of increased turbidity in wetlands. However, these effects would be mitigated through implementation of appropriate road construction methods that would remove stormwater drainage from the road surface and route it to upland areas.

Although direct impacts would occur to higher quality wetlands, the acreage impacted would be very small, and would be necessary for stream crossing improvements that would provide overall benefit to the hydraulic function of the watershed. Additionally, project-wide BMPs would be implemented and drainage features would be installed to prevent sediment-laden water from entering wetlands. Thus, direct and indirect wetland impacts would be **low**.

3.5.2.2 OPERATION AND MAINTENANCE IMPACTS

Operation and maintenance activities that could impact wetlands include road maintenance activities, such as culvert cleaning or grading, in or near wetlands. Vegetation trimming or removal would primarily affect wetlands with a forested vegetation layer. However, the wetlands in the project area are currently scrub shrub or emergent vegetation types, generally making vegetation short enough that these sorts of activities would be unnecessary. Over the long term, some surface erosion of road surfaces could occur, particularly following the rainy season and large storm events. Implementation of the Proposed Action would benefit wetlands in the area by helping reduce the potential for road, culvert, or bridge failure, or landslides—all of which could inadvertently release large amounts of sediment into adjacent wetlands. Additionally, culvert cleaning, drain dips, and water bars included in the Proposed Action would all improve stormwater function and improve the likelihood that excess sediments and velocities would be dissipated from stormwater before they reach wetlands.

Operation and maintenance of the Proposed Action would likely have **low** impacts on wetlands and associated buffers due to the limited areas that would be affected by vegetation maintenance and the infrequent use and maintenance of the access road.

3.5.3 MITIGATION – PROPOSED ACTION

If the Proposed Action is implemented, the following mitigation measures would be used to reduce impacts on wetlands:

- Design construction activities to minimize impacts to wetlands, and obtain the appropriate permits.
- Complete work below the ordinary high water during the ODFW recommended in-water work period between July 1 and September 15.
- Flag wetland boundaries in the vicinity of construction areas to ensure these areas are avoided during construction.
- Park construction vehicles or equipment at least 50 feet from any wetland, unless authorized by a permit or on an existing road.
- Place geotextile fabric around work areas at stream crossings with associated wetlands within 25 feet of wetlands to avoid depositing excavated material into the wetlands.

- Plant a total of 490 trees across four stream crossing improvement locations to provide streambank stability and riparian buffer establishment.
- Store fuel and refuel machinery at least 150 feet from wetlands and waterways, and inspect regularly for leaks.
- Require a BPA environmental specialist to meet with contractors in the field, and visit wetlands near or within construction areas to review mitigation measures and any permit requirements.
- Install sediment barriers along with other suitable erosion- and runoff-control BMPs, where needed, prior to ground-disturbing activities at construction sites to minimize off-site sediment movement near wetlands.
- Revegetate disturbed wetland and buffer areas with appropriate native plant species following specific revegetation guidelines in any applicable permits.

3.5.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

Unavoidable impacts to wetlands would include a minimal amount of fill at two stream crossing improvements, equaling less than 0.01 acre.

3.5.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Potential project area wetland cumulative impacts could result if other projects and actions were to affect wetland functions (i.e., water quality, hydrology, and wildlife habitat). Reasonably foreseeable future actions in the project area that could have wetland impacts include silvicultural forestry clearing and construction of associated roads activities, agricultural activities, vegetation control along roads and utility corridors, and commercial and residential development. These activities are also responsible for most of the past and ongoing project area wetland impacts and loss. The small area of wetland impacts and implementation of the mitigation measures described in Section 3.5.3 would ensure that the cumulative impact of the Proposed Action and other past, present, and reasonably foreseeable future projects on wetlands would be *low* on wetlands. Ongoing maintenance of the Boyer-Tillamook transmission line is also anticipated to have effects on wetlands; however, these would be mitigated through BPA's implementation of BMPs and general avoidance, resulting in *low* wetland impacts.

3.5.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, BPA work crews would continue to use roads to access the transmission line ROW to conduct maintenance and emergency repairs on the Boyer-Tillamook transmission line. The frequency of road maintenance events and the level of associated impacts would likely increase under the No Action Alternative as the road would continue to deteriorate over time and more substantial maintenance activities would be required. If it becomes necessary to perform emergency road repairs, it would likely not be possible to plan or time them to minimize impacts to wetlands, or route them around wetlands. Additionally, there would be no improvements to stormwater drainage from implementation of proposed road improvements, which would otherwise reduce stormwater velocities and suspended sediment before it reaches wetlands and waterways. Consequently, stormwater runoff would continue to affect wetlands with excess suspended sediment and velocities. Thus, impacts to wetlands from the No Action Alternative could result in *moderate* impacts, depending on the extent of the damage and the quality of the wetlands.

3.6 VEGETATION

This section describes the existing vegetation resources found within the project area, as well as the potential impacts of the Proposed Action and No Action Alternative on those resources.

3.6.1 AFFECTED ENVIRONMENT

The project area for vegetation includes the existing access roads and any areas potentially affected by road construction or improvement activities from the Proposed Action. The project area lies within the Oregon Coast level III Ecoregion (Thorson et al. 2003), an area generally described as evergreen forests historically dominated by Sitka spruce, but currently dominated by Douglas-fir (*Pseudotsuga menziesii*) due to the effects of logging. Moving from south to north, the Proposed Action traverses the Mid-Coastal Sedimentary, Volcanics, and Coastal Uplands EPA Level IV ecoregions, all of which contain Douglas-fir forests currently managed for logging.

The major project area vegetation types discussed below and illustrated in Figure 3-6 are based on Oregon Gap Analysis Program (GAP) data (Kiilsgard 1999), with the exception of wetlands, which are discussed in detail in Section 3.5, Wetlands and Floodplains. Oregon GAP data are based upon 1998 aerial photographs. Some of the following descriptions are augmented by interpretation of more recent (2011) aerial photography.

3.6.1.1 AGRICULTURE

Agricultural areas are those that have been modified for growing crops and/or raising livestock. Agricultural areas are interspersed in the project area and are found around structure 14/3 and between structures 16/6 and 17/1.

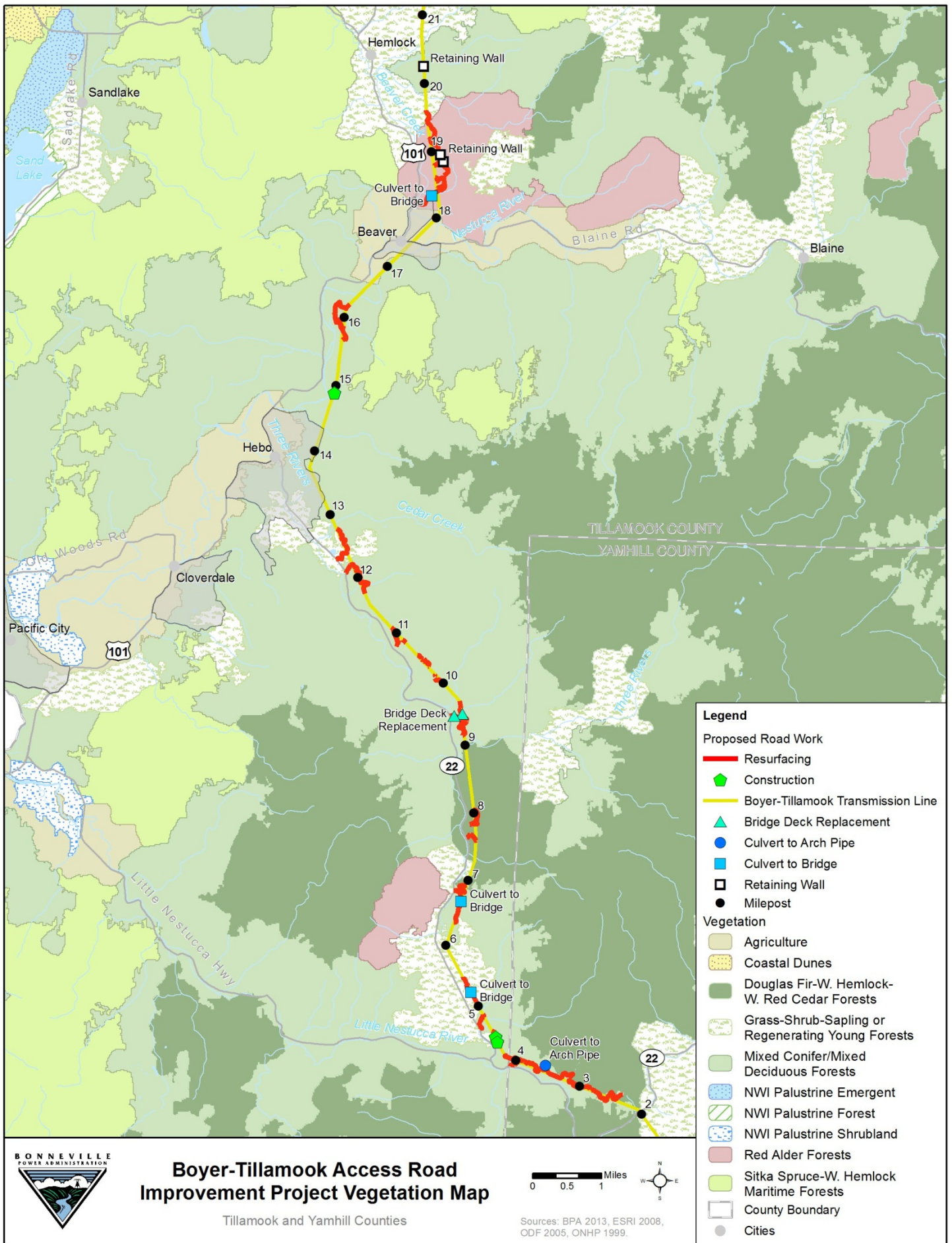


FIGURE 3-6. VEGETATION

3.6.1.2 DOUGLAS-FIR / WESTERN HEMLOCK / WESTERN RED CEDAR

Douglas-fir / Western Hemlock / Western Red Cedar forests occur in low- to mid-elevations throughout the Coast Range. These vegetation types occur within the project area between structures 9/1 and 10/1. These areas are dominated by Douglas fir, and also contain western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and grand fir (*Abies grandis*). Other common species include Pacific yew (*Taxus brevifolia*), big leaf maple (*Acer macrophyllum*), and red alder. Shrub layer species common in the Coast Range include salal (*Gaultheria shallon*), evergreen huckleberry (*V. ovatum*), elderberry (*Sambucus racemosa*), and salmonberry. Herbs and forbs include Swordfern, western bracken fern (*Pteridium aquilinum*), deer fern (*Blechnum spicant*), lady fern, inside-out flower (*Vancouveria hexandra*), twinflower (*Linnaea borealis*), Siberian springbeauty, vanilla leaf (*Achlys triphylla*), bedstraw (*Galium triflorum*), western iris (*Iris tenax*), and Oregon oxalis (*Oxalis oregana*) (Kiilsgard 1999).

3.6.1.3 GRASS-SHRUB-SAPLING OR REGENERATING

Grass-Shrub-Sapling or Regenerating areas are within the range of successional conditions following timber harvest. These areas include vegetation in successional phases: growth of annual grasses, development of a shrub layer, and emergence of conifer saplings (Kiilsgard 1999). A variety of shrubs and forbs may be present in this vegetation type, which occurs as a patchwork mosaic between structures 7/1 and 7/5 and structures 21/3 and 21/5.

3.6.1.4 MIXED CONIFER / MIXED DECIDUOUS FOREST

The Mixed Conifer / Mixed Deciduous Forest is an early successional forest common throughout the Coast Range as a patchwork mosaic with younger clearcuts and established forests. These forests occur in the project area between structures 4/2 and 6/6, 8/3 and 9/1, and 14/1 and 18/4. They contain an overstory of co-dominant conifer and deciduous species (Douglas-fir [which is replanted as a monotype following timber harvest], red alder, and/or big leaf maple). The canopy is generally single story and closed; as such these areas do not contain a diverse understory due to continuous shade (Kiilsgard 1999).

3.6.1.5 RED ALDER FOREST

Red Alder Forests occur as early seral forests to Douglas-fir / Western Hemlock / Western Red Cedar Forests, and also as overstory riparian species in the project area. These forests primarily occur between structures 20/1 and 21/3, and are also intermixed throughout the project area. Red alder forests commonly colonize sites following timber harvests. Red alder dominates the overstory. The understory contains a variety of shrub species including vine maple, salmonberry, thimbleberry (*R. parviflorus*), evergreen huckleberry, and salal shrubs. The herb layer may contain oxalis, swordfern, foamflower (*Tiarella trifoliata*), vanilla leaf, beadlily (*Clintonia uniflora*), skunk cabbage (*Lysichitum americanum*), coltsfoot (*Petasites frigidus*), and twinflower (*Linnaea borealis*) (Kiilsgard 1999).

3.6.1.6 RESIDENTIAL OR MAINTAINED AREAS

Areas of vegetation maintained for residential use or transmission line access also occur in the project area. These areas exist at too fine a scale (i.e., they are too small) to be shown on maps. Generally, this

vegetation type applies to the Boyer-Tillamook transmission line ROW and the few residences in the area. Vegetation in residential or maintained areas in the project area includes the following species: annual bluegrass (*Poa annua*), creeping bentgrass (*Agrostis stolonifera*), colonial bentgrass (*A. capillaris*), tall fescue (*Schedonorus arundinaceus*), white clover (*Trifolium repens*), hairy cat's ear (*Hypochaeris radicata*), stickywilly (*Galium aparine*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), prickly lettuce (*Lactuca serriola*), Queen Anne's lace (*Daucus carota*), western brackenfern, common snowberry (*Symphoricarpos albus*), thimbleberry, and trailing blackberry (*Rubus ursinus*). Additionally, this community includes sporadic patches of Himalayan blackberry (*Rubus armeniacus*) (BPA 2013b).

3.6.1.7 NOXIOUS WEEDS

Federal or state laws designate some plant species as noxious weeds. In Oregon, the Oregon Department of Agriculture (ODA) divides noxious weeds into three categories: A, B, and T. A-listed weeds are of known economic importance whose presence is imminent or which occur in the state in small enough infestations to make eradication or containment possible. B-listed weeds are of known economic importance and are regionally abundant, where eradication or containment is not possible. T-listed weeds are priority noxious weeds designated by the Oregon State Weed Board as a target for which the ODA would develop and implement a statewide management plan (ODA 2013).

Noxious weeds in Tillamook County include bull thistle, Canada thistle, common evening primrose (*Oenothera villosa*), Japanese knotweed (*Polygonum cuspidatum*), policeman's helmet (*Impatiens glandulifera*), Scotch broom (*Cytisus scoparius*), and tansy ragwort (*Senecio jacobaea*) (Tillamook County 2013b). Priority noxious weeds in Yamhill County include Italian thistle (*Carduus pycnocephalus*), meadow knapweed (*Centaurea pratensis*), purple loosestrife (*Lythrum salicaria*), Japanese knotweed, false brome (*Brachypodium sylvaticum*), spurge laurel (*Daphne laureola*), and Scotch broom (*Cytisus scoparius*) (Yamhill County 2013).

Noxious weeds observed in the project area during field visits and the wetland survey included Scotch broom, Himalayan blackberry, reed canarygrass, and bull thistle.

3.6.1.8 WETLAND VEGETATION

Wetland vegetation in the project area includes palustrine emergent and scrub shrub types. Plant species occurring in wetlands in the project area are detailed in Section 3.5.1.1, Wetlands and Floodplains.

3.6.1.9 FEDERALLY OR STATE-LISTED PLANTS

State- and/or federally-listed species known to occur in Yamhill and Tillamook counties are listed in Table 3-5. Federal and state species of concern also occur in the counties. As suitable habitat for these species does not occur within the project area, none are expected to occur. As such, special-status and rare plants are not discussed further in this document.

Table 3-5. Federal and State Threatened and Endangered Species, and Species of Concern in Tillamook and Yamhill Counties and Their Likelihood of Occurrence in the Project Area

Species	Federal Status	State Status	Distribution in the Project Area
Cascade Head catchfly <i>Silene douglasii</i> var. <i>oraria</i>	Species of Concern	Threatened	None. This is a grassland species found on steep coastal bluffs and ledges facing the ocean.
Coast Range fawn lily <i>Erythronium elegans</i>	Species of Concern	Threatened	Not likely. Although this plant occurs in a variety of habitats including open and closed coniferous forests, it is only known to occur in six primary sites, each on prominent peaks and ridges, which do not occur in the project area.
Kincaid's lupine <i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	Threatened, Critical Habitat designated	Threatened	None. Found mainly in the Willamette Valley in native grassland habitats. Habitat is upland prairie with fescue as the dominant species.
Nelson's checker-mallow <i>Sidalcea nelsoniana</i>	Threatened	Threatened	Not likely. Most frequently occurs in swales and meadows with wet depressions. Also occurs in wetlands within remnant prairie grasslands. Most common in the Willamette Valley.
Pink sandverbena <i>Abronia umbellata</i> var. <i>breviflora</i>	Species of Concern	Endangered	None. Occurs on broad beaches and/or near the mouths of creeks and rivers.
Point Reyes bird's-beak <i>Cordylanthus maritimus</i> ssp. <i>Palustris</i>	Species of Concern	Endangered	None. Occurs in salt marsh habitat.
Water howellia <i>Howellia aquatilis</i>	Threatened	-	None. A water plant that grows in areas associated with glacial potholes and river oxbows that flood seasonally. It is also found on the edges of deep ponds associated with deciduous trees such as black cottonwood and aspen. Occurrence in Oregon is historical.
Willamette daisy <i>Erigeron decumbens</i> var. <i>decumbens</i>	Endangered, Critical Habitat designated	Endangered	None. Occurs on alluvial soils and is known to occur only in the Willamette Valley.
White rock larkspur <i>Delphinium</i> <i>leucophaeum</i>	Endangered	Species of Concern	None. This species is restricted to the northern Willamette Valley.

Sources: ODA 2013. USFWS 2013 a, c, d, e.

3.6.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The following sections describe the potential impacts of construction, operation, and maintenance of the Proposed Action on vegetation found within the project area.

3.6.2.1 CONSTRUCTION IMPACTS

General Vegetation

Impacts to vegetation would include tree cutting and removal; low-growing vegetation removal; compaction or disruption of soils, roots, or seed banks; and the potential spread of noxious weeds.

Clearing would occur for road widening and new roads, construction of retaining walls, culvert installation, and bridge construction. Additional vegetation cutting would include trees adjacent to roadways and to allow the passage of equipment; in these areas, surface vegetation would be left in place. Vegetation would be removed from approximately 3.13 acres, and would include removing about 2.25 acres of Mixed Conifer / Mixed Deciduous Forests, 0.57 acre of Douglas-fir / Western Hemlock / Western Red Cedar Forests, 0.22 acre of Grass-Shrub-Sapling or Regenerating Young Forests, and 0.10 acre of Red Alder Forests (Kiilsgard 1999).

The proposed number of trees to be removed has been cataloged by species, size, and location. Overall, a total of approximately 533 individual trees would be removed, with an average diameter at breast height (dbh) of 13 inches. Red alder is the most common species in the project area, making up 60 percent of the trees to be removed, while Douglas-fir is second at 36 percent (see Table 3-6). Most of the trees being removed are relatively small, with 87 percent of the trees with a diameter at breast height of 19 inches or less. The approximate locations of trees and the land ownership and management in tree removal areas are provided in Table 3-1 (in Section 3.2, Land Use and Recreation).

Table 3-6. Number and Percentage of Tree Species Proposed for Removal

DBH (inches)	Number (Percent) of Trees to be Removed								Total
	Red Alder	Cascara	Western Red Cedar	Douglas-Fir	Western Hemlock	Big Leaf Maple	Sitka Spruce	Wild Cherry	
<19	281 (53%)	1 (<1%)	1 (<1%)	169 (32%)	5 (1%)	2 (<1%)	5 (1%)	2 (<1%)	466 (87%)
20–32	39 (7%)	0 (0%)	0 (0%)	19 (4%)	3 (1%)	1 (<1%)	1 (<1%)	0 (0%)	63 (12%)
33–37	0 (0%)	0 (0%)	0 (0%)	3 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (1%)
TOTALS	320 (60%)	1 (<1%)	1 (<1%)	191 (36%)	8 (2%)	3 (1%)	6 (1%)	2 (<1%)	533 (100%)

Disturbed riparian areas would be planted with a total of 490 native trees for streambank protection and riparian buffer enhancements. The number of trees planted for riparian buffers at each site was based on a 2:1 ratio for trees planted to trees removed as suggested by NMFS (Annie Birnie, pers. comm., December 2012). No trees would be removed at the lower Lawrence Creek site because that site is adjacent to an

agricultural field without riparian vegetation. Live cuttings of willows and alders would be incorporated into the streambank protection for each bridge and planted in a density of 2 feet on center (see Section 3.4, Water Resources, Table 3-4). Revegetated areas would be monitored annually until a 70-percent establishment rate is met.

Physical movement of construction equipment and soils adjacent to project roads and around stream crossing improvement areas could compact soils, damage soil structure, and disrupt the seed bank in the upper soil horizon, inhibiting regeneration of desirable species.

Areas cleared of vegetation could be invaded by weeds, which could preclude growth of native vegetation. Tree removal could result in altered solar radiation and wind velocities, increased soil temperatures, reduced transfer of water from land to the atmosphere by plants, increased periods of soil saturation, and corresponding reduced soil oxygen concentrations. These impacts could affect establishment, growth, and integrity of surrounding trees, particularly if roots are cut or damaged, if soils are excessively compacted during nearby tree removal, if pathogens are introduced, or if protective vegetation surrounding them are removed, resulting in wind throw. However, the remaining canopy, understory trees, shrubs, and crown sprouts should mitigate some of these potential effects. In areas that are allowed to regenerate, residual dormant seeds in the existing soil seed bank should contribute to subsequent shrub and tree recruitment and disturbed site revegetation.

Because the area of soil disturbance is relatively small (3.13 acres), and soil disturbance and tree removal would be distributed throughout the 13.42-mile project corridor, the remaining canopy, understory trees, shrubs, and crown sprouts are expected to regrow, and existing trees would continue to provide shade and stabilize soils, thereby mitigating most impacts of the Proposed Action. A total of 490 riparian trees would be replanted to improve the riparian buffer and streambank stability. Additionally, most of the vegetation to be permanently removed is in relatively low quality, production forest; there would be minimal disturbance to high-quality, mature native forests. Most trees that would be removed would not be replanted, to allow for construction of project features or the safe passage of vehicles. Entire trees, including the stumps, would be removed in areas where the roadbed or associated features are constructed. Stumps would remain and would provide benefits to soil stabilization and erosion prevention in areas where trees are cut to allow the safe passage of vehicles. Only three of the trees to be removed are larger than 33 inches in diameter (three Douglas-firs). Roughly 90 percent (466) of the trees to be removed are less than 19 inches in diameter. Thus, the Proposed Action would not have a major impact on the productivity or quality of adjacent plant communities, resulting in a **low** impact to vegetation.

Near the location of the unnamed tributary to Sourgrass Creek culvert replacement, 176 trees, a combination of Douglas-fir and red alder, would be removed between structures 5/4 and 5/5. Most clearing at this location would occur prior to construction of the roadbed at a wider turn radius than is existing. Other tree removal would be associated with the conversion of the undersized culvert to an arch pipe. Trees cleared to allow for passage of vehicles and the stumps would be retained in the soil. All but three of these trees are smaller than 20 inches in diameter, and 88 of them have a diameter of less than 8 inches. At this large area of clearing, the remaining canopy likely would not mitigate the effects. A total of 197 trees would be replanted at this location to provide streambank stability and restore the riparian buffer. The loss of trees would not have a major impact on the productivity or quality of adjacent plant communities, and restoration plantings would aid in site recovery; however, this reduction in wooded habitat and the potential for weed recruitment would have a **moderate** impact to this area.

Accidental spills or leaks of vehicle or equipment, hydraulic fluids or petroleum products could result in localized vegetation mortality or reduced viability for some species, and a reduced potential for successful revegetation within spill areas. Because BMPs would be implemented to reduce the possibility of spills on vegetation (see Section 3.4.3, Water Resources Mitigation), and since any spills that could occur would affect a small area, potential impacts would be **low**.

The use of chainsaws and other small gas-powered equipment, particularly during the dry season, could pose a fire risk. A fire could potentially impact the majority of vegetation in the project area. As a fire prevention precaution, all chainsaws and other small gas-powered equipment would be outfitted with spark-arrestors. If necessary, according to USFS fire season restrictions, a water truck would be onsite to extinguish unintended fires. With mitigation, the risk or spread of a forest fire would be low, and impacts from a forest fire, which, if started, should be quickly extinguished, would be **no-to-low**.

Noxious Weeds

Construction could disrupt vegetation and disturb or relocate soils and noxious weed propagules (e.g., bull thistle), thereby increasing the potential for noxious weeds to invade new areas. Noxious weeds could colonize disturbed soils along the road edge, and new roads could provide new avenues for the dispersal of noxious weeds. Vehicles and the materials they transport could import new species or inadvertently transport seeds/propagules from infested areas to new locations and access roads. If conditions are appropriate, these species could take advantage of disturbed soils and the lack of competing vegetation in recently cleared areas to establish new populations. These impacts would be reduced or prevented through implementation of noxious weed mitigation measures discussed in Section 3.6.3, including using weed free mulch, vehicle washing to remove weeds and propagules, and collaboration with management agencies and landowners on noxious weed control where needed. Additionally, the project area would be located largely within the existing road corridors, as opposed to previously undisturbed areas; as such, the project would not introduce weeds into pristine habitats, but would occur in areas with the opportunity for weeds to already be present. Due to implementation of mitigation measures and the previously disturbed road corridor, there would be **low** impacts to vegetation due to the potential to spread noxious weeds.

3.6.2.2 OPERATION AND MAINTENANCE IMPACTS

Routine and emergency operation activities require visits to structure locations and movement of personnel, materials, and vehicles on project roads. While these activities could damage vegetation or spread noxious weeds if vehicles are pulled off the road to park or turn around, improved road conditions would increase the likelihood that vehicles would stay on project roads and not need to find alternate routes due to undrivable conditions or inadequate passage. Thus, impacts to adjacent roadside vegetation would be **low**. While driving and parking maintenance vehicles along access roads, small fuel and oil leaks could poison vegetation. In addition, hot engines parked over vegetation during the dry season could start a fire. Proper maintenance of vehicles and the use of fire safety equipment would ensure that these accidents would not occur, and so impacts to vegetation would be **no-to-low**.

Road maintenance activities could include tree removal, grading of the road surface, and mowing or herbicide use in and along roads to preserve the roadbed and control noxious weeds. These activities could inadvertently affect non-target native species. However, because maintenance activities would be infrequent, in areas that have already been disturbed, and would not drastically alter adjacent plant

communities, impacts would be *low*. In addition, implementation of noxious weed control measures as discussed in Section 3.6.3 would further reduce the potential spread of noxious weeds.

3.6.3 MITIGATION – PROPOSED ACTION

If the Proposed Action is implemented, the following mitigation measures would minimize impacts to vegetation:

- Cut or crush vegetation rather than blade in areas that would remain vegetated, to maximize the ability of native plants to resprout and maintain soil integrity. Soils would be prepared if needed prior to seeding.
- Prior to seeding, prepare soils through decompaction, if needed.
- Implement noxious weed control measures in coordination with the county weed board and landowners if state-listed noxious weeds are found in the project area.
- Treat identified noxious weed infestations where possible prior to construction manually, mechanically, and/or chemically.
- Clean vehicles and other equipment that have been in weed infested areas at established blow or wash stations upon leaving the infested areas, to prevent spreading weeds to uninfested areas during construction.
- Monitor and treat existing and new infestations during construction annually for at least three years after construction.
- Use weed-free mulch, if mulch is used for erosion control.
- Equip all vehicles with basic fire-fighting equipment, including extinguishers and shovels, to potentially put out small fires.
- Plant a total of 490 trees across four stream crossing improvement locations to provide streambank stability and riparian buffer establishment.
- Implement restoration or stabilization actions as soon as possible after ground disturbing activities.
- Reseed all disturbed areas as soon as possible after construction with an appropriate seed mix. Native seed mixes would be used where appropriate and effective.

3.6.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

The Proposed Action would directly remove vegetation adjacent to project roads, including a total of 533 trees. Construction-related ground disturbance and long-term maintenance activities could result in weeds spreading into or increasing along project roads and around stream crossing improvement areas.

3.6.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Logging, agriculture, vegetation control along roads and utility corridors, and commercial and residential development are responsible for most of the past and present vegetation impacts in the project area. Logging has changed the dominant tree species from Sitka spruce to Douglas-fir, since these are planted after logging. Agriculture has altered the vegetation in the region by replacing native plant communities

with crops, introducing non-native weeds, and impacting herbaceous plant communities through livestock grazing. Vegetation control routinely occurs along local highways, county roads, residential roads, and utility corridors in the project area, including the existing Boyer-Tillamook transmission line and easements for other utilities such as natural gas. Vegetation control activities generally include herbicide applications and mechanical cutting of vegetation using mowers and chainsaws. Commercial and residential development has resulted in further reductions in native plant communities.

Reasonably foreseeable future activities in the project area that could contribute to vegetation impacts include ongoing maintenance of the Boyer-Tillamook transmission line, other utility ROWs, and other local roads—including logging and USFS roads. Future logging in the project area is also expected.

Contributions to cumulative impacts from the Proposed Action on vegetation would be limited to the permanent removal of 533 trees and temporary reduction of 3.13 acres of vegetation. Through the implementation of mitigation measures discussed in Section 3.6.3, vegetation losses would be minimized and thus, the Proposed Action would have *low* cumulative impacts on vegetation.

3.6.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be constructed and construction-related impacts on vegetation—including the removal of 533 trees—would not occur. However, current vegetation management practices would continue, including tree removal and vegetation management in and along roadsides. Localized impacts from emergency maintenance activities could occur more frequently and be of a greater magnitude than under the Proposed Action due to the current state of the road, particularly if vegetation clearing for alternate routes becomes necessary. Damage from vehicles gaining access to structures on or around impassible roads could result in the temporary loss of vegetative cover and facilitate the spread of weeds. Similar impacts could occur as a result of erosion and landslides, which could occur more frequently given poor road conditions and drainage. However, because these potential disturbances would occur in isolated areas, and since there would not be extensive tree removal, the No Action Alternative would have *low* impacts on vegetation.

3.7 FISH AND WILDLIFE

This section describes the existing fish and wildlife resources found within the project area, as well as the potential impacts of the Proposed Action and No Action Alternative on those resources.

3.7.1 AFFECTED ENVIRONMENT

The following sections describe the affected environment for fish, wildlife, and their respective habitats.

3.7.1.1 FISH AND WILDLIFE AND THEIR HABITATS

The project area for fish and wildlife includes the general vicinity surrounding the location of the Proposed Action and the streams or watercourses that cross the areas where road improvements or construction is proposed to occur. The project area is in the Oregon Coast Ecoregion (discussed in Section 3.5.1, Wetlands and Floodplains) and falls entirely within the Nestucca River and Little Nestucca River watersheds (discussed in Section 3.4.1, Water Resources). Collectively, these watersheds encompass an estimated 350 linear miles of stream (Susac 2005).

Typical of temperate river basins of the Oregon Coast, the Nestucca and Little Nestucca River watersheds support numerous species of anadromous salmon—including coastal cutthroat trout (*Oncorhynchus clarkia*), steelhead (*Oncorhynchus mykiss*), coho salmon (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), and Chinook salmon (*Oncorhynchus tshawytscha*)—and are the focus of numerous habitat and species recovery efforts. Habitat for salmonids has declined in these watersheds for many years due to a variety of impacts including large and intense forest fires, logging and removal of riparian vegetation communities, flow modification, and direct habitat modification. These factors have resulted in rivers now generally characterized by increased width and reduced depth. Modified river channels have resulted in more direct sunlight than what would be expected under natural conditions, which increases water temperatures. Excessive summertime water temperatures, excessive amounts of fine sediments, diminished availability of appropriate spawning gravels, and reduced riparian cover have cumulatively resulted in diminished habitat quality for salmonids (ODEQ 2002; Kavanagh et al. 2005).

Of the salmonids present in the project area, only the Oregon Coast coho salmon is listed under the ESA (see Section 3.7.1.2). Survey monitoring data suggest that steelhead could be present during the in-water construction project areas, particularly juveniles (Jepsen and Leader 2007; ODFW 2013). Coastal cutthroat trout are considered ubiquitous throughout the watershed (ODFW 2005a). Chum salmon spawn and rear in the low gradient, tidal portions of basins, and into the lower reaches of river mainstems and tributaries. Spring Chinook salmon are present in the Nestucca River basin, returning from the ocean in April and May. They spawn in September and October, peaking in late September to early October. Fall run Chinook salmon return to the estuaries in late summer/early fall, hold until fall rains arrive, then distribute throughout the watershed. They primarily spawn in November and December. Fall Chinook salmon extend further upstream into the Nestucca River watershed than spring Chinook. In the Nestucca River watershed, both fall and spring Chinook salmon are considered "ocean-type," in which juveniles typically migrate to the lower river mainstem and estuarine rearing areas 3 to 6 months after hatching (in the spring-summer period) (Nicholas and Hankin 1989; Myers et al. 1998). Fish species typical to the project area are listed in Table 3-7.

Wildlife habitat in the project area is primarily Douglas-fir and/or red alder forests at various stages of regeneration from current or past logging activities and fire (described in Section 3.6.1, Vegetation). The project area does not include any Oregon Conservation Strategy Habitat areas (habitats that have been prioritized for conservation by the Oregon Department of Fish and Wildlife). The Oregon Coast's streams and forests support many types of wildlife, as listed in Table 3-7.

Table 3-7. Typical Wildlife Species in the Northern Oregon Coast

Type	Typical Species
Fish	Sculpin (<i>Cottoidea</i> sp.), river lamprey (<i>Lampetra ayresii</i>), western brook lamprey (<i>Lampetra richardsoni</i>), Pacific lamprey (<i>Lampetra tridentate</i>), Oregon coast Evolutionary Significant Unit (ESU) of coastal cutthroat trout (<i>Oncorhynchus clarkia</i>), and the Pacific Coast ESU of four salmonids: chum salmon (<i>Oncorhynchus keta</i>), coho salmon (<i>Oncorhynchus kisutch</i>), summer and winter runs of steelhead (<i>Oncorhynchus mykiss</i>), and spring run Chinook salmon (<i>Oncorhynchus tshawytscha</i>).
Mammals	Black bear (<i>Ursus americanus</i>), cougar (<i>Puma concolor</i>), bobcat (<i>Lynx rufus</i>), Columbian black tail deer (<i>Odocoileus hemionus</i>), striped skunk (<i>mephitis mephitis</i>), Western spotted skunk (<i>Spilogale gracilis</i>), and small herbivores including white-footed deer mice (<i>Peromyscus leucopus</i>), and a variety of species of rabbits, chipmunks, shrews, and moles.
Birds	Bald eagle (<i>Haliaeetus leucocephalus</i>), black-capped chickadee (<i>Poecile atricapillus</i>), bushtit (<i>Psaltriparus minimus</i>), brown creeper (<i>Certhia Americana</i>), golden-crowned kinglet (<i>Regulus satrapa</i>), marbled murrelet (<i>Brachyramphus marmoratus</i>), Northern flicker (<i>Colaptes auratus</i>), northern spotted owl (<i>Strix occidentalis caurina</i>), Oregon gray jay (<i>Perisoreus Canadensis</i>), red-breasted nuthatch (<i>Sitta canadensis</i>), red-breasted sapsucker (<i>Sphyrapicus ruber</i>), red-tailed hawk (<i>Buteo jamaicensis</i>), red crossbill (<i>Loxia curvirostra</i>), Steller's jay (<i>Cyanocitta stelleri</i>), turkey vulture (<i>Cathartes aura</i>), Western pileated woodpeckers (<i>Dryocopus pileatus</i>), and wood duck (<i>Aix sponsa</i>).
Amphibians	California slender salamander (<i>Batrachoseps attenuatus</i>), coastal tailed frog (<i>Ascaphus truei</i>), Northern red-legged frog (<i>Rana aurora</i>), and rough skinned newt (<i>Taricha granulosa</i>).
Reptiles	Northern alligator lizard (<i>Elagaria coerulea</i>), rubber boa (<i>Charina bottae</i>), Western pond yurtle (<i>Clemmys marmorata</i>), and Western skink (<i>Eumeces skiltonianus</i>).
Invertebrates	Caddisflies (<i>Tricoptera</i> sp., including <i>odontoceridae odontocerinae</i>), mayflies (<i>Ephemeroptera</i> sp.), stoneflies (<i>Plecoptera</i> sp.), as well as common spiders, bugs, beetles, butterflies, and other invertebrates.

3.7.1.2 SPECIAL-STATUS FISH AND WILDLIFE SPECIES

The USFWS and National Marine Fisheries Service (NMFS) prepare lists of wildlife species protected under the ESA that may occur in Tillamook and Yamhill counties (USFWS 2013f, g; Interagency Special-Status Sensitive Species Program 2013). NMFS and USFWS categorize species as threatened, endangered, proposed, or candidate. Species receiving protection under the ESA are designated as endangered or threatened. Candidate or proposed species could be included on the ESA list in the future. Areas designated as critical habitat for listed species also receive protections under the ESA. The ODFW maintains lists of species considered threatened or endangered, or candidates for listing, at the state level. All species included on the ESA and Oregon threatened and endangered species list with the potential to occur in the project area are discussed here.

A review of these lists indicates that 10 wildlife species under USFWS jurisdiction and 5 fish species under NMFS jurisdiction could occur in Tillamook and/or Yamhill counties (USFWS 2013f, g). Two additional special-status species, bald eagle and red tree vole, are also discussed here. Bald eagles were delisted from the ESA, but still receive protections under the Bald and Golden Eagle Protection Act (16 USC 668, 668d). The red tree vole and streaked horned lark are candidate species for ESA listing.

Species are listed in Table 3-8 along with their likelihood of occurrence in the project area, required habitat features, and a summary of their present known distribution. Four of these species—coho salmon, bald eagle, marbled murrelet, and northern spotted owl, have the potential to occur in the project area and are discussed in more detail below. Ten of these species—four sea turtles, two butterflies, and the western snowy plover, short-tailed albatross, streaked horned lark, and grey wolf—would not or are highly unlikely to occur in the project area. Habitat features that would support these species do not exist in the project area and/or few historical occurrences of these species have been documented. Although grey wolf are likely to have occurred in at least some portion of the project area in the past, they are currently considered to be locally extinct (i.e., extirpated) from the area. These species are not discussed further in this document.

Federal species of concern are identified by the USFWS and NMFS but do not receive protection under the ESA. These species have potentially declining populations and could require additional management or protection in the future. State sensitive species are those recognized by the ODFW as naturally-reproducing fish and wildlife species, subspecies, or populations that are facing one or more threats to their populations and/or habitats within the state (ODFW 2008). Federal species of concern and state sensitive species that could occur in the Oregon Coast Ecoregion are listed in Appendix A. Additionally, documented presence of these species in the Siuslaw National Forest is also indicated in Appendix A.

Table 3-8. Federal and State-Listed Threatened, Endangered, and Candidate Wildlife Species in Tillamook and Yamhill Counties and Their Likelihood of Occurrence in the Project Area

Type	Species	Federal Status	Critical Habitat	State Status	Distribution in Vicinity of Project Area
Fish	Coho salmon (Oregon Coast ESU)	Threatened	None	Sensitive - Vulnerable	Occurs in three project area streams: unnamed tributary into Sourgrass Creek, Lawrence Creek, and Hester Creek (Hutchinson 2012).
Birds	Bald eagle	Delisted	Not Applicable	Threatened	Possible. The lack of large bodies of water nearby for feeding makes the project area marginal habitat, and there are no documented bald eagle nest sites within 5 miles of project features (ORBIC 2012).

Type	Species	Federal Status	Critical Habitat	State Status	Distribution in Vicinity of Project Area
	Marbled murrelet	Threatened	Designated within project area	Threatened	Present. The Proposed Action corridor occurs within a forested section of the Coast Range, which is known to contain suitable habitat for marbled murrelets. Designated Critical Habitat and suitable nest trees are located within the project area. Documented presence in Siuslaw National Forest (SNF).
	Northern spotted owl	Endangered	Designated within project area	Threatened	Possible. Generally inhabits old growth forests. Critical habitat is designated within the project area. Documented presence in SNF.
	Short-tailed albatross <i>Phoebastria albatrus</i>	Endangered	None	Endangered	None. Extremely rare species. Breeding habitat is in Pacific islands and does not occur in the project area.
	Western snowy (coastal) plover <i>Charadrius alexandrinus nivosus</i>	Threatened	Designated outside of project area	Threatened	None. Designated critical habitat does not occur near the project area. This species breeds on beaches and does not occur in the project area. Documented presence in SNF, though not within at least 1 mile of project activities.
	Streaked horned lark <i>Eremophila alpestris strigata</i>	Proposed	None	None	None. Occurs in open fields with large patches of bare ground and sparse vegetation, beaches, and dunes. Forests and tall vegetation are avoided, as are field edges.
Reptiles	Green sea turtle <i>Chelonia mydas</i>	Endangered	None	Endangered	None. Marine only.
	Loggerhead sea turtle <i>Caretta caretta</i>	Threatened	None	Threatened	None. Marine only.
	Olive (=Pacific) ridley sea turtle <i>Lepidochelys olivacea</i>	Threatened	None	Threatened	None. Marine only.

Type	Species	Federal Status	Critical Habitat	State Status	Distribution in Vicinity of Project Area
	Leatherback sea turtle <i>Dermochelys coriacea</i>	Threatened	None	Endangered	None. Marine only.
Mammals	Gray wolf <i>Canis lupus</i>	Delisted	None	Endangered	None. No wolf populations are known to exist in northwestern Oregon.
	Red Tree Vole <i>Arborimus longicaudus</i>	Candidate	None	Vulnerable	Unlikely. Found in late-successional forests and feed on conifers, principally Douglas-fir needles. They are unlikely to persist in younger stands. Expanses of land without suitable forest cover can be a barrier to tree vole movement and population connectivity. Documented presence in SNF, though not within at least 1 mile of project activities.
Invertebrates	Fender's blue butterfly <i>Icaricia icarioides fender</i>	Endangered	Designated outside of project area	-	Unlikely. Fender's blue butterfly is dependent on upland prairie in the Willamette Valley (Xerces 2013). This occurs to the east and outside of the habitat in the project area.
	Oregon silverspot butterfly <i>Speyeria zerene hippolyta</i>	Threatened	Designated outside of project area	-	Unlikely. In the region, this species would occur in higher elevation grassland habitat (USFWS 2011c). The Proposed Action does not cross any high elevation grasslands.

Sources: USFWS 2013f, USFWS 2013g, ORBIC 2010, Interagency Special-Status Sensitive Species Program 2013, ODFW 2012.

Oregon Coast ESU Coho Salmon

Coho salmon are born in freshwater streams and rivers, spending approximately the first half of their life cycle rearing and feeding in freshwater streams and tributaries. After 1 to 4 years, juvenile coho migrate in the spring to the marine environment and stay there for 2 to 3 years, moving from estuarine and marine waters out to deeper ocean waters as they grow. In the fall, adult coho return to their birth streams to spawn and die. Threats to coho are a product of a variety of factors, including water quality, fish passage concerns, over-fishing, and predation. The current condition of freshwater habitat in project area watersheds continues to limit the population production of coho salmon, especially the loss of winter

habitat and stream complexity (ODFW 2005a). Coho salmon occur in three project area streams: the unnamed tributary to Sourgrass Creek, Lawrence Creek, and Hester Creek.

Bald Eagle

Bald eagles were listed under the ESA from 1967 to 2007. They are currently delisted from the ESA but are still protected under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act (16 USC 703-712), and the Lacey Act (16 USC 3371–3378). Bald eagles range from central Alaska and Canada to Mexico, and are known to nest along the Oregon coast and the Coast Range, among other places. Bald eagles are known to choose a variety of tree species and habitats for nest sites. Nest trees are often located near a habitat edge or water. Bald eagle habitat primarily occurs where there is little human activity. There are no documented bald eagle nest sites within 5 miles of the project area (ORBIC 2012).

Marbled Murrelet

Marbled murrelet is a small seabird approximately 9.5 inches (24 centimeters) in length. This species ranges from the Aleutian Archipelago in Alaska south to central California (USFWS 2013i). In Oregon, marbled murrelets inhabit the Coast Range and Siskiyou Coast Range geographic zones. Within these regions this species requires two habitat types: foraging habitat in the ocean or near the shore, and nesting habitat in mature or old-growth forest stands. Occupancy behavior has been recorded up to 35 miles inland in Oregon forest. However, marbled murrelet is most often observed within 5 miles of the ocean (USFWS 2013i).

Marbled murrelet populations are considered to be highly sensitive to forest fragmentation, and are nearly absent from much of their historic range. Very few murrelets have been observed between the Olympic Peninsula in Washington and Tillamook County, Oregon, an area where they were once abundant. The primary threat to marbled murrelet is loss of older forest habitat from commercial logging. These effects are chronic and can be persistent, since it takes 100 to 200 years for forests to develop the mature habitat (i.e., trees with nesting structures) that is needed by marbled murrelet. The marbled murrelet population has been reduced by 50 to 80 percent from pre-logging levels, and continues to decline 4 to 7 percent annually in Oregon (USFWS 2013i). In addition, past and current management practices have increased the amount of forests with homogenous species and younger, even-aged stands of trees. Recovery of this species is believed to also be affected by higher rates of killing by other species (i.e., predation), apparently due to the visibility and vulnerability of nesting in highly fragmented landscapes (USFWS 1997). Edge effects resulting from areas where trees were clear-cut adjacent to nest sites may contribute to increased predation rates.

Suitable nesting habitat for marbled murrelet is described as:

- Tree stands that are at least 60 years old in which at least five trees within a 330-foot-radius contain suitable platforms (a platform is a relatively flat surface at least 4 inches in diameter and 33 feet high in the live crown of a coniferous tree) (Evans Mack et al. 2003);
- Tree stands dominated by western hemlock and Sitka spruce that are at least 80 years old; or
- Tree stands dominated by Douglas-fir that are at least 100 years old.

Designated critical habitat for marbled murrelets (USFWS 2011a), which by definition contains primary constituent elements (PCEs) considered essential for the conservation of the species, occurs in the project area and includes the area between structures 7/3 and 7/5 (0.14 mile), near 8/7 (0.3 mile), and between structures 10/1 and 10/3 (0.5 mile). The PCEs of marbled murrelet critical habitat are: (1) individual trees with potential nesting platforms and (2) forested areas within 0.5 mile of individual trees with potential nesting platforms with a canopy height of at least one-half the site-potential tree height (61 FR 25256). At least one of these PCEs needs to be present for an area to qualify as critical habitat. Areas without PCEs within designated critical habitat would not be suitable habitat for marbled murrelet under current conditions, but occur within the historic habitat for the species and could develop suitable habitat characteristics in the future. This is largely the case for the forest in the project area, as described below.

Site visits to ground-truth potential marbled murrelet habitat within the proposed construction limits were conducted in February 2012, August 2012, and March 2013. Forests within the project area range from mature forests to those in various stages of regrowth from logging (i.e., early successional forests). Two dominant habitat types (clear cut/early successional conifer forest, and red alder riparian forest) were identified within 0.25 mile of the Proposed Action corridor (BPA 2013b). These habitat types generally do not provide suitable nesting habitat for marbled murrelet, although roosting habitat could occur for transitory marbled murrelets (flying to the ocean to forage). However, there may be isolated areas capable of supporting marbled murrelet near the project area: two nests were documented 21 years ago within 1 mile of the project area, although it is not known if those are in existence today (ORBIC 2012). In addition, there are numerous known or predicted nest sites within 2 miles of the project area, although neither the nests nor their 0.5-mile buffers are crossed by the project.

Northern Spotted Owl

The northern spotted owl is a medium-sized dark brown owl. In the northern part of its range (Canada to southern Oregon), it primarily inhabits old growth forests, nesting in cavities or on platforms in large trees. It also uses the abandoned nests of other species. Northern spotted owls prefer nesting sites in old growth forests with high tree species diversity and comprised of complex canopy structures, with open spaces among the lower branches to allow flight under the canopy. Snags, downed woody debris, and physical deformities in trees that provide potential platforms and cavities for nest building are also important habitat components. The requirements for roosting and dispersal habitat are less restrictive, but adequate canopy cover remains important for these activities. Northern spotted owls form long-term bonds with their mates and remain in the same geographical location year after year. Migration is limited, occurring only if hunting is challenged by drastic seasonal changes (USFWS 2012a).

Northern spotted owls are intolerant of habitat disturbance, and require a large amount of land for hunting and nesting. They are believed to have historically inhabited most forests within their historic range, but have been negatively affected by timber harvests, land conversions, and natural disturbances. The amount of suitable habitat for northern spotted owls is estimated to have been reduced by over 60 percent in the last 190 years, with populations declining an average of 2.9 percent each year rangewide (USFWS 2012a).

Suitable habitat for northern spotted owls is described as:

- Moderate to high canopy closure (60 to 100 percent);
- A multi-layered, multi-species canopy dominated by large overstory trees with dbh greater than 30 inches;

- A high incidence of large trees with various deformities;
- Numerous large snags; and
- Large accumulations of fallen trees and other woody debris on the ground.

Designated critical habitat for northern spotted owl (USFWS 2012b), which by definition contains features considered essential for the conservation of the species, occurs within the project area. The critical habitat designation in the project area is critical habitat unit (CHU) 1: North Coast Ranges and Olympic Peninsula, Subunit NCO 5 (USDI 2012). It crosses the project area between structures 4/2 to 5/5, 7/3, 7/4, 8/5 to 8/7, 9/5 to 11/5, and 22/1 to 22/3. Areas within designated critical habitat can lack certain features that would make them suitable habitat for northern spotted owl under current conditions, but occur within the historic habitat for the species and could develop suitable habitat characteristics in the future. This is largely the case for the forest in the project area, as described below. In addition, this subunit is expected to function primarily to support to the overall population and provide north-south connectivity between other critical habitat units and subunits.

Surveys for northern spotted owl were not conducted in the project area as a part of this project; however, GIS data from the USFWS and USFS were used to assess potential presence. Nesting, roosting, and foraging habitat exists within the project area, but only on the fringes of the project where tree removal and other project impacts would not occur (BPA 2013b). There are currently no known nesting pairs of northern spotted owls within 1.5 miles of the project area. However, USFWS habitat models predict that three nests would likely occur within 1 mile of the project, with the project area intersecting the 1.2-mile home range surrounding the nest (neither the predicted nest site or the 0.5-mile core area surrounding the nest site would be in the project area) (BPA 2013b). Although the presence of northern spotted owls within the project area is assumed based on adjacent documented occurrences as well as historic and predicted occurrences, nesting pairs are unlikely to occur because the forest within the affected area—including tree removal areas—is primarily managed forest that does not contain the features associated with nesting habitat. Any northern spotted owls that occur in the project area would most likely be dispersing from nest sites outside of the project area and using available perching or foraging habitat within their home ranges.

Red Tree Vole

The red tree vole is considered a candidate species under the ESA (USFWS 2011b), meaning that it may become listed in the future. ODFW considers it a sensitive-vulnerable species in the Coast Range Ecoregion. Red tree voles are small furry rodents less than 8 inches long that live in tree tops and rarely come to the forest floor. Their main food is conifer needles. As such, their habitat is restricted to conifer forests. They are generally found in Douglas-fir trees, but may also utilize western hemlock and Sitka spruce in the Northern Coast Range.

The red tree vole has a preference for older trees and complex forest habitats. Nests are found in the larger diameter trees within a stand. Where old growth habitat conditions are absent, they have been found in younger forests, but it is unknown whether younger, or successional, forest conditions have the ability to support this species over the long term (USFWS 2011b). The USFWS has concluded that unfragmented old-growth forests provide the most suitable habitat for this species.

The red tree voles' home range is limited to less than 0.5 acre and dispersal distance is often less than 1,000 feet. GIS data obtained from the Oregon Biodiversity Information Center shows one historic occurrence of a similar species with similar habitat requirements, the white-footed vole (*Arborimus albipes*), within the

project area in the vicinity of structures 17/9 and 18/1 in 1972. No other occurrences of either vole have been documented in the project area since 1972 (ORBIC 2012). Current data suggests that the red tree vole is uncommon or absent in the northern portion of the Coast Range, suggesting that the population has declined significantly (USFWS 2013b) and is absent from the project area.

3.7.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The following sections describe the potential construction, operation, and maintenance impacts of the Proposed Action on fish, wildlife, and their respective habitats. A summary of the environmental impacts to fish and wildlife is provided in Table 3-11 below.

3.7.2.1 CONSTRUCTION IMPACTS

Fish and Fish Habitats

Road improvements under the Proposed Action would include culvert and bridge work with instream components (see Section 2.1.3, Bridge and Arch Pipe Construction) in six fish-bearing streams. The existing culverts on Hester Creek (between structures 20/2 and 20/3) and the unnamed tributary of Sourgrass Creek (between structures 5/4 and 5/5) that impede upstream passage of salmonids and other fish species, and likely block fish passage entirely at most levels of stream flows, would be replaced with structures that allow for year-round fish passage and improved stream function. The existing stacked culvert structure at the unnamed tributary to Louie Creek would be replaced with a bridge that would span the channel, and the site would be restored to have proper stream and floodplain function. The two bridge replacement sites on Lawrence Creek (between structures 11/3 and 11/4) currently do not impede fish passage.

At all locations where work would be completed within the stream channel, short-term construction disturbances could impact fish and fish habitat. The work area would be isolated and de-watered at the locations where culverts would be replaced with the arch pipe or bridges: the unnamed tributary to Sourgrass Creek, Hester Creek, and the unnamed tributary to Louie Creek. A biologist would be on site during construction to capture, transport, and release any fish and invertebrates to the portion of the stream outside of the work area. Although the goal of this effort would be to remove all individuals, limited mortality may result, particularly to burrowing species such as lamprey or sculpin. For all other crossing improvement locations, the work area would not be isolated because removal of existing culverts would not be necessary. Because construction would occur during the ODFW in-water work window of July 1 through September 15, impacts to juvenile and adult salmonids would be avoided since migrations are not occurring during this time. However, construction could affect young salmon and other fresh water fish if any are present at or downstream of the work site (see Section 3.7.1.2, Special-Status Fish and Wildlife Species for a discussion of impacts to ESA-listed fish). At all crossing improvement locations, increased turbidity from in-water work and/or soil erosion, physical damage from workers or equipment, and potential spills of hazardous materials from equipment and vehicles could cause illness, injury, or incidental mortality. Additionally, all crossings would be graded and reinforced with fish-friendly rock at specifications determined by SLOPES design criteria to protect aquatic species.

Riparian tree removal and subsequent restoration at the stream crossing improvements is discussed in Section 3.4.2, Water Resources and Section 3.5.2, Wetlands and Floodplains. Tree removal would be necessary at these locations to create the space necessary to install the improved crossing structure. This could result in a temporary increase in erosion and turbidity due to soil disturbance, and could also cause

an increase in water temperature if shading is reduced. The proposed stream crossings would improve fish habitat in the long term through the re-establishment of naturally flowing streams, widening of channels and functional floodplains, and improvements in stream processes, drainage, and connectivity.

Road improvements would also improve the stormwater function, road drainage, and stability in the watershed, thereby reducing overall erosion and mass wasting. Outlet ditches, which release water from the road into upland areas, are all at least 50 feet from a stream, and so would not impact fish or fish habitat. In addition, the cleaning of 24 culverts could result in temporary increased turbidity, although the effects would be minimal and should be quickly diluted.

Temporary construction impacts would be reduced through implementation of appropriate BMPs (see Section 3.7.3, Mitigation – Proposed Action). In addition, in-stream impacts would occur in five streams, which make up a small proportion of the total available habitat in the project area. Because the only adverse effects to fish and fish habitat would be temporary construction impacts in a small number of streams, and since long-term impacts would be beneficial, impacts on fish and fish habitat, with mitigation, would be **low**.

Wildlife and Wildlife Habitats

Impacts to wildlife from the Proposed Action could include incidental mortality from construction equipment and associated ground disturbance from access road work and culvert or bridge removal/installation; temporary displacement of wildlife near work areas and roads; and long-term habitat modification, loss, and degradation from access road work. Effects to special-status species (i.e., federal species of concern and state special-status species listed in Appendix A) would be the same as the effects to general wildlife species, if these species occur within the project area.

Incidental mortality from road and stream crossing construction under the Proposed Action would be avoided for most wildlife species because animals are typically mobile and would flee if startled by construction equipment. However, small mammals, invertebrates, amphibians, and reptiles that are less mobile or that take refuge underground or in the water could be harmed or killed by equipment during construction. Species that could be harmed in this way include moles, chipmunks, snakes, other ground-dwelling mammals and reptiles, and aquatic or semi-aquatic species. Overall, while some incidental mortality of small common animals might occur as a result of the Proposed Action, impacts would occur at the scale of individuals and would likely not have an impact on regional populations. Because incidental mortality would not occur for most wildlife species and the remainder that would be affected are common and not subject to population level impacts, incidental mortality impacts to wildlife would be **low-to-moderate**.

Road work activities would result in an increase in noise and human presence compared to current conditions. This would likely result in some temporary behavior modifications by area wildlife, such as avoidance of the area. This effect would be considered **low** for common wildlife species since they would likely resume normal activities following construction. In addition, there would be beneficial impacts to wildlife species dependent on aquatic and riparian habitats, since road crossing improvements would improve floodplain functions and restore natural stream processes.

New roads and widening of existing roads would permanently impact a total of 3.13 acres of primarily forest habitat (see Section 3.6.2.1, Vegetation); however, these impacts would be dispersed along the

13.42-mile project area such that local impacts at any area would be minimal. The effects of habitat loss on wildlife are anticipated to be **low** since most clearing, except 0.9 acre for road construction and the 176-tree removal area (discussed below), would be edge habitat adjacent to existing roads. The two areas where new roads would be constructed do not offer high-quality habitat but are maintained as residential grassland or mowed ROW. Additionally, there would be no removal or alteration of Oregon Department of Fish and Wildlife (ODFW) strategy habitats.

Tree removal would result in both temporary and long-term impacts to forest-dependent wildlife. Wildlife, especially nesting birds, could be harmed or displaced during tree felling. Trees within the project area would be removed with chainsaws and excavators along 21.5 miles of existing BPA access roads. These activities would be completed quickly (i.e., generally within 1 to 2 days) in any one area, and high noise producing activities between April 1 and September 15 would occur between two hours after sunrise and two hours before sunset to protect potential marbled murrelet nesting. Also, tree clearing activities would take place outside of the nesting period for birds protected under the Migratory Bird Treaty Act, so no active nests would be impacted.

Indirect impacts to birds and tree-dependent wildlife could occur as a result of habitat loss and modification where trees are removed. A total of 533 trees would be removed as part of the Proposed Action, all of which are less than 38 inches dbh (see Table 3-6). Most (86.9 percent) of these trees are less than 19 inches dbh; 12 percent are 20 to 32 inches dbh; and less than 1 percent are larger than 33 inches dbh. Most of the trees to be removed are red alder (320), followed by Douglas-fir (191), which are the two dominant species in the project area. Tree removal would mostly be dispersed along project roads, such that only a small amount of forest habitat would be affected in any one place. Tree removal areas are part of the edge habitat of a large forest, such that the number of trees removed would be small relative to those remaining in the surrounding forest. The positive effects of the remaining canopy, understory trees, shrubs, and crown sprouts are expected to be effective at mitigating most effects of the Proposed Action because they would continue to provide canopy cover and maintain existing habitat. Additionally, most trees that would be removed occur in previously disturbed production forest, with little high-quality native forest habitat.

Temporarily disturbed areas—primarily those around stream crossing construction sites—would be replanted with a combination of native trees for streambank protection and riparian buffer enhancements to restore the existing habitat. Also, where feasible, felled trees located within riparian areas would be left onsite within the stream-floodplain corridor for added habitat complexity. The remaining trees would either be removed via truck or left onsite to benefit wildlife habitat. This includes the most significant area of tree clearing along the project at the unnamed tributary to Sourgrass Creek between structures 5/4 and 5/5 where a culvert is being replaced with an arch pipe. To create a wider curve, the existing road would be moved over, requiring the forested hillside to be re-sloped to accommodate the road. As a result, 176 trees would be removed along approximately 546 feet of the existing roadway. Most of this area, including the old roadbed, would be restored and revegetated with trees. Some additional forest habitat would be lost to the new roadbed, but the majority of the impact would be temporary.

With mitigation, impacts to wildlife and wildlife habitat from tree removal activities would be **low** since the nesting season would be avoided, disturbance from construction impacts would be temporary and localized, and a relatively small amount of forest habitat would be permanently lost.

The use of chainsaws and other small gas-powered equipment, particularly during the dry season, could pose a fire risk. A fire would have an adverse effect on wildlife in the project area and possibly beyond

from mortality and a potentially wide-spread temporary loss or long-term degradation of habitat with potential post-fire weed invasion. As a fire prevention precaution, all chainsaws and other small gas-powered equipment would be outfitted with spark-arrestors. If necessary, according to USFS fire season restrictions, a water truck would be onsite to extinguish any fires. With mitigation, the risk or spread of a forest fire would be low, and impacts from a forest fire, which, if started, should be quickly extinguished, would be **no-to-low**.

Special-Status Species

The following discussion describes potential impacts to special-status species, including Oregon Coast ESU coho salmon, marbled murrelet, northern spotted owl, bald eagle, and red tree vole.

Oregon Coast ESU Coho Salmon

Coho salmon and their designated critical habitat occur in streams affected by the Proposed Action at three locations: the unnamed tributary to Sourgrass Creek (structures 5/4 to 5/5), Lawrence Creek (structures 11/3 to 11/4), and Hester Creek (structures 20/2 to 20/3). Affected coho salmon would most likely be fry and smolts, given that work would occur within the ODFW recommended in-water work period between July 1 and September 15. This is outside the spawning period and the adult and juvenile migration (Kavanagh et al. 2005). Both adverse and beneficial impacts would be the same as those described in Section 3.7.2.1, Construction Impacts, Fish and Fish Habitat, including potential incidental mortality and habitat modification. The other two areas with in-water work—at the unnamed tributaries to Louie and Alder creeks—are approximately 0.25 and 0.45 mile, respectively, upstream of documented occurrences of coho and, in the case of the Louie Creek tributary, coho critical habitat. Work in these areas would not likely affect coho, since any increase in turbidity would reduce to background levels across the given distance. Potential chemical spills could affect fish at this distance; however, the mitigation measures described in Section 3.4.3, Water Resources would prevent spills.

Improvements to the stream crossings at Hester Creek and the unnamed tributary to Sourgrass Creek would restore fish passage and upstream access to approximately 0.5 mile of coho habitat. Fish passage currently exists and would be maintained when bridges are replaced at Lawrence Creek; where coho habitat would be improved through the widening of the stream channel and functional floodplain. In addition to the mitigation measures for fish and fish habitat, the Proposed Action would comply with any additional mitigation required following consultation with NMFS on the Biological Assessment for Oregon Coast coho salmon, potentially including fish recovery and rescue, stream diversions during construction, and stream crossing design criteria.

Although project activities could cause incidental mortality of young coho and affect coho critical habitat, impacts would be **low-to-moderate** since stream crossing construction activities would be done during ODFW's in-water work period, fish removal and recovery would reduce the number of fish potentially harmed, only a small amount of critical habitat would be affected, the disturbance would be temporary, and coho habitat and stream passage would ultimately be improved—contributing to coho recovery efforts.

Marbled Murrelet

Tree removal would not greatly affect marbled murrelet and its designated critical habitat because the vegetation to be removed does not contain suitable nesting, roosting, or foraging habitat and would be

limited to effects to dispersal or potential future habitat. The forest in the project area is at an early to mid-successional stage that does not support marbled murrelet nesting due to tree size and structure and tree species composition. Of the total of 533 trees to be removed, only 23 evergreen trees with a dbh greater than 18 inches would be removed (5 percent of the total tree removal); only three of these have a dbh greater than 36 inches.

Construction disturbance would also have a **low** impact on marbled murrelets because construction noise or visual activity could result in harassment. Harassment is a type of take under the ESA and is defined as “an intentional or negligent act or omission which created the likelihood of injury by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering” (50 Code of Federal Regulations [CFR] § 17.3). According to the current USFWS guidance on auditory harassment, chainsaw use is the construction activity that generates the highest level of noise (see Table 3-9). Heavy equipment and visual activity are also types of auditory harassment and would also occur as part of the Proposed Action.

Table 3-9. Auditory Harassment Thresholds for Marbled Murrelets

Activity	Threshold Distance
Blasting (> than 2-pound charge)	1 mile (1.6 kilometers)
Blasting (< than 2 pound charge)	360 feet (110 meters)
Pile driving, jackhammer, or rock drill	180 feet (55 meters)
Chainsaw	135 feet (40 meters)
Heavy Equipment	105 feet (32 meters)
Visual Activity	300 feet (90 meters)

Source: USFWS 2006

Track hoes, trucks, and graders would be the predominant heavy equipment used during construction of the Proposed Action. The threshold distance for these types of equipment is 180 feet. Chainsaws would also be used to remove trees and would have an auditory action area of 195 feet. Because visual disturbances to marbled murrelets can extend up to 300 feet from an activity, the maximum distance of disturbance extends 300 feet from the construction limits, although dense forests surrounding the construction area would likely limit visual impacts.

Individual birds could be present within the project area, but the Proposed Action construction activities are not expected to result in harassment to nesting birds because use of the project area is primarily limited to dispersal habitat, with limited roosting habitat. There is no known nesting or suitable nesting habitat within 0.25 mile (1,320 feet) of proposed construction activities—well outside of the threshold distance for most auditory harassment levels, including chainsaws. Noise from chainsaws and other machinery could disturb transitory marbled murrelets, but this would be a low impact because it would cause only temporary displacement, and there is adequate dispersal habitat in the surrounding area that they could use instead of the project area.

Within the CHUs, tree removal would be limited to 221 trees, with 9 trees greater than 18 inches dbh, only one of which is greater than 36 inches dbh. Review of the trees greater than 18 inches dbh concluded that they did not provide the PCEs necessary to be nesting habitat (BPA 2013b). Since these trees do not include

these necessary elements, the Proposed Action would not negatively affect nesting habitat. Tree removal could affect dispersal habitat for marbled murrelet, and potential future nesting habitat, by modifying small areas of forest that could develop into suitable old-growth habitat; however, these impacts would occur intermittently and primarily in a line adjacent to project roads, and dispersal habitat is not limited in the area. In areas where large numbers of trees are being removed in a single area, particularly between structures 5/4 and 5/5, trees would be replanted in approximately a 2:1 ratio of trees planted to trees removed (BPA 2013b). In addition, the majority of the project area is in forest managed for timber harvest, which would preempt the development of old-growth forest except in areas on USFS land where an AMR overlaps with marbled murrelet critical habitat, as it does for northern spotted owl (see Northern Spotted Owl). Since tree removal would primarily affect dispersal habitat without PCEs, impacts would be **low** except in the USFS AMR, where impacts would be small but **moderate** since tree removal could preempt the development of future nest trees.

Northern Spotted Owl

Removal of vegetation would have **low** impacts to northern spotted owl and its designated critical habitat because the vegetation to be removed does not contain suitable nesting, roosting, or foraging habitat and would be limited to effects to dispersal or potential future habitat, similar to marbled murrelet. Within the vegetation removal area, a total of 26 trees greater than 18 inches dbh would be removed, of which three would be greater than 36 inches. In each instance where large tree removal would occur, however, the trees are within small isolated patches or are single trees and do not contain potential northern spotted owl nest structures.

One tree, initially proposed for removal, was found to have 38 inches dbh and the necessary elements to make it suitable nesting habitat, so it would now be preserved. In spite of its potential as nesting habitat, this tree was part of a very small patch of forest (less than 5 acres) that was surrounded by early-seral managed forest that had recently been cleared. Likewise, the habitat surrounding the other trees marked for removal does not provide suitable northern spotted owl nesting, roosting, or foraging habitat because of recent clear cuts, forest management, rural residential uses, or agricultural uses. Although the tree removal areas do constitute potential dispersal habitat, tree removal would not reduce the habitat quality or quantity since it would occur intermittently and in a line adjacent to project roads, and there is adequate dispersal habitat in the area.

Individual birds could be present in the project area due to the presence of dispersal habitat, but proposed project activities are not expected to result in harassment. There is no known nesting or suitable nesting habitat within 0.25 mile of the project area. As with marbled murrelets, construction noise would attenuate to background conditions before reaching any potentially-suitable nesting habitat, thus harassment of nesting northern spotted owls would likely not occur. Noise from chainsaws and other machinery could disturb dispersing owls. This disturbance would have a **low** impact on these birds since it would cause only a temporary displacement, and there is adequate dispersal habitat in the surrounding area to which they could move.

Within critical habitat areas, tree removal would be limited to 221 trees with nine trees greater than 18 inches dbh, one of which is greater than 36 inches dbh. As with marbled murrelets, these trees greater than 18 inches were analyzed and do not contain the elements necessary to qualify as critical habitat under current conditions. Also, tree removal would generally not reduce future northern spotted owl habitat, since the majority of the project area is in forest managed for timber harvest, which would preempt the development of old-growth forest. In addition, most of the tree removal would occur intermittently and in

a line adjacent to project roads, rather than in a large single acreage. Four trees greater than 18 inches dbh would be removed near structure 5/5 within critical habitat managed by the USFS as AMR, which could become higher quality habitat in the future as a result of the land use management plan for AMRs. However, this would be a small number of trees relative to the total number of trees in the AMR. Also, in areas where large numbers of trees are being removed in a single area, particularly between structures 5/4 and 5/5, where 176 trees would be removed, trees would be replanted in approximately a 2:1 ratio of trees planted to trees removed (BPA 2013b). Since tree removal would primarily affect dispersal habitat without the optimal structural characteristics for nesting habitat, impacts would be *low* except in the USFS AMR, where impacts would be small but *moderate* since tree removal could preempt the development of future nest trees.

Bald Eagle

Since no known bald eagle nests occur within 5 miles of the project, and no large bodies of water exist in or near the project area to provide food sources, *no* impacts to this species are anticipated from the project.

Red Tree Vole

Although the project area is in the range of the red tree voles, it does not contain unfragmented habitat with the old growth characteristics necessary for long-term support of the red tree vole, therefore *no* impacts to this species are anticipated.

Table 3-10. Impact Determinations for Wildlife and Fish Species

Impact Magnitude	Rationale ¹	Species	Federal Status
None	Unfragmented old growth habitat does not exist in the project area.	Red tree vole	Candidate
	No nests or feeding areas occur within or near the project area.	Bald eagle	Delisted
Low	Overall improvements in habitat and compliance with design criteria outlined in the NMFS BA. Restoration planting of 490 riparian trees.	Oregon Coast ESU Coho Salmon	Threatened
		General fish species	None
Low to Moderate	Possible disturbance and incidental mortality during construction. Impacts would be limited to the site of construction activities and at the scale of individuals and would not likely affect local or regional population levels for common and fast reproducing species.	General wildlife species	None

Impact Magnitude	Rationale ¹	Species	Federal Status
Low to Moderate	Species is not known to be present in the project area, but the area does contain suitable habitat for dispersal. Trees that would be removed are not suitable for nesting and do not have the PCEs required for critical habitat.	Marbled murrelet	Threatened
	Species could be present in the project area, but habitat is limited to dispersal. Trees that would be removed are not suitable for nesting and do not have the PCEs required for critical habitat.	Northern spotted owl	Threatened

For all ESA-listed species, habitat loss would require, as applicable, on-site restoration and/or off-site compensatory mitigation (BPA 2013a, b).

3.7.2.2 OPERATION AND MAINTENANCE IMPACTS

The new and improved roads would require less emergency maintenance work compared with the existing access roads, reducing the impacts of maintenance work to fish and wildlife. Use of roads to access the transmission line could cause direct effects to wildlife due to vehicle collisions and indirect effects due to disturbance. However, because the Proposed Action is not designed to increase capacity, it is not expected to result in increased road use beyond that which is estimated under existing conditions. Therefore, any wildlife utilizing habitat near the roadway would be accustomed to the existing noise and traffic levels. Future maintenance activities could involve tree removal, which would temporarily displace wildlife from work areas and remove small amounts of tree habitat. Herbicides could also be used to control noxious weeds and have the potential to affect aquatic species, but buffer zones and other protocols as part of BPA's vegetation management program would mitigate possible impacts. Cleaning of culverts could also temporarily affect fish and other aquatic species. However, these effects would be temporary and infrequent, and are, therefore, expected to be **low** for both fish and wildlife.

3.7.3 MITIGATION – PROPOSED ACTION

3.7.3.1 FISH

Project activities would be consistent with the project's NMFS BA, which is incorporated by reference into this EA (BPA 2013a). This document details the numerous guidelines and measures to be taken to minimize the potential impacts to ESA-listed fish, which would minimize effects to general fish species as well. These measures include:

- Complete in-water construction work by the ODFW recommended work period between July 1 and September 15, the period below ordinary high water.
- Isolate work areas at the Sourgrass and Hester Creek crossings and utilize a biologist to capture, transport, and release any fish found in the work area.
- Place fish-friendly rock in all stream crossings where instream work is done. Determine the depth and gradient of the streambed consistent with SLOPES design criteria.
- Screen any pumping of surface waters to re-route downstream discharges according to NMFS guidelines (NMFS 2011).

- Limit diversions of surface water to 10 percent of the available streamflow at the time of construction.
- Treat water generated during construction activities prior to its discharge to prevent the release of contaminated or sediment-laden water into the streams.
- Prevent equipment from fording the stream sections during construction.
- Implement pollution and erosion control measures prior to construction and maintain them throughout the duration of the Proposed Action.
- Replant disturbed woody riparian areas at four stream crossing improvement areas with woody plants for channel stability and to provide riparian cover.
- Leave any removed large trees or existing pieces of large woody debris in or near the stream channel impact areas on site when feasible.

3.7.3.2 WILDLIFE

Mitigation measures for wildlife include:

- Design the Proposed Action to minimize impacts to sensitive natural resources in the affected area.
- Seed all temporarily disturbed areas with a native seed mix and plant with native woody vegetation where appropriate to restore natural habitats. Seeding should be done at the appropriate time for germination.
- Utilize fire prevention and control training and equipment to protect habitats.
- Continue to advise transmission maintenance crews annually about the occurrence (general and/or specific locations), seasons of use, and sensitivity of nesting migratory birds, raptors, and other special-status species that could be adversely affected by maintenance activities. Incorporate this information into maintenance planning and schedules to minimize adverse impacts to sensitive species.

3.7.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

In-stream construction activities in the unnamed tributary to Sourgrass Creek, the unnamed tributary to Louie Creek, and Hester Creek would require that a portion of the stream be dewatered and the downstream flow re-routed. Although fish removal would be carried out at these three locations, such activities would likely remove all individuals, and some mortality of aquatic species could result. Although salmonids generally tolerate removal successfully, burrowing species such as lamprey and sculpin pose greater challenges. At the three crossing locations where existing bridges would be improved, streamflow would not be rerouted, so increased turbidity would likely occur in the streams during construction, potentially affecting aquatic species for a short period of time.

Habitat impacts to birds and other tree-dwelling wildlife from the removal of 533 trees and other roadside vegetation would persist after mitigation and would be permanent, except where vegetation (including trees) would be replanted. Construction equipment, vegetation removal, and soil excavation could injure

wildlife or cause some incidental mortality of less mobile species in small areas. Temporary impacts to wildlife from construction noise and human disturbance would also still occur, potentially causing stress and/or temporary displacement of more mobile wildlife.

3.7.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Cumulative impacts for fish and wildlife are described in the following sections.

3.7.5.1 FISH

Stream crossings (such as with culverts), along with logging, agriculture, removal of riparian vegetation adjacent to roads and in utility corridors, and commercial and residential development are responsible for most of the past and ongoing impacts to fish communities and associated riverine habitat in the project area. These effects include blocking of fish passage, loss of riparian vegetation, livestock use of streams, herbicide run-off, and soil erosion. These ongoing activities could lead to sedimentation from runoff due to road and land use, potential spills from vehicle access and emergency repairs of the Boyer-Tillamook transmission line, and blockage of fish passage, all of which could combine to cumulatively impact fish and fish habitat.

The Proposed Action is expected to have a **low** cumulative impact on fish and fish habitat. The Proposed Action would have some adverse impacts on fish and fish habitat (described above), but the impacts would be temporary and small, no other projects affecting fish or fish habitat are expected to occur in the project area at the same time, and the long-term impacts of the Proposed Action would be beneficial to fish by improving fish passage in multiple areas, providing renewed access to suitable fish habitat, and helping restore more natural floodplain function.

3.7.5.2 WILDLIFE

Logging, agriculture, commercial and residential development, and maintenance of utility corridors have impacted wildlife and wildlife habitat since the late 1800s. Past and current logging practices have caused distinct habitat changes in the local watersheds. For instance, logging companies began replanting deforested areas with Douglas-fir instead of historically dominant species such as Sitka spruce in the 1980s. These practices foster homogenous, even-aged timber stands with very little diversity in tree heights (i.e., structure). This reduces the diversity of habitats available to wildlife. Logging and road construction have also reduced the quality of forest habitats by resulting in habitat fragmentation—restricting wildlife dispersal—and cutting down old-growth forests—reducing the available habitat of wildlife species such as marbled murrelet and northern spotted owl. Agricultural activities and commercial and residential development have removed forest habitats and replaced them with habitats that generally support different wildlife than previously existed in the forests. These ongoing activities, including maintenance of the Boyer-Tillamook transmission line, cumulatively impact wildlife and wildlife habitat.

The Proposed Action is expected to have a **low** cumulative impact on wildlife and wildlife habitat since it would remove forest habitat—including some mature Douglas-fir trees—in small amounts along project roads, particularly in addition to forest habitat expected to be lost to future logging in the surrounding area.

3.7.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be constructed and construction-related impacts on fish and wildlife—including the removal of 533 trees in forest habitat—would not occur. However, current vegetation management practices would continue, including vegetation management in and along roadsides. Localized impacts from emergency maintenance activities could occur more frequently and be of a greater magnitude than under the Proposed Action due to the current state of the road, particularly if vegetation clearing for alternate routes becomes necessary. Damage from vehicles gaining access to structures on or around impassible roads could result in the temporary loss of or damage to forest, wetland, or riparian habitats, and facilitate the spread of weeds, which would further degrade fish and wildlife habitats. Similar impacts could occur as a result of erosion and landslides, which could occur more frequently given poor road conditions and drainage. However, because these potential disturbances would occur in isolated areas, and since there would not be extensive tree removal, the No Action Alternative would have **low** impacts on fish and wildlife.

3.8 CULTURAL RESOURCES

This section describes the affected environment and potential impacts of the Proposed Action on cultural and historical resources in the project area.

3.8.1 AFFECTED ENVIRONMENT

Cultural resources include things and places that demonstrate evidence of human occupation or activity related to history, architecture, archaeology, engineering, and culture. Historic properties, as defined by 36 CFR 800—the implementing regulations of the National Historic Preservation Act (NHPA; 16 USC 470 *et seq.*), are a subset of cultural resources that consists of any district, site, building, structure, artifact, ruin, object, work of art, or natural feature important in human history that meets defined eligibility criteria for the National Register of Historic Places (NRHP).

The NHPA requires that cultural resources be inventoried and evaluated for eligibility for listing in the NRHP and that federal agencies evaluate and consider the effects of their actions on these resources. Cultural resources are evaluated for eligibility in the NRHP using four criteria commonly known as Criterion 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), as well as significance in American culture, among other things. A cultural resource must meet at least one criterion to be eligible for listing in the NRHP.

Historic properties include prehistoric resources that predate European contact and settlement. Traditional Cultural Properties (TCPs) are properties that are eligible for inclusion in the NRHP because of their association with the cultural practices or beliefs of a living community that are rooted in that community’s history and are important in maintaining the continuing cultural identity of the community (Parker and King 1998). The area of potential effects (APE; defined in 36 CFR 800.16[d]) for cultural resources in the Proposed Action includes the road easement within discontinuous sites in areas where the Proposed Action would occur for 18 miles of the Boyer-Tillamook transmission line (Appendix B).

In compliance with the NHPA, BPA identified and documented cultural resources in the project area and evaluated them for eligibility for listing in the NRHP. In the first step of identification, BPA conducted a literature review to identify previously recorded cultural sites (Ives and Gough 2012; Oliver and Schmidt 2010). Two cultural resources surveys were conducted in the Proposed Action APE (see Ives and Gough 2012; Oliver and Schmidt 2010).

3.8.1.1 BACKGROUND

The earliest inhabitants on the Oregon coast region near the APE were present by at least 10,000 years before present (Aikens 1986; Ames and Maschner 1999). During the early portion of this period, the people of the region lived in small groups that were very mobile. Most of their habitation sites were likely situated near stable and predictable food resources, including upland, marine, and plant foods. People that lived inland from the coast had riverine-oriented diets, although they frequented the coast as well (Ross 1990). Artifacts that represent this early period can be seen in the archaeological record and consist primarily of stone tools, associated debris from the manufacture of those tools, and diffuse midden materials (i.e., plant remains and organic remains such as shell and bone).

The region was historically inhabited and used by the Salish-speaking Tillamook Indians, who are made up of four bands including the Nehalem, Nestucca, Salmon River, and Siletz (Seaburg and Miller 1990). The Nehalem band occupied Tillamook Bay and its tributaries, and the other bands occupied the river basins for which they were named. The Nestucca band traditionally occupied the general vicinity of the APE (Ives and Gough 2012). Villages were lived in during the winter at major river mouths where ceremonies were mostly held, including a first salmon ceremony and winter dances. Temporary camps were used in the spring, summer, and fall months to collect seasonally available resources, some of which were processed and stored for consumption during the winter.

Trade goods and disease epidemics introduced by European explorers had entered the region as early as the 1500s. The early 1800s brought additional Euro-American explorers, fur traders, and missionaries. Homesteaders, loggers, and miners encroached on the traditional territories of the Tillamook Indians in the mid-1800s, which increased hostility between the groups (Ives and Gough 2012). Open conflict began in the mid-1850s after the Oregon Donation Land Act of 1850 (9 Stat. 496) and the ceding of Indian lands by the unratified treaties of 1851. Both the nearby Coast Reservation for the Confederated Tribes of the Siletz Indians and the Confederated Tribes of the Grande Ronde Reservation were created in 1855. Some Tillamook Indians moved to these reservations after their creation; however, many remained in their homelands (Seaburg and Miller 1990).

The APE is located in Yamhill and Tillamook counties, which were established in 1843 and 1853, respectively (Oregon State Archives 2012a, b). Early industries in both counties included fur trading, raising livestock, agriculture, lumber, and fishing. The Siuslaw National Forest, in which a portion of the APE is located, was established in 1908.

World War I initially stimulated Oregon's economy. In 1942, the U.S. Naval Air Station near Tillamook was commissioned after the start of World War II to build blimps for the war effort (Oregon Blue Book 2013). Coastal communities saw employment rise as lumber and plywood was needed for military efforts, as well as civilian housing, ship decking, and railroad ties (Wells 2006). Prosperity ensued for Oregon's coast after the end of World War II. As the timber business grew, plywood plants as well as pulp and paper mills sprung up around the coast (Wells 2006). Tourism also developed along the coast, which was then accessible due to the completion of U.S. Highway 101 (Oregon Blue Book 2013). Recreation trails and campgrounds were created east of the APE in the Siuslaw National Forest.

3.8.1.2 ARCHAEOLOGICAL RESOURCES

Two previously recorded prehistoric archaeological village sites (35TI59 and 35TI91) are located within 1 mile of the APE (Ives and Gough 2010; Oliver and Schmidt 2010). No archaeological resources were identified in the APE.

3.8.1.3 HISTORICAL/ARCHITECTURAL RESOURCES

Several historic cultural features are located within 1 mile of the APE, including segments of historic roads identified on the Government Land Office surveyor's maps; two stumps with spring board notches; a possible log skid path segment; and the Boyer-Tillamook transmission line conductors and structures (Ives and Gough 2012; Oliver and Schmidt 2010). The transmission line and associated structures were examined in 2010 and are part of a multiple property submission to the NRHP for BPA's Transmission

Network, which is being compiled by BPA (Oliver and Schmidt 2010). The period of significance is defined as being from 1937 to 1974.

3.8.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

BPA is required under the NHPA to consider the effects of the Proposed Action on historic properties, which are eligible for listing on the NRHP. No archaeological resources were identified in the Proposed Action APE. The Proposed Action would not impact the Boyer-Tillamook transmission line, as the APE does not encompass the structures or conductors. Although portions of the APE pass below the conductors, they would not be altered or upgraded as part of the Proposed Action. The Proposed Action would also not affect the setting of the transmission line.

Construction activities, including road widening, road repair, and replacement and/or installation of retaining walls, culverts, and bridges, have the potential to affect cultural resources, including human remains and TCPs, not currently known to exist in the APE. Implementation of the mitigation measures described in Section 3.8.3 would ensure that previously undiscovered historic properties were managed properly as required by the NHPA, and would minimize both direct and indirect impacts from the Proposed Action. A letter was received from SHPO on February 28, 2011 agreeing that the Proposed Action would have **no** effect on any known cultural resources.

Wild hazelnut (*Corylus cornuta*) is an ethnobotanical resource found in the area, important to the Siletz tribe as a food resource. The nuts of the hazelnut tree are picked in early fall, stored until fully ripe, and then eaten raw or roasted. Young plants can also be twisted into rope. The project area would be disturbed by vegetation clearing, ground disturbances, or vehicle access activities. No wild hazelnut trees have been identified for removal; however, there is the potential that young plants could be disturbed in areas of ground clearing. Impacts on these culturally significant plants, if present, would be the same as those described in Section 3.6, Vegetation.

Because no historic and archaeological resources are currently known in the APE, and since implementation of mitigation measures identified in Sections 3.8.3 including management of previously undiscovered historic properties is required by the NHPA, project-related impacts on historic, archaeological, and ethnobotanical resources would be **no-to-moderate**, depending upon their presence.

3.8.3 MITIGATION – PROPOSED ACTION

The following mitigation measures would be implemented under the Proposed Action to avoid and minimize impacts on cultural resources.

- Implement BPA's Inadvertent Discovery Procedure. Under this procedure, should ground-disturbing activities reveal any cultural materials (e.g., structural remains, Euro-American artifacts, or Indian artifacts), all activities in the vicinity of the find would cease. The BPA archaeologist, the Oregon State Historic Preservation Officer (SHPO), and affected tribes would be notified immediately.
- Require, under the Inadvertent Discovery Procedure, that crews cease construction immediately within 200 feet of any human remains, suspected human remains, or any items suspected to be related to a human burial (i.e., funerary items, sacred objects, or objects of cultural patrimony)

encountered during Proposed Action construction. The area around the discovery would be secured and the Tillamook and/or Yamhill county sheriffs, the BPA archaeologist, the Oregon State SHPO, and the affected tribes would be contacted immediately.

- Minimize construction footprints if any areas contain wild hazelnut as an ethnobotanical species. Include wild hazelnut in seed mixes where the species would naturally occur.

3.8.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

The potential impacts described in Section 3.8.2 would be unavoidable because they are associated with impacts on cultural resources that are currently not known to exist but that may be discovered during construction of the Proposed Action. Implementation of the mitigation measures described in Section 3.8.3 would minimize those construction-related impacts.

3.8.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Cultural resources in the project area have likely been cumulatively affected by past, present, and current development activities. Most impacts have likely occurred as a result of inadvertent disturbance or destruction from ground-disturbing activities such as road work, site development, and logging. Like the Proposed Action, other reasonably foreseeable future projects in the vicinity of the project area—including ongoing logging, agricultural, residential, commercial, and utility line maintenance activities—have the potential to disturb previously undiscovered cultural resources. The Proposed Action would not contribute to cumulative effects on currently known historic properties because construction activities would not affect historic properties, such as the Boyer-Tillamook transmission line conductors and structures or any known archaeological resources. Implementation of the mitigation measures described in Section 3.8.3 would reduce the potential for construction activities to contribute incrementally to the cumulative impacts on unknown cultural resources in the APE. In the event that previously undiscovered cultural resources are encountered, potential impacts would be *low-to-moderate*, depending on the level and amount of disturbance, and the eligibility of the resource for listing in the NRHP.

3.8.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, some limited maintenance activities would occur, as they do now, that could disturb currently unknown cultural resources in the APE. Impacts associated with continued routine maintenance of the existing transmission line as well as emergency additional repairs could range from *low-to-high*, depending upon the level and amount of disturbance, the location of the disturbance, and the eligibility of the resource(s) for listing in the NRHP.

3.9 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PUBLIC SERVICES

This section describes the socioeconomic characteristics for the Proposed Action and includes discussions about population, housing, employment and income levels, property taxes, and environmental justice. It also includes discussions about public services and emergency services. Potential environmental consequences of the Proposed Action to socioeconomics, and public services are discussed, and mitigation measures are presented to reduce potential impacts.

3.9.1 AFFECTED ENVIRONMENT

The study area for socioeconomics, environmental justice, and public services is Yamhill and Tillamook counties, which are the counties along the Boyer-Tillamook transmission line. The study area includes the small communities of Hebo and Beaver along U.S. Highway 101.

3.9.1.1 POPULATION

Residences are dispersed along the proposed access road improvements in Yamhill and Tillamook counties on properties that are comprised largely of forests. Population estimates for the project area and the state were obtained from the 2010 U.S. Census (see Table 3-11). The population densities in 2010 were 139 persons per square mile in Yamhill County and 23 persons per square mile in Tillamook County.

Table 3-11. Population Characteristics, 2000 and 2010

Area	2000 Population (number of people)	2010 Population (number of people)	Percent Change, 2000-2010	2010 Population per Square Mile (number of people)
Yamhill County	84,992	99,193	16.7	139
Tillamook County	24,262	25,250	4.1	23
Hebo	231	232	0.4	142
Beaver	145	122	-15.9	145 ^a
Oregon	3,421,399	3,831,074	12.0	40

Source: U.S. Census Bureau 2010

^a The total area of Beaver is less than one square mile (0.4 square miles) so population density is per this area.

Population growth in Yamhill County was a moderate rate of 16.7 percent between 2000 and 2010, but there was a low rate of only 4.1 percent in Tillamook County. In comparison, Oregon had a moderate growth rate of 12.0 percent during the same period. The communities nearest to the Proposed Action roads, Hebo and Beaver, had 2010 populations of 232 and 122 with stable and declining population rates, respectively (U.S. Census Bureau 2010).

The Oregon Office of Economic Analysis (OEA) estimated that by 2040, Yamhill County could reach a population of 154,800 and Tillamook County could reach a population of 32,500, equating to a population growth rate from 2010 of 56 percent (a moderate rate of 1.4 percent annually) and 29 percent (a low rate of 0.7 percent annually), respectively (OEA 2000).

3.9.1.2 AREA EMPLOYMENT, INCOME, AND AGRICULTURE

The economy within the project area is described by employment/unemployment numbers, employment by industry, income, and agricultural activity.

There is a strong level of employment in the project area according to U.S. Census Bureau data for 2011 (see Table 3-12). The unemployment rates were 6.0 percent in Yamhill County and 4.2 percent in Tillamook County, lower than the state level of 6.3 percent. Hebo and Beaver also had unemployment rates substantially below the state level. The educational services, health care, and social assistance industrial sectors employed the most people in both Yamhill and Tillamook counties with 22.1 percent and 15.0 percent, respectively. The arts, entertainment, recreation, and accommodation and food services industrial sector employed the majority of people with 49.1 percent in Hebo in 2011, while the finance, insurance, real estate, and rental/leasing industry provided all of the employment in Beaver.

Table 3-12. Employment by Industry and Unemployment Rates in the Project Area, 2011

Employment Sectors	Number of People (Percent of County Employment)				
	Yamhill County	Tillamook County	Hebo	Beaver	Oregon
Agriculture, forestry, fishing and hunting, and mining	2,171 (4.8%)	1,058 (9.8%)	22 (8.3%)	0	61,622 (3.5%)
Construction	3,099 (6.9%)	872 (8.1%)	0	0	113,378 (6.5%)
Manufacturing	7,213 (16.1%)	1,346 (12.5%)	41 (15.5%)	0	201,509 (11.5%)
Wholesale trade	1,158 (2.6%)	274 (2.5%)	0	0	53,522 (3.1%)
Retail trade	5,096 (11.3%)	1,533 (14.2%)	0	0	216,507 (12.3%)
Transportation and warehousing, and utilities	1,829 (4.1%)	642 (6.0%)	34 (12.8%)	0	76,045 (4.3%)
Information	752 (1.7%)	44 (0.4%)	0	0	35,727 (2.0%)
Finance and insurance, and real estate and rental and leasing	2,205 (4.9%)	409 (3.8%)	0	11 ^a (100.0%)	108,796 (6.2%)
Professional, scientific, and management, and administrative and waste management services	3,271 (7.3%)	674 (6.3%)	0	0	175,714 (10.0%)
Educational services, and health care and social assistance	9,907 (22.1%)	1,616 (15.0%)	0	0	378,721 (21.6%)
Arts, entertainment, and recreation, and accommodation and food services	4,025 (9.0%)	1,235 (11.5%)	130 (49.1%)	0	163,986 (9.4%)
Other services, except public administration	2,364 (5.3%)	405 (3.8%)	0	0	86,953 (5.0%)
Public administration	1,825 (4.1%)	657 (6.1%)	38 (14.3%)	0	80,918 (4.6%)

Employment Sectors	Number of People (Percent of County Employment)				
	Yamhill County	Tillamook County	Hebo	Beaver	Oregon
Total Employed, all sectors	44,915	10,764	265	11	1,753,398
Unemployment	4,554 (6.0%)	872 (4.2%)	16 (3.7%)	0 (0.0%)	191,276 (6.3%)

Source: U.S. Census Bureau 2011

^a The U.S. Census Bureau 2011 American Community Survey estimates only identified 11 persons in the workforce in the Beaver Census Designated Place (CDP) all within the finance and insurance, and real estate and rental and leasing industry. Other persons working in the Beaver CDP could potentially be residing in other surrounding communities or within Tillamook County.

Income levels in the project area vary relative to state income levels (see Table 3-13). Median household income was the highest in the community of Hebo (\$55,588), compared to the state (\$49,850 median). Oregon had a higher per capita income (\$26,561) in 2011 than the project area counties and communities (U.S. Census Bureau 2011).

Table 3-13. Income Characteristics in the Project Area, 2011

Area	Median Household Income	Per Capita Income
Yamhill County	\$53,819	\$23,759
Tillamook County	\$41,400	\$22,706
Hebo	\$55,588	\$24,212
Beaver	\$14,688	\$19,676
Oregon	\$49,850	\$26,561

Source: U.S. Census Bureau 2011

Farms are more common in Yamhill County than in Tillamook County, although agriculture contributes substantially to the economies of both counties. Approximately 5 percent of the land area in Tillamook County and 39 percent in Yamhill County were farmland in 2007, compared to 27 percent statewide. A total of 2,115 farms in Yamhill County, with an average size of 86 acres, generated approximately \$277.6 million in agricultural sales in 2007, with crops accounting for 83 percent of sales by value. In Tillamook County, 302 farms with an average size of 125 acres generated \$110.9 million in sales, with livestock accounting for 99 percent of the total (U.S. Census of Agriculture 2007).

3.9.1.3 PROPERTY TAXES

State and local property taxes help to support the activities of local taxing districts, such as schools and local government services including fire protection, sanitation, and water districts. Property tax rates generally range from 9 to 12 percent in Yamhill and Tillamook counties. Taxes are paid by private property owners, unless they have a tax-exempt status such as veterans, non-profit organizations, or specific zoning exemptions. Private landowners eligible for one of the Oregon Department of Revenue Special Assessment programs, including farmland and forestland, might have reduced taxes if they are within certain zoning and/or use the land for farming or harvesting timber (OEA 2013). All federal, state, and local government real properties are exempt from property taxes, including the Siuslaw National Forest and state forest lands that together comprise about 30 percent of the Proposed Action. The state of Oregon has no sales taxes for goods and services purchased but, if desired, local municipalities can impose a sales tax.

When BPA acquires an easement across private property, the landowner continues to pay property taxes, but often at a lesser value, based upon any limitation of use created by the encumbrance. If BPA acquires new access road ROWs 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 access road would have on the remaining portion of the property. Where existing easements accommodate existing access road improvements, and no new acquisition would be made, no additional compensation would be paid.

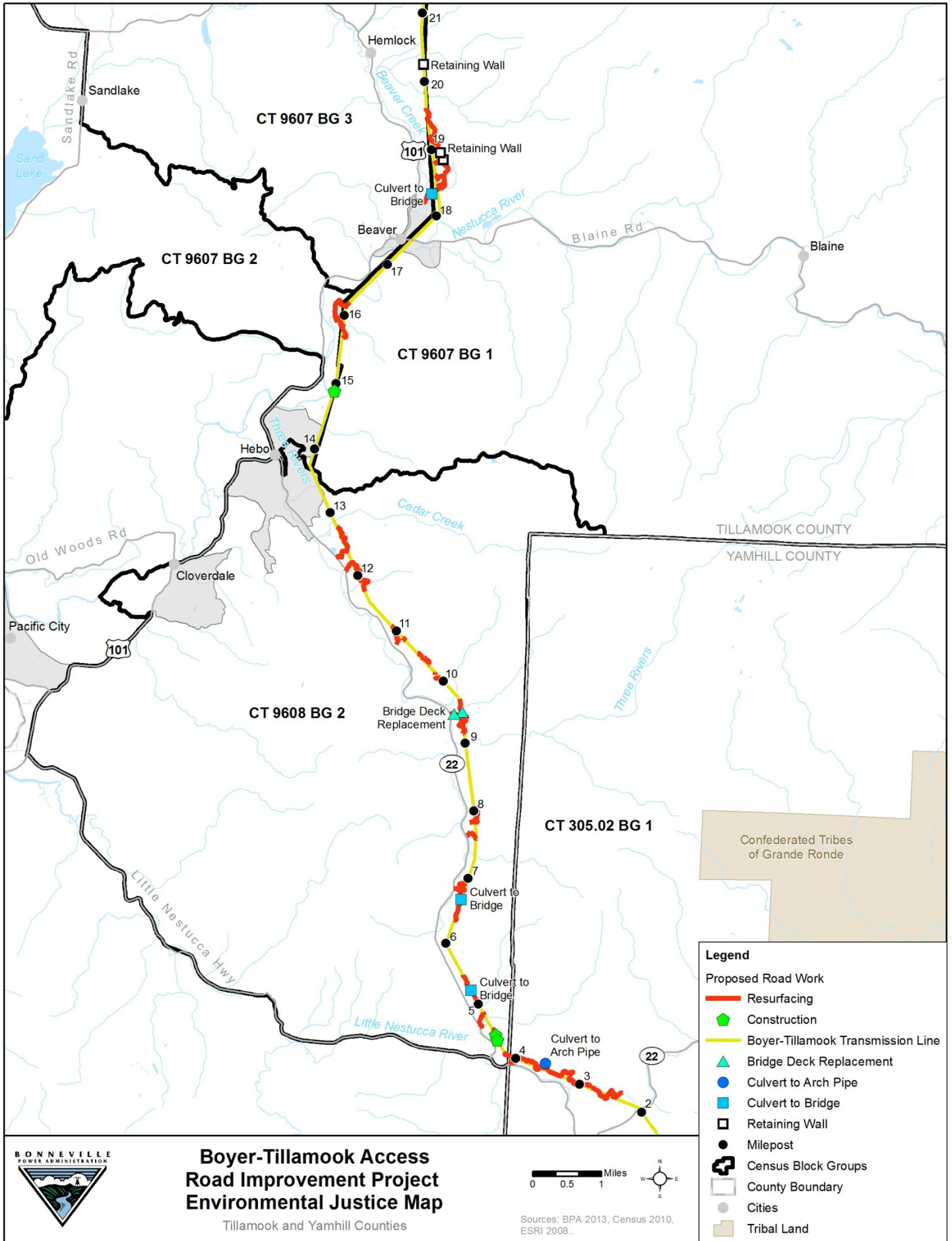
3.9.1.4 ENVIRONMENTAL JUSTICE

All projects involving a federal action (e.g., federal funding, permits or land) must comply with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994). Environmental Justice Populations are low-income and minority populations protected under Executive Order 12898 from disproportionate adverse effects of federal projects. The affected environment for environmental justice was assessed at the county, community, and census block group levels (see Figure 3-7 and Table 3-14). A census block group is the smallest geographic area for which the U.S. Census Bureau provides consistent sample data and generally contains a population of 600 to 3,000 individuals. (Abbreviations in Figure 3-7 are CT for census tract and BG for block group).

The largest minority populations for both Yamhill and Tillamook counties in 2010 were Hispanic or Latino populations, at 14.7 percent for Yamhill County and 9.0 percent for Tillamook County. Similarly, Hispanic or Latino populations were the largest minority population for Hebo and Beaver. Hebo also had a relatively high number of Asian or Pacific Islanders (6.0 percent), while Beaver had a relatively high Other Race population (7.4 percent).

Tillamook County had the second highest population living below the poverty level (17.6 percent), and was the only area with a higher poverty level than the state of Oregon at 14.8 percent. Hebo had a lower poverty level than the two counties or Beaver, at 3.0 percent.

Census Tract 305.02 Block Group 1 in Yamhill County, which includes the Confederated Tribes of Grande Ronde, had the highest American Indian and Alaska Native population (14.1 percent), and Two or More Races population (5.4 percent). Census Tract 9607 Block Group 2 had the highest population living below the poverty level (22.0 percent).



Boyer-Tillamook Access Road Improvement Project Environmental Justice Map

Tillamook and Yamhill Counties



Sources: BPA 2013, Census 2010, ESRI 2008..

FIGURE 3-7. ENVIRONMENTAL JUSTICE—POPULATIONS IN THE PROJECT AREA

Table 3-14. Minorities in 2010 and Percent of Total Population below Poverty in 2011

Area	White	Black or African American	American Indian and Alaska Native	Asian or Pacific Islander	Other Race	Two or More Races	Hispanic or Latino	Total Population Below Poverty
Yamhill County	85.4%	0.9%	1.5%	1.7%	7.2%	3.3%	14.7%	12.8%
Tillamook County	91.5%	0.3%	1.0%	1.1%	3.6%	2.4%	9.0%	17.6%
Hebo	86.2%	0.0%	2.6%	6.0%	1.7%	3.4%	13.4%	3.0%
Beaver	87.7%	0.0%	0.8%	0.0%	7.4%	4.1%	9.0%	10.6%
Census Block Groups								
CT 305.02 BG 1	78.9%	0.2%	14.1%	0.7%	0.8%	5.4%	2.3%	5.3%
CT 9608 BG 2	93.1%	0.0%	1.6%	1.7%	2.5%	1.1%	4.5%	16.9%
CT 9607 BG 2	93.1%	0.9%	1.3%	0.7%	0.7%	3.4%	1.7%	22.0%
CT 9607 BG 1	95.1%	0.1%	0.5%	0.3%	2.2%	1.9%	5.0%	8.6%
CT 9607 BG 3	93.7%	0.0%	0.7%	0.9%	2.1%	2.6%	5.3%	2.6%
Oregon	83.6%	1.8%	1.4%	4.0%	5.3%	3.8%	11.7%	14.8%

Sources: U.S. Census Bureau 2010 and U.S. Census Bureau 2011

3.9.1.5 PUBLIC SERVICES

The primary public services of concern within the project area are emergency responders, including fire protection, medical, and sheriff's departments. In general, emergency responders in the community of Tillamook are the closest to the Proposed Action while Yamhill County responders are located farther away in McMinnville and Willamina. The Tillamook County sheriff's department is located in the city of Tillamook and the Yamhill County sheriff's department is located in McMinnville.

Fire protection is provided by the Tillamook Fire District, with the closest station located at Pleasant Valley Station 72, approximately 11 miles north of Beaver and along U.S. Highway 101. This fire district includes three stations and has four full-time staff as well as 40 additional volunteer firefighters (USFD 2013). In Yamhill County, the Willamina Fire Department is located about 18 miles east of the Proposed Action, along State Route 22. This fire district includes two stations and has five full-time staff as well as 42 additional volunteer firefighters (USFD 2013). The Oregon Department of Forestry and the Siuslaw National Forest also have fire protection plans and personnel.

The Tillamook County General Hospital is located in the city of Tillamook, about 13 miles north of Beaver. In 2009, the general hospital had 25 staffed beds available and 68 registered nurses (OHA 2011). The Willamette Valley Medical Center is located in Yamhill County, in McMinnville, about 32 miles east along State Route 22. This medical center had 88 staffed beds available and 150 registered nurses in 2009 (OHA 2011).

3.9.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

This section describes the potential construction, operation, and maintenance impacts of the Proposed Action on area wide socioeconomics, environmental justice, and public services.

3.9.2.1 CONSTRUCTION IMPACTS

Construction activities would occur over a period of 2 to 4 months. During construction, nearby residents, businesses, and motorists would experience temporary disturbances including noise, dust, and roadside hazards from construction equipment and activities. There could also be brief delays in access to properties as construction vehicles move through an area. Impacts on residents, businesses, and motorists would be **low** as these impacts would be in temporary construction areas away from population centers and would not last long in any one area. (Distances from the Proposed Action to nearby residences and construction rates are described in Section 3.2.1.2, Land Use.)

A limited number of local and non-local construction workers would be needed to construct the Proposed Action. Due to the low number of workers required and the short duration of construction, income earned by project construction workers is not expected to increase the average annual income levels in Yamhill or Tillamook counties. Because there would be no to few temporary employment opportunities during construction, and no additional employment likely during operation and maintenance following completion of the Proposed Action, the Proposed Action would have **no-to-low** impacts on employment in the project area.

Construction would create a temporary positive economic impact to the counties and communities near the Proposed Action through the purchase of local supplies, materials, food, hotel or campground accommodations, and other direct or indirect spending by construction workers. The impact of construction-related activities on the local and regional economies, while positive, is expected to be **low** due to the short duration and limited and temporary scope of the construction.

Local workers are expected to remain in their existing housing and would create no additional housing demand. Non-local workers would require housing during construction, which could include temporary housing in hotels or in RV parks or campgrounds. Based upon existing housing vacancy rates, as well as the number of hotels and RV parks or campgrounds located throughout Yamhill and Tillamook counties, existing local lodging is expected to be sufficient to accommodate non-local workers during construction. Thus, there would be a **low** impact on housing during construction.

All persons, regardless of race or income, would experience the same minor negative impacts associated with construction of the Proposed Action roads, such as short-term traffic delays and temporary disturbances including noise, dust, and roadside hazards from construction equipment and activities. All persons would also experience potential positive economic impacts from short-term construction employment opportunities and economic activity. Therefore, construction of the Proposed Action would have **no** adverse or disproportionate impacts on minority or low-income populations.

Any short-term traffic delays from approximately three to four construction vehicles would not disrupt the ability of emergency services personnel to respond to emergencies. In the event of an emergency, responders would access the construction areas from either U.S. Highway 101 or State Route 22.

Therefore, there would likely be *no* impact to emergency services from short-term construction in Yamhill and Tillamook counties.

3.9.2.2 OPERATION AND MAINTENANCE IMPACTS

BPA personnel would continue to use access roads at least once per year during annual inspections of the Boyer-Tillamook transmission line. Additionally, access road maintenance activities would be conducted as needed and might include removing trees, and grading and graveling road surfaces. The timing of these activities would not change, compared to existing conditions, except that road repair and maintenance activities could occur less frequently, therefore there would be *no* impacts to socioeconomics and environmental justice from operation and maintenance of the Proposed Action. The Proposed Action would change the amount of property taxes collected by Yamhill and Tillamook counties because BPA is acquiring new easements for project roads; however, BPA is only acquiring three easements, so there would be a *low* impact to tax revenues.

3.9.3 MITIGATION – PROPOSED ACTION

Since there would be no impacts to environmental justice populations from the Proposed Action, no mitigation is proposed. The following mitigation measures were identified to avoid, minimize, or compensate for potential socioeconomic and public service impacts from the Proposed Action:

- Distribute a schedule of construction activities to all potentially affected landowners and businesses.
- Coordinate construction activities with the Oregon Department of Transportation, county public works and transportation staff, the Siuslaw National Forest, and private landowners to minimize construction-related disturbances.
- Compensate landowners at fair market value for any new land rights required for new, temporary, or permanent access roads on private lands.
- Maintain access to residences, farms, and businesses during construction.
- Use traffic safety signs and flaggers if needed to inform motorists and manage traffic when transporting equipment and construction materials on State Route 22 and U.S. Highway 101.
- Repair any damage to non-project roads caused during project construction.
- Maintain access to residential and business driveways during construction to the extent possible.

3.9.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

The Proposed Action could affect public services by briefly disrupting access to properties, causing localized increases in noise and dust, and causing small traffic slow-downs, and could affect property taxes due to easement acquisition. Any other impacts to socioeconomics, environmental justice, or public safety would be mitigated.

3.9.5 CUMULATIVE IMPACTS – PROPOSED ACTION

No current or future projects have been identified that would cumulatively impact socioeconomics, environmental justice populations, and public services in the project area. There are no known land use applications or planned major developments near the project area in either Tillamook or Yamhill counties at this time (K. Friday and B. Sheets, pers. comm., Tillamook and Yamhill counties, April 1, 2013), and ODF is not aware of any planned timber sales (M. Maine, pers. comm., ODF, April 1, 2003). The small influx of revenue and taxes associated with the temporary increased spending and lodging in the project area would combine with the spending associated with workers employed in existing industries and result in a low positive cumulative impact on Tillamook and Yamhill counties' economies. A small reduction in property taxes received by the counties would occur from the acquisitions of roughly 1,500 feet of new access road easements on private land at three sites between structures 4/5 and 5/2, which would be a **low** cumulative impact together with existing tax-exempt properties of the USFS, BPA, and ODF.

The Proposed Action could affect public services by briefly disrupting access to properties, causing localized increases in noise and dust, and causing small traffic slow-downs, although it would have a **low** cumulative impact since there are no other known projects that would be occurring during the same period. Also, the Proposed Action is not anticipated to disproportionately affect environmental justice populations. Therefore, the Proposed Action would have **low** cumulative impacts on socioeconomics and public services and **no** cumulative impacts on environmental justice populations.

3.9.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no positive socioeconomic impacts from temporary employment, purchases of local goods and services, and temporary housing from construction workers or activities. Residents and businesses in the project area would not experience short-term minor negative construction impacts from noise, dust, and traffic delays. Maintenance of access roads and the Boyer-Tillamook transmission line would still be needed and would likely result in some **low** impacts on socioeconomics and public facilities, related to temporary construction-related disturbances. **No** impacts on environmental justice populations would occur during maintenance activities.

3.10 VISUAL QUALITY

This section describes the visual quality of the affected environment, and includes discussion of potential environmental consequences of the Proposed Action to visual resources and mitigation measures suggested to reduce potential impacts.

3.10.1 AFFECTED ENVIRONMENT

The Proposed Action project area for visual resources includes the project roads. The existing transmission line traverses northwest from the border of Yamhill and Tillamook counties, paralleling State Route 22. At the town of Hebo, the transmission line traverses northeast to the unincorporated town of Beaver, Oregon, paralleling U.S. Highway 101. Much of the land surrounding the transmission line, including 4.06 miles where access road improvements would occur, is on Siuslaw National Forest land. The existing transmission line, wood pole structures, and access roads are a part of the visual landscape of the project area, although much of these elements are screened from view by surrounding forest.

The project area lies within the Oregon coast ecoregion. The southern portion of the project area between the communities of Dolph and Hebo is characterized by steep, forested slopes with small valleys used for residential and limited agricultural use. The majority of the transmission line is located 700 to 1,000 feet from State Route 22. The forested hills obscure views of the transmission line from the roadway and the residences located along State Route 22.



FIGURE 3-8. EXISTING TRANSMISSION LINE NEAR STRUCTURE 5/2



FIGURE 3-9. EXISTING ACCESS ROAD NEAR STRUCTURE 6/4

In the northern portion of the project area, roughly in the area around structures 12/5 to 14/5, land along the Nestucca River valley between the communities of Hebo and Beaver has been cleared for agricultural purposes, providing longer vistas from residences and U.S. Highway 101. This portion of U.S. Highway 101 (the Pacific Coast Scenic Byway) is designated as an All American Road by the Federal

Highway Administration. All American Roads have desirable qualities, such as scenic or natural values, that make them tourist destinations unto themselves. The segment of the Pacific Coast Scenic Byway between Tillamook and Lincoln City is known for its winding forested views (Oregon Department of Transportation 2013a). Approximately 4 miles of the Proposed Action between Hebo and Beaver parallel this scenic byway. Within this section of the project area, the transmission line is approximately 1,000 feet from the roadway, and is generally not visible.



FIGURE 3-10. EXISTING ACCESS ROAD NEAR STRUCTURE 20/3



FIGURE 3-11. EXISTING TRANSMISSION LINE AT THE LOCATION OF THE ACCESS ROAD TO BE CONSTRUCTED NEAR STRUCTURE 17/1

The area south of the community of Beaver contains the largest concentration of residential development in the project area, with small enclaves located along the Nestucca River. The existing transmission line crosses the Nestucca River in three locations south of Beaver, between structures 18/3 and 18/2, 18/4 and 18/5, and 19/3 and 19/4.

3.10.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The primary long-term impact on visual resources would be from the new bridges, new retaining walls, and new and wider road surfaces (gravel). Impacts could also occur in temporarily disturbed areas before vegetation can be reestablished. Construction, operation, and maintenance activities would be similar to those already occurring along the transmission line and access roads and would not result in changes to the viewshed because construction activities would be almost entirely hidden by dense forest and distances from the main roads or recreation areas. Thus, there would be *no* impacts on recreational viewers or motorists.

Construction activities could, however, affect the viewshed of adjacent landowners. Residential viewers can be highly sensitive to changes in their visual environment. In areas where there are planned changes from the Proposed Action near residences, the existing transmission line and access roads are already a prominent element in the landscape for residential viewers. The improvements would occur in areas where the landscape is already altered. As the access roads are an existing element of the viewshed and the improvements would occur in previously altered views, long-term visual impacts to project area residential viewers would be *low*.

Temporary modifications to the visual landscape for residential viewers would occur during construction, through the storage and use of construction equipment and the removal of trees and other vegetation. The majority of the road work would occur in areas that are not near residences and screened by sufficient vegetation. Also, any construction impacts to residential viewers would be temporary and localized; thus, impacts would be *low*.

3.10.3 MITIGATION – PROPOSED ACTION

If the Proposed Action is implemented, the following mitigation measures would reduce the temporary visual impacts during construction.

- Schedule all construction work during daylight hours to avoid the use of nighttime illumination of work areas.
- Avoid storing construction equipment and supplies on residential streets or access roads directly adjacent to residential or business property to the greatest extent possible.
- Incorporate erosion control BMPs into the construction of access roads to minimize permanent visual impacts.
- Reseed disturbed, non-farmed areas, including the roadbed, once construction is completed using a predominantly native seed mix or a seed mix agreed upon with landowners.
- Inspect reseeded sites periodically over a 3-year period to verify adequate growth has occurred. If necessary, contingency measures, such as reseeded, would be implemented to ensure development of adequate growth and vegetation cover. Areas replanted with woody species would be monitored until a 70 percent establishment rate is met.
- Require contractors to maintain clean construction sites to minimize the visual impact of the temporary use of these areas.

3.10.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

With the implementation of the Proposed Action, residents would be exposed to temporary and long-term visual impacts from construction activities and improvements to the access roads and stream crossings. These changes would remain secondary to the existing transmission line, access roads, and structures present in the existing visual landscape in the project area.

3.10.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Agricultural activities, logging, the development of roadways, and commercial and residential development are responsible for most of the past and ongoing impacts to visual resources in the vicinity of the project area. Agricultural activities and the construction of roadways and residential areas have altered the visual resources in the region by removing native vegetation, adding new infrastructure, and creating more open vistas within the landscape.

No other reasonably foreseeable future projects that would alter the viewshed are planned in the project area during the same period as the Proposed Action construction. Because a majority of the project access roads already exist—except for a few small sections—and would be improved instead of

constructed, the Proposed Action is expected to have **low** cumulative impacts on visual resources for residents or other viewers.

3.10.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no changes to project roads or stream crossings. Because ongoing operation and maintenance activities would continue, the No Action Alternative would result in intermittent visual impacts on the residential property owners, motorists, and recreationists. As roads continue to degrade under the No Action Alternative, more frequent maintenance activities would be required. These activities would result in visual impacts from a temporary increase in construction activity within the project area. Long-term operation and maintenance activities would result in a **low-to-moderate** impact.

3.11 AIR QUALITY AND GREENHOUSE GASES

This section describes the existing air quality in the project area, as well as the potential impacts of the Proposed Action and No Action Alternative on air quality and greenhouse gas levels.

3.11.1 AFFECTED ENVIRONMENT

The following sections describe the affected environment for air quality and greenhouse gases.

3.11.1.1 AIR QUALITY

The air quality project area includes the airsheds within Tillamook and Yamhill counties. The agencies with primary air quality jurisdiction in these counties are the EPA and the Oregon Department of Environmental Quality (ODEQ) Air Quality Division. Under the Clean Air Act (42 U.S.C. 7401 *et seq.*), the EPA has established national ambient air quality standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), ozone, particulate matter (PM), lead, sulfur dioxide, and nitrogen dioxide. ODEQ has adopted the standards set by the EPA. For each of the six criteria pollutants, the NAAQS represent a maximum concentration above which adverse effects on human health may occur. When an area's air quality exceeds these standards, it is designated a nonattainment area.

Given the rural-to-low density urban setting of the project area, the three criteria pollutants of potential interest are CO, ozone, and PM. The remaining three criteria pollutants (lead, sulfur dioxide, and nitrogen dioxide) are not discussed further in this section. There are currently no air monitoring stations located in Tillamook and Yamhill counties (ODEQ 2013a). No part of the project area is within a designated nonattainment area for monitored pollutants (ODEQ 2013b).

CO is generally associated with transportation sources (e.g., roads and traffic). The highest ambient CO concentrations often occur near congested roadways and intersections during periods of low temperatures, light winds, and stable atmospheric conditions. The NAAQS standards for CO levels are as follows: 8-hour standard of 9 parts per million and 1-hour standard of 35 parts per million. Vehicles traveling along U.S. Highway 101, State Route 22, Little Nestucca Highway, and Blaine Road are the primary sources of CO in the vicinity of the Proposed Action. ODEQ does not monitor CO in Tillamook and Yamhill counties.

Ozone is primarily a product of more concentrated motor vehicle traffic on a regional scale. It is created during warm sunny weather by photochemical reactions involving volatile organic compounds (VOCs) and nitrogen oxides (NO_x). Small amounts of ozone may be produced by the existing transmission line as a result of corona (i.e., the breakdown of air at the surface of conductors). The NAAQS 8-hour average standard for ozone is 0.075 parts per million. ODEQ does not monitor ozone in Tillamook and Yamhill counties.

PM is generated by industrial emissions, residential wood combustion, motor vehicle engines, and fugitive dust from roadways and unpaved surfaces. Two forms of PM are regulated by EPA: PM less than 10 micrometers in size (PM₁₀) and PM less than 2.5 micrometers in size (PM_{2.5}). PM_{2.5} has a greater health effect than PM₁₀ at locations far from the emitting source, because it remains suspended in the atmosphere longer and travels farther. The NAAQS 24-hour standards for PM are as follows: 150

micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for PM_{10} and $35 \mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$. ODEQ does not monitor PM in Tillamook and Yamhill counties.

Class I areas are specific areas of national or regional natural, recreational, scenic, or historic value where air quality is to be preserved, protected, and enhanced under Section 160 of the Clean Air Act (42 USC 7470[2]). No Class I areas are located within Tillamook and Yamhill counties (EPA 2012).

3.11.1.2 GREENHOUSE GASES

Greenhouse gases (GHGs) are chemical compounds found in the Earth's atmosphere that absorb and trap infrared radiation as heat. Global atmospheric GHG concentrations are a product of continuous emission (release) and removal (storage) of GHGs over time. In the natural environment, this release and storage is largely cyclical. For example, 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, where it is available to be taken up again by new plants (Ecological Society of America 2008). There is also a large amount of GHGs stored deep underground in the form of fossil fuels, and 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 GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. When forests are permanently converted to cropland, for instance, or when new buildings or roads displace vegetation, the GHG 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, and burning fossil fuels releases GHGs that have been stored underground for thousands of years and cannot be readily replaced (Kessavalou et al. 1998). The resulting buildup of heat in the atmosphere is due to increased GHG levels, which causes warming of the planet through a greenhouse-like effect (EIA 2009). Increasing levels of GHGs could increase the Earth's temperature by up to 7.2 degrees Fahrenheit by the end of the twenty-first century (EPA 2010).

The principal GHGs emitted into the atmosphere through human activities are CO_2 , CH_4 , N_2O , and fluorinated gases, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (EPA 2013). CO_2 is the major GHG emitted, and the burning of fossil fuels accounts for 84 percent of all U.S. GHG emissions (EPA 2013; U.S. Energy Information Administration 2009b). CO_2 enters the atmosphere primarily through electricity generation and transportation activities, with lesser quantities from industrial, residential, and commercial activities. CO_2 levels have increased to 379 parts per million within the last century, a 36 percent increase, as a result of human activities (Intergovernmental Panel on Climate Change 2007). Appendix E contains a report discussing these specific GHGs in more detail.

3.11.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The following sections describe the potential impacts of construction, operation, and maintenance of the Proposed Action on air quality and greenhouse gases.

3.11.2.1 CONSTRUCTION IMPACTS

Air Quality

Air quality effects from the Proposed Action would occur during construction, which would take approximately 2 to 4 months to complete. Construction activities have the potential to temporarily increase PM, CO, NO_x, and VOC levels within a localized area. PM would be the pollutant of most concern generated by construction activities. Fugitive dust could be created during site preparation, including access road work, onsite travel on unpaved surfaces, and soil-disrupting operations. Implementation of the BMPs and the mitigation measures described in Section 3.11.3 would minimize these impacts.

In addition to increased PM, the operation of heavy equipment and vehicles during the proposed tree removal activities, roadwork, retaining wall construction, as well as culvert and bridge work under the Proposed Action could result in increases in CO, NO_x, and VOC levels. However, these emissions would also be short-term and localized. In addition, vehicle and equipment emissions would be relatively small, and comparable to current conditions found in agricultural, active forest harvest, and developed areas.

Overall, air quality impacts resulting from construction would be **low** as these impacts would occur near the construction site, would be temporary in nature, and would not result in permanent regional impacts to air quality or a change in air quality that would likely create any risk to human health.

Greenhouse Gases

GHG emissions resulting from the Proposed Action were calculated using the methodology described in the GHG technical report (see Appendix E). Calculations were done for three types of activities that produce GHG emissions: construction, tree clearing, and ongoing annual operations and maintenance for the estimated 50-year-long operational life of the access roads. GHG emissions associated with construction activities would occur over a period of approximately 4 months. The permanent removal of trees and other vegetation that would occur as a part of the Proposed Action would not immediately emit any GHGs, but it would reduce the level of solid carbon storage in the area.

Construction of the Proposed Action would result in an estimated total of 948 metric tons of carbon dioxide equivalent (CO₂e)¹ emissions during construction (see Table 3-15). Additionally, approximately 3.73 acres of tree cover would be permanently converted, including trees cut for project construction and to make way for the safe passage of vehicles. The net carbon footprint associated with the removal of trees for the Proposed Action would be an estimated 5,155 metric tons of CO₂e. Detailed information about the calculations performed to estimate these CO₂e emission levels is presented in Appendix E.

¹CO₂e 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.

Table 3-15. Net Carbon Footprint over 50-Year Life of the Proposed Action

Activity	Total CO ₂ Emissions (metric tons)	Total N ₂ O Emissions (metric tons)	Total CH ₄ Emissions (metric tons)	Total CO ₂ -eq Emissions (metric tons)
Construction	806	121	20	948
Tree Clearing	5,115	-	-	5,115
Operation and Maintenance	0.588	0.007	0.007	3
			TOTAL	6,066

To provide context for this level of emissions, the EPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO₂e emitted annually (74 FR 56260). This threshold is approximately the amount of CO₂e generated by 4,400 passenger vehicles per year. Comparatively, the emissions during project construction would be equivalent to the emissions generated by about 166 passenger vehicles per year. Tree clearing would result in lost carbon storage equivalent to 907 passenger vehicles per year. Because these activities would be similar to existing conditions, project GHG emissions likely would not represent a substantial change. Therefore, given the low contributions, the impacts of construction, operation, and maintenance on GHG concentrations would be *low*.

3.11.2.2 OPERATION AND MAINTENANCE IMPACTS

Air Quality

Access roads would be used by BPA personnel traveling in one or two passenger vehicles at least once a year during annual inspections of the Boyer-Tillamook transmission line. Access road maintenance activities (e.g., grading and graveling road surfaces, replacing riprap, removing downed trees, etc.) would result in brief increases in some air pollutants from road maintenance equipment. Because a number of existing road issues would be addressed by the Proposed Action, fewer access road maintenance activities would likely occur than if it were not implemented. Neither activity would violate the NAAQS and, since there would be a potential reduction in emissions as a result of the Proposed Action, impacts would be considered *low*.

Greenhouse Gases

Access roads would be used by BPA personnel at least once per year during annual inspections of the Boyer-Tillamook transmission line. Access road maintenance activities (e.g., grading and graveling road surfaces, replacing riprap, etc.) would result in emissions of CO₂, CH₄, and N₂O through the operation of vehicles and heavy machinery. Downed trees would be removed, resulting in the same types of GHG emissions as described for the construction phase. Because a number of existing road issues would be addressed by the Proposed Action, fewer access road maintenance activities would likely have to occur than if it were not implemented, and tree issues would be resolved, at least in the immediate future. GHG emission impacts would be far below the Mandatory Reporting threshold, at approximately 3 metric tons of CO₂e emissions for operations and maintenance activities over the 50-year lifespan of the roads (see Table 3-15; Appendix E). Because of these factors, the incremental contribution of the Proposed Action to atmospheric GHG emissions during operation and maintenance would be less than under the No Action Alternative and would be *low*.

3.11.3 MITIGATION – PROPOSED ACTION

BPA would implement the following mitigation measures under the Proposed Action to avoid or minimize impacts on air quality and climate change:

- Encourage use of carpooling and shuttle vans among construction workers to minimize construction-related traffic and associated emissions.
- Utilize alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.
- Reduce electricity usage in the construction office by using compact fluorescent bulbs and turning off computers and other electronic equipment every night.
- Recycle or salvage non-hazardous construction and demolition debris where practicable.
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
- Locate staging areas in previously disturbed or graveled areas to minimize soil and vegetation disturbance where practicable.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Use local rock sources for road construction where practicable.

3.11.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

3.11.4.1 AIR QUALITY

As noted above, short-term increases in some air pollutants would occur during construction, operation, and maintenance of the Proposed Action, and these releases would be unavoidable.

3.11.4.2 GREENHOUSE GASES

Implementation of mitigation measures identified in Section 3.11.3 would help to reduce GHG emissions. However, unavoidable impacts would include slight increases in GHG releases and decreases in GHG storage capacity during construction, operation, and maintenance of the Proposed Action. These impacts would be *low* for the reasons discussed in Section 3.11.2.

3.11.5 CUMULATIVE IMPACTS – PROPOSED ACTION

Cumulative impacts for air quality and greenhouse gases are described in the following sections.

3.11.5.1 AIR QUALITY

There are no known land use applications or planned major developments near the project area in either Tillamook or Yamhill county at this time (K. Friday and B. Sheets, pers. comm., Tillamook and Yamhill counties, April 1, 2013), and ODF is not aware of any planned timber sales (M. Maine, pers.

comm., ODF, April 1, 2003). Ongoing vehicular use, agricultural activities, logging, and commercial and residential facilities in the project area all contribute to ambient air pollutant emissions. These sources of pollutants would continue to occur. Potential future activities also include maintenance of the Boyer-Tillamook transmission line. While the Proposed Action would contribute a small amount to pollutant levels, it and ongoing activities in the project area are not expected to violate NAAQS and, therefore, cumulative impacts on air quality would be **low**.

3.11.5.2 GREENHOUSE GASES

Vehicular traffic, agricultural activities (e.g., timber harvesting), and commercial and residential facilities in the project area have all contributed to GHG emissions. These sources of GHG emissions would continue to occur. Potential future activities include ongoing maintenance of the Boyer-Tillamook transmission line. However, the Proposed Action's incremental impact on GHG concentrations would be **low** given the low amount of contribution.

3.11.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, no construction-related air pollutants or GHGs emissions would be generated and, therefore, there would be **no** impacts to air quality or climate change from construction activities. Operation and maintenance activities would still occur. Because a number of existing road issues would be addressed by the Proposed Action, fewer access road maintenance activities would be needed than if the Proposed Action were not implemented. Therefore, operation and maintenance emissions of criteria pollutants and GHGs under the No Action Alternative have the potential to be higher than under the Proposed Action, but would still be **low**.

3.12 NOISE, PUBLIC HEALTH, AND SAFETY

This section describes the affected environment and potential impacts of the Proposed Action and No Action Alternative on noise levels and public health and safety in the project area.

3.12.1 AFFECTED ENVIRONMENT

This section describes the existing noise levels and public health and safety issues in the project area.

3.12.1.1 NOISE

Noise is commonly defined as loud, unwanted, or unexpected sound that disrupts normal human activities or diminishes the quality of the human environment. Audible noise is measured in decibels on the A-weighted scale. The A-weighted decibel scale (dBA) describes sound that corresponds to human perception. Table 3-16 contains examples of common activities and the associated noise level in dBA.

Table 3-16. Common Activities and Associated Noise Levels

Noise Source	Noise Level (dBA)
Loud live band music	110
Truck 50 feet away	80
Gas lawnmower 100 feet away	70
Normal conversation indoors	60
Moderate rainfall on vegetation	50
Refrigerator	40
Bedroom at night	25

Source: Federal Transit Administration 2006

3.12.1.2 AMBIENT NOISE ENVIRONMENT

The project area for the noise analysis includes noise-sensitive land uses within 500 feet of the proposed roadwork, retaining wall construction, and culvert and bridge work. Land uses most sensitive to noise include occupied buildings (e.g., residences, libraries, hospitals, and businesses), natural areas used for recreation, and other areas where noise can interfere with peoples' use or enjoyment of the environment. The project area primarily consists of large forest tracts with dispersed residences. There is one campground approximately 0.5 mile away from a project road. There are approximately 25 residences and two businesses within 500 feet of resurfacing, widening, and new construction, including the following: four residences near structure 7/2, one business near structure 9/1, one business near structure 11/4, 13 residences near structure 14/3, two residences near structure 17/1, and six residences near structure 20/3 (five of which are in the community of Beaver).

Within the project area, ambient noise levels vary with the proximity of the project area to highways and other noise-generating activities. Most of the proposed activities are located in rural, undeveloped areas where ambient noise is generally low. In these areas, the dominant sources of noise are agricultural equipment, logging equipment, and vehicular traffic. In particular, vehicles traveling along

U.S. Highway 101, State Route 22, Little Nestucca Highway, and Blaine Road (see Figure 1-1) generate noise in proximity to the Proposed Action. In the more developed areas, particularly in Beaver, traffic and noise associated with human activity are the main contributors to background noise.

Sources of audible noise associated with electrical transmission systems include construction and maintenance equipment, transmission line corona (see below), and the hum of electrical transformers. Audible noise from high-voltage transmission lines (generally 345-kV and above) occurs as a result of conductor corona activity (i.e., the electrical breakdown of air molecules in the vicinity of high-voltage conductors). This corona activity produces a hissing, crackling, popping sound, particularly during wet conditions such as rain or fog. Generally, audible noise from 115-kV transmission lines is so low as to not be 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 the existing 115-kV Boyer-Tillamook transmission line to meet applicable state and federal noise regulations. Historically, public complaints or inquiries about transmission line audible noise at this voltage level are extremely rare.

3.12.1.3 PUBLIC HEALTH AND SAFETY

Year-round access for line crews, material, and equipment into each structure on the Boyer-Tillamook transmission line is required to sustain routine operations and/or restore main grid lines in the event of an emergency. Parts of the transmission line experience high wind events each winter, many of which cause trees to fall on the line resulting in outages and requiring crews to provide emergency response. However, existing access road conditions to the Boyer-Tillamook transmission line are very poor, particularly in the winter, and create a hazard for public and worker health and safety. Many of the access roads are washed out with limited access in the summer and no access in winter, making repairs to the lines from winter storm damage difficult, time consuming, and dangerous. In addition, landslides are known to occur in the project area (see Section 3.3.2, Geology and Soils), and current poor road drainage could contribute to soil destabilization and an increased risk of landslides.

3.12.2 ENVIRONMENTAL CONSEQUENCES – PROPOSED ACTION

The following sections describe the potential noise and public health and safety impacts from construction of the Proposed Action.

3.12.2.1 CONSTRUCTION IMPACTS

Noise

Construction activities would result in temporary and intermittent noise impacts as construction progresses along the access roads. Construction is anticipated to proceed at an average rate of about 1 mile per week, with bridges and culverts taking the longest to construct. Noise would result from construction equipment and vehicles used for the proposed roadwork, retaining wall construction, tree removal, and culvert and bridge work. Noise from truck traffic and increased worker trips would temporarily contribute to existing traffic noise on local roads and highways, but would not likely result in a substantial increase in average traffic noise levels.

Oregon counties have the authority to establish a noise control ordinance pursuant to Oregon Revised Statute 467.100. Tillamook County does not have regulations pertaining to noise (Bettis 2013). Yamhill County's noise control ordinance (Ordinance 822) applies to all unincorporated areas of Yamhill County. The ordinance does not specify allowable noise levels near noise-sensitive land uses, but instead considers the following criteria when determining whether a violation of the provisions of the ordinance exists:

- The volume of the noise;
- The intensity of the noise;
- Whether the nature of the noise is usual or unusual;
- Whether the origin of the noise is natural or unnatural;
- The volume and intensity of the background noise, if any;
- Whether the noise is plainly audible within a noise sensitive unit;
- The nature and zoning of the area within which the noise emanates;
- The density of the inhabitation of the area within which the noise emanates;
- The time of day or night the noise occurs;
- The duration of the noise;
- Whether the noise is recurrent, intermittent, or constant; and
- The willingness or unwillingness of the noise producer to timely cease or abate the noise.

Table 3-17 summarizes noise levels generated by typical equipment that could be used to construct the Proposed Action. Noise levels at 50 feet from a construction site would range from 80 to 89 dBA. Noise produced by construction equipment would decrease with distance from the site.

Table 3-17. Typical Construction Noise Levels

Type of Equipment	Maximum Noise Level (dBA) at 50 Feet
Backhoe	80
Bulldozer	85
Chainsaw	85
Concrete pump	82
Crane	85
Heavy truck	88
Pneumatic tools	85
Road grader	85
Combined equipment	89

Source: Federal Transit Administration 2006

Construction activities that occur within 500 feet of the proposed roadwork could be bothersome to people, including area residents. These activities could include retaining wall construction, tree removal, and culvert and bridge work. Noise from construction vehicles would temporarily contribute

to existing traffic noise on local roads, but would not likely result in a substantial increase in average traffic noise levels. Because of the temporary and intermittent noise from construction equipment and traffic, noise impacts would be **low-to-moderate**, depending on the proximity to construction activities.

Public Health and Safety

Potential public health and safety impacts could be associated with the use of construction and heavy equipment; potential exposure to hazardous materials, such as fuels and lubricants during construction; possible collisions between construction vehicles and vehicles driven by the public; and worker proximity to power lines. As standard construction safety procedures would be employed and the mitigation measures described in Section 3.12.3 would be implemented to reduce potential health and safety impacts from construction would be **low**.

3.12.2.2 OPERATION AND MAINTENANCE IMPACTS

Noise

Access roads would be used by BPA personnel at least once per year during annual inspections of the Boyer-Tillamook transmission line. Access road maintenance activities would be conducted as needed. Typical maintenance activities might include removing downed trees, grading and graveling road surfaces, and replacing riprap. Because a number of existing road issues would be addressed by the Proposed Action, fewer maintenance activities would have to occur than if it were not implemented. Periodic noise impacts would occur during maintenance activities and would typically be associated with equipment used to maintain or repair infrastructure (e.g., access roads). Given the short-term nature of this noise, and the anticipated low levels to be produced, this impact would be **low**.

Public Health and Safety

Access roads would be used by BPA personnel at least once per year during annual inspections of the Boyer-Tillamook transmission line, and more often should emergency line repairs be needed. Access road maintenance activities would be conducted as needed. Potential public health and safety impacts during maintenance activities could be associated with the use of heavy equipment; potential exposure to hazardous materials, such as fuels and lubricants; possible collisions between BPA vehicles and vehicles driven by the public; and worker proximity to power lines. Due to the emphasized safe operation of heavy equipment and vehicles, low potential for exposure to hazardous materials, maintenance worker safety measures, and implementation of the mitigation measures described in Section 3.12.3, the potential health and safety impacts would be **low**. In addition, improvements to the roads—including improved drainage, stream crossings, and road surfaces—would make the roads safer for both maintenance workers and other road users, including adjacent landowners.

3.12.3 MITIGATION – PROPOSED ACTION

To reduce the potential for temporary, adverse noise impacts during construction, the following mitigation measures would be incorporated into contract specifications:

- Distribute construction the schedule to all landowners within 500 feet of the Proposed Action to inform the landowners of when they might experience construction-related noise.
- Limit construction noise to daylight hours (7:00 a.m. to 5:00 p.m.).
- Locate equipment as far away as is practical from noise-sensitive uses.
- Turn off construction equipment during prolonged periods of non-use.
- Operate and maintain all equipment so as to minimize noise generation.
- Muffle all gasoline or diesel engines exhausts.

The following mitigation measures would minimize potential public health and safety risks if the Proposed Action is implemented:

- Conduct crew safety meetings at the start of each workday to review potential safety issues and concerns.
- Conduct monthly meetings between BPA and the contractor to discuss safety concerns.
- Secure the site at the end of each workday to protect equipment and the general public.

3.12.4 UNAVOIDABLE IMPACTS REMAINING AFTER MITIGATION

Short-term construction noise in the vicinity of some residences, businesses, and a nearby campground would be unavoidable during construction.

3.12.5 CUMULATIVE IMPACTS – PROPOSED ACTION

The following sections describe the potential cumulative noise and public health and safety impacts from construction of the Proposed Action.

3.12.5.1 NOISE CUMULATIVE EFFECTS

There are no known land use applications or planned major developments near the project area in either Tillamook or Yamhill county at this time (K. Friday and B. Sheets, pers. comm., Tillamook and Yamhill counties, April 1, 2013), and ODF is not aware of any planned timber sales (M. Maine, pers. comm., ODF, April 1, 2003). Within the project area, the predominant sources of noise are agricultural equipment operation (e.g., for timber harvesting) and vehicular traffic. These sources of noise would continue to occur. Additionally, BPA conducts routine helicopter inspection patrols of the federal transmission system in the Pacific Northwest, including the transmission lines in the project area. As part of these routine patrols, BPA would continue to use helicopters to fly the Boyer-Tillamook transmission line to identify any problems or repair needs. These patrols typically occur two or three times per year, generally in March, July, and/or October. Any noise experienced during these flyovers

would be infrequent and limited in duration (i.e., only for the few seconds it would take for the helicopter to pass).

Cumulative noise impacts occur when there is noise from more than one noise source at approximately the same time. Since there are no other projects anticipated in the area, the Proposed Action is expected to have a **low** cumulative impact on noise.

3.12.5.2 PUBLIC HEALTH AND SAFETY CUMULATIVE EFFECTS

There are no known land use applications or planned major developments near the project area in either Tillamook or Yamhill county at this time (K. Friday and B. Sheets, pers. comm., Tillamook and Yamhill counties, April 1, 2013), and ODF is not aware of any planned timber sales (M. Maine, pers. comm., ODF, April 1, 2003). Past and ongoing land use activities along the Proposed Action include timber harvest and associated logging roads, agriculture, residences, and a nearby campground. Since the effects of the Proposed Action would be mitigated through safety and mitigation measures aimed at reducing the risks from operating heavy equipment and vehicles and exposure to hazardous materials; improving maintenance worker and general public safety through improved road and drainage conditions; and implementing the mitigation measures described in Section 3.12.3, the cumulative impacts on public health and safety are expected to be **low**.

3.12.6 ENVIRONMENTAL CONSEQUENCES – NO ACTION ALTERNATIVE

Under the No Action Alternative, noise associated with construction activities would not occur. Noise associated with maintenance would continue as in the past, and could occur more often than under the Proposed Action because of the deteriorated condition of the existing access roads and the likely need for more frequent maintenance activities. However, since these activities would be infrequent and brief, impacts would be **low**.

Potential construction-related public health and safety risks also would not occur under the No Action Alternative. Under the No Action Alternative access road improvements would not be implemented, but some limited individual maintenance activities would still occur. Leaving the access roads in their current condition—including narrow and rutted roads and unstable soils across often steep terrain—could result in potentially severe accidents involving injury or loss of life. Because of the current unsafe access road conditions, impacts to worker and public health and safety could be **moderate-to-high**.

CHAPTER 4

ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS

This chapter addresses federal statutes, implementing regulations, and executive orders applicable to the Proposed Action. This EA is being sent to tribes, federal agencies, and state and local governments as part of the consultation process for the Proposed Action. Persons consulted are listed in Chapter 5, Persons, Tribes, and Agencies Consulted.

4.1 NATIONAL ENVIRONMENTAL POLICY ACT

This EA was prepared by BPA pursuant to regulations implementing NEPA (42 U.S.C. 4321 *et seq.*), which require federal agencies to assess the impacts that their actions may have on the environment. NEPA requires preparation of an EIS for major federal actions significantly affecting the quality of the human environment. BPA prepared this EA to determine if the Proposed Action would cause any significant environmental impacts that would warrant preparation of an EIS, or whether it is appropriate to prepare a FONSI.

4.2 LAND USE

4.2.1 *NORTHWEST FOREST PLAN*

The Siuslaw National Forest is managed under the Northwest Forest Plan, which was adopted in 1994 to regulate land use on national forests. The Northwest Forest Plan is based on five key principles:

- Never forget human and economic dimensions of issues.
- Protect long-term health of forests, wildlife, and waterways.
- Focus on scientifically sound, ecologically credible, and legally responsible strategies and implementation.
- Produce a predictable and sustainable level of timber sales and non-timber resources.
- Ensure that federal agencies work together.

Under this plan, northwest federal forests are assigned land allocations which have specific management approaches, ranging from conservation to harvest. The applicable management approach is outlined in a series of standards and guidelines that may apply within a particular land allocation or across an entire national forest. The Northwest Forest Plan also includes an aquatic conservation strategy with the objective of restoring and maintaining watersheds and aquatic functions and systems.

4.2.2 *NORTHWEST OREGON STATE FORESTS MANAGEMENT PLAN*

The Board of Forestry updated their forest management plan in 2010, which provides management direction for all state forestry lands in Northwest Oregon. This plan includes a multi-resource approach to forest management and includes management goals and directions for integrated forest management.

4.2.3 STATE AND LOCAL LAND USE

As a federal agency, BPA generally is not required to comply with state and local land-use approvals or permits; however, BPA strives to meet or exceed the substantive standards and policies of state and local plans and programs to the maximum extent practical.

Table 4-1 identifies state and local land use plans that guide development in the project area.

Table 4-1. State and Local Land Use Plans in the Project Area

Agency	Plan	Description
State		
Oregon Department of Land Conservation and Development (DLCD)	Oregon Statewide Planning Goals	These goals constitute the framework of Oregon’s statewide program of land use planning.
Oregon Parks and Recreation Department (OPRD)	2005-2014 Oregon Statewide Trails Plan	Oregon’s official plan for recreational trail management for the next 10 years, serving as a statewide and regional information and planning tool to assist Oregon recreation providers (local, state, federal, and private) in providing trail opportunities and promoting access to Oregon’s trails and waterways.
	2008–2012 Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP)	Oregon’s basic five-year plan for outdoor recreation. It provides information and recommendations to guide federal, state, and local units of government, as well as the private sector, in making policy and planning decisions.
State of Oregon	Oregon Revised Statutes (ORS) 197	The ORS establishes priorities for including land inside urban growth boundaries (UGBs); goal exceptions would need to demonstrate consistency with ORS 197.298.
County		
Yamhill County	Comprehensive Plan and Zoning Ordinance	The comprehensive plan was revised in 1996 and guides the county’s zoning ordinance for land use regulations.
Tillamook County	Comprehensive Plan and Land Use Ordinance	The comprehensive plan is organized to correspond with state land use goals and guides the county’s land use ordinance for land use regulation. The Land Use Plan was last updated in 1982.

4.3 WATER RESOURCES

4.3.1 CLEAN WATER ACT

The Clean Water Act regulates discharges into waters of the United States. The various sections applicable to the Proposed Action are discussed below.

- **Section 401** - A federal permit to conduct an activity that causes discharges into navigable waters is issued only after the affected state certifies that existing water quality standards would not be violated if the permit were issued. Applicants receiving a Section 404 permit from the USACE are required to obtain a Section 401 water quality certification from ODEQ. BPA is consulting with ODEQ and the USACE to determine if any permits are needed.
- **Section 402** - This section authorizes discharges, including stormwater, into the waters of the United States under the National Pollutant Discharge Elimination System. EPA Region 10 has a general permit for federal facilities for discharges from construction activities. BPA is working with EPA to determine if it needs to obtain coverage under the EPA general permit and is preparing a stormwater pollution prevention plan to address stabilization practices, structural practices, stormwater management, and other controls (see Section 3.4, Water Resources).
- **Section 404** - Authorization from the USACE under Section 404 when dredged or fill material is discharged into waters of the United States, including wetlands. Impacts on wetlands are described in Section 3.5, Wetlands and Floodplains and other regulations pertinent to wetlands and floodplains are described in Section 4.4 below. Project wetlands were delineated in 2012. BPA filed a Joint Permit with the USACE to obtain a Section 404 permit.

4.3.2 OREGON FISH PASSAGE LAW

Since August 2001, the owner or operator of an artificial obstruction located in waters in which native migratory fish are currently or were historically present must address fish passage requirements prior to certain events, such as the construction, installation, replacement, extension, or repair of culverts, roads, or any other hydraulic facilities. Laws regarding fish passage are found in Oregon Revised Statutes 509.580 through 509.910 and in Oregon Administrative Rules 635, Division 412. BPA has consulted with ODFW on fish passage requirements, and has implemented requested specifications in the design of the culverts, arch pipe, and bridges.

4.4 WETLANDS AND FLOODPLAINS

4.4.1 FLOODPLAIN/WETLANDS ENVIRONMENTAL REVIEW REQUIREMENTS

The U.S. Department of Energy mandates that impacts on floodplains and wetlands be assessed and alternatives for protection of these resources be evaluated in accordance with Compliance with Floodplain/Wetlands Environmental Review Requirements (10 CFR 1022.12) and Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands). Potential impacts to floodplains and wetlands from the Proposed Action are discussed in detail in Section 3.5, Wetlands and Floodplains. Direct impacts to wetlands from the Proposed Action total 0.01 acre. Wetland management, regulation, and

protection are addressed in several sections of the Clean Water Act, including Sections 401, 402, and 404 (see Section 4.3 above). Wetlands are also addressed in a combination of other federal laws, including the Coastal Zone Management Act, the Endangered Species Act, National Historic Preservation Act (NHPA), Rivers and Harbors Act, and Wild and Scenic Rivers Act.

4.4.2 OREGON REMOVAL FILL LAW

Oregon's Removal Fill Law (ORS 196.795-990), administered by the Department of State Lands (DSL), requires a permit for removal of material or placement of fill in waters of the state, which include waterways and wetlands. Some activities, such as culvert replacements, are exempt from this requirement. BPA is coordinating with DSL to determine which activities may be subject to the Removal Fill Law and would meet the requirements, as part of the Coastal Zone Management Act (CZMA) (16 USC Sections 1451–1464) consistency determination, discussed below. BPA would submit the wetland delineation for this project to DSL for review.

4.4.3 COASTAL ZONE MANAGEMENT ACT

As an agency of the federal government, BPA would follow the guidelines of the CZMA to ensure that the Proposed Action activities are, to the maximum extent practicable, consistent with the enforceable policies of the state management programs. Because the Proposed Action is within Oregon's coastal zone, which includes almost all watersheds draining to the Pacific Ocean, BPA is subject to the coordination and consistency requirements of the CZMA.

The state of Oregon has an approved Coastal Zone Management Program, Oregon Coastal Management Program (OCMP), which is implemented by the Oregon DLCDC. The CZMA requires that "each federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs" (16 USC 1456c). OCMP policies include the statewide planning goals, county and city comprehensive plans, and state natural resource laws.

BPA is designing and planning to implement the Proposed Action in such a way that it would be consistent to the maximum extent practicable with the OCMP.

4.5 VEGETATION, FISH, AND WILDLIFE

4.5.1 ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) of 1973 (16 USC 1531 *et seq.*), establishes a national program for the conservation of threatened and endangered species, and the preservation of the ecosystems on which they depend. The ESA is administered by the U.S. Fish and Wildlife Service (USFWS) for wildlife and freshwater species, and by the National Marine Fisheries Service (NMFS) for marine and anadromous species. The ESA defines procedures for listing species, designating critical habitat for listed species, and preparing recovery plans. It also specifies prohibited actions and exceptions.

Section 7(a)(2) of the ESA requires federal agencies to ensure that the actions they authorize, fund, and carry out do not jeopardize the continued existence of any endangered or threatened species or result in

the destruction or adverse modification of their critical habitats. Section 7(c) of the ESA and other federal regulations require that federal agencies prepare biological assessments addressing the potential effects of major construction actions on listed or proposed endangered species and critical habitats. Three species were identified as being potentially affected by the Proposed Action: marbled murrelet, northern spotted owl, and Oregon coastal coho salmon. A biological assessment has been developed for marbled murrelet and northern spotted owl, and informal consultation is currently underway with the USFWS. In addition, BPA is preparing a biological assessment for Proposed Action activities potentially affecting Oregon coastal coho salmon and is in formal consultation with NMFS. Potential impacts to ESA-listed species are discussed in Section 3.7, Fish and Wildlife.

4.5.2 FISH AND WILDLIFE CONSERVATION ACT AND FISH AND WILDLIFE COORDINATION ACT

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 *et seq.*) encourages federal agencies to conserve and promote conservation of non-game fish and wildlife and their habitats. In addition, the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*) requires federal agencies with projects affecting water resources to consult with the USFWS and the state agency responsible for fish and wildlife resources. Fish and wildlife impacts are discussed in Section 3.7, Fish and Wildlife. BPA coordinated with USFWS during project development and with ODFW to design the culverts, arched pipe and bridges that would be installed as part of the Proposed Action. Each agency will be sent copies of the EA.

4.5.3 MAGNUSON-STEVEN'S FISHERY CONSERVATION AND MANAGEMENT ACT

NMFS is responsible for ensuring compliance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (Magnuson-Stevens Act) (16 USC 1801 *et seq.*). The Magnuson-Stevens Act established requirements for including Essential Fish Habitat (EFH) descriptions in federal fishery management plans, and requires federal agencies to consult with NMFS on activities that may adversely affect EFH (Pub. L. No. 104-297). EFH can include all streams, lakes, ponds, wetlands, and other viable waterbodies, and most of the habitat historically accessible to salmon necessary for spawning, breeding, feeding, or growth to maturity. Activities above impassible barriers are subject to consultation provisions of the Magnuson-Stevens Act.

EFH for the Oregon coastal coho salmon and the Oregon coastal chinook salmon is found within all project watersheds. Compliance with the Magnuson-Stevens Act is typically handled by incorporating an impact analysis of the EFH within the biological assessment prepared in compliance with Section 7 of the ESA. The information is included the biological assessment BPA is preparing as part of its formal consultation with NMFS on the impacts of the Proposed Action on Oregon coastal coho salmon and Oregon coastal chinook salmon.

4.5.4 MIGRATORY BIRD TREATY ACT AND FEDERAL MEMORANDUM OF UNDERSTANDING

The Migratory Bird Treaty Act implements various treaties and conventions between the United States and other countries, including Canada, Japan, Mexico, and the former Soviet Union, for the protection of migratory birds (16 U.S.C. 703–712). Under the Act, taking, killing, or possessing migratory birds, or taking, destroying, or possessing their eggs or nests, is unlawful. The Act classifies most species of birds as migratory, except for upland and nonnative birds such as pheasant, chukar, gray partridge, house sparrow, European starling, and rock dove.

BPA (through the U.S. Department of Energy [DOE]) and the USFWS have a memorandum of understanding (MOU) to address migratory bird conservation in accordance with Executive Order (EO) 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). EO 13186 directs each federal agency to work with the USFWS to develop mitigation for reducing any adverse effects to migratory bird populations likely to occur as a result of a federal action (DOE and USFWS 2006).

Impacts of construction, operation, and maintenance of the Proposed Action on migratory birds are described in Section 3.7.2.

4.5.5 BALD EAGLE AND GOLDEN EAGLE PROTECTION ACT

The Bald Eagle and Golden Eagle Protection Act prohibits the taking or possessing of and commerce in bald and golden eagles, with limited exceptions (16 U.S.C. 668–668d). The Act covers only intentional acts, or acts in “wanton disregard” of the safety of bald or golden eagles. There are no documented bald eagle nest sites within five miles of Proposed Action and the lack of large water bodies nearby for feeding makes the project area for the Proposed Action marginal habitat. Mitigation measures to avoid and minimize impacts to birds, including eagles are identified in Section 3.7.3.

4.6 CULTURAL RESOURCES

Cultural resources are protected by a number of federal laws. A cultural resource is an object, structure, building, archaeological site, or district that provides irreplaceable evidence of natural or human history. Cultural resources include national landmarks, archaeological sites, and properties listed (or eligible for listing) on the NRHP. In addition, American Indian Tribes are afforded special rights under certain laws, as well as the opportunity to voice concerns about issues under these laws. Laws and other directives for the protection of cultural resources and the rights of American Indian Tribes include the following:

- Antiquities Act of 1906 (16 U.S.C. 431-433)
- Historic Sites Act of 1935 (16 U.S.C. 461-467)
- NHPA of 1966 (16 U.S.C. 470 *et seq.*), as amended, inclusive of Section 106
- Archaeological Data Preservation Act of 1974 (16 U.S.C. 469 a-c)
- Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. 470 aa-mm), as amended
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 *et seq.*)
- Executive Order 13007 (Indian Sacred Sites)
- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996, 1996a).

Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties. Historic properties are properties that are included in or that meet the criteria for listing on the NRHP. If a federal agency plans to undertake a type of activity that could affect historic properties, it must consult with the appropriate State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer and others to make an assessment of adverse effects on identified historic properties.

In compliance with the NHPA, BPA identified and documented cultural resources in the project area and evaluated them for eligibility for listing in the NRHP. In the first step of identification, BPA conducted a

literature review to identify previously recorded cultural sites (Ives and Gough 2012; Oliver and Schmidt 2010). Two cultural resources surveys were conducted in the Proposed Action APE (see Ives and Gough 2012; Oliver and Schmidt 2010).

In compliance with Section 106, BPA consulted with the SHPO, the Confederated Tribes of Grand Ronde, and the Confederated Tribes of Siletz on the APE. BPA then provided the cultural resources study and impact determination of no effect to historic properties to these parties. BPA received concurrence from the SHPO on November 13, 2012.

If, during construction, previously unidentified cultural resources that would be adversely affected by the Proposed Action are found, BPA would follow the mitigation measures identified in Section 3.8.3, Cultural Resources Mitigation.

BPA is also considering potential impacts to hazelnut, an ethnobotanical population of concern. Populations and individual plants could be disturbed by vegetation clearing and ground disturbances. Impacts to these culturally significant plants would be minimal, as described in Section 3.8, Cultural Resources. The mitigation measures identified in Section 3.8.3 would further minimize impacts from the Proposed Action on this resource.

4.7 TRIBAL CONSULTATION

In addition to the laws and directives mentioned above, the federal government has a general trust responsibility with Tribal governments. BPA recognizes that trust responsibility derives from the historical relationship between the federal government and the Tribes as expressed in treaties, statutes, Executive Orders, and federal Indian case law.

BPA's Tribal Policy follows the principles set forth in the Department of Energy's American Indian Tribal Government Policy (USDOE Order No. 1230.2—Apr. 8, 1992). BPA fully respects Tribal law, and recognizes Tribal governments as sovereigns. BPA consults with Tribal governments to assure that Tribal rights and concerns are considered prior to BPA taking actions, making decisions, or implementing programs that may affect Tribal resources. BPA recognizes that Tribal interests are not limited to cultural resources but may also include fish, wildlife, water resources and wetlands, vegetation, health, socioeconomic characteristics, noise, and visual resources. BPA also recognizes that Tribes may have specific rights reserved under treaties, such as fishing, hunting, gathering, and grazing rights. The USACE, as a federal permitting agency, may also conduct tribal consultation as part of their permit review process.

BPA has provided notifications to and consulted with Tribes and relevant agencies in the project area, including the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz (also see Section 4.8, Cultural Resources). BPA has reached out to its tribal counterparts to share and gather information, to address tribal concerns, and to invite further consultation. No tribe has requested formal government-to-government consultation meetings during the preliminary EA process.

4.8 SOCIOECONOMICS AND PUBLIC SERVICES

4.8.1 EXECUTIVE ORDER ON ENVIRONMENTAL JUSTICE

In February 1994, Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was released to federal agencies. This order states that federal agencies must identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Proposed Action would not cause disproportionately high and adverse impacts on minority and low-income populations (see Section 3.9.1.4, Environmental Justice).

4.9 AIR QUALITY

4.9.1 CLEAN AIR ACT

The Clean Air Act, as revised in 1990 (42 U.S.C. 7401 *et seq.*), requires EPA and individual states to carry out a wide range of regulatory programs intended to assure attainment of the national ambient air quality standards. Under the Clean Air Act, the EPA has established national ambient air quality standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), ozone, particulate matter (PM), lead, sulfur dioxide, and nitrogen dioxide. DEQ has adopted the standards set by EPA. For each of the six criteria pollutants, the NAAQS represent a maximum concentration above which adverse effects on human health may occur. When an area's air quality exceeds these standards, it is designated a nonattainment area.

Potential impacts from the Proposed Action on air quality would be low and are discussed in detail in Section 3.11, Air Quality and Greenhouse Gases.

4.10 NOISE, PUBLIC HEALTH, AND SAFETY

4.10.1 THE NOISE CONTROL ACT AND LOCAL NOISE CONTROL ORDINANCES

The Noise Control Act of 1972, as amended (42 U.S.C. 4901 *et seq.*), sets forth a broad goal of protecting all people from noise that jeopardizes their health or welfare. The Act further states that federal agencies are authorized and directed, to the fullest extent consistent with their authority under federal laws administered by them, to carry out the programs within their control in such a manner as to further this policy. Noise effects of the Proposed Action are discussed in Section 3.12, Noise, Public Health, and Safety.

As discussed in Section 3.12.2.1, Noise, Public Health, and Safety, Tillamook County does not have regulations pertaining to noise (Bettis 2013). Yamhill County's noise control ordinance (Ordinance 822) applies to all unincorporated areas of Yamhill County. The ordinance does not specify allowable noise levels near noise-sensitive land uses, but instead considers criteria when determining whether a violation of the provisions of the ordinance exists, as discussed in Section 3.12.2.1. As described in Section 3.12, the Proposed Action would have temporary **low** noise impacts, and mitigation measures identified in Section 3.12.3 would further reduce these impacts.

4.10.2 SAFE DRINKING WATER ACT

The Safe Drinking Water Act (42 U.S.C. Section 300f *et seq.*) is designed to protect the quality of public drinking water and its sources. BPA would comply with state and local public drinking water regulations and apply Best Management Practices (BMPs) for protecting water resources (see Section 3.4.3, Water Resources Mitigation). The Proposed Action would not affect any sole source aquifers or other critical aquifers, or adversely affect any surface water supplies.

4.10.3 TOXIC SUBSTANCES CONTROL ACT

The Toxic Substances Control Act (15 U.S.C. 2601 *et seq.*) is intended to protect human health and the environment from toxic chemicals. Section 6 of the Act regulates the use, storage, and disposal of polychlorinated biphenyls (PCBs). BPA adopted guidelines to ensure that 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 and any other applicable federal or state regulations.

4.10.4 FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT

The Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 (a-y)) registers and regulates pesticides. BPA uses herbicides (a kind of pesticide) only in a limited fashion and under controlled circumstances in accordance with BPA's *Transmission System Vegetation Management Program Final EIS/Record of Decision* (BPA 2000). Herbicides are used on transmission line ROWs and in substation yards to control vegetation, including noxious weeds. When BPA uses herbicides, the date, dose, and chemical used are recorded and reported to state government officials. Herbicide containers are disposed of according to Resource Conservation and Recovery Act (RCRA) standards discussed below.

4.10.5 RESOURCE CONSERVATION AND RECOVERY ACT

RCRA (42 U.S.C. 6901 *et seq.*), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of hazardous waste, and on owners and operators of treatment, storage, and disposal facilities. Each facility owner or operator is required to have a permit issued by EPA or the state. Small amounts of hazardous wastes may be generated under the Proposed Action, such as solvents, pesticides, paint products, motor and lubricating oils, and cleaners. These materials would be disposed of according to state law and RCRA.

If a hazardous material, toxic substance, or petroleum product is discovered, and may pose an immediate threat to human health or the environment, BPA requires that the contractor notify the Contracting Officer's Technical Representative immediately. Other conditions such as large dump sites, drums of unknown substances, suspicious odors, and stained soil must also be reported immediately. The technical representative would coordinate with the appropriate BPA personnel. In addition, the contractor would not be allowed to disturb such conditions until the Technical Representative has given the notice to proceed.

4.10.6 OREGON DEPARTMENT OF TRANSPORTATION AND LOCAL PUBLIC WORKS DEPARTMENTS

The contractor would consult with the ODOT and with city and county public works departments to secure the necessary permits for the transportation of large loads on the roadways.

4.10.7 UNIFORM FIRE CODE

The development of a hazardous materials management plan may be required by local fire districts in accordance with the Uniform Fire Code. BPA would develop and implement such a plan, if necessary.

CHAPTER 5

PERSONS, TRIBES, AND AGENCIES CONSULTED

5.1 FEDERAL AGENCIES

National Marine Fisheries Service
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Army Corp of Engineers

5.2 STATE AGENCIES

Mid-Willamette Cooperative Weed Management Areas
North Coast Cooperative Weed Management Area
Oregon Department of Agriculture
Oregon Department of Energy
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Parks and Recreation Department
Oregon Department of State Lands
Oregon Department of Transportation
The Oregon Watershed Enhancement Board - North Coast Regional Office

5.3 COUNTIES AND CITIES

Allen Springer (Commissioner of Yamhill County Commissioners Office)
Bill Baertlein (Vice Chairperson of Tillamook County)
Brian Van Bergen (Yamhill County Clerk)
John Boyd (Director of Community Development for Tillamook County)
John Phelan (Road Department Director for Yamhill County)
Kathy George (Chair of Yamhill County Commissioners Office)
Lianne Welch (Public Works Director for Tillamook County)
Mark Labhart (Chairperson of Tillamook County)
Mary P. Stern (Vice Chair of Yamhill County Commissioners Office)
McMinnville Water & Light
Mike Brandt (Planning Director for Yamhill County)
Oregon Municipal Electric Utilities
Representative Kurt Schrader
Representative Suzanne Bonamici
Senator Jeff Merkley
Senator Ron Wyden
State Representative David Gomberg (District 10)
State Senator Arnie Roblan (District 5)
Sue Becraft (Board Assistant for Tillamook County)
Tillamook People's Utility District
Tim Josi (Tillamook County Commissioner)

5.4 TRIBES

The Confederated Tribes of Grand Ronde
The Confederated Tribes of Siletz

5.5 NON-GOVERNMENT ORGANIZATIONS

Audubon Society of Lincoln City
Environment OR
North Coast Watershed Association
OR Environmental Council
Oregon Sierra Club
Oregon Wild
The Greenbelt Land Trust
The Nature Conservancy of Oregon
The Xerces Society
Water Watch of Oregon
Wetlands Conservancy
Workers for a Livable Oregon

5.6 LANDOWNERS

Agency Creek Management Co.
American Eagle Mortgage 100 LLC
American Eagle Mortgage Mexico
Ashford, Sherrill A &
Beaver Water District
Beck, Dorothy J
Bentley, Mervin D & Deborah J
Brown, Muriel J
Buck, William D & Jacqueline J
C.G.C. Tree Farm Ltd
Casselman, Jim & Marie
Cavanaugh, Brian J & Amy J
Cemetery, Beaver Community Chu
Central Coast Land Conservancy
Chance, William K
Chapman, David T & Judith A S
Chitwood, Larry J Jr
Christian, Darci
Church, Of The Nazarene Of Hem
Columbia Credit Union
Cook, Jason Lee &
Cooper, Patrick & Charlene
Crowe, Todd & Tawnya
Cunningham, Laura M

Currie, Gene R & Judith W
Disselbrett, Lonnie D
Edwards, Michael D & Rita S
Ellis, Dwaine A & Sandra M
Erecan, Mustafa Nur
Erpelding, Leonard &
Farley, Mary Louise Trustee
Farstad, Shawn & Crystal R
Fast, Danny K & Debra A
Finnell, Rick & Sherrie
Fitch Development LLC
Fitch, Lester A & Sheila D
Fitzgerald, Carl E & C A
Fox, Laura J
Gefre, Patrick R & Laurie A
Geil, Jason R & Heather D
Geissler, Kenneth A 1/2 &
Gibbs Family LLC
Gilman, Sandra L
Goin, Gerald Jay
Hads, William R & Barbara A
Hagerty, Simon & Jessie
Hale, David A & Debra M
Hammond, John D & Donna L

Hancock, Anthony W & Susan J
Hayes, Arthur Jr & Tammy
Hesketh, Paul C & Lynette M
High Heaven Investments Inc 1/
Hodgdon, Edwin L & Deborah M
Hogevoll, Rodney C &
Hopkes, Paul M Co-Trustee &
Hugill, Paul L & Kathryn J
Hurliman, Tony &
Icenogle, Donna M
Johnson, Leslie Charles 1/2 &
Jones, Darcy R & Donna L
Journey, Ronald J & Sandra L
Kallio, Frank H
Kellow, Barry J Trustee
Kellow, Steven F & Mary K &
Keser, Patricia A Trustee
Konink, Kathryn Jane S
Kottre, Steve 1/2 &
Larson, Shad T
Lewis, Mike & Kathy
Livengood, Timothy J &
Long, Coleman C 1/2 &
Love, Mary E Trustee
Mashburn, Bill S Jr
Mazur, Marvin S & Debra L
Mcconkey, Mack E & Marguerite
Mckillip, James D & K M
Menefee, Richard & Sandy
Moersch, William L &
Nelson, Richard H Jr
Nestucca Bend Owners Association
Nestucca Forests LLC
Newhouse, Mary B
Ng, Peter T
Nicklaus, Betty M
Noble Sisters LLC
Nunn, Clifford D &
Oregon, State Of
Ouska, Joe T
Owens, Benjamin & Natosha 1/2
Pahl, Shirley M
Pappas, John W &
Peets, Phillip Vincent & Anita
Phelps, Charles H & Marilyn J
Pinto, David J
Prowell, Clifford E Trustee 1/
Pruter, Forest Walker
Reeder, Perry C Jr & Sharon L
Rivergreen Properties
Riverview Community Bank
Robbins, Donna &
Roos, Alan B & Sandra M
Rural Fire, Nestucca
Sanders, Adelaida G
Sanders, Charmaine K
School District #8
Sellers, Paula R
Sewell, Stephen E & Valerie M
Shluka, Kevin J
Sigman, Joseph M Sr
Smith, Donald Alan &
Spelbring, Dale L Trustee &
Spencer, Michael & Stacey E
Spoon, Kim Trustee
Stankewitsch, Leonard & Irene
Stimson Lumber Company
Stitt, Vincent J & Lisa A
Storey, Jeffrey W
Sumerlin, Susan Rosanne Jill
Sumerlin, William &
Tanzer, Sharron Lee 1/3 &
Teune, Daniel & Marie
Therrien, Virginia
Thiemens, Jacob M & Cassie R
Thorson, Darrel A
Tillamook PUD
Trent, Waymon M &
Underwood, Richard A & Karen
Vogel, Karl H Co-Trustee &
Wecker, Derek
West, Byron L & Loretta L
Wettstein, James R & Lori M
Woods Ella Estate
Woods, Derald & Phyllis
Woods, Wayne E & Lori K
Wyss, William D & Joann
Zalonis, Jesse & Sara

CHAPTER 6

GLOSSARY AND ACRONYMS

6.1 GLOSSARY

Abutment – structure built to support the end of a bridge deck.

Access road – roads and spurs that provide access to the transmission line corridor and structure sites during construction and operation and maintenance.

Aggregate – various loose particulate materials such as sand, gravel, or pebbles.

Airshed – a geographic area used to evaluate air quality. Typically involves areas regional in scale (e.g., Columbia Basin Airshed), though local airsheds can be defined as well.

Alluvial - deposited by a stream or running water.

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 such as Chinook, coho, and sockeye salmon and steelhead trout.

Angle structures – structures that support the transmission line at points where it changes direction at an angle of 15 degrees or more.

Aquifer – underground bed or layer of permeable rock, sediment, or soil that contains groundwater.

Area of Potential Effect - the area around a project where the character or use of historic resources may be impacted as a result of the project.

Arch pipe – a large, bottomless culvert.

Average daily traffic – the average number of vehicles that pass a specific point going both directions over a 24-hour period.

A-weighted decibels – logarithmic measurement of sound based on the decibel but weighted to approximate the human perception of sound. Commonly used for measuring environmental and industrial noise levels.

Best management practices – the practices determined by the discipline to be the most effective at achieving a specific goal.

Biological criteria – the descriptive qualities that must be present to support a desired condition in a waterbody, such as the presence, condition, and numbers of types of fish, insects algae, plants, and other organisms, and serve as the standard against which assessment results are compared.

Bridge deck – the surface portion of a bridge that is driven or walked upon.

Capacity – the ability to store an electrical charge.

Carbon dioxide equivalent – a measurement used to compare the global warming potential of a typical greenhouse gas, based on concentrations of carbon dioxide.

Centerline – the center line of the transmission corridor, which divides the corridor into halves of equal width.

Circuit – the pathway for an electrical current.

Co-Dominant – being one of two or more species that are equally dominant in a biotic community.

Compaction – the compression of soils by heavy equipment, which degrades soil structure and increases the risk of sheet erosion.

Conductor – the wire cable strung along a transmission line through which electricity flows.

Conifer – any of numerous, chiefly evergreen trees or shrubs including pine, fir, spruces, and other cone-bearing trees and shrubs.

Counterpoise – a weight that counterbalances the weight of the transmission lines, typically underground wires that extend horizontally from each structure and that connect with ground wire to provide lightning protection.

Corona – an electrical field around the surface of a conductor, insulator, or hardware caused by ionization of the surrounding air.

Critical Habitat - Habitat essential to the conservation of an endangered or threatened species that has been designated as critical by the US Fish and Wildlife Service or the National Marine Fisheries Service.

Cultural resources – historic, archaeological, or paleontological resources that are protected under federal statutes, regulations, and executive orders.

Culvert – a device used to carry or divert water from a drainage area in order 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.

Dampers – devices attached to insulators in order to minimize vibration of the conductors in windy conditions.

Danger trees – trees located off the transmission line corridor that are a current or future hazard to the transmission line.

Dead-end structure – a structure that can independently carry the weight and tension of conductors and is typically used on a straight alignment, at angles greater than 15 degrees, or over river crossings.

Debitage – all waste material produced during lithic reduction and the production of chipped stone tools.

Decibel – a logarithmic ratio of sound relative to a reference level.

Dissolved oxygen – the amount of oxygen dissolved in a body of water as an indication of the degree of health of the water and its ability to support a balanced aquatic ecosystem.

Distinct Population Segment – a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The federal Endangered Species Act provides for listing species, subspecies, or distinct population segments of vertebrate species.

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).

Dryland – land that receives little precipitation; used in reference to agricultural production without irrigation.

Electromagnetic field – the physical field around the electric wire or conductor that is produced when electric transmission is occurring.

Electromagnetic interference – interference of an electrical device caused by the presence of an electromagnetic field.

Endangered Species – a plant or animal species in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

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 and water.

Essential fish habitat – the environmental conditions that are necessary for the spawning, breeding, growth, and nurture of specific fish species.

Ethnobotanical - relating to cultural value of plants, including traditional uses for medicine, food, and fiber.

Ethnographic - relating to specific human cultures.

Evapotranspiration – the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.

Extirpate – locally extinct.

Flash flood – a rapid flood of a low-lying area such as a steep wash or canyon that results from intense rainfall.

Floodplain – the flat land that is adjacent to a surface water that is periodically flooded.

Forestry – the management of forests and forest land.

Fossil fuels – fuels derived from hydrocarbon deposits in the Earth's crust; typically combusted for energy (e.g., natural gas, oil, and coal).

Geomorphic – relating to the surface features of the Earth.

Global warming potential – a relative measure of how much heat a greenhouse gas 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.

Graminoids – herbaceous plants with narrow leaves growing from the base, including grasses (cereals, bamboo, and grassland), sedges, and rushes.

Greenhouse gas – 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.

Harassment – any act of pursuit, torment, or annoyance which has the potential to injure an animal in the wild; or, has the potential to disturb an animal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Historic isolate – an archaeological site with less than nine artifacts.

Hydraulic roughness – an estimate of the resistance to flow due to energy loss caused by friction between the channel and the water.

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.

Intermittent stream – a stream or waterway that only flows for part of the year.

Intertidal – occurring within, or forming, the area between the high and low tide levels in a coastal zone.

Kilovolt – one thousand volts of electrical power.

Landslide – a rapid movement of a large mass of earth and rocks down a hill or a mountainside.

Large woody debris – large woody matter that falls into surface waters and provides channel stability and habitat complexity for aquatic species.

Lattice-steel structure – a square or triangular transmission tower constructed steel poles.

Lek – traditional breeding area for sage and sharp-tailed grouse where male grouse assemble to establish dominance and display to attract females during the breeding season (also referred to as strutting-ground).

Liquefaction – a process whereby waterlogged soil becomes soft and liquid as a result of ground shaking.

Low-income population – a group of low-income residents who live in geographic proximity that could be disproportionately affected by a federal action.

Mass wasting – downhill movement of soil and rock fragments induced by gravity.

Microtopography - surface features of the earth on a small or microscopic scale.

Midden - a mound of domestic refuse containing shells and animal bones marking the site of a prehistoric settlement.

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.

Monotype – the only type of its group, as a single species constituting a genus.

Nonattainment area – an air basin that is not in compliance with applicable air quality standards for a specific pollutant.

Nonnative – 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.

100-year floodplain – areas that have a 1% chance of being flooded in a given year, as designated by the Federal Emergency Management Agency.

Old Growth – forest growth consisting of mature or overmature trees.

Ordinary High Water Marks - refers to the highest level reached by a body of water that has been maintained for a sufficient period of time to leave evidence on the landscape, including vegetation and soils.

Outage – the loss of electric power to an area caused by a natural or human disturbance to the electrical system.

Outlet Ditch – drainage outlet to ensure positive flow away from roadway.

Overstory – the uppermost layer of foliage in a forest, forming the canopy.

Palustrine wetlands – non-tidal wetlands that are substantially covered with emergent vegetation. Palustrine emergent wetlands are wetlands dominated by non-woody, soft-stemmed plants while palustrine scrub-shrub wetlands are dominated by woody vegetation, such as young trees and shrubs.

Particulate matter – a criteria air pollutant. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air.

Pelagic – living or growing at or near the surface of the ocean.

Perennial – refers to streams or waterways with continuous, year-round water flow.

Perched - unpressurized water held above the water table by impermeable rock or sediment.

Permeability – the rate at which a substance passes through a porous medium, such as dirt or rock.

Physiographic – the science of physical geography.

Pliocene – an epoch of the Tertiary period occurring between about 5 and 2 million years ago.

Predation –killing by other species.

Priority habitats – a habitat designated for protection because of its rarity or functional significance.

Propagule – a plant part that becomes detached from the rest of the plant and grows into a new plant.

Proposed special-status species – a species proposed for listing as having special-status by the U.S. Fish and Wildlife Service or National Marine Fisheries Service under the provisions of the Endangered Species Act.

Pulling and tensioning – the process of installing and tightening new conductors.

Quaternary Landslide – the geomorphic process by which soil, sand, and rock move downslope, typically as a mass, largely under the force of gravity, but frequently affected by water and water content.

Recharge Area – a place where water is able to seep into the ground and refill an aquifer because the soil or rock is permeable.

Reconductor – to replace the cable or wire on a transmission line.

Redox concentrations – zones of apparent accumulation of iron and manganese oxides in soils.

Retaining Wall – a wall designed for holding in place a mass of earth at the edge of a terrace or excavation.

Right-of-way – the corridor of land in which transmission structures and conductors are established, operated, and maintained.

Riparian – refers to vegetation or habitat situated on the banks of rivers and streams.

Riprap – crushed rock used to armor streambeds, culvert inlets and outlets, bridge abutments, pilings, and other structures against scour, water, or ice erosion.

Road bed – The surface of a road that is driven and walked upon, excluding any related ditches or curbs.

Rock Fill – crushed rock added in areas where landslide or slope stabilization is required.

Salmonid – member of the family of soft-finned fish that includes salmon and trout. Most are anadromous: they spawn in fresh water, but spend their life in the marine environment.

Scarify - the act of breaking up soil that has been compacted.

Sedimentary – rock formed from consolidated sediments.

Sensitive Species – a species that can only survive within a narrow range of environmental conditions and whose disappearance from an area is an index of pollution or other environmental change.

Seral – the stage of ecological succession. For example early refers to the vegetation community found soon after disturbance events.

Sheet erosion – the removal of a uniform, thin layer of soil by raindrops or water runoff on bare soil.

Silviculture – the cultivation of forest trees; forestry.

Sock line – the line or rope connected to a steel wire that is used to pull the conductors through the structures during installation.

Soil Creep – a long term process resulting from a combination of small movements of soil or rock in different directions over time and directed by gravity gradually downslope.

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.

Special-status species – plant or wildlife species that have been identified for protection and/or management under federal or state law.

Species of Concern – species about which either federal or state agencies have concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA.

Spur road – a short length of new road extending an existing road network.

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.

Structure – a type of support used to hold up transmission or substation equipment.

Subsistence – the means of supporting life; a living or livelihood.

Substation – the fenced site that contains the terminal switching and transformation equipment that transforms voltage.

Substrate – the substance or layer that underlies something, or on which some process occurs.

Successional – replacement of one kind of community by another kind; the progressive changes in vegetation and animal life that may culminate in the climax.

Surface water – open water bodies such as rivers, lakes, and streams.

Take – to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.

Tap Line – a line that connects to an existing transmission or distribution line without breakers at the tap point, resulting in an additional terminal on the existing line.

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 – the maximum amount of a pollutant that can be introduced to a water body while still being compliant with water quality standards.

Travel route – either a route through farm fields (temporary travel route) or existing non-public roads in good condition that may require improvement for use (permanent travel route).

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.

Volcanic Rocks - rocks formed from magma that has flowed out or has been violently ejected from a volcano.

Vulnerable Species – a species categorized as likely to become endangered unless the circumstances threatening its survival and reproduction improve.

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 – land that is permanently or periodically saturated with water. May be connected to a surface water or groundwater source. Indicators of wetlands include plant species adapted to such conditions, characteristic soil colors and chemical properties, and physical evidence of flooding or waterlogged soils.

6.2 ACRONYMS AND ABBREVIATIONS

ADT	average daily traffic
AMA	Adaptive Management Areas
AMR	Adaptive Management Reserves
AOL	Ahead-On-Line
APE	Area of Potential Effect
ARPA	Archaeological Resources Protection Act
BLM	Bureau of Land Management
BMP	best management practice
BOL	Back-On-Line
BPA	Bonneville Power Administration
CDP	Census designated place
CFR	Code of Federal Regulations
CH ₄	methane
CHU	Critical habitat unit
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
CZMA	Coastal Zone Management Act

DAHP	Washington Department of Archaeology and Historic Preservation
dba	A-weighted decibel
dbh	diameter at breast height
DLCD	Oregon Department of Land Conservation and Development
DOE	U.S. Department of Energy
DOGAMI	Oregon Department of Geology and Mineral Industries
DPS	distinct population segment
DSL	Oregon Department of State Lands
EA	environmental assessment
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
EIS	environmental impact statement
EMF	electromagnetic fields
EMI	electromagnetic interference
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
ESU	evolutionary significant unit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FPA	Forest Practices Act
FPPA	Farmland Protection Policy Act
G	gauss
GHG	greenhouse gas
GMA	Washington State Growth Management Act of 1990
Improvement Project	Boyer-Tillamook No. 1 Transmission Line Access Road Improvement Project
IPL	Inland Power & Light
kV	kilovolt

µg/m ³	micrograms per cubic meter
mG	milligauss
MOU	memorandum of understanding
MSE	mechanically stabilized engineered, used in reference to retaining walls
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOX	nitrogen oxides
NPCC	Northwest Power and Conservation Council
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWFP	Northwest Forest Plan
OCMP	Oregon Coastal Management Program
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon State Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OFM	Washington Office of Financial Management
ORPD	Oregon Parks and Recreation Department
ORS	Oregon Revised Statutes
PCBs	polychlorinated biphenyls
PCEs	primary constituent elements
PCC	Palouse River and Coulee City

PEM	palustrine emergent
PHS	priority habitats and species
PM10	particulate matter less than 10 micrometers in size
PM2.5	particulate matter less than 2.5 micrometers in size
PSS	palustrine scrub shrub
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
ROW	right-of-way
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Officer
SNF	Siuslaw National Forest
TCP	Traditional Cultural Property
TMDL	total maximum daily load
Type F	fish-bearing waters
Type N	non-fish-bearing waters
Type Np	perennial, non-fish-bearing waters
Type Ns	seasonal, non-fish-bearing waters
Type S	shorelines of the state
Type U	unidentified waters
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOCs	volatile organic compounds

CHAPTER 7

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APPENDIX A

FEDERAL SPECIES OF CONCERN AND STATE SENSITIVE WILDLIFE SPECIES IN TILLAMOOK AND YAMHILL COUNTIES AND THEIR LIKELIHOOD OF OCCURRENCE IN THE PROJECT AREA

Type	Species	Federal Status	State Status	Documented (D) or Suspected (S) Occurrence in Siuslaw National Forest
Fish	Coastal cutthroat trout (Oregon Coast ESU) <i>Oncorhynchus clarkii</i>	Species of Concern	-	-
	Chinook salmon (Oregon Coast ESU, spring run) <i>Oncorhynchus tshawytscha</i>	-	Sensitive - critical	-
	Chum salmon (Pacific Coast ESU) <i>Oncorhynchus keta</i>	-	Sensitive - critical	-
	Pacific lamprey <i>Lampetra tridentata</i>	Species of Concern	Sensitive - vulnerable	-
	Steelhead (Oregon Coast ESU, summer run) <i>Oncorhynchus mykiss</i>	Species of Concern	Sensitive - vulnerable	-
	Steelhead (Oregon Coast ESU, winter run) <i>Oncorhynchus mykiss</i>	Species of Concern	Sensitive - vulnerable	-
	Western brook lamprey <i>Lampetra richardsoni</i>	-	Sensitive - vulnerable	-
Birds	Acorn woodpecker <i>Melanerpes formicivorus</i>	Species of Concern	-	-
	American Three-toed Woodpecker <i>Picoides dorsalis</i>	-	Sensitive - vulnerable	-
	Arctic Peregrine Falcon <i>Falco peregrinus tundrius</i>	-	Sensitive - vulnerable	-
	American Peregrine Falcon <i>Falco peregrinus anatum</i>	-	Sensitive - vulnerable	Documented
	American White Pelican <i>Pelecanus erythrorhynchos</i>	-	Sensitive - vulnerable	-
	Band-tailed pigeon <i>Patagioenas fasciata</i>	Species of Concern	-	-
	Black-backed Woodpecker <i>Picoides arcticus</i>	-	Sensitive - vulnerable	-
	Black Oystercatcher <i>Haematopus bachmani</i>	Species of Concern	Sensitive - vulnerable	-

Appendix A

Federal Species of Concern and State Sensitive Wildlife Species

Type	Species	Federal Status	State Status	Documented (D) or Suspected (S) Occurrence in Siuslaw National Forest
	Bobolink <i>Dolichonyx oryzivorus</i>	-	Sensitive - vulnerable	-
	Cassin's Auklet <i>Ptychoramphus aleuticus</i>	-	Sensitive - vulnerable	-
	Flammulated Owl <i>Otus flammeolus</i>	-	Sensitive - vulnerable	-
	Franklin's Gull <i>Larus pipixcan</i>	-	Sensitive - vulnerable	-
	Grasshopper Sparrow <i>Ammodramus savannarum</i>	-	Sensitive - vulnerable	-
	Great Gray Owl <i>Strix nebulosa</i>	-	Sensitive - vulnerable	-
	Harlequin duck <i>Histrionicus histrionicus</i>	Species of Concern	-	-
	Lewis's Woodpecker <i>Melanerpes lewis</i>	Species of Concern	Sensitive - critical	-
	Little Willow Flycatcher <i>Empidonax traillii brewsteri</i>	-	Sensitive - vulnerable	-
	Mountain quail <i>Oreortyx pictus</i>	Species of Concern	-	-
	Northern Goshawk <i>Accipiter gentilis</i>	-	Sensitive - vulnerable	-
	Olive-sided Flycatcher <i>Contopus cooperi</i>	Species of Concern	Sensitive - vulnerable	-
	Oregon vesper sparrow <i>Poocetes gramineus affinis</i>	Species of Concern	-	-
	Purple Martin <i>Progne subis</i>	Species of Concern	Sensitive - critical	Documented
	Red-necked Grebe <i>Podiceps grisegena</i>	-	Sensitive - critical	-
	Rhinoceros Auklet <i>Cerorhinca monocerata</i>	-	Sensitive - vulnerable	-
	Snowy Egret <i>Egretta thula</i>	-	Sensitive - vulnerable	-

Type	Species	Federal Status	State Status	Documented (D) or Suspected (S) Occurrence in Siuslaw National Forest
	Spruce Grouse <i>Falcipennis canadensis</i>	-	Sensitive - vulnerable	-
	Swainson's Hawk <i>Buteo swainsoni</i>	-	Sensitive - vulnerable	-
	Tufted Puffin <i>Fratercula cirrhata</i>	-	Sensitive - vulnerable	-
	Upland Sandpiper <i>Bartramia longicauda</i>	-	Sensitive - critical	-
	Yellow-billed Cuckoo <i>Coccyzus americanus</i>	-	Sensitive - critical	-
	Yellow-breasted chat <i>Icteria virens</i>	Species of Concern	-	-
	Yellow Rail <i>Coturnicops noveboracensis</i>	-	Sensitive - critical	-
Amphibians	Black Salamander <i>Aneides flavipunctatus</i>	-	Sensitive - vulnerable	-
	Cascades Frog <i>Rana cascadae</i>	-	Sensitive - vulnerable	-
	Cascade Torrent Salamander <i>Rhyacotriton cascadae</i>	-	Sensitive - vulnerable	-
	Clouded Salamander <i>Aneides ferreus</i>	-	Sensitive - vulnerable	-
	Coastal Tailed Frog <i>Ascaphus truei</i>	Species of Concern	Sensitive - vulnerable	-
	Columbia Torrent Salamander <i>Rhyacotriton kezeri</i>	-	Sensitive - vulnerable	-
	Cope's Giant Salamander <i>Dicamptodon copei</i>	-	Sensitive - vulnerable	-
	Del Norte Salamander <i>Plethodon elongatus</i>	-	Sensitive - vulnerable	-
	Foothill Yellow-legged Frog <i>Rana boylei</i>	-	Sensitive - vulnerable	Suspected
	Larch Mountain Salamander <i>Plethodon larselli</i>	-	Sensitive - vulnerable	-

Appendix A

Federal Species of Concern and State Sensitive Wildlife Species

Type	Species	Federal Status	State Status	Documented (D) or Suspected (S) Occurrence in Siuslaw National Forest
	Northern Leopard Frog <i>Lithobates pipiens</i>	-	Sensitive – critical	-
	Northern Pacific pond turtle <i>Actinemys marmorata marmorata</i>	Species of Concern	-	-
	Northern red-legged frog <i>Rana aurora aurora</i>	Species of Concern	Sensitive – vulnerable	-
	Oregon Slender Salamander <i>Batrachoseps wrightorum</i>	-	Sensitive – vulnerable	-
	Oregon Spotted Frog <i>Rana pretiosa</i>	-	Sensitive – critical	-
	Siskiyou Mountains Salamander <i>Plethodon stormi</i>	-	Sensitive – vulnerable	-
	Southern Torrent Salamander <i>Rhyacotriton variegatus</i>	Species of Concern	Sensitive – vulnerable	-
	Rocky Mountain Tailed Frog <i>Ascaphus montanus</i>	-	Sensitive – vulnerable	-
	Western Toad <i>Anaxyrus boreas</i>	-	Sensitive – vulnerable	-
Reptiles	California Mountain Kingsnake <i>Lampropeltis zonata</i>	-	Sensitive – vulnerable	-
	Common Kingsnake <i>Lampropeltis getula</i>	-	Sensitive – vulnerable	-
	Western Painted Turtle <i>Chrysemys picta bellii</i>	-	Sensitive – critical	-
	Western Pond Turtle <i>Actinemys marmorata</i>	-	Sensitive – critical	Documented
Mammals	American Marten <i>Martes americana</i>	-	Sensitive – vulnerable	-
	California Myotis <i>Myotis californicus</i>	-	Sensitive – vulnerable	-
	Camas pocket gopher <i>Thomomys bulbivorus</i>	Species of Concern	-	-

Appendix A
Federal Species of Concern and State Sensitive Wildlife Species

Type	Species	Federal Status	State Status	Documented (D) or Suspected (S) Occurrence in Siuslaw National Forest
	<i>Fisher Martes pennant</i>	-	Sensitive – critical	Documented
	Fringed myotis bat <i>Myotis thysanodes</i>	Species of Concern	Sensitive – vulnerable	Suspected
	Hoary bat <i>Lasiurus cinereus</i>	-	Sensitive – vulnerable	-
	Long-eared myotis bat <i>Myotis evotis</i>	Species of Concern	-	-
	Long-legged myotis bat <i>Myotis volans</i>	Species of Concern	Sensitive – vulnerable	-
	Pallid Bat <i>Antrozous pallidus</i>	-	Sensitive - vulnerable	-
	Ringtail <i>Bassariscus astutus</i>	-	Sensitive - vulnerable	-
	Silver-haired bat <i>Lasionycteris noctivagans</i>	Species of Concern	Sensitive - vulnerable	-
	Spotted Bat <i>Euderma maculatum</i>	-	Sensitive - vulnerable	-
	Townsend's western big-eared bat <i>Corynorhinus townsendii townsendii</i>	Species of Concern	Sensitive - critical	-
	White-footed vole <i>Arborimus albipes</i>	Species of Concern	-	-
	White-tailed Jackrabbit <i>Lepus townsendii</i>	-	Sensitive - vulnerable	-
	Yuma myotis bat <i>Myotis yumanesis</i>	Species of Concern	-	-
Invertebrates	American acetropis grass bug <i>Acetropis americana</i>	Species of Concern	-	-

Sources: ODFW 2008, USFWS 2013a, USFWS 2013b, USFS 2011.

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APPENDIX B

CULTURAL RESOURCES PROPOSED ACTION APE MAPS

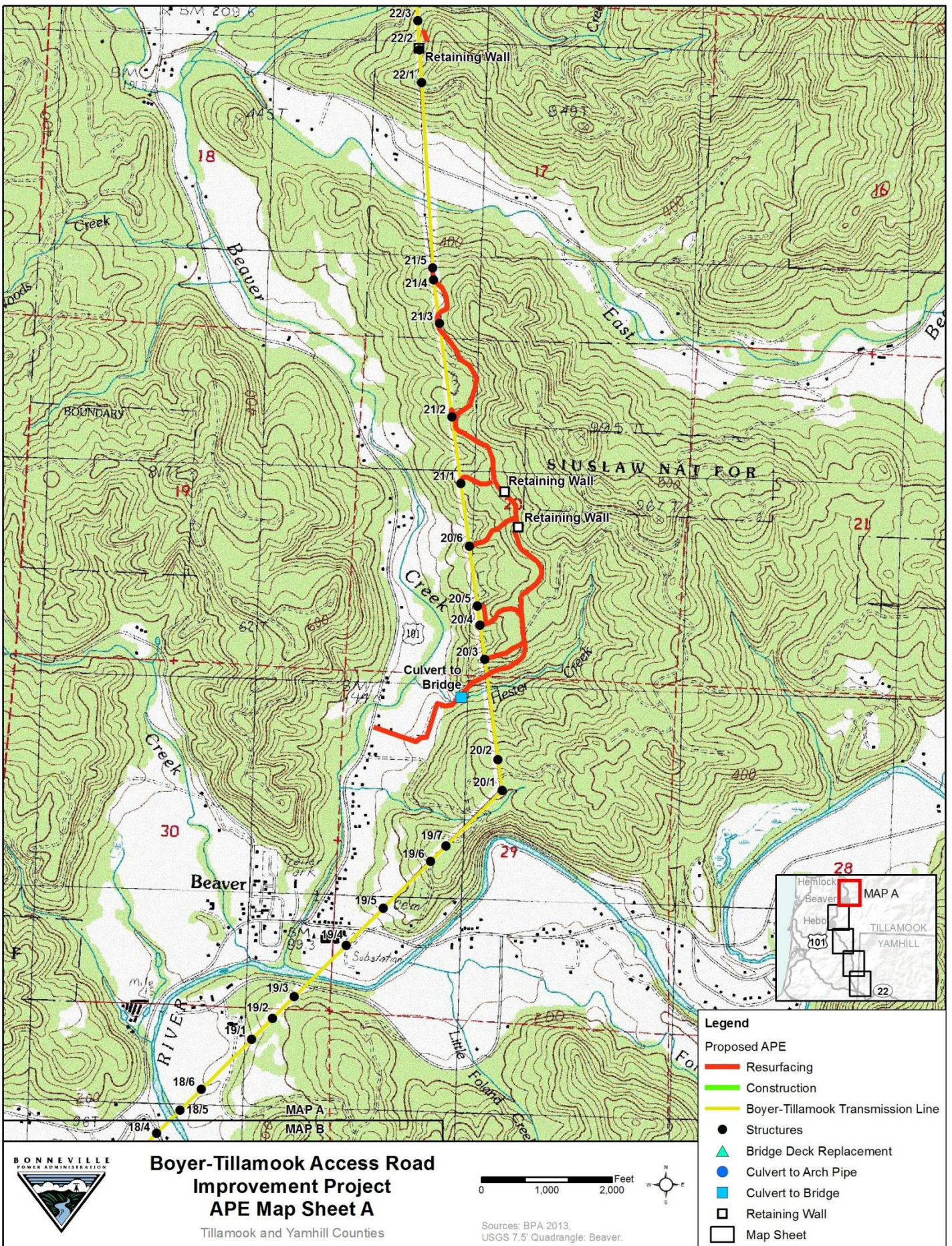


Figure B-1. Proposed Action APE, Map

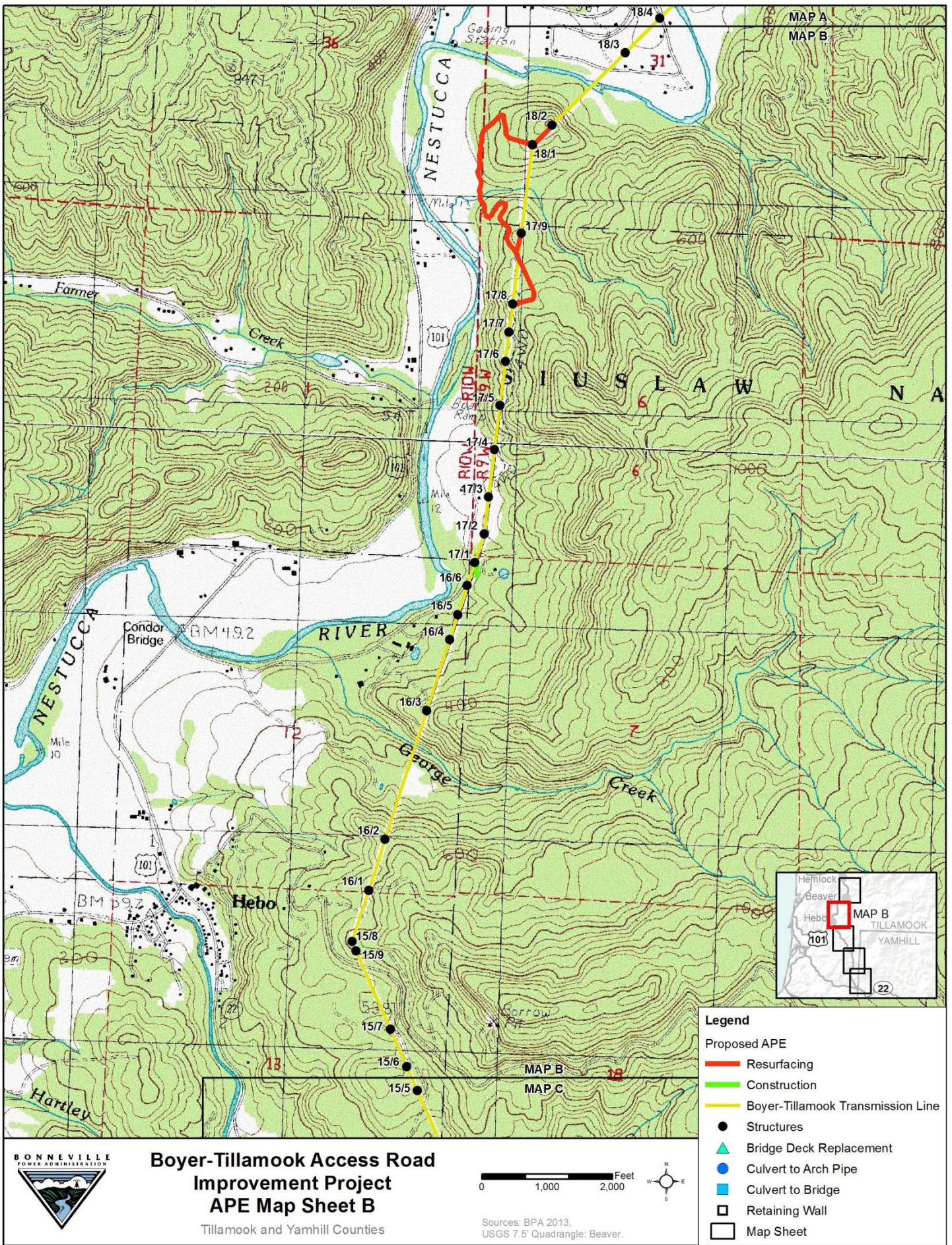


Figure B-2. Proposed Action APE, Map B

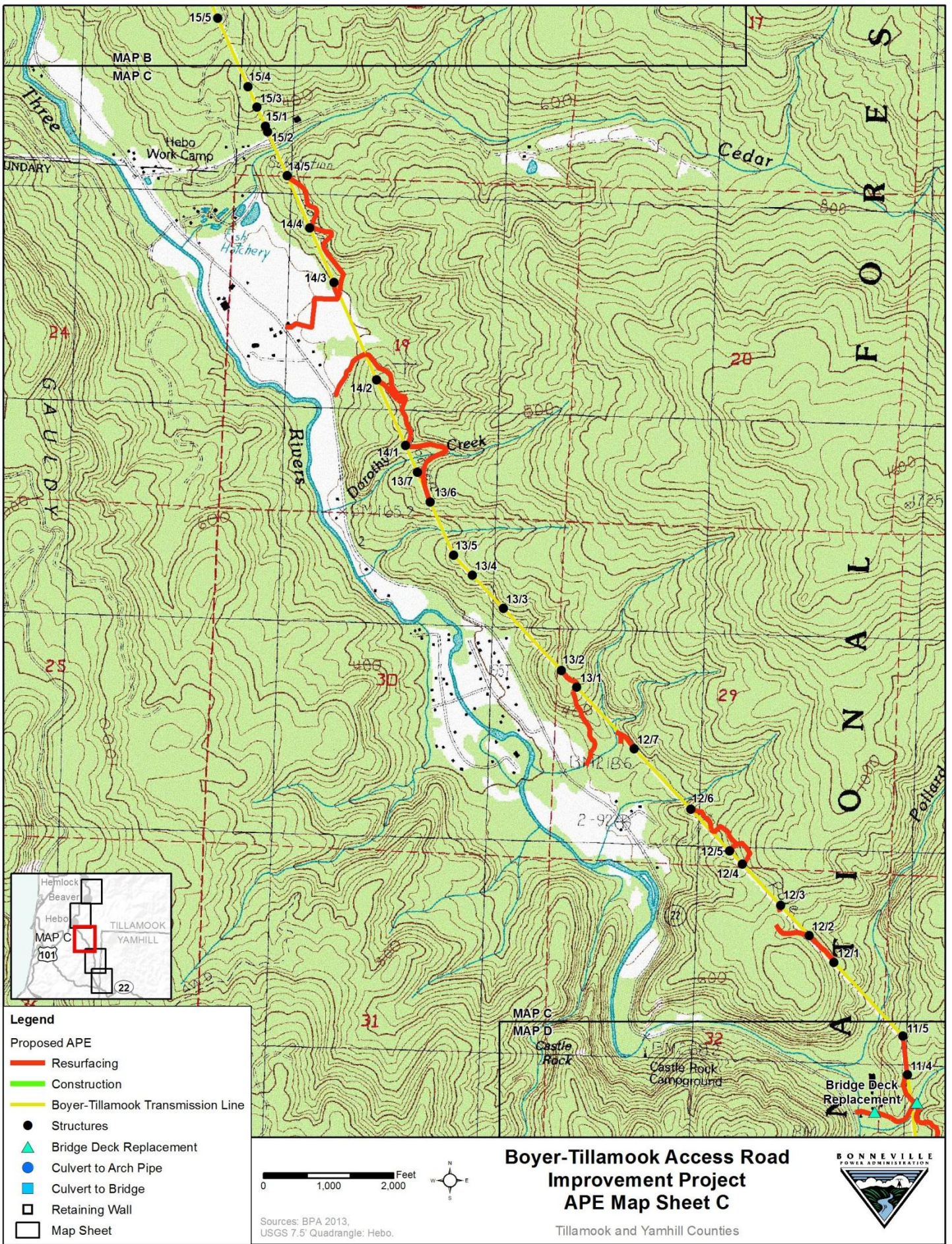


Figure B-3. Proposed Action APE, Map C

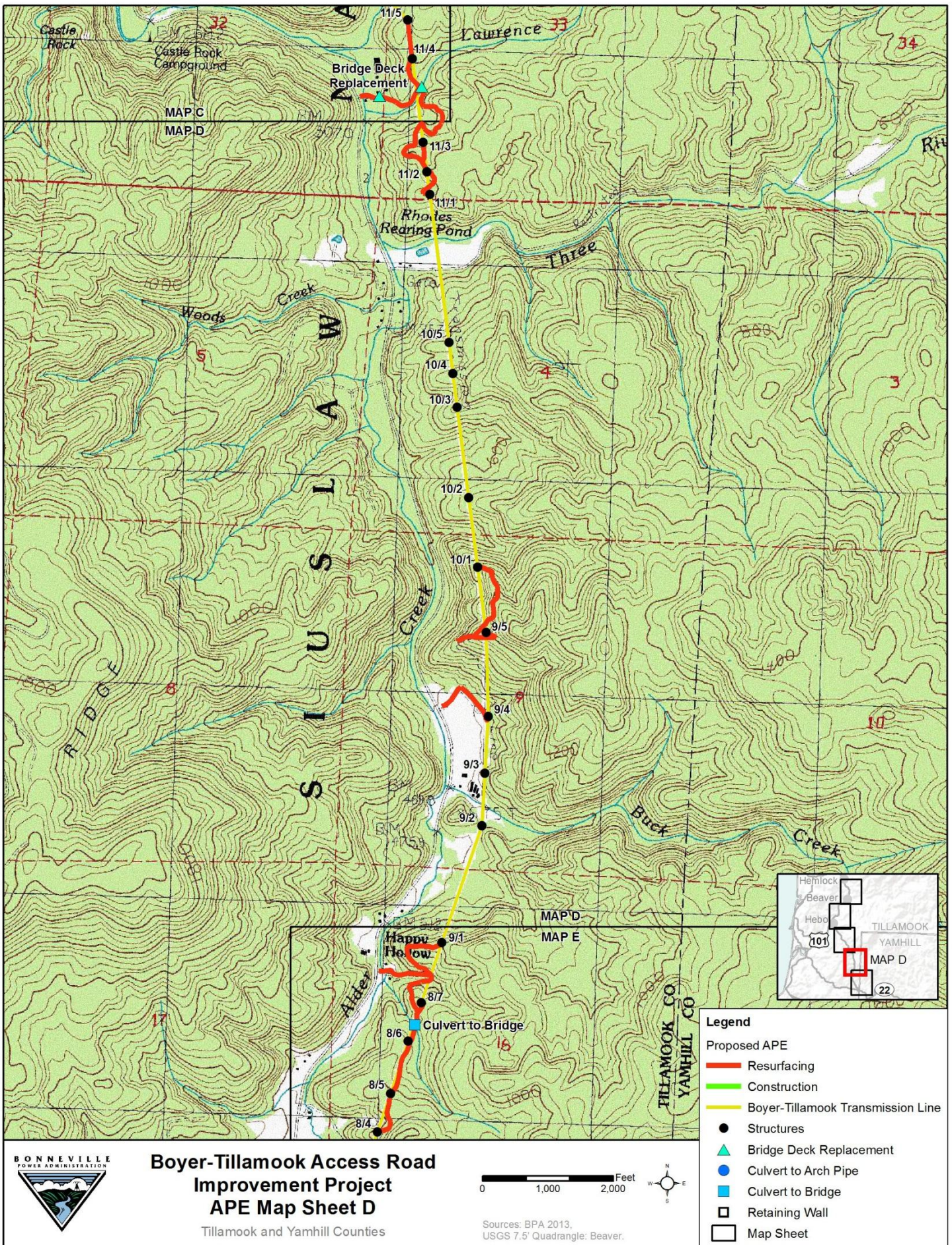
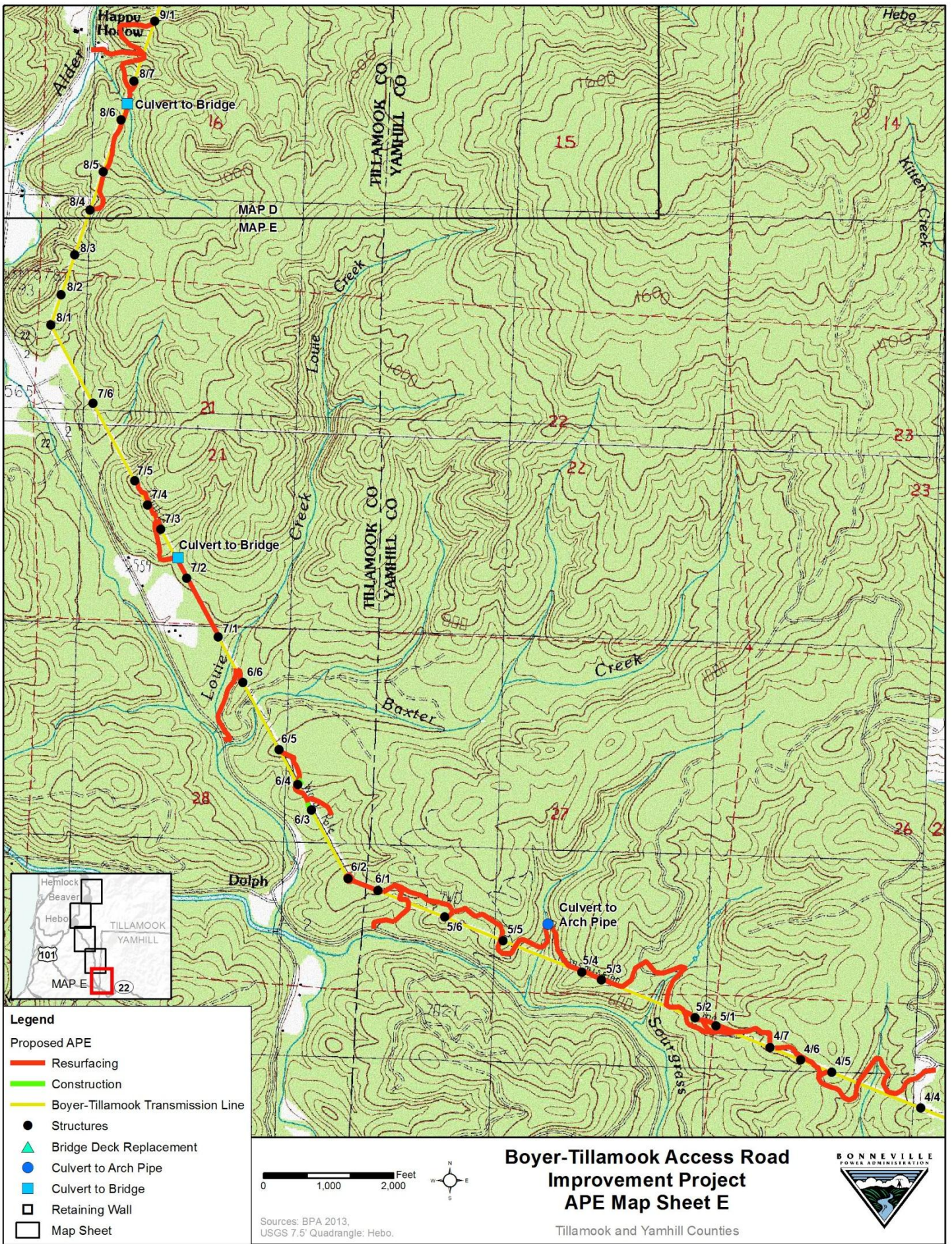


Figure B-4. Proposed Action APE, Map D



Date: 8/21/2013 GIS Analyst: NJH Map Document: MapSheetsDRGLLeft.mxd Project Number: 40268006

Figure B-5. Proposed Action APE, Map

APPENDIX C

NMFS BIOLOGICAL ASSESSMENT

(Document under construction, to be provided in final EA)

APPENDIX D

USFWS BIOLOGICAL ASSESSMENT

(Document under construction, to be provided in final EA)

APPENDIX E

GREENHOUSE GAS ANALYSIS

APPENDIX E

GREENHOUSE GAS ANALYSIS

INTRODUCTION

Greenhouse gases (GHG) are chemical compounds found in the Earth's atmosphere that absorb and trap infrared radiation as heat. They are released both naturally and through human activities such as deforestation, soil disturbance, and burning of fossil fuels. These activities disrupt the natural cycle by increasing the GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. The resulting build up of heat in the atmosphere due to increased GHG levels causes warming of the planet through a greenhouse-like effect (EIA 2009a). The average temperature on Earth has risen by 1.5 degrees Fahrenheit over the past century (EPA 2013a). Most of the warming has been caused by GHG emissions (EPA 2013a). Scientists predict that the temperature will rise another 2 to 11.5 degrees Fahrenheit over the next century (EPA 2013a).

The principal GHGs emitted into the atmosphere through human activities are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorinated gases (EPA 2012).

- **Carbon dioxide** is the major GHG emitted (EPA 2013b; Houghton 2010). CO₂ 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. CO₂ emissions resulting from the combustion of coal, oil, and gas constitute 84% of all U.S. GHG emissions (EPA 2013b). Before the industrial revolution, CO₂ concentrations in the atmosphere were roughly stable at 280 parts per million. By 2010, CO₂ levels had increased to 390 parts per million, a 40% increase, as a result of human activities (EPA 2013a).
- **Methane** is emitted during the processing and transport of fossil fuels, through intensive animal farming, and by the degradation of organic waste. Concentrations of CH₄ in the atmosphere have increased more than 2.5 times of preindustrial levels (EPA 2013a).
- **Nitrous oxide** is emitted during agricultural and industrial activities and during the combustion of fossil fuels and solid waste. Atmospheric levels of N₂O have increased 18% since the beginning of industrial activities (EPA 2013a).
- **Fluorinated gases**, including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆), are synthetic compounds emitted through industrial processes. They sometimes replace ozone-depleting compounds such as chlorofluorocarbons (CFCs) in insulating foams, refrigeration, and air conditioning. Although fluorinated gases are emitted in small quantities, fluorinated gases have the ability to trap more heat than CO₂ and are considered gases with a high global warming potential (EPA 2013).

While models predict that atmospheric concentrations of all GHGs will increase over the next century due to human activity, the extent and rate of change is difficult to predict, especially on a global scale. As a response to concerns over the predicted increase of global GHG levels, various federal and state mandates address the need to reduce GHG emissions, including those described below.

- The federal **Clean Air Act** establishes regulations to control emissions from large generation sources such as power plants: limited regulation of GHG emissions occurs through a review of new sources.

- The U.S. Environmental Protection Agency (EPA) has issued the **Final Mandatory Reporting of Greenhouse Gases Rule** that requires reporting of GHG emissions from large sources. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHGs are required to submit annual reports to EPA, although no other action is required (40 CFR Parts 86, 87, 89 et al. Final Rule October 30, 2009).
- **Executive Orders 13423 and 13514** require federal agencies to measure, manage, and reduce GHG emissions by agency-defined target amounts and dates.
- In **Washington State, Executive Orders 07-02 and 09-05** direct state agencies to work with western states and Canadian provinces to develop a regional emissions reduction program designed to reduce GHG emissions to 1990 levels by 2020.

ACTIVITIES THAT WOULD CONTRIBUTE TO GREENHOUSE GAS EMISSIONS

The Proposed Action would involve construction and reconstruction of access roads for the Boyer to Tillamook No.1 transmission line. Under the No Action Alternative, the access road construction and reconstruction would occur and ongoing operation and maintenance activities would continue. Implementation of the Proposed Action would contribute to an increase in GHG concentrations through the following activities, each discussed in more detail below:

- **construction:** use of gasoline and diesel-powered vehicles, including cars, trucks, construction equipment, and helicopters; and tree removal to allow for construction of the project and safe passage of vehicles.
- **tree removal:** the permanent removal of trees and other vegetation would occur as a result of road construction and reconstruction. Although permanent tree removal would not immediately emit any GHGs, it would reduce the level of solid carbon storage in the area.
- **ongoing operation and maintenance:** use of gasoline and diesel-powered vehicles for routine patrols, maintenance project work (vegetation management and site-specific repairs of roads and transmission line structures and associated hardware), emergency maintenance, and resource review.

METHODS USED TO CALCULATE GREENHOUSE GAS EMISSIONS

CONSTRUCTION

Project construction would take about 4 months (June through October), with peak construction activity occurring during a 3-month-long period. 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 GHG 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. GHG emissions were calculated for both the 4-month-long peak construction period and the 1-month-long non-peak period based on estimates of vehicle round trips per day.

Overestimating the number of round trips ensures that GHG emission estimates are conservatively high. The number of round trips was deliberately overestimated using the following assumptions.

- Construction crews would be based out of Tillamook, the nearest large town.
- 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 Tillamook Substation and back (about 162 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 2013c). Again, this is likely an overestimation as more efficient vehicles may be occasionally used.
- Up to 20 construction workers would be at work on the road project during the peak construction period (4 months) and an estimated 5 workers could be present during the non-peak construction period (1 month).

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 one round trip every other week from the Portland, Oregon BPA Headquarters during the 4-month-long construction period would result in a total of 5 round trips at an estimated 162 miles per trip.

Fuel consumption and GHG 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.

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 10 equipment machines would be in operation during peak construction and 1 equipment machine 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% 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).

GHG emissions associated with equipment operation were overestimated to account for all potential construction activities and associated material deliveries to and from the construction site. They are also expected to account for the low levels of GHG emissions related to temporary soil disruption and damaged vegetation from construction activities, which were not estimated separately in this analysis. GHG emissions that result from soil disturbance are short-lived and return to background levels within several hours (Kessavalou et al. 1998). Emissions from decomposing vegetation would also be relatively short-lived where vegetation would be allowed to reestablish following construction.

TREE CLEARING

Tree growth and future carbon sequestration rates are highly variable and depend on several factors, including the species of tree, age of tree, climate, forest density, and soil conditions. In total, approximately 3.73 acres of tree cover would be permanently converted as a result of the Proposed Action. The operation of tree removal equipment to clear these trees was included within the construction analysis above.

OPERATIONS AND MAINTENANCE

During operation and maintenance of the access roads, the following annual activities would result in GHG emissions:

- Maintenance of roads and structures and associated hardware: 1 round trip every two years, from the BPA Portland office, 162 miles; and
- Emergency maintenance to address line outages, landslides, and other unpredicted events: 0.25 round trips per year (approximately 1 trip every 4 years), from BPA Portland office, 162 miles round trip.

Vegetation management activities, including mowing along roadsides and weed control, would be conducted during most years. Because vegetation management does not include permanent vegetation removal, this activity was not included in GHG calculations.

Calculations of GHG emissions include operations and maintenance work for the estimated 50-year life span of the improved access roads.

RESULTS

GHG emissions were calculated using the estimated values described above for two types of activities: construction of the Proposed Action and ongoing annual operations and maintenance for the estimated 50-year life span of the transmission line. Each type of activity is discussed separately below.

CONSTRUCTION EMISSIONS

Table E-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 948 metric tons of CO₂e¹ (equivalent carbon dioxide) emissions. All GHG emissions associated with construction activities would occur in the first year. The project's contribution to GHG emissions during construction would be **low**.

¹ CO₂e 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 1.

Table E-1. Estimated Greenhouse Gas Emissions from Project Construction

Estimated GHG Emissions of Construction Activities	CO ₂ (metric tons)	CH ₄ (CO ₂ e) ¹ (metric tons)	N ₂ O (CO ₂ e) ¹ (metric tons)	Total CO ₂ e (metric tons) ³
Peak construction transportation	26.9	17.6	105.3	149.8
Off-peak construction transportation	2.0	1.3	8.0	11.4
BPA employee transportation	0.7	0.5	2.9	4.1
Helicopter operation	0.0	0.0	0.0	0.0
Peak construction: equipment operation	751.4	0.8	5.0	757.2
Off-peak construction: equipment operation	25.0	0.0	0.2	25.2
TOTALS	806.1	20.3	121.4	947.7

¹ CO₂ emission factors calculated from DOE and EIA 2011. CH₄ and N₂O emission factors from EPA 2013b.

² CH₄ and N₂O emissions have been converted into units of equivalent carbon dioxide (CO₂e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH₄ and 310 GWP for N₂O (ICBE 2000).

³ The sum of the individual entries may not sum to the total depicted due to rounding.

TREE CLEARING EMISSIONS

Assuming each affected acre contains only Hemlock, which contains the maximum carbon density for a forest in the Pacific Northwest, the net carbon footprint associated with the removal of trees under the Proposed Action would be an estimated 5,155 metric tons of CO₂e² (equivalent carbon dioxide) (Table E-2). The project’s contribution to GHG emissions due to tree clearing would be **low**.

Table E-2. Estimated Greenhouse Gas Emissions from Tree Clearing

Purpose	Total CO ₂ -eq Storage Loss (metric tons)
New Access Roads	4,180
Hazard Tree Clearing	935
TOTAL	5,115

OPERATIONS AND MAINTENANCE EMISSIONS

Table E-3 displays the contribution to GHG emissions that would result from operations and maintenance activities. Proposed Action operations and maintenance would result in an estimated 111 metric tons of CO₂e emissions over the life of the project. Given this estimate, the impact of operations and maintenance activities on GHG emissions would be **low**.

² CO₂e 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 1.

Table E-3. Estimated Greenhouse Gas Emissions from Operations and Maintenance for the Life of the Project

Type of Operation and Maintenance Activity	CO ₂ (metric tons)	CH ₄ (CO ₂ e) ¹ (metric tons)	N ₂ O (CO ₂ e) ¹ (metric tons)	Total CO ₂ e (metric tons) ³
Routine patrols	0.0	0.0	0.0	0.0
Maintenance work	0.4	0.1	1.5	2.0
Emergency maintenance	0.2	0.1	0.8	1.0
Natural resource review	0.0	0.0	0.0	0.0
Helicopter surveys	0.0	0.0	0.0	0.0
TOTALS³	0.6	0.2	2.3	3.0

¹ CO₂ emission factors calculated from DOE and EIA 2011. CH₄ and N₂O emission factors from EPA 2013b.

² CH₄ and N₂O emissions have been converted into units of equivalent carbon dioxide (CO₂e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH₄ and 310 GWP for N₂O (ICBE 2000).

³ The sum of the individual entries may not sum to the total depicted due to rounding.

SUMMARY OF RESULTS

To summarize, the Proposed Action would result in an estimated total of 948 metric tons of CO₂e emissions during the construction phase, and an estimated 3 metric tons of CO₂e emissions from ongoing operation and maintenance activities over the life of the project. Tree clearing would result in lost carbon storage equivalent to 5,155 metric tons of CO₂.

To provide context for this level of emissions, EPA's mandatory reporting threshold for annual CO₂ emissions is 25,000 metric tons of CO₂e, roughly the amount of CO₂ generated by 4,400 passenger vehicles per year. The project construction emissions would be equivalent to the emissions from approximately 166 passenger vehicles per year. Project operation and maintenance emissions would be equivalent to the emissions from less than one passenger vehicles per year. Tree clearing would result in loss of carbon storage equivalent to 907 passenger vehicles per year. All levels of GHG emissions are significant in that they contribute to global GHG concentrations and climate change, but given the small anticipated contribution from the project, the project's impact on GHG concentrations would be *low*.

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