BONNEVILLE POWER ADMINISTRATION

Northern Mid-Columbia Joint Project

Draft Environmental Assessment

November 2014

DOE/EA-1945

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Chapter 1 Purpose of and Need for Action

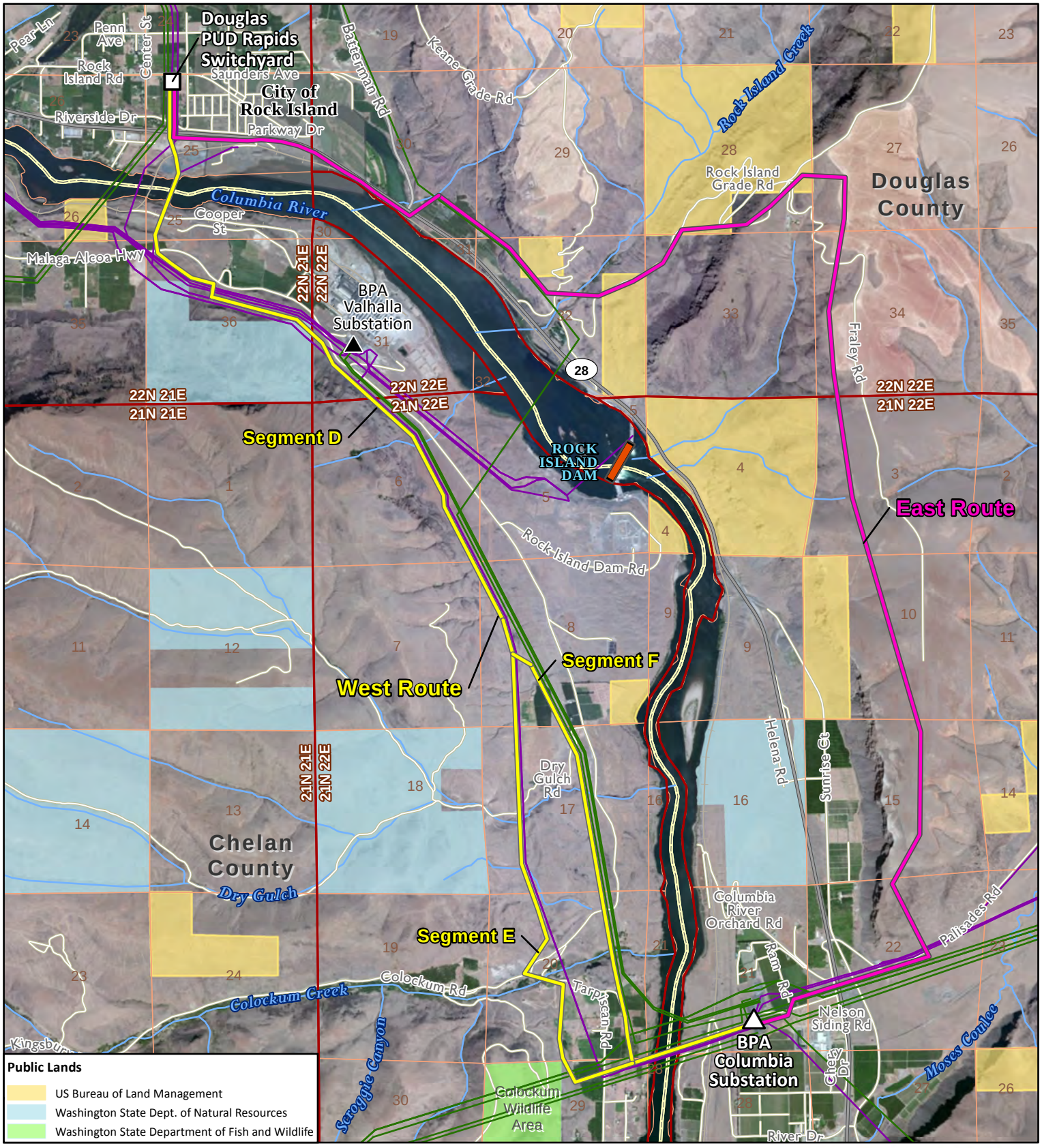
1.1. INTRODUCTION

Bonneville Power Administration (BPA) is proposing to participate in the construction of a new 230-***kilovolt***[1] (kV) ***transmission line*** and associated facilities in the northern mid-Columbia area of Washington State. The overall project is referred to as the Northern Mid-Columbia Joint Project (Joint Project or Proposed Action), while the proposed transmission line is referred to as the Rapids – Columbia 230-kV transmission line. This proposed transmission line would extend from Douglas County ***Public Utility District*** (Douglas PUD) No. 1's Rapids Switchyard, located outside the city limits but within the urban growth boundary of the City of Rock Island, to BPA's Columbia ***Substation*** (See Figure 1.1).

Both endpoints of the approximately 8- to 11-mile long proposed transmission line are in Douglas County, Washington. Douglas PUD would permit, design, build, own, and operate the proposed line. BPA participation in the Joint Project would involve (1) providing partial funding for construction of the new line, and (2) adding equipment to BPA's existing Columbia Substation to interconnect the proposed line to the Federal Columbia River Transmission System (FCRTS).

BPA prepared this draft ***environmental assessment*** (EA) for this proposal pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 USC 4321 et seq.), which requires federal agencies to assess the impacts their actions may have on the environment. This draft EA describes anticipated impacts to natural and human resources from the Northern Mid-Columbia Joint Project (Joint Project or Proposed Action). It includes construction ***best management practices*** and ***mitigation*** measures that would help avoid or minimize these impacts. The analysis in this draft EA will be used by BPA to determine if the Proposed Action would cause environmental effects of a magnitude that would warrant preparation of an ***environmental impact statement*** (EIS), or whether it is appropriate to prepare a ***finding of no significant impact*** (FONSI).

[1] Terms defined in Chapter 6, Glossary, are shown in bold, italicized typeface the first time they are used.



Project Vicinity Map

Proposed Northern Mid-Columbia Joint Project

Chelan and Douglas Counties, Washington

- Douglas PUD Switchyard (work proposed)
- BPA Substation (work proposed)
- BPA Substation (no work proposed)
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section Boundary
- County Boundary

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives

0 ½ 1 2 Miles

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Figure 1.1

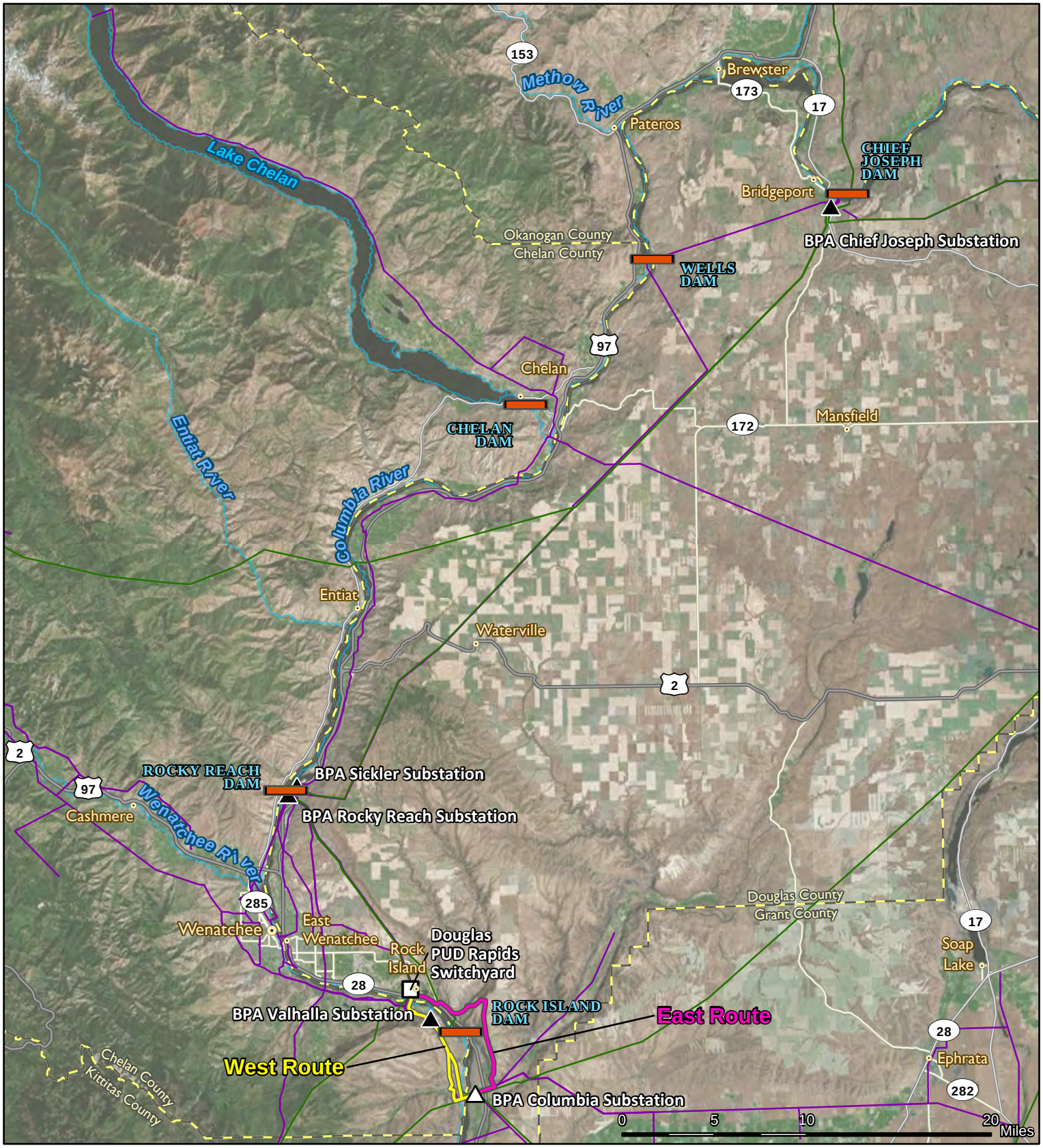
1.2. BACKGROUND

BPA is a federal agency that owns and operates more than 15,000 miles of ***high-voltage*** transmission lines. BPA's transmission lines move most of the Pacific Northwest's high-voltage power from facilities that generate power to utility customers 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 the improvements, additions, and replacements to its transmission system necessary to maintain electrical ***stability*** and ***reliability***, as well as to provide service to BPA's customers (16 United States Code [USC] 838b(b–d)).

Chelan County PUD, Grant County PUD, and Douglas County PUD (mid-Columbia PUDs) own and operate electrical systems in the northern mid-Columbia area that are interconnected to the FCRTS. The northern mid-Columbia area and the hydroelectric dams in this area are depicted in Figure 1.2. The electrical systems of the mid-Columbia PUDs deliver electric power to and from BPA over the FCRTS. There are currently periods of transmission congestion that occur on the mid-Columbia area transmission system. Transmission line congestion occurs when too much power enters transmission lines without sufficient ***capacity***, causing them to ***overload***. Overloading of transmission lines causes these lines to operate at over 100 percent of their present temperature rating. Overloads can result in thermal heating on transmission lines that can lead to ***power outages***.

Accordingly, BPA and the mid-Columbia PUDs are currently required to operate the mid-Columbia area transmission system and mid-Columbia hydroelectric generation facilities to avoid transmission line thermal overloads under certain conditions when there is transmission congestion. In particular, seasonal power generation patterns expose the transmission system to costly operating adjustments to meet ***demands***. The problems are most severe in the summer season because hydroelectric generation is highest in the summer when the thermal capability of the electrical system is at its lowest.

Because of the existing transmission congestion and the need for special operating procedures to prevent overloads, the overall operational flexibility of the northern mid-Columbia electrical system is significantly reduced. The implementation of operational procedures to prevent overloads in the northern mid-Columbia transmission area can result in the need to ***redispatch*** or reduce generation at the Chelan PUD Rocky Reach and Douglas PUD Wells hydroelectric generation facilities, decreasing the ability to serve hourly demands and reducing the ability of the PUDs to generate revenue. The congested system adds another undesirable variable that constrains the operation of the Columbia River hydroelectric generation facilities.



Northern Mid-Columbia Area Map

Proposed Northern Mid-Columbia Joint Project

Chelan and Douglas Counties, Washington

- Douglas PUD Rapids Switchyard (work proposed)
- BPA Substation (work proposed)
- BPA Substation (no work proposed)
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- County Boundary
- Hydroelectric Dam

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives

Roads

- US Highways
- State Highways
- Major Roads

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BONNEVILLE POWER ADMINISTRATION

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Figure 1.2

In addition to the existing transmission congestion, ***load*** growth is occurring in the mid-Columbia PUD service areas that is contributing to congestion on their transmission lines. Chelan PUD loads are growing. Alcoa Wenatchee Works could increase production which would increase Chelan PUD loads. Douglas PUD loads are also growing, and there is a new server farm that adds a large new load in the Pangborn Airport area. Grant PUD's server farm load and its industrial loads in the Moses Lake area have grown in the last couple of years, and the loads are expected to continue to increase. While existing energy conservation programs at the PUDs are helping to address load growth, they are not sufficient to meet increasing load growth.

1.3. NEED FOR ACTION

BPA needs to take action to help maintain the reliable operation of the portion of the FCRTS located in the northern mid-Columbia area. Because the FCRTS and the transmission facilities of the mid-Columbia PUDs are interconnected, the existing transmission congestion that threatens the continued reliable operation of the northern mid-Columbia transmission area is a problem shared by BPA and the mid-Columbia PUDs.

A solution is needed that provides for current and projected load growth while relieving existing transmission congestion and accommodating seasonal generation patterns in order to assure adequate, reliable, and cost-effective transmission in the northern mid-Columbia transmission area. A solution also must meet reliability criteria established by the ***North American Electric Reliability Corporation*** (NERC) and the ***Western Electricity Coordinating Council*** (WECC). NERC, the national electric reliability organization and WECC, the regional reliability organization, help coordinate the operation and planning of the bulk transmission system in the region. Utilities are required to meet the standards of both organizations when planning new facilities.

1.4. PURPOSES OF ACTION

Purposes are the goals to be achieved while meeting the need for the Proposed Action. BPA has identified the following purposes that will be used to evaluate Joint Project alternatives:

- Meet transmission system public safety and reliability standards—including those of the National Electrical Safety Code (NESC), the North American Electric Reliability Corporation (NERC), and the Western Electricity Coordinating Council (WECC).
- Avoid or minimize environmental impacts
- Demonstrate cost-effectiveness
- Use facilities and resources efficiently

1.5. OTHER AGENCIES THAT MAY USE THIS EA

Chapter 4, Consultation, Review, and Permit Requirements, identifies other federal agencies that may have permitting, review, or other approval responsibilities related to certain aspects of the

Joint Project. Certain state, regional, and local agencies also may use all or part of this draft EA to fulfill their applicable environmental review requirements for actions they would take for the Proposed Action.

For example, before the State of Washington and local agencies/jurisdictions can act to authorize the use of state-managed lands or issue regulatory permits, Douglas PUD must comply with the requirements of the Washington State Environmental Policy Act (SEPA). Douglas PUD has coordinated with BPA in the preparation of this draft EA, and BPA and Douglas PUD are coordinating with the State of Washington and local agencies/jurisdictions so that environmental issues relevant to applicable SEPA requirements are addressed to the fullest extent practicable in BPA's NEPA process.

1.6. PUBLIC INVOLVEMENT

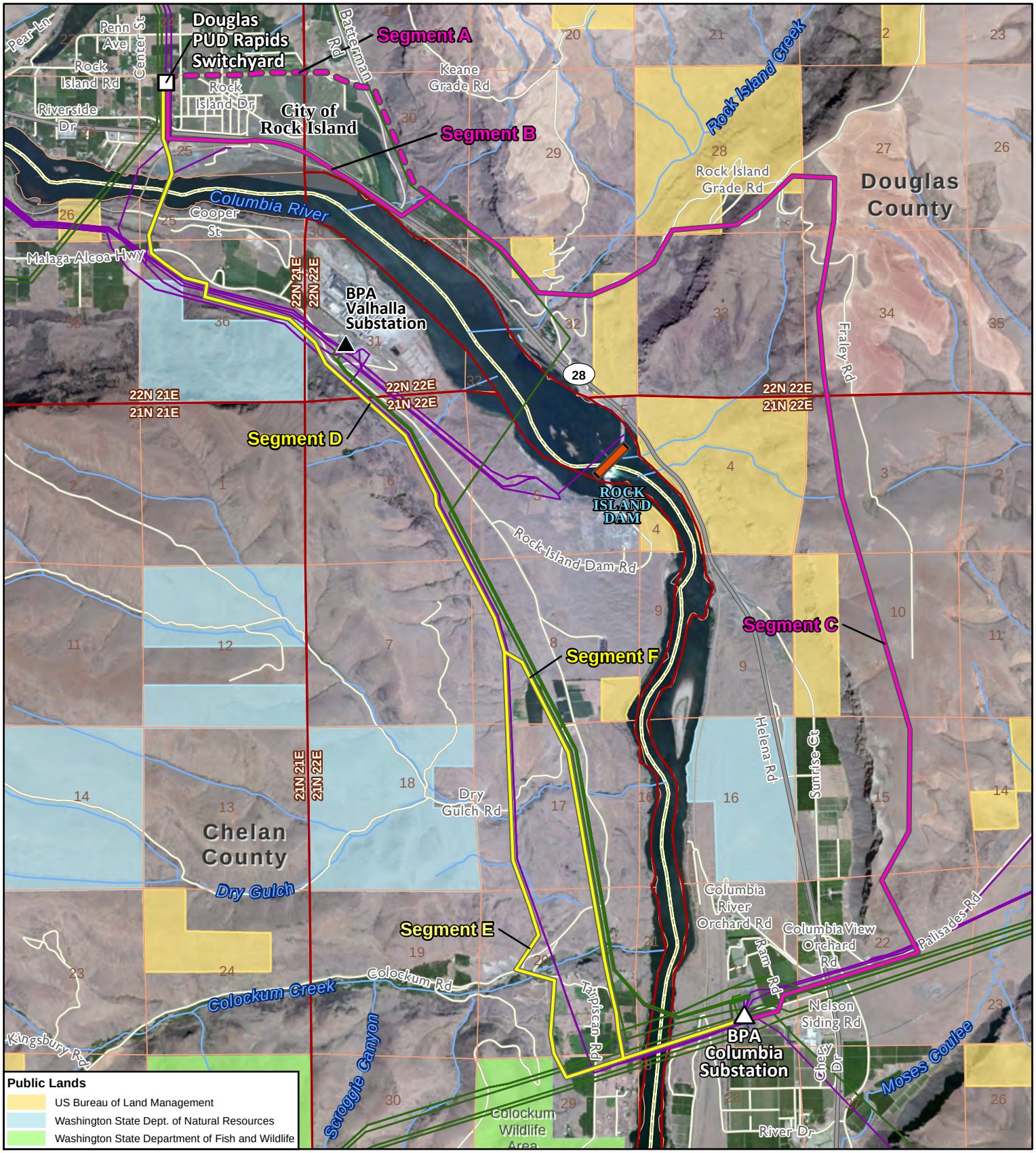
BPA conducted public outreach for the Proposed Action to help determine the issues that should be studied and discussed in this EA. Outreach was conducted through various means and provided notice of and information on the Joint Project proposal, the environmental process, and opportunities to comment. BPA proposed three routing alternatives (Figure 1.6).

1.6.1. Project Webpage

BPA created a webpage specifically for the Joint Project where information can be accessed. The webpage contains current information about the Joint Project and the environmental review process, links to project materials, information on when and how to comment, comments received, and project contacts (see http://efw.bpa.gov/environmental_services/Document_Library/NMC_Joint_Project/). The Joint Project webpage went live on October 26, 2012, and was updated, as needed, throughout the environmental review process.

1.6.2. Public Scoping Process

On October 26, 2012, BPA began the public ***scoping*** process for the Joint Project by sending a letter to people potentially interested in or affected by the Proposed Action. BPA notified landowners within a minimum distance of 0.25 mile on either side of the proposed centerline of all route alternatives under consideration for the new transmission line. BPA also notified tribes, federal, state, and local governments and agencies, including elected officials, and public interest groups. The letter explained the proposal, the environmental process, how to participate, the scoping period dates, and contact information for BPA and Douglas PUD Joint Project staff. The mailing included the notification letter, a project vicinity map with proposed route alternatives, a comment form, reply card with mail list and document delivery options, and a postage-paid return envelope. The letter, map, and comment form were posted on the BPA Joint Project website.



Transmission Line Route Alternatives Proposed During Project Scoping Map

Proposed Northern Mid-Columbia Joint Project

- Douglas PUD Switchyard (work proposed)
- BPA Substation (work proposed)
- BPA Substation (no work proposed)
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section Boundary
- County Boundary

Douglas PUD 230-kV Transmission Line Route Alternatives

- Eliminated after Project Scoping
- East Route Alternatives
- West Route Alternatives

0 ½ 1 2 Miles

N W E S

Project Location

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Figure 1.6

BPA sent a press release to local media with information about the scoping period and public scoping meetings and placed paid ads (4 inches by 7 inches in size) in the following newspapers:

- Wenatchee Business Journal – November 5, 2012
- Wenatchee World – November 4, 2012, and November 11, 2012
- Douglas Empire Press – November 1, 2012, and November 8, 2012

The scoping period for the Joint Project closed on December 14, 2012. BPA invited comments through a variety of methods, including a dedicated voice messaging system, comment forms mailed or faxed, and written and verbal comments. The Joint Project website included an electronic comment form that allowed the public to submit online comments.

1.6.3. Public Scoping Meeting

BPA held a public scoping meeting to meet with persons interested in the Joint Project in order to describe the proposal, answer questions, and solicit comments. The meeting was held on November 14, 2012, at the Douglas PUD offices in East Wenatchee, Washington. The meeting featured six stations with topic-specific project information. BPA and Douglas PUD Joint Project team members answered questions, discussed possible routes, and accepted comments relevant to the scope of the environmental analysis. Parcel maps and a laptop with Google Earth were available to help landowners locate their property in relation to the proposed route alternatives. Project staff recorded verbal public comments in their notes. A comment station provided members of the public an opportunity to complete and submit a comment form during the public meeting.

1.6.4. Scoping Comments

Comments received during the scoping comment period, both written and verbal, were posted on the Joint Project website. BPA received comments about a wide range of issues for consideration. These comments were considered in the environmental analysis of the Proposed Action and helped shape the location of transmission line route alternatives. These topics are addressed in appropriate sections of this EA.

Written and verbal scoping comments received from landowners, the City of Rock Island officials, county, state, and federal agencies, and tribes, are summarized below. Comments provided the following suggested changes to the location of segments that make up the East Route alternatives:

- Move East Route Segment B between the city waste water treatment plant and the railroad tracks.
- Develop a new East Route segment that would head north out of the Douglas PUD Rapids Switchyard along the PUD's existing transmission line, then head east to Batterman Road to avoid or minimize impacts to City of Rock Island residents.
- Modify East Route Segment B to remain on the west side of SR 28 to a highway crossing at Rock Island Creek to avoid crossing a lake and a property with a residence.

Some comments supported siting the transmission line within or adjacent to an existing utility corridor (West Route) in order to minimize or avoid impacts to Washington State Department of Natural Resources (DNR)-managed lands, the City of Rock Island, BLM lands, and the environment. Some comments suggested that it might be easier to site the transmission line in an existing corridor due to preexisting rights and that it would increase the efficiency of utilities to use a common corridor.

Comments included opinions on both detrimental and beneficial socioeconomic effects of the Joint Project. Detrimental effects included concerns that a transmission line would decrease property values, inhibit resale of property, and preclude the ability to maintain an existing cherry orchard. City of Rock Island officials expressed concern that the presence of the transmission line within the city would discourage new development that is needed to support city services and increase the tax base. Chelan PUD expressed support for the Joint Project, stating it makes good business sense and would save money for Chelan PUD's customer-owners over the long term. One comment included the suggestion that the East Route could potentially provide transmission ***interconnection*** services for a wind project that is being considered in that area.

City of Rock Island officials expressed concern about various detrimental effects from East Route Segment A on residents, neighborhoods, and the aesthetics of the city. A City of Rock Island official stated that the city has some low-income residents in neighborhoods that would be affected. Other comments noted that residents in Rock Island would be affected by construction. Improvements to the city were suggested, including converting transmission line facilities within the City of Rock Island to underground facilities and converting the Rapids Switchyard property into a public park. City officials stated that Joint Project public meetings should be held in the city because the community would be affected by the project.

Federal and state agencies and the Douglas County Transportation and Land Services provided the following recommendations and requirements:

- The transmission line must comply with the Douglas County code, including provisions pertaining to critical areas, shoreline management, ***right-of-way*** franchise, road standards, and building and fire safety.
- Washington Department of Ecology (Ecology) submitted comments regarding compliance with requirements related to ***wetlands***, the local shoreline master plan, shoreline permits, the National Pollutant Discharge Elimination System (NPDES) permit, and soil and ***groundwater*** contamination reporting requirements.
- DNR commented regarding recommended ***habitat*** stewardship measures at aquatic lands crossings; vegetation management on state-owned lands, including ***noxious weed*** control and establishment of ***native*** plant communities; concerns about soil compaction from construction activities; and other requirements related to obtaining an ***easement*** and conducting environmental surveys on state-managed lands.
- The Washington State Department of Transportation's Aviation Division's Airport Land Use Compatibility Program noted that because the northern portions of both route alternatives are within the approach to Pangborn Memorial Airport, airspace impacts need to be addressed.

- BLM expressed concern about visual and resource impacts from the new East Route utility corridor and provided information on requirements related to obtaining a BLM right-of-way permit and on procedures for conducting resource inventories on BLM lands.
- The Environmental Protection Agency (EPA) submitted comments concerning a variety of human and natural resources.

Some commenters expressed concern that a new transmission line would detract visually from some areas along the East Route. Concerns were raised that the visual effects of a transmission line in Rock Island would detract visually from the city and affect views of, and from, property. Other areas mentioned where views that could be detrimentally affected by the transmission line included views along SR 28, the lake crossed by East Route Segment B, and the hillside northeast of Rock Island Dam. One commenter expressed a preference for aluminum poles instead of rust-colored (weathered) steel poles.

Some comments concerned cultural resources in the project area. A tribe commented on potential impacts to tribal traditional cultural properties known to occur within the project area. Some comments provided information on the presence of known cultural sites within the project area. Both DNR and BLM provided information on the process, approvals, and permits required prior to conducting cultural surveys on their lands.

A comment regarding public health included concern about the health effects from having the electrical wires close to a home.

Some comments were made related to geology and soils, including the concern that building the towers would be more difficult along the East Route because of the ***basalt*** cliffs.

1.6.5. Scoping Outreach and Post-Scoping Public Involvement

In addition to BPA's public scoping meetings, staff from BPA and Douglas PUD organized and attended various meetings related to the Joint Project. Staff met, in person and by conference call with federal, state, and local agencies and representatives of tribes with interests in the area. From the scoping period until the release of the draft EA, BPA continued to update the project website with new information and project maps. BPA also mailed a project update.

BLM owns some parcels along the East Route alternative. Douglas PUD coordinated with BLM staff to discuss obtaining right-of-way on BLM lands. Both BPA and Douglas PUD communicated with BLM on required information needed by BLM to meet its obligations as a federal land manager.

DNR owns a parcel along West Route Segment D and requires a permit for crossings of the Columbia River. Douglas PUD coordinated with DNR staff to discuss obtaining an easement on DNR lands. Both BPA and Douglas PUD communicated with DNR on required information needed by DNR to meet its obligations as a state land manager.

BPA determined that three tribes have an interest in the Proposed Action. BPA requested information from these tribes on cultural resources in the project vicinity. BPA provided information about the alternative routes during project scoping to Tribal cultural resource program staff and solicited comments about these routes with respect to cultural resources. This

information was used to shape the alternative routes and the cultural resource field investigations for the Proposed Action. Throughout the project, BPA continued consultation with tribes and the Washington State Historic Preservation Officer (SHPO) on the identification of cultural resources in the project area and any adverse effects to cultural resources that could result from the project.

Staff from BPA and Douglas PUD met with federal and state agency staff regarding known and potential fish, wildlife, and botanical resources in the project area. Both the U.S. Fish and Wildlife Service (USFWS) and the Washington Department of Fish and Wildlife provided information on wildlife resources in the study area. USFWS, BLM, and DNR provided information on botanical resources. These meetings and interactions are described in more detail in Chapter 4 of this EA, including consultation with USFWS and the National Marine Fisheries Service (NOAA Fisheries) under the federal ***Endangered Species Act***.

BPA is releasing this draft EA for review and comment. In addition to distributing the draft EA to interested parties, the draft EA distribution letter, comment form, and information on how to comment is posted on the Joint Project website.

1.7. DRAFT EA CONTENT AND ORGANIZATION

The remainder of this draft EA is organized as follows:

- Chapter 2 describes the Proposed Action alternatives, the No Action Alternative, and alternatives eliminated from detailed consideration. It describes how Douglas PUD engineers and other specialists developed potential routes for the transmission line and includes a summary of the route segments that make up the Proposed Action alternatives. It also describes the proposed work at the Douglas PUD Rapids Switchyard and the BPA Columbia Substation, the transmission components that would make up the Douglas PUD transmission line, and construction and maintenance requirements including mitigation measures that are part of the project.
- Chapter 3 describes, for each type of resource, the existing environment that could be affected by the project, environmental consequences of the action alternatives and the No Action Alternative, and mitigation measures that could be used to minimize impacts to resources.
- Chapter 4 discusses the consultation requirements and permits and other approvals that would need to be obtained to implement the project and the project's consistency with state substantive standards.
- Chapter 5 includes the individuals who helped prepare the EA, as well as the individuals, agencies, and organizations consulted and/or notified of the availability of this EA.
- Chapter 6 contains a glossary including acronyms and abbreviations used in the EA. Terms defined in the glossary, are shown in bold, italicized typeface the first time they are used in the EA.
- Chapter 7 includes the references used to support this EA.
- Supporting technical information is provided in appendices or referenced on the project website.

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Chapter 2 Proposed Action and Alternatives

This chapter describes the Proposed Action (including different transmission line routing alternatives), the No Action Alternative, and alternatives considered but eliminated from detailed study. This chapter also compares the Proposed Action alternatives and the No Action Alternative to the project purposes as defined in Chapter 1 of this EA.

2.1. PROPOSED ACTION

Under the Proposed Action, BPA would participate in the construction of the Northern Mid-Columbia Joint Project (Joint Project or Proposed Action). The Joint Project is a proposed transmission line and associated facilities to be located in the northern mid-Columbia area of Washington State. The overall project is referred to as the Joint Project, while the proposed transmission line is referred to as the Rapids – Columbia 230-kV transmission line. This approximately 8- to 11-mile long 230-kV transmission line would extend from Douglas PUD's Rapids Switchyard near the City of Rock Island in Douglas County, Washington to BPA's Columbia Substation in Douglas County, Washington (See Figure 1.1). BPA's Columbia Substation is located about 7 miles southeast of Douglas PUD's Rapids Switchyard.

Douglas PUD would design, build, own, and operate the Rapids – Columbia 230-kV transmission line and would add equipment and a line termination at its existing Rapids Switchyard in order to interconnect the proposed transmission line into Douglas PUD's transmission system. BPA participation in the Joint Project would involve (1) providing partial funding for construction of the new line, and (2) adding equipment at BPA's existing Columbia Substation to interconnect the proposed line to the Federal Columbia River Transmission System (FCRTS).

The Joint Project would address deficiencies in the northern mid-Columbia transmission system that could cause power outages and affect the reliability of transmission systems of utilities in this area. The new transmission line would reduce congestion by providing increased capacity for power flows on several transmission facilities in the northern mid-Columbia area. A new 230-kV transmission line between the Douglas PUD Rapids Switchyard and the BPA Columbia Substation would complete a new parallel path that would span the Rapids Switchyard to the Chelan PUD Rocky Reach Substation and the Columbia Substation. This would reduce the 230-kV flows between the Chelan PUD Rocky Reach Substation and the Columbia Substation on the existing line.

The new transmission line would also reduce the potential for power outages by allowing Douglas PUD and BPA to offer reliable transmission line capacity during a single ***contingency*** transmission line outage, which could be caused by the failure of one element of the system, such as one transmission line. The addition of the new line to the northern mid-Columbia transmission system would add needed operating flexibility and would reduce the need to redispatch or reduce electric power generation at the Rocky Reach and Wells hydroelectric facilities during certain conditions. It would also provide more flexibility to schedule planned outages for maintenance. Finally, the new transmission line would help meet load growth by adding a new 230-kV ***circuit***

to the northern mid-Columbia transmission area. This is a needed ***reinforcement*** for the northern mid-Columbia area that would provide the added transfer capacity to support growing loads.

2.1.1. Transmission Line Route Alternatives

Figure 1.1 shows the three route alternatives that were developed for the proposed Rapids – Columbia 230-kV transmission line. In developing these route alternatives, BPA and Douglas PUD took into consideration the location of existing infrastructure in the project area, including transmission lines and roads, home sites, and various land uses. BPA and Douglas PUD also took into consideration existing topography, water and landscape features, and other environmental constraints or limitations. Finally, BPA and Douglas PUD also sought to minimize the length (and footprint) of the proposed transmission line by identifying potential routes for the line that are as direct as possible given existing infrastructure and environmental resources.

The three transmission line route alternatives are:

- East Route
- West Route D-E – Segments D and E
- West Route D-F – Segments D and F

All three of these alternatives begin at the Douglas PUD Rapids Switchyard and end at the BPA Columbia Substation. The East Route alternative is entirely within Douglas County, while the two West Route alternatives begin and end in Douglas County but include two crossings of the Columbia River, with the majority of the route in Chelan County.

These three route alternatives are described below, and the characteristics, components, and potential disturbance areas that would result from each of the routes are shown in Table 2.1-1.

Table 2.1-1. Characteristics of Proposed 230-kV Transmission Line Route Alternatives

Characteristic	East Route	West Route D-E	West Route D-F
Transmission line length	11.1 miles	8.4 miles	8.1 miles
Transmission line right-of-way easement that would be acquired	10.8 miles	7.2 miles	6.4 miles
Transmission line right-of-way paralleling existing infrastructure	2.5 miles	7.8 miles	8.1 miles
Transmission line right-of-way width	75 to 100 feet	75 to 100 feet	75 to 100 feet
Length of transmission line that would be double circuited with existing line	0.0 miles	1.3 miles	1.3 miles
Transmission structure style and material	Tubular weathering steel	Tubular weathering steel	Tubular weathering steel
Transmission structure height range	40 to 140 feet	40 to 140 feet	40 to 140 feet
Average transmission structure height	110 feet	100 feet	100 feet
Number of steel pole transmission structures	69	67	65
1-pole structures	54	51	52
2-pole structures	5	10	10
3-pole structures	10	6	3
Total number of steel poles	94	89	81
Permanent transmission structure footprint (49.2 square feet per pole)	0.1 acre	0.1 acre	0.1 acre
Permanent disturbance area for steel poles (531 square feet per pole)	1.2 acres	1.1 acre	1.0 acre
Temporary disturbance area for transmission structures (0.72 acre per structure)	49.7 acres	48.2 acres	46.8 acres
Average distance between structures	875 feet	715 feet	690 feet
New access roads constructed	2.9 miles	0.4 mile	0.3 mile
Acreage of new access roads (temporary and permanent disturbance areas)	7.0 acres	1.0 acre	0.8 acre
Existing access roads improved	11.1 miles	10.4 miles	8.6 miles
Acreage of temporary disturbance from improvement of existing access roads	8.1 acres	7.6 acres	6.3 acres
Number of conductor (electrical wires) pulling and tensioning sites	18	15	14
Temporary disturbance area for conductor pulling and tensioning sites (up to 1.13 acres per site)	20.3 acres	17.0 acres	15.8 acres
Estimated cost of transmission line design and construction	$18.29 million	$17.25 million	$17.10 million
Estimated cost of design and construction at BPA Columbia Substation and Douglas PUD Rapids Switchyard	$6 million	$6 million	$6 million
Total estimated cost of design and construction	**$24.29 million**	**$23.25 million**	**$23.10 million**

East Route

The East Route alternative is located on the east side of the Columbia River, entirely within Douglas County. The proposed route extends south from the Douglas PUD Rapids Switchyard within an existing transmission line corridor, crosses SR 28 and parallels the west side of SR 28 for approximately 3 miles. This portion of the route avoids most of the populated portions of the City of Rock Island by paralleling SR 28 at the western edge of the city.

Based on input received during the public scoping process for the Joint Project, the crossing of SR 28 was moved further south to avoid crossing over the western edge of Hammond Lake and to move the route away from a home. After crossing to the east of the highway south of Batterman Road, the route parallels BPA's Rocky Reach – Columbia No. 1 230-kV transmission line for about 0.88 mile. The proposed line would require new right-of-way adjacent to the existing BPA line (as well as for the remainder of the 7.97 miles to the Columbia Substation).

After crossing Rock Island Creek and Rock Island Grade Road, the route turns east and follows the general route of Rock Island Grade Road to the top of a high plateau. The route turns south, following the general route of Fraley Road through dryland wheat and ***Conservation Reserve Program (CRP) lands***, and descends the plateau in the vicinity of Palisades Road, about 0.5 mile east of SR 28. The route turns southwest and parallels the south side of Palisades Road, crosses SR 28, and terminates at the BPA Columbia Substation.

The East Route alternative is the longest of the three route alternatives, at about 11.1 miles. Of the three route alternatives, the East Route would require the most transmission structures (69) and would result in the largest ground disturbance areas from installation of transmission structures (49.7 acres). The East Route would require the most construction of new ***access roads*** (2.9 miles) and improvement of existing access roads (11.1 miles). At an estimated cost of $24.29 million, the East Route would cost about $1.04 to $1.19 million more than either of the West Routes.

About 8.6 miles of the East Route would not be within or parallel to existing infrastructure corridors, including utilities and roads. Lands along the East Route are privately owned except for some parcels owned by the U.S. Department of Interior Bureau of Land Management (BLM), the Washington State Department of Transportation (WSDOT), Chelan PUD, and the City of Rock Island.

West Route Alternatives

The two West Route alternatives both begin at the Douglas PUD Rapids Switchyard in Douglas County, with the majority of both routes in Chelan County, and both end at the BPA Columbia Substation in Douglas County. Both West Route alternatives require two crossings of the Columbia River, but would traverse more level terrain than the East Route alternative. Most of the two West Route alternatives would be within existing utility corridors adjacent to multiple existing transmission lines and a gas pipeline. The northern half of both of the West Route alternatives consists of Segment D, but the alternatives differ in the location of the southern portion of each route (Segments E and F).

West Route D-E

West Route D-E begins with Segment D. Segment D extends south from Rapids Switchyard within an existing transmission line corridor and crosses SR 28. The proposed route then crosses the BNSF railroad and the Columbia River.

Based on input received during the public scoping process for the Joint Project, the crossing of the Columbia River was moved about 170 feet downstream, to be within the right-of-way of Douglas PUD's existing Hanna – Valhalla 115-kV transmission line. This portion of the existing Hannah – Valhalla line would be replaced with ***double-circuit*** structures that would carry both the existing line and the proposed Rapids – Columbia line. The total length of the double-circuit portion of Segment D would total approximately 1.3 miles in length and include 10 steel-pole structures. Of the total double-circuit structures, 8 steel-poles would replace existing 115-kV wood-pole structures and 2 steel-poles would replace existing 115-kV steel-pole structures.

After crossing the Columbia River, Segment D continues generally south in new right-of-way, crosses the Malaga Alcoa Highway, and continues in a southeasterly direction parallel with the highway to the vicinity of the Alcoa Plant. The route continues south, parallel to the Chelan PUD Rocky Reach – Columbia No. 2 230-kV line, until the point where Segments E and F branch off from Segment D.

Segment E originates at the south end of Segment D and turns southwest and parallels the Chelan PUD Rocky Reach – Columbia No. 2 230-kV line in new right-of-way. The route diverts from this existing transmission line and continues in a southwesterly direction north of Colockum Road. From Colockum Road, the route continues south near existing orchards. The route then turns east, crossing existing orchards and then on to cross the Columbia River and the BNSF railroad, parallel to the Chelan PUD Rocky Reach – Columbia No. 2 230-kV transmission line, and enters the Columbia Substation.

West Route D-E is about 8.4 miles long and would require about 67 transmission structures. Structure installation would result in the disturbance areas of about 48.2 acres. It would require the construction of 0.4 mile of new access roads and improvement of 10.4 miles of existing access roads. The cost would be approximately $23.25 million, which would be about one million less than the East Route, but slightly higher than West Route D-F.

About 0.6 mile of West Route D-E would not be within or parallel to existing utility or infrastructure corridors. This route would result in less ground disturbance than would the East Route, but slightly more ground disturbance than West Route D-F. It would result in less disturbance to existing orchards than West Route D-F. Most lands along both West Routes are privately owned except for parcels owned by Washington Department of Natural Resources, WSDOT, Chelan County, and property owned by Chelan and Grant County PUDs.

West Route D-F

The first 4.5 miles of West Route D-F (Segment D), is described above for West Route D-E. Segment D branches into Segment F, which turns southeast and parallels BPA's Rocky Reach – Columbia No. 1 230-kV transmission line. The route follows the existing line east across the Columbia River and the BNSF railroad, and joins the corridor containing Chelan PUD's Rocky Reach – Columbia No. 2 230-kV transmission line to the Columbia Substation.

West Route D-F is the shortest of the three routes at about 8.1 miles. Of the three route alternatives, this route would require the fewest structures (65), the smallest disturbance areas for structures (46.8 acres) the least construction of new access roads (0.3 mile) and improvement of existing roads (8.6 miles), and cost the least at about $23.10 million.

The entire route is within or parallel to existing utility or infrastructure corridors. Most lands along both West Routes are privately owned except for parcels owned by WSDOT, Chelan County, and property owned by Chelan and Grant County PUDs.

2.1.2. Joint Project Elements

Transmission Line and Access Road Easements

Douglas PUD would acquire new right-of-way easements or agreements for the Rapids – Columbia 230-kV transmission line and access roads where existing right-of-way easements do not exist. Easements would provide the rights to access, construct, operate, and maintain the transmission line in perpetuity and include restrictions on any uses that could interfere with constructing, operating, or maintaining the transmission facilities. The transmission line right-of-way easements would be about 75- to 100-feet-wide depending on the type of transmission structures used, as explained below. Access road easements would be about 20-feet-wide.

Douglas PUD currently has a transmission line easement for the right-of-way of their Hanna – Valhalla 115-kV line on the northern portion of Segment D, the common segment along both West Route alternatives. About 1.35 miles of the existing Douglas PUD right-of-way would be used in the vicinity of the SR 28 crossing, across the Columbia River, to near the Valhalla Substation. In the double-circuit portion of the proposed transmission line, it would be constructed within the right-of-way of the existing Douglas PUD Hanna – Valhalla 115-kV line by co-locating both lines on the same transmission structures.

Most of the transmission line and access road easement acquisition would involve privately owned lands, except for some parcels of public lands along all the route alternatives. Table 2.1-2 lists transmission line and access road easements that would be acquired by ownership for each transmission line alternative.

The East Route alternative would require about 7.78 miles of transmission line easement acquisition across privately owned lands and about 2.97 miles across publicly owned lands. The publicly owned lands where an easement would need to be acquired include 4,752 feet across property managed by the BLM, 6,230 feet across WSDOT property, 1,373 feet across Chelan PUD property; and 370 feet across City of Rock Island property.

West Route D-E alternative would require about 6.15 miles of easement acquisition across privately owned lands and about 0.75 mile across publicly owned lands. The publicly owned lands where an easement would need to be acquired include 280 feet across of WSDOT property, 211 feet across Grant PUD property, and 475 feet across Chelan County property.

West Route D-F alternative would require about 5.85 miles of easement acquisition across privately owned lands and about 0.75 mile across publicly owned lands. The publicly owned lands where an easement would need to be acquired include 280 feet across of WSDOT property, 211 feet across Grant PUD property, and 53 feet across Chelan County property.

Table 2.1-2. Easements That Would Be Acquired by Land Ownership

Easement Land Ownership	Miles of Easement		
	East Route	West Route D-E	West Route D-F
Transmission Line Easements to be Acquired			
Total privately owned lands	**7.78**	**6.15**	**5.85**
Total publicly owned lands	**2.97**	**0.75**	**0.75**
Federal: BPA lands (easement)	0.56	0.55	0.55
Federal: BLM lands	0.90	0.00	0.00
WSDOT Franchise Permit Easement	1.18	0.05	0.05
Chelan PUD	0.26	0.02	0.00
City of Rock Island	0.07	0.00	0.00
Grant PUD	0.00	0.04	0.04
Chelan County	0.00	0.09	0.09
Total transmission line easements to be acquired	**10.75 miles**	**6.9 miles**	**6.6 miles**
Total existing Douglas PUD transmission line easement that would be used	**0.35 miles**	**1.5 miles**	**1.5 miles**
Access Road Easements to be Acquired			
New access road on privately owned lands	2.89	0.41	0.32
New access road on publicly owned lands	0.05	0.02	0.02
Total Easement to be acquired for new roads to be constructed for access	**2.94**	**0.43**	**0.34**
Existing road on privately owned lands	4.16	9.07	7.20
Existing road on publicly owned lands	6.97	1.29	1.38
Total Easement to be acquired for existing roads to be used for access	**11.13 miles**	**10.36 miles**	**8.58 miles**

Transmission Line Structures

The transmission line would consist of tubular steel poles (structures) that would support or be attached to various types of wires, including three electrical wires called ***conductors***, ***overhead ground wire***, and ***fiber optic cables***, described below. Structures would range in height from 40 to 140 feet, but would average about 110 feet tall for the East Route alternative and about 100 feet tall for both West Route alternatives. The distance between structures (span length) would vary depending on the terrain, the need for road crossings, and other factors, but would average about 850 feet for the East Route alternative and about 700 feet for the West Route alternatives.

Transmission structures would be constructed of weathering steel, which appears as dark brown with an external rust coating. About 65 to 69 structures would be needed for the proposed transmission line, depending on the alternative selected.

The proposed transmission structures are numbered for each transmission line alternative. Selected structure numbers are shown on Figure 2.1 to assist the reader during review of Chapter 3 of this EA. The structures for each route are numbered as follows:

- East Route structures are numbered 1EW (East/West designation for structures 1EW through 4EW which are common to east and west alternatives) to 69E (East)
- West Route Segment D structures are numbered 1EW to 43W (West); due to design changes after the initial numbers were assigned, numbers 10W and 11W are not used and Structures 6WN, 6WS, and 13-1W were added
- West Route Segment E structures are numbered 44W to 66W
- West Route Segment F structures are numbered 68W to 84W and then include 63W to 66W

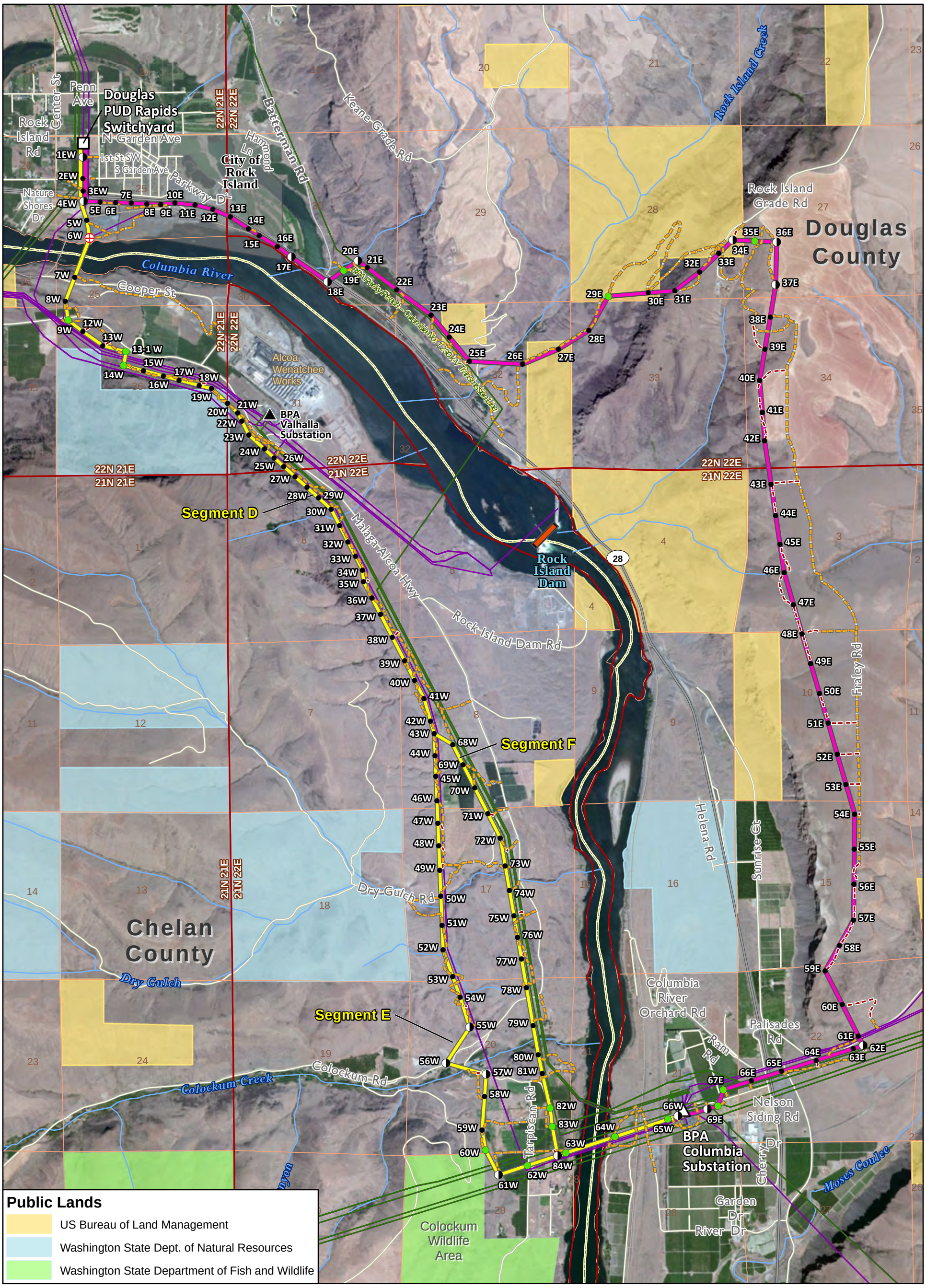
Three types of transmission structures would be used: 1-pole ***suspension structures***, 2-pole suspension structures, and 3-pole ***dead-end structures*** (see Figure 2.2). The location of 1-pole, 2-pole, and 3-pole structures are shown by color on Figure 2.1. Suspension structures would be used along straight stretches of the transmission line path and would usually consist of 1-pole structures, but 2-pole structures would be used where the proposed line would need to go under existing transmission lines. Dead-end 3-pole structures would be used where the line angles or when entering substations. Two-pole and 3-pole structures would also be used where rugged terrain requires a stronger structure.

On the northern bank of the Columbia River near the City of Rock Island, there would be a unique structure configuration consisting of three structures in close proximity. Structure 6W would be a 1-pole structure. On either side of Structure 6W, two shorter 2-pole structures (6WN and 6WS) would be located under the conductors. This pole configuration is needed to loop the existing 115-kV line into the Hanna Substation.

Two types of foundations would be used to install transmission structures. The foundation type needed would depend on the terrain, soil, and structure type. The two types of foundations that would be used are:

- The directly embedded foundation type would be used for suspension structures; these foundations are directly embedded in a drilled shaft with gravel, concrete, or other selected material that would be used to backfill the shaft.
- The concrete caisson foundation would be used for all dead-end structures and select suspension structures; these foundations are engineered columns of concrete reinforced by steel rods.

An auger would be used to drill a vertical shaft for the footings of both foundation types. The depth of the hole would depend on site-specific engineering requirements. The soil and rock removed from the hole would be spread out around the structure base in upland locations. In ***bedrock***, blasting may be used to excavate the structure foundation.



Proposed Location of Transmission Line Structures and Access Roads Map

Proposed Northern Mid-Columbia Joint Project

- Douglas PUD Switchyard (work proposed)
- BPA Substation (work proposed)
- BPA Substation (no work proposed)
- Township, Range Boundary
- Section Boundary
- County Boundary
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access
- 1-pole structure
- 2-pole structure
- 3-pole structure
- Includes 3 structures: 6WN (2-pole), 6W (1-pole), 6WS (2-pole)

0 ½ 1 2 Miles

N W E S

Project Location

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 2.1

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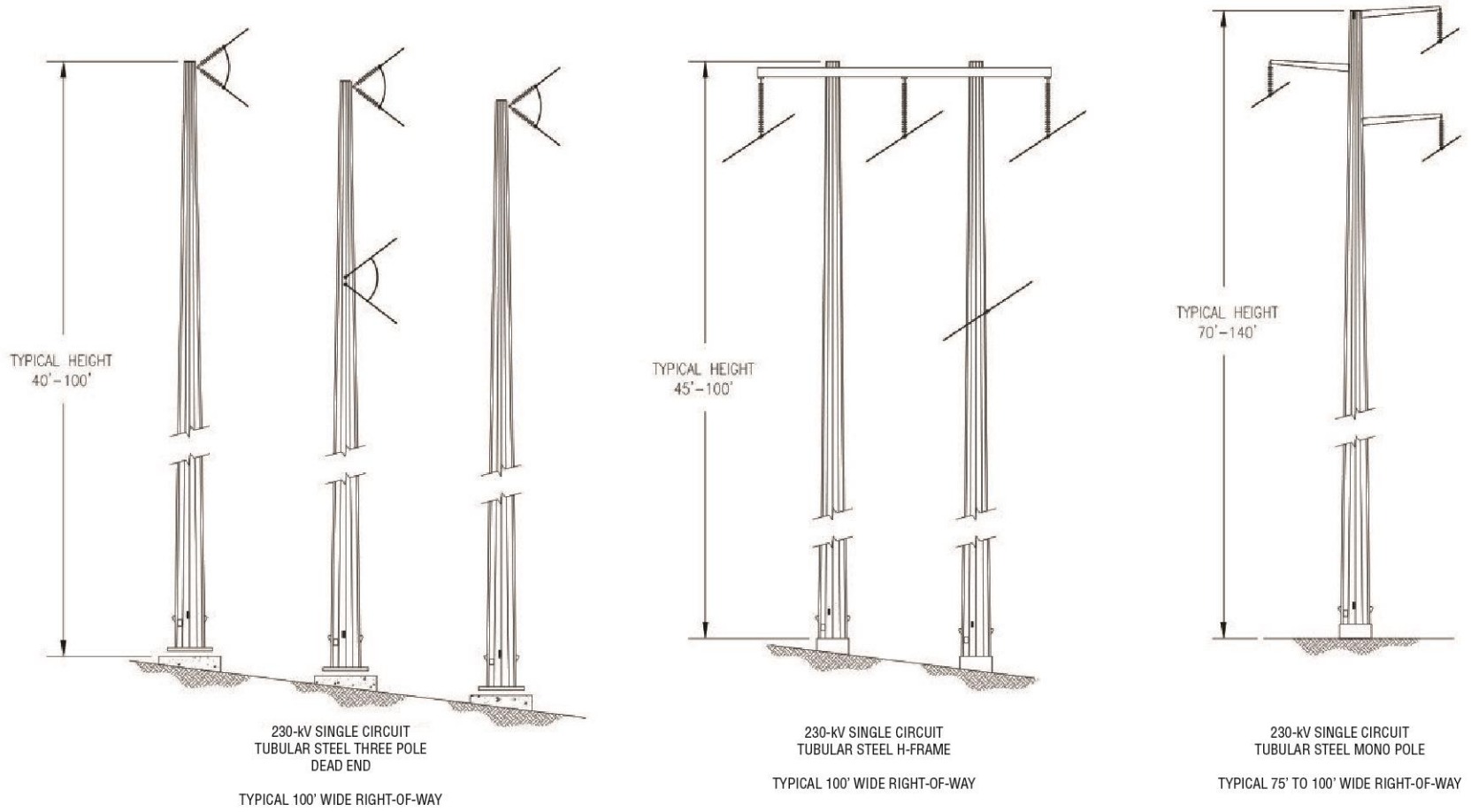

Figure 2.2 Typical Transmission Line Structures

Each structure pole would occupy a permanent area (footprint) up to about 8 feet in diameter, about 49.2 square feet. The permanent disturbance area around each pole includes the area within 10 feet of poles, or about 531 square feet, where vegetation would be managed and material from the hole may be spread at the base of the pole. To install structures, the area disturbed during construction would be about 0.72 acre or approximately 175 feet by 175 feet in size. The structure disturbance area includes the entire area where equipment could be located or parked during construction, where materials would be staged or laid down, and where soils and vegetation could be disturbed. Structures would be assembled on site and installed by a 30- to 100-ton-capacity crane.

Conductors

The wires that carry the electrical ***current*** on the transmission line are called conductors. Alternating-current transmission lines require three conductors to make a complete circuit. ***Single-circuit structure***s that support a transmission line carry three conductors (***phases***) arranged in a triangular, vertical, or horizontal design. Each phase would consist of a metal wire 1.4 inches in diameter. Conductors are attached to the structures using non-reflective polymer ***insulators***.

The minimum height of the conductor above the ground (***conductor clearance***) would meet or exceed National Electrical Safety Code (NESC) ground-to-conductor clearance requirements. For most of the proposed transmission line, the ground-to-conductor clearance would be 26.5 feet or higher. The proposed minimum height over Washington state highways is 37 feet. The standard proposed height over orchards is 43 feet. In other areas, such as over railroads and at river crossings, the ground-to-conductor clearances would be determined on a site-specific basis and in compliance with all applicable local, state, and federal regulations.

A conductor is delivered to the project construction site on large reels. To install a conductor on transmission line structures, it would be strung from structure to structure through pulleys on the structures. To accomplish this, the conductor sock line, a thick rope, would be placed in the pulleys, which may be pulled through by a small helicopter or by land-based equipment. A hard line, a wire smaller than the conductor, would be attached to the end of the sock line and pulled back to where the conductor reel is located. The hard line would be connected to the conductors (one for each phase) which would be pulled through the pulleys to the other end and secured.

The conductor would be connected (spliced) together where one reel of conductor ends and a new reel of conductor begins. Conductor splices would be created by hydraulic compression about once every 1.75 miles for each phase.

After the conductor has been strung, pulling/tensioning equipment would be used to tighten the conductor and meet minimum conductor height requirements. Conductor ***pulling and tensioning sites*** are areas where equipment is located in order to pull and tighten the conductor to the correct tension after it is connected to the transmission structures. Pulling and tensioning sites for the proposed line would be set up about every mile along the transmission line route and where there are large angle points and/or dead-end structures. Depending on the route alternative selected, 14 to 18 pulling and tensioning sites would be required for construction of the proposed transmission line. Each pulling and tensioning site would occupy about 1.13 acres.

All pulling and tensioning sites would be located at level sites within or immediately adjacent to the transmission line right-of-way. Pulling and tensioning sites would include a level area for the large flatbed trailer that holds the reels of conductor and the pulling and tensioning machine. Depending on site conditions, these sites might require grading and placement of crushed rock and small-diameter material. Locations for pulling and tensioning sites would be determined based on site conditions, existing sensitive environmental resources, and land use data.

Overhead Ground Wires and Fiber Optic Cable

Overhead ground wire would consist of one or two 0.5-inch-diameter wires, depending on the type of structures used. It would be attached to the top of transmission structures. Overhead ground wire protects substation equipment from damage due to electric surges caused by lightning strikes. Ground wire would be installed from the Hanna ***Tap*** at Structure 6W to the end of the double circuit portion of the line at structure 14W and the last mile (before the BPA Columbia Substation) of the transmission line. Overhead ground wire would be grounded at the base of each structure, typically in the same hole that is augered for the transmission structure. Ground wire would be installed using a similar process to that described above for conductor installation.

A fiber optic cable or cables would extend over the entire length of the line, attached to each structure below the electrical conductors. Fiber optic cable would be installed in order to monitor the electric power system operation and equipment. Fiber optic cables are approximately 1 inch in diameter. Fiber optic cable would be spliced at 1- to 1.5-mile intervals. Splices would be located in splice enclosures in concrete vaults (about 4 feet by 4 feet by 4 feet in size) in the ground, adjacent to the structures. Approximately 1.13 to 2.25 acres would be temporarily disturbed by a fiber optic reel truck and tensioning equipment; these would most likely be the same locations used for conductor pulling and tensioning sites.

The overhead fiber optic cable would end at the last structure outside the substations on each end of the line. Splices would again be located in splice enclosures in concrete vaults (about 4 feet by 4 feet by 4 feet) located in the ground adjacent to the last structure outside the substations. The fiber optic cable would then be installed underground into the two substations from these splice vaults.

Access Roads

Access roads would be used to reach each structure site during construction and for use by Douglas PUD crews for ongoing or emergency maintenance during transmission line operation. Access road easements would be obtained from landowners; easements for access roads acquired by Douglas PUD are generally 20 feet wide.

Access roads are designed to be used by construction equipment, including cranes, excavators, supply trucks, boom trucks, log trucks, and line trucks. Access roads would be located within the transmission line right-of-way to the greatest extent possible. Some access roads would need to be located outside of the right-of-way in areas where terrain, land use, or sensitive resources preclude use of the right-of-way.

The proposed access road work would include new road construction, improvement to existing access roads, and creation of temporary access roads, described below. Douglas PUD, in

coordination with landowners, may gate access roads to discourage unauthorized public access to private lands and the transmission line right-of-way. Gates could also be installed in fences used to contain animals or denote property lines. The use of gate locks, if required, would be coordinated with the landowners to ensure that both Douglas PUD and the landowner have access. No access work is proposed within waterways or wetlands.

New Access Roads

Where there are no existing access roads to reach the proposed transmission structure locations, new access roads would need to be constructed. About 2.9 miles of new access roads would need to be constructed for the East Route alternative, whereas about 0.4 miles of new access roads would need to be constructed for either the West Route D-E alternative or the West Route D-F alternative (see Table 2.4-1). Some of the new access roads would be short spur roads. New spur roads would be located within the transmission line right-of-way as much as possible.

Access roads would be constructed with minimum 12-foot-wide travel surfaces. Road construction could disturb up to a 20-foot width. Road grades would vary depending on the ***erosion*** potential of the soil but would generally be no more than 6 to 8 percent on erodible soils; 10 to 15 percent for erosion-resistant soils; and a maximum of 15 to 18 percent for short distances on steep terrain.

Improvements to Existing Roads

Some portions of the transmission line alternative routes would be accessible from existing public and privately owned roads. These access roads include residential access, county roads, and agricultural roads. In areas where the proposed transmission line routes would parallel existing utility lines, existing access roads would be used to access structure work areas to the greatest possible extent.

Existing roads used for access may require improvements to accommodate construction equipment. About 11.1 miles of existing access roads could need improvement under the East Route alternative, about 10.4 miles could need improvement under the West Route D-E alternative, and about 8.6 miles could need improvement under the West Route D-F alternative.

Some portions of access road surfaces may require improvements for dust abatement, stability, load bearing, and seasons of use. Depending on the road condition, work could range from reconstructing the road base and bed to less extensive work on the existing road surface, such as grading and rocking. Other improvements could include clearing brush along road edges, widening existing roads, improving curves for vehicle use, and installing ditches, ***culverts***, ***water bars,*** or other drainage features if needed. Water bars or other water-control features could also be installed on steep slopes or where access roads cross drainages that carry seasonal runoff.

Temporary Access Roads

Temporary access roads would generally be constructed to access transmission line structures in agricultural fields, but permanent access roads may be used depending on project needs and landowner preference. After construction is completed, temporary access roads would be removed, disturbed portions of farm fields (including fallow farm fields and CRP lands) would

be returned to grade, and the soil in the road area would be decompacted. Reseeding and weed control would be conducted as appropriate on all access roads.

Work in Substations

Substations connect different transmission lines together, disconnect lines when necessary, and regulate voltage of the transmission system. Similar equipment would be installed at the existing Rapids Switchyard and Columbia Substation. This equipment would link the proposed transmission line to the substations and allow Douglas PUD's transmission system to interconnect to the FCRTS.

Douglas County PUD Rapids Switchyard

Douglas County PUD would install equipment at their Rapids Switchyard, the ***switching substation*** that would be the start point of the proposed transmission line. Equipment that would be installed within the existing substation fence would include ***power circuit breakers*** (switching devices to automatically interrupt power flow), ***switches*** (devices to mechanically disconnect equipment), bus tubing and pedestals (ridged aluminum pipes that the power flows on within the substation), and transmission line dead-end structures to bring the line into the switchyard.

All equipment would be accommodated within the existing switchyard; no expansion would be needed. Adequate roads currently exist at the Rapids Switchyard for construction access and there is adequate parking for construction workers.

BPA Columbia Substation

BPA would install equipment in the Columbia Substation, which would be the end point of the proposed transmission line. The equipment would be installed within the existing substation fence and would include power circuit breakers, switches, bus tubing and pedestals, and transmission dead-end towers to bring the line into the substation.

Materials and equipment would be staged within the existing substation fence. Adequate roads currently exist at the Columbia Substation for construction access and there is adequate parking for construction workers.

2.1.3. Construction

Transmission line construction would be expected to occur during an 8- to 11-month period, depending on the route alternative selected. A typical crew can usually construct about 1 mile of transmission line in 1 month. In areas where terrain is steep, progress could be slower.

The transmission line would be constructed by one or more construction crews. A typical transmission line construction crew for a 230-kV line includes 12 construction workers, six vehicles (pickups, vans), two bucket trucks, one conductor reel machine, one large excavator with an auger, and one line puller/tensioner.

The sequence of construction activities would begin with the staging of materials, installation of best management practices (BMPs), clearing of work areas within the right-of-way, and construction and improvement of project access roads. Construction activities that would follow

include work at substations, installation of structures and conductor, and site stabilization and ***restoration*** work.

Staging Areas

One to three temporary staging areas would be needed along or near the proposed transmission line for construction crews to store materials, trucks, and other equipment. The size of the staging areas would be based on the types of sites available for lease and the size needed to accommodate materials and equipment, but could typically be up to 10 acres in size. Staging areas are generally existing large, level, sites. Site-specific environmental review of staging areas would be conducted once the locations are identified and prior to use.

Vegetation Clearing

The right-of-way and the area immediately adjacent to the right-of-way would need to be cleared of vegetation that may hinder construction and access, or may threaten transmission line safety. Some of the vegetation in construction work sites would be damaged by vehicles and equipment, but would not need to be removed and could recover. Tall vegetation that grows within the transmission line right-of-way and tall trees that grow outside of the right-of-way that could fall into the line would be removed. When vegetation grows or falls close to a transmission line it can cause an electric arc which can start a fire and/or cause an outage of the line.

Most of the vegetation along transmission line routes consists of low-growing sagebrush, other shrubs, ***herbaceous*** plants or agricultural crops. These low-growing plants tend to be are compatible with transmission lines and are typically allowed to grow under the lines cause they do not pose a threat of interfering with the conductors.

It is expected that relatively little tree clearing would be required because, other than in areas of orchards, few tall growing ***species*** are present in areas of the proposed transmission line routes. Douglas PUD expects that there would be minimal tree removal in areas where the proposed transmission line routes cross orchards and where other trees would be or could grow too close to the proposed conductors. Some routes cross canyons that are treed, but trees would not require removal because the line would be well above the tree heights. Douglas PUD would determine which trees need to be removed and discuss tree removal with affected landowners.

Restoration of Areas Disturbed by Construction

All areas disturbed by construction activities, except permanent access road surfaces, would be reseeded with a native seed mix, a seed mix recommended by state and local agencies appropriate for the geographic area, or a seed mix as agreed upon with landowners. The original grade and drainage patterns in sensitive areas would be restored to the greatest extent possible.

Construction Schedule

If the decision is made to proceed with the project, the expected duration of construction activities would be eight to eleven months. Assuming that a decision is made to proceed with the proposed project following completion of the NEPA and SEPA processes, it is likely that the project construction could occur sometime in 2015 or 2016, possibly extending into 2017. Prior

to construction, final design of the selected alternative, easement acquisition, and permitting would occur.

2.1.4. Operation and Maintenance

During the life of the project, Douglas PUD would perform routine, periodic maintenance and emergency repairs to the transmission line and access roads. Maintenance of tubular steel structures involves periodically replacing insulators and checking for loose hardware. An annual inspection of the entire transmission line corridor would be conducted by vehicle, with some inspection done by walking portions of the transmission line right-of-way, as needed.

Vegetation management would be needed periodically to ensure safe operation and to allow access to the line. ***Danger trees*** are trees adjacent to the right-of-way that would need to be removed if they interfered with safe operation of the transmission line. Other than occasional danger tree removal, it is expected that the proposed transmission line corridors would require little vegetation removal because they are primarily vegetated with dryland wheat, orchards, ***shrub-steppe*** and other low-growing native vegetation.

Prior to controlling vegetation, Douglas PUD sends notices to landowners and requests information that might help in determining appropriate methods and mitigation measures (such as ***herbicide***-free ***buffer*** zones around springs or wells). Noxious weed control is also part of Douglas PUD's vegetation maintenance program. Douglas PUD coordinates with the Chelan County Weed Board, Douglas County Weed Management Task Force, and landowners concerning plans for effective control of noxious weeds.

2.2. NO ACTION ALTERNATIVE

The No Action Alternative assumes that BPA would not provide partial funding for the Joint Project. It assumes that Douglas PUD would not build the proposed Rapids – Columbia 230-kV transmission line and that neither Douglas PUD nor BPA would install interconnection equipment in their respective substations. Construction activities associated with the Joint Project would not occur, and the reliability concerns that prompted the proposal for action would persist. Douglas PUD, Chelan PUD, Grant PUD, and BPA would not be able to offer reliable transmission line capacity for a single contingency transmission line outage and would each need to seek an alternative solution in the future.

2.3. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

In considering potential alternatives for the Joint Project, BPA and Douglas PUD considered whether each potential alternative would meet the identified need for the Proposed Action and facilitate achievement of the project's purposes (see Chapter 1). BPA and Douglas PUD also considered whether the alternative would be practical and feasible, from a technical and economic standpoint, pursuant to the Council on Environmental Quality (CEQ) guidance on assessing the reasonableness of alternatives. In addition, BPA and Douglas PUD considered whether the alternative clearly would have greater adverse environmental effects than other

proposed alternatives. This section summarizes the alternatives that were considered but have been eliminated from detailed study in light of these considerations.

2.3.1. Route along SR 28

A transmission line alternative that would parallel SR 28 on the east side of the Columbia River was considered but eliminated from detailed study prior to public scoping. This route alternative would go south from the Rapids Switchyard crossing SR 28. The route would then turn southwest and would parallel SR 28 to the vicinity of Palisades Road. The route would then turn west into the Columbia Substation.

This alternative was rejected due to inadequate right-of-way width in two areas. In the vicinity of Rock Island Dam and just to the south of the dam, the highway right-of-way and the BNSF railroad right-of-way are very narrow due to the close proximity of the Columbia River and the steep banks next to the two rights-of-way. There is no room for a transmission line right-of-way without either reducing the width of the highway or reducing the railroad right-of-way. Because a reduction in the highway and railroad right-of-way is not possible, this route was not considered further.

2.3.2. East Route – Segment A

At the time of public scoping for the Joint Project, BPA had identified a route segment for the East Route that generally followed streets within the City of Rock Island. This segment, referred to as Segment A of the East Alternative, would have extended north from Douglas PUD's Rapids Switchyard to Rock Island Road. The route would turn east, follow Rock Island Road to Saunders Avenue, and then cross Batterman Road. The route would parallel a BPA 230-kV line, and then meet up with Segment C on the east side of SR 28.

City of Rock Island officials expressed concern about various detrimental effects of the construction and operation of a transmission line along Segment A on neighborhoods, residents, and the aesthetics of the city, including the golf course development area. A major concern expressed by City of Rock Island officials was that the presence of the transmission line within the city could discourage new development of an approved subdivision near the existing golf course. Based on the recent addition of new city infrastructure, City officials stated that this and other new development is needed to support City services and increase the tax base. Because of the various public concerns about the effects on the City of Rock Island from Segment A, this segment was considered but then eliminated from detailed study after public scoping.

2.3.3. Route North of the City of Rock Island

During project public scoping, an alternative route out of the City of Rock Island was suggested as a scoping comment. BPA and Douglas PUD were asked to develop a new East Route segment that would head north out of the Rapids Switchyard along the PUD's existing transmission line, then head east to Batterman Road. This was suggested to avoid or minimize impacts to City of Rock Island residents.

The suggested alternative was considered, and project engineers considered how to site this route. Residential development north of the Rapids Switchyard is less dense than within the city

center, but there are still residential areas that could not be avoided. This route would have been less direct and would have added mileage and thus expense to the East Route. In addition, the remaining East Route (Segments B and C) would have clearly fewer impacts to residents and would be able to utilize existing infrastructure corridors. For these reasons, an alternative route north of the City of Rock Island was considered but eliminated from detailed study.

2.3.4. Underground Transmission Line

Construction of an underground transmission line was suggested as a possible alternative during the public scoping process. Underground construction would be significantly more expensive and result in substantial ground disturbance, likely resulting in considerable environmental impacts. The steep terrain along the East Route and river crossings along both West Route alternatives would make underground construction of the transmission line, and subsequent maintenance, extremely difficult and very expensive. Therefore, building an underground transmission line was considered but eliminated from further study.

2.4. COMPARISON OF ALTERNATIVES

Table 2.4-1 compares how well the East Route alternative, the West Route alternatives, and the No Action Alternative meet the purposes of the project as defined in Chapter 1, Purpose of and Need for Action. Detailed analysis of the environmental impacts is presented in Table 2.4-1.

Table 2.4-1. Comparison of How the Proposed Action Alternatives and No Action Alternative Respond to the Project Purpose

Purpose	East Route Alternative	West Route Alternative D-E	West Route Alternative D-F	No Action
Meet transmission system public safety and reliability standards—including those of the National Electrical Safety Code (NESC), the North American Electric Reliability Corporation (NERC), and the Western Electricity Coordinating Council (WECC)	Would meet public safety standards (conductor distance from ground) and would meet reliability standards	Would meet public safety standards (conductor distance from ground) and would meet reliability standards	Would meet public safety standards (conductor distance from ground) and would meet reliability standards	Reliability concerns that prompted the proposal for action would persist. Douglas PUD, Chelan PUD, Grant PUD, and BPA would not be able to offer reliable transmission line capacity for a single contingency transmission line outage and would each need to seek an alternative solution in the future
Minimize environmental impacts (See Table 2.5-1 for a summary of environmental impacts on various resources and the subsequent sections of Chapter 3 for a full discussion of impacts and mitigation)	Construction impacts would be low to high along the 11.1-mile long route, primarily temporary, and could mostly be mitigated	Construction impacts would be low to moderate along the 8.4-mile long route, primarily temporary, and could mostly be mitigated	Construction impacts would be low to moderate along the 8.1-mile long route, primarily temporary, and could mostly be mitigated	No project-related construction activities would occur and no project-related environmental impacts would occur
Demonstrate cost effectiveness	Estimated cost of construction is $24.29 million	Estimated cost of construction is $23.25 million	Estimated cost of construction is $23.10 million	No costs would be incurred related to project construction but utilities would need to address potential service disruptions that could lead to additional expenditures during potential outage response
Use facilities and resources efficiently	Would provide reliable transmission line capacity and use of steel poles with a 100-year lifespan would reduce replacement costs	Would provide reliable transmission line capacity and use of steel poles with a 100-year lifespan would reduce replacement costs	Would provide reliable transmission line capacity and use of steel poles with a 100-year lifespan would reduce maintenance and replacement costs	Would not provide transmission line outage contingency and would not aid in preventing service disruptions

2.5. SUMMARY OF IMPACTS TABLE

Chapter 3 describes potential impacts to human and natural resources from the Proposed Action Alternatives. Potential environmental impacts are summarized by resource in Table 2.5-1 to enable comparison between alternatives. This table represents the level of impact that would be expected to result after implementation of the mitigation measures and best management practices (BMPs) listed in each resource section.

Table 2.5-1. Comparison of Alternatives by Environmental Impacts

Section 3.2. Land Use, Recreation, and Transportation

East Route	West Route D-E	West Route D-F	No Action Alternative
Agriculture – Construction would result in soil disturbance and temporary inconvenience to farmers; permanent removal of up to 0.03% of County Prime Farmland (PF) and up to 0.02% of County Farmland of Statewide Importance (FSWI), a ***low*** impact	**Agriculture –** Construction would result in soil disturbance and temporary inconvenience to farmers; permanent removal of up to 0.29% of County PF and up to 0.11% of County FSWI, a ***low*** impact	**Agriculture –** Construction would result in soil disturbance and temporary inconvenience to farmers; permanent removal of up to 0.37% of County PF and up to 0.14% of County FSWI; could hinder or prevent the production of cherries in one orchard that would be spanned, a ***moderate*** impact	No project related activities would occur and therefore, no project related impacts to land uses would occur.
Residential – Temporary impacts from construction noise and if access was blocked; permanent impacts to land use where the transmission line easement would cross residential parcels, a ***low*** to ***moderate*** impact depending on the proximity of construction activities	**Same as East Route**	**Same as East Route**	
Industrial – No industrial facilities affected, therefore ***no impact***	**Industrial –** Transmission line structures and access roads could affect future industrial uses of one industrial site; structures and access roads on the American Silicon Technologies site could have a ***low*** impact on future industrial uses of the side, depending on what was proposed	**Same as West Route D-E**	
Transportation – During construction, localized and temporary disruption of transportation access and traffic flow, a ***low*** impact	**Same as East Route**	**Same as East Route**	
Recreation – Construction noise and views of construction work areas from recreational areas could temporarily detract from the enjoyment of some golfers and boaters and temporarily impact hunting, a ***low*** impact	**Same as East Route**	**Same as East Route**	
Operation and Maintenance – Infrequent and temporary impacts to land uses in localized areas, a ***low*** impact	**Same as East Route**	**Same as East Route**	

Section 3.3. Geology and Soils

East Route	West Route D-E	West Route D-F	No Action Alternative
Structures and new access roads would permanently impact 8.3 acres of soil.	Structures and new access roads would permanently impact 2.1 acres of soil.	Structures and new access roads would permanently impact 1.9 acres of soil.	No project related activities would occur and therefore, no project related impacts to geology and soils would occur.
Existing access road improvements, conductor pulling sites and construction activities would disturb up to 78.1 acres, including 1.5 acres of lithosols and talus	Existing access road improvements, conductor pulling sites and construction activities would disturb up to 72.8 acres, no impact to lithosols	Existing access road improvements, conductor pulling sites and construction activities would disturb up to 68.9acres, including 1.44 acres of lithosols	
Ground disturbance during construction would cause soil disruption, compaction, and some loss of biological functions, erosion and soil loss	**Same as East Route**	**Same as East Route**	
Construction in talus in portions of the route would result in a change of substrate	No impact to talus	**Same as West Route D-E**	
Construction in steep grades along the route could result in erosion	Construction in steep grades in Segment D could result in erosion	**Same as West Route D-E**	
No recently burned areas	Construction in previously burned areas (86% of Segment E) could release dust and cause erosion	Construction in previously burned areas of Segment F (26%) could release dust and cause erosion	
Construction – *low* to ***moderate*** impacts to soils and geology, as described above	**Construction – *low*** impacts to soils and geology, as described above	**Same as West Route D-E**	
Maintenance – Infrequent impacts to soils and geology in localized areas, including compaction and minor erosion, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Structure construction – Permanent impact on vegetation in 1.2 acres and temporary disturbance of vegetation in up to 49.7 acres	Structure construction – Permanent impact on vegetation in 1.1 acre and temporary disturbance of vegetation in up to 48.2 acres	Structure construction – Permanent impact on vegetation in 1.0 acre and temporary disturbance of vegetation in up to 46.8 acres of	No project related activities would occur and therefore, no project related impacts to vegetation would occur.
Conductor pulling and tensioning - Vegetation disturbance in up to 20.3 acres	Conductor pulling and tensioning - Vegetation disturbance in up to 17.0 acres	Conductor pulling and tensioning - Vegetation disturbance in up to 15.8 acres	
New access roads - Permanent vegetation disturbance in 7.0 acres	New access roads - Permanent vegetation disturbance in 1.0 acres	New access roads - Permanent vegetation disturbance in 0.8 acres	
Improvements to existing roads could disturb vegetation along 11.1 miles of roads	Improvements to existing roads could disturb vegetation along 10.4 miles of roads	Improvements to existing roads could disturb vegetation along 8.6 miles of roads	
High quality shrub-steppe - Permanent impact of 0.2 acre and temporary disturbance of 11.0 acres from structure installation and conductor pulling and tensioning	High quality shrub-steppe (burned in 2013 and 2014) - Permanent impact of 0.1 acre and disturbance of 7.3 acres from structure installation and conductor pulling and tensioning	High quality shrub-steppe (burned in 2013 and 2014) – Permanent impact on 0.1 acre and disturbance of 7.3 acres from structure installation and conductor pulling and tensioning	
Lithosol - Disturbance to 7.2 acres of lithosol and talus	Lithosol – No impact	Lithosol - Disturbance to 1.44 acres of lithosol	
Construction – *moderate* impact to vegetation types, as described above	**Same as East Route**	**Same as East Route**	
Special-Status Plant Species – Indirect impacts to special-status species near work areas could result in ***low*** to ***moderate*** impacts; only about half of the East Route was surveyed due to access restrictions so there could be additional impacts to special status species, if present	**Special-Status Plant Species –**Special-status populations observed more than 200 feet from construction work areas, therefore ***no impact*** with the implementation of BMPs and mitigation measures	**Special-Status Plant Species –**Special-status populations not observed along this route, therefore ***no impact***	
Maintenance – Infrequent impacts to vegetation in localized areas, including disturbance and/or removal, a ***low*** to ***moderate*** impact depending on the vegetation affected	**Same as East Route**	**Same as East Route**	
Noxious Weeds – Potential degradation of plant communities from the introduction and spread of weed species, a ***moderate*** impact	**Same as East Route**	**Same as East Route**	

Section 3.5. Fish

East Route	West Route D-E	West Route D-F	No Action Alternative
No direct impacts on fish as a result of construction because no proposed in-water work in fish-bearing waters	**Same as East Route**	**Same as East Route**	No project related activities would occur and therefore, no project related impacts to fish and fish habitat would occur.
Minimal ground disturbance near fish-bearing streams could result in minimal and temporary sedimentation into Rock Island Creek, a ***low*** impact	***No impacts*** are expected to Colockum Creek fish habitat because the creek would be spanned and no ground disturbance or vegetation removal would be conducted near the creek	**Same as West Route D-E**	
No direct path for construction related sediments to enter Columbia River fish habitat, a ***low*** or ***no impact***	Impacts to Columbia River fish habitat from sedimentation are not expected or would be minimal because mitigation measures to prevent or minimize sedimentation would be implemented at three structure installation sites and access road work sites within 200 feet of the river, but on the high bluffs above the river, a ***low*** or ***no impact***	**Same as West Route D-E**	
Potential short-term disturbance of fish due to construction noise and activity in proximity to fish-bearing waterways, a ***low*** impact	**Same as East Route**	**Same as East Route**	
Removal of small amount of riparian vegetation in construction areas would not measurably increase water temperatures, a ***low*** impact	No removal of riparian vegetation, therefore no increase water temperatures, ***no impact***	**Same as West Route D-E**	
Maintenance activities within 200 feet of fish-bearing streams could cause infrequent and temporary impacts to fish habitat, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Temporary loss of about 78.1 acres of wildlife habitat in work areas	Temporary loss of about 72.8 acres of wildlife habitat in work areas	Temporary loss of about 68.9 acres of wildlife habitat in work areas	No project related activities would occur and therefore, no project related impacts to wildlife and wildlife habitat would occur.
Permanent loss of about 8.2 acres of wildlife habitat in work areas	Permanent loss of about 2.1 acres of wildlife habitat in work areas	Permanent loss of about 1.8 acres of wildlife habitat in work areas	
Construction – Temporary disturbance and displacement of wildlife, including special-status species (mule deer, chukar, raptors, bald and golden eagles, sage thrasher, great blue heron, sage grouse, Washington ground squirrel), a ***low*** impact	**Construction –** Temporary disturbance and displacement of wildlife, including special-status species (mule deer, bighorn sheep, elk and raptors), a ***low*** impact	**Same as West Route D-E**	
Noxious weeds – Degradation of wildlife habitat would occur if noxious weeds become established in areas disturbed by construction and maintenance, a ***moderate*** impact	**Same as East Route**	**Same as East Route**	
Operation – Potential for avian collisions with the proposed transmission line at or near waterways and near about 7 miles of the proposed line that would not parallel an existing line and would be located on a high plateau, a ***low*** to ***high*** impact, depending on the species affected	**Operation** – Potential for avian collisions with most portions of the proposed transmission line are not expected because the line would parallel existing transmission lines, thus birds may be accustomed to avoiding this potion of air space, a ***low*** impact	**Same as West Route D-E**	
Maintenance – Ground disturbance and vegetation management in localized areas would degrade wildlife habitat and equipment noise could temporarily displace wildlife, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
No direct path for construction related sediments to enter the Columbia River, a ***low*** or ***no impact***	Access road work and structure installation on the bluffs above the Columbia River could result in minimal and temporary sedimentation, a ***low*** impact	**Same as West Route D-E**	No project related activities would occur and therefore, no project related impacts to water resources would occur.
Minimal ground disturbance during construction near Rock Island Creek could result in minimal and temporary erosion and sedimentation, a ***low*** impact	Access road work and potential culvert replacement in Dry Gulch, could result in minimal and temporary sedimentation, a ***low*** impact	No work areas within 200 feet of waterways, therefore ***no impact***	
Removal of a small amount of riparian vegetation in construction areas would not measurably increase water temperatures or cause erosion, a ***low*** impact	No removal of riparian vegetation, therefore no increase water temperatures, ***no impact***	**Same as West Route D-E**	
With the implementation of mitigation measures, the potential risk of accidental release of chemicals or fuel into waterways from construction equipment would be ***low***	**Same as East Route**	**Same as East Route**	
Construction – ***low*** impact to waterways and water quality as described above	**Same as East Route**	**Same as East Route**	
Maintenance – infrequent and temporary impacts to water quality from maintenance activities within 200 feet of streams, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Construction is not expected to require wetland fill	Construction is not expected to require wetland fill	Construction would not require wetland fill	No project related activities would occur and therefore, no project related impacts to wetlands would occur.
Construction near low-quality wetlands could result in indirect impacts, including the runoff of minimal amount of sediments into wetlands and removal of wetland buffer vegetation, a ***low*** impact	**Same as East Route**	No wetlands located within 200 feet of construction work areas, therefore ***no impact*** to wetlands	
Installation of four structures within 100 feet of wetland ponds along SR 28 could indirectly impact wetlands, a ***low*** impact	No structures would be installed within 200 feet of wetlands, therefore ***no impact*** to wetlands	**Same as West Route D-E**	
Proposed spur roads off SR 28, within 100 feet of wetland ponds could indirectly impact wetlands, a ***low*** impact	Two low-quality wetlands would be crossed by or adjacent to access roads and road improvement, if needed, could impact wetlands, a ***low*** impact	No proposed access roads within 200 feet of wetlands, therefore ***no impact*** to wetlands	
Noxious weeds could be introduced into low-quality wetland areas by construction vehicles, a ***low*** impact	**Same as East Route**	No wetlands present in construction work areas, therefore ***no impact*** to wetlands	
Construction – ***low*** impact to wetlands as described above	**Same as East Route**	**Construction –** ***no impact*** to wetlands as described above	
Maintenance – Periodic maintenance of structures and access roads and vegetation management could result in the release of sediments into wetlands and removal of wetland buffer vegetation, a ***low*** impact	**Same as East Route**	**Maintenance –** No wetlands present in areas where maintenance activities would be required, therefore ***no impact*** to wetlands	

East Route	West Route D-E	West Route D-F	No Action Alternative
No construction in floodplains because structures and access roads would be outside floodplain boundaries	**Same as East Route**	**Same as East Route**	No project related activities would occur and therefore, no project related impacts to floodplains would occur.
Construction in localized areas near floodplains could result in the deposition of incidental amounts of sediments in floodplains and the degradation of a small amount of habitat near floodplains, but would not change floodplain capacity or alter flood flows, a ***low*** impact	**Same as East Route**	**Same as East Route**	
Construction areas would be separated from the floodplain by a railroad berm, resulting in ***low*** impacts to floodplains	Construction areas would be on the high bluffs along the river outside the floodplain, resulting in ***low*** impacts to floodplains	**Same as West Route D-E**	
Five structures and one conductor pulling and tensioning site would be located near but outside floodplains, resulting in ***low*** impacts to floodplain functions and quality, such as habitat	Three structures and two conductor pulling and tensioning sites would be located near but outside floodplains, resulting in ***low*** impacts to floodplain functions and quality, such as habitat	**Same as West Route D-E**	
Short spur roads and about 212 feet of new access road would be constructed near, but outside floodplains, resulting in ***low*** impacts to floodplain functions and quality, such as habitat	Access road improvements (1,659 feet) and new road construction (770 feet) would occur near, but outside floodplains, resulting in ***low*** impacts to floodplain functions and quality, such as habitat	**Same as West Route D-E**	
Construction – ***low*** impact to floodplains as described above	**Same as East Route**	**Same as East Route**	
Maintenance – Periodic maintenance activities in localized areas near floodplains could result in the deposition of incidental amounts of sediments in floodplains and the degradation of a small amount of habitat near floodplains, but would not change floodplain capacity or alter flood flows, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Construction – Residents, recreational users, and motorists would have temporary views of construction activities, a ***low*** impact	**Same as East Route**	**Same as East Route**	No project related activities would occur and therefore, no project related impacts to visual resources would occur.
Operation – The presence of the line would change views by increasing the number of transmission line structures, access roads, and conductors seen by viewers, and would introduce new visual impacts along the high plateau where a transmission line does not exist, a ***moderate*** to ***high*** impact	**Operation –** The presence of the line would change views by increasing the number of transmission line structures, access roads, and conductors seen by viewers, and it would introduce new visual impacts along Segment E where a transmission line does not exist immediately adjacent to the proposed route, a ***moderate*** impact	**Operation –** The presence of the line would increase the number of transmission line structures, access roads, and conductors seen by viewers, but most of the line would be immediately adjacent to existing lines, a ***low to moderate*** impact	
Motorists – Motorists along SR 28 and the Malaga Alcoa Highway would have temporary glimpses of the transmission line, a ***low*** to ***moderate*** impact	**Motorists –** Motorists along SR 28, the Malaga Alcoa Highway, and Tarpiscan Road would have temporary glimpses of the transmission line, a ***low*** to ***moderate*** impact	**Same as West Route D-E**	
Recreational Users – Recreational users would have distant views of transmission line structures and conductor, a ***low*** to ***moderate*** impact	**Recreational Users –** Distant views of transmission line structures and conductor would not be prominent enough to have a substantial effect on views, a ***low*** to ***moderate*** impact	**Same as West Route D-E**	
Residential Views – City of Rock Island residents would have distant or direct views of the transmission line, and south of Batterman Road, two other residents would have direct views, a ***low*** to ***moderate*** impact	**Same as East Route**	**Same as East Route**	
Maintenance – Temporary and localized visual effects that would not result in any new or different impacts on visual resources, a ***low*** impact	**Same as East Route**	**Same as East Route**	

Section 3.11. Cultural Resources

East Route	West Route D-E	West Route D-F	No Action Alternative
Potential impacts to known cultural resources would be avoided where possible because structures and access roads would be sited to avoid known resources and mitigation would be implemented if impacts are unavoidable, a ***low*** to ***moderate*** impact	**Same as East Route**	**Same as East Route**	No project related activities would occur and therefore, no project related impacts to cultural resources would occur.
Because only about half of the East Route was surveyed due to access restrictions, there could be additional cultural resources not considered in this analysis, which could result in ***low*** to ***high*** impacts depending on the type of resource and the extent of impacts, if any	All areas surveyed except a transmission line span where there would be no construction impacts	All areas surveyed	
During construction and maintenance, potential impacts on previously undocumented archaeological resources would be ***low*** to ***moderate*** depending on the extent of the disturbance and loss, with implementation mitigation measures	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Construction would result in temporary increases in criteria pollutants in localized areas as a result of ground disturbance and the operation of equipment, but would not violate current air quality standards, a ***low*** to ***moderate*** impact	**Same as East Route**	**Same as East Route**	No project related activities would occur and therefore, no project related impacts to air quality would occur.
The construction of up to 2.9 miles of new access roads and the extent of unpaved access roads would result in the generation of dust and particulate emissions, a ***low*** to ***moderate*** impact	The construction of up to 0.4 mile of new access roads, the use of some unpaved access roads, would result in the generation of dust and particulate emissions, a ***low*** impact	The construction of up to 0.3 mile of new access roads and the use of some unpaved access roads would result in the generation of dust and particulate emissions, a ***low*** impact	
	Construction within the previously burned vegetation along 86 percent (approximately 2.8 miles) of Segment E, would result in particulate emissions, a ***moderate*** impact	Construction within the previously burned vegetation along 26 percent (1 mile) of Segment E, would result in particulate emissions, a ***low*** impact	
Construction – ***low*** to ***moderate*** impacts to air quality as described above	**Same as East Route**	**Same as East Route**	
Operation – Corona emissions would result in the emission of limited amounts of ozone and oxides of nitrogen, a ***low*** impact	**Same as East Route**	**Same as East Route**	
Maintenance – Periodic maintenance activities in localized areas would result in infrequent and temporary increases in criteria pollutants in localized areas as a result of ground disturbance and the operation of equipment, but would not violate current air quality standards, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Construction would result in an estimated 1,846 metric tons of carbon dioxide equivalent emissions, a ***low*** impact	Construction could result in an estimated 1,426 metric tons of carbon dioxide equivalent emissions during construction, a ***low*** impact	Construction could result in an estimated 1,342 metric tons of carbon dioxide equivalent emissions during construction, a ***low*** impact	No project related activities would occur and therefore, no project related impacts to climate change would occur.
Direct emissions from substation equipment would result in the loss of an estimated 2,260 metric tons of carbon dioxide equivalent storage. a ***low*** impact	**Same as East Route**	**Same as East Route**	
Operation and maintenance would result in an estimated 21 metric tons of carbon dioxide equivalent emissions over the 100 year life span of the transmission line, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Temporary decrease in housing availability during construction, and no long-term changes in population or housing demand, a ***low*** impact	**Same as East Route**	***Same as East Route***	No project related activities would occur and therefore, no project related impacts to socioeconomics or environmental justice would occur.
Temporary and localized disruption of agricultural activities during construction and maintenance and permanent removal of 0.8 acre of orchards, a ***low*** to ***moderate*** impact	Temporary and localized disruption of agricultural activities during construction and maintenance and permanent removal of 0.5 acre of orchards, a ***low*** to ***moderate*** impact	Temporary and localized disruption of agricultural activities during construction and maintenance and permanent removal of 0.4 acre of orchards, potentially permanent disruption of cherry drying practices, , a ***moderate*** impact	
During construction, temporary negative impacts on property values and salability could occur, a ***low*** impact	**Same as East Route**	**Same as East Route**	
The proposed transmission line would not be expected to have appreciably measurable impacts on property values, a ***low*** impact	The proposed transmission line would not be expected to have appreciably measurable impacts on most property values, but because the transmission line would cross residential properties, it would be a ***low*** to ***moderate*** impact	**Same as West Route D-E**	
Overall economic impacts resulting from spending by construction workers in the project area and increased transmission system reliability and capacity would be ***beneficial***	**Same as East Route**	**Same as East Route**	
No disproportionate impacts on environmental justice populations.	**Same as East Route**	**Same as East Route**	
Construction would result in temporary and localized effects, a ***low*** impact	**Same as East Route**	**Same as East Route**	

East Route	West Route D-E	West Route D-F	No Action Alternative
Construction – Temporary and localized increase in ambient noise from the operation of equipment and vehicles, a ***low*** to ***moderate*** impact, depending on the type of noise and proximity of sensitive noise receptors to the noise disturbance	**Same as East Route**	**Same as East Route**	No project related activities would occur and therefore, no project related noise impacts would occur.
Operation – An increase in audible noise levels would result from the operation of the line near residences that is expected to be below Washington State night-time noise limits for a new source, a ***low*** impact	**Same as East Route**	**Same as East Route**	
Maintenance – Periodic maintenance in localized areas would generate infrequent and temporary noise, a ***low*** impact	**Same as East Route**	**Same as East Route**	

Section 3.16. Public Health and Safety

East Route	West Route D-E	West Route D-F	No Action Alternative
Safety risks and potential injury from use of construction equipment, high voltage equipment, exposure to hazardous materials and risk of fire would be avoided through implementation of appropriate safety plans and procedures, a ***low*** impact	With the implementation of site safety and traffic control plans, construction and operation would result in ***low*** to ***moderate*** potential for impacts to public health and safety.	**Same as East Route**	No project related activities would occur and therefore, no project related impacts to public health and safety would occur.
Minimal increase in electric field near residences would be below the BPA guidelines of 2.5 kV/m at the edge of the right-of-way	**Same as East Route**	**Same as East Route**	
Minimal increase in magnetic field near residences	Minimal increase in magnetic field near homes; although new magnetic field levels would be generated near residences near Colockum Creek, these levels are expected to be less than the maximum levels set in other states	Minimal increase in magnetic field near residences along Segment D	
Interference with radio and TV reception is not expected, ***no impact*** is expected	**Same as East Route**	**Same as East Route**	

Chapter 3 . Affected Environment, Environmental Consequences, and Mitigation

3.1. INTRODUCTION

This chapter includes an analysis of the potential impacts that could result from the Proposed Action alternatives and the No Action alternative on the environment. Each section of this chapter describes the environment that could be affected for a specific resource, analyzes the potential impacts on that resource, and identifies mitigation measures to reduce or avoid impacts. Each resource section includes the following primary subsections:

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

To identify potential impacts on each resource, a defined area is considered, referred to as the study area. The term project area is used to describe the area in the immediate vicinity of the project alternatives. The location of potentially affected resources are identified by local landmarks, route alternatives, route alternative segments, or proposed transmission line structure numbers. For some resources, the study area includes locations where direct physical impacts could occur as a result of project activities and is the same as or very similar to the project area. Because the project could result in impacts on resources that are geographically removed from the project area (e.g., airborne emissions may result in measurable air pollution miles from a project location), the study area for some resources extends beyond the project area.

To evaluate the impacts that could result from construction and operation and maintenance of the proposed transmission line, impact levels were characterized as high, moderate, low, or no impact. High impacts are considered to be significant impacts, whereas moderate and low impacts are not. Beneficial impacts are discussed where applicable.

Cumulative impacts are impacts that result when the impacts to resources from the Proposed Action are added to impacts that have or could occur to that resource from other actions, including past, ongoing, or reasonably foreseeable future actions.

Table 2.5-1 compares and summarizes the environmental impacts, by resource, of the Proposed Action alternatives and the No Action Alternative. This table represents the level of impact that would be expected to result after implementation of the mitigation measures and best management practices (BMPs) listed in each resource section.

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3.2. LAND USE, RECREATION, AND TRANSPORTATION

3.2.1. Affected Environment

The study area for land use, recreation, and transportation includes the right-of-way, the surrounding access road system that extends outside of the right-of-way, and lands that extend 0.25 mile beyond these project work areas. This includes areas where landowners and the public could be affected by Joint Project activities.

Land uses within the project area consist of one urban area, recreational facilities, industrial uses, rural residential areas, agricultural and grazing lands, transmission line corridors and substations, transportation corridors, and undeveloped land. These land uses are described below and applicable land use plans are discussed in Chapter 4.4 of this EA.

Land Use - Agriculture

Agriculture is an important economic resource in the Wenatchee-East Wenatchee Metropolitan Statistical Area (MSA), which includes both Chelan and Douglas Counties. The primary agriculture types found within the project area are fruit orchards, including cherry, apple, and pear along the West Route alternatives and cherry, apple and apricot as well as dryland wheat along the East Route. Livestock grazing occurs within portions of all route alternatives. Agricultural employment directly affects nonfarm employment through the production of nondurable goods, especially food manufacturing, and the demand for trade and transportation employment (Berreth 2012).

The Farmland Protection and Policy Act (FPPA) of 1981, 7 USC 4201, defines and protects ***Prime Farmland*** (PF) and Unique Farmland. The State of Washington further protects ***Farmland of Statewide Importance*** (FSWI). Table 3.2-1 lists PF and FSWI acreage in Douglas and Chelan Counties. All transmission line routes cross some PF and FSWI. See Figure 3.2-1 Farmland Classification in the Project Area.

Table 3.2-1. Farmland Classification by County

Farmland Classification	Douglas County (acres)	Chelan County (acres)
Prime Farmland[a]	320,312	32,756
Farmland of Statewide Importance	249,944	22,208

Source: NRCS 2013.

a Prime Farmland has been aggregated to include farmland that is irrigated and/or drained.

Douglas County has lands enrolled in the U.S. Department of Agriculture Conservation Reserve Program (CRP). Signed into law in 1985, CRP is the largest private-lands conservation program in the United States. The program offers a yearly rental payment in exchange for removing environmentally sensitive land from agricultural production and planting species in order to improve the land's environmental health and quality. Contracts for land enrolled in CRP are 10 to 15 years in length. The long-term goal of the program is to re-establish valuable land cover to help improve ***water quality***, prevent soil erosion, and reduce loss of wildlife habitat. CRP lands

are present within the southern half of the East Route in the vicinity of proposed Structures 43E to 58E.

Ranching occurs within both the East and West Routes. Along and near the East Route, cattle graze the lands south of Batterman Road to Rock Island Grade Road, south of Palisades Road, and east of Washington State Route (SR) 28. The East Route crosses the winter hay feeding operation along Rock Island Creek. Within the West Routes, cattle and horses graze within a portion of Segment E, and horses, goats and cattle graze within a portion of Segment F.

Land Use - Residential

The proposed transmission line corridor for all route alternatives is adjacent to some residences in the City of Rock Island, which has a total population of 788 residents. (See Figure 3.2-2). The downtown includes a main street, residential areas, and a golf course. Land uses include retail, offices, government, industrial, and residential uses. Community facilities include the post office, city hall, and Rock Island Elementary School. SR 28 is located to the south of downtown, between the city and the Columbia River. Within the City of Rock Island, the centerline of the initial portion of the East Route and both West Routes is within 200 to 475 feet of approximately 12 single-family residences, with an existing intervening 230-kV transmission line to the south. Three transmission lines are located immediately to the north of this initial portion of the East and West Routes: a 115-kV line, a 345-kV line and 500-kV line.

After crossing SR 28, the East Route continues south on the west side of SR 28, directly across the highway from 12 residences located along and near 3rd Street SW. South of the City of Rock Island, a single rural residence is located within 300 feet of the East Route centerline, with an existing intervening 230-kV transmission line. The remainder of the East Route is more than 1,000 feet from residences.

Once the West Routes leave the City of Rock Island, the remaining portion of Segment D is not near any residences. West Route Segment E passes through a cluster of homes along and near Colockum Creek. The centerline of Segment E passes within 225 feet of one single-family residence when crossing Colockum Creek. Segment E is within 500 feet of eight additional single-family residences in the same area.

West Route Segment F is located near some residences and a proposed development. The centerline of Segment F passes within 250 feet of one single-family residence on the east side of Colockum Road, to the north of Colockum Creek. Ravenwing Ranch, a large lot rural residential development, is proposed for this area. The developer submitted plans and received development approval from Chelan County in 2007 for the 10,000-acre Ravenwing Ranch, located south of Alcoa's Wenatchee Works plant and north of Colockum Creek. The plans include development of 700 acres, including 48 residential lots between 2 and 10 acres in size, 40 condominiums, a riding stable and lodge. The lodge is planned on lands adjacent to the river (Ryan 2008). As of March 2014, approvals at this site are ongoing and development could occur subsequent to application approval. The centerline of Segment F would also pass within 300 to 500 feet of an area of small buildings that do not appear to be single-family homes but may be used for agricultural worker seasonal housing. There are multiple existing overhead transmission lines within 500 feet or less of most of the residences described above, along the East and West Routes.

There are multiple existing overhead transmission lines within 500 feet or less of most of the residences described above, along the East and West Routes.

Table 3.2-2 summarizes the presence of residences within 500 feet of the centerline of the proposed transmission line alternatives.

Table 3.2-2. Residences within 500 feet of Proposed Transmission Line Route Alternatives

Route (Segment)	Easement Required Across Residential Parcel (Y/N)	Distance of Residence from Proposed Transmission Line Right-of-Way Centerline (approximate)	Description of Residences and Adjacent Existing Transmission Lines
East and West (D)	No	475 feet	Approximately 10 single-family homes with an existing 230-kV line between the homes and the proposed line
East and West (D)	No	200 feet	Two single family homes surrounded by orchards, with an existing 230-kV line between the homes and the proposed line
East	No	300 feet	Approximately 12 single-family homes located across SR 28 from the proposed line
East	Yes	300 feet	One single-family home at the east edge of orchards with an existing 230-kV line between the home and the proposed line, the proposed line would clip the southern end of the property
West (F)	Yes	250 feet	One single-family home structure that is part of Ravenwing Ranch with two existing 230-kV lines between the home and the proposed line, the proposed line would pass to the west of home crossing the middle of the of the property. One pole would be located on the property.
West (F)	Yes	300 – 500 Feet	Multiple small buildings that are potentially living quarters in a grouped settlement with one existing 115-kV and one 230-kV line between the buildings and the proposed line
West (E)	No	225 Feet	One single-family home with an existing 230-kV line to the east of the home
West (E)	No	430 Feet	One single-family home with multiple outbuildings with an existing 230-kV line to the east of the home, proposed line would not cross the property
West (E)	Yes	190 Feet	One single-family home with one outbuilding with an existing 230-kV line to the east of the home, the proposed line would clip the southwestern edge of the property
West (E)	Yes	170 Feet	One single-family home with one outbuilding with an existing 230-kV line to the east of the home, the proposed line would clip the eastern edge of the property and travel along the edge of the property and a 3-pole structure and a 1-pole structure would be on the property
West (E)	No	425	One single-family home with an existing 230-kV line to the east of the home, proposed line would not cross the property

Route (Segment)	Easement Required Across Residential Parcel (Y/N)	Distance of Residence from Proposed Transmission Line Right-of-Way Centerline (approximate)	Description of Residences and Adjacent Existing Transmission Lines
West (E)	No	270 Feet	One single-family home with an existing 230-kV line to the east of the home, proposed line would not cross the property
West (E)	Yes	215 Feet	One single-family home with an existing 230-kV line to the south of the home, proposed line would pass through the west of the property and then out through the northeast of the property, with a 3-pole structure located on the property
West (E)	Yes	320 Feet	One single-family home with an existing 230-kV line to the south of the home, proposed line would pass through the south of the property, with a 2-pole structure located on the property
West (E)	No	485 Feet	One single-family home with an existing 230-kV line to the north of the home, proposed line would not cross the property

Land Use - Industrial

The former American Silicon Technologies plant is located the northeastern portion of the project area, just south of the City of Rock Island. The company produced silicon and operated until 2003. Fill material composed of silicon is still present on the ground surface at the site. The site includes settling ponds that were used to precipitate silica fume waste, a well that was contaminated, and the building itself, which contained laboratories.

The Alcoa Wenatchee Works aluminum smelter is located in the northwestern portion of the project area, between Malaga Alcoa Road and the Columbia River. The smelter produces a variety of aluminum products. The site was opened in 1952 and covers more than 2,700 acres, with the plant itself covering 100 acres. West Route D is opposite the Alcoa site on the west side of Malaga Alcoa Road.

Transportation

The primary transportation corridors within the project area are two north-south roadways, one on either side of the Columbia River. In Douglas County, SR 28 is the main route in the City of Rock Island, which runs north to East Wenatchee and south to Quincy. Other Douglas County roads adjacent to and crossed by the East Route include Batterman Road, Rock Island Grade Road, and Palisades Road. These roads are designated as Rural Major Collectors in the Douglas County transportation Chapter of the Comprehensive Plan (Douglas County 2012).

In Chelan County, the primary roadway along the West Routes is the Malaga Alcoa Highway which turns into Colockum Road. This roadway is designated as a Rural Major Collector in the Chelan County Transportation Element (Chelan County 2009). Both West Routes cross this road and parallel it. Both Segments E and F cross Colockum Road. Where Colockum Road turns west, Tarpiscan Road begins and continues south along the West Routes. Segment E crosses Tarpiscan Road. Tarpiscan Road is also designated as a Rural Major Collector.

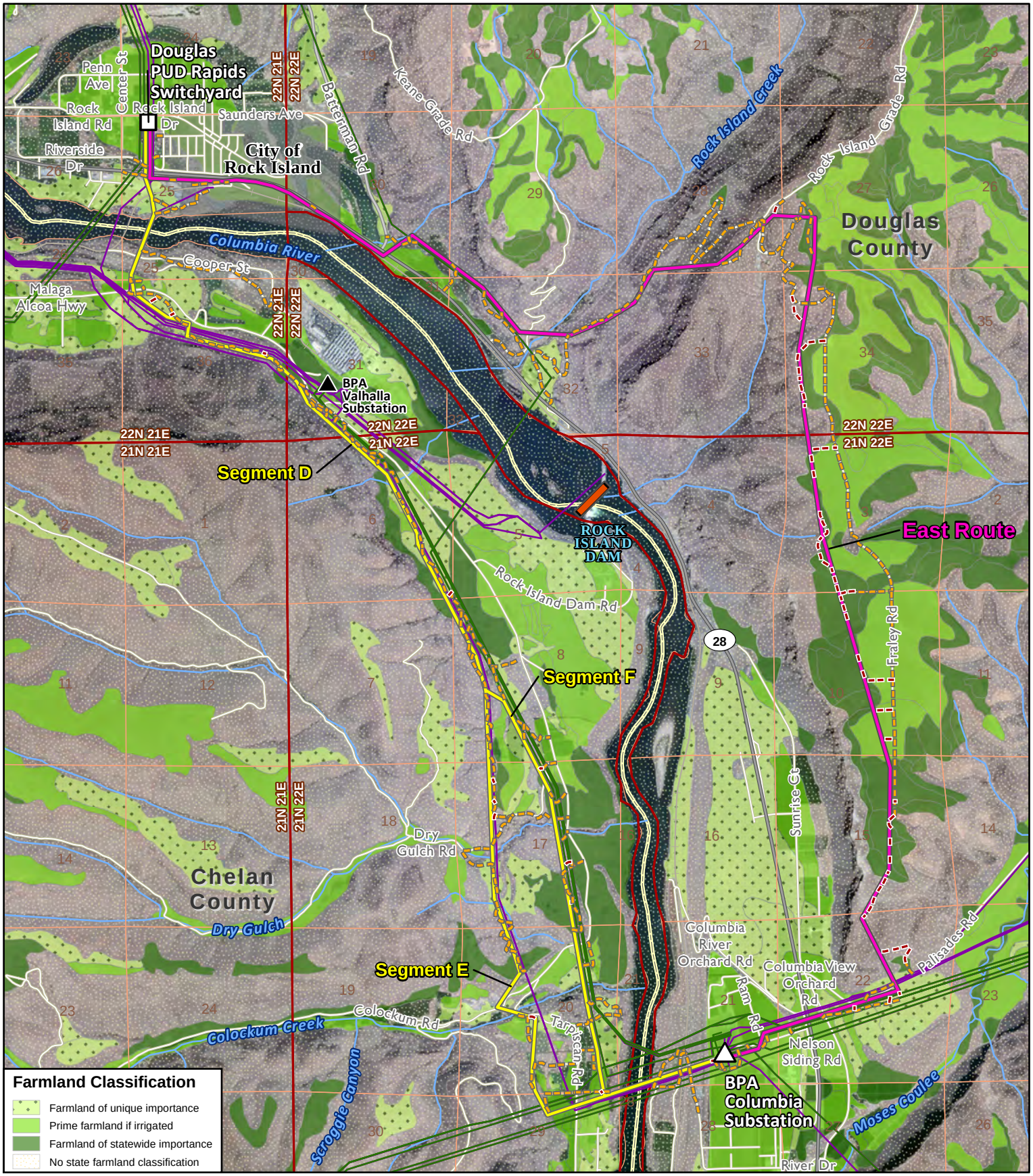
The Burlington Northern Santa Fe (BNSF) Railroad right-of-way includes a railroad track that crosses the Columbia River on the Rock Island Bridge. The crossing is located to the north of Segment D of both West Routes. The rail track then travels on the east bank of the Columbia River, between the river and SR 28.

Recreation

Within the City of Rock Island, the primary recreational resources include several small lakes surrounding the city and the 18-hole Rock Island Golf Course (See Figure 3.2-2 City of Rock Island Land Use Map). The lakes are the focus of two of the City of Rock Island's larger city-planned community events, Fishing Days in the spring and Mini-Hydroplane Races in August. Both events attract local residents, and tourists.

A local historical preservation group within the City of Rock Island aspires to develop a public interpretive site at the landing site of David Thompson. Mr. Thompson was one of the first Europeans to navigate the full length of the Columbia River and whose maps were relied upon into the mid-twentieth century (Northwest Journal 2013). The interpretive site would be located west of SR 28 to the southwest of an industrial site, American Silicon Technologies. No formal plans are approved for the interpretive site.

Although Chelan and Douglas counties are known for many outdoor recreation opportunities, there are no designated recreational sites within the study area. The Colockum Wildlife Area is a designated wildlife recreation area immediately to the west of West Route Segment E. Fishing, recreational boating, and waterfowl hunting are popular on the Columbia River within the project area. Hunting occurs on undeveloped lands along the East and West Routes.



Farmland Classification in the Project Area Map

Proposed Northern Mid-Columbia Joint Project

- Douglas PUD Switchyard (work proposed)
- BPA Substation (work proposed)
- BPA Substation (no work proposed)
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- County Boundary

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access

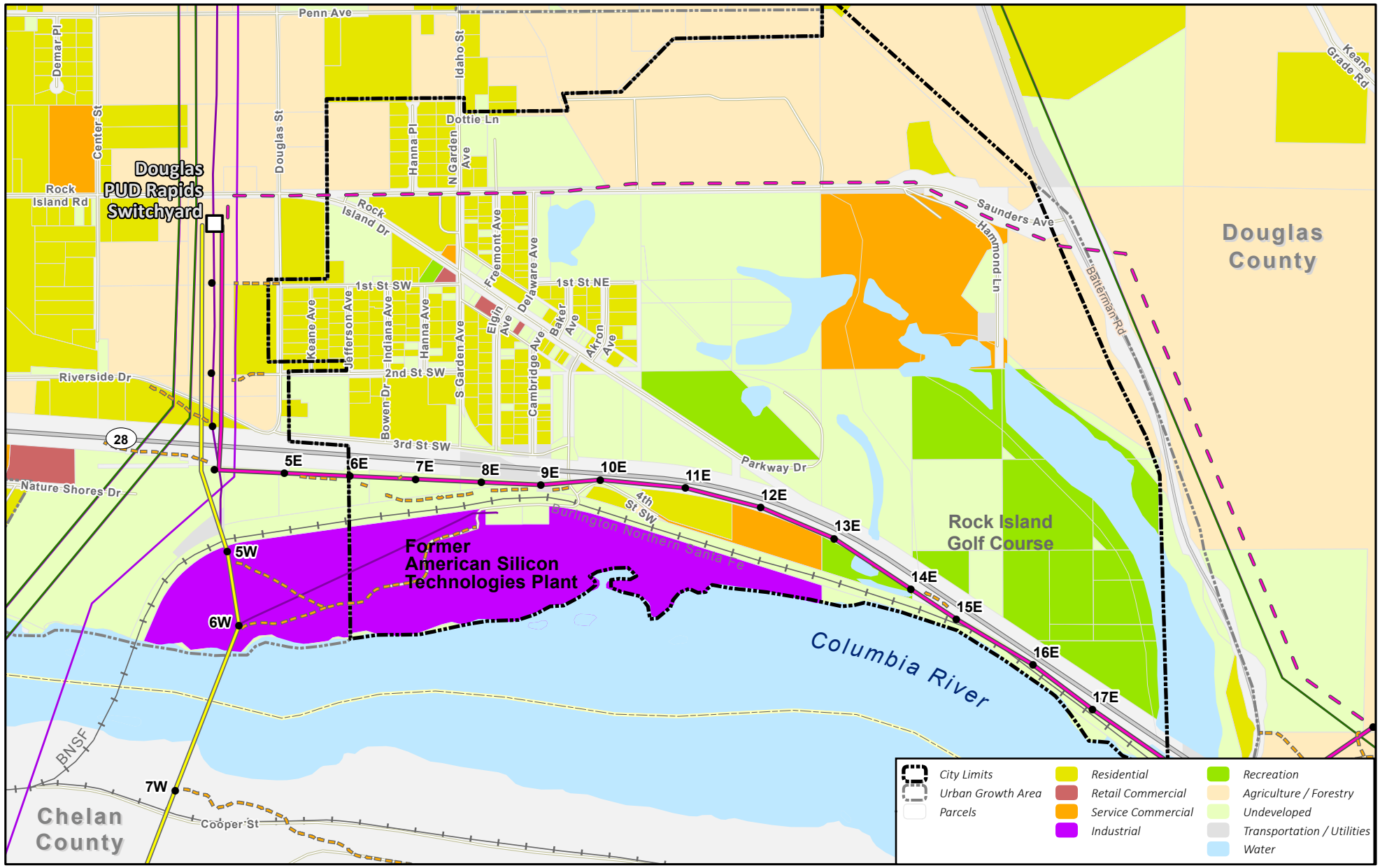
0 ½ 1 2 Miles

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 3.2-1



City of Rock Island Land Use Map

Proposed Northern Mid-Columbia Joint Project

Existing BPA Transmission Lines

Existing Transmission Line, Non-BPA Owned

County Boundary

Douglas PUD 230-kV Transmission Line Route Alternatives

East Route, Segment A, Eliminated after Project Scoping

East Route Alternative

West Route Alternatives

Proposed Transmission Structures

Existing Road Proposed for Access

New Road to be Constructed for Access

0 ¼ ½ ¾ 1 Mile

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 3.2-2

3.2.2. Environmental Consequences – Proposed Action Alternatives

Agriculture – Land Use

The Proposed Action would temporarily impact some agricultural lands from disturbance of soils, disturbance of CRP lands, and inconvenience to farmers. Disruption to agricultural activities from construction would be limited to isolated locations and would be short in duration. Construction activities could also pose a danger to livestock in the area, including increasing the risk of escape.

Construction would permanently remove some agricultural land from production. At the edge of some agricultural lands wind break trees, generally Lombardy poplars, would need to be removed. In addition to the direct disturbance areas, right-of-way easements would apply building restrictions and maintenance conditions, such as tree height limitations, that could affect agricultural areas.

The total acres of classified farmlands and percentage of the countywide base of classified farmlands that could be affected by the Proposed Action are listed in Table 3.2-3. These estimates include impacts to agricultural lands that could result from construction of transmission line structures and access roads. The impacts at structure locations are based on a 100-foot radius disturbance area around each structure, which includes the area temporarily affected by construction and the smaller area around the structure that would be permanently impacted. Impacts from access roads are calculated based on proposed access road locations and dimensions.

Table 3.2-3. Potentially Affected Farmland Types by Route Alternative

Route (Segment)	Prime Farmland (acres)	% of County Base	Farmland of Statewide Importance (acres)	% of County Base
East	**82.4**	**0.03**	**50.8**	**0.02**
West (D)	96.2	0.29	14.8	0.07
West (E)	0	0	8.3	0.04
West (F)	24.6	0.08	15.2	0.07
West (D-E)	**96.2**	**0.29**	**23.1**	**0.10**
West (D-F)	**120.8**	**0.37**	**30.0**	**0.14**

Source: NRCS 2013.

East Route

Approximately 82.4 acres of PF and 50.8 acres of FSWI would be converted to unpaved access roads or areas surrounding transmission line structures. The installation of three structures could require the removal of up to 0.75 acre of orchard trees:

- Structure 19E (2-pole structure) – 0.1 acre
- Structure 21E (1-pole structure) – 0.15 acre

- Structure 67E (2-pole structure) and access road – 0.5 acre

On the high plateau along the East Route, most of the land is farmed for dryland wheat or is CRP lands. The vegetation at the base of sixteen 1-pole transmission line structures on CRP lands could be crushed or cleared during construction, causing 11.52 acres of temporary and 0.20 acre of permanent impacts. Access roads would be needed to reach these structures. All temporarily disturbed areas would be reseeded using CRP seeding guidelines. The proposed transmission line would not be expected to change the CRP status of these lands.

Three transmission line structures, two 1-pole structures and one 3-pole structure at the south end of the East Route would be within grazing land. The vegetation at the base of those poles in grazing lands could be crushed or cleared during construction, causing 1.44 acres of temporary and 0.06 acre of permanent impacts. Because these structure locations are near a developed road and could be accessed with short spur roads, there would be limited disturbance from access roads. Douglas PUD would reseed disturbed areas in grazing lands with an appropriate pasture mix.

The permanent impact along the East Route would be less than 8 acres, of which only a portion is farmland and in most cases access roads in farmlands would be temporary. Because the East Route could impact a small amount of farmland, including up to 0.03 percent of Douglas County PF and up to 0.02 percent of the County base of FSWI, impacts on PF and FSWI classified agricultural lands would be low.

West Route D-E

Approximately 96.2 acres of PF and 23.1 acres of FSWI would be converted to unpaved access roads or area surrounding a transmission line structure. Most of the land along Segment E is steeply sloped and not used for agriculture. The installation of two structures could require up to 0.5 acre of orchard tree removal as follows:

- Structure 9W (1-pole structure) – 0.2 acre
- Structure 62W (2-pole structure) – 0.3 acre

The permanent impact along the West Route would be less than 1.48 acres, of which only a portion is farmland and in most cases access roads in farmlands would be temporary. Because West Route D-E could impact a small amount of farmland, including up to 0.29 percent of the County PF and up to 0.11 percent of the County base of FSWI, impacts on agricultural lands would be low.

West Route D-F

Approximately 120.8 acres of PF and 30 acres of FSWI would be converted to unpaved access roads or area surrounding a structure. The installation of two structures could require up to 0.45 acre of orchard tree removal as follows:

- Structure 62W (1-pole structure) – 0.3 acre
- Structure 83W (2-pole structure) – 0.15 acre

The presence of the proposed transmission line spanning a cherry orchard in Segment F would prevent orchard maintenance using helicopters according to the project scoping comment by the owner the orchard. Helicopters are used just before harvest to dry the cherries and prevent cracking. Much of the orchard area is already crossed by transmission lines, but some open areas currently allow for helicopter use.

The permanent impact along the West Route would be less than 1.48 acres, of which only a portion is farmland and in most cases access roads in farmlands would be temporary. Because West Route D-F would impact a small amount of farmland, including up to 0.37 percent of the County PF and 0.14 percent of the County base of FSWI, and could hinder or prevent the production of cherries from an orchard, impacts on agricultural lands in West Route D-F would be moderate.

Operation and Maintenance

Operation and maintenance activities could affect agriculture through soil disturbance, disturbance of livestock, and by inconvenience if access is blocked or delivery is delayed. Because of the infrequent nature of operation and maintenance activities, however, these impacts would be temporary and localized and would have a low impact on agricultural uses.

Residential – Land Use

Construction activities have the potential to result in temporary impacts on residential land uses during project construction activities. Table 3.2-1 identifies the number and proximity of residences near the proposed routes. Trucks and construction equipment may temporarily block local access to private residences. Construction activities near residences would increase localized noise and dust levels for a temporary period which could affect use and enjoyment of the property (see Section 3.15, Noise). Disturbance to residents from construction activities would be limited to short periods and would be localized, occurring within the existing right-of-way and along existing access road locations.

None of the routes would require removal of houses or other structures. Along the East Route and West Route Segment E, the transmission line would cross close to residences Permanent impacts to land use would occur to residents because the transmission line would cross their land and an easement would need to be acquired. Residential property that would be crossed by the line would be limited from placing houses or outbuildings and from planting tall-growing vegetation within the right-of-way. The transmission line would also potentially create other possible issues for residents, such as impacts to views from homes, or concerns about property values and electric and magnetic field exposure (please see Sections 3.10 Visual Quality, 3.14 Socioeconomics, and 3.16 Public Health and Safety for more detailed discussions on these topics).

Temporary and permanent impacts to residential land use along all route alternatives would be low to moderate, depending on the proximity of the construction activities to residence and whether the proposed easement would cross residential land.

Operation and Maintenance

Operation and maintenance activities could affect residential uses if local access is temporarily blocked by these activities or if an increase in localized noise or dust levels from these activities affects use and enjoyment of the property. Because of the infrequent nature of operation and maintenance activities, however, these impacts would be temporary and localized and would have a low impact on residential uses. Residential properties crossed by the right-of-way for the new transmission line would also need to abide by easement requirements for the right-of-way, such as limitation on the height of residential landscaping and restrictions on building structures within the right-of-way. Because compensation would be provided to landowners for these easements, however, this would be considered a low impact.

Industrial – Land Use

The East Route would not result in any impacts to industrial uses. East Route transmission line structures and access roads would not be located on the former American Silicon Technologies plant site.

In Segment D of both West Routes, existing wood-pole transmission line structures would be replaced and existing access roads would be improved on the American Silicon Technologies plant site. Project activities are proposed in and near the former ponds, but would not occur near the well or industrial building site. Two existing wood-pole structures along West Route Segment D would be removed and replaced near silica fume waste. Portions of access roads would cross some silica fume waste piles. Because wood-pole structures and access roads are already present on the plant site, the proposed steel-pole structures and access roads could have a low impact on future industrial uses of the site, depending on what was proposed.

Because no West Route structures or access roads would be constructed at the Alcoa site, there would be no impacts to this industrial site.

Operation and Maintenance

The American Silicon Technologies plant site is no longer in operation. Operation and maintenance activities would only have an impact if the site resumed industrial operations of some kind. Because operation and maintenance activities would be temporary and localized, impacts to industrial use would be low.

Transportation

Along all route alternatives, the Proposed Action would have the potential to result in temporary impacts on transportation. Impacts would result from increased traffic generated by construction vehicles and disruption to traffic from temporary single-lane closures. The temporary increase in construction-related traffic would represent a low to moderate increase in daily traffic volume, depending on the setting. These temporary increases in traffic volume are not expected to substantially degrade traffic operation on local roads.

The locations where the transmission line would cross the roadway may require temporary lane closures, which would not exceed 10 minutes (Sblendorio 2013 personal communication). Lane

closures would result in temporary traffic delays and would not be expected to substantially degrade traffic operation at these locations because of their short duration.

The East Route parallels SR 28 within the City of Rock Island and travels south toward Batterman Road, where the proposed transmission line would cross SR 28 just south of Batterman Road. Temporary construction delays not exceeding 10 minutes on SR 28, Batterman Road, Rock Island Grade Road, and Palisades Road would be considered a low impact. WSDOT recommends that construction be scheduled to avoid peak harvest season between July and October as traffic levels on SR 28 are higher with the increase in fruit delivery trucks during this period (Sblendorio 2013 personal communication).

The West Routes parallel and cross the Malaga Alcoa Highway and travel south, crossing Colockum Road and travel along or near Tarpiscan Road. The southern portion of both West Routes includes fruit orchards. Traffic levels are higher during the peak harvest season between July and October, with the increase in fruit delivery trucks during this period. Temporary delays on the roadways could slow or delay delivery trucks.

A traffic control plan would be submitted to the regional Washington State Department of Transportation (WSDOT) office prior to commencing construction. Public announcements about closures would be communicated to schools, emergency services, and the general public prior to construction. Because road closures and increased traffic would be temporary and not expected to substantially degrade traffic operation, impacts on transportation would be low.

East Route transmission line structures would be constructed adjacent to, but outside the BNSF right of way. The West Route crosses the BNSF tracks but no structures would be built within the BNSF right of way. Douglas PUD would coordinate with BNSF to procure any permits or approvals necessary for crossing the tracks with the transmission line or for working adjacent to BNSF right of way. Because no railroad closure or long-term impacts to the BNSF tracks are expected, impacts on rail traffic would be low.

Operation and Maintenance

Operation and maintenance activities could affect transportation if these activities result in temporary lane closures or traffic delays. Because of the infrequent nature of operation and maintenance activities these impacts would be temporary and localized and would have a low impact on transportation.

Recreation

East Route

Although the East Route does not cross designated recreational facilities or prevent any recreational activities, construction activities and equipment would be visible from the Rock Island Golf Course and the Columbia River and some construction noise would likely be heard by recreational users. This could temporarily detract from the enjoyment of some visitors resulting in temporary impacts. Visual impacts are discussed in more detail in Section 3.10, Visual Quality, and noise impacts are discussed in more detail in Section 3.15, Noise.

Construction could impact hunting. If construction and hunting season coincide, it could temporarily affect hunters in this area as construction activity would displace game and discourage hunting in the vicinity of construction work areas.

Because potential impacts to recreation would be limited to temporary disruption during construction activities, impacts from the East Route would be low.

West Routes D-E and D-F

Construction activities and equipment would be visible from the Rock Island Golf Course and the Columbia River and some construction noise could be heard by recreational users, as described under the East Route. Although both West Route alternatives cross the Columbia River twice, the structures would be constructed on the high river banks, resulting in no direct impact to recreational boating, fishing and hunting activities. During conductor installation at the river crossings, the portion of the river under the conductor would need to be temporarily closed to boat traffic. Construction could temporarily impact hunting. If construction and hunting season coincide, it could temporarily affect hunters in this area as construction activity would displace game and discourage hunting in the vicinity of construction work areas.

Construction would be temporary and would not prevent recreational uses. Because impacts to recreational use would be temporary, impacts on recreation from West Route alternatives would be low.

Operation and Maintenance

Operation and maintenance activities could affect recreation through noise and visual impacts during these activities. In areas where hunting occurs, the occasional presence of maintenance crews could discourage hunting in a localized area. Because of the infrequent nature of operation and maintenance activities these impacts would be temporary and localized and would have a low impact on recreational uses.

3.2.3. Mitigation

The following mitigation measures are identified to avoid or minimize impacts from the Proposed Action on residents and local land uses, including recreational uses and transportation. See also Section 3.14, Socioeconomics and Section 3.15, Noise for additional mitigation measures that relate to land use.

- Develop and distribute a schedule of construction activities to potentially affected landowners along the transmission line corridor to inform residents when they may be affected by construction activities.
- Conduct a preconstruction public meeting and invite landowners to meet with contractors and Douglas PUD staff responsible for project implementation in order to receive information and discuss concerns.
- Provide appropriate contact information for contractor liaisons and Douglas PUD staff to local residents for any concerns or complaints during construction.

- Develop and distribute a schedule of construction activities to potentially affected farm operators along the transmission line corridor to allow planting, harvesting, or maintenance activities to be coordinated with construction.
- Provide a schedule of construction activities to the owners/managers of potentially affected recreational facilities to allow the owners to advise visitors and appropriately schedule any events that could be adversely affected by construction activities.
- Keep construction activities and equipment clear of residential driveways, to the greatest extent possible.
- Coordinate the routing and scheduling of construction traffic with WSDOT and County road staff to minimize interruptions to local traffic.
- Employ traffic control flaggers and post signs along roads warning of construction activity and merging traffic for temporary interruptions of traffic, where needed.
- Control dust during construction with water or other appropriate control methods, as needed.
- Reseed disturbed areas after construction and regrading are complete at the appropriate time period for germination, using a native seed mix, a seed mix identified in the Stormwater Management Manual for Eastern Washington (Ecology 2004), or as recommended by Douglas PUD biologists, or as agreed upon with landowners for use on their property.
- Monitor seed germination and plant survival in reseeded areas until site stabilization is achieved; if vegetative cover is inadequate, implement contingency measures and reseed until adequate revegetation is reestablished on disturbed soils.

3.2.4. Unavoidable Impacts Remaining after Mitigation

Agriculture - The Proposed Action would result in temporary and permanent impacts on agricultural lands from disturbance of soils, disturbance of CRP lands, inconvenience to farmers, and direct permanent impacts through removal of some agricultural land from production, a low impact. One orchard along West Route Segment F could be permanently impacted by the reduced ability to use helicopters to dry cherries, a moderate impact.

Transportation - Because road closures and increased traffic would be temporary and not expected to substantially degrade traffic operation, impacts on transportation would be low.

Recreation - Construction and maintenance activities could temporarily affect recreational uses because it would be visible from the Rock Island Golf Course and the Columbia River and some construction noise could be heard by recreational users. Along the West Route alternatives, short sections of the Columbia River would be temporarily closed to boat traffic during conductor stringing. Along all alternatives, construction could temporarily affect hunting activity. Impacts to recreational uses along all alternatives would be low.

Residential Use - The Proposed Action would temporarily impact residential land uses during construction and maintenance. Trucks and construction equipment could temporarily block local access to private residences, and noise levels would temporarily increase. Permanent impacts to land use would occur for residents where the proposed transmission line easement would cross their land. Temporary and permanent impacts to residential land use along all route alternatives

would be low to moderate, depending on the proximity of the construction activities to residence and whether the easement would cross residential land.

Industrial - The East Route would result in no impacts to industrial uses. Both West Routes would require structures and access roads on the American Silicon Technologies site could have a low impact on future industrial uses of the site, depending on what was proposed.

3.2.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to land use from construction and operation and maintenance of the proposed transmission line would not occur.

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3.3. GEOLOGY AND SOILS

3.3.1. Affected Environment

The study area for geology and soils includes the proposed right-of-way, access roads that extend outside the right-of-way and areas that extend 200 feet beyond project work areas. This includes area where soils could be directly affected by project work and areas indirectly affected by adjacent project activities.

Geology and Topography

Surface geology in the project area is comprised primarily of Columbia River Basalt (Gresens 1983). Project area topography was influenced primarily by volcanic basalt flows and the Columbia River, which created tall basalt terraces and rolling hills. Areas directly adjacent to the Columbia River are primarily exposed basalt.

The topography is relatively flat adjacent to the Columbia River with steep grades (30 to 80 percent) rising up to plateaus on either side of the river valley. The project area ranges in elevation from approximately 640 feet above sea level at the City of Rock Island up to approximately 2,100 feet above sea level along the ridge just east and above SR 28 (USGS 2013a).

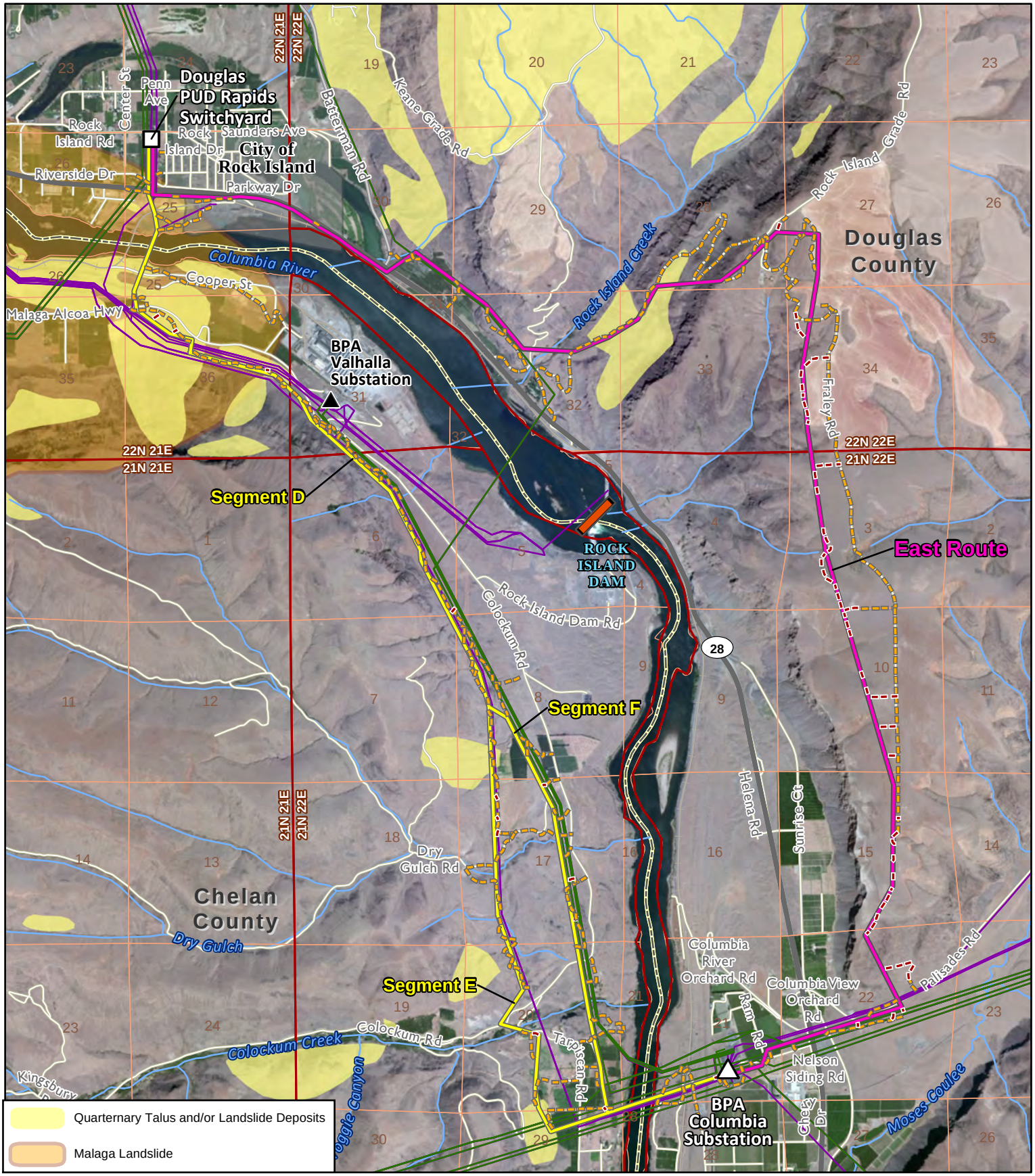
A large, dormant, ***prehistoric landslide*** known as the Malaga Landslide is located in the northwest portion of the project area (Figure 3.3). The landslide is exhibited primarily by unconsolidated sediments in the area.

Soils

Within the Douglas County portion of the project area, soils are primarily derived from basalt and are well to excessively well-drained. The major soil types include Grinrod-Rock outcrop-rubble land complex, Argabak-Horseflat complex along the top of the plateau, Renslow ***silt*** loam (cemented substratum), Willis silt loam, Pogue cobbly fine sandy loam, and Malaga gravelly fine sandy loam in the area below the plateau and adjacent to the Columbia River (NRCS 2013).

While many of the soil types in the Douglas County portion of the project area have a moderate resistance to creating dust when disturbed, the loam soils have low resistance to wind erosion and release dust when disturbed. Soils in the area generally have a slight erosion hazard with the exception of the Grinrod-Rock outcrop-rubble land complex which can present a severe erosion hazard when the soil surface is exposed.

Within the Chelan County portion of the project area, major soil types include Ellisforde silt loam, Zen-Rock outcrop complex, Rock land (rock outcrop), Cashmont stony sandy loam, and Pogue gravelly fine sandy loam. In general, these soils all have a low to moderate resistance to creating dust when disturbed. These soils generally have a slight to moderate erosion hazard with the exception of the Zen-Rock outcrop complex, which can present moderate to severe erosion hazards when the soil surface is disturbed (NRCS 2013).



Landslide Hazard Areas Map

Proposed Northern Mid-Columbia Joint Project

Douglas PUD 230-kV Transmission Line Route Alternatves

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access

0 ½ 1 2 Miles

- Douglas PUD Switchyard (work proposed)
- BPA Substation (work proposed)
- BPA Substation (no work proposed)
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section, Boundary
- County Boundary

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Project Location

Figure 3.3

Thin, rocky soils known as ***lithosols*** are present in both Chelan and Douglas Counties. ***Talus***, an accumulation of rocky debris on or at the base of a slope, is also present in both counties resulting from the weathering of basalt outcrops. Lithosols and talus are found in the project area along the East Route. Lithosols are found along West Route Segment F. The West Route segments include areas mapped as talus or landslide deposits in the WDNR Geologic Hazards dataset. Steep slopes, including cliffs and talus, occur immediately west of the West Route corridors, and historic landslide deposits and scattered basalt erratics occur within the route segments. Eight structures along West Route Segment D and three structures along Segment E are located in areas mapped as historic landslide areas (See Figure 3.3). Field review of these sites did not reveal talus areas in these locations.

The 2013 Mile Post 10 and Colockum Tarps fires burned several hundred acres of vegetation in the southwest portion of the project area along both West Route alternatives. Most of the portion of Segment D west of the Malaga-Alcoa Highway that did not burn in those fires, burned in a lightning-caused fire in May 2014. Due to the loss of vegetation throughout the burned areas, soil stability was greatly degraded. In areas that burned, soils will be prone to water and wind erosion until vegetation is reestablished.

3.3.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

Direct impacts on soils would result from transmission line structure installation, conductor pulling and tensioning, and conducting road work. Direct impacts could occur as a result of ground disturbance leading to loss of soils, disruption of soils, or soil compaction. Excavation for transmission line structure footings would directly impact geology and soils. While it is expected that most holes for foundations would be drilled, blasting may be required if rock substrate is encountered.

Clearing and grading related to transmission line construction and road work would be done with a bulldozer or similar earth moving equipment. This work could strip or crush vegetation and remove the upper, most biologically active portion of the soil. Loss of plant cover and movement of soil would disrupt biological functions, including nutrient retention and recycling, and thus reduce productivity, at least temporarily. Removal of lithosols and talus would change the substrate, impacting the vegetation associated with these rocky areas, as discussed in Section 3.4, Vegetation.

Use of heavy equipment would compact soil in construction work areas. Compaction of soils by heavy equipment would degrade soil structure by reducing the pore space within soils. Pore spaces contribute to retention of moisture and gas exchange, which are important for respiration and other metabolic functions of soil organisms. Soil compaction would be localized and would not be substantial enough to significantly increase or permanently alter stormwater runoff.

Indirect impacts to soils could occur if soil disturbance and vegetation removal resulted in erosion. Indirect impacts from project construction could include minor ***sheet erosion*** and the creation of some small channels. If soils were left bare or were slow to ***revegetate***, minor gullying and other erosion could occur. Eroded soils could enter nearby ***surface waters*** and

degrade water quality. The risk of erosion would be highest on steep slopes and during heavy rainfall.

Direct impacts to geology and soils would be localized to construction work areas and indirect impacts could extend outside of construction work areas. Use of heavy equipment and subsurface excavation or driving also has the potential to affect slope stability in areas of talus and/or landslide deposits.

The route alternatives cross varying land uses, soil types, and topography with different potentials for impacts to geology and soils. Discussion of the potential impacts specific to each route alternative are presented below. Estimates of disturbance areas by route alternative are in Table 2.1-1 in Chapter 2.

East Route

The construction of 69 structures along the East Route would require installation of 94 steel poles. The total permanent pole footprint would be about 0.1 acre. The area of soils permanently disturbed by pole installation could extend up to 10 feet from each pole, a total of about 1.2 acres. Soils up to 175 feet from structures could be disturbed by the equipment used for structure installation, impacting about 49.7 acres. Two new structures (one 3-pole and one 1-pole structure) would be constructed in high quality lithosol and talus, permanently impacting 0.1 acre and temporarily disturbing 1.4 acres of this relatively rare habitat. At the 18 conductor pulling and tensioning sites, soils up to 250 feet from structures could be disturbed, impacting about 20.3 acres.

Road work would include the construction of about 2.9 miles of new roads and the improvement of some existing roads, as needed. The construction of new access roads would disturb about 7.0 acres. Some of the 11.1 miles of existing roads that would be used for access could need improvement, including grading and rocking road surfaces.

The northern portion of the East Route would be constructed primarily in areas that are developed or adjacent to existing roads. The potential for dust and erosion hazards related to soil exposure would be minimized due to the use of existing roads for access. The middle to southern portion of the East Route generally parallels Rock Island Grade Road and then travels southeast along the top of the plateau. This portion of the East Route would present the greatest potential impact related to dust and erosion hazards because of the steep grade, the presence of talus in some locations, and the undeveloped nature of the area.

Although most of the soils atop the plateau are resistant to dust creation, the Grinrod-Rock outcrop-rubble land complex is susceptible to erosion. Loamy soils at the south end of the project area near the Columbia Substation have the highest potential for dust propagation on the East Route.

The use of BMPs during construction activities would limit soil exposure and associated dust and erosion impact potential, as well as the potential for stormwater runoff. Construction activities could cause erosion, mainly on slopes. Therefore, impacts to geology and soils along the East Route would be low to moderate.

West Route D-E

The construction of 67 structures along West Route D-E would require installation of 89 steel poles. The total permanent pole footprint would be about 0.1 acre. The area of soils permanently disturbed by pole installation could extend up to 10 feet from each pole, a total of about 1.1 acres. Soils up to 175 feet from structures could be disturbed by the equipment used for structure installation, impacting about 48.2 acres. Two new structures (one 2-pole and one 1-pole structure) would be constructed in high quality lithosol permanently impacting 0. 04 acre and temporarily disturbing 1.4 acres of this relatively rare habitat. At the 15 conductor pulling and tensioning sites, soils up to 250 feet from structures could be disturbed, impacting about 17.0 acres. There would be no structures installed in areas with talus.

Road work would include the construction of about 0.4 mile of new roads and the improvement of some existing roads, as needed. The construction of new access roads would disturb about 1.0 acres. Some of the 10.4 miles of existing roads that would be used for access could need improvement, including grading and rocking road surfaces.

The presence of talus and/or landslide deposits on the south side of the Columbia River across from Rock Island (Figure 3.3) may indicate unstable slopes in this area. This area is also the site of a dormant, prehistoric landslide known as the Malaga Landslide. While there is no indication that this landslide will reactivate, its existence is an indicator of a landslide prone area.

Because about 86 percent of the land that is crossed by Segment E burned in 2013, soils in this area are anticipated to be more susceptible to water and wind erosion hazards. The use of BMPs would limit soil exposure and associated dust and erosion impact potential from construction, as well as the potential for stormwater runoff. Construction activities could cause erosion, mainly on slopes and it would be limited to minor sheet erosion and occasional small channels. Therefore, impacts to geology and soils along the West Route D-E are expected to be low.

West Route D-F

Potential impacts related to West Route D-F would be similar to those in West Route D-E. The construction of 65 structures along the East Route would require installation of 81 steel poles. The total permanent pole footprint would be about 0.1 acre. The area of soils permanently disturbed by pole installation could extend up to 10 feet from each pole, a total of about 1.0 acre. Soils up to 175 feet from structures could be disturbed by the equipment used for structure installation, impacting about 46.8 acres. At the 14 conductor pulling and tensioning sites, soils up to 250 feet from structures could be disturbed, impacting about 15.8 acres. There would be no structures installed in areas with talus.

Roadwork would include the construction of about 0.3 mile of new roads and the improvement of some existing roads, as needed. The construction of new access roads would disturb about 0.8 acre. Some of the 8.6 miles of existing roads that would be used for access could need improvement, including grading and rocking road surfaces.

As noted above in West Route D-E, the presence of talus and/or landslide deposits on the south side of the Columbia River across from Rock Island (Figure 3.3) may indicate unstable slopes in this area. This area is also the site of a dormant, prehistoric landslide known as the Malaga

Landslide. While there is no indication that this landslide will reactivate, its existence is an indicator of a landslide prone area.

Compared to West Route D-E, impacts from the 2013 fires to the project area within this route were less, with the fires affecting approximately 26 percent of the land that is crossed by Segment F. Similar to Segment E, burned areas along Segment F are anticipated to have high potential for water and wind erosion until vegetation is reestablished. The use of BMPs would limit soil exposure and associated dust and erosion impact potential from construction, as well as the potential for stormwater runoff. Construction activities could cause erosion, mainly on slopes and it would be limited to minor sheet erosion and occasional small channels. Therefore, impacts to geology and soils along West Route D-F are expected to be low.

Operation and Maintenance

Operation and maintenance activities would result in direct and indirect impacts to soils and geology during maintenance work. Repair of transmission line structures and associated hardware could result in soil disturbance in work areas. Removal of vegetation that causes soil disturbance could result in erosion. Periodic maintenance of access roads, including grading or rocking of road surfaces, replacement of culverts, and vegetation removal, could result in minor soil compaction and erosion. Because maintenance would be infrequent and localized to small work areas, impacts are expected to be limited to compaction and minor soil erosion in disturbed areas, a low impact.

3.3.3. Mitigation

The following mitigation measures are identified to avoid and minimize impacts from the Proposed Action on geology and soils. Other mitigation measures relevant to geology and soil are in Section 3.4, Vegetation, and Section 3.7, Waterways.

- Explain erosion control measures, including BMPs and permit conditions to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Locate staging areas in previously disturbed or graveled areas to minimize disturbance to soil and vegetation, where possible.
- Minimize the size of construction disturbance areas and removal of vegetation within 200 feet of waterways, wetlands, and ***floodplains***, to the greatest extent possible.
- Conduct standard inspections for work occurring within inactive landslide zones (if present) during construction.
- Address geotechnical issues, such as new and existing landslides, and potentially unstable slopes, if they arise during construction.
- Delineate construction limits within 200 feet of streams, other waterbodies, wetlands, and floodplains; manage sediment as specified in the Stormwater Pollution Prevention Plan (SWPP Plan), with an approved method that meets the most recent version of Stormwater Management Manual for Eastern Washington (Ecology 2013) erosion and stormwater control BMPs to minimize or eliminate sediment discharge into waterways and wetlands, minimize

the size of construction disturbance areas, and minimize removal of vegetation, to the greatest extent possible.

- Inspect erosion and sediment controls periodically during construction, maintain them as needed to ensure their continued effectiveness, and where appropriate, remove them from the site when vegetation is reestablished and the site has been stabilized.
- Design and construct access roads to minimize drainage from the road surface directly into surface waters, size new and replacement culverts large enough to accommodate predicted flows, and size and space cross drains and water bars properly to accommodate flows and direct sediment-laden waters into vegetated areas.
- Reseed disturbed areas (see mitigation measures in Section 3.2 Land Use, Recreation, and Transportation).
- Monitor seed germination of seeded areas until site stabilization is achieved; if vegetative cover is inadequate, implement contingency measures and reseed to ensure adequate vegetation of disturbed soils.
- Inspect and maintain access roads, culverts, and other facilities after construction to ensure proper function and nominal erosion levels.

3.3.4. Unavoidable Impacts Remaining after Mitigation

Although implementation of construction BMPs and mitigation would reduce the potential for increased erosion, some increased levels of temporary erosion would be expected during and immediately after construction. Long-term impacts remaining after mitigation would be limited to normal sedimentation from road surfaces, soil compaction, some erosion of formerly vegetated ground, and loss or elimination of natural biological functions in the areas that were formerly undeveloped but would be converted to structure locations and access roads. Impacts on geology and soils would be moderate for the East Route alternative due to the impacts to lithosols and talus. Impacts to geology and soils for West Route alternatives would be low for the West Route D-E due to disturbance of soils and moderate for West Route D-F due to disturbance of soils and impacts to lithosols.

3.3.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to geology and soils from construction and operation and maintenance of the proposed transmission line would not occur.

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3.4. VEGETATION

3.4.1. Affected Environment

The study area for vegetation includes the proposed right-of-way, access roads that extend outside the right-of-way, and areas that extend 200 feet beyond project work areas. This includes areas where vegetation could be directly affected by project work and areas where vegetation could be indirectly affected by adjacent project activities.

The vegetation in the project area is influenced by the topography, climate, soils, and current and past human activities. Topography in the area has been influenced primarily by volcanic basalt flows and the Columbia River, creating tall basalt terraces and rolling hills. Climatically, the region can be characterized as arid to semiarid with low precipitation, hot, dry summers, and relatively cold winters (Franklin and Dyrness 1988).

Vegetation in the project area has been extensively modified in the last two centuries by a variety of land uses and activities, including livestock grazing, agriculture (dryland wheat, CRP lands, orchards, and pasturelands), hydropower production, wildfires, residential and commercial development, and road, railroad and utility corridor construction. Livestock grazing, orchards and dryland farming are dominant land uses of the project area, particularly along the East Route. Historic and contemporary livestock grazing has degraded the vegetation communities and facilitated the spread of weed species. Cheatgrass *(Bromus tectorum)* is a common ***non-native*** grass species that has replaced native grasses and ***forbs*** and is the most abundant weed species in the project area.

Wildfire is a natural element of shrub-steppe habitats in the ***Columbia River Basin***. Disturbed habitats, particularly those supporting high-density weed populations such as cheatgrass, can burn frequently and intensively because there is an abundance of dry, fine fuels. Two large fires in August 2013, the Colockum Tarps Fire and the Mile Post 10 Fire, burned several hundred acres of vegetation in the southwest portion of the project area along both West Routes, including 2.8 miles or 85 percent of the length of Segment E and approximately 1 mile or 26 percent of the length of Segment F. Most of the portion of Segment D west of the Malaga-Alcoa Highway that did not burn in August 2013, burned in a lightning-caused fire in May 2014.

To determine the vegetation types present in the project area, existing sources of information on vegetation resources were reviewed, including aerial imagery, vegetation maps, National Wetlands Inventory (NWI) maps, Washington Natural Heritage Program (WNHP) rare plant data, ***priority habitats*** were identified using Washington Department of Fish and Wildlife Priority Habitats and Species (PHS) data, and various academic reports, studies, and plant-related resources. In addition, where Douglas PUD was able to obtain landowner permission to enter property, field surveys were conducted to verify and further characterize project vegetation. Douglas PUD obtained landowner permission and field surveys were conducted for about 42 percent of the East Route (mainly on the northern portion of this route) and about 97 percent of the West Routes. The objectives of the surveys were to describe the general vegetation types present within the project area, evaluate the quality of vegetation communities, locate special-status (rare) plant species, and create a list of plant species observed. The distribution and overall

cover of Class A- and B-designate noxious weeds in the project area also were mapped and described.

Vegetation Types

General vegetation types in the project area include shrub-steppe, sandy shrub-steppe, lithosol**,** ***riparian***, wetland**,** CRP land, and fields of ***fallow land***, described below. The relative quality of vegetation types was characterized as low, medium, or high, based on a variety of factors including cover by native or non-native species and the overall level of disturbance. The relative quality of vegetation types in the project area ranges from very low to high, and averages low to medium.

Table 3.4-1. Vegetation Community Composition in the Project Area

	Acres / Percentage							
	Developed	Lithosol	Rare Plant Habitat	Fallow fields and CRP	Riparian	Sandy Shrub Steppe	Shrub Steppe	Total (acres)
East Route	17.48 (12)	0.67 (<1)	0.03 (<1)	63.04 (44)	6.59 (5)	0.00 (0)	54.33 (38)	142.14
West Route D-E	5.27 (5)	0.36 (<1)	0.32 (<1)	27.20 (26)	0.88 (<1)	0.16 (<1)	68.91 (69)	103.11
West Route D-F	4.05 (4)	3.09 (3)	0.00 (0)	29.16 (29)	1.15 (1)	2.10 (2)	61.02 (61)	100.56

Note: Information based on field studies conducted prior to the 2013 and 2014 wildfires along the West Route Alternatives.

Shrub-steppe

Within shrub-steppe, the most common shrub is big sagebrush (*Artemisia tridentata*) and the most common native ground cover is bluebunch wheatgrass (*Pseudoroegneria spicata*). Tall deciduous shrubs, including serviceberry (*Amelanchier alnifolia*), chokecherry *(Prunus virginiana),* mock orange *(Philadelphus lewisii),* and wax currant *(Ribes cereum),* tend to occur in moister areas, such as at the base of steep slopes, on north-facing slopes, and near wetlands. Typically, shrub-steppe communities on north-facing slopes have substantially less weed cover than shrub-steppe communities on south-facing slopes. In some areas, the deep-soiled mounds of shrub-steppe are interspersed with lithosol patches forming a mosaic of vegetation types.

Most of the shrub-steppe in eastern Washington has been degraded or destroyed by a number of land uses and activities including grazing, agricultural conversion, wild fire, invasion of trees and weed species, and fire suppression. Livestock grazing and wildfires have resulted in the spread of weeds. Many shrub-steppe areas in the project area have very high cover of cheatgrass and almost no native grasses or forbs. The quality of shrub-steppe in the project area ranges from very low to high.

The project area has several small areas of sandy shrub-steppe types. The largest areas are north of Colockum Creek and the east side of the northern Columbia River crossing. Dominant shrub species include big sagebrush (*Artemesia tridentata*), gray rabbitbrush (*Ericameria nauseosa*), bitterbrush (*Purshia tridentata*), and snow buckwheat (*Eriogonum niveum*). Dominant native grass species include Sandberg's bluegrass (*Poa secunda*), Thurber's needlegrass (*Achnatherum*

thurburianum), and needle-and-thread grass (*Hesperostipa comate*). Dominant forb species include pale evening primrose (*Oenothera pallida*), thread-leaf fleabane (*Erigeron filifolius*), white-leaf phacelia (*Phacelia hastata*), and hoary aster (*Machaeranthera canescens*). The quality of sandy shrub-steppe in the project area ranges from low to medium.

The 2013 and 2014 wildfires influenced the density and distribution of shrubs along the West Route alternatives. In general, fire increased abundance of herbaceous species and decreased woody plants. The fire return interval for productive shrub-steppe is 12-15 years (Miller and Eddleman 2001). The immediate effect of these fire occurrences reduced both shrub and herbaceous plant cover. In the next few years, the plant community in burned areas will likely consist of herbaceous species. Fire-tolerant shrubs such as willow (Salix sp.) are already regrowing and will quickly re-establish woody shrub stands. Re-establishment of sagebrush and bitterbrush will depend on dispersion and survival of seed from adjacent unburned areas, and the length of time until the next fire event. Eventually it is anticipated that the area would return to shrub-steppe.

Lithosol

Lithosol vegetation types, characterized by soils that are stony and extremely shallow to bedrock, are not very widespread within the project area. They occur on topographical highpoints such as the foothills between Rock Island Creek and Moses Coulee on the East Route and just south of Colockum Creek on West Route Segment F. Within the project area, lithosols do not cover large contiguous areas. They form a patchy mosaic within shrub-steppe types and individual patches are often less than one acre in size. The plant community transition between shrub-steppe and lithosol is often quite abrupt.

The most common plant association in lithosol is stiff sagebrush and Sandberg's bluegrass (Daubenmire 1970). Dominant shrub species in lithosol include stiff sagebrush (*Artemisia rigida*), thyme-leaf buckwheat (*Eriogonum thymoides*), Hood's phlox (*Phlox hoodia*), snow buckwheat, and narrowleaf goldenweed (*Nestotus stenophyllus*). Dominant grasses are Sandberg's bluegrass, Thurber's needlegrass, and bluebunch wheatgrass. Showy native forbs on lithosols include Hooker's balsamroot (*Balsamorhiza hookeri*), nodding microseris (*Microseris nutans*), yellow fleabane (*Erigeron linearis*), and stonecrop species (*Sedum* sp.). Cheatgrass, barren fescue (*Vulpia bromoides*), and bulbous bluegrass (*Poa bulbosa*) are common weed species in lithosol types, although weed species are typically not a prominent component of lithosol types. The quality of lithosol vegetation types in the project area ranges from moderate to high.

Riparian Areas

The East Route crosses the riparian area of Rock Island Creek, a ***perennial*** creek. In the project area, the Rock Island Creek riparian area has heavy ongoing cattle grazing and is very disturbed and weedy. Shrubs are present in and adjacent to the riparian area. ***Intermittent*** creeks crossed by the East Route do not support riparian vegetation.

The West Routes cross the Columbia River twice. Transmission line structures and access roads would be constructed on high bluffs above the Columbia River. The conductor would span the riparian vegetation along the water's edge. This reach of the Columbia River has a long history

of disturbance including widespread livestock grazing, an altered hydrologic regime associated with large hydroelectric dams, agricultural conversion, railroads, highways, and commercial development.

Of the two proposed crossings of the Columbia River, the west side of the river at the north crossing area has medium quality vegetation. The riparian area is dominated by trees and tall shrubs including non-native Siberian elm (*Ulmus pumila*), silver maple (*Acer saccharinum*) and green ash (*Fraxinus pennsylvanica*), and native tree species including black cottonwood (*Populus balsamifera*) and chokecherry (*Prunus virginiana*). Native shrubs include rose species (*Rosa* sp.), western white clematis (*Clematis ligusticifolia*), and gray rabbitbrush. Non-native wetland species, including yellow iris (*Iris pseudacorus*) and reed canarygrass (*Phalaris arundinacea*) grow along the river's edge.

The other three Columbia River bank locations where structures and access roads would be located have low quality vegetation types and a high cover of weed species. The east side of the north Columbia River crossing is on a high bank above the river. It has a narrow strip of low quality sandy shrub-steppe on the edge of the bank, adjacent to silica spoil piles. The east side of the south crossing has low quality lithosol vegetation. The west side of the south Columbia River crossing is located between an orchard and the river bank. It is vegetated with a mix of weedy riparian species and shrub steppe.

West Route Segment D crosses Dry Gulch, an intermittent stream, commonly referred to as a wash. This area has shrub-steppe vegetation types of moderate quality that have been affected by a long history of grazing and disturbance. This riparian area burned during the 2013 wildfires.

Both Segment E and F of the West Route include one perennial riparian creek crossing of Colockum Creek. The vegetation in the Segment E crossing of Colockum Creek has been altered by ranches, residences, roads, a natural gas pipeline, and heavily grazed range lands. This area was further degraded due to flooding caused by vegetation loss from the 2013 fire. The upland vegetation is dominated by non-native species with a narrow riparian strip of mixed native and non-native trees, including Siberian elm and willows, with a non-native herbaceous species understory.

The riparian vegetation in the Segment F crossing of Colockum Creek is characterized by relatively undisturbed, diverse stands of trees, shrubs, forbs, and grasses growing within a steep canyon. Common native tree and shrub species associated with this riparian area include ponderosa pine (*Pinus ponderosa*), water birch (*Betula occidentalis*), alder (*Alnus* sp.), chokecherry, willow, Wood's rose (*Rosa woodsii*), Douglas maple (*Acer douglasii*), poison ivy (*Toxicodendron rydbergii*), and smooth sumac (*Rhus glabra*). Common grasses include Great Basin wildrye (*Leymus cinereus*) and sedge species (*Carex* sp.).

Wetlands

Along the East Route there are three wetlands that are open water ponds in the proposed right-of-way along SR 28. The majority of the vegetation around these wetlands is non-native tree and shrub species including Russian olive (*Elaeagnus angustifolia*), Siberian elm, black locust (*Robinia pseudoacacia*), and Himalayan blackberry (*Rubus armeniacus*). Wetland edges support native shrubs such as narrowleaf willow (*Salix exigua*), alder (*Alnus* sp.), serviceberry, and

western white clematis. Noxious weed species such as purple loosestrife (*Lythrum salicaria*), yellow iris (*Iris pseudacorus*), and reed canarygrass (*Phalaris arundinacea*) are present in the fringe of these ***emergent*** wetlands.

Two wetlands are located along West Route D-E. A wetland dominated by shrubs (scrub-shrub wetland) is located near Segment E, adjacent to Dry Gulch Road. This wetland burned during the Mile Post 10 Fire in 2013. Dominant plant species in this wetland before the fire were willow species, cattail (*Typha latifolia*), and Russian knapweed (*Acroptilon repens*). Post-fire, the Russian knapweed cover greatly increased. It is likely that cattail and willow roots survived the fire and will resprout and recolonize this wetland.

An emergent wetland is located within the proposed right-of-way along Segment E. This wetland is a wet pasture that has been intensively grazed year-round for decades. The vegetation structure, species composition, and soils have been extensively altered by intensive grazing, livestock waste, and compaction by livestock. The plant community is dominated by non-native grasses.

Agricultural Lands and the Conservation Reserve Program

Much of the southern half of the East Route is either dryland wheat or CRP. There are several orchards, farms, fallow fields, and pasturelands in lowland areas along both East Route and West Route alternatives. At the edge of some agricultural lands rows of wind break trees, generally Lombardy poplars, are common. These agricultural areas often contain remnants of low quality shrub-steppe that may provide important connections for plants and wildlife to surrounding native habitats.

Special-Status Plant Species

Special-status plant species are rare species that have been identified for protection and/or management under federal or state laws or other mandates. Special-status plant species include ***federally listed*** species, species that are candidates for federal listing, federal ***species of concern***, state-listed and ***sensitive species***, and for the BLM parcels in the project area, species on the BLM Sensitive Species list. A rare plant survey was conducted in 2013 to identify special status species in the vegetation study area.

Federally Listed Plant Species

Three federally-listed species were considered to have the potential to occur in Chelan and Douglas Counties (USFWS 2013a, b), including showy stickseed (*Hackelia venusta*), Wenatchee Mountains checker-mallow (*Sidalcea oregana* var. *calva*), and Ute ladies'-tresses (*Spiranthes diluvialis*). There is no designated ***critical habitat*** for these species within the project area.

Potential habitat for federally-listed species does not occur in the vegetation study area for the following reasons:

- Showy stickseed occurs in dry loose granitic sands; habitat for showy stickseed does not occur in the project area because the bedrock and soils are basaltic rather than granitic.

- Wenatchee Mountains checker-mallow occurs in moist meadows in open coniferous stands and along the edge of shrub and hardwood thickets; there is no potential habitat for this species in the project area.
- Ute ladies'-tresses occurs along rivers, in floodplains, and wet meadows with soils that remain wet into the growing season. The project area was surveyed for potential habitat but project area wetlands are weedy, disturbed, and steep-sided and do not provide habitat for this species.

State Special-Status Plant Species

There are known occurrences of six state special-status plant species within 1 mile of the vegetation study area (WNHP 2013a, BPA 2013a). Populations of four special-status plant species were documented in the project area during 2013 vegetation surveys (Table 3.4-2).

Special-status plant species that occur along the East Route include sticky phacelia (*Phacelia lenta*), a state ***threatened species*** and federal species of concern, pauper milk-vetch (*Astragalus misellus* var. *pauper*), a state sensitive species, and Whited's penstemon (*Penstemon eriantherus* var. *whitedii*), a state sensitive species. None of these species were found within portions of the proposed transmission line right-of-way accessible by vehicles. Pauper milk-vetch occurs about 100 feet from a proposed structure work area, while the other species occur at least 350 feet from proposed structure work areas. Three of the species are adjacent to existing roads that would be used for access. It is not known whether there are special-status populations in areas along the portions of the East Route that could not be surveyed.

The only ***special-status species*** observed along West Route alternatives is Whited's milk-vetch (*Astragalus sinuatus*), a state ***endangered species*** and federal species of concern. This population is located along Segment E, in an area that burned in the July 2013 Colockum Tarps fire. The population observed in spring 2013 was within the proposed right-of-way, located more than 250 feet from proposed structure work areas and access roads. Additional vegetation survey conducted in spring 2014 confirmed survival of the population and documented the presence of numerous seedlings of Whited's milk-vetch. No special status plant species were found in the West Route D-F.

BLM Sensitive Plant Species

The Oregon/Washington BLM now maintains a list of special status/sensitive species via an interagency program with the Pacific Northwest Regional Office of the U.S. Forest Service called the Interagency Special Status/Sensitive Species Program (ISSSSP). Pauper milk-vetch, sticky phacelia and Whited's penstemon are all listed as BLM Sensitive Plant Species (ISSSSP 2011). Populations of pauper milk-vetch and sticky phacelia were found on BLM parcels along the East Route. A population of Whited's penstemon was found on private land along the East Route.

Table 3.4-2. Special-Status Plant Populations in Project Vegetation Study Area

Route Alternatives and Special Status Species Occurrence	Federal and/or State Status	In or Out of Proposed Right-of-way	Within 200 Feet of Proposed Structure	Within 200 Feet of Proposed Access Road
East Route				
Pauper milk-vetch *(Astragalus misellus* var. *pauper)*	S-S, S-BLM	Out of Right-of-Way	160 feet from one structure	Adjacent to access road
Whited's penstemon *(Penstemon eriantherus* var. *whitedii)*	S-S, S-BLM	In Right-of-Way	No	Adjacent to access road
Sticky phacelia *(Phacelia lenta)*	SoC, T, S-BLM	Out of Right-of-Way	No	Adjacent to access road
West Route D-E				
Whited's milk-vetch *(Astragalus sinuatus)*	SoC, E	In Right-of-Way	No	None
West Route D-F				
None				

Notes:

SoC = Federal Species of Concern

E = State Endangered. In danger of becoming extinct or ***extirpated*** from Washington

T = State Threatened. Likely to become endangered in Washington

S-S = State Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state

S-BLM = BLM Sensitive Species

Noxious Weeds

Noxious weeds are non-native plants that have been designated as undesirable plants by federal and state laws. Weeds displace native species, decrease plant species ***diversity***, degrade habitat for rare species and wildlife, decrease productivity of farms, rangelands and forests, create unattractive areas dominated by single species, and impair full use of the landscape by wildlife and humans. As weed infestations spread, private landowners and public land managers spend increasing amounts of money, time, and resources conducting weed control activities.

Chelan and Douglas counties classify noxious weeds in the following categories (Chelan County 2014, Douglas County 2008):

- Class A noxious weeds are non-native species that are limited in distribution in Washington. State law requires that these species be eradicated.
- Class B noxious weeds are non-native species that are either absent from or limited in distribution in some portions of the state, but are abundant in other areas. The goal for the management of Class B species is to contain the plants where they are already widespread and prevent their spread into new areas.

- Class B-designate noxious weeds are designated for control in state regions where they are not yet widespread. Prevention of new infestations in these areas is the primary goal. In addition, prevention of seed production is mandatory for these species. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal.
- Class B and C county selected weeds are non-native species that have been selected for control from the State Class B Non-designated list and the Class C list. Requirement of control for these species is decided by the county noxious weed board each year when the county weed list is adopted.
- Class C noxious weeds are widespread in Washington State and not considered feasible to eradicate.

Noxious weeds were searched for, identified, and mapped as part of the vegetation survey. Field surveys were conducted for Class A and Class B weed lists for Chelan and Douglas Counties. No Class A noxious weeds were observed in the vegetation survey area (Beck 2013).

Class B noxious weeds occur along both the East and West Route alternatives as shown in Table 3.4-3, and each species is described below. Along the East Route, Class B noxious weeds were identified near the proposed locations of Structures 13E (1-pole) and 15E (1-pole) and between the proposed location of Structures 17E (3-pole) and 18E (3-pole). Small infestations of the Class B–select noxious weed species Russian knapweed were located in Chelan County, along the West Route (between Segments E and F) near the access road to proposed Structure 73W, along Dry Gulch. This area burned in 2013.

Other weeds, such as Class C and weedy non-native species were recorded when observed. Class C weeds found in portions of project include field bindweed (*Convovulus arvensis*), baby's-breath (*Gypsophila paniculata*), Canada thistle (*Cirsium arvense*), yellow iris (*Iris pseudacorus*), reed canary-grass (*Phalaris arundinacea*), curly pondweed (*Potomegeton crispus*), and Himalayan blackberry (*Rubus armeniacus*). Of these Class C species, only Canada thistle is a Class C Select species in Chelan County, where it may be designated for control.

Table 3.4-3. Class B Noxious Weeds Identified in the Vegetation Study Area

Noxious Weed			County Weed Status	
Common Name	Route Alternatives Where Class B Weeds Were Found	County Where Found	Chelan	Douglas
Class B Noxious Weeds				
Acroptilon repens, Russian knapweed	West Route D-E and D-F	Chelan	B-Select	B
Centaurea diffusa, Diffuse knapweed	East Route West Route D-E and D-F	Chelan, Douglas	B	B
Kochia scoparia, Kochia	East Route West Route D-E and D-F	Douglas	B-Select	B[a]
Lepidium latifolium, Perennial pepperweed	East Route West Route D-E and D-F	Douglas	B-Designate	B[a]
Linaria dalmatica, Dalmatian toadflax	East Route	Douglas	B-Select	B
Lythrum salicaria, Purple loosestrife	East Route	Douglas	B-Designate	B
Myriophyllum spicatum, Eurasian watermilfoil	East Route	Douglas	B-Designate	B
Potentilla recta, Sulfur cinquefoil	West Route D-E and D-F	Douglas	B	B[a]

Source: Beck 2013.

a Noxious weed species not included on the list of species known to occur in Douglas County.

Russian knapweed (*Acroptilon repens*) is a bushy, branched perennial, reaching up to three feet tall, with many flower heads. It forms colonies that arise from vigorous, deep, spreading rhizomes. Found growing in pastures, hayfields, grain fields, irrigation ditches, and roadsides, Russian knapweed is considered a noxious weed because it is an aggressive invader of pastures, non-crop areas, grain fields and other cultivated fields, and is poisonous to horses. Russian knapweed reproduces by seed, spreads laterally by its root system, and can regenerate from root fragments following cultivation. Russian knapweed was found in Chelan County where it is a Class B-Select weed. This species was found along both West Route alternatives. It was found along some access roads along Segment E (access roads between proposed Structures 50W to 53W) and Segment F (access road to proposed Structure 73W).

Diffuse knapweed (*Centaurea diffusa*) is an annual, biennial or perennial that branches freely and grows up to about 3 feet tall, with a long taproot. It grows in a variety of habitats, including river shores, rangeland and pastures and thrives in disturbed habitats such as gravel pits, roadsides, railroad tracks, vacant lots, airports, trails and heavily grazed pasture. Diffuse knapweed is considered a noxious weed because infestations increase production costs for ranchers, decrease plant diversity and wildlife habitat, increase soil erosion rates, and pose wildfire hazards. It reproduces primarily by seed and a single flower stalk can produce 1,200 seeds. When the plant is broken off at the base, it can be blown around like a ***tumbleweed*** and disperse its seed. Diffuse knapweed was found in both Chelan and Douglas counties, where it is a Class B weed. It occurs in locations along all route alternatives. Along the West Route, it was found near the Columbia River along both the north and south crossings of the Columbia River.

It was also found along some Segment E access roads. Along the East Route, this species occurs in the vicinity of open ponds adjacent to SR 28.

Kochia (*Kochia scoparia*) is an annual plant, with many branches that grows up to five feet tall. It is found on pasture, rangeland, roadsides, ditch banks, wastelands and cultivated fields. Kochia is considered a noxious weed because in areas where it is widespread, it is considered a serious pest of late-maturing crops. It effectively competes for light, nutrients, and soil moisture, reducing crop yield. Kochia reproduces from seeds, typically producing around 14,600 seeds per plant. Seeds are dispersed in the fall when the plant breaks off at the base and becomes a tumbleweed. Kochia was found in Douglas County where it is a Class B weed. Along West Route Segment D, it was found along the access roads on the east bank of the north Columbia River crossing (access roads to 5W and 6W). Along the East Route, this species occurs in the vicinity of open ponds adjacent to SR 28.

Perennial pepperweed (*Lepidium latifolium*) has multiple stems from a woody base. It normally grows one to three feet tall, but may grow up to six feet tall. Found in a variety of places, including waste areas, wet areas, ditches, roadsides, cropland and in dry habitats, it is considered a noxious weed because it forms dense infestations that can turn into monocultures. The dense monocultures of semi-woody stems accumulate, degrading wildlife habitat and displacing more desirable species. It produces abundant seed with a high germination rate and also reproduces by creeping rhizomes and root fragments. Perennial pepperweed was found in Douglas County where it is a Class B weed. Along West Route Segment D, it was found along the access roads on the east bank of the north Columbia River crossing (access roads to proposed Structures 5W and 6W). Along the East Route, it occurs on the west side of SR 28, extending to the south of the City of Rock Island, in the vicinity of proposed Structures 4EW to 13E.

Dalmatian toadflax (*Linaria dalmatica*) is a perennial herbaceous plant that grows up to three feet tall. Found on roadsides, in pastures, rangeland and waste areas, it is considered a noxious weed because mature plants are strongly competitive. Dalmatian toadflax displaces native plants and other desirable species in pastures, rangelands, and natural areas. It spreads by horizontal or creeping rootstocks as well as by seed and a single mature plant can produce up to 500,000 seeds. Dalmatian toadflax was found in Douglas County where it is a Class B weed. It was found in one East Route location near the Columbia Substation.

Purple loosestrife (*Lythrum salicaria*) is an aquatic plant that can reach up to ten feet tall and five feet wide, with up to 50 stems per plant and a persistent, perennial tap root and spreading rootstock. It occurs in freshwater wetlands, streams, marshes, and other habitats with moist ground or standing water. It is considered a noxious weed because it is a vigorous competitor and can crowd out other vegetation including native species. It can quickly dominate a site and adapt to environmental changes. Loosestrife stands provide poor cover for waterfowl. Purple loosestrife reproduces by seed and a mature plant can produce 2.7 million thin-walled, flat seeds. It also reproduces from stems fragments in favorable conditions. Purple loosestrife was found in Douglas County where it is a Class B weed. Along the East Route, this species occurs in the open ponds adjacent to SR 28.

Eurasian watermilfoil (*Myriophyllum spicatum*) is a perennial, submersed, aquatic plant that forms dense mats with flowering stems extending above the water's surface. It is used in aquariums and has escaped cultivation and is now found in streams, ponds, lakes and ditches.

Eurasian watermilfoil is considered a noxious weed because it forms dense mats that shade out other aquatic plants, degrades water quality, inhibits water flow and impacts recreational activities. Eurasian watermilfoil spreads mainly by pieces of stem that easily break off from the parent plant, and root separately, forming a new plant. This noxious weed was found in Douglas County where it is a Class B weed. Along the East Route, it occurs in the open ponds adjacent to SR 28.

Sulphur cinquefoil (*Potentilla recta*) is a perennial species with a woody rootstock, reaching up to three feet in height. It can form monocultures over large areas in open grasslands, shrubby areas, open forest and logged areas, roadsides, waste areas, and abandoned fields. Sulphur cinquefoil is considered a noxious weed because it is a strong competitor with other plant species including native species and grasses in rangeland areas. Because it has a high tannin content, it is unpalatable to most wildlife and livestock. Sulfur cinquefoil reproduces by seed, but it can be spread by roots if they are moved by tillage or on soil-moving equipment. Sulphur cinquefoil was found in Douglas County where it is a Class B weed. It was found in one location along both West Route alternatives, just west of the Columbia Substation.

Vegetation Management

Douglas PUD conducts ongoing vegetation management of its electrical facilities under its Vegetation Management Program. Manual, mechanical, herbicidal, and biological methods of vegetation management are employed to keep plants from interfering with transmission lines and to control weed species.

In the project area, other entities routinely conduct vegetation control along state and county roads, railroads, utility corridors, residential roads, recreational areas, and agricultural areas. Vegetation control activities generally include herbicide applications to control vegetation and noxious weeds, and mechanical cutting of vegetation.

3.4.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

Direct impacts on vegetation would result from construction activities. Transmission line structure installation, access road work, and conductor pulling and tensioning would directly impact vegetation through removal of or disturbance to vegetation. Clearing and grading during construction could strip or crush vegetation, and remove the upper, most biologically active portion of the soil. Heavy equipment would compact soils, which could damage plant roots. Loss of plant cover and movement of soil would disrupt biological functions, including nutrient retention and recycling, and thus degrade plant habitat, at least temporarily. Removal of lithosols and talus would change the substrate, impacting the vegetation associated with these rocky areas. Areas where the ground is disturbed by construction would be revegetated after construction.

The extent of direct impacts to vegetation at each structure installation site would depend on the quality of existing vegetation, soils, topography, and the number of poles per structure. At structure installation sites, each pole would permanently disturb 531 square feet (0.012 acre) and up to 0.72 acre would be temporarily disturbed but could be expected to recover to pre-

disturbance conditions after construction. Each conductor tensioning site would temporarily disturb vegetation in up to 1.13 acres.

Direct impacts to vegetation would also result from disturbance of vegetation, including some tree removal, from new access road construction and improvements to existing roads. Under all alternatives some orchard trees would be removed. At the edge of some agricultural lands wind break trees, generally Lombardy poplars, would need to be removed.

Because most areas along existing roads consist of lower quality vegetation, impacts would be low and mostly of a temporary nature. In some areas, creation of new roads would disturb areas that have not been subject to much disturbance in the past.

Indirect impacts to vegetation could occur where project construction activities resulted in degradation of nearby plant communities or in construction areas after the initial disturbance. Indirect impacts from construction activities could include minor sheet erosion and the formation of some small channels, which could degrade downslope plant communities. The risk of erosion would be highest on steep slopes and during heavy rainfall. The implementation of BMPs and mitigation measures described below would help prevent or minimize indirect impacts to plant communities.

Each route alternative would cross varying land uses, soils, and topography with different types and qualities of vegetation. Discussions of potential impacts to vegetation types specific to each route alternative are presented below. Estimates of disturbance areas by route alternative are in Table 2.1-1 in Chapter 2.

Indirect impacts to vegetation would include degradation of plant communities from the introduction and spread of noxious weed species into areas disturbed by construction. Construction equipment, vehicles, workers, and materials contaminated with seeds, roots, and other weed parts could spread weeds from one work area to another. Areas where the ground is disturbed by construction are more vulnerable to invasion by weed species during and following construction, than undisturbed areas. Bare, disturbed, and compacted soils are vulnerable to weed invasion through natural dispersal, such as wind-blown seeds. Weeds could displace native plants and degrade vegetative types, whether natural or managed.

Because weeds occur in the project area and ground-disturbing activities would open up new areas for weed infestation, impacts on vegetation from weed species could be moderate from all proposed alternatives. Impacts specific to each of the route alternatives are discussed below.

East Route

Vegetation Types – Impacts to high quality shrub-steppe, lithosols, and riparian areas along the East Route would occur primarily near and along Rock Island Grade Road, from SR 28 to the top of the plateau. The construction of nine structures (six 1-pole, two 2-poles, and one 3-pole structures) along the East Route would permanently disturb a total of 0.20 acre of high quality shrub-steppe habitat (Table 3.4-4). During construction at these structure installation sites, up to 6.5 acres of high quality shrub-steppe vegetation could be temporarily disturbed.

Two new structures (one 3-pole and one 1-pole structure) would be constructed in high quality lithosol and talus habitat, permanently impacting 0.1 acre and temporarily disturbing 1.4 acres of this relatively rare habitat (Table 3.4-4).

Construction of about 2.9 miles of new access roads would disturb a total of 7.0 acres of vegetation of varying types and quality, ranging from low to high quality (Table 2.1-1). Vegetation along about 11.1 miles of existing roads could be impacted by road improvements.

Indirect impacts to vegetation from erosion and sedimentation and weed introduction or spread, could occur, but with the implementation of BMPs and mitigation measures, indirect impacts would be low. Direct impacts from construction activities in the East Route would have a moderate impact on vegetation because a small acreage of some low, moderate, and high-quality plant communities would be disturbed.

Special-Status Plant Species – No direct impacts would occur to special-status species from structure construction or conductor pulling and tensioning along the East Route. All proposed structure locations and conductor tensioning and pulling sites avoid direct impacts to special-status species. A population of Whited's penstemon is about 250 feet from proposed structure locations. Construction would not result in direct impacts and is not likely to result in indirect impacts to this species because it is located at least 150 feet from construction work areas. A pauper milk-vetch population is about 160 feet from the proposed location of one structure and about 60 feet from the structure work area. With the implementation of BMPs and mitigation measures at structure installation sites, indirect impacts to special-status species from potential erosion and sedimentation would be avoided.

Both pauper milk-vetch and sticky phacelia populations are adjacent to and near a well-maintained county road. With implementation of BMPs and mitigation measures that protect the populations, it is likely that direct impacts to these species could be avoided. Any improvements to the road in these areas would have the potential to indirectly impact special-status species by potential erosion and subsequent runoff or through the spread of weeds. This alternative has the potential to result in low to moderate impacts to special status species.

Noxious Weeds – Five Class B noxious weed species are known to occur along the East Route. Four species occur in the right-of-way adjacent to SR 28. Diffuse knapweed and kochia occur in roadside uplands, while purple loosestrife and Eurasian watermilfoil occur in the nearby ponded wetlands. Because wetlands would be avoided during construction, the potential for spreading aquatic weeds is low. Diffuse knapweed and kochia could be spread by construction equipment. In addition, scattered dalmatian toadflax occurs near the Columbia Substation at the south end of the East Route. Because of the potential for noxious weed introduction or spread from construction, impacts could be moderate.

Table 3.4-4. Summary of Vegetation Impacts by Alternative

Vegetation Type	Structures	Conductor Pulling and Tensioning Sites	Proposed Access Road Work Within 200 Feet of Right-of-Way
East Route			
Shrub-Steppe (High Quality)	0.2 acre of permanent disturbance,.6.5 acres of temporary disturbance Nine structures (13 poles) 27E, 28E, 29E (2-pole), 31E, 32E, 33E, 34E (3-pole), 35E (2-pole), 39E	4.5 acres of temporary disturbance 31E (2 tensioning sites) 36E (2 tensioning sites)	Rock Island Grade Road, spur roads to 32E and 39E, 31E, 33E, 34E (3-pole), 36E (3-pole), 37E (3-pole), 40E, 41E
Lithosol/Talus	0.1 acre of permanent disturbance, 1.4 acres of temporary disturbance Two structures (4 poles) 37E (3-pole), 40E	5.7 acres of temporary disturbance 36E (2 tensioning sites), 40E, 41E, 42E	Rock Island Grade Road; spur roads to 39E
Riparian	None	None	None
West Route D-E			
Shrub-Steppe (High Quality)	0.1 acre of permanent disturbance, 5.0 acres of temporary disturbance Seven structures (7 poles) 21W, 22W, 23W, 24W, 25W, 26W, 27W	2.3 acres of temporary disturbance 21W (2 tensioning sites)	21W – 27W, 54W
Lithosol	None	None	None
Riparian	0.02 acre of permanent disturbance	None	57W (3-pole)
West Route D-F			
Shrub-Steppe (High Quality)	0.1 acre of permanent disturbance, 5.0 acres of temporary disturbance Seven structures (7 poles) 21W, 22W, 23W, 24W, 25W, 26W, 27W	2.3 acres of temporary disturbance 21W (2 tensioning sites)	21W – 27W ,76W, 77W, 78W
Lithosol	0.04 acre of permanent disturbance, 1.4 acres of temporary disturbance Two structures (3 poles) 64W (2-pole), 80W	None	78W, 80W
Riparian	0.02 acre of permanent disturbance	None	None

Note: Information based on field studies conducted prior to the 2013 and 2014 wildfires along the West Route Alternatives.

West Route D-E

Vegetation Types – Although all high quality shrub-steppe in West Route D-E burned in the 2013 and 2014 fires, it is anticipated that these areas will eventually recover to high quality shrub-steppe, although they will be in an early stage of recovery for several years. Impacts to areas that were high quality shrub-steppe prior to the 2013 and 2014 fires along Segment D

would occur primarily along the west side of Colockum Road near the Valhalla Substation. In Segment D, the installation of seven 1-pole structures would permanently disturb 0.1 acre and temporarily disturb up to 5.0 acres of former high quality shrub-steppe vegetation. No impacts would occur to high quality lithosol or ***riparian habitat*** because these habitats are absent in construction areas.

Only one proposed structure (Structure 54W) in Segment E would be constructed in areas mapped as high quality shrub-steppe prior to the fires. Because most of Segment E will likely be in an early stage of recovery for several or more years, impacts from construction of Segment E would not disturb high or medium quality shrub-steppe vegetation. Natural re-establishment of native plants will be affected by temporary disturbance. However post-construction ***restoration***, including reseeding of native plants and weed control, may ultimately enhance establishment of native plants in temporarily disturbed areas in comparison to those not manipulated post-fire.

The approximately 0.4 mile of new access roads proposed for West Route D-E would disturb a total of 1.0 acres of vegetation of varying quality, ranging from low to high quality. Vegetation along about 10.4 miles of existing roads could be impacted by road improvements. Indirect impacts to vegetation from erosion and sedimentation and weed introduction or spread, could occur, but with the implementation of BMPs and mitigation measures, indirect impacts would be low to moderate.

Construction activities for West Route D-E would have a low to moderate impact on vegetation because a small acreage of some low, moderate, and high-quality plant communities would be disturbed.

Special-Status Plant Species – Along Segment D, no impacts would occur to special-status species, because no special-status species occur in this segment. Along Segment E, no direct impacts to special status species would occur from structure construction or conductor pulling and tensioning. A ***subpopulation*** of Whited's milk-vetch occurs within 200 feet of an existing public road that would be used for access. No project-related improvements are planned for this road. Because the only special-status species population known to occur along West Route D-E is located over 200 feet from any project work areas, no direct or indirect impacts are expected to occur to special-status species.

Noxious Weeds – Five Class B noxious weed species are known to occur along the West Route D-E. In Segment D, scattered diffuse knapweed, perennial pepperweed, and kochia occur on the east bank of the Columbia, near the proposed location of Structure 5W and its access road. Russian knapweed occurs along some access roads along Segment E and F. Sulphur cinquefoil occurs in one location along both West Route alternatives, just west of the Columbia Substation. Because of the potential for noxious weed introduction or spread from construction, impacts could be moderate.

West Route D-F

Vegetation Types – Impacts to vegetation along Segment D of this alternative would be the same as described above for the West Route D-E. Construction of seven 1-pole structures would permanently disturb 0.1 acre of former high quality shrub-steppe habitat and temporarily disturb 5.0 acres west of Colockum Road near the Valhalla Substation.

The 2013 fires that burned the portion of the project area that would be crossed by Segment F of this alternative burned the only area mapped as high quality shrub-steppe habitat in Segment F, including the locations of proposed Structures 76W and 77W. As a result, 0.2 acre would be permanently disturbed and would not return to high quality shrub-steppe. Because most of Segment F will be in an early stage of recovery for several years, impacts from construction of Segment F may affect the future natural recovery of high or medium quality shrub-steppe vegetation in temporarily disturbed areas. Natural re-establishment of native plants will be affected by temporary disturbance. However post-construction restoration, including reseeding of native plants and weed control, may ultimately enhance establishment of native plants in temporarily disturbed areas in comparison to those not manipulated post-fire

Some scattered patches of lithosols would be impacted along Segment F. Two proposed structures (Structures 73W and 78W) would be located in an area of lithosol that burned in the fires of 2013. Two unburned lithosol areas would be impacted by Structures 64W (2-pole) and 80W (1-pole). Along Segment F, the installation of two structures in lithosols would permanently impact 0.04 acre and temporarily disturb 1.4 acres of the relatively rare lithosol habitat during construction.

The approximately 0.3 mile of new access roads proposed for West Route D-F would disturb a total of 0.8 acre of vegetation of varying quality, ranging from low to high quality. Vegetation along about 8.6 miles of existing roads could be impacted by road improvements. Indirect impacts to vegetation from erosion and sedimentation and weed introduction or spread, could occur, but with the implementation of BMPs and mitigation measures, indirect impacts would be low to moderate.

Construction activities for West Route D-F would have a low to moderate impact on vegetation because a small acreage of some low, moderate, and high-quality plant communities, including lithosols and high-quality shrub-steppe, would be disturbed.

Special-Status Plant Species – Because no special- status species are known to occur along Segments D and F, there would be no direct or indirect impacts to special- status species from West Route D-F.

Noxious Weeds – Five Class B noxious weed species are known to occur along the West Route D-F in the same locations as described under Segment D-E above. Because of the potential for noxious weed introduction or spread from construction, impacts could be moderate.

Operation and Maintenance

Operation and maintenance activities would result in direct and indirect impacts to vegetation during maintenance work. Repair of transmission line structures and associated hardware could result in soil and vegetation disturbance in work areas. Removal of vegetation that causes soil disturbance could result in erosion and the introduction or spread of noxious weeds. Because the alternative routes mostly cross areas of low-growing vegetation that would not threaten the safety and reliability of the line, little maintenance vegetation removal would be expected. Periodic maintenance of access roads, including grading or rocking of road surfaces, replacement of culverts, and vegetation removal, could result in minor soil compaction and erosion. Because

maintenance would be infrequent and localized to small work areas, impacts to vegetation are expected to be low in most areas and moderate in high-quality plant communities.

3.4.3. Mitigation

The following mitigation measures are identified to avoid and minimize impacts from the Proposed Action to vegetation. Other mitigation measures relevant to vegetation are found in Section 3.3, Geology and Soils, Section 3.7, Waterways, and Section 3.8, Wetlands, in this EA.

- Avoid siting proposed transmission line structures and access roads within 200 feet of special-status plant populations during the design process, where possible.
- Prior to construction, survey any areas for special-status plant species that were not previously surveyed due to lack of permission to enter and if federal-status plant species are found, conduct consultation with the USFWS; avoid or minimize impacts to non-federal status species, if found.
- Explain vegetation-related mitigation measures to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Locate staging areas in previously disturbed or graveled areas to minimize disturbance to vegetation, where possible.
- Mark the boundaries of special-status plant populations in the field as "no entry" areas and keep construction disturbance more than 100 feet away, where possible.
- Identify special-status plant populations, including a minimum 25-foot buffer, as sensitive areas to be avoided in construction documents and maps used by construction contractors.
- Inspect erosion and sediment controls in the immediate vicinity of known special-status plant populations, maintain them as needed to ensure their continued effectiveness, and remove them from the site when vegetation is reestablished and the site has been stabilized if not required to maintain stability.
- Minimize the size of construction disturbance areas and removal of vegetation, to the greatest extent possible.
- Cut or crush vegetation rather than blade in areas that would remain vegetated to increase the ability of native plants to recover.
- Reduce the construction work area to the smallest area possible in identified moderate to high-quality shrub-steppe and lithosol areas.
- Monitor and treat existing and new noxious weed infestations before and during construction and for at least three years after construction.
- Use certified weed-free mulch, if mulch is used for erosion control.
- Use local sources of rock for road construction and obtain road fill materials from weed-free quarries.
- Air or water-pressure wash vehicles and other equipment that have been in weed infested areas at blow or wash stations as soon as possible after leaving the infested areas.

- Equip all vehicles used in construction with basic fire-fighting equipment, including extinguishers and shovels to minimize the potential for fires and their spread.
- Reseed disturbed areas after construction and regrading are complete, at the appropriate time period for germination, with a native seed mix, a seed mix recommended by Douglas PUD biologist, or a seed mix identified in the *Stormwater Management Manual for Eastern Washington* (Ecology 2004), or as agreed upon with landowners for use on their property.
- Monitor seed germination of seeded areas until site stabilization is achieved; if vegetative cover is inadequate, implement contingency measures and reseed to ensure adequate revegetation of disturbed soils.

3.4.4. Unavoidable Impacts Remaining after Mitigation

Although implementation of construction BMPs and mitigation would reduce impacts to vegetation, some impacts would remain. Structure installation, conductor pulling and tensioning and access road work would disturb or remove vegetation, including some high-quality shrub-steppe and lithosol plant communities. Plant communities and special-status plant species populations could be degraded by the introduction or spread of weed species as a result of project construction. Unavoidable impacts to vegetation remaining after mitigation for all route alternatives would therefore be moderate due to vegetation removal and potential degradation of plant communities.

3.4.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to vegetation from construction and operation and maintenance of the proposed transmission line would not occur.

3.5. FISH

3.5.1. Affected Environment

The study area for fish includes riparian and aquatic areas that provide habitat for fish species that may be directly or indirectly affected by the Proposed Action. Activities within 200 feet of waterways were considered to have the potential to affect fish species and fish habitat.

Information on fish occurrence in the project area was obtained from Washington Department of Fish and Wildlife (WDFW) fish biologists as well as from published literature and databases including U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) species lists, the WDFW Priority Habitat and Species (PHS) database, Washington Natural Heritage Program (WNHP) data, and StreamNet (Fish Data for the Northwest).

The project area lies within the upper Columbia River Basin and includes the following fish-bearing waterways: the Columbia River, Colockum Creek, and Rock Island Creek. A detailed description of the waterways within the project area is in Section 3.7 Waterways and Water Quality.

According to WDFW PHS data, the following fish species are designated as having occurrence/migration ***priority areas*** within the project area:

- Chinook salmon (*Oncorhynchus tshawytscha*)
- Steelhead (*O. mykiss*)
- Bull trout (*Salvelinus confluentus*)
- Coho salmon (*O. kisutch*)
- Sockeye salmon/kokanee (*O. nerka*)
- Rainbow trout (*O. mykiss*)
- Pacific lamprey (*Lampetra tridentata*)
- Westslope cutthroat trout (*O. clarki lewisi*)
- Leopard dace (*Rhinichthys falcatus*)
- Umatilla dace (*R. umatilla*)
- Mountain sucker (*Catostomus platyrhynchus*)

Spring-run Chinook salmon, steelhead, and bull trout that occur within the project area are listed under the federal Endangered Species Act (ESA) (Table 3.5-1). High quality freshwater habitat for spawning, rearing, and migration is critical to the recovery and survival of declining salmon populations. Degradation of freshwater habitats has occurred in the project vicinity as a result of land uses that directly or indirectly affect streams and water quality. The quality of fish habitat in the project vicinity varies. Some waterways are degraded by sedimentation due to nearby land uses, and some have been physically altered. A variety of land uses that remove or degrade vegetation has resulted in a range of riparian habitat quality within the project vicinity.

Designated critical habitat under the federal ESA occurs in the project area for spring-run Chinook salmon, steelhead, and bull trout. The primary constituent elements (PCEs) of critical habitat are biological or physical habitat features essential for the conservation of the ESU.

The PCEs that may be present within the study area for salmon and steelhead include: freshwater rearing sites that enable juvenile salmon to forage, grow, and develop; and freshwater migration corridors that enable adult fish to successfully avoid predators and swim upstream to reach spawning areas on limited energy stores and juvenile fish downstream migration to marine environments.

Bull trout PCEs in the Mainstem Upper Columbia River that may be present include:

- Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia;
- Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent or seasonal barriers;
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;
- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities and structure; and
- Water temperature ranging from 2ºC to 15ºC (36ºF to 59ºF), with adequate thermal refugia available for temperatures at the upper end of this range.

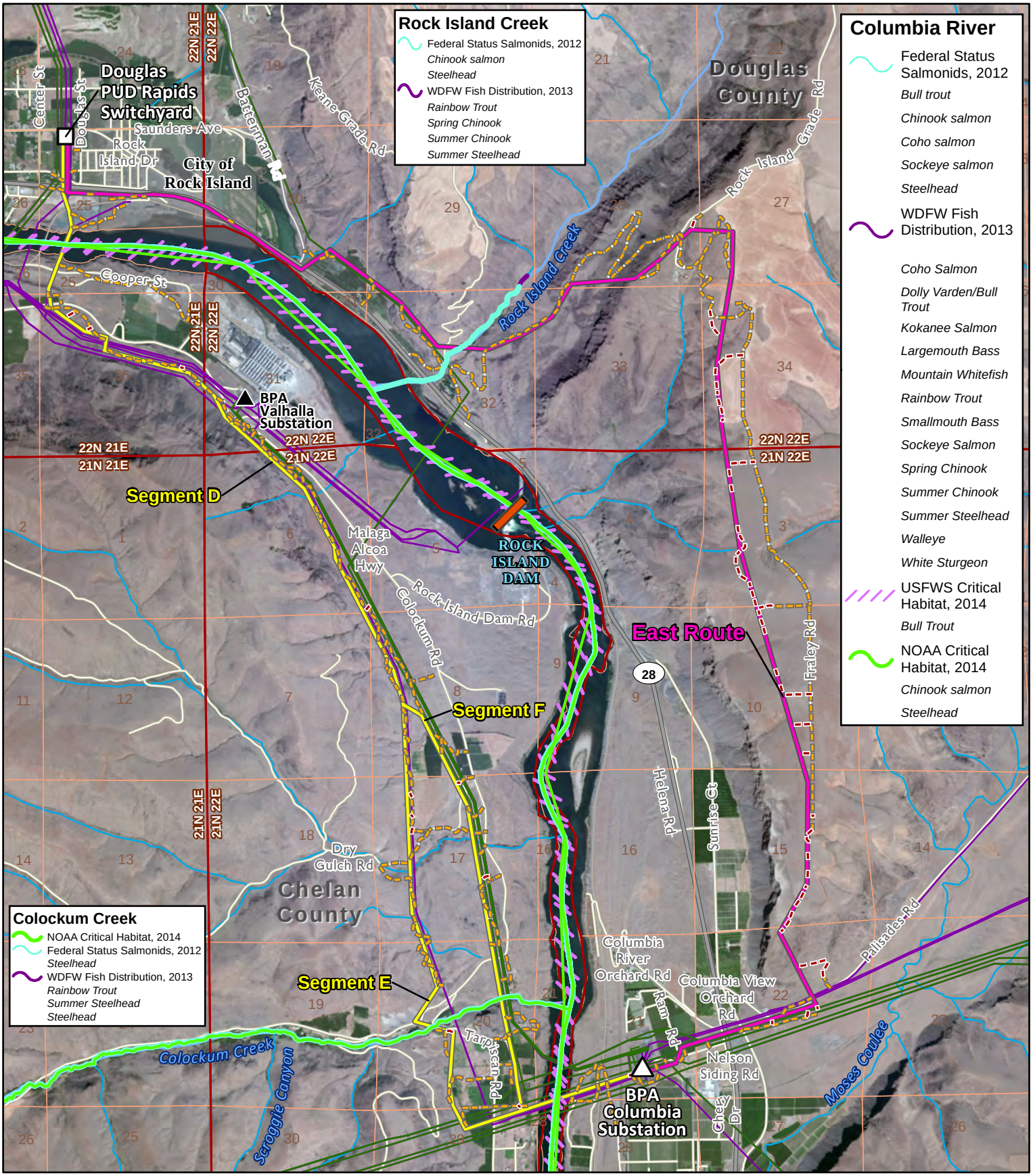
Pursuant to the requirements of Section 7(c) of the ESA, BPA and Douglas PUD are preparing a biological assessment (BA) that addresses potential project effects on spring-run Chinook salmon, steelhead, and bull trout and their designated critical habitat. BPA is currently in consultation with NMFS on spring-run Chinook salmon and steelhead and with USFWS for bull trout. See Section 4.2 for information on Section 7 consultation for the Joint Project. Figure 3.5 shows fish distribution in the project area.

Table 3.5-1. Federally Listed Fish Species and Designated Critical Habitat in the Project Area

Common Name	Scientific Name	Federal Status	Known to Occur in Project Area?	Designated Critical Habitat in Project Area?
Upper Columbia River DPS[a] Steelhead	*Oncorhynchus mykiss*	Threatened	Yes – Columbia River, Rock Island Creek, Colockum Creek	Yes – Columbia River and Colockum Creek
Bull trout	*Salvelinus confluentus*	Threatened	Yes – Columbia River	Yes- Columbia River
Upper Columbia River ESU[b] spring-run Chinook	*Oncorhynchus tshawytscha*	Endangered	Yes – Columbia River, Rock Island Creek	Yes – Columbia River

a DPS = Distinct Population Segment

b ESU = Evolutionarily Significant Unit



Fish Distribution Map

Proposed Northern Mid-Columbia Joint Project

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access

- BPA Substation
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section Boundary

0 ½ 1 2 Miles

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 3.5

Upper Columbia River Spring-run Chinook Salmon

Within the project area, spring-run Chinook salmon utilize the Columbia River and Rock Island Creek for migration. Spring-run Chinook salmon do not use Colockum Creek (StreamNet 2013). The UCR spring-run Chinook salmon ***evolutionarily significant unit*** (ESU) includes all naturally spawned and most hatchery populations of spring-run Chinook salmon in all accessible river reaches in the mainstem Columbia River and its tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River (70 FR 37160), and was listed as endangered March 24, 1999 (64 FR 14308). The ESU consists of one major population group composed of three existing subpopulations (the Entiat, Methow, and Wenatchee) and one extinct population (formerly distributed above Chief Joseph Dam). The existing three subpopulations migrate through the project area.

The Columbia River rearing/migration corridor is considered to have a high conservation value for rearing and migrating juveniles and migrating adults. Dams, diversions, roads and railways, agriculture (including livestock grazing), residential development, and forest management continue to threaten the conservation value of critical habitat for this species in some locations in the upper Columbia Basin (NMFS 2008b).

Critical habitat was designated for UCR spring-run Chinook on September 2, 2005 (70 FR 52630) and includes all Columbia River estuarine areas and river reaches upstream to Chief Joseph Dam and several tributary subbasins. The critical habitat designation includes the Columbia River rearing/migration corridor, which connects the ESU to the Pacific Ocean and includes the project area.

Upper Columbia River Steelhead

Within the project area, summer-run steelhead utilize the Columbia River and Rock Island Creek for migration, as well as Colockum Creek for both migration and rearing (StreamNet 2013). The Upper Columbia River (UCR) ***distinct population segment*** (DPS) of steelhead includes all naturally spawned and most hatchery origin ***anadromous*** steelhead populations below natural and human-made impassable barriers in tributaries in the Columbia River Basin upstream from the Yakima River, Washington, to the Canadian border (NMFS 2008a). The UCR steelhead DPS is listed as threatened (74 FR 42605).

The Columbia River rearing/migration corridor is considered to have a high conservation value for rearing and migrating juveniles and migrating adults. The key limiting factors and threats for this DPS include hydropower projects, predation, harvest, hatchery effects, degraded tributary habitat, ocean conditions, and degraded estuary habitat.

Critical habitat was designated for UCR steelhead on September 2, 2005 (70 FR 52630). The critical habitat designation includes the Columbia River rearing/migration corridor, which connects the DPS to the Pacific Ocean. Within the project area, the Columbia River and the lower portion of Colockum Creek are designated critical habitat for UCR steelhead.

Bull Trout

Within the project area, bull trout utilize the Columbia River primarily for foraging, migration, and overwintering (FMO) habitat. Bull trout do not use Colockum Creek or Rock Island Creek

(StreamNet 2013). Bull trout in the coterminous United States (the lower 48 states) were listed as threatened in 1999 (64 FR 58910). Degradation of habitat by land and water management activities, competition and hybridization with introduced non-native fish, and illegal harvest were identified as factors contributing to listing.

Critical habitat was designated for the Columbia River population of bull trout in 2004 (69 FR 59995) and 2005 (70 FR 56212), and was again designated in 2010 for the Mid-Columbia Recovery Unit (75 FR 63897). The project area occurs within the Mainstem Upper Columbia River Critical Habitat Unit (CHU) of the Mid-Columbia Recovery Unit. The Mainstem Upper Columbia River CHU includes the Columbia River from John Day Dam upstream 323.2 miles to Chief Joseph Dam. The Mainstem Upper Columbia River CHU supports FMO habitat for fluvial bull trout. On September 4, 2014 a Revised Draft Recovery Plan was made available for a 90-day review.

Non-federal Status Fish Species

The other fish species with WDFW PHS designations within the project area are not federally listed. Sockeye salmon and coho salmon utilize the Columbia River within the project area for migration purposes only, and neither species is present within Colockum Creek or Rock Island Creek (StreamNet 2013). Rainbow trout are a resident fish within the Columbia River system.

Other fish species without federal status are known to occur in the project area. Eastern brook trout (*Salvelinus fontinalis*), a non-native fish species, occur in Rock Island Creek. Native fish species known to occur in the Columbia River in the project area include: white sturgeon (*Acipenser transmontanus*), northern pikeminnow (*Ptychocheilus oregonensis*), suckers (*Catostomus* spp.), dace (*Rhinichthys* spp.), chiselmouth (*Acrocheilus alutaceus*), prickly sculpin (*Cottus asper*), threespine stickleback (*Gasterosteus aculeatus*), burbot (*Lota lota*), peamouth (*Mylocheilus caurinus*), redside shiner (*Richardsonius balteatus*), lake whitefish (*Coregonus clupeaformis*) and mountain whitefish (*Prosopium williamsoni*). Non-native species include walleye (*Zander vitreum*), largemouth bass (*Micropterus salmoides*), small-mouth bass (*Micropterus dolomieu*), carp (*Cyprinus carpio*), tench (*Tinca tinca*), sunfishes (*Lepomis* spp.), bullheads (*Ictalurus* spp.), black crappie (*Pomoxis nigromaculatus*) and yellow perch (*Perca flavescens*).

Essential Fish Habitat

Under Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, NMFS is required to provide ***essential fish habitat*** (EFH) conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. EFH includes all streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to Chinook and coho salmon. Adverse effects to EFH may result from actions occurring within EFH or outside EFH.

Total dissolved gas (TDG) is a regulated water pollutant which has been shown to be harmful to aquatic life. Elevated TDG levels are mainly caused by spilling water at hydroelectric dams. Because Wells and Rocky Reach dams are run-of-river projects with little storage capacity, redispatch results in forced spill of water causing elevated TDG levels.

Under the Pacific salmon EFH designation, waterways within the project area are Chinook and coho salmon EFH. Waterways in the project vicinity provide waters and substrate necessary to coho and Chinook salmon for both migration between freshwater and marine environments and feeding and growth. BPA and Douglas PUD are currently in preconsultation with NMFS concerning project activities that may adversely affect EFH. See Section 4.2 for more information on EFH.

3.5.2. Environmental Consequences - Proposed Action Alternatives

Construction Impacts

Impacts on fish and fish habitat could occur where construction takes place near fish-bearing streams. Direct impacts on fish would not be expected as a result of construction activities associated with structure installation, because most structures would not be close to waterways, and construction equipment would not enter fish-bearing streams. As part of the proposed project, no in-water work would be proposed in any fish-bearing streams. Because it is unlikely that there would be disturbance, injury, or death of any fish individuals, there would be no direct impacts to fish as part of the proposed project.

There is the potential for short-term disturbance of fish due to construction noise and activity in proximity to fish-bearing waterways. Fish could be affected due to shadowing when conductors would be strung over fish-bearing streams. This would be a low impact as stress or flight behavior in response to shadowing would be of short duration without permanent affects.

Construction activities and vegetation removal could result in minor temporary disturbances to freshwater EFH aquatic habitat through the increase in sedimentation. The areas of disturbance are relatively small in scale compared with the amount of habitat available to coho and Chinook salmon within the project area. With the implementation of mitigation measures, project activities are not likely to reduce the abundance or distribution of coho or Chinook salmon or to adversely modify the ***ecosystem*** to the extent that measurable effects on spawning, feeding, or growth to maturity for coho or Chinook salmon would result. Therefore, no impacts on EFH are anticipated.

Indirect effects on federally listed species could result from construction and vegetation removal that results in sediment contribution to fish-bearing streams. Impacts would be similar for all alternatives. Most project work areas are over 200 feet from listed species habitat and there would be no in-water work in fish-bearing streams. Implementation of mitigation measures would reduce erosion and sedimentation, decreasing effects on listed fish species. It is reasonably certain that the Joint Project would not reduce the abundance or distribution of listed species and would not significantly reduce the likelihood of survival and recovery of these species.

The Proposed Action could result in impacts on designated critical habitat for federally listed fish species. PCEs that could be affected include juvenile rearing areas and migration corridors. The potential effects on designated critical habitat due to Joint Project could include:

- Temporary indirect effects on juvenile rearing areas could result from sedimentation and removal of riparian vegetation, which would be minimized through implementation of mitigation measures.

- Temporary indirect effects on migration corridors could result from sedimentation or shadowing, which would be minimized through implementation of mitigation measures.

With the implementation of mitigation measures to avoid or minimize effects, designated critical habitat for fish within the study area would not be degraded, thus critical habitat is not likely to be adversely modified. Therefore, impacts on designated critical habitat would be low.

Indirect impacts on water quality could occur if sediment-laden runoff from ground-disturbance during construction enter waterways and result in increased ***turbidity***. Work that would occur within 200 feet of waterways is presented in Table 3.7-2 in Section 3.7, Waterways. For work that would occur beyond 200 feet, existing vegetation between the waterway and work areas would provide an adequate filter to prevent sediments from reaching waterways. With the implementation of mitigation measures to prevent or minimize erosion, indirect impacts on fish and fish habitat from ground disturbance near fish-bearing streams would be low because any sedimentation would be minimal and temporary.

Vegetation removal near streams could indirectly affect water quality. The removal of vegetation near waterways could decrease cover and shading and lead to increases in stream temperatures. Very little to no removal of woody vegetation near waterways would occur because most construction work areas near waterways do not support woody riparian vegetation. Given the extremely small amount of cover that would be removed, removal of vegetation would not be expected to measurably increase water temperatures to a level that could affect fish. Therefore, indirect impacts on fish and fish habitat from vegetation removal would be low.

Douglas PUD would implement weed control efforts, as needed. Some weed species occur in riparian areas and some weed control could occur near waterways. The use of herbicides near aquatic areas can affect water quality. Only herbicides approved for work near water would be used, and where feasible, appropriate mechanical and biological control methods would be used in and near riparian habitats. Given the beneficial effect of weed control in riparian areas, the indirect effects of weed control on fish would be low.

A further discussion of the potential impacts from construction to fish and fish habitat from each route alternative follows.

<u>East Route</u>

Along the northern portion of the East Route, five transmission line structures would be constructed in close proximity to wetlands along SR 28 and within 200 feet of the Columbia River. Some tall-growing woody vegetation along wetlands could need removal. These wetlands are hydrologically connected to the Columbia River, but are not known to have fish passage connectivity. The Columbia River is separated from work areas by the railroad berm so there would be no direct path for sediments into the river. The project could affect water quality in the wetlands adjacent to the river but impacts to Columbia River fish habitat are expected to be minimal, because the wetland would provide some water quality treatment functions and mitigation measures to minimize sedimentation would be implemented.

The transmission line would cross Rock Island Creek but transmission structures would not be constructed within 200 feet of the creek. No in-water work would occur in Rock Island Creek. The narrow band of vegetation along the creek is not expected to require removal or topping

because it is low-growing. There is some potential of short-term disturbance of fish due to shadowing when conductors would be installed, as described above.

No project access roads would cross Rock Island Creek, but two project access roads would be located within about 100 feet of the creek. One access road would be north of Rock Island Creek and may require some improvements. Rock Island Grade Road, a county road, would also be used for access.

Indirect impacts to fish could result from construction of the East Route due to structure construction, road improvement, shadowing, and minimal vegetation removal in proximity to fish-bearing waterways. With the implementation of mitigation measures, indirect impacts on fish and fish habitat from ground disturbance near fish-bearing streams would be low because any sedimentation would be minimal and temporary.

West Route D-E

West Route D-E would cross the Columbia River twice and Colockum Creek once. No in-stream work would occur. Three structures (6WN, 6W, and 6WS) would be constructed within 200 feet of the edge of the bluffs along the Columbia River. No structures would be constructed within 200 feet of Colockum Creek.

Project access roads would be within 200 feet of the Columbia River in three areas: along both sides of the north river crossing and on the west side of the river in the south crossing. These access roads may require improvement. Tarpiscan Road, a county road that crosses Colockum Creek, would be crossed for access and would not require road improvements.

Near the Columbia River, construction work areas near riparian areas do not have trees or shrubs that would require removal. Because structures would be constructed on the high bluffs along the Columbia River, riparian vegetation would not be disturbed. There is some potential of short-term disturbance of fish due to shadowing when conductors are installed, as described above.

Impacts to Columbia River fish habitat are not expected or would be minimal because mitigation measures to prevent or minimize sedimentation would be implemented at the three work sites within 200 feet of the river and there would be no removal of riparian vegetation. No impacts are expected to Colockum Creek fish habitat because no work or vegetation removal would be conducted near the creek.

West Route D-F

West Route D-E would cross the Columbia River twice and Colockum Creek once. The impacts would be the same as those described above. The Colockum Creek crossing has well-developed riparian vegetation, including woody species, in a deep canyon. It is expected that no vegetation removal would be needed because the conductors would span the creek well above the height of vegetation. If some vegetation removal or tree topping was required, this could degrade water quality by causing an increase in water temperature. Because shrubby and low-growing riparian vegetation would not be disturbed, impacts to water quality would be minimal, a low impact.

Operation and Maintenance Impacts

Maintenance work on structures or access roads within 200 feet of fish-bearing streams could cause indirect impacts to fish and fish habitat. As described above, impacts could result from ground disturbance and the removal of vegetation in construction work areas. Because work near streams would be infrequent and temporary, impacts are expected to be low.

If the proposed transmission line was constructed, transmission congestion would be reduced, which would decrease the need to redispatch at the Wells and Rocky Reach dams. The Proposed Action would result in a decrease in TDG levels at these dams, which would have positive effects on water quality and could have positive effects on fish.

3.5.3. Mitigation

The following mitigation measures are identified to avoid or minimize impacts from the Proposed Action on fish and fish habitat. The mitigation measures in Section 3.4, Vegetation that relate to riparian vegetation would also minimize impacts on fish and fish habitat. Other relevant mitigation measures that relate to the prevention of erosion, sedimentation, and fuel spills are found in Section 3.7 Waterways, and Section 3.8 Wetlands.

- Avoid siting proposed transmission line structures and access roads within 200 feet of streams and wetlands during the design process, where possible.
- Explain fish-related permit conditions, BMPs, and mitigation measures to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Delineate construction limits within 200 feet of waterways and minimize the size of construction disturbance areas within 200 feet of waterways, to the greatest extent possible.
- Minimize the size of construction disturbance areas and removal of vegetation within 200 feet of waterways, to the greatest extent possible.
- Minimize disturbance to waterways by installing signage, fences and flagging, where needed, to restrict vehicles and equipment to designated routes. Conduct weed control in riparian areas using procedures that prevent the introduction of herbicides into aquatic areas, and use herbicides approved for use near aquatic areas when chemical control methods are used.
- Implement mitigation measures for all work conducted in or near fish habitat for federally listed species and in Essential Fish Habitat, as agreed upon in consultation with NMFS.

3.5.4. Unavoidable Impacts Remaining after Mitigation

Implementation of the mitigation measures described above would reduce impacts on fish and fish habitat, but would not completely eliminate them. Installation of structures and access road work near fish-bearing streams could cause erosion and result in the minimal deposition of sediments in waterways, temporarily degrading fish habitat. Some temporary impacts could occur as a result of construction noise and activity near or over fish-bearing streams. Maintenance within 200 feet of fish-bearing streams could cause infrequent and temporary impacts to fish habitat.

3.5.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to fish and fish habitat from construction and operation and maintenance of the proposed transmission line would not occur. Transmission congestion would continue, which would result in redispatch at the Wells and Rocky Reach dams. Redispatch would result in an increase in TDG levels at this dam, which would have negative effects on water quality and could have negative effects on fish.

3.6. WILDLIFE

3.6.1. Affected Environment

The project area includes lands that provide habitat for numerous wildlife species. The study area for wildlife species includes the proposed transmission line right-of-way and access roads with a 0.25-mile-wide buffer extending beyond these areas. For ***raptors***, the study area was extended to 2.0 miles beyond the right-of-way and access roads. For bighorn sheep (*Ovis canadensis*), the study area was extended to 1.0 mile beyond the right-of-way and access roads.

In addition to more common wildlife species, some less common wildlife species with federal or state status are known to occur or that could potentially occur in the project area. Information on wildlife in the project area was obtained from the Washington Department of Fish and Wildlife (WDFW) and U.S. Fish and Wildlife Service (USFWS) biologists, as well as from published literature and databases, including USFWS species lists for Douglas and Chelan counties, the WDFW Priority Habitats and Species (PHS) database and the Washington Natural Heritage Program (WNHP) data. In 2013, field investigations were conducted by wildlife biologists to verify the presence of species and potential habitat (Douglas County PUD and West 2014).

Habitats and Associated Wildlife Species

Different types of wildlife habitat occur in the project area, defined in part by the dominant type of vegetation. The most widespread vegetation community type present within the project area is shrub-steppe. Other general plant community types in the project area include: sandy shrub-steppe, lithosol, wetlands, agricultural lands, and Conservation Reserve Program (CRP) lands.

Much of the East Route consists of dryland wheat farms, grazing lands, or CRP. The vegetation on the two BLM parcels along Rock Island Grade Road is primarily shrub-steppe interspersed with lithosols.

There are several orchards, farms, old fields, and pasturelands in lowland areas along both the East and West Route alternatives. These agricultural areas often contain remnants of low quality shrub-steppe. Even low quality shrub-steppe may provide important connections for native plant species and wildlife to surrounding native habitats.

The project area includes open water, wetland, and riparian habitats that function as wildlife habitat. Intact riparian and wetland areas provide habitat for most wildlife species found in the project area. Many of the smaller wildlife species often use riparian corridors for movement. Most bird species found within the project area use riparian areas to varying degrees. Most riparian vegetation in the project area has been degraded by various land uses and activities.

Open water habitat includes the Columbia River and nearby lakes. There are three open water ponds within the project area, all of which are located along the East Route just south of the City of Rock Island. The East Route would cross the Rock Island Creek riparian area, in an area where it has been degraded by grazing activities. Section 3.8 contains information on wetlands. Section 3.7 contains information on water resources and water quality.

Both West Route alternatives would cross the Columbia River twice and would cross Colockum Creek once. Along West Route Segment F, Colockum Creek riparian habitat includes a relatively undisturbed and diverse area located within a steep-sided canyon. Along West Route Segment E,

Colockum Creek consists of degraded riparian habitat crossed by a county road, within a rural residential area.

Additional habitats important to wildlife found within and near the project area include talus, cliffs, and rock outcrops, which provide habitat for several species of bats, reptiles and raptors. Within the project area, cliff and talus habitats are designated as Fish and Wildlife Habitat Conservation Area (FWHCA) critical areas. Section 3.3, Geology and Soils, provides a description of talus, cliffs, and rock outcrops within the project area.

Portions of big game winter range for bighorn sheep, elk (*Cervus elaphus*), and mule deer (*Odocoileus hemionus*) occur within the project area. According to PHS data, portions of the East and West Routes are regular concentration priority areas for mule deer. Portions of the West Routes are regular concentration priority areas for elk and bighorn sheep.

Numerous migratory bird species use the project area. According to PHS data, portions of the East Route are regular concentration priority areas for chukar (*Alectoris chukar*). According to PHS data, portions of both the East Route and West Routes are priority breeding areas for golden eagle (*Aquila chrysaetos*).

Ten raptor nests located within the wildlife survey area were active in 2013 (occupied by a nesting pair). Occupied nests include eight red-tailed hawk (*Buteo jamaicensis*) nests, one golden eagle nest, and one prairie falcon (*Falco mexicanus*) nest. Two active common raven (*Corvus corax*) nests were also observed. Known nests in the survey area that are suitable for nesting but were not occupied in 2013 include four inactive golden eagle nests and 21 other inactive nests of other raptor or corvid species. All of the nests observed were located along waterways, with nearly all of the nests located along the Columbia River and its tributaries, including Rock Island Creek, Colockum Creek, and Douglas Creek. Douglas Creek does not cross the proposed right-of-way or access roads but is within the 2-mile buffer for nesting raptor surveys. Outside of the two mile-buffer, one active peregrine falcon nest (*Falco peregrinus*) was observed during the raptor nesting survey.

Special-Status Species

Six federally-listed wildlife species are known to occur or have the potential to occur in Douglas and Chelan counties (Table 3.6-1). Of these six federally-listed species, only the gray wolf and Washington ground squirrel (*Urocitellus washingtoni*) occur within the project area. A single wolf was observed on April 10, 2013 during a bighorn sheep lambing survey near West Route Segment D. Three to four gray wolves were observed on October 15, 2013 during a wildlife survey near West Route Segment D (between Dry Gulch and Jumpoff Road). One Washington ground squirrel was observed within the project area in 2013 during special-status wildlife surveys.

Some wildlife species with the potential to occur within the project area are not federally listed, but have some other type of federal or state status (Table 3.6-1). A determination was made whether or not these species are likely to occur within the project area based on occurrence data, information obtained from field surveys, and information from biologists with expertise in wildlife within the region.

Greater sage-grouse (*Centrocercus urophasianus*) and the Washington ground squirrel are of particular interest within the region and are described below and presented in Table 3.6-1. These

species are on the USFWS species list for Douglas County, but are not on the list for Chelan County.

Greater sage-grouse have declined dramatically in both distribution and population size in Washington due to conversion of shrub-steppe for production of crops and degradation of the remaining native habitat. The current range of greater sage-grouse in the state is about 8 percent of the historical range. Within Washington, the greater sage-grouse persists in two relatively isolated areas: one primarily on the U.S. Army's Yakima Training Center in Kittitas and Yakima counties and the other northeast of the project area in Douglas County. A third population is being reestablished in Lincoln County (WDFW 2012). Greater sage-grouse that might be present along the East Route would consist of transient individuals with no established populations present.

Washington ground squirrels occupy shrub-steppe and native grassland habitats, especially on sites with deep silty loam soils, which may facilitate burrow digging. They occur only in the Columbia Basin region of eastern Washington and north-central Oregon. In Washington, the species is found east and south of the Columbia and Spokane Rivers (WDFW 2012). Washington ground squirrel colonies are located within 1 to 2 miles of the East Route.

Table 3.6-1. Special-Status Wildlife Species Potentially Occurring in Douglas and Chelan Counties

Common Name	Scientific Name	Federal Status	State Status	Detected/Known to Occur in Project Area?	Expected to Occur in Project Area?
Mammals					
Gray wolf	*Canis lupus*	Endangered	Endangered	Yes – Chelan County only	Yes
Pygmy rabbit	*Brachylagus idahoensis*	Endangered	Endangered	No	No
Grizzly bear	*Ursus arctos horribilis*	Threatened	Endangered	No	No
Canada lynx	*Lynx canadensis*	Threatened	Threatened	No	No
Washington Ground Squirrel	*Urocitellus washingtoni*	Candidate	Candidate	Yes – Douglas County only	Yes
Birds					
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Threatened	No	No
Northern spotted owl	*Strix occidentalis caurina*	Threatened	Endangered	No	No
Greater Sage-Grouse	*Centrocerus urophasianus*	Candidate	Threatened	No	Yes – Douglas County only
Golden eagle	*Aquila chrysaetos*	None	Candidate	Yes	Yes
Bald eagle	*Haliaeetus leucocephalus*	SOC	Sensitive	Yes	Yes
Great blue heron	*Ardea herodias*	None	Monitor	Yes	Yes
Turkey vulture	*Cathartes aura*	None	Monitor	Yes	Yes
Gray Flycatcher	*Empidonax wrightii*	None	Monitor	Yes	Yes

Common Name	Scientific Name	Federal Status	State Status	Detected/Known to Occur in Project Area?	Expected to Occur in Project Area?
Loggerhead shrike	*Lanius ludovicianus*	SOC	Candidate	Yes	Yes
Sage thrasher	*Oreoscoptes montanus*	None	Candidate	Yes	Yes
Lewis' woodpecker	*Melanerpes lewis*	None	Candidate	Yes	Yes
Burrowing owl	*Athene cunicularia*	SOC	Candidate	Yes	Yes
Bats					
Big Brown Bat	*Eptesicus fuscus*	None	Priority Habitat	Yes	Yes
California myotis	*Myotis californicus*	None	Priority Habitat	Yes	Yes
Canyon bat	*Parastrellus hesperus*	None	Monitor	Yes	Yes
Fringed myotis	*Myotis thysanodes*	SOC (western WA only)	Monitor & Priority Habitat	Yes	Yes
Hoary bat	*Lasiurus cinereus*	None	None	Yes	Yes
Little brown myotis	*Myotis lucifugus*	None	Priority Habitat	Yes	Yes
Long-legged myotis	*Myotis volans*	SOC (western WA only)	Monitor & Priority Habitat	Yes	Yes
Silver-haired bat	*Lasionycteris noctivagans*	None	None	Yes	Yes
Townsend's big-eared bat	*Corynorhinus townsendii*	SOC (statewide)	Candidate	Yes	Yes
Western small-footed myotis	*Myotis ciliolabrum*	SOC (western WA only)	Monitor & Priority Habitat	Yes	Yes
Western long-eared myotis	*Myotis evotis*	SOC (statewide)	Monitor & Priority Habitat	Yes	Yes

Note: SOC = species of concern

3.6.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

Ground disturbance and vegetation clearing in construction work areas would result in the temporary and permanent loss of wildlife habitat and habitat degradation. Specific estimates of the amount of wildlife habitat that would be temporarily or permanently impacted are provided below for each route alternative. In addition to affects to wildlife habitat, during construction, there is the potential for some mortality of wildlife due to clearing of vegetation using heavy equipment.

Temporary habitat degradation could occur from installation of transmission line structures and from conductor pulling and tensioning. Vegetation could be cleared or crushed in about 0.72 acre at each proposed structure and in about 1.13 acres at each conductor pulling and tensioning sites. This would result in a temporary loss of vegetation which would degrade wildlife habitat. In

areas temporarily disturbed, short term declines in the quality and quantity of habitat would occur, a low to moderate impact, depending on the wildlife present and quality of habitat.

Temporary habitat degradation could also occur from improvements to existing access roads. Vegetation clearing could be needed along existing access roads, resulting in a temporary loss of vegetation. Impacts to wildlife would be low because habitat degradation would be temporary and would occur within areas where vegetation is managed on an ongoing basis.

Permanent loss of wildlife habitat would occur at the bases of each transmission line structure. An estimated 531 square feet per pole would be permanently lost as functional habitat. This includes the pole footprint and the area around it that would be permanently managed and not expected to return to functional habitat.

The construction of new access roads could also lead to temporary and permanent loss of wildlife habitat. The area where wildlife habitat would be permanently lost would include the 12-foot-wide road bed and the 4-foot wide shoulder on both sides of the road for a total of 20 feet in width. Some new access roads in agricultural lands, including CRP lands, would be returned to pre-disturbance condition after construction and would not result in a permanent loss of habitat.

The areas that would be used to stage materials and equipment are expected to be disturbed areas with little or no function as wildlife habitat. Staging areas are generally level areas that were graveled or filled and previously used for commercial or industrial activities. Impacts to wildlife habitat are not expected from the use of staging areas.

Construction would result in increased noise and activity levels, from the use of heavy equipment to install structures, string conductor, and conduct access road work. Low-flying helicopters could be used to string conductor. Construction generated noise could temporarily displace or stress wildlife near work areas. Noise and human presence could disrupt foraging, breeding, and other normal activities. Impacts from noise and activities would vary depending on the proximity of construction areas to wildlife, the quality of the habitat near construction, and the duration of the noise disturbance. Wildlife would likely avoid construction areas during construction activities. Construction activity would be restricted to within and near the right-of-way and access roads, within areas where there is already considerable human activity and where wildlife habitat exists adjacent to areas of disturbance. Because impacts from noise and activity are temporary, wildlife displacement disturbance impacts would be low.

Degradation of wildlife habitat would occur if noxious weeds become established in areas disturbed by construction activities. Non-native plants provide poor forage for wildlife, and thickets of weeds can impede wildlife movement. Impacts on wildlife habitat from weed infestation would be low to moderate, depending on the severity of the infestation and the success of the weed control measures implemented.

Habitat loss would also occur during tree removal. Trees of various sizes and species could be removed under the Proposed Action and would include orchard trees and wind break trees. However, trees within riparian areas would not be removed. Wildlife, especially nesting birds, could be temporarily displaced by the removal of trees.

To help protect raptor nest sites, construction activities would not occur within 0.6 mile of active raptor nests during the March-August nesting period, unless previously documented by a

biologist to be inactive during the breeding period, unsuccessful after the incubating period, or to have successfully fledged young.

During operation, birds could collide with the transmission line structures, conductor, and overhead ground wire. Eagles, herons, and vultures have been identified as bird types that may have a higher susceptibility for collision with power lines, as they have large wing spans, heavy bodies, and generally poor maneuverability (APLIC 2012). Portions of the project area with a higher potential for avian (bird) collisions include areas where the proposed transmission line would cross open water, floodplains, and where there would be long spans of conductors over canyons and waterways. The high plateau areas of the East Route currently do not have transmission infrastructure, and are considered an area of collision risk for golden eagles and other raptors.

The majority of the route alternatives are oriented north-south which could help avoid the potential for collision during bird migration. In areas where the proposed line would be adjacent to existing lines, resident birds may already be accustomed to avoid these areas.

Birds are not electrocuted by contact with the conductors of high-voltage transmission lines. The typical conductor-to-conductor spacing for the proposed transmission line structure would be too wide for any bird species to contact two conductors at the same time. Electrocution of birds is more commonly a problem with lower voltage distribution lines (the lines feeding neighborhoods or businesses) that have conductors generally spaced 2 to 6 feet apart.

East Route

Up to 78.1 acres of wildlife habitat could be temporarily degraded from the following activities:

Installation of 69 transmission line structures:	49.7 acres
Conductor tensioning and pulling sites (18):	20.3 acres
Improved access roads (11.1 miles):	8.1 acres

Up to 8.2 acres of wildlife habitat could be permanently degraded from the following activities:

Installation of 104 poles:	1.2 acres
New access roads (2.9 miles):	7.0 acres

Washington State priority species and special-status species that could be impacted during construction of the East Route include mule deer, chukar, raptors (especially bald and golden eagles), other bird species (e.g., sage thrasher, great blue heron), and potentially sage grouse and Washington ground squirrel. These species could experience increased stress from nearby construction noise and human presence. Because displacement both within and near construction sites would occur but would be temporary, impacts would be low.

Birds, including bald and golden eagles, have the potential to collide with the proposed transmission line, in several areas along the East Route. The ponds and lakes south of the City of Rock Island are frequented by waterfowl, which could collide with the proposed transmission line along SR 28. The line would cross the Rock Island Creek riparian area at the mouth of a long canyon. Birds may use this area as a travel route.

About 7 miles of the East Route are located on a high plateau where there are no existing transmission lines. Therefore, birds would not be accustomed to avoiding this air space. Birds, including golden eagles, are known to use this habitat. The impacts related to avian collisions would be low to high depending on the species affected. Installing bird diverters, coils of wire installed on transmission line conductors to make the conductors more visible, would decrease the risk of avian collision with conductors.

West Route D-E

Up to 72.8 acres of wildlife habitat could be temporarily degraded from the following activities:

Installation of 67 transmission line structures (89 poles):	48.2 acres
Conductor tensioning and pulling sites (14):	17.0 acres
Improved access roads (10.4 miles):	7.6 acres

Up to 2.1 acres of wildlife habitat could be permanently degraded from the following activities:

Installation of 89 poles:	1.1 acre
New access roads (0.4 mile):	1.0 acre

Washington State priority species and special-status species that could be impacted during construction of West Route D-E would include mule deer, bighorn sheep, elk and raptors. These species could experience increased stress from nearby construction noise and human presence. A small portion of bighorn sheep wintering habitat is located adjacent to the West Route D-E. However, with the implementation of timing restrictions, impacts to bighorn sheep are anticipated to be low. For all other species, displacement both within and near construction sites could occur but because it would be temporary, impacts would be low.

In most areas, avian collisions with the proposed transmission line are not anticipated because the proposed transmission line would parallel existing transmission lines, thus birds may be accustomed to avoiding this portion of the air space.

Because the Columbia River crossings are already spanned by transmission lines and a railroad bridge, the Colockum Creek wildlife habitat is poor quality and crossed by roads with homes in close proximity to the creek, and the new line would be marked to make it more visible to birds, decreasing the likelihood of collisions, impacts to avian species from collisions at waterway crossings are anticipated to be low.

West Route D-F

Up to 68.9 acres of wildlife habitat could be temporarily degraded from the following activities:

Installation of 65 transmission line structures:	46.8 acres
Conductor tensioning and pulling sites (14):	15.8 acres
Improved access roads (8.6 miles):	6.3 acres

Up to 1.8 acres of wildlife habitat could be permanently degraded from the following activities:

Installation of 81 poles:	1.0 acre
New access roads (0.3 mile):	0.8 acre

The same species would be potentially affected as discussed under West Route D-E above. As discussed above, temporary impacts to wintering bighorn sheep could occur from construction of West Route D-F. A small portion of bighorn sheep wintering habitat is located adjacent to both West Routes, however, with the implementation of timing restrictions, impacts to bighorn sheep are anticipated to be low.

Avian collisions with the proposed transition line are not anticipated because the proposed transmission line would parallel existing transmission lines, thus most resident birds are likely accustomed to avoiding this portion of the air space.

The potential for avian collision at transmission line waterway crossings is discussed in West Route D-E above. Along Segment F, the Colockum Creek riparian area is much higher quality than along Segment E, so there may be more bird use in this area. Because the Columbia River and Colockum Creek are already spanned by transmission lines and the new line would be marked to make it more visible to birds, decreasing the likelihood of collisions, impacts are anticipated to be low.

Operation and Maintenance Impacts

Maintenance of the proposed transmission line and access roads would have the potential to impact wildlife in the same ways as construction, but at a smaller and more localized scale. Ground disturbance and vegetation clearing would degrade wildlife habitat and noise generated by equipment could displace or stress wildlife near work areas. Degradation of wildlife habitat would occur if noxious weeds become established in areas disturbed by maintenance activities.

Habitat loss would also occur during vegetation management. Trees adjacent to the right-of-way would need to be removed if they interfered with safe operation of the transmission line. It is expected that the proposed transmission line corridors would require little vegetation removal because they are primarily vegetated with dryland wheat, orchards, shrub-steppe and other low-growing native vegetation, which are compatible with safe transmission line operation with little or no need for cutting or topping.

During operation, birds could collide with the transmission line structures, conductor, and overhead ground wire. Impacts to wildlife from collision with the proposed transmission line are discussed above.

3.6.3. Mitigation

The following mitigation measures are identified to avoid or minimize impacts from the Proposed Action on wildlife. Other mitigation measures in Section 3.4, Vegetation, are relevant to mitigation of impacts on wildlife habitat.

- Explain wildlife-related mitigation measures and permit conditions to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Delineate construction limits within 200 feet of streams, other water bodies, wetlands, and floodplains; manage sediment as specified in the SWPP Plan, with an approved method that meets the *Stormwater Management Manual for Eastern Washington* (Ecology 2004) erosion

and stormwater control best management practices, to eliminate sediment discharge into waterways and wetlands, minimize the size of construction disturbance areas, and minimize removal of vegetation, to the greatest extent possible.

- Restrict construction activities to the area needed to work effectively, in order to limit disturbance of native plant communities to the minimum amount necessary to prevent spread of weed species.
- Install spiral bird diverters or other appropriate marking device on conductor in areas with a higher potential for bird collisions.
- Implement timing restrictions on construction work conducted near and within suitable habitat.
- Avoid construction activities within 0.6 mile of any active raptor nest during the raptor nesting season (e.g., March 1 to August 15 for ferruginous hawks, February 15 to July 15 for golden eagles), if possible.
- Avoid construction activities within PHS-designated big game winter range during the winter range period from November 1 through March 31, if possible.
- Install gates across access roads in wildlife habitat where permitted by landowners or land managing agencies to limit vehicular use of new access roads.
- Restrict speed for construction vehicles on unpaved access roads to no greater than 15 miles per hour to minimize dust.

3.6.4. Unavoidable Impacts Remaining after Mitigation

Implementation of the mitigation measures described above would reduce impacts to wildlife, but would not completely eliminate them. Noise, activity, and vegetation removal during construction would result in a temporary loss of wildlife habitat in and near construction areas. Avian collisions with transmission lines could occur at river crossings and in areas of high concentrations of waterfowl and other birds (especially within the East Route), a low to high impact depending on route selection and affected species. A minimal amount of permanent habitat loss would occur from the installation of transmission line structures in areas where structures currently do not exist and from construction of new access roads. This loss of habitat is not expected to adversely affect the viability or survival of species at the population level. Therefore, unavoidable impacts on wildlife from loss of habitat after mitigation would be low to moderate.

3.6.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to wildlife and wildlife habitat from construction and operation and maintenance of the proposed transmission line would not occur.

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3.7. WATER RESOURCES AND WATER QUALITY

3.7.1. Affected Environment

The study area for water resources and water quality includes the proposed right-of-way, access roads that extend outside the right-of-way, and areas that extend 200 feet beyond project work areas. This includes areas where water features could be directly affected by project work and areas that could be indirectly affected by adjacent project activities.

Groundwater

Groundwater is administered by the Washington Department of Ecology (Ecology) under the Water Quality Standards for Groundwaters of the State of Washington Administrative Code (WAC 173-200). This chapter implements the State Water Pollution Control Act (90.48 Revised Code of Washington (RCW) that applies to all groundwaters of the state that occur in a saturated zone or stratum beneath the surface of land or below a surface water body. The Antidegradation Policy (WAC 173-200-030) states that existing and future beneficial uses shall be maintained and protected and degradation of groundwater quality that would interfere with or become injurious to beneficial uses shall not be allowed.

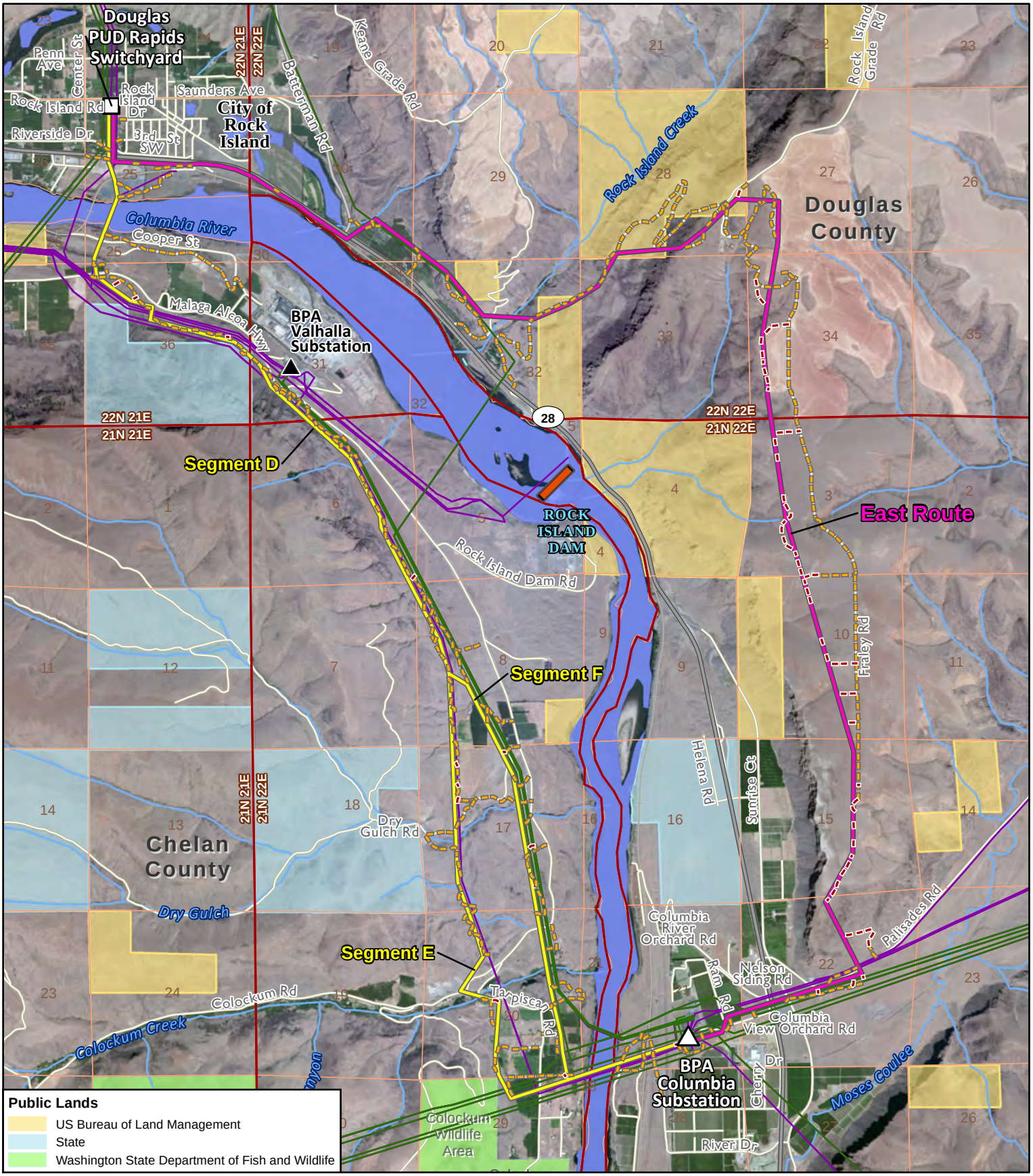
The predominant contributor to groundwater resources in the project area is the Columbia River. The US Geological Survey (USGS) is currently conducting the Columbia River Plateau Groundwater Availability Study (USGS 2013b). The study has three broadly defined goals: characterizing the hydrologic status of the system; identifying trends in groundwater storage and use; and quantifying groundwater availability. Upon completion of the study, the information will be used to better manage the groundwater resources in the Columbia Plateau, including the Northern Mid-Columbia Project area.

Surface Water

Ecology and other state natural resources agencies divide the state into 62 Water Resource Inventory Areas (WRIA) to delineate the state's major ***watersheds***. WRIAs were formalized under WAC 173-500-040 and authorized under the Water Resources Act of 1971, RCW 90.54. Ecology was given responsibility for the development and management of these administrative and planning boundaries (Ecology 2013a).

The study area is located within two WRIAs, which are separated by the Columbia River. The West Routes are primarily in the Alkali/Squilchuck WRIA (40), but short portions east of the Columbia River occur in the Moses Coulee WRIA (44) (Ecology 2009a, b). The East Route is located entirely within WRIA 44.

The East Route would cross Rock Island Creek, a perennial stream, two intermittent streams, and a few ***ephemeral streams***. Both West Routes would cross Colockum Creek, a perennial stream, six intermittent streams, and there would be two crossings of the Columbia River. Figure 3.7 shows waterways in the project area.



Waterways Map

Proposed Northern Mid-Columbia Joint Project

- BPA Substation
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section Boundary

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access

0 ½ 1 2 Miles

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 3.7

Ecology has conducted limited water quality assessments of perennial streams in the study area. The Columbia River has been extensively monitored and is listed on the ***Clean Water Act 303(d) list*** of impaired waterbodies requiring a ***Total Maximum Daily Load (TMDL)*** or ***water pollution*** control plan (Ecology 2008a). In the project area, the Columbia River is impaired for temperature. The lower reaches of Rock Island Creek are listed as impaired for fecal coliform (Table 3.7-1). No water quality ***exceedances*** were reported for Colockum Creek.

Total dissolved gas (TDG) is a regulated water pollutant which has been shown to be harmful to aquatic life. Elevated TDG levels are mainly caused by spilling water at hydroelectric dams. Because Wells and Rocky Reach dams are run-of-river projects with little storage capacity, redispatch results in forced spill of water causing elevated TDG levels.

Table 3.7-1. Water Quality Assessment of Perennial Streams in the Project Area

Waterway	Route Alternative	WRIA	Impaired Parameter
Columbia River	West Routes D-E and D-F	40/44	Temperature
Rock Island Creek	East Route	44	Fecal Coliform
Colockum Creek	West Routes D-E and D-F	40	None

3.7.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

Ground disturbing activities associated with any of the Proposed Action alternatives would not be expected to affect groundwater quality, because these activities would not result in deep excavations that would directly reach groundwater resources. The ratio of the potential area of groundwater impact to the area available for groundwater recharge is extremely small. Therefore, there would be no impact on groundwater.

Construction disturbance associated with transmission line structure installation and access road work has the potential to affect waterways and water quality. Installation of transmission line structures and access road work within 200 feet of waterways could require vegetation removal and cause soil compaction, erosion, and the deposition of soil within waterways. Indirect impacts on water quality could occur when sediment-laden runoff from construction work areas enters streams and results in increased turbidity.

The locations of proposed construction work areas within 200 feet of major streams and tributaries are identified in Table 3.7-2. No in-water work is proposed within perennial streams.

Ground disturbance more than 200 feet from streams is not expected to result in impacts to water quality. Vegetated areas between the disturbance area and the surface water act as a vegetative filter, intercepting sediments before being discharged into surface waters.

Table 3.7-2. Proposed Construction Work Areas in Relation to Waterways

Waterway	Structures[a] and Conductor Tensioning Sites		Access Road Work	
	In Waterway	Within 200 Feet of Waterway	In Waterway	Within 200 Feet of Waterway
East Route				
Rock Island Creek (perennial)	None	None	None	**To access Structure 25E:** Improve– 200 feet **To access Structure 26E:** Improve – 600 feet of Rock Island Grade Road
Columbia River	None	Structures 14E, 15E, 16E, 17E (3-pole), and 18E (3-pole) One tensioning site near Structure 18E	None	**To access Structures 14E and 15E:** Construct short spur roads **To access Structures 17E and 18E:** Construct 212 feet
West Route D-E				
Columbia River	None	Structures 6WN (2-pole), 6W, 6WS (2-pole) One tensioning site north of Structure 6W	None	**To access 5W and 6WN, 6W, 6WS:** Construct – 223 feet Improve – 1297 feet **To access 7W:** Construct – 547 feet, Improve – 362 feet
Dry Gulch (intermittent)	None	None	Replace culvert between 50W and 51W	**To access 50 W and 51W:** Improve - 750 feet
Colockum Creek (perennial)	None	None	None	None
West Route D-F				
Columbia River	None	Structures 6WN (2-pole), 6W, 6WS (2-pole) One tensioning site north of Structure 6W	None	**To access 5W and 6W:** Construct – 223 feet Improve– 1297 feet **To access 7W:** Construct – 547 feet Improve – 362 feet
Dry Gulch (intermittent)	None	None	None	**To access 73 W:** Improve - 350 feet
Colockum Creek (perennial)	None	None	None	None

a Structures would be 1-pole structures, except where noted.

Surface waters could be contaminated from chemicals or other pollutants associated with construction activities. Construction activities require the use of fuel and other chemicals, such as coolants, hydraulic fluids, and brake fluids, to operate heavy equipment and vehicles. With the implementation of BMPs, the potential risk of water quality impacts associated with accidental spills during construction would be low.

East Route

There would be no direct impacts to perennial waterways, because the East Route would not require any in-water work. Five transmission line structures south of the City of Rock Island would be constructed within 200 feet of the Columbia River. To access these structures, 212 feet of new access roads would be constructed and short spur roads would be constructed off SR 28 to access three structures. Because the Columbia River is separated from construction areas by a railroad berm, there would be no direct run-off into the Columbia River during construction.

No structures would be constructed within 200 feet of Rock Island Creek. About 800 feet of existing access road could be improved within 200 feet of Rock Island Creek. Access road improvements would not affect stream ***hydrology*** or stormwater conveyance. Access road improvements would have the potential to release sediments into Rock Island Creek.

Construction of the East Route would have a low impact on water bodies and water quality, because there would be no in-water work, construction work within 200 feet of waterways would be limited to a few areas, and BMPs and mitigation measures would be implemented and maintained during construction to minimize erosion and sedimentation.

West Route D-E

West Route D-E would span the Columbia River twice. Three proposed structures (one 1-pole structure and two 2-pole structures) on the north bank of the Columbia River would be within 200 feet of the river at the north crossing.

Access road work would be conducted within 200 feet of the Columbia River to access Structures 6WN, 6W, 6WS, and 7W. Access road work would include road improvements (1,659 feet) and new road construction (547 feet). Access road work could result in soil compaction and erosion. Because the structures and access roads would be on the bluffs high above the river and BMPs would be implemented, there would be minimal or no impacts to Columbia River water quality.

Along Segment E, Dry Gulch would be crossed and an existing culvert may need to be replaced. If a replacement culvert is required to cross Dry Gulch, it would be designed and installed to accommodate expected flows. Culvert replacement would be done during periods without flow and temporary increases in turbidity would not exceed the terms and conditions of permits that would be obtained for the project. Because activities that could increase turbidity would be limited to specific locations, would be temporary, and would not exceed water quality parameters, the impacts on surface water quality would be low.

About 750 feet of access road could be improved within 200 feet of Dry Gulch. The road surface would be designed to direct the flow of surface water into vegetated areas where water would slowly infiltrate into soils. The implementation of BMPs would minimize sedimentation into

streams during construction. Because access road work would be localized and would not affect existing hydrology, impacts on water quality would be short term and minimal, resulting in a low impact on waterways.

West Route D-F

The impacts to waterways from West Route D-F would be the same as those to West Route D-E, described above, except that Dry Gulch would not be crossed by Segment F access roads. About 350 feet of existing access road would be improved within 200 feet of Dry Gulch to access Structure 73W. Impacts to waterways would be slightly less than those for West Route D-E because a culvert replacement would not be needed.

Operation and Maintenance Impacts

Operation and maintenance activities within and near waterways could result in direct and indirect impacts. Periodic maintenance of access roads, including grading or rocking of road surfaces, replacement of culverts, and vegetation removal could result in minor soil compaction and erosion. Structure maintenance work near waterways would include repair, removal, and replacement of structures and associated hardware, when needed. Removal of vegetation that causes soil disturbance could result in the release of sediments into waterways. Impacts are expected to be limited to the short-term release of minimal amounts of sediment in waterways from soil erosion in disturbed areas, a low impact.

If the proposed transmission line was constructed, transmission congestion would be reduced, which would decrease the need to redispatch at the Wells and Rocky Reach dams. The Proposed Action would result in a decrease in TDG levels at these dams, which would have positive effects on water quality.

3.7.3. Mitigation

The following mitigation measures and BMPs are identified to avoid and minimize impacts from the Proposed Action to waterways and water quality:

- Avoid siting proposed transmission line structures and access roads within 200 feet of streams during the design process, where possible.
- Explain water quality-related permit conditions, BMPs, and mitigation measures to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Locate staging areas in previously disturbed or graveled areas at least 200 feet from waterways and wetlands and outside of floodplains.
- Delineate construction limits within 200 feet of waterways and minimize the size of construction disturbance areas within 200 feet of waterways, to the greatest extent possible.
- Design and improve access roads to minimize drainage from the road surface directly into surface waters, size replacement culverts, if any, large enough to accommodate predicted flows, and size and space cross drains and water bars properly to accommodate flows and direct sediment-laden waters into vegetated areas.

- Minimize the size of construction disturbance areas and removal of vegetation within 200 feet of waterways, wetlands, and floodplains, to the greatest extent possible.
- Minimize disturbance to waterways and wetlands by installing signage, fences and flagging, where needed, to restrict vehicles and equipment to designated routes.
- Install erosion and stormwater control BMPs to eliminate sediment discharge into waterways and inspect erosion and sediment controls during construction, maintain them as needed to ensure their continued effectiveness, and if appropriate remove them from the site when vegetation is reestablished and the site has been stabilized.
- Implement a spill prevention and control plan that requires storage of fuel and other potential pollutants in a secure location at least 150 feet from waterbodies, floodplains, and wetlands; that ensures that spill containment and cleanup materials are readily available on site and restocked promptly after use; and ensures that, in the event of a spill, contractors are trained to immediately contain the spill, eliminate the source, and deploy appropriate measures to clean and dispose of spilled materials in accordance with federal, state, and local regulations.
- Restrict refueling and servicing operations to locations where any spilled material cannot enter natural or human-made drainage conveyances (e.g., ditches, catch basins, ponds, wetlands, streams, and pipes), at least 150 feet from streams, waterbodies, floodplains, and wetlands; use pumps, funnels, absorbent pads, and drip pans when fueling or servicing vehicles when necessary.
- Prohibit deposition of excavated material into waterbodies during construction, except as authorized by federal, state, or local permits.
- Locate tensioning sites at least 200 feet away from surface waters, including wetlands, and outside of ***100-year floodplains***, if possible.
- Revegetate disturbed areas within 200 feet of waterbodies using native species for revegetation in wetlands.
- Inspect and maintain access roads, culverts, and other facilities after construction to ensure proper function and nominal erosion levels.
- Conduct weed control in riparian areas using procedures that prevent the introduction of toxic herbicides into aquatic areas, and use herbicides approved for use near aquatic areas, when chemical control methods are used.

3.7.4. Unavoidable Impacts Remaining after Mitigation

Implementation of the mitigation measures described above would reduce impacts on waterways and water quality, but would not completely eliminate impacts. Installation of structures and access road work near waterways could cause erosion and result in the deposition of sediments in waterways. Because the area near waterways that would be affected by the Proposed Action is relatively small and only one culvert would be replaced, impacts on water quality would be temporary and localized. The project would not result in permanent or temporary alteration of a water body that supports fish, wildlife habitat, or human uses such that its use or integrity would be adversely affected. It is not expected to result in a permanent or temporary exceedance of

state or federal ambient water quality criteria. Unavoidable impacts to waterways and water quality remaining after mitigation would therefore be low.

3.7.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to waterways and water quality from construction and operation and maintenance of the proposed transmission line would not occur. Transmission congestion would continue, which would result in redispatch at the Wells and Rocky Reach dams. Redispatch would result in an increase in TDG levels at this dam, which would have negative effects on water quality.

3.8. WETLANDS

3.8.1. Affected Environment

The study area for wetlands includes the proposed right-of-way, access roads that extend outside the right-of-way where work is proposed, and areas within 200 feet of project work areas. This includes areas where wetlands and ***wetland buffers*** could be directly affected by project work and indirectly affected by adjacent project activities.

Wetlands are areas that have certain characteristics related to water, soils, and vegetation. In general, to be considered a wetland, the following criteria must be met: 1) the area must be inundated or saturated with water for a portion of the growing season in most years; 2) the soils must have certain characteristics that are produced by prolonged saturation or inundation (hydric soils); and 3) the area must contain plant species with special adaptations that enable them to grow in saturated soils (***hydrophytic vegetation***).

To determine the presence of wetlands in the project area, a preliminary review of existing information was conducted. Potential wetland areas in the project area were identified using National Wetland Inventory (NWI) maps. A variety of other maps and aerial photographs were also used to identify ponds, streams, depressions, wet pastures, and other areas that might be wetland areas. County soil survey maps were used to locate areas with hydric soils. A vegetation survey of the proposed right-of-way in May 2013 identified potential wetland areas by identifying areas where hydrophytic vegetation grows in the project area.

A field reconnaissance of the wetland study area was conducted in the summer of 2013 where Douglas PUD was able to obtain landowner permission to enter property. This survey work was conducted by a wetland specialist to verify and determine the presence of wetlands. Field surveys for about 40 percent of the East Route (mainly on the northern portion of this route). The remaining portion of this route where landowner permission was not granted consists of a high plateau and steep slopes so it is unlikely that wetlands are present in this area. For the West Routes, Douglas PUD obtained landowner permission and on-site field surveys were conducted for over 95 percent of these routes, with the remaining portion inspected for wetlands from off-property locations.

Based on these field surveys, five potential wetland areas were identified in or near proposed structure locations and access road construction work areas. Four wetlands are within the proposed right-of-way and one is near a proposed access road. All of the identified wetlands in the project area are freshwater wetlands, described below.

The NWI depicts wetlands in the project area in the City of Rock Island and along the Columbia River (Figure 3.8). Along the East Route, there are three open water areas (ponds) mapped in the proposed right-of-way within 50 feet of SR 28. These ponds are bounded by SR 28 on the east and gravel roads and the BNSF railroad tracks on the west. Originally created as borrow pits to procure fill material, their edges are steep-sided, resulting in a narrow band of wetland vegetation along their boundary.

No surface water connections between the ponds and the Columbia River were observed in the field, but they are likely hydrologically connected to the Columbia River because of the presence

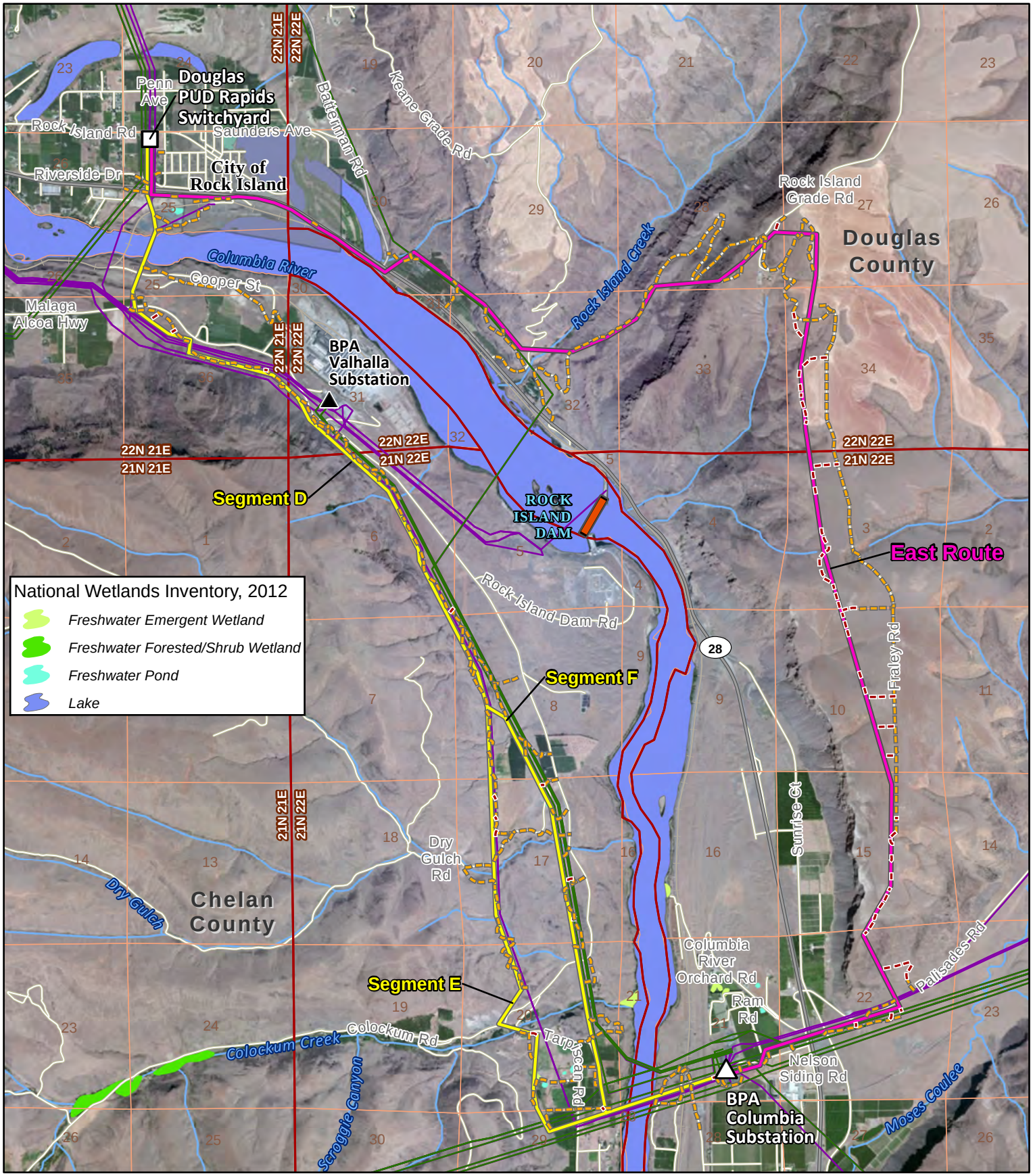
of permanent open water. These ponds would probably be considered ***jurisdictional waters of the US*** under Section 404 of the ***Clean Water Ac***t and subject to regulation. See Section 4.3 for a discussion of Section 404 requirements.

The majority of the vegetation in the wetland buffer around the ponds consists of non-native tree and shrub species including Russian olive (*Elaeagnus angustifolia*), Siberian elm (*Ulmus pumila*), black locust (*Robinia pseudoacacia*), and Himalayan blackberry (*Rubus armeniacus*). Wetland edges support native trees and shrubs such as narrowleaf willow (*Salix exigua*), alder (*Alnus rubra*), serviceberry (*Amelanchier alnifolia*), and western white clematis (*Clematis ligusticifolia*). Non-native species such as purple loosestrife (*Lythrum salicaria*), yellow iris (*Iris pseudacorus*), and reed canarygrass (*Phalaris arundinacea*) are present along the fringe of these wetlands. Aquatic noxious weed species are present in the ponds, including Eurasian water-milfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*).

The ponds are low quality wetlands that provide water quality and hydrologic functions. They function to improve the water quality of stormwater runoff from the adjacent roads and rail lines. These wetlands only provide low habitat functions because of their small size and location between a railroad berm and SR 28.

During field surveys, two wetlands were found along West Route Segment E. An emergent wetland, located adjacent to Dry Gulch Road, was found during a May 2013 botanical survey. This wetland burned during the Mile Post 10 Fire in 2013. Dominant plant species in this wetland before the fire were willow species, cattail, and Russian knapweed. Post-fire, the Russian knapweed cover greatly increased. It is likely that cattail and willow roots survived the fire and will sprout and recolonize this wetland.

Another emergent wetland is located within the proposed Segment E right-of-way. This wetland is a wet pasture that has been intensively grazed year-round for decades. The vegetative structure, species composition and soils have been extensively altered by intensive grazing, livestock waste, and compaction by livestock. The plant community is dominated by non-native grasses.



National Wetland Inventory Map

Proposed Northern Mid-Columbia Joint Project

- BPA Substation
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section Boundary

0 ½ 1 2 Miles

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 3.8

3.8.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

East Route

Installation of structures along the East Route would avoid direct impacts to wetlands. Four proposed structures would be within 100 feet of wetlands and their installation could indirectly impact wetlands:

- Structure 13E, a 1-pole structure, would be about 50 feet from a wetland boundary.
- Structure 14E, a 1-pole structure, would be about 20 feet from a wetland boundary.
- Structure 17E, a 3-pole structure, would be about 20 feet from a wetland boundary.
- Structure 18E, a 3-pole structure, would be about 90 feet from a wetland boundary.

All East Route access road work would avoid direct impacts to wetlands. There are no wetlands within 200 feet of access roads except for proposed spur roads that would be used to access structures off SR 28.

Construction for the East Route would not result in direct impacts to wetlands because wetland boundaries would be marked and ground disturbance would be restricted to upland areas. The installation and maintenance of erosion and sedimentation control measures would help prevent sediments from construction areas from entering wetlands. There would be low indirect impacts to wetlands and their functions, including removal of vegetation near wetlands and minimal sedimentation into wetlands.

West Route D-E

No wetlands occur in Segment D. Both emergent wetlands along Segment E are at least 200 feet from proposed structure locations. One wetland between Structures 58W and 59W would be spanned by the conductor. With the implementation of mitigation measures, West Route D-E would have low to moderate impacts on the two wetlands from adjacent use of access roads.

Two emergent wetlands in Segment E would be crossed by or adjacent to access roads. These access roads would need no improvement or minimal improvements. Road work and construction traffic adjacent to wetlands could result in erosion and the runoff of sediments into wetlands. The installation and maintenance of erosion and sedimentation control measures would help prevent sediments from construction areas from entering wetlands. Noxious weeds could be introduced to the wetland area by construction vehicles, degrading wetland plant communities.

West Route D-F

No wetlands occur in Segment D and wetlands are not located within 200 feet of proposed structure locations and access roads in Segment F. Construction would not directly or indirectly impact wetlands.

Table 3.8-1. Wetlands Near Proposed Transmission Line Structures and Access Roads

	Structures		Proposed Access Roads	
Wetland	In Wetland	Within 200 Feet of Wetland	In Wetland	Within 200 Feet of Wetland
East Route	None	13E, 14E,17E, 18E	None	Spur roads off SR 28 (~1500 feet)
West Route D-E	None	None	None	Existing roads near Dry Gulch leading to two proposed structures (49W and 50W) are adjacent to a low quality wetland. An existing road leading to proposed Structure 59W crosses a low quality wetland.
West Route D-F	None	None	None	None

Operation and Maintenance Impacts

Operation and maintenance activities near wetlands could result in minimal wetland impacts. Periodic maintenance of access roads, including grading or rocking of road surfaces, and vegetation removal near or in wetlands could result in minor soil compaction and erosion. Impacts to wetlands from operation and maintenance are expected to be limited to the short-term release of minimal amounts of sediment in waterways from soil erosion in disturbed areas, a low impact. The extent of impacts to wetlands that would be expected from operations and maintenance activities would depend on the alternative selected, and could include:

- Along the East Route, access road work and structure maintenance near wetlands would include repair, removal, and replacement of structures and associated hardware, when needed.
- Along West Route D-E, there would be no impacts to wetlands from structure maintenance because there are no structures located within 200 feet of wetlands; maintenance of access roads near or in wetlands could require the removal of vegetation and soil disturbance and result in the release of sediments into wetlands.
- Along West Route D-F there are no wetlands near structures and access roads and therefore there would be no impacts to wetlands from operation and maintenance activities.

3.8.3. Mitigation

The following mitigation measures are identified to avoid and minimize impacts from the Proposed Action on wetlands. Other relevant mitigation measures that relate to vegetation and weed control and are found in Section 3.4, Vegetation.

- Avoid siting new structures and access roads within 200 feet of wetlands during the design process, where possible.
- Explain wetland-related permit conditions, BMPs, and mitigation measures to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.

- Locate staging areas in previously disturbed or graveled areas at least 200 feet from waterways and wetlands and outside of floodplains.
- Delineate construction limits within 200 feet of streams, other waterbodies, wetlands, and floodplains and manage sediment as specified in the SWPP Plan, with an approved method that meets the *Stormwater Management Manual for Eastern Washington* (Ecology 2004) erosion and stormwater control best management practices, to eliminate sediment discharge into waterways and wetlands, minimize the size of construction disturbance areas, and minimize removal of vegetation, to the greatest extent possible.
- Inspect erosion and sediment controls periodically during construction, maintain them as needed to ensure their continued effectiveness, and where appropriate, remove them from the site when vegetation is reestablished and the site has been stabilized.
- Design and construct access roads to minimize drainage from the road surface directly into surface waters, size new and replacement culverts large enough to accommodate predicted flows, and size and space cross drains and water bars properly to accommodate flows and direct sediment-laden waters into vegetated areas.
- Store, fuel, and maintain vehicles and equipment in designated vehicle staging areas located a minimum of 150 feet away from streams, waterbodies, and wetlands.
- Implement a spill prevention, control and countermeasures plan that requires storage of fuel and other potential pollutants in a secure location at least 150 feet from streams, waterbodies, and wetlands; that ensures that spill containment and clean-up materials are readily available on site and restocked within 24 hours, if used; and that ensures that, in the event of a spill, contractors are trained to immediately contain the spill, eliminate the source, and deploy appropriate measures to clean and dispose of spilled materials in accordance with federal, state, and local regulation.
- Restrict refueling and servicing operations to locations where any spilled material cannot enter natural or human-made drainage conveyances (e.g., ditches, catch basins, ponds, wetlands, streams, and pipes), at least 150 feet from streams, waterbodies, and wetlands; use pumps, funnels, absorbent pads, and drip pans when fueling or servicing vehicles.
- Minimize the size of construction disturbance areas and removal of vegetation within 200 feet of waterways, wetlands, and floodplains, to the greatest extent possible.
- Minimize disturbance to waterways and wetlands by installing signage, fences and flagging, where needed, to restrict vehicles and equipment to designated routes.
- Prohibit deposit of excavated material from structure construction into wetlands.
- Locate tensioning sites at least 200 feet away from surface waters, including wetlands, and outside of 100-year floodplains, if possible.
- Revegetate disturbed areas near wetlands using native species and control noxious weeds.

3.8.4. Unavoidable Impacts Remaining after Mitigation

Except for West Route D-F, which has no wetlands, implementation of the mitigation measures described above would avoid direct impacts and reduce indirect impacts on wetlands, but would

not completely eliminate impacts. Depending on the alternative selected, structure and access road work near wetlands could cause erosion and result in the deposition of sediments in wetlands. Because the area near wetlands that would be affected by the East Route and West Route D-E is relatively small and there would be no fill or excavation in wetlands, impacts on wetlands would be temporary and localized. Unavoidable impacts to wetlands remaining after mitigation would therefore be low.

3.8.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to wetlands from construction and operation and maintenance of the proposed transmission line would not occur.

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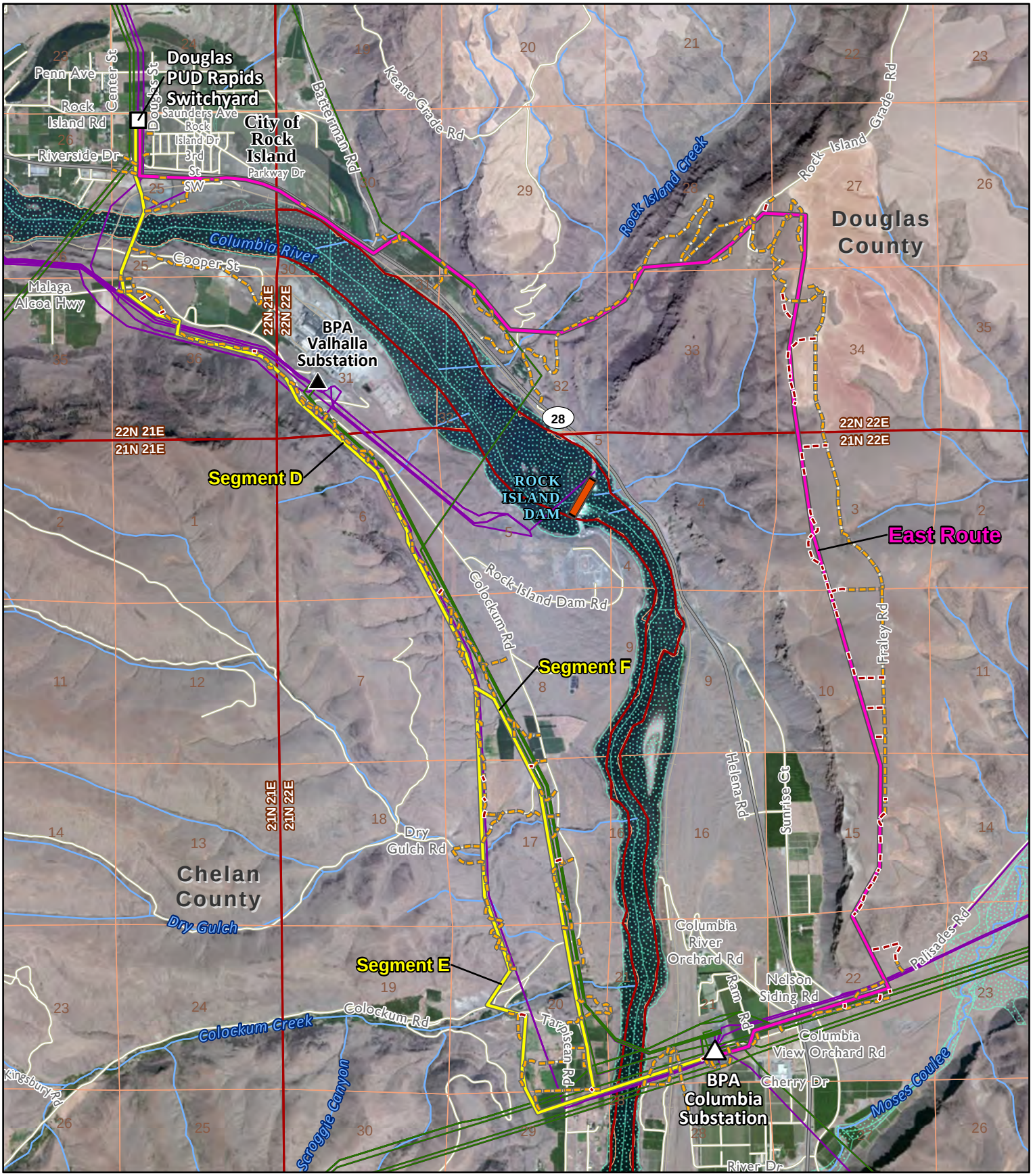
3.9. FLOODPLAINS

3.9.1. Affected Environment

The Federal Emergency Management Agency identifies areas with a 1 percent chance of being flooded in a given year as 100-year floodplains. The study area for floodplains includes the proposed transmission line right-of-way and access roads within 200 feet of 100-year floodplains. This includes the areas where floodplains could be directly or indirectly affected by the project, including structure installation and access road work, and maintenance work.

Portions of the East Route that parallel the west side of SR 28 are near the Columbia River 100-year floodplain boundary. The floodplain boundary is located along the berm of the railroad line that parallels SR 28.

Near the Columbia River, portions of both West Route alternatives are near or cross the Columbia River 100-year floodplain. Water levels within the Columbia River floodplain in the project area are controlled by the elevation and operations of the Rock Island Dam (Figure 3.9).



100-year Floodplains Map

Proposed Northern Mid-Columbia Joint Project

Douglas PUD 230-kV Transmission Line Route Alternatives

- East Route Alternative
- West Route Alternatives
- Existing Road Proposed for Access
- New Road to be Constructed for Access

0 ½ 1 2 Miles

- FEMA Flood Hazard Zone
- BPA Substation
- Existing BPA Transmission Lines
- Existing Transmission Lines, Non-BPA Owned
- Township, Range Boundary
- Section Boundary

N W E S

BONNEVILLE POWER ADMINISTRATION

10/17/2014

Figure 3.9

3.9.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

Construction disturbance associated with transmission line structure installation and access road work has the potential to affect floodplain functions and qualities. Installation of transmission line structures and access road work within 200 feet of floodplains would require vegetation removal and cause soil compaction, which could cause erosion, and result in the deposition of soil within floodplains. The placement of two tensioning sites near the floodplain would result in additional soil compaction and vegetation removal. These indirect impacts to floodplains would be localized to small areas and would mainly degrade habitat near floodplains. Other floodplain functions, such as floodplain capacity, would not be affected.

Table 3.9-1 lists proposed transmission structures and access roads for all alternatives that would located within 200 feet of 100-year floodplains.

Table 3.9-1. Proposed Project Elements Within 100-year Floodplains

	Transmission Structures[a] and Conductor Tensioning Sites		Access Road Work	
Floodplain Area	In Floodplain	Within 200 Feet Of Floodplain	In Floodplain	Within 200 Feet Of Floodplain
East Route				
Columbia River	None	Structures 14E, 15E, 16E, 17E (3-pole), and 18E (3-pole) One tensioning site near Structure 18E	None	**To access 14E and 15E:** Construct short spur roads **To access 17E and 18E:** Construct – 212 feet
West Routes				
West Route D-E and West Route D-F	None	Structures 6WN (2-pole), 6W, 6WS (2-pole) One tensioning site north of Structure 6W One tensioning site near Structure 6WN, 6W, 6WS	None	**To access 5W and 6W:** Construct – 223 feet Improve – 1297 feet **To access 7W:** Construct – 547 feet, Improve – 362 feet

a Structures would be 1-pole structures, except where noted.

Implementation of mitigation measures, including locating structures and construction work areas outside of floodplains, minimizing work areas within 200 feet of floodplains, installing erosion and sediment control measures, and revegetation of work sites would minimize sediment deposition into floodplains. The amount of sediment deposited from work within 200 feet of floodplains would not change existing flood-storage capacity or alter the course of floodwaters. Impacts are expected to sediment be low and limited to degradation of a small amount of habitat and incidental amounts of deposition in the floodplain from soil erosion in disturbed areas.

East Route

The East Route would cross two areas near 100-year floodplains (Figure 3.7). Three 1-pole transmission line structures (14E, 15E, and 16E), and two 3-pole structures (17E and 18E) would be within 50 feet to 200 feet of the floodplain boundary with one tensioning site near the floodplain. Five proposed structures would be located adjacent to and east of the railroad berm, outside the floodplain.

Short spur roads would be constructed to access three structures and about 212 feet of new access road would be constructed between Structures 17E and 18E. Because the floodplains are separated from construction areas by a railroad berm, there would be no or low indirect impacts to the water quality in floodplains from soil compaction in construction work areas or erosion. Construction would be localized to small areas outside the floodplain, resulting in low impacts to floodplain functions and quality, such as habitat.

West Route D-E

West Route D-E would span the Columbia River floodplain at the north and south river crossing. In the areas where the transmission line would cross the Columbia River, proposed structures would be constructed on high bluffs, well above the water level. Three proposed structures would be near, but outside, the floodplain boundary, including one 1-pole structure (6W), and two 2-pole structures (6WN, 6WS) at the north crossing. These structures would be located on the bluffs high above the river and would not be affected by a 100-year flood event.

Access road work would be conducted within 200 feet of floodplains to access Structures 6WN, 6W, 6WS, 7W, and 64W. Access road work would include road improvements (1,659 feet) and new road construction (770 feet). Access road work would result in minor soil compaction and could result in erosion. These impacts would degrade a small amount of habitat near floodplains but would not change floodplain capacity nor would they alter flood flows. Therefore, impacts from access road work near floodplains would be low.

West Route D-F

West Route D-F would have the same impacts to floodplains as West Route D-F, as explained above. The same structures and access road areas are located near floodplains in both routes. Therefore, impacts from access road work near floodplains would be low.

Operation and Maintenance Impacts

Operation and maintenance activities near floodplains could result in indirect impacts to floodplains. Periodic maintenance of access roads in areas adjacent to floodplains, including grading or rocking of road surfaces and vegetation removal, would result in minor soil compaction and could result in erosion. Structure maintenance work near floodplains would include repair of structures and associated hardware, when needed. Impacts are expected to be low and limited to incidental amounts of sediment deposition in the floodplain from soil erosion in disturbed areas and the degradation of a small amount of habitat near floodplains. These impacts would not change floodplain capacity nor would they alter flood flows.

3.9.3. Mitigation

The following mitigation measures are identified to minimize impacts from the Proposed Action on floodplains:

- Avoid siting proposed transmission line structures and access roads in floodplains during the design process, where possible.
- Explain floodplain-related permit conditions, BMPs, and mitigation measures to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Locate staging areas in previously disturbed or graveled areas at least 200 feet from waterways and wetlands and outside of floodplains.
- Minimize the size of construction disturbance areas and removal of vegetation within 200 feet of waterways, wetlands, and floodplains, to the greatest extent possible.
- Delineate construction limits within 200 feet of floodplains and minimize the size of construction disturbance areas within 200 feet of floodplains, to the greatest extent possible.
- Delineate construction boundaries within 200 feet of floodplains; implement erosion and stormwater control best management practices to eliminate sediment discharge into floodplains.
- Locate tensioning sites at least 200 feet away from surface waters, including wetlands, and outside of 100-year floodplains, if possible.
- Prohibit deposition of excavated material into floodplains during construction.
- Revegetate disturbed areas in floodplains using native species.
- Implement a spill prevention and control plan that requires storage of fuel and other potential pollutants in a secure location at least 150 feet from waterbodies, floodplains, and wetlands; that ensures that spill containment and cleanup materials are readily available on site and restocked promptly after use; and that ensures that, in the event of a spill, contractors are trained to immediately contain the spill, eliminate the source, and deploy appropriate measures to clean and deploy appropriate measures to clean and dispose of spilled materials in accordance with federal, state, and local regulations.
- Restrict refueling and servicing operations to locations where any spilled material cannot enter natural or human-made drainage conveyances (e.g., ditches, catch basins, ponds, wetlands, streams, and pipes), at least 150 feet from streams, waterbodies, floodplains, and wetlands; use pumps, funnels, absorbent pads, and drip pans when fueling or servicing vehicles when necessary.

3.9.4. Unavoidable Impacts Remaining after Mitigation

Implementation of the mitigation measures described above would reduce impacts on floodplains, but would not completely eliminate impacts. Installation of structures and access road work near floodplains could cause erosion and result in the deposition of sediments in floodplains. Because the area within floodplains that would be affected by the Proposed Action

is relatively small and these impacts would not change floodplain capacity or alter flood flows, unavoidable impacts remaining after mitigation would be low.

3.9.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to floodplains from construction and operation and maintenance of the proposed transmission line would not occur.

3.10. VISUAL QUALITY

3.10.1. Affected Environment

The study area for visual quality includes the proposed right-of-way, new or improved access roads that extend outside the right-of-way, and surrounding residences, businesses, recreational facilities, travel routes, and cultural sites with views of the proposed transmission structures, conductor, access roads, and project construction work areas.

The visual setting for the project area is the northern mid-Columbia River, which includes lowlands along the Columbia River and high plateaus (Photo 3.10-1). The Columbia River is a dominant visual feature in the project area. Vegetation consists mainly of ***steppe*** and shrub-steppe vegetation interspersed with farming uses. The project area has very little forest vegetation but does have small clusters of trees near some residences. During much of the year, the low vegetative cover is tan or brown interspersed with patches of green, depending on the season. Orchards of pears, cherries, and other fruits can also be seen in or near the project area. Snow sometimes accumulates in the surrounding areas, significantly altering the color, light, and other aspects of the visual setting.

Photo 3.10-1. Representative photograph of the project area view from the hills to the east of the Columbia River

Although the project area does not include national, state, or county parks, or other public natural areas, there is an abundance of undeveloped land. The project area includes the Rock Island Golf Course which is an 18-hole public golf course and is the primary recreational facility in the study area (Wenatchee Valley Chamber of Commerce 2013).

Human-created visual elements in the study area include transportation and rail corridors, numerous electrical transmission lines and substations, the Rock Island Dam, industrial facilities, agricultural lands, the City of Rock Island, and rural residences. Major industrial facilities include the Alcoa Wenatchee Works and the American Silicon Technologies plant, which is no longer operational.

Photo 3.10-2. Representative density of transmission lines in the project area; the transmission lines above parallel Palisades Road which is located near the southern end of the East Route

Electric power infrastructure is a predominant visual element near substations and where multiple transmission lines occur in transmission corridors (Photo 3.10-2). Because of the lack of screening by tall or dense vegetation in most areas, transmission line structures can be quite visible both up close and at a distance. In some areas, transmission lines are less obvious, blending in more with surroundings.

Residential uses dominate views in the City of Rock Island, the only developed town or city in the study area. The City of Rock Island has a population of around 788 people (U.S. Census 2010) and is the most populous area within or near the study area. Residences on the slopes above the city have views of the Columbia River, and the lands on the east and west side of the river. Outside of the City of Rock Island, the area is sparsely populated with development mainly limited to rural homes, ranches, and farms. Outbuildings, farm equipment and agricultural materials are a common sight in the agricultural areas.

Sensitive Views

The potential for visual impact is influenced by the number and type of viewers as well as their expectations. High numbers of viewers, or high expectations of scenic views (such as from a scenic overlook) can indicate the presence of a sensitive view. The project area includes limited views due to high hills and steep slopes, and existing infrastructure. Due to these features, as well as the lack of any major parks, attractions, or historic sites, there are very few sensitive views that would be potentially affected. No existing or proposed scenic corridors were identified in the project area within state plans and National Scenic Byways Program plans.

East Route

The East Route, like the two West Routes, has its northern endpoint in the City of Rock Island at the Rapids Switchyard. The routes travel south through a residential area, crossing SR 28.

The East Route also passes near Rock Island Golf Course (Photo 3.10-3). The views from the clubhouse and areas to the north of the site are open and picturesque. The topography of the course is low in elevation compared to surrounding areas, and some views are blocked by trees.

Photo 3.10-3. View from Rock Island Golf Course, looking west

Keane Grade Road is located north of, and above, the City of Rock Island and provides distant views of the visual study area (Photo 3.10-4). There are no parks, trails, or other destinations along Keane Grade Road. Viewers along the road are restricted primarily to traffic to and from the few residences located along the road.

Photo 3.10-4. View from Keane Grade Road, near a single residence, looking southwest to the opposite side of the Columbia River toward the area of Segment D of the West Routes

The most numerous viewers of the East Route are motorists and passengers on SR 28. The East Route is within 100 feet of the west side of SR 28 for approximately 2.8 miles (Photo 3.10-5).

Photo 3.10-5. View along SR 28, just south of the City of Rock Island, looking north

After crossing to the east side of SR 28, the East Route parallels SR 28, but is not immediately adjacent to the highway. It then ascends Rock Island Grade Road (Photo 3.10-6). This area is visible in the distance to motorists along SR 28 and to residents, motorists, and passengers on the west side of the Columbia River.

Photo 3.10-6. Looking north up Rock Island Grade Road in vicinity of proposed East Route alignment, near Rock Island Creek Canyon

After ascending Rock Island Grade Road, the East Route travels south on a high plateau that is not easily seen by motorists on SR 28. With the exception of one residence on a farm property just south of the intersection of Rock Island Grade Road and Fraley Road, there are no residences, business, parks, or trails on the plateau. The residence is located within a depression at the top of a drainage and does not appear to have a direct view of the Columbia River (or the West Route alternatives).

The route then descends the high plateau just north of Palisades Road. It parallels Palisades Road before crossing SR 28 and entering the Columbia Substation. Existing transmission lines entering and leaving the Columbia Substation already parallel Palisades Road and cross SR 28 in this area.

West Route D-E

Segment D of West Route D-E leaves the Rapids Switchyard and travel south through a residential area, crossing SR 28, as described under the East Route. The East and West Routes diverge and the West Routes cross the Columbia River. Segment D follows the existing Douglas PUD Rapids-Valhalla 115-kV transmission line right-of-way.

After crossing the Malaga Alcoa Highway, Segment D turns south, parallel to the Malaga Alcoa Highway. There are no residences along Segment D, west of the Columbia River. Transmission lines along the Malaga Alcoa Highway are visible to motorists and passengers. Existing transmission lines parallel the roadway (Photo 3.10-7). Views of the river are mostly obstructed by topography. No sensitive views were identified in this area.

Photo 3.10-7. View along Malaga Alcoa Highway looking south; Segment D of West Routes D-E and D-F is located within the transmission line corridor on the right side of the photograph

Segment E travels near a small residential area located near Colockum Creek, along Tarpiscan Road (Photo 3.10-8). There are more residences clustered in this area than anywhere else in the study area other than the City of Rock Island. Some of the residences have views screened by trees and undulations in topography.

Photo 3.10-8. View from West Route, Segment E, from Tarpiscan Road, looking north at a portion of the residential area along Colockum Creek in the vicinity of Segment E

To the south of the Colockum Creek residential area, residences along and near the west bank of the river have views to the north and across the river towards the Columbia Substation. These residents have views of multiple transmission lines and of the Columbia Substation across the river.

West Route D-F

Segment D is described under West Route D-E, above. Segment F includes Ravenwing Ranch, a proposed large-lot rural residential development, located south of Alcoa's Wenatchee Works plant and north of Colockum Creek. The developer submitted plans and received development approval from Chelan County in 2007 for the 10,000-acre Ravenwing Ranch. The plans include development of 700 acres, 48 residential lots between 2 and 10 acres in size, 40 condominiums, a riding stable and a lodge. The lodge is planned for lands adjacent to the river (Ryan 2008). The Ravenwing Ranch website notes majestic views as one of the significant site attributes

(http://www.ravenwingranch.com/). As of March 2014, approvals at this site are ongoing and development could occur subsequent to application approval. Two houses along Colockum Road are presumed to be part of Ravenwing Ranch and are located within 330 and 600 feet of the centerline of Segment F. Views from these houses are limited due to orchards and residential landscaping, including trees.

Segment F crosses Colockum Creek in an area with no residential development. South of Colockum Creek, it then parallels Tarpiscan Road through an area with orchards (Photo 3.10-9). Segment F and Segment E join west of the Columbia River. In the residential area south of Segment F, residents have views of multiple transmission lines and of the Columbia Substation across the river. Segment F and Segment E cross the river along a common route to the Columbia Substation.

Photo 3.10-9. View of orchards along Tarpiscan Road

3.10.2. Environmental Consequences – Proposed Action Alternatives

The key evaluation criteria used in the following visual impact assessment are:

Visibility: Visual impacts are influenced by the degree of project visibility, the distance from which transmission facilities would be viewed, and the location of the project in the landscape. Visibility can be influenced by a proposed facility's proximity and relationship to existing facilities. As the distance between viewer and proposed transmission facilities increases, the potential for visual impact decreases.

Visual compatibility with the landscape: Visual impacts are influenced by the compatibility between the proposed project and the landscape in which it is located. Compatibility is considered in terms of the form, line, color, and texture of the proposed facilities and their relationships to the landforms and vegetation of the surrounding landscape.

Viewer sensitivity: The potential for visual impact is influenced by the number and type of viewers. As the number of viewers increases, the potential for visual impact also increases. Residents and recreational users are usually sensitive to changes in their surrounding environments and views. Highway travelers may not be as sensitive because transmission lines and associated facilities are in view for only a short time while travelers are briefly traveling through an area.

Construction Impacts

Construction activities that would cause temporary impacts to visual resources include structure installation, temporary pulling and tensioning of conductor, access road work, staging of equipment and materials, and the installation of electrical equipment at the Rapids Switchyard and Columbia Substation. These activities would remove vegetation and could create dust from the movement of vehicles, from excavation work, and from wind blowing across exposed soil. Temporary construction areas like those used for construction staging would be reclaimed after construction, returning the landscape to pre-disturbance condition.

The Rapids Switchyard is located just outside of Rock Island city limits and is surrounded by residential properties while the Columbia Substation is located on rural agricultural land and borders extensive cherry orchard operations. Due to its location in a residential area, the Rapids Switchyard would have a larger number of impacted viewers than the Columbia Substation. Visual impacts from construction activities at the substations would be temporary and therefore, are expected to be low.

The addition of electrical equipment would result in permanent visual effects to Rapids Switchyard and the Columbia Substation. The substations are existing facilities and work would be done inside the existing fence. Because the equipment that would be added is visually similar to existing equipment, visual impacts are expected to be low.

The greatest visual impact would come from the presence of the proposed transmission line facilities, including access roads. The transmission line structures would be weathered steel, which is dull in finish and is not reflective. The new conductors would initially be shiny, but would dull over time due to exposure to air and weather. The Joint Project would use the same type of structures as were used for a recently constructed Douglas PUD line (Photo 3.10-10).

Photo 3.10-10. Recently constructed Douglas PUD transmission line with the same type of steel-pole structures that would be used for the proposed Rapids-Columbia transmission line

The effect of the addition of transmission line facilities to the visual environment is described by route alternative, below. Table 3.10-1 summarizes the visual impact analysis of each route alternative. Compatibility with existing views is recorded as its inverse, intrusion, which allows all criteria to be scored from low to high, with low as the least visual impact.

Table 3.10-1. Summary of Visual Impacts by Viewpoint

Viewpoints		Level of Impact		
		East Route	West Route D-E	West Route D-F
Tarpiscan Road	Visibility	Low	Moderate	Low
	Intrusion	Moderate	Moderate	Low
	Sensitivity	Low	Moderate	Low
Ravenwing Development	Visibility	Low to High	Low	Moderate
	Intrusion	Moderate to High	Low	Moderate
	Sensitivity	Moderate	Low	Low
City of Rock Island	Visibility	Moderate	Low	Low
	Intrusion	Moderate	Low	Low
	Sensitivity	Low	Low	Low
Rock Island Golf Course	Visibility	Low	Low	Low
	Intrusion	Low	Low	Low
	Sensitivity	Moderate	Moderate	Moderate
Keane Grade	Visibility	Low	Low	Low
	Intrusion	Moderate	Low	Low
	Sensitivity	Low	Low	Low
SR 28	Visibility	Moderate	Low	Low
	Intrusion	Moderate	Low	Low
	Sensitivity	Low	Low	Low
Malaga Alcoa Highway	Visibility	Low to Moderate	Moderate	Moderate
	Intrusion	Low to Moderate	Low	Low
	Sensitivity	Low	Low	Low
	Blended Effects	Low to high levels of visual change	Low to moderate levels of visual change	Low to moderate levels of visual change

East Route

During project scoping, public comments were received about the potentially detrimental effect on the views within and of the City of Rock Island from the construction of proposed the transmission line. In response to the comments, a detailed evaluation was done of the visual impacts of the East Route on the City of Rock Island and the views of the project area from within the city.

Along the East Route, the proposed transmission line would introduce a visual change to some residences near the Rapids Substation and along SR 28. The East Route has the potential to affect views from the City of Rock Island. Throughout much of the town, views of the transmission line would be blocked by trees, houses, non-residential structures, or other infrastructure. Views from Keane Grade Road would be affected by the introduction of the structures along SR 28. Depending on the location of residences, the change in the visual setting in and near the City of Rock Island would be low to moderate.

The views from the Rock Island Golf Course would be affected by the project. When recreating, there is often an expectation that natural, open views can be enjoyed, and the introduction of prominent infrastructure could adversely affect such views. The concentration of viewers at the golf course could have higher visual quality expectations than general viewers (e.g., motorists). In addition to golfers, fishing occurs at Putters Lake, which has similar views as the golf course. Views from these locations, however, would change minimally. There are some existing transmission line structures in this view and the proposed steel-pole structures and conductors would be distant and not prominent enough to have a substantial effect on views.

After crossing to the east side of SR 28, the East Route parallels SR 28, but is not located immediately adjacent to the highway. One residence is located near a proposed structure and would have a view of the transmission line and at least one 1-pole structure. Because a 230-kV transmission line is located between the residence and the proposed transmission line, residents currently have views of a transmission line, including its lattice steel structures.

Photo 3.10-11 shows a simulation of the East Route looking north along SR 28. The 110-foot-tall steel pole structures are somewhat prominent. In addition to 15 1-pole structures, one 2-pole structure and one 3-pole structure would be adjacent to SR 28 and visible to motorists. About 800 feet from the highway, another 3-pole structure and five 1-pole structures would be visible in the distance. Although views would change, the impact to the views experienced by motorists would be low to moderate because they would only have temporary glimpses of the scenery.

Photo 3.10-11. Visual simulation of view along SR 28, looking north. Arrows point to the proposed transmission line structures (from left to right, structures 18E, 19E, 20E, and 21E)

To the south, Rock Island Creek canyon was considered to determine if it has potentially significant views. Following a site visit, interviews with residents and officials, and further research, the views of the canyon were not found to be particularly significant or sensitive. Because it is rather difficult to access good views looking up the canyon or down from above it, good views would be seen by very few people.

The East Route would ascend Rock Island Grade Road, an area visible in the distance to motorists along SR 28 and residents and motorists on the west side of the Columbia River. Structures along Rock Island Grade Road would be briefly visible to motorists along SR 28 and to travelers and residents on the west side of the river. At the top of the ascent, one 2-pole and three 3-pole structures would make this portion of the line more visible.

After ascending Rock Island Grade Road, the East Route transmission corridor would cross a high plateau that currently has no existing transmission facilities. Generally, when new infrastructure is located in areas that previously had none, a moderate to high level of visual impact is likely. However, only one residence in the area would have a view of the East Route. Additionally, no scenic resources, parks, or other attractions are present. Changes on the high plateau would affect very few viewers, unless it could be viewed from the west bank of the Columbia River. This portion of the East Route is not visible from SR 28 or areas along the east bank of the Columbia River due to the steep ridge rising just east of the highway which blocks views of any new infrastructure on the top of the plateau.

The route would descend the high plateau just north of Palisades Road. The descent of the high plateau would be visible to drivers along SR 28 and Palisades Road. Along this section of the highway, there are few other transmission line structures, primarily older, wood-pole structures as well as some mast arms for street lighting. The introduction of the new steel-pole structures and conductors would alter the views along this section of SR 28. Few people would experience these views except when travelling along SR 28. The view along this stretch of SR 28 is not designated as scenic, nor would it be considered a particularly sensitive view

After crossing Palisades Road, the route turns west, and parallels the road before crossing SR 28 and entering the Columbia Substation. At the turning point, a 3-pole structure would be needed, which would be visible to motorists. Because several existing transmission lines enter and leave the Columbia Substation and cross SR 28 in this area, the visual effect of the proposed structures in this area would be low.

The potential impact to visual resources from the East Route could be low to high, depending on the location. There are viewpoints where the East Route could be intrusive, including residential areas in and near the City of Rock Island and areas along SR 28 (see Table 3.10-1). The Rock Island Golf Course is considered a sensitive view point that could be impacted by views of structures and conductor. It is not known how visible the portion of the East Route along the high plateau would be to viewers on the west bank of the Columbia River. If the transmission line structures and conductor were visible on the top of the plateau, this could be a high impact. Because there are no existing transmission lines in a portion of the East Route, the overall visual effect would be moderate. If transmission line structures could be viewed on the top of the high plateau from the west bank of the Columbia River, visual effects from the East Route could be high.

West Route D-E

Like the East Route, the initial portion of Segment D would introduce a visual change to some homes near the Douglas PUD Rapids Switchyard and along SR 28. Segment D has the potential to affect some views from the City of Rock Island. Throughout much of the town, views of the transmission line would be blocked by trees, houses, non-residential structures, or other

infrastructure. Views from Keane Grade Road would be affected by the introduction of the structures. Depending on the location of residences, the change in the visual setting in and near the City of Rock Island would be low to moderate.

After crossing the Columbia River, there would be few visual impacts from Segment D. The new line would be co-located with existing lines. Segment D of the West Route follows the existing Douglas PUD Rapids-Valhalla 115-kV transmission line right-of-way. The existing wood-pole line would be replaced with a double-circuit line on the proposed steel structures on either side of the Columbia River. The double-circuit structures would be similar in appearance to structures used in one of the transmission lines that interconnects to the Rapids Switchyard, located outside the city limits but within the urban growth boundary (Photo 3.10-11). The views are not associated with any designated scenic highways or parks and are not considered sensitive. Additionally, there are few viewers, partly due to the lack of development, limited access, no roads crossing the river, and industrial facilities blocking views.

After crossing the Malaga Alcoa Highway, the route turns south, parallel to the Malaga Alcoa Highway. At the turning point, a 2-pole structure would be needed (9W) and to the south two additional 2-pole structures (13W and 14W) would be needed adjacent to the highway. These structures would be visible to viewers on the west side of the river and travelers along the Malaga Alcoa Highway. The new structures would become part of the already visually cluttered view along the Malaga Alcoa Highway (Photo 3.10-12). Because the proposed structures are different from the existing structures and would be taller, visual impacts to motorists would low to moderate.

Photo 3.10-12. Visual simulation along Malaga Alcoa Highway looking south

Drivers on the Malaga Alcoa Highway will likely be focused on the roadway that has a posted speed limit of 50 to 60 miles per hour. Passengers may notice the new structures, but may not differentiate them as the roadway is flanked by various existing transmission lines. Views of

existing transmission lines parallel the roadway and views of the proposed northern river crossing are mostly obstructed by topography. No sensitive views from which the project would be visible were identified.

Along Segment E, some of the residences have views screened by trees and undulations in topography. South of Colockum Road, the proposed right-of-way would be close to, but separate from, the existing Chelan County PUD 230-kV transmission line alignment. The proposed transmission line structures including three 3-pole structures (55W, 56W, and 57W) and conductors would introduce new visual features for residences in this area. Some of the residences would have direct views of proposed structures that would be near homes, a moderate impact.

In the southernmost portion of the route, residences along and near the west bank of the river would have views of the structures on both the west and east bank of the river as they enter the Columbia Substation. Most of the proposed structures would be either 2-pole or 3-pole structures and would be quite visible. The line would be located in an existing transmission corridor with multiple existing transmission lines, including lines with both wood-pole and lattice steel structures.

Table 3.10-1 summarizes the visual impacts of West Route D-E. Because the visual environment of most of the route is already affected by views of existing transmission lines, the addition of one more line in those areas would result in a low to moderate impact. For residents along Tarpiscan Road who would see the transmission line in the distance and a few structures in close proximity, the line could be intrusive. This would be a moderate impact due the fact that the proposed line would be a new visual element. The potential impact to visual resources from West Route D-E would be low to moderate.

West Route D-F

Segment D is described above under West Route D-E. Segment F would be located at least 300 feet from two existing residences in the Ravenwing development. Some 1-pole structures and the conductors could be visible to a few residences.

In the southernmost portion of the route, residences along and near the west bank of the river would have views of the structures on both the west and east bank of the river as they enter the Columbia Substation. Most of the proposed structures would be either 2-pole or 3-pole structures and would be quite visible. The line would be located in an existing transmission corridor with multiple existing transmission lines, including lines with both wood pole and lattice steel structures.

Table 3.10-1 summarizes the visual impacts of West Route D-F. Because the visual environment of most of the route is already affected by views of existing transmission lines, the addition of one more line in those areas would result in a low to moderate impact. Residents in the area of the Ravenwing Development may have views of structures and conductors, a moderate impact, but most views seem to be screened by landscaping. The potential impact to visual resources from West Route D-F would be low to moderate.

Operation and Maintenance Impacts

The visual impacts from the presence of the transmission line and associated facilities after construction are discussed above under Construction Impacts. Visual impacts from operation and maintenance activities would be temporary and localized and would not result in any new or different impacts on visual resources. Temporary visual impacts from operation and maintenance activities would be low.

3.10.3. Mitigation

The following mitigation measures are identified to avoid or minimize impacts from the Proposed Action on visual resources.

- Schedule all construction work during daylight hours to avoid nighttime illumination of work areas.
- Use water trucks or other appropriate methods to control dust during construction, as needed.
- Re-grade and re-seed disturbed areas after construction is completed.

3.10.4. Unavoidable Impacts Remaining After Mitigation

If the Proposed Action is implemented, residents, recreational users, and motorists would be exposed to views of construction activities. Although these views would be temporary, visual impacts associated with construction would be unavoidable. The construction of the transmission line would change the views in the project area. The project would increase the number of transmission line structures, access roads, and conductor in areas along the West Routes. It would introduce new impacts along Segment E of West Route D-E and along portions of the East Route because transmission lines do not currently exist in these areas. These impacts would be low to moderate depending on the location of the changes in relation to the location of sensitive viewers except for the East Route, where impacts could be high if the transmission line was visible on the top of the high plateau from the west side of the Columbia River.

3.10.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line, and the construction activities associated with the build alternatives would not occur. Neither temporary nor permanent visual impacts associated with the other alternatives would occur.

3.11. CULTURAL RESOURCES

3.11.1. Affected Environment

Cultural resources are nonrenewable resources associated with 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), are a subset of cultural resources that are eligible for inclusion in the National Register of Historic Places (National Register or NRHP). Historic properties include districts, sites, buildings, structures, artifacts, ruins, objects, works of art, or natural features important in human history at the national, state, or local level and properties of traditional religious and cultural importance to an Indian tribe that meet certain criteria. Historic properties include both historic and pre-contact resources, which pre-date contact between Euro-Americans and Native Americans.

The study area for cultural resources consists of the proposed transmission line right-of-way, construction work areas for transmission line structures and access roads, and conductor and pulling and tensioning sites. The NHPA requires that cultural resources be identified and evaluated for eligibility in the National Register before determining effects from the Proposed Action. Cultural resources are evaluated for National Register eligibility using four criteria commonly known as Criterion A, B, C, and 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), significance in American culture, association with a significant person, possession of great artistic value, or properties that may yield important information about the past. A cultural resource must meet at least one criterion to be eligible for listing in the National Register.

Consistent with the NHPA, BPA consulted with the Washington State Historic Preservation Office (SHPO) and three tribes with an interest in this area, requesting information on cultural resources within the study area. A review of background information was conducted, including a search of site records housed at the SHPO in Olympia, a review of General Land Office (GLO) plats, and a review of related Bureau of Land Management (BLM) land records. Previous cultural resource investigations within a mile of the proposed right-of-way identified a total of 109 ***prehistoric*** sites, 12 of which appeared to be within the cultural resource study area.

A cultural resource field survey was conducted in the study area in 2013 where BPA was able to obtain landowner permission to enter property. The survey was conducted to find, revisit, and document previously identified sites and to look for any previously undocumented sites. The survey area included approximately 40 miles of transmission line alternatives, 16 conductor tensioning sites, and existing and proposed access roads. BPA was able to obtain landowner permission and conduct the field survey for about 42 percent of the East Route (mainly on the northern portion of this route) and about 97 percent of the West Routes.

During the cultural resource survey, 37 cultural resource sites were identified in the project survey area. Twelve of the sites had been previously recorded.

Of the 37 cultural resource sites, 18 are prehistoric sites, ten are historical sites including irrigation features, foundations, and scatters of historic debris, and nine are structures or

buildings over 50 years of age. Of the identified sites, two have been determined eligible for listing on the NRHP, including the BPA Columbia Substation and a prehistoric site.

The density of the cultural sites identified in the cultural resource study area, based on the areas where there was permission to survey, is shown in Table 3.11-1.

Table 3.11-1. Cultural Site Density in Route Alternatives (2013 and 2014 Cultural Survey Data)

Route/Alternatives	Acres Surveyed	Percent of Study Area Surveyed	Cultural Sites Identified	Cultural Sites per Acre Surveyed
East Route	160	42.3	11	.069
West Route D-E	341	96.0	28	.082
West Route D-F	308	100	27	.088

Historic properties also include ***traditional cultural properties*** (TCPs), which are associated 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). Properties of traditional religious and cultural importance to an Indian tribe are a type of TCP. Two consulting tribes are conducting studies to identify TCPs in the cultural resources study area. Identified TCPs will be evaluated for eligibility in the National Register. The potential effects from the Proposed Action on TCPs will be determined in consultation with the WA SHPO and consulting tribes.

Additional cultural survey work was conducted in spring and summer 2014 along the West Route alternatives to obtain more information on the character, location, and extent of pre-contact and historic cultural sites in the study area. This work included subsurface testing of areas with a high probability to contain cultural resources. Survey data was used to assist in evaluation of sites for eligibility in the National Register. It was also used to aid in avoidance of cultural sites through modifications to the project design.

Additional cultural work may be needed if design changes are made which change the project footprint. Once staging sites and any other work areas are identified, they will be surveyed for cultural resources and be the subject of consultation under the NHPA. These surveys could result in the discovery of additional cultural resources in the project area.

Historical Information

The study area lies in ethnographic territory identified with the Middle Columbia River Salishans (Miller 1998), either at the southern extent of Wenatchi territory or the northern edge of Sinkayuse, or Columbia, territory (Ray 1936, 1974; Smith 1983a; Spier 1936; Teit 1928). It is unclear whether the entire project study area is located entirely within Columbia ethnographic territory, or partially within Wenatchi territory. Boundaries between the Middle Columbia Salish groups were fluid in terms of land use. Five village locations, four Columbia and one Wenatchi, were identified in the project area (Ray 1936, 1974).

The Middle Columbia Salish moved to specific geographic areas or types of habitats depending on the season to access various resources (Smith 1983b). Winter villages tended to be located in

the major river valleys. In the spring, temporary camps were located near the Columbia River or on the Columbia Plateau uplands to facilitate collecting of foods and plant materials, hunting, and fishing. In the summer, bands camped as far east as the Wilbur area (70 miles from the City of Rock Island) or located at nearby fishing areas along the Columbia and Wenatchee rivers. In the fall, large salmon runs drew Middle Columbia groups to the Columbia and Wenatchee Rivers to fish.

Ethnographic information regarding Middle Columbia Salish groups' subsistence patterns is sparse (Chalfant 1974a; Smith 1983b). The earliest of accounts describe a post-horse subsistence economy (Galm and Masten 1985). The horse enabled exploitation of a larger hunting and gathering geographic area and changes in patterns of those pursuits (Teit 1928). While the Middle Columbia Salish groups relied on collecting, fishing and hunting for their subsistence, records do not explain which group emphasized certain disciplines (Smith 1983b).

Members of the 1805 Lewis and Clark expedition were the first Euro-Americans to record their experiences in the Columbia Plateau (Bruce, et al. 2001). They were followed by British and Canadian fur traders. Euro-American activity in and around the study area during the nineteenth century was dominated by fur trading with annual flotillas of bateaus traveling down the Columbia River to deliver furs to Fort Vancouver for shipments overseas. Washington became a territory and the wave of American settlement accelerated. Settlement around Rock Island increased in 1893 with the construction of a Great Northern Railroad bridge across the Columbia River (Bruce et al. 2001). The primary industries during this period and continuing into the twentieth century were agriculture, cattle and sheep ranching, mining and logging.

The desire to expand the acreage of arable land and the need to supply power to a growing economy led to the construction of numerous hydroelectric and water storage dams along the mid-Columbia River. Among the earliest of these mid-Columbia Dams was Rock Island Dam, completed in 1933 by the Puget Sound Power and Light Company. It was the first hydroelectric project on the main stem of the Columbia River and transmission lines were installed to distribute electricity to nearby developing areas (Pitzer 1994).

3.11.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

During project design, transmission line structures, construction work areas, and access roads were sited to avoid known cultural resources, where possible. If any known cultural resources cannot be avoided, impacts to cultural resources during construction could potentially affect the integrity of these sites and associated information could be lost. BPA determined that the Joint Project would not adversely affect the substation's National Register eligibility. Although an additional bay would be added, the substation would retain its original function, appearance, and ownership.

Ground disturbance associated with constructing the transmission line and conducting access road work could damage or destroy currently undiscovered cultural resources. If a previously undocumented cultural resource was disturbed by project construction, the characteristics of the site could be adversely affected such that cultural information could be lost or damaged.

Increased access to lands within the study area during project construction could result in vandalism and looting of cultural resource sites.

Impacts on cultural resources would be low to high, depending on the level of disturbance, the amount of disturbance, the eligibility of the resource, and the type of mitigation. Implementation of the mitigation measures described below would minimize the potential for construction-related impacts.

Operation and Maintenance

If the transmission line is constructed, impacts to cultural resources from maintenance activities could range from low to high, depending on the location, level, and extent of disturbance or other type of adverse effect and the significance of the affected resource. If transmission line structures and access roads are located outside of cultural sites, it would decrease the potential for impacts during operation of the line.

3.11.3. Mitigation

The following mitigation measures are identified to avoid and minimize impacts from the Proposed Action on cultural resources.

- Avoid siting proposed transmission line structures and access roads within 200 feet of historic properties during the design process, where possible.
- Prior to construction, survey and identify cultural resources in any areas that were not previously surveyed due to lack of permission to enter and conduct consultation under the National Historic Preservation Act on any cultural resources that are identified.
- Maintain construction limits greater than 100 feet away from site boundaries where possible, through fencing or flagging as an area to be avoided.
- Depict cultural sites to be avoided in construction documents and on construction maps.
- Explain cultural resource related mitigation measures to construction contractors and inspectors, including the field marking for avoidance, during preconstruction meetings covering environmental requirements.
- Minimize the size of construction disturbance areas and removal of vegetation near cultural resource sites, to the greatest extent possible.
- Implement an Inadvertent Discovery Plan that details construction crew member responsibilities for reporting in the event of a discovery during construction; require work to stop immediately and notification of local law enforcement officials (as required), appropriate Douglas PUD and BPA personnel, the Washington SHPO, and affected tribes if cultural resources or human remains are discovered during construction activities.
- Prepare and implement a mitigation plan for unavoidable adverse impacts on cultural resources eligible for listing in the National Register in consultation with the WA SHPO and consulting tribes, including the use of cultural resource monitors in agreed upon locations.

3.11.4. Unavoidable Impacts Remaining After Mitigation

Although implementation of mitigation measure would reduce the potential for impacts to cultural resources, the Proposed Action could potentially adversely affect cultural resource sites. Disturbance of previously undocumented cultural resources could occur through inadvertent disturbance or destruction during project construction. Even with mitigation, the integrity of these sites could be affected and sensitive cultural information in an intact setting could be lost. Impacts would be low to moderate, depending on the level and amount of disturbance.

3.11.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, potential impacts to cultural resources from construction and operation and maintenance of the proposed transmission line would not occur.

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3.12. AIR QUALITY

3.12.1. Affected Environment

The project area for the air quality analysis is defined as the air basin that includes Douglas and Chelan counties. The Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) regulate air quality in Douglas and Chelan counties. EPA has established the National Ambient Air Quality Standards (NAAQS) for six ***criteria pollutants***: carbon monoxide (CO), ***ozone***, ***particulate matter,*** lead, sulfur dioxide, and nitrogen dioxide. Ecology adopted the standards set by EPA.

For each of the six criteria pollutants, NAAQS are defined as a maximum concentration above which adverse effects on human health may occur. When air quality in an area exceeds NAAQS, it is designated as a ***nonattainment area***. The State of Washington has maintenance areas only for CO, ozone and particulate matter. Because all portions of the project area do not exceed NAAQS, it is in attainment for air quality standards (Ecology 2013b).

CO is an air pollutant generally associated with transportation sources. The highest ambient CO concentrations often occur near congested roadways and intersections during periods of low temperatures, light winds, and stable atmospheric conditions. Vehicles along SR 28 are the primary source of CO in the project area. Because Ecology does not operate CO monitoring stations in the project area, no data are available on CO concentrations in the project area. Because the traffic volumes on SR 28 rarely result in congestion, it is unlikely that CO levels exceed standards in the project area.

Ozone is primarily a product of concentrated motor vehicle traffic during warm, sunny weather. Small amounts of ozone can be produced by transmission lines as a result of ***corona***, the breakdown of air at the surface of conductors. Ecology does not monitor ozone in the project area (Ecology 2013c). Ozone concentrations in the project area are likely to be less than the 8-hour average standard of 0.075 parts per million, because the area is sparsely developed and traffic levels are relatively low.

Particulate matter is typically generated by industrial activity, residential wood combustion, motor vehicle operation, ***fugitive dust*** from roadways and unpaved surfaces, including surface disturbance related to agricultural activities. In 2013, two wild fires occurred in the southwest portion of the project area, the Mile Post 10 and Colockum Tarps fires. Wild fires generate particulate matter both during and after the fire. After a fire, burned material and destabilized soils are susceptible to disturbance, releasing particulate matter into the air.

Two forms of particulate matter are regulated by EPA: particulate matter less than 10 micrometers and greater than 2.5 micrometers in size (PM_{10}) and particulate matter less than 2.5 micrometers in size ($PM_{2.5}$). $PM_{2.5}$ has more adverse health effects than PM_{10} at locations far from the emitting source, because it remains suspended in the atmosphere longer and travels farther. Ecology monitors ambient $PM_{2.5}$ concentrations at a monitoring station located at 1300 Fifth Street in Wenatchee. Ecology posts real-time data on its website (Ecology 2013c). PM_{10} and $PM_{2.5}$ concentrations in the project area are likely to be lower than the NAAQS, because the project area is sparsely developed and traffic levels are relatively low.

Sulfur dioxide primarily derives from burning ***fossil fuels*** at power plants and other industry. Smaller sources of sulfur dioxide emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. In 2010, the EPA revised sulfur emissions under NAAQS to a new 1-hour standard level of 75 parts per billion (ppb) (EPA 2013b). The Alcoa Wenatchee Works aluminum smelter located within the project area has the greatest potential for emitting sulfur dioxide, which is regulated under its air quality permit issued by Ecology (Ecology 2013d). No other large sources of sulfur dioxide emissions are present in the project area. Due to permit limits on the Alcoa smelter and a lack of other large sources of sulfur dioxide emissions, sulfur dioxide concentrations are likely to be lower than the NAAQS.

EPA's NAAQS uses nitrogen dioxide as the indicator for the larger group of ***nitrogen oxides***. Nitrogen dioxide forms from emissions from cars, trucks and buses, power plants, and off-road equipment (EPA 2013b). Ecology does not monitor nitrogen dioxide in the project area (Ecology 2013c). Nitrogen dioxide concentrations in the project area are likely to be less than the primary standards of a 1-hour average of 100 ppb or the annual average of 53 ppb because the area is sparsely developed and traffic levels are relatively low.

Historically, the major sources of lead emissions have been from fuels in on-road motor vehicles (including cars and trucks) and from industrial sources. Since leaded fuel is no longer used in motor vehicles, lead emissions from the transportation sector dropped dramatically between 1980 and 1995 and high levels of lead in air are usually associated with lead smelters (EPA 2013a). Due to the lack of lead emitting sources in the project area, it is unlikely that lead concentrations in the area exceed the NAAQS three-month rolling average limit of 0.15 micrograms per cubic meter.

The Alcoa Wenatchee Works is required to monitor a range of potential air contaminants including particulate matter, total fluoride, particulate organic matter, sulfur dioxide, and volatile organic compounds (Ecology 2013d). In 2005 and 2006, Alcoa reported exceedances of permitted particulate matter to Ecology. Ecology initiated regulatory action after the second exceedance and Alcoa replaced emission control equipment at the facility. Since Alcoa replaced equipment, their emissions have consistently been less than half the limit since the second exceedance (Ecology 2013d).

In the northeast portion of the project area, just south of the City of Rock Island, fill material is present on the ground surface at the site of the former American Silicon Technologies site. This fill, known as silica fume waste, was a by-product of the silicon manufacturing process. A Site Inspection conducted in April 2013, found that the silica fume waste material contains elevated levels of cadmium, copper, lead, selenium, silver and zinc, as compared to background concentrations (E&E 2013). It is not known if the silica fume waste on the ground surface is susceptible to wind erosion. See Section 4.8.2 for more detail on the former plant site.

3.12.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

NAAQS criteria pollutants that could increase as a result of project construction activities are CO, nitrogen dioxide, sulfur dioxide, ozone, and particulate matter. Air quality could be affected

during the estimated eight to eleven months of project construction but would mostly be affected during peak construction.

An increase in particulate matter as a result of soil disturbance would be the main impact to air quality. Fugitive dust could be created during structure construction, access road work, travel on unpaved surfaces, and other soil-disturbing activities. Particulate matter levels would be partially reduced by implementing measures to control dust during construction, as needed. Although construction activities could increase dust and particulate levels, impacts would be low to moderate because they would be temporary, occur in localized areas, and would not exceed air quality standards.

The operation of heavy equipment during construction would result in temporary increases of NAAQS regulated pollutants including CO, sulfur dioxides, nitrogen oxides, as well as other combustion byproducts such as carbon dioxide and volatile organic compounds. The increase in vehicle emissions from construction equipment would be temporary and localized to specific work areas and would change on a daily or weekly basis. The increase in emissions would likely be relatively small compared to the existing emission levels found in agricultural and rural areas. For these reasons, impacts on air quality from construction activities would be low.

East Route

While the number of structures and the area of construction disturbance would be similar across all three action alternatives, the East Route would require the most new access roads. Up to 2.9 miles of new access road construction would be needed to access structures. Additionally, when compared to the West Routes, the East Route could present greater potential for dust emissions because much of the area is accessed by unpaved roads, including Rock Island Grade Road and on the high plateau area in the southern half of the route. Due to the potential for particulate emissions, the East Route could have moderate impacts to air quality.

West Route D-E

Along West Route D-E, structures would be accessed from both paved and unpaved roads.

Segment D would cross the silica fume waste area at the American Silicon Technologies plant site. Four structures and their associated access roads would be located on the western portion of the plant site near the silica fume waste area. One proposed structure would be located outside of the silica fume waste area, near the railroad right-of-way. Three proposed structures would be located near the banks of the Columbia River, near the edge of the silica fume waste area. Access roads would cross short sections of silica fume waste. Because these structures are near the former settling ponds, installation could disturb some of the silica fume waste.

Access roads would cross short sections of silica fume waste. It is not known if the silica fume waste is susceptible to wind erosion. Douglas PUD would work with Ecology to determine if any special procedures would need to be followed when vehicles and construction equipment work in and traverse these areas.

Much of Segment D would run parallel to the Malaga Alcoa Highway and Colockum Road, which are both paved. The southern portion of the route, Segment E, diverges from Colockum Road and crosses open areas that would necessitate the use of existing unpaved access roads or

construction of new access roads. This would increase the potential for dust emissions. It is anticipated that up to 0.4 mile of new access roads would be constructed.

The 2013 Mile Post 10 and Colockum Tarps fires burned vegetation along 85 percent (approximately 2.8 miles) of Segment E. Until vegetation is reestablished, any construction activities in burned areas are likely to result in more particulate emissions than in unburned areas. Based on the potential for particulate emissions, West Route D-E could have moderate impacts to air quality.

West Route D-F

Segment D is described above under West Route D-E. Along Segment F, existing unpaved roads would be used for access and some construction of new access roads would be required. The construction of up to 0.3 mile of new access roads would be less than that needed for West Route D-E.

Portions of Segment F burned in the 2013 Mile Post 10 and Colockum Tarps fires, although less extensively than Segment E. Approximately 1 mile or 26 percent of Segment F burned, compared to 2.8 miles or 86 percent of Segment E. Until vegetation is reestablished, any construction activities in burned areas are more likely to result in particulate emissions than in unburned areas. Because there would be less new access road construction and construction in fewer burned areas than along West Route D-E, dust emission potential could be expected to be slightly less for West Route D-F, a low impact.

Operation and Maintenance Impacts

Air quality could be slightly affected during operation and maintenance of the transmission line. During operation, the transmission line would emit limited amounts of ozone and oxides of nitrogen as a result of the corona effect, explained in Section 3.16, Public Health and Safety. These substances would be released in quantities generally too small to be measured or to have an impact on humans, animals, or plants. Vehicle emissions that would result from occasional maintenance would be temporary and localized. For these reasons, impacts on air quality from operation and maintenance activities would be low.

3.12.3. Mitigation

The following mitigation measures are identified to minimize impacts from the Proposed Action on air quality. See Section 3.13, Greenhouse Gas Emissions, for additional mitigation measures that relate to air quality.

- Restrict speed for construction vehicles on unpaved access roads to no greater than 15 miles per hour to minimize dust.
- Control dust during construction with water or other appropriate control methods, as needed.
- Require that all engines in vehicles used for construction and operation and maintenance are maintained in good operating condition to minimize exhaust emissions.

3.12.4. Unavoidable Impacts Remaining After Mitigation

Implementation of the mitigation measures described above would reduce impacts on air quality, but would not completely eliminate impacts. There could be temporary increases in criteria pollutants during construction and in localized areas during maintenance activities due to ground disturbance and the operation of equipment. During operation, corona emissions would result in the emission of limited amounts of ozone and oxides of nitrogen. These emissions of criteria pollutants would not violate current air quality standards and impacts would be considered low to moderate.

3.12.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to air quality from construction and operation and maintenance of the proposed transmission line would not occur.

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3.13. CLIMATE CHANGE

3.13.1. Affected Environment

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.

The principal GHGs emitted into the atmosphere through human activities are carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and fluorinated gases, such as ***hydrofluorocarbons***, ***perfluorocarbons*** (PFCs), and sulfur hexafluoride (SF_6) (U.S. Energy Information Administration 2013).

CO_2 is the major GHG emitted, and the burning of fossil fuels accounts for approximately 84 percent of all U.S. GHG emissions (EPA 2013a). CO_2 released by human activities enters the atmosphere primarily through electric power generation using fossil fuels and transportation activities, with lesser quantities emitted from industrial, residential, and commercial activities.

In the natural environment, the release and storage of carbon is largely cyclical. Through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. When plants decay or are burned, the stored carbon is released back into the atmosphere, available once again to be taken up again by plants. In forests, carbon can be stored for long periods of time. Because forests are very productive and long-lived, they have an important role in carbon capture and storage and can be thought of as temporary carbon reservoirs. Soils store carbon in the form of organic material and serve as the largest carbon reservoir on land (Swift 2001).

Human activities such as deforestation, soil disturbance, and burning of fossil fuels increase 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, or when new buildings or roads displace vegetation, the GHG storage capacity of the disturbed area is diminished. Carbon dioxide, nitrous oxide and methane emissions increase when soils are disturbed (Kessavalou et al. 1998). Burning fossil fuels releases GHGs that have been stored underground for thousands of years and cannot be readily replaced.

CO_2 levels have increased to 379 parts per million (as reported in 2005) as a result of human activities from the pre-industrial era level of about 280 parts per million, a 35 percent increase (Intergovernmental Panel on Climate Change 2007). The resulting buildup of heat in the atmosphere due to increased GHG levels increases temperatures causes the warming of the planet similar to a greenhouse, called the ***greenhouse effect*** (EPA 2013a). Climate models predict that increasing levels of GHGs could increase the Earth's average temperature by between 2.0ºF and 11.5ºF by 2100 (EPA 2013a).

3.13.2. Environmental Consequences – Proposed Action Alternatives

GHG emissions resulting from the action alternatives were calculated using the methodology described in the technical report in Appendix A. Calculations were completed for proposed construction activities (building the transmission line and access road work) and for ongoing operation and maintenance for the estimated 100-year-long operational life of the transmission

line. GHG emissions associated with construction activities would occur over a period of approximately eleven months for the East Route, eight and a half months for West Route D-E, and eight months for West Route D-F.

East Route

During construction, direct emissions would result from the use of gasoline- and diesel-powered vehicles, including cars, trucks and construction equipment. The operation of equipment and vehicles during construction of the East Route would result in an estimated total of 1,846 ***metric tons*** of carbon dioxide equivalent (***CO_2e***)[2] emissions.

Over the 100-year lifespan of the Proposed Action, GHG emissions would result from direct emissions from substation equipment, and during operation and maintenance of the transmission line from the use of gasoline- and diesel-powered vehicles for routine patrols, routine and emergency maintenance, resource reviews, and inspections. An estimated 22.6 metric tons of CO_2e emissions per year would occur related to direct emissions from substation equipment, resulting in approximately 2,260 metric tons of CO_2e emissions over the 100-year lifespan. An estimated total of 21 metric tons of CO_2e emissions could result from operations and maintenance activities over the 100-year lifespan of the Proposed Action. Total CO_2e emissions for the project including construction, direct substation equipment emissions and operation and maintenance would be approximately 4,127 metric tons (see Table 3.13-1).

To provide context for this level of emissions, the EPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO_2e emitted annually (74 FR 56260). This threshold is comparable to the approximate amount of CO_2e generated by 5,263 passenger vehicles per year (EPA 2013b). Comparatively, the GHG emissions during project construction divided over the life of the project would be equivalent to the emissions generated by about 3 passenger vehicles per year, a low impact to ***climate change.***

Direct emissions from substation equipment and from operation and maintenance activities would result in carbon dioxide emissions about equal to that of 4 passenger vehicles per year averaged over the 100 year life span of the transmission structures. GHG emissions from maintenance activities would be minimal, therefore resulting in a low impact to climate change.

West Route D-E

During construction, direct emissions would result from the use of gasoline- and diesel-powered vehicles, including cars, trucks and construction equipment. The construction of West Route D-E could result in an estimated total of 1,426 metric tons of CO_2e emissions during construction.

Over the 100-year lifespan of the Proposed Action, GHG emissions would result from direct emissions from substation equipment, and during operation and maintenance of the transmission line from the use of gasoline- and diesel-powered vehicles for routine patrols, routine and emergency maintenance, resource reviews, and inspections. As with the East Route and West

[2] CO_2e is a unit of measure used by the Intergovernmental Panel on Climate Change and government agencies such as the EPA to describe the global warming potential of different greenhouse gases by setting them equivalent to the relative effects of CO_2.

Route D-F, an estimated 22.6 metric tons of CO_2e emissions per year would occur related to direct emissions from substation equipment, resulting in approximately 2,260 metric tons of CO_2e emissions over the 100-year lifespan. As with the East Route and West Route D-F, an estimated total of 21 metric tons of CO_2e emissions would result from ongoing operation and maintenance activities over the 100-year lifespan of the Proposed Action. Total CO_2e emissions for the project including construction, direct substation equipment emissions and operation and maintenance would be approximately 3,707 metric tons (see Table 3.13-1).

The GHG emissions during project construction divided over the life of the project would be equivalent to the emissions generated by about 3 passenger vehicles per year, a low impact to climate change.

As with the other two alternatives, direct emissions from substation equipment and from operation and maintenance activities would result in carbon dioxide emissions about equal to that of 4 passenger vehicles per year averaged over the 100 year life span of the transmission structures. GHG emissions from maintenance activities would be minimal, therefore resulting in a low impact to climate change.

West Route D-F

During construction, direct emissions would result from the use of gasoline- and diesel-powered vehicles, including cars, trucks and construction equipment. The construction of West Route D-F would result in an estimated total of 1,342 metric tons of CO_2e emissions during construction.

Over the 100-year lifespan of the Proposed Action, GHG emissions would result from direct emissions from substation equipment, and during operation and maintenance of the transmission line from the use of gasoline- and diesel-powered vehicles for routine patrols, routine and emergency maintenance, resource reviews, and inspections. As with the East Route and West Route D-E, an estimated 22.6 metric tons of CO_2e emissions per year would occur related to direct emissions from substation equipment, resulting in approximately 2,260 metric tons of CO_2e emissions over the 100-year lifespan. Total CO_2e emissions for the project including construction, direct substation equipment emissions and operation and maintenance would be approximately 3,623 metric tons (see Table 3.13-1).

The GHG emissions during project construction divided over the life of the project would be equivalent to the emissions generated by about 2 passenger vehicles per year, a low impact to climate change

As with the other two action alternatives, direct emissions from substation equipment that would be installed and from operation and maintenance activities would result in carbon dioxide emissions about equal to that of 4 passenger vehicles per year averaged over the 100 year life span of the transmission structures. GHG emissions from maintenance activities would be minimal, therefore resulting in a low impact to climate change.

Table 3.13-1. Net Carbon Footprint over 100-Year Life of the Proposed Action

Type of Activity	Total CO_2e Emissions in Metric Tons
East Route	
Construction (during 11 month construction period)	1,846
Direct emissions from substation equipment (over entire project life)	2,260
Operation and maintenance (over the entire project life)	21
Total	**4,127**
West Route D-E	
Construction (during 8.5 month construction period)	1,426
Direct emissions from substation equipment (over entire project life)	2,260
Operation and maintenance (over entire project life)	21
Total	**3,707**
West Route D-F	
Construction (during 8 month construction period)	1,342
Direct emissions from substation equipment (over entire project life)	2,260
Operation and maintenance (over entire project life)	21
Total	**3,623**

3.13.3. Mitigation

The following mitigation measures are identified to avoid or minimize impacts from the Proposed Action on GHG emissions.

- For BPA substation work, install equipment with a SF6 gas leak rate that is no greater than 0.5% per year for the life of the breaker.
- For BPA substation work, continue BPA's SF_6 monitoring process to calculate an annual leak rate of substation equipment in compliance with EPA requirements.
- Encourage carpooling and the use of shuttle vans among construction workers to minimize construction-related traffic and associated emissions.
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
- Dispose of wood poles in the local area where practicable.
- Use local rock sources for road construction where practicable.
- 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.
- Recycle or salvage non-hazardous construction and demolition debris where practicable.

3.13.4. Unavoidable Impacts Remaining After Mitigation

Implementation of the mitigation measures described above would reduce impacts on climate change, but would not completely eliminate impacts. There would be temporary increases in GHG emissions during construction and in localized areas during maintenance activities due to ground disturbance and the operation of equipment. During construction, GHG emissions from any of the three action alternatives would be below EPA mandatory reporting threshold for large sources of GHGs, a low impact. GHG emissions from maintenance activities would be minimal, resulting in a low impact to climate change.

3.13.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line; therefore, the GHG emission impacts related to the construction and operation of the project would not occur. GHG emission impacts would be similar to existing conditions. Because there would be no activities that would result in GHG emissions, there would be no impacts on climate change and GHG emissions.

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3.14. SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PUBLIC SERVICES

3.14.1. Affected Environment

Socioeconomic conditions and resources include population and housing, employment and income, public services, utilities and infrastructure, government revenue, property values, and land-generated income such as agricultural production. In addition, existing quality of life and other values important to individuals who live in or visit the project area are considered.

The study area for existing socioeconomic conditions, and potential impacts, consists of Chelan and Douglas Counties, the counties in which the Proposed Action would occur. Some residents in these two counties could be affected by the Proposed Action.

Population and Housing

In 2010, the population of Douglas County was estimated at 38,431 and the population of Chelan County was estimated at 72,453. Chelan County is ranked third in size in the state, while Douglas County is smaller and ranks 17th in size statewide. Both counties are largely rural with low population densities and together comprise 1.6 percent of the state's population.

The largest city in these two counties, Wenatchee, is located in Chelan County about 10 miles to the north of project area. Wenatchee had a population of 31,925 in 2010. East Wenatchee, directly across the Columbia River from Wenatchee, is the largest city in Douglas County and had a population of 13,190 in 2010. These cities are included within the Wenatchee-East Wenatchee Metropolitan Statistical Area (MSA) which had a population of 110,884 in 2010.

From 2000 to 2010, Douglas County grew by 17.9 percent, while Chelan County grew by 8.8 percent. During this same time period, the Wenatchee-East Wenatchee MSA grew by 11.8 percent and Washington State as a whole grew by 14.1 percent (U.S. Census Bureau 2010). Population trends in the project area are shown in Table 3.14-1.

Table 3.14-1. Population Change in Washington and in the Project Area From 2000 to 2010

Location	2000	2010	% Population Change 2000–2010
City of Rock Island	863	788	-8.7
Douglas County	32,603	38,431	17.9
Chelan County	66,616	72,453	8.8
Wenatchee-East Wenatchee MSA	99,219	110,884	11.8
Washington State	5,894,121	6,724,540	14.1

Source: U.S. Census 2000, U.S. Census 2010

The largest concentration of residences near the East and West Route alternatives is within the City of Rock Island. Other rural residences are located in a few areas along other route alternatives. Other than the City of Rock Island, the most residential development is present in low density along West Route Segment E south of Colockum Creek, along Tarpiscan Road.

In both Douglas and Chelan Counties the majority of housing units are owner-occupied with relatively low vacant housing rates (Table 3.14-2). Temporary housing in Douglas and Chelan counties includes rental housing, hotel/motel accommodations, and campgrounds and RV parks. Availability fluctuates throughout the year, with more demand for temporary lodging in the outlying areas during the summer. Permanent housing availability per county is not discussed due to the short-term nature of construction employment, although homes are available in both counties.

Table 3.14-2. Housing Units and Tenure in Douglas and Chelan Counties

	City of Rock Island	%	Douglas County	%	Chelan County	%	Washington	%
Total Housing Units	**277**		**16,004**		**35,465**		**2,885,677**	
Occupied housing units	262	94.6	13,894	86.8	27,827	78.5	2,620,076	90.8
Vacant housing units	15	5.4	2,110	13.2	7,638	21.5	265,601	9.2
Owner-occupied housing units	175	66.8	9,721	70.0	17,684	63.5	1,673,920	63.9
Renter-occupied housing units	87	33.2	4,173	30.0	10,143	36.5	946,156	36.1

Source: U.S. Census 2010

Employment and Income

The two major industries in the project area are agriculture and tourism (Meseck 2012). Agriculture is an important economic resource for this area and accounts for one-third of Douglas County's employment (Meseck 2012). The Wenatchee-East Wenatchee MSA had 13 percent of total agricultural employment in Washington in 2011, second only to the Yakima MSA (WSESD 2012). Agriculture primarily consists of orchards bearing apples, pears, cherries, and peaches (Photo 3.14-1).

Much of the nonfarm employment in the area is related to agriculture. Wineries are being developed in the area and have contributed to both the tourism and agriculture industries. Other jobs in the study area include nondurable goods manufacturing, trade and transportation, and warehousing (Meseck 2012).

Cattle ranching occurs within both East and West Route alternatives. Additional information on agriculture and ranching can be found in Section 3.2, Land Use.

Tourism opportunities in the study area are related to the natural resources in the area, including the project area's proximity to the eastern Cascade Mountains and multiple lakes including Lake Chelan, which is the third deepest lake in the country. The area is known for year-round recreation and nearly continual sunshine. Chelan County has a stronger tourism base than Douglas County, with Lake Chelan and the Leavenworth ski area being prime recreational areas that are located within the county.

Photo 3.14-1. View of orchards on the west bank of the Columbia River, near the southern end of proposed West Route alternatives

Other employment sectors in the study area include health services, retail trade, government and educational services. Much of Douglas County's economy depends on retail trade as East Wenatchee has the largest shopping mall in North Central Washington (Meseck 2012). The technology sector has also grown in both counties as additional server farms were recently constructed due to the counties' low electricity rates (Photo 3.14-2).

Photo 3.14-2. Intergate Columbia Technology Campus is one of the large technology centers in Douglas and Chelan Counties

Chelan County averaged 39,583 jobs in 2012 covered by unemployment insurance with a total payroll of more than $1.34 billion. Douglas County averaged 10,776 jobs covered by unemployment insurance with a total payroll of more than $327 million. In 2012, Chelan County had an average annual wage for total covered employment of $33,735 and Douglas County had an average annual wage of $30,373. Chelan County had a

median hourly wage of $14.90 and the Douglas County median hourly wage was $14.33 (Meseck 2012).

Specific to agriculture, the highest statewide average annual earnings in 2010 for production agriculture were for workers in cattle ranching and farming, at $29,259 per year. The lowest average state annual earnings in 2010 were for workers in fruit and tree nut farming, at $17,138 (WSESD 2012).

Some of the minority residents in the project area work in employment related to the local agricultural industry. The production of apples, cherries, and pears dominates the demand for seasonal and migrant labor in Washington during the state's long harvest season (WSESD 2012). Much of the migrant labor consists of workers of Hispanic or Latino origin (Graham 2012). Some local businesses cater to Hispanic residents (Photo 3.14-3).

Photo 3.14-3. La Tiendita Hispana (The Little Hispana Store) in the City of Rock Island

Property Value

The value of property can be measured in several ways. The price at which property is bought and sold under competitive conditions determines the market price. County assessors assess the value of real property for tax-collection purposes. Assessors estimate the value of residential properties based on the recent sale price of nearby, similar properties. They estimate the value of most commercial and industrial properties based on the potential use or revenue-generating potential of the property. The assessed value of real property in 2012 was about $10 billion in Chelan County and $3.6 billion in Douglas County (Washington Department of Revenue 2012). Due to market adjustments from the recent recession, the market value of property has generally trended downward because of foreclosures, financing difficulties, unemployment, sluggish economic conditions, reduced demand, and excess housing supply.

In addition to fee-owned property, various agencies, including Douglas PUD, Chelan PUD and BPA, have existing transmission line right-of-way and access road easements in the project area that were obtained when transmission lines were built. These easements, depending on the original agreement, allow these agencies to use the land for specified purposes and activities, and restrict the types of activities and uses allowed in the right-of-way.

Agricultural Production

Agricultural land and production is an important sector in both Douglas and Chelan counties (Table 3.14-3). Although agricultural land makes up about 76 percent in Douglas County and about 5 percent in Chelan County, Chelan has a larger share of orchards (22,681 acres) compared to Douglas County (14,877acres). Crops grown in the project area include cherries, apples, and pears along the West Route alternatives and cherries, apples, and apricots as well as dryland

wheat along the East Route. Livestock production within the project area includes cattle (USDA 2009) (see Section 3.2, Land Use). In 2007, crops in Douglas and Chelan counties produced about $402 million in revenues. Besides generating revenue directly from production, agricultural lands and farms contribute to the region's economy by providing open space and other valuable amenities that contribute to the quality of life for residents and visitors.

Table 3.14-3. Agricultural Highlights by County

Item	Douglas County	Chelan County
Land in farms (acres)	883,094	93,883
County land in farms (%)	76	5
Harvested cropland (% of farm land)	21	27
Farms (number)	955	979
Average Farm Size (acres)	925	96
Orchards (acres)	14,877	22,681
Market value of agricultural products sold ($1,000)	193,367	208,800

Source: 2007 Census of Agriculture

Environmental Justice

All projects involving a federal action (e.g., funding, permitting, or land acquisition) must comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by President Clinton on February 11, 1994. This executive order directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of ***minority populations*** and ***low-income populations***, collectively known as ***Environmental Justice*** populations, to the greatest extent practicable and permitted by law. A summary of the executive order on Environmental Justice and accompanying guidelines can be found in Section 4.9.

Projects involving a federal action are required to assess potentially disproportionate impacts to Environmental Justice populations. BPA and Douglas PUD conducted public outreach for the Proposed Action, which included mailing a letter describing the proposal as well as a project map to all residents within 0.25 mile of the route alternatives, including all residents of the City of Rock Island. A public scoping meeting was held on November 14, 2012, at the Douglas PUD office with a native Spanish speaker in attendance to provide translation services. For additional information on this project's public involvement process see Chapter 1.

Evaluating whether the Proposed Action has the potential to have disproportionately high and adverse impacts on minority and/or low-income populations typically involves:

- The identification of any potential high and adverse environmental or human health impacts,
- The identification of any minority or low income communities within the potential high and adverse impact areas, and
- The examination of the spatial distribution of any minority or low-income communities to determine if they would be disproportionately affected by these impacts.

Both the Council on Environmental Quality (CEQ) and Environmental Protection Agency (EPA) guidelines note that larger and more populated geographic areas may have the effect of "masking" or "diluting" the presence of concentrations of minority and low income populations (CEQ 1997, EPA 1998). The two potentially affected counties (Douglas and Chelan) encompass large areas, ranging in size from 1,819 to 2,920 square miles.

The potential existence of "high concentration pockets" of minority and low income communities in the vicinity of the alternatives was evaluated by reviewing 2010 Census data at the census block group level. A census block group is a smaller geographic subdivision of a census tract and typically contains between 3,000 and 6,000 people. Analysis at this level allows a review of the characteristics of surrounding populations at a finer geographic resolution than analysis at the census tract level. Each proposed route alternative crosses one census tract and one block group, depending on the alternative. Population demographics are listed below in Table 3.14-3 and Table 3.14-4.

Minority Populations

The Douglas County population (38,431) is estimated to consist of 80 percent white, 3 percent of two or more races, 1 percent Asian, and 1 percent American Indian. From this population, 29 percent identify as being of Hispanic or Latino origin (U.S. Census Bureau 2010) [3]. In Douglas County, the percentage of people of Hispanic or Latino origin is proportionately larger and statistically significant compared to those in Washington as a whole, which has a Hispanic or Latino origin population of 11 percent (Table 3.14-3).

The City of Rock Island population (788) is estimated to consist of 64 percent white, 33 percent of some other race, 2 percent of two or more races, 1 percent Black or African American, and 1 percent American Indian (U.S. Census Bureau 2010). Of this population, 51 percent identified being of Hispanic or Latino origin. In the City of Rock Island, the percentage of people of Hispanic or Latino origin is proportionately much larger and statistically significant compared to those in Washington, Douglas County or Chelan County as a whole. The Chelan County population (72,453) is estimated to consist of 79 percent white, 3 percent of two or more races, 1 percent Asian, and 1 percent American Indian (U.S. Census Bureau 2010). Of this population, 26 percent identified being of Hispanic or Latino origin, People of Hispanic or Latino origin make up a larger share of the Chelan County population than for Washington as a whole. The City of Rock Island and Chelan County however, experienced a slower growth in the Hispanic population over the past 10 years (53 percent and 46 percent respectively) when compared with the Hispanic population growth of both Douglas County and Washington State (both 71 percent respectively) (Table 3.14-4).

[3] Federal standards mandate that race and Hispanic origin (ethnicity) are separate and distinct concepts and that when collecting these data via self-identification, two different questions must be used. Race is collected in the following categories: White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, Some Other Race, Two or more Races, and Hispanic origin (ethnicity) is collected by individuals identifying whether or not they are of Hispanic origin.

Census information from 2010 was collected for the two Census Tracts (Census Tract 9612, Block Group 1 and Census Tract 9503, Block Group 5) that were intersected by all three action alternatives (Table 3.14-3).

Census Tract 9612, Block Group 1 is located in Chelan County and includes the majority of both West Routes. It includes only the southern section of segment D after it would cross the Columbia River. This tract has a lower proportion of people of Hispanic origin (16 percent) than both Chelan County (26 percent) and Douglas County (29 percent), but a greater proportion of people of Hispanic origin than the state of Washington (11 percent).

Census Tract 9503, Block Group 5 is located in Douglas County. This block group includes the Douglas County section of the West Routes and the entirety of the East Route. It has higher proportions of people of Hispanic origin (49 percent) than in Chelan County (26 percent), Douglas County (29 percent), and Washington State (11 percent).

Minority populations (including Hispanic) are proportionately lower in Block Group 1 than in Block Group 5. This is most likely due to the fact that Block Group 5 includes the City of Rock Island which has a large Hispanic population.

Table 3.14-4. Racial and Ethnic Characteristics

	Census Tract 9612, Block Group 1[a]	%	Census Tract 9503, Block Group 5[b]	%	City of Rock Island	%	Douglas County	%	Chelan County	%	Washington	%
Total Population	**2,059**		**1,208**		**788**		**38,431**		**72,453**		**6,724,540**	
White	1,739	84	803	66	502	64	30,573	80	57,484	79	5,196,362	77
Black or African American	4	0	13	1	6	1	128	0	236	0	240,042	4
American Indian and Alaska Native	12	1	4	0	4	1	405	1	700	1	103,869	2
Asian	30	1	3	0	1	0	283	1	588	1	481,067	7
Native Hawaiian or Pacific Islander	4	0	1	0	1	0	52	0	100	0	40,475	1
Some Other Race	229	11	369	31	257	33	5,979	16	11,355	16	349,799	5
Two or more races	41	2	15	1	17	2	1,011	3	1,990	3	312,926	5
Hispanic or Latino (of any race)	**328**	**16**	**593**	**49**	**405**	**51**	**11,013**	**29**	**18,713**	**26**	**755,790**	**11**
Mexican					375	48	10,160	26	17,216	24	601,768	9
Puerto Rican					5	1	38	0	115	0	25,838	0
Cuban					0	0	12	0	22	0	6,744	0
Other Hispanic or Latino					25	3	803	2	1,360	2	121,440	2

Source: U.S. Census 2010

a Block Group 1 is located in Chelan County and includes the majority of both West Routes (southern segment of D and all of E and F).

b Block Group 5 is located in Douglas County and includes the northern segment of D for both West Routes and the full East Route.

Table 3.14-5. Hispanic Population Growth from 2000 to 2010

Location	2000	2010	% Population Change 2000–2010
City of Rock Island	264	405	53
Douglas County	6,433	11,013	71
Chelan County	12,831	18,713	46
Washington State	441,509	755,790	71

Source: U.S. Census 2010

Low-Income Populations

The CEQ and EPA guidelines indicate that low-income populations should be identified based on the annual statistical poverty thresholds established by the U.S. Census Bureau. The current (2012) poverty thresholds are shown in Table 3.14.6.

Like minority populations, low-income communities could be affected by the Proposed Action. Low-income communities may consist of individuals living in geographic proximity to one another or as a geographically dispersed set of individuals.

Table 3.14-6. Current Low-Income (Poverty) Thresholds

	Related children under 18 years					
Size of family unit	None	One	Two	Three	Four	Five
One person (unrelated individual)						
Under 65 years	11,945					
65 years and over	11,011					
Two People						
Householder under 65 years	15,374	15,825				
Householder 65 years and over	13,878	15,765				
Three people	17,959	18,480	18,498			
Four people	23,681	24,069	23,283	23,364		
Five people	28,558	28,974	28,087	27,400	26,981	
Six people	32,847	32,978	32,298	31,647	30,678	30,104

Source: U.S. Census Bureau (2012)

In 2011, Washington had a median household income of $58,890, a per capita income of $30,481 and a 12.5 percent poverty rate. Both median household income and per capita income in Douglas County were lower than the state average at $49,707 and $22,751, respectively, and the poverty rate was above average, at 16.7 percent. The median household income and per capita income in Chelan County was also lower than the state average at $49,509 and $24,944, respectively, and a slightly higher poverty rate at 12.6 percent (U.S. Census Bureau 2013).

(U.S. Census Bureau 2013). Table 3.14-7 provides a comparison of median household incomes and per capita income from the Census Tracts that intersect all three action alternatives, the City of Rock Island, the counties, and the state.

Census Track 9612 in Chelan County had a higher median household income than either county and the state. Census Tract 9503 and the City of Rock Island in Douglas County may include low-income areas, based on the most recent available data (2011). The City of Rock Island had a median household income and per capita income lower than the state average at $38,098 and $15,273, respectively, with a higher poverty rate at 24.9 percent. Census Tract 9503 had a 24 percent poverty rate and median household income equivalent to just 70 percent of the Washington State median. Information on the block group income level of residents near the proposed transmission line route alternative is not available.

Table 3.14-7. Median Household Income

	Census Tract 9612[a]	Census Tract 9503[b]	City of Rock Island	Douglas County	Chelan County	Washington
Median household income	$64,172	$41,496	$38,098	$49,707	$49,509	$58,890
Per capita income	$27,790	$20,032	$15,273	$22,751	$24,944	$30,481
Poverty Rate	9.6%	24.0%	24.9%	16.7%	12.6%	12.5%

Source: U.S. Census Bureau

a located in Chelan County and includes the majority of both West Routes (southern segment of D and all of E and F).

b located in Douglas County and includes the northern segment of D for both West Routes and the full East Route.

Public Services

The following public services can be found within the project area:

- Electrical service provided by both the Douglas PUD and Chelan PUD.
- Public water provided by municipal systems and water districts.
- Wastewater from East Wenatchee is disposed of at the Douglas County Sewer District No. 1, as well as at the Wenatchee Wastewater Treatment Plant.
- Road maintenance is provided by various agencies depending on the roadway. SR 28 is serviced by the Washington Department of Transportation while local roads in the project area are serviced by the Douglas County Transportation department. The roadways located in Chelan County are serviced by Chelan County Maintenance District #1 Wenatchee.
- Fire protection and emergency services are provided by county fire protection districts, including Chelan County Fire District 1 and the Douglas County Fire District 2.
- Police protection is provided by the Chelan County Sheriff's Department, the Douglas County Sheriff's Department, and the Washington State Patrol.
- Douglas County is served by 12 school districts and Chelan County is served by eight school districts, all providing education from grades 1 through 12; Rock Island Elementary School, within the City of Rock Island is the closest school and sits 1,150 feet to the northwest of the

Rapids Switchyard. Students are transported to schools by school bus routes that traverse most county roads.

3.14.2. Environmental Consequences – Proposed Action Alternatives

Population and Housing

Because construction activities would occur within an estimated 8-month to 13-month period, the duration of construction work would not be long enough to induce any permanent changes to the population in the project area. During peak construction, a maximum of 25 employees (Brown 2013, personal communication) would work along various portions of the project.

Based on a recently completed 230-kV transmission line construction project, it is estimated that 80 percent of the work force would be from outside the project area. These non-local workers would temporarily increase local populations by about 20 persons. This would depend, however, on where the construction contractor is based. If workers (and possibly some of their dependents) were from out of the area, they would require temporary lodging in the local area during construction. Construction workers might rent parking for RVs or other live-in vehicles. While there would be a short-term increase in the demand for temporary housing in the project area, the existing temporary housing near the project would be sufficient to accommodate non-local workers without creating a discernable change in availability. Because increased demand for housing would be temporary, impacts on housing availability during construction would be low. Existing Douglas PUD staff would operate and maintain the proposed transmission line and associated facilities, so there would be no long-term impact on the population and the demand for housing.

Employment and Income

The local area could experience a temporary, positive impact on employment and most sectors of the local economy during project construction. This could occur through hiring local construction workers, procuring local supplies and equipment such as gravel and fuel for vehicles, equipment rentals, staging area leasing, and worker spending on food, lodging and other needs and services.

These direct expenditures would generate economic activity in other parts of the economy through what is known as the ***multiplier effect***, with direct spending generating indirect and induced economic impacts. Indirect impacts consist of spending on goods and services by industries that produce the items purchased as part of the project. Induced impacts include expenditures made by workers' households involved, either directly or indirectly, in the construction process. The local economy would temporarily be stimulated through material purchases in the area, payroll to construction workers, and related indirect or multiplier effects.

Douglas PUD would hire a contractor to build the line, and a combination of contractors and consultants would be responsible for engineering design, surveys, environmental analysis and monitoring, and obtaining construction materials, including the structures. These expenditures would likely not be made locally, except potentially for the procurement of some materials, such as rock.

The Proposed Action would bring about 25 temporary jobs to the project area and an estimated 20 percent would be filled locally. They would work an estimated 60 hours per week during peak construction for approximately eleven months. This increase in employment would last only through the construction of the project. Because most of the workers would not be local residents, they would need to temporarily reside near the construction site, with or without their families, using motels or RV parks for lodging. They would purchase meals, groceries, gasoline, and other necessities from local restaurants and stores.

This economic impact analysis assumes that 20 of the construction workers would come from outside the project area and would likely spend an average of $100 per day within the project area over the 11-month construction period, including $40 per day for lodging, $50 per day for meals and groceries, and $10 per day for fuel. This spending would generate a total of $528,000 in direct spending within the project area. This would increase the total income within the project area by contributing to the incomes of the employees and owners of the businesses that serve the construction workers. A portion of the money spent by the workers would be retained in the project area, thus increasing total regional output and labor income. Therefore, the impacts of these additional expenditures on overall area economic activity, while beneficial, would be low.

After construction, the proposed transmission line would positively affect economic activity in the project area. Increased power capacity and reliability could serve as an incentive for businesses, such as server farms, to locate in the project area. The proposed transmission line would also indirectly contribute to regional stability and economic growth by reliably meeting power demands. This would be a long-term positive impact.

Construction could result in temporary interference with agricultural operations near work areas. For example, structure construction and access road work adjacent to apple and cherry orchards could result in conflicts with agricultural operations. Impacts on agricultural operations could result from the use of roads by construction-related vehicles and equipment, which could result in some delays to vehicles and trucks used in agricultural operations. Because the disruptions would be temporary, and work could be timed to avoid conflicts, the economic impact would be low.

During operation and maintenance, the project would have no long-term direct impact on employment and no impact on private income, as Douglas PUD plans to operate and maintain the proposed transmission line with existing staff. Also, by improving the reliability of electricity delivery in the region, the project would encourage businesses who need high-quality power to locate and invest in the area, which could provide jobs. Improved reliability would allow commercial, industrial, and residential consumers to avoid costs from power interruptions.

Property Values

The construction and operation of the proposed transmission line is not expected to have long-term impacts on property values in the area for a variety of reasons. Proposed land uses changes often raise concerns about the effect the change may have on nearby property values. Zoning and permits are the primary means by which most local governments protect property values. By restricting some uses, or permitting them only under certain conditions, conflicting uses are avoided. Although some residents consider transmission lines to be an incompatible use adjacent to residential areas, the presence of transmission lines in residential areas is fairly common.

Some temporary negative impacts on property values (and salability) could occur on an individual basis as a result of the transmission line and access road construction. However, these impacts would be highly variable, individualized, and unpredictable. These short-term impacts on property value and salability could occur on an individual basis during construction. This could occur as a result of construction-related disturbance from construction noise and increased activity. However, because construction-related disturbance would be temporary and would likely last in any one location for no more than a few days, this impact would be low. Douglas PUD would acquire the necessary real estate property rights for construction, installation, and maintenance of the transmission line.

Some orchard trees would need to be removed along all action alternatives, as described below. Because farmers would be compensated for easement acquisition, it is assumed that tree removal would not be expected to have appreciably measurable impacts on agricultural property values.

The question of whether transmission line easements across residential property can affect property values has been studied many times in the United States and Canada over the last 20 years. In rural areas, a 2010 study involved several hundred sales of rural land in various locations across central Wisconsin that considered the placement of the easement across the property (Jackson 2010). Four transmission line easement location categories were used to describe the way in which a transmission line passed through a rural residential parcel: through the middle, along the edge, clipping the edge, and through the property diagonally. The results indicated that property sales diminished by about 4 percent for the middle pattern and 2 percent for the diagonal pattern. No diminished property values were observed for either the edge, or clipping pattern sales.

In 2012, another rural lands study focused on looking at impacts of a 500-kV transmission line on property value based on different types of land uses, including agricultural land, rural recreation, and various types of rural residential homes. This study concluded that "The research reported here is certainly consistent with the findings in the published literature that property value effects cannot be presumed and are generally infrequent." (Chalmers 2012). The research also found that production agricultural property land value was unaffected by transmission lines. The researcher found that in the case of agricultural property, the purchase of the easement could be considered a windfall benefit of sorts to the current owner, who would not have to make any discount in sale price for the easement if the property were to be sold.

BPA also initiated studies, beginning in the 1990s in Washington, to examine the potential impact of transmission lines on residential property values in urban areas, which have resulted in similar findings (Cowger and Bottemiller 1996; Bottemiller et al. 2000; Wolverton and Bottemiller 2003). Additionally, a 2009 study conducted a literature review and found that half of the major studies evaluating property value effects from high-voltage transmission lines found no effect; the other half found property value declines of 3 to 6 percent, generally not beyond 200 to 300 feet from the lines, with declines dissipating over time (Chalmers and Voorvaart 2009).

Studies of property value impacts during periods of physical change, such as new transmission line construction, generally revealed greater short-term than long-term impacts. However, most studies have concluded that other factors, such as general location, size of property, improvements, condition, amenities, and supply and demand factors in a specific market area are

far more important criteria than the presence or absence of transmission lines in determining the value of residential real estate.

The proposed transmission line would cross over, or be located near current and potential future residential areas, agricultural lands, and industrial land depending on the alternative (see Section 3.2, Land Use). The presence of the proposed transmission line would not be expected to have appreciably measurable impacts on residential property values along the action alternatives or in the general vicinity. Non-project impacts, along with other general market factors, are already reflected in the market value of properties in the area. These conditions are not expected to change appreciably.

The project area includes industrial, residential, and agricultural land, much of which is undeveloped. Table 3.2-2 summarizes the presence of residences within 500 feet of the centerline of the proposed transmission line alternative and potential impacts to property values. All three routes begin in the City of Rock Island at the existing Douglas PUD Rapids Switchyard. Within the City of Rock Island, the centerline of the initial portion of both the East and West Route alternatives is within 200 to 475 feet of approximately 12 single-family residences, with an existing intervening 230-kV transmission line to the south. Three intervening transmission lines are located to the north: a 115-kV line, a 345-kV line and 500-kV line. Because this portion of the proposed transmission line would be located within an existing transmission line corridor, it would not be expected to have appreciably measurable impacts on property values.

East Route

The East Route continues south to the west of SR 28, directly across the highway from 12 residences located along and near 3rd Street SW. There are a series of residences that are located on the north side of SR 28 and 3rd street SW in the City of Rock Island that would be 300 feet from the proposed alignment centerline. However, because there are intervening roads between the residences and the proposed transmission line, it would not be expected to have appreciably measurable impacts on property values.

South of the City of Rock Island and Batterman Road, a single rural residence is located within 250 feet of the East Route centerline, with an existing intervening 230-kV transmission line that is located closer to the residence than the proposed line. The transmission line would clip the southern part of the property. Douglas PUD would need to acquire an easement in order for the line to traverse the property. A 1-pole transmission line structure would be located 400 feet from the residence. Because the proposed transmission line would be located adjacent to an existing transmission line corridor, it would not be expected to have appreciably measurable impacts on property values.

The remainder of the East Route is more than 1,000 feet from residences.

South of the City of Rock Island, the East Route crosses rural lands including the southern half of the route on top of the high plateau. Rural lands along the East Route consist of large land holdings primarily used for farming as well as for recreational use (leased for hunting). A portion of the land on top of the plateau is enrolled in the U.S. Department of Agriculture Conservation Reserve Program (CRP). Twelve 1-pole transmission line structures would be located in these

CRP lands. Placement of structures would not necessarily affect CRP status and no loss in value would be expected for CRP land. South of the plateau, three transmission line structures (two 1-pole and one 3-pole structure) would be within ranching land, primarily for cattle. Temporary disruption could occur during construction as the animals could potentially be moved to ensure their safety. No long-term impacts on CRP lands would be expected.

Because Douglas PUD would acquire the necessary real estate property rights, construction impacts would be temporary, and based on the results of studies on the impact of transmission line on property values, the proposed transmission line would not be expected to have appreciably measurable impacts on property values along the East Route alternative, low impact.

West Route D-E

Segment D would follow an existing right-of-way out of the Rapids Switchyard, across the site of the former American Silicon Technologies facility. Constructing two structures at the edges of this parcel would not be expected to have appreciably measurable impacts on property values.

The proposed route crosses the Columbia River and pass near Alcoa's Wenatchee Works plant, located to the east of the proposed right-of-way. This portion of Segment D would be within an existing transmission line corridor with multiple lines and an underground gas pipeline. The proposed line would not deter any industrial development because it would be within an existing transmission line corridor. In Chelan County, Segment D is not near any residences. Much of the route for Segment D is already subject to transmission line easements.

Segment E would pass through a cluster of homes near Colockum Creek, along Tarpiscan Road. The transmission line corridor would cross through two of the residential property lots and the centerline of the corridor would be within 170 feet to 485 feet of this cluster of homes.

A residence located northeast of the bridge crossing Colockum Creek, would be approximately 225 feet from the proposed Right-of-Way centerline and no structures would be constructed on the property. The presence of the transmission line near this property would not be expected to have appreciably measurable impacts on property values.

To the east of the property listed above, a residence would be located 430 feet from the Right-of-Way centerline. The line would not pass over the property and an easement would not be required. The presence of the transmission line near this property would not be expected to have appreciably measurable impacts on property values.

To the southeast of the bridge crossing Colockum Creek, the transmission line would clip the southwestern edge of a residential property and would require Douglas PUD to acquire an easement. The residence on this lot would be located 190 feet from the corridor centerline. Because transmission line structures would not be located on the property, it would not be expected to have appreciably measurable impacts on property values.

Another residence is located to the south of Tarpiscan Road, about 170 feet from the transmission line centerline. The transmission line would clip the eastern edge of the property and travel along the edge of the property. Douglas PUD would need to acquire an easement on this property. A 3-pole and 1-pole structure would be located on the property, approximately 600

and 800 feet respectively from the home. Constructing two structure on this property would not be expected to have appreciably measurable impacts on property values.

One single-family home is located approximately 425 feet from the 3-pole structure mentioned at the residence above. The proposed line would not cross this property and the adjacent transmission line structures would not be expected to have appreciably measurable impacts on property values.

One single-family home with an existing 230-kV to the east of the home is located approximately 270 feet from the crossing of Colockum Road by West Route D-E. The proposed line would not cross this property and the adjacent transmission line structures would not be expected to have appreciably measurable impacts on property values.

One single-family home with an existing 230-kV line to the south of the home is located approximately 215 feet east of the proposed line. The proposed line would pass through the west of the property and then out through the northeast of the property, with a 3-pole structure located on the property. Constructing one structure on this property would not be expected to have appreciably measurable impacts on property values.

One single-family home with an existing 230-kV line to the south of the home is located approximately 320 feet east of the proposed line. The proposed line would pass through the south of the property, with a 2-pole structure located on the property. Constructing one structure on this property would not be expected to have appreciably measurable impacts on property values.

One single-family home with an existing 230-kV line to the north of the home is located 485 feet south of the proposed line. The proposed line would not cross the property and the presence of the adjacent proposed transmission line would not be expected to measurably impact property values.

The potential property value impacts on Segment E residential property would be low to moderate for several reasons, including the small footprint of structures, the temporary nature of construction impacts, compensation for easements by Douglas PUD, and study results that indicate that transmission line structures in close proximity to a property have no long-term negative impact upon those property values.

West Route D-F

Segment D, the northern portion of this route, is discussed above under West Route D-E. West Route Segment F is located near some residences and a proposed development. These residences are potentially a part of Ravenwing Ranch, a large lot rural residential development, which is proposed for this area (see Section 3.2, Land Use for additional information on this development). As of March 2014, approvals at this site are ongoing.

The centerline of Segment F would pass within 330 feet of one single-family residence on the east side of Colockum Road, to the north of Colockum Creek. The proposed transmission line would pass through the middle of this lot and Douglas PUD would need to acquire an easement to cross this property. A 1-pole structure would also be constructed on this residential property.

There are two intervening transmission lines (115-kV and 230-kV) that pass in close proximity to this residence. Because the transmission line would span the middle of the property, it could potentially have an impact on the residential property value which would be offset by easement acquisition.

Continuing south, the centerline of Segment F would pass within 425 feet of a residential settlement comprised of small buildings that do not appear to be single-family residences but may be agricultural worker residences. It is unknown if this property is inhabited or the status of its current use.

The potential property value impacts on Segment F residential property would be low to moderate for several reasons, including the small footprint of structures, the temporary nature of construction impacts, compensation for easements by Douglas PUD, and study results that indicate that transmission line structures in close proximity to a property have no long-term negative impact upon those property values.

Agricultural Production

The project could impact the revenue that farmers earn from agricultural production on lands directly affected by the project. For example, construction of transmission line structures and access roads would permanently remove some land from agricultural production.

Construction and maintenance of the project could cause crop damage, however this would be a temporary impact. Douglas PUD would assess and pay for the damage caused. Typically there are few reductions in productivity and few increases in management costs on agricultural land next to transmission line structures and access roads, or within the right-of-way. If it would be necessary to modify an irrigation system due to the construction of the transmission facilities, the appraisal process would include an estimate of the cost. If the landowner has reserved rights or entered into an agreement with Douglas PUD to grow crops within the right-of-way, the landowner would be responsible for the control of weeds within the right-of-way if weeds were not introduced by project construction.

East Route

About 0.8 acre of orchard tree removal would be required along the East Route to install one 2-pole and two 1-pole transmission line structures near the Columbia Substation (Brown 2013 personal communication).

The small decrease in agricultural production due to tree removal and temporary impacts to farming operations during construction would likely have no impact on the regional prices for agricultural produce, and therefore, impacts to agriculture production would be low.

West Route D-E

A total of about 0.5 acre of orchards would be removed for structure installation for West Route D-E. About 0.2 acre of orchard trees would need to be removed for the installation of a 1-pole transmission line structure in Segment D where the line would cross the Malaga Alcoa Highway (Brown 2013 personal communication). About 0.3 acre of orchard trees would need to be

removed along the southern portion of Segment E for the installation of a 2-pole transmission line structure (Brown 2013 personal communication).

The small decrease in agricultural production due to tree removal and temporary impacts to farming operations during construction would likely have no impact on the regional prices for agricultural produce, and therefore, impacts to agriculture production would be low.

West Route D-F

A total of about 0.4 acre of orchards would be removed for structure installation for West Route D-E, including the 0.2 acre of orchard along Segment D, described above for West Route D-E.

At the southern end of Segment F, the transmission line would cross through several orchards. The installation of a 2-pole transmission line structure would require removal of 0.15 acre of orchard trees (Brown 2013 personal communication). The owner of one of these orchards has stated that the proposed transmission line would restrict the ability to continue to utilize helicopters to dry excess moisture from the cherry crop.

The impact on agricultural production in Segment F is considered moderate due to the potential permanent disruption of current farming practices in the existing cherry orchard.

Environmental Justice Populations

Census data demonstrates that all route alternatives are not likely to have over 50 percent minority persons, low-income persons, or households. All routes have very few inhabitants near the transmission line right-of-way. Low-income information could only be acquired to the block group level. There is little certainty about the economic status of residences along any of the routes due to this lack of data.

Households near the Proposed Action alternatives' right-of-way would experience effects from the construction of the facilities and potentially ongoing effects from the presence of the facilities (see Section 3.10, Visual Quality). However, none of the identified environmental consequences are high and adverse. The impact on Environmental Justice populations would be low, and none of the likely effects would be disproportionately severe for Environmental Justice populations.

The largest concentration of residences is within the City of Rock Island which is common to all route alternatives. It is expected that many of these residences are owned by Environmental Justice populations as the city has the highest concentration of persons of Hispanic descent and low income populations within the project area. Because the proposed line would be located within an existing transmission line corridor, impacts on Environmental Justice populations would be low.

East Route

The second-largest cluster of residences of persons of Hispanic descent present is located at the southern end of the route, near existing orchards. However, these residences are located more than 3,000 feet away from the proposed right-of-way and therefore, there would be no impacts on Environmental Justice populations.

West Route D-E

In addition to the residences in Rock Island, there is a cluster of residences along Segment D near the location of the transmission line crossing. Census data indicates that 10 individuals of Hispanic or Latino origin live in this area. These residences are more than 2,000 feet from the proposed right-of-way and any transmission line structures. Because the transmission line corridor in this location is in existing right-of-way and among existing transmission lines, and the residences are more than 2,000 feet away, it is unlikely that the addition of this line would have any impact on the residents.

There is a cluster of residences located along Segment E, near Colockum Creek. Census data (2010) indicates there are no persons of Hispanic or Latino descent in this area, although there could be some residences that are occupied by persons of Hispanic or Latino descent. Based on census data, there would be no impacts on Environmental Justice populations from West Route D-E.

West Route D-F

Segment D is described under West Route D-E. Although census data indicates that there are no persons of Hispanic or Latino descent in this area, there is at least one residence in this area rented by persons of Hispanic descent. However, impacts to Environmental Justice populations are not disproportional. Because the transmission line corridor would be adjacent to existing transmission lines, and residences are at least several hundred feet from the proposed transmission line location, it is unlikely that the addition of this line would have any impact on the residents.

Public Services

Because the project would not permanently increase employment or population in the area, no overall impact to schools, police, fire, or medical services would occur. However, during project construction activities, there could be temporary impacts to certain public services. The Proposed Action could affect the following public services during construction:

- Construction would require the use of water for dust suppression, which would be provided by local sources. This use would not be substantial enough to affect local water supply.
- Construction waste would be recycled or transported to a local waste disposal site with adequate capacity.
- WSDOT recommends that construction be scheduled to avoid peak harvest season between July and October as traffic levels on SR 28 and local roads are higher with the increase in fruit delivery trucks during this period (Sblendorio 2013 personal communication).
- Traffic impacts would be minimal, and a traffic control plan would be submitted to Douglas County and WSDOT prior to construction.

East Route

Traffic impacts would be minimal, and a traffic control plan would be submitted to the Washington State Department of Transportation (WSDOT) prior to construction. The locations

where the transmission line would cross both SR 28 and Batterman Road require temporary lane closures not to exceed 10 minutes (Sblendorio 2013 personal communication).

West Routes – Both D-E and D-F

Both the West Routes would have similar impacts on public services. Construction equipment traffic would result in minimal localized delays on the Malaga Alcoa Highway, Colockum Road, and Tarpiscan Road of only a few minutes, but would not disrupt the ability of emergency service personnel to operate.

For all route alternatives, construction-related impacts to public services would be temporary and would result in minimal localized effects. During project operation and maintenance, associated activities would also be temporary and localized, and would also occur only infrequently. Because the Proposed Action would not diminish the supply of public services for other purposes or have an overall effect on the ability of public service providers to provide their services, impacts to public services would be low.

3.14.3. Mitigation

The following mitigation measures are identified to avoid, minimize, or compensate for impacts from the Proposed Action. See also Section 3.2, Land Use, for additional mitigation measures that relate to public services.

- Douglas PUD would acquire the necessary real estate property rights for construction, installation, and maintenance of the transmission line.
- Develop and distribute a schedule of construction activities to potentially affected landowners along the transmission line corridor to inform residents when they may be affected by construction activities.
- Conduct a preconstruction public meeting and invite landowners to meet with contractors and Douglas PUD staff responsible for project implementation in order to receive information and discuss concerns.
- Provide local residents with appropriate contact information for contractor liaisons and Douglas PUD staff in order to allow them to address any concerns or complaints during construction.
- Develop and distribute a schedule of construction activities to potentially affected farm operators along the transmission line corridor to allow planting, harvesting, or maintenance activities to be coordinated with construction.
- Provide a schedule of construction activities to the owners/managers of potentially affected recreational facilities to allow the owners to advise visitors and appropriately schedule any events that could be adversely affected by construction activities.
- Keep construction activities and equipment clear of residential driveways, to the greatest extent possible.
- Coordinate the routing and scheduling of construction traffic with WSDOT and County road staff to minimize interruptions to local traffic.

- Employ traffic control flaggers and post signs along roads warning of construction activity and merging traffic for temporary interruptions of traffic, where needed.

3.14.4. Unavoidable Impacts Remaining After Mitigation

Implementation of the mitigation measures described above would help to minimize some of the socioeconomic impacts associated with building and operating the proposed transmission line in the project area. However, temporary impacts associated with construction, maintenance and operation, including potential conflicts with agricultural operations, disruption of travel along some construction access roads, and temporary impacts to property values would still remain after mitigation. The proposed transmission line would not be expected to have appreciably measurable impacts on most property values, but because the transmission line would cross residential properties, it could result in low to moderate impacts. Modest economic benefits could include temporary increases in employment, and local purchase of goods and services, and a long-term increase in service capacity on the Douglas PUD transmission grid.

3.14.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to socioeconomics and public services from construction and operation and maintenance of the proposed transmission line would not occur.

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3.15. NOISE

3.15.1. Affected Environment

The study area for the human noise analysis includes the area within 1,000 feet of the proposed right-of-way and 500 feet of project roadways (i.e., any road that could be subject to increases in traffic volume from construction vehicles and worker trips). Noise-sensitive land uses in the project area include residences, an elementary school, businesses and other areas where noise can affect how indoor and outdoor areas are used or enjoyed.

Noise is generally considered as sound that is loud, unexpected, or otherwise undesirable that disrupts normal human activities or diminishes the quality of the human environment. Transient noise sources, such as passing aircraft or motor vehicles, produce noise that is of short duration. Stationary sources such as urban freeways, commercial and industrial facilities, transmission lines, substations and ***transformers*** can emit noise over a longer period.

Ambient noise at any one location includes all noise generated by typical sources such as traffic, neighboring businesses or industries, and weather (wind or rain). The ambient noise level is typically a mix of noise from natural and manmade sources that may be near or distant.

Audible noise is commonly quantified in terms of ***A-weighted decibels***, which corresponds to how humans hear sound. Table 3.15-1 contains examples of common activities and their associated noise levels in ***dBA***.

Table 3.15-1. Common Activities and Associated Noise Levels

Activity	Noise Level (dBA)
Bedroom at night	25
Refrigerator	40
Moderate rainfall on vegetation	50
Normal conversation indoors	60
Gas lawnmower 100 feet away	70
Truck 10 feet away	80
Loud live band music	110

The ability to perceive a new noise source depends on the nature of the intruding sound and the background sound. Where the nature of the new sound is similar to the background sound (e.g., new traffic noise added to background traffic noise) a noise of 3 dBA is just noticeable, a change of 5 dBA is clearly noticeable, and an increase of 10 dBA is perceived as doubling the sound level. Where the nature of the new intruding sound is different from background sound (e.g., construction noise in an otherwise quiet setting), the new sound (e.g., sporadic "clanks" from construction equipment) can be perceived even if it only raises the overall noise level by less than 1 dBA.

Some federal and state noise level guidelines apply to operating transmission lines. The Environmental Protection Agency (EPA) has established a guideline of 55 dBA for an average day-night noise level (Ldn) and 45 dBA for night-time noise levels (between 10 p.m. and 7 a.m.)

in outdoor areas (EPA 1978). The state of Washington has similar guidelines for maximum permissible noise levels of 60 dBA (Ldn) and 50 dBA (night-time) that would intrude into residential property (Washington State 1975). Construction noise (including blasting) and sounds created by the installation or repair of essential utility services are exempted from state noise regulations (WAS 173-60-050). Washington state noise regulations (WAC 173-60-040) are generally equivalent to or more stringent than Chelan and Douglas Counties' noise regulations.

Background noise levels vary along the length of the East and West Routes. Most of the project area consists of agricultural lands, undeveloped land, and transportation infrastructure, with scattered rural residences. Noise levels in these areas are generally low. The predominant sources of noise in the project area include local traffic and equipment used seasonally for farming. Background noise levels found in rural environments without significant transportation or industrial noise are generally 35 to 45 dBA depending on wind conditions. Rural areas near public roads and residential areas likely experience higher background noise levels from increased human activity in the range of 40 to 50 dBA. Other sources of noise in the project area include the Alcoa Wenatchee Works smelter, Rock Island Dam, existing substations, commercial facilities in the City of Rock Island, existing road, highway and rail traffic, recreational water craft use and the occasional use of maintenance vehicles along utility corridors.

Corona-generated audible noise from the operation of transmission lines in the project area contributes to the noise setting, but is overshadowed in developed areas by other noise sources. Corona-generated noise on conductors, characterized as a hissing, crackling sound, is generally only of concern for transmission lines operating at voltages of 345-kV or greater during wet weather such as rain, snow, or heavy fog (EPRI 1982).

Audible noise from operation of existing 115-kV and 230-kV lines in the project area is usually so low as to be unnoticeable. The low amount of corona activity generated at these voltage levels would result in corona-generated noise well below other ambient noise levels in the area.

Some project areas have existing transmission lines that are operating at voltages greater than 345-kV. These areas include the right-of-way adjacent to the Rapids Switchyard in the City of Rock Island (both West and East Routes), the most southerly portion of West Route alternative Segments E and F, and the most southerly portion of the East Route parallel to Palisades Road. In these areas corona-generated noise may be audible in proximity to the transmission lines during wet weather.

3.15.2. Environmental Consequences – Proposed Action Alternatives

Construction Impacts

Direct noise impacts occur in locations where increased noise affects human noise-sensitive receptors. Construction activities would create noise as construction progresses along the right-of-way. Construction activities that would create noise include right-of-way clearing, access road work, excavation for transmission line structure footings, assembling and lifting structures into place, and blasting in bedrock (if needed). Use of construction equipment is estimated to produce a maximum noise level of 90 dBA at 50 feet from the source. For example, augur drill rigs typically produce a sound level of 85 dBA at 50 feet (Thalheimer 2000). Estimated construction

noise levels are calculated based on an estimated distance from the noise-producing activity and the noise receiver are shown in Table 3.15-2.

The duration of construction activities in any given location is expected to be relatively short (approximately 1 to 2 days). Construction would be limited to daylight hours. Noise-sensitive properties within 800 feet of construction zones could be exposed to noise levels of 60 dBA or higher, as shown in Table 3.15-2. Blasting could be required in rocky areas where conventional excavation for structure footings would be impractical. Where blasting could occur, the explosion would produce a short noise like a thunderclap that could be audible for a mile or more.

Although construction noise would result in a temporary increase in ambient noise for some sensitive receptors, the impact would be considered low to moderate depending on the type of noise and the proximity of sensitive noise receptors to the noise disturbance.

Table 3.15-2. Construction Noise

Distance Between Source and Receiver (feet)	Calculated Sound Level (dBA)[a]
50	90
100	82
200	74
300	70
400	67
500	64
600	62
800	59
1,000	56
1,400	52
1,800	49
2,500	46

Source: Federal Transit Authority 2006.

a This calculation does not include the effects, if any, of local shielding from walls, topography or other barriers which could further reduce sound levels.

To determine the expected level of corona-generated noise during operation of the transmission line, noise modeling was conducting using design specifications (Table 3.15-3). Expected noise levels during wet conditions were calculated at the edges and center of the transmission line corridor in three areas. These three areas were chosen because of the proximity of residences. Existing noise levels were modeled based on the voltage of the existing transmission lines within the transmission line corridor. Expected noise levels were modeled with the addition of the proposed transmission line to the utility corridor. In one of the areas where modeling was conducted, all corona-generated noise would be attributed to the proposed transmission line because there are no existing transmission lines along the proposed route (West Route D-E).

All three route alternatives share a common route to the south of the Rapids Switchyard in the City of Rock Island. The audible noise levels modeled approximately 700 feet south of the Rapids Switchyard resulted in minimal change when compared to existing levels, as noted in

Table 3.15-3. Within the corridor and at the western edge of the corridor, noise levels were unchanged, whereas at the eastern edge of the corridor, noise levels increased by 0.1 dBA from 49.4 to 49.5 dBA. The impact from transmission line operation would be low because the change in audible noise levels in residential areas along this common route is expected to be unnoticeable and new noise levels are expected to be below Washington State night-time noise limits for a new source.

Table 3.15-3. Existing and Predicted Corona-Generated Noise Levels During Wet Conditions[a]

Location of Noise Modeling and Existing Transmission Lines and their Voltage at These Locations		Maximum at Eastern Transmission Line Corridor Edge (dBA)	Maximum on Proposed Right-of-Way (dBA)	Maximum at Western Transmission Line Corridor Edge (dBA)
East and West Routes in City of Rock Island Approximately 700 feet south of Rock Island Switchyard (between Structures 1EW and 2EW); 585 ft-wide Right-of-Way with five existing transmission lines: Rocky Reach – Columbia, 230-kV Valhalla – Hanna – Rapids, 115-kV Rapids – South Nile, 115-kV Rocky Reach – Maple Valley, 345-kV Sickler – Schultz, 500-kV	Before Action	49.4	57.2	55.4
	After Action	49.5	57.2	55.4
East Route Near Residence: Between Batterman Road and Rock Island Creek (between Structures 22E and 23E); 225 ft-wide Right-of-Way with one existing transmission line: Rocky Reach – Columbia, 230-kV	Before Action	31.0	34.8	33.2
	After Action	39.9	42.4	37.3
West Route D-E Near Residences: Near Colockum Creek (Between Structures 56W and 57W); 75 ft-wide Right-of-Way with no existing transmission lines	Before Action	-	-	-
	After Action	39.7	41.4	40.5
	After Action	39.7	41.4	40.5

a Values developed from BPA modeling program, Liebhaber 2014.

East Route

The East Route parallels public roadways and existing transmission right-of-way for about one-third of the route but otherwise traverses agricultural, grazing, or undeveloped land. Noise from construction equipment and construction-related vehicles would temporarily increase traffic noise on local roads and on SR 28, a low to moderate increase in traffic noise levels.

The residential noise-sensitive areas along the East Route are limited to residential areas in the City of Rock Island, described above, and one residence along SR 28, approximately 0.25 mile southeast of Batterman Road. The expected audible noise level during operation was calculated for the area near the residence located between Batterman Road and Rock Island Creek. The addition of the proposed transmission line would result in a minimal change in noise levels when compared to existing levels, as noted in Table 3.15-3. At the western edge of the transmission

line corridor, closest to the residence, noise levels increased by 4.1 dBA, from 33.2 to 37.3 dBA. Within the corridor, noise levels increased by 8.4 dBA, from 34.8 to 42.4 dBA.

As explained above, noise impacts from construction along the East Route would be low to moderate due to their temporary nature. The impact from transmission line operation would be low because the audible noise change to residences is expected to be unnoticeable and new noise levels are expected to be below Washington State night-time noise limits for a new source. Noise levels generated during maintenance activities are not expected to exceed state standards, would be infrequent and temporary in nature, and therefore would result in low impacts.

West Route D-E

West Route D-E is immediately adjacent to existing transmission lines the entire length except for Segment E near Colockum Creek, where the proposed right-of-way would be several hundred feet from an existing 230-kV transmission line. West Route D-E travels through industrial, agricultural, and undeveloped areas as well as a cluster of residences near Colockum Creek. During construction, noise levels could increase above 60 dBA and be heard by residents of the City of Rock Island, the two farm properties northwest of Alcoa, and Colockum Creek.

The residential noise-sensitive areas along West Route D-E includes residential areas in the City of Rock Island, described above. It would also include the residential area along Colockum Creek. During operation, the audible noise levels modeled near the residences along Colockum Creek would be less than 41.4 dBA, as noted in Table 3.15-3.

As explained above, noise impacts from construction would be low to moderate due to their temporary nature. The impact from transmission line operation would be low because although there would be in increase in audible noise levels near residences, it is expected to be below Washington State night-time noise limits for a new source.

West Route D-F

West Route D-F is immediately adjacent to existing transmission lines the entire length. It parallels existing transmission corridors through industrial, agricultural, and undeveloped areas. The route passes near one rural residence near the fork with the West Route D-E and passes near a couple of rural residences near the southern crossing of the Columbia River. During construction, noise levels could increase above 60 dBA and be heard by residents of the City of Rock Island, the two farm properties northwest of Alcoa, and Colockum Creek.

The residential noise-sensitive areas along West Route D-F include residential areas in the City of Rock Island, described above, and several other residences near the route. Noise modeling was not conducted along this route because residences are not in close proximity to the proposed transmission line. As explained above, noise impacts from construction would be low to moderate due to their temporary nature.

Operation and Maintenance Impacts

For all alternatives, the transmission line would be inspected periodically and maintenance activities would be performed as needed. Douglas PUD would also need to maintain vegetation along the line for safe operation and to allow access to the line. It is expected that minimal

vegetation removal would be required primarily due to the low-growing vegetation in the area. Noise levels generated during occasional maintenance activities are not expected to exceed state standards, would be infrequent and temporary in nature, and therefore would result in low impacts. Corona-generated noise during operation is discussed above, under each alternative, and would also result in low impacts.

3.15.3. Mitigation

The following mitigation measures are identified to avoid or minimize noise impacts from the Proposed Action.

- Employ a lands liaison who would be available to provide information, answer questions, and address concerns during project construction.
- Schedule all construction work during daylight hours.
- Locate construction equipment as far away from noise-sensitive uses as possible.
- Require sound control devices on all construction equipment powered by gasoline or diesel engines that are at least as effective as those originally provided by the manufacturer.

3.15.4. Unavoidable Impacts Remaining After Mitigation

During construction and maintenance, noise from equipment and vehicles would result in an increase over existing ambient noise levels, after implementation of mitigation. Although construction noise would result in a temporary increase in ambient noise for some sensitive receptors, the impact would be low to moderate, depending on the type of noise and proximity of sensitive noise receptors to the noise disturbance, because the noise increases would be temporary and localized. Occasional maintenance activities along the line would generate infrequent and temporary noise, a low impact.

Because the proposed transmission line would operate at 230-kV, corona-generated noise in areas with existing transmission lines is expected to be so low as to be unnoticeable, a low impact. Along Segment E, where there is no existing corona-generated noise, the new audible noise levels are expected to be below Washington State night-time noise limits for a new source.

3.15.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to noise from construction and operation and maintenance of the proposed transmission line would not occur.

3.16. PUBLIC HEALTH AND SAFETY

This section covers potential public health and safety concerns that could result from construction and operation of transmission facilities, including electrical shocks, fires, hazardous materials, the effects of ***electric and magnetic fields (electromagnetic fields or EMF),*** and ***electromagnetic interference (EMI)***.

3.16.1. Affected Environment

The study area for public health and safety includes the area within 100 feet of the right-of-way and project access roads that extend outside of the right-of-way. Sensitive land uses within the study area include residences, businesses, agricultural areas, recreation areas, and other areas where people might be present. The study area includes areas where people live, recreate, and work along the proposed and existing transmission lines, access roads, and substations.

Wildland fire hazards in the project area include both natural and human-caused fires. In the project area, fire danger is generally the highest in the summer months. Because tree cover in the area is sparse, rangeland fires are the most common type of fires in the project area. In 2013, the Mile Post 10 and Colockum Tarps fires burned several hundred acres of vegetation in the southwest portion of the project area and included some proposed right-of-way and access roads. The fires closed some public roads and flash floods after the fire washed out the bridge over Colockum Creek. Most of the portion of Segment D west of the Malaga-Alcoa Highway that did not burn in August 2013, burned in a lightning-caused fire in May 2014.

Hazardous waste sites that could be encountered in the study area include illegal dump sites, illicit drug labs, buried chemical drums, and unreported chemical spills. In more developed areas, including urban areas, contaminated sites are generally identified and listed with regulatory agencies. Because the study area consists primarily of undeveloped land, the risk of encountering unreported hazardous waste sites or unreported contamination during project construction is possible, but unlikely.

Segment D of the West Route alternatives crosses a portion of the former American Silicon Technologies plant site, located along the Columbia River in the City of Rock Island. The plant was originally built by the U.S. Department of Defense in the 1940s for the production of ferro alloys during World War II. Since that time the plant has operated on and off under a series of corporate owners utilizing a similar production process and the plant is no longer operating. The site includes settling ponds that were used to precipitate silica fume waste, a well that was contaminated, and the building itself, which contained laboratories.

Numerous environmental studies and investigations were conducted to determine if there is hazardous waste contamination at the plant site, (Environmental Engineering & Consulting, Inc. 1988, 1991, E&E 2013). While the silica fume waste was found to contain elevated levels of cadmium, copper, lead, selenium, silver and zinc, as compared to background concentrations, it did not appear that it was impacting groundwater with the possible exception of zinc. There are no EPA or WDOE standards established for zinc. The site was determined to not be the source of area groundwater issues, which have now been linked to historic orchard herbicide application practices. Based on the site investigation, EPA determined that no further action under the Federal Superfund Program is warranted at the former Rock Island Silicon Plant site (Tonel

2013). More information about this former plant site and the environmental investigations related to hazardous materials that have been conducted at the site is provided in Section 4.8.2 of this EA.

Electromagnetic Fields

All electrical wires, from transmission lines to household wiring, produce EMF. Current (the flow of electric charge in a wire) produces the ***magnetic field***. Voltage (the force that drives the current) is the source of the electric field. Throughout a home, the ***electric field strength*** from wiring and appliances is typically less than 0.01 kV per meter (kV/m). Fields of 0.1 kV/m and higher, however, can be found very close to electrical appliances.

Transmission lines are present in most of the areas where there are residences along proposed transmission routes. West Route D-E parallels adjacent right-of-way except for a portion of Segment E in a residential area along Colockum Creek. Along the East Route, residences are near existing transmission lines.

There are no nationally recognized regulatory standards or limits for electric fields from transmission lines except those inferred from the National Electric Safety Code (NESC) 5-milliampere criterion for maximum allowable steady-state current in vehicles due to electrostatic effects. The State of Washington does not have guidelines for electric fields from transmission lines. Douglas PUD would design the proposed transmission line to meet BPA's electric-field guideline of 9-kV/m maximum on the right-of-way and 2.5-kV/m maximum at the edge of the right-of-way.

The primary parameters that affect the EMF levels produced by a power line are line voltage, current loading, line configuration, and line routing. Douglas PUD lines are designed and constructed in accordance with NESC, which specifies the minimum allowable distance between the conductors and the ground surface or other objects. These requirements determine the edge of the right-of-way, the minimum height of the conductors, and the closest point that houses, other buildings, and vehicles are allowed to the transmission line. The strength of the electric field from transmission lines depends on the design of the transmission line and on the distance the electric field is measured from the transmission line. Electric field strength decreases rapidly with distance.

Electric fields from high-voltage transmission lines can cause nuisance shocks when a grounded person touches an ungrounded object under a transmission line or when an ungrounded person touches a grounded object. Douglas PUD transmission lines are designed so that the electric field would be below levels where primary shocks could occur from even the largest (ungrounded) vehicles expected under the line.

Magnetic fields are measured in units of ***gauss*** (G) or ***milligauss*** (mG), with 1 G equal to 1,000 mG. Average magnetic field strength in most homes (away from electrical appliances and home wiring, etc.) is typically less than 2 mG. Very close to appliances carrying high current, fields of tens or hundreds of mG are present. Typical magnetic field strengths for some common electric appliances found in the home are given in Table 3.16-1. Unlike electric fields, magnetic fields from outside power lines are not reduced in strength by intervening trees and building materials. Transmission lines and distribution lines (the lines feeding a neighborhood or home) can be a

major source of magnetic field exposure throughout a home located close to the line. There are no national standards for magnetic field or state standards in Washington, and BPA and Douglas PUD do not have magnetic field limits for transmission lines.

Table 3.16-1. Typical Magnetic Field Strengths - (2 Feet from Common Appliances)

Appliance	Magnetic Fields (mG)
Copy Machine	7
Personal Computer	2
Vacuum cleaner	10
Microwave Oven	10

Source: Golder 2009.

After decades of research, the issue of whether any long-term health effects are associated with exposure to magnetic fields from transmission lines remains inconclusive. Magnetic fields are most in question as possible sources of long-term effects, although studies sometimes lump the two fields (electric and magnetic) together. Scientific reviews of the research on EMF health effects have found that there is insufficient evidence to conclude that EMF exposures lead to long-term health effects (Golder 2009). Some uncertainties, however, remain for childhood exposures at levels above 4 mG (NIEHS 1998, 1999, 2002).

Electromagnetic Interference

EMF can interfere with electric equipment, including radio and television interference. Electromagnetic interference (EMI) can occur from corona activity or as a result of spark-discharge activity from aging hardware. Conductor corona activity is primarily a function of the operating line voltage. In certain circumstances, EMI can also affect other types of communications systems and sensitive receivers. As with corona audible noise, corona EMI is generally associated with lines operating at voltages of 34-kV or higher.

In the U.S., EMI from transmission systems is governed by the Federal Communications Commission (FCC), which requires the operator of any device that causes "harmful interference" to take prompt steps to eliminate it (FCC 1988). There are no state limits for EMI.

3.16.2. Environmental Consequences – Proposed Action Alternatives

Health and safety risks associated with transmission line construction, operation, and maintenance would include increased risk of electrical shocks or fires from high-voltage equipment. It would also include increased risk of fires and injury from the use of heavy equipment near high-voltage lines and in dry vegetation. There would be a risk of injury from the use of hazardous substances, including fuels and blasting materials, and from encountering hazardous materials already present in the environment. In addition, there would be potential safety issues to workers and the public from the increased traffic on the highways and roads in the study area during construction.

The transmission line would be constructed in accordance to Douglas County Title 15 fire and safety building codes and Chelan County Title 3 building regulations codes. Site safety and traffic control plans would be prepared and followed during the duration of construction activities to minimize public health and safety risks. Douglas PUD would perform routine and periodic maintenance inspections of the line and right-of-way to ensure maximum operational safety. Routine and emergency maintenance would be conducted following standard safety protocols. During vegetation management within the right-of-way to control weeds and reduce obstructions which could inhibit access to the right-of-way, Douglas PUD licensed herbicide applicators would follow all directions for safe use to avoid or minimize risk from herbicide exposure.

With the implementation of site safety and traffic control plans and the mitigation specified in Section 3.16, construction and operation of the all routes would result in a low potential for impacts to public health and safety during line construction and maintenance. The potential effects of EMF from each route alternative are discussed below.

Electric Field Levels

To determine the expected electric field that would be generated during operation of the proposed transmission line, modeling was conducted using design specifications (Table 3.16-2). Existing electric field levels were modeled based on the voltage of the existing transmission lines within the transmission line corridors.

The expected electric fields were calculated at the edges and within the transmission line corridor that would include the proposed transmission line. Modeling was conducted in three areas, chosen because of the proximity of residences to the proposed line (Table 3.16-2). Expected electric field levels were modeled with the addition of the proposed transmission line to the utility corridor. In one of the areas where modeling was conducted, there are no existing transmission lines. In that area, the expected electric field would only be attributed to the proposed transmission line (West Route D-E).

All three route alternatives share a common route south of the Rapids Switchyard in the City of Rock Island. Four proposed transmission line structures would be located in this common route, Structures 1EW to 4EW. The electric field levels modeled approximately 700 feet south of the Rapids Switchyard resulted in minimal change when compared to existing levels, as noted in Table 3.16-2. Within the corridor and at the western edge of the corridor, electric field levels were unchanged, whereas at the eastern edge of the corridor, electric field levels increased by 0.1 kV/m. The impact from transmission line operation would be low because the electric field levels in residential areas along this common route would not change or would only be slightly higher than existing levels. The electric field levels modeled along the East Route and West Route D-E are discussed below.

The transmission line would be designed to meet NESC standards within and at the edge of the right-of-way. According to the modeling results in Table 3.16-2, electric field levels would be below the BPA guidelines of 9 kV/m within the right-of-way. Both the existing and proposed electric field levels are also below the edge of right-of-way guideline of 2.5 kV. The electric field from the transmission lines would decrease rapidly and approach ambient levels at distances greater than a few hundred feet from the right-of-way.

Table 3.16-2. Electric Fields[a] along the Proposed Transmission Right-of-Way

Right-of-Way (ROW) Location for Electric Field Modeling		Eastern Right-of-Way Edge (kV/m)	Maximum on Right-of-Way (kV/m)	Western Right-of-Way Edge (kV/m)
East Route and West Routes Approximately 700 feet south of Rock Island Switchyard (between Structures 1EW and 2EW); 585 ft-wide Right-of-Way with five existing transmission lines: Rocky Reach – Columbia, 230-kV Valhalla – Hanna – Rapids 115-kV Rapids – South Nile 115-kV Rocky Reach – Maple Valley 345-kV Sickler – Schultz, 500-kV	Before Proposed Action	0.6	3.2	2.2
	After Proposed Action	0.7	3.2	2.2
East Route Between Batterman Road and Rock Island Creek (between Structures 22E and 23E); 225 ft-wide Right-of-Way with one existing transmission line: Rocky Reach – Columbia, 230 kV	Before Proposed Action	0.2	0.8	0.7
	After Proposed Action	1.1	2.3	0.7
West Route Segment D-E Near Colockum Creek (Between Structures 56W and 57W); 75 ft-wide Right-of-Way with no existing transmission lines	Before Proposed Action	-	-	-
	After Proposed Action	1.4	2.6	1.3

a Existing (before Proposed Action) and expected (after Proposed Action) electric fields calculated using BPA modeling program (Liebhaber 2014).

Magnetic Field Levels

The expected magnetic field generated during operation of the proposed transmission line was also determined by modeling, using design specifications (Table 3.16-3). The existing and expected magnetic fields were calculated in the same three areas where electric field modeling was conducted. Magnetic field from the line would decrease rapidly and approach ambient levels at distances greater than a few hundred feet from the right-of-way.

Long-term magnetic field exposure is related to average levels. Actual magnetic fields at any particular time depend on line loading at that time. Loading varies throughout the day and year. The predicted field levels are indicators of how the Proposed Action may affect the magnetic-field environment.

All three route alternatives share a common route to the south of the Rapids Switchyard in the City of Rock Island. Four proposed transmission line structures would be located in this common route, Structures 1EW to 4EW. The magnetic field levels modeled approximately 700 feet south of the Rapids Switchyard resulted in minimal change when compared to existing levels, as noted in Table 3.16-3. Within the corridor and at the western edge of the corridor, magnetic field levels would decrease, whereas at the eastern edge of the corridor, the annual average magnetic field level increased by 1.6 mG and the annual peak level would increase by 2.1 mG. The impact from transmission line operation would be low because the change in magnetic field levels in

residential areas along this common route would not change or would only be slightly higher than existing levels. The magnetic field levels modeled along the East Route and West Route D-E are discussed below.

The expected magnetic fields from transmission line operation would increase on the right-of-way and at the western edge of right-of-way compared to existing levels, but levels are expected to be less than regulated levels in other U.S. states (Golder 2009). Although the state of Washington has no applicable standards for magnetic fields, the expected magnetic field levels would be less than maximum levels set in the states of Florida (150 mG) and New York (200 mG) (FAC 1993, NYPSC 1990). The expected magnetic levels would be two orders of magnitude less than International Committee on Non-Ionizing Radiation Protection standards (2,000 mG) (ICNIRP 2010).

Table 3.16-3. Magnetic Fields[a] along the Proposed Transmission Right-of-Way

Right-of-Way (ROW Location for Electric Field Modeling		Eastern Right-of-Way Edge (mG)		Maximum on Right-of-Way (mG)		Western Right-of-Way Edge (mG)	
		Annual Average	Annual Peak	Annual Average	Annual Peak	Annual Average	Annual Peak
East Route and West Routes Approximately 700 feet south of Rock Island Switchyard (between Structures 1EW and 2EW); 585 ft-wide Right-of-Way with five existing transmission lines: Rocky Reach – Columbia, 230-kV Valhalla – Hanna – Rapids 115-kV Rapids – South Nile 115-kV Rocky Reach – Maple Valley 345-kV Sickler – Schultz, 500-kV	Before Proposed Action	8.1	24.7	37.9	114.7	24.0	53.8
	After Proposed Action	9.7	26.8	36.6	113.6	23.1	51.7
East Route Between Batterman Road and Rock Island Creek (between Structures 22E and 23E); 225 ft-wide Right-of-Way with one existing transmission line: Rocky Reach – Columbia, 230 kV	Before Proposed Action	2.6	8.4	10.6	44.8	6.2	22.9
	After Proposed Action	14.6	28.4	26.1	62.6	6.2	21.6
West Route Segment D-E Near Colockum Creek (Between Structures 56W and 57W); 75 ft-wide Right-of-Way with no existing transmission lines	Before Proposed Action	-	-	-	-	-	-
	After Proposed Action	16.4	30.6	27.2	68.8	16.7	31.8

a Existing (before Proposed Action) and expected (after Proposed Action) magnetic fields calculated using BPA modeling program (Liebhaber 2014).

East Route

Along the East Route, the route parallels roads and existing transmission right-of-way for about one-third of the route, then crosses undeveloped land. The areas where residences are near this alternative include residential areas in the City of Rock Island and one residence near SR 28,

approximately 0.25 mile southeast of Batterman Road. Existing transmission lines along a portion of the proposed East Route right-of-way generate EMF in the vicinity of homes.

The expected change in electric field levels in residential areas in the City of Rock Island, are expected to minimal, as described above. Electric field modeling was done at one other East Route location, near the residence southeast of Batterman Road. An existing 230-kV line would be located between the home and the proposed transmission line. According to the modeling results in Table 3.16-2, electric field levels would increase 0.9 kV/m at the eastern right-of-way edge and increase 1.5 kV/m on the right-of-way. It would remain the same on the western right-of-way edge, closest to the home.

The expected change in magnetic field levels in residential areas in the City of Rock Island are expected to be minimal, as described above. Magnetic field modeling was done at one other East Route location, near the residence southeast of Batterman Road. According to the modeling results in Table 3.16-3, magnetic field levels would increase at the eastern edge of the right-of-way by 12.0 mG (annual average) and by 20.0 mG (annual peak). Magnetic field levels would also increase on the right-of-way by 15.5 mG (annual average) and by 17.8 mG (annual peak). Nearest the residence, the annual average would not change and the annual peak would decrease slightly by 0.1 mG.

Although there would be an increase in electric field in the two areas near homes along the East Route where modeling was conducted, all levels at the edge of right-of-way would be below the BPA guidelines of 2.5 kV/m. The increase in magnetic field would be minimal at the right-of-way edge near homes.

West Route D-E

Segment D crosses the silica fume waste at the American Silicon Technologies plant site. Project activities are proposed in and near the former settling ponds, but would not occur near the well or industrial building site. Four structures and their associated access roads would be located on the western portion of the plant site near the silica fume waste area. One proposed structure would be located outside of the silica fume waste area, near the railroad right-of-way. Three proposed structures would be located near the banks of the Columbia River, near the edge of the silica fume waste area. Access roads would cross short sections of silica fume waste. Because these structures are near the silica fume waste areas and settling ponds and portions of access roads would cross some areas with silica fume waste, installation could disturb some of the silica fume waste. Douglas PUD would work with Ecology to determine if any special procedures would need to be followed when vehicles and construction equipment work in and traverse these areas.

Along Segment D, the expected change in electric field levels in residential areas in the City of Rock Island, are expected to be minimal, as described above. Electric field modeling was done along Segment E, near the residences along Colockum Creek. Because there are no existing transmission lines immediately adjacent to the proposed route, all expected electric field levels calculated from modeling would be attributable to the proposed transmission line. According to the modeling results in Table 3.16-2, electric field levels would be 1.4 kV/m at the eastern right-of-way edge, 2.6 kV/m on right-of-way, and 1.3 kV/m on the western right-of-way edge.

Along Segment D, the expected change in magnetic field levels in residential areas in the City of Rock Island, are expected to be minimal, as described above. Magnetic field modeling was done in one area in Segment E, near the residences along Colockum Creek. Because there are no existing transmission lines immediately adjacent to the proposed route, all expected magnetic field levels calculated from modeling would be attributable to the proposed transmission line. According to the modeling results in Table 3.16-3, magnetic field levels would be 16.4 mG (annual average) and 30.6 (annual peak) at the eastern right-of-way edge, 27.2 mG (annual average) and 68.8 (annual peak) on right-of-way, and 16.7 (annual average) and 31.8 (annual peak) on the western right-of-way edge. Although the state of Washington has no applicable standards for magnetic fields, the expected magnetic field levels are less than maximum levels set in the states of Florida (150 mG) and New York (200 mG) (FAC 1993, NYPSC 1990).

Magnetic fields would be minimal at the right-of-way edge near homes in Segment D, as discussed above. Although new magnetic field levels would be generated near residences near Colockum Creek, these levels are expected to be less than the maximum levels set in other states. Because these are new levels, the impact would be moderate.

Magnetic fields would be minimal at the right-of-way edge near homes in Segment D, as discussed above. Although new magnetic field levels would be generated near residences near Colockum Creek, these levels are expected to be less than the maximum levels set in other states. Because these are new levels, the impact would be considered moderate.

West Route D-F

West Route Segment D-F begins near the City of Rock Island and parallels existing transmission right-of-way through industrial, agricultural, and undeveloped areas, and passes near some rural residences. The route parallels existing transmission lines for a majority of the route.

Along Segment D, the silica fume waste at the American Silicon Technologies site could be disturbed by improvements to and travel on access roads and structure construction, as discussed in West Route D-E above. Douglas PUD would work with Ecology to determine if any special procedures would need to be followed when vehicles and construction equipment work in and traverse these areas.

Because existing transmission lines run parallel to the entire proposed route, existing transmission lines generate EMF along this route. Residences are present approximately 330 feet and 600 feet east of the proposed transmission line. Between the existing residences and the proposed transmission line there is an existing 115-kV transmission line and an existing 230-kV transmission line.

Electric and magnetic field modeling was not conducted for any locations near residences along West Route D-F because the closest residence is about 330 feet from the centerline of the proposed right-of-way. The electric and magnetic fields from the proposed transmission line would decrease rapidly and approach ambient levels at distances greater than a few hundred feet from the right-of-way.

Electromagnetic Interference

During operation, corona-generated EMI is not expected to change long-term, and corrective actions would be taken by Douglas PUD if interferences are experienced. The proposed transmission line would consist of new, properly installed connecting hardware that would reduce any risk associated with aging hardware spark-discharging activity. Based on past performance of similar Douglas PUD transmission lines, no EMI complaints are expected. With implementation of the mitigation measures specified in Section 3.16, Public Health and Safety, the potential impact to public health and safety for all alternatives would be low.

3.16.3. Mitigation

The following mitigation measures are identified to avoid or minimize impacts from the Proposed Action on public health and safety.

- Design, construct, and operate the proposed transmission line to meet the NESC.
- Site the transmission line to avoid close proximity to residences, as much as possible.
- Employ a lands liaison, who would be available to provide information, answer questions, and address concerns during project construction.
- Prepare a safety plan in compliance with state requirements before starting construction; specify how to manage and report hazardous materials, such as fuel, and any toxic materials found in work sites; include a fire prevention and suppression plan and detail how to respond to emergency situations; keep the safety plan on site during construction, and maintain and update, as needed.
- Contact Ecology to determine if any special procedures would need to be followed when vehicles and construction equipment traverse silica fume waste in the former American Silicon Technologies plant.
- Require the construction contractor to hold safety meetings with workers at the start of each work week to review potential safety issues and concerns.
- Require monthly meetings attended by the construction contractor and Douglas PUD staff to discuss safety issues.
- Employ traffic control flaggers and post signs along roads warning of construction activity and merging traffic for temporary interruptions of traffic, where needed.
- Secure the work area at the end of each workday, as much as possible, to protect the general public and to safeguard equipment.
- Install temporary guard structures (wood pole structures) over local utility lines and county roads, where needed, to ensure continued service and safe passage when the conductor line is installed, or if guard structures are not used along some county roadways, employ flaggers to ensure safe passage.
- Ground fences and other metal structures on and near the right-of-way during construction to limit the potential for nuisance shocks.

- Take appropriate safety measures when blasting consistent with state and local codes and regulations, and secure or remove all explosives from the work site at the end of each workday.
- Install implosive fittings used to connect the conductors in a way that minimizes potential health and safety risks.
- Restore reception quality if radio or television interference occurs as a result of EMI produced during operation of the transmission line.
- Carry fire suppression equipment including (but not limited to) shovels and fire extinguishers on all operation and maintenance vehicles.
- Coordinate with affected land owners concerning plans for effective control of noxious weeds regarding herbicide use during vegetation management.

3.16.4. Unavoidable Impacts Remaining After Mitigation

Although implementation of mitigation measures would reduce the potential for health and safety risk, some increased levels of risk would remain. Electric and magnetic fields would increase in some areas along all alternatives, a low to moderate impact. The risk of accidental fire or injury is always a possibility with transmission line construction and maintenance. Due to the implementation of safety plans and standard safety protocols and procedures, the potential for impacts would be low.

3.16.5. Environmental Consequences – No Action Alternative

Under the No Action Alternative, Douglas PUD would not build the proposed transmission line. Because construction activities associated with any of the proposed alternatives would not occur, impacts to public health and safety from construction and operation and maintenance of the proposed transmission line would not occur.

3.17. CUMULATIVE IMPACTS

Cumulative impacts are environmental impacts 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), entity, or person undertakes these actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

This section of the EA describes existing development and conditions that resulted from past activities in the vicinity of the proposed project, as well as present and reasonably foreseeable future development for the area. Potential cumulative impacts from the proposed project are analyzed and described. The past, present, and reasonably foreseeable future actions provide the context in which to assess the cumulative impacts of these actions in combination with the Proposed Action.

3.17.1. Past Actions

The nature and extent of past developments and activities in the project vicinity are described earlier in this chapter in the "Affected Environment" sections for each type of resource. These developments and activities resulted in present day conditions in the project area.

The original Indian inhabitants set up some permanent and temporary camps and villages in the project vicinity and collected, hunted, and fished (Smith, 1983b; Galm and Masten, 1985). With the arrival of Europeans, British and Canadian fur traders operated in and around the study area. They harvested furs and traveled down the Columbia River to deliver furs to Fort Vancouver for shipment overseas.

In general, the type of development that caused impacts to resources in the mid-Columbia region began during the mid-nineteenth century. Impacts accelerated in the mid-19th century with permanent Euro-American settlement of the area Smith (1983b). The original Homestead Act of 1862 allowed settlers to claim up to 160 acres of land to obtain title. The Desert Land Act of 1877 allowed a settler to purchase up to an additional 640 acres at 25 cents per acre if they irrigated the land and grew crops within three years. The demand for agricultural and meat products resulted in an expansion of the acreage of arable land and an increase in the area used to graze livestock.

Most of the project area has continued to be farmed and ranched since the mid-20th century. Settlement around Rock Island increased in 1893 with the construction of a Great Northern Railroad bridge across the Columbia River. The primary industries in the project area during this period and continuing into the twentieth century were agriculture, and cattle and sheep ranching.

Agriculture is an important economic resource in the Wenatchee-East Wenatchee Metropolitan Statistical Area (MSA), which includes both Chelan and Douglas Counties. The primary agriculture types found within the project area are fruit orchards, including cherry, apple, and pear along the West Route alternatives and cherry, apple and apricot as well as dryland wheat along the East Route. Livestock grazing occurs within portions of all route alternatives. Agricultural employment directly affects nonfarm employment through the production of

nondurable goods, especially food manufacturing, and the demand for trade and transportation employment (Berreth 2012).

Ranching occurs within both the East and West Routes. Within the East Route, cattle graze the lands south of Batterman Road to Rock Island Grade Road and in Moses Coulee south of Palisades Road and east of Washington State Route (SR) 28. The proposed right-of-way would cross the winter hay feeding operation along Rock Island Creek. Within the West Routes, cattle and horses graze within a portion of the Segment E right-of-way, and horses, goats and cattle graze within a portion of the Segment F right-of-way.

The need for flood control and to need to supply power to a growing economy led to the construction of numerous hydroelectric and water storage dams along the mid-Columbia River. The earliest of the mid-Columbia Dams was Rock Island Dam, completed in 1933 by the Puget Sound Power and Light Company. It was the first hydroelectric project on the main stem of the Columbia River and transmission lines and substations were installed to distribute electricity (Pitzer 1994).

During World War II, electrical infrastructure was built, including the BPA Columbia Substation, to support aluminum plants supplying the war effort. After the war, the population increased and transmission infrastructure was built to serve increased load. Along various portions of route alternatives, twenty transmission lines are immediately adjacent to the proposed right-of-way (Table 3.17.1). About 36 percent (4.0 miles) of the East Route would be adjacent to an existing transmission line, 89 percent (7.5 miles) of West Route D-E would be adjacent to a transmission line, and 100 percent (8.0 miles) of West Route D-F would be adjacent to a transmission line.

In addition to the transmission lines in Table 3.17-1, there are other transmission lines in the project area, near but not immediately adjacent to the proposed right-of-way. Two new transmission lines were recently built in the project area. The Douglas to Rapids 230-kV line was constructed in 2013 by Douglas PUD. This 13 mile transmission line was constructed in the existing transmission corridor between the Douglas Switchyard near the Rocky Reach Dam to Douglas PUD's Rapids Switchyard in Rock Island. The line provides more capacity for the distribution system in the southern part of Douglas County.

The Columbia to Rocky Ford 230-kV line was energized by Grant PUD on February 6, 2014. This 35.3 mile transmission line brings Priest Rapids Project power from BPA's Columbia Substation in Douglas County to Grant PUD's Rocky Ford Substation. The line increases transmission system reliability and improves voltage-stability performance for Grant PUD.

The Williams Northwest Pipeline, which transports natural gas, is co-located within a portion of Segment D of the West Routes. This pipeline is a primary artery for the transmission of natural gas to the Pacific Northwest and Intermountain Region. The pipeline is a 4,000-mile bi-directional transmission system crossing the states of Washington, Oregon, Idaho, Wyoming, Utah and Colorado. The Northwest's bi-directional system provides access to British Columbia, Alberta, Rocky Mountain and San Juan Basin gas supplies.

A network of local roads and state and county highways have been developed in the project area, which has facilitated further development. The primary transportation corridors within the

project area are two north-south roadways, one on either side of the Columbia River. In Douglas County, SR 28 is the main route in the City of Rock Island, which runs north to East Wenatchee and south to Quincy. Other Douglas County roads in the project area adjacent to and crossed by the East Route include Batterman Road, Rock Island Grade Road, and Palisades Road.

In Chelan County, the primary roadway along the West Routes is the Malaga Alcoa Highway which turns into Colockum Road. Segment D would cross this road and parallel it. To the south both Segments E and F would cross Colockum Road. Where Colockum Road turns west, Tarpiscan Road begins and continues south along the West Routes.

The Burlington Northern Santa Fe (BNSF) Railroad track is present through the project area. The railroad track travels alongside the Columbia River on the Chelan County side of the river and crosses over to Douglas County via the Rock Island Bridge. The crossing is located just north of where the West Routes would cross the Columbia River. The track then travels alongside the Douglas County side of the Columbia River between the river and SR 28 to the east/southeast until it passes out of the project area.

Two relatively large industrial sites exist in the project area, described in Section 3.2, Land Use. In the northeast portion of the project area, just south of the City of Rock Island, the site of the former American Silicon Technologies site is present. The Alcoa Wenatchee Works aluminum smelter is located in the northwest portion of the project area, sitting in between Malaga Alcoa Road and the Columbia River.

Typical residential development that has occurred in the project area includes scattered rural residences and the City of Rock Island, which has a population of 788 residents. Detailed information regarding residential development in the project area can be found in Section 3.2, Land Use.

Other human activities that affected resources in the project area include recreation. The depletion of game and fish from hunting, fishing and habitat loss contributed to declines in fish and wildlife populations. Land was converted to develop a golf course development in the City of Rock Island.

Table 3.17-1. Existing Transmission Lines Adjacent to Portions of Route Alternatives

Current Owner	Transmission Line Name	Voltage
Chelan PUD	Rocky Reach – Columbia No. 2	230-kV
Douglas PUD	Rapids – Valhalla	115-kV
Douglas PUD	South Nile – Rapids	115-kV
BPA	RR – Maple Valley No. 1	345-kV
BPA	Sickler – Schultz	500-kV
Douglas PUD	Hanna – Valhalla	115-kV
BPA	Rocky Reach – Columbia No. 1	230-kV
Grant PUD	Columbia – Quincy	115-kV
Grant PUD	Columbia – Ephrata	115-kV
BPA	Columbia – Grand Coulee	230-kV
BPA	Grand Coulee - Raver No. 1 and No. 2	500-kV
Grant PUD	1 line, name unknown	230-kV
BPA	Columbia – Grand Coulee No. 3	230-kV
BPA	Grand Coulee – Olympia	287-kV
BPA	Midway – Columbia (Vantage – Columbia)	230-kV
Chelan PUD	4 lines, names unknown	115-kV
BPA	Columbia – Valhalla No. 2	115-kV
BPA	Columbia – Valhalla No. 1	115-kV
BPA	Coulee – Ellensberg	115-kV
BPA	Bettas Road – Columbia No. 3	230-kV

3.17.2. Current and Reasonably Foreseeable Future Actions

Current actions are those projects, developments, and other actions that are currently underway, either because they are currently in permitting, under construction, or are occurring on an ongoing basis. Reasonably foreseeable future actions generally include those actions formally proposed or planned, or highly likely to occur based on available information. Various sources, including local, state, and federal agency websites and city and county staff, were consulted to obtain information about any current and potential future development in the project vicinity. The following describes these current and reasonably foreseeable future actions.

Transmission Line Projects

Other than the proposed project, BPA, Chelan, Grant, and Douglas PUD do not have any new transmission line projects that are either underway or that are reasonably foreseeable in the northern mid-Columbia region. On an ongoing basis, BPA and the northern mid-Columbia PUDs conduct routine transmission line maintenance projects to maintain existing transmission infrastructure, such as transmission line hardware, conductor, pole replacements, access road maintenance, and vegetation management of utility right-of-ways.

Pipeline Projects

The 2014 Gas Outlook put together by the Northwest Gas Association does not indicate that any natural gas pipelines and storage facilities are reasonably foreseeable in the northern mid-Columbia region. Williams conducts routine maintenance to maintain the existing Northwest Pipeline.

Wind Projects

A wind project was being considered in the past by Douglas PUD in the project vicinity. Douglas PUD had determined that this project is not feasible at this time and is no longer investigating the wind project.

Mineral Exploration Projects

The Washington Department of Natural Resources does not indicate that any current or future mining operations will occur in northern-mid-Columbia region.

Restoration/Habitat Improvement Projects

No information is available on habitat restoration or improvement projects, although it is likely WDFW has had or will have such projects in the project area.

Transportation Projects

In addition to general roadway maintenance and improvement projects such as repaving, shoulder widening, drainage improvement, signal and signage replacement, sidewalk and ADA ramp upgrade, and cross walk restriping, the following are reasonably foreseeable transportation-related projects in the vicinity of the Proposed Action:

- SR 28 / Rock Island Intersection project in Rock Island includes relocating the stop bar location on Rock Island Drive closer to the paved shoulder of SR 28. Other proposed changes to SR 28 will include the realignment of the westbound right turn lane and extension of the left turn refuge lane length from 60 feet to 250 feet. This project has been awarded funding and was expected to be constructed in summer 2014.
- Chelan-Douglas Rural Commuter Service WSDOT Statewide Transportation Improvement Program 2014 – 2017 will be providing ongoing funding to assist in the operation of rural commuter services in Chelan and Douglas County on Link Transit. Link Bus Route 23 travels into the City of Rock Island and in close proximity to the project area.

Land Use Development Projects

In the City of Rock Island, projects include a potential subdivision near Rock Island Elementary approximately 0.5 mile north of the project area and potential upgraded recreational facilities at Putter's Lake approximately 0.25 mile north of the site. The Port of Douglas County is applying for a grant to explore the environmental risks and development potential of the American Silicon Technologies site within the project area. The study would look at potential industrial and commercial uses of the site. Details on the future plans for site development are not known to exist at this time.

In Chelan County, planned projects include the 10,000-acre Ravenwing Ranch within the project area, a large lot rural residential development, located south of Alcoa's Wenatchee Works plant and north of Colockum Creek along the West Route alternatives. The plans include development of 700 acres, including 48 residential lots between 2 and 10 acres in size, 40 condominiums, a riding stable and lodge.

In Douglas County, a planned development is the Spanish Castle Resort, located approximately 2 miles south of the project area along the Columbia River This master planned community of 1,129 vacation dwelling units would consist of 497 detached single family homes and 628 condominium and townhouse units. The development also includes plans for a 100 room hotel, an 18-hole golf course, spa and related infrastructure and services that include a public water system, on-site wastewater treatment facility and fire station.

3.17.3. Cumulative Impact Analysis

The following subsections describe the cumulative effects that the Proposed Action, in combination with the past, present, and reasonably foreseeable future actions identified above, would have on the various environmental resources discussed in this EA. Overall, the Proposed Action in combination with past, present, and reasonably foreseeable future actions would result in low to moderate cumulative impacts to all assessed resources.

Land Use and Recreation

Land use in the project vicinity has incrementally changed due to past and present disturbance from transportation, and utility infrastructure construction and maintenance, development of a gas pipeline, residential, commercial, and industrial development, ranching, and agricultural activities. The cumulative effect of the changes has been to introduce dispersed human development and ranching and agricultural uses. This trend will likely continue, although current land use is not expected to change much in the near future. The areas that the transmission line route alternatives traverse are mostly rural in nature.

Throughout most of the proposed alternative routes, the Proposed Action would not contribute significant new adverse impacts to land use, recreation, or transportation in the project area. The Proposed Action would result in temporary impacts to agricultural lands from disturbance of soils, disturbance of CRP lands, inconvenience to farmers, and some permanent impacts through removal of some agricultural land from production. Construction-related activities could temporarily disturb or displace some grazing animals. There would be minor delays and interruptions of local traffic during construction. Some permanent impacts would arise from the construction of some new access roads.

The addition of potential impacts of the Proposed Action added to the impacts from other activities in the project area would result in the following cumulative impacts to land use and recreation for each route alternative:

- Along the East Route alternative, there is no existing transmission infrastructure in about half the route and more new access roads would need to be built than with other alternatives, resulting in a moderate contribution of the Proposed Action to cumulative impacts on land use.

- Along West Route D-E, the temporary and localized nature of most land use impacts and the relatively low amount of permanent impact to existing land uses, would result in a low contribution of the Proposed Action to cumulative impacts on land use Along West Route D-F, the temporary and localized nature of most land use impacts and the relatively low amount of permanent impact to existing land uses, except for the possible restriction in the management of a cherry orchard, would result in a moderate contribution of the Proposed Action to cumulative impacts on land use.

Geology and Soils

The primary past and ongoing activities that cumulatively affected soils in the project area include construction and maintenance of transportation infrastructure, utility infrastructure construction and maintenance, development of gas pipelines, residential, commercial, and industrial development, ranching, and agricultural activities. Reasonably foreseeable future activities including infrastructure maintenance with periodic replacement, residential development and ongoing ranching and agricultural activities are expected to continue at similar intensities as in recent years, with similar levels of impacts.

Throughout the proposed alternative routes, the Proposed Action would not contribute significant new adverse impacts to soils or geology. Impacts on geology and soils would be low to moderate during and shortly after construction, depending on the alternative, then at a low level as disturbed areas revegetate. Although implementation of construction BMPs and mitigation would reduce the potential for increased erosion, some increased levels of temporary erosion would be expected during and immediately after construction. Long-term impacts remaining after mitigation would be limited to normal sedimentation from road surfaces, soil compaction, some erosion of formerly vegetated ground, loss of some areas of lithosols, and loss or elimination of natural biological functions in the areas that were formerly undeveloped but would be converted to structure locations and access roads. Impacts from geological hazards are expected to be low.

The addition of potential impacts of the Proposed Action added to the impacts from other activities in the project area would result would result in a low contribution of the Proposed Action to cumulative impacts on soils and geology,

Vegetation

The primary past and ongoing activities that cumulatively affected vegetation in the project area by removing native plant communities include agricultural activities, predominantly fruit orchards, dryland wheat production, and CRP. Livestock grazing that has occurred or is occurring in much of the project area decreased or eliminated native bunch grasses from native plant communities and enabled non-native grasses to replace native grasses. The development of road and utility corridors, industrial, commercial, and residential uses also has contributed to the cumulative impact to native vegetation communities in the vicinity of the project. Wildfire is a natural element of shrub-steppe habitats in the Columbia River Basin and can be expected to occur repeatedly into the future in the project vicinity. If substantial additional development occurs on private lands in the area, a more extensive shift away from native vegetation communities could occur but that is not likely in the foreseeable future except in the area along West Route D-F where the Ravenwing Ranch could be developed.

Past and present activities have resulted in the introduction and spread of noxious weeds in the project area. The spread of noxious weeds will likely continue as a result of ongoing and reasonably foreseeable actions.

The Proposed Action would be expected to have a minimal contribution to cumulative impacts on vegetation, compared to the combined impacts of past, ongoing, and future vegetation-altering activities in the study area. The amount of vegetation that would be affected by the Proposed Action is small compared to the area affected by agricultural activities, livestock grazing, wildfire, vegetation control along roads and other utility corridors, and industrial, commercial, and residential development in the area. Accordingly, due to the linear nature of the project and the pre-existing condition of the vegetation, in combination with mitigation measures and actions to avoid impacts to special-status plant species, the project would have a low impact in regard to loss to vegetation communities and associated wildlife habitat.

Construction activities associated with the Proposed Action could contribute to cumulative noxious weed impacts because linear corridors can act as a path for the movement of weed species and because of the difficulty of controlling many weed species. The potential contribution of the proposed project would, however, be minimized by project-related mitigation measures designed to minimize the spread of new noxious weed infestations and colonization in the project area. The addition of potential impacts of the Proposed Action added to the impacts from other activities in the project area would result would result in a low contribution of the Proposed Action to cumulative impacts on vegetation.

Fish

Past, present, and future actions in the project vicinity have cumulatively affected fish and fish habitat through destruction and modification of habitat, limiting access to habitat through the installation of fish passage barriers, and degradation of water quality. These actions include utility and road construction and maintenance, road use, residential development activities that expose and disturb the ground surface near streams, ranching, and agricultural activities. They also include periodic vegetation management activities, hydropower development, and recreational and commercial fishing. Reasonably foreseeable future activities that would affect fish and fish habitat, including infrastructure maintenance with periodic replacement, residential development and ongoing ranching and agricultural activities, are expected to continue at similar intensities as in recent years, with similar levels of impacts.

The Proposed Action would contribute, although in a minor way, to these cumulative impacts on fish and fish habitat, through installation of structures and access road work near waterways that could cause erosion and result in the deposition of sediments in waterways. Some temporary impacts could occur as a result of construction noise and activity. Because the area near waterways that would be affected by the Proposed Action is relatively small, effects related to sedimentation are expected to be temporary and localized. Unavoidable impacts to fish and fish habitat remaining after mitigation would therefore be low. The Proposed Action would result in a decrease in TDG levels at the Wells and Rocky Reach dams, which could have positive effects on fish. Compared to the combined cumulative impacts of past and ongoing fish habitat alteration in the study area, the incremental contribution of the Proposed Action to cumulative impacts on fish and fish habitat would be low.

Wildlife

Past and present development and other activities have had a cumulative adverse impact on wildlife species and their habitat in the project vicinity. The clearing and conversion of land for home sites, communities, transportation, energy, and utility infrastructure, and other uses since the 19th century has resulted in the cumulative loss of wildlife habitat. Grazing modified the native habitats and agricultural operations resulted in disturbed grasslands and cropland dominating the area. Existing roads in the project vicinity have led to increased disturbance from human activity, increased landscape fragmentation and the presence of wildlife travel barriers, lost habitat, and the introduction and spread of noxious weeds. This habitat loss and modification has resulted in the displacement of wildlife species. Wildlife species also have been directly affected by hunting and trapping activities, as well as incidental harm and killing from other human activities in the area. Reasonably foreseeable future actions involving development would be expected to incrementally add to these cumulative impacts.

The Proposed Action would contribute to these cumulative impacts on wildlife and wildlife habitat through temporary disturbance during construction and permanent removal of small areas of wildlife habitat through construction of new transmission line structures and access roads. Except for the East Route, construction of a transmission line along action alternatives would result in low cumulative impacts related to habitat fragmentation because of the existence of existing adjacent infrastructure in most areas. The new transmission line could increase the potential for avian collisions at the Columbia River crossings and near waterways, but especially along the East Route, where the transmission line would be at the edge of a high plateau that currently has no transmission infrastructure. In the new transmission line right-of-way along the East Route, the transmission corridor could act as a path for the movement of difficult to control weed species and thereby degrade wildlife habitat through the spread of weed species, especially with regard to grazing and browsing species such as mule deer.

The Proposed Action would contribute to these cumulative impacts on wildlife and wildlife habitat through temporary disturbance during construction, temporary loss of habitat, permanent removal of extremely small areas of wildlife habitat, and a potential increase in avian collisions due to construction of new infrastructure. The implementation of the mitigation measures described in Section 3.6.4 above would reduce impacts on wildlife and wildlife habitat. The loss of habitat is not expected to adversely affect the viability or survival of wildlife species at the population level, resulting in low cumulative impacts. However, the East Route has a greater potential to contribute to cumulative impacts due to the location at the edge of a plateau in an area with no existing transmission lines, which could result in moderate cumulative impacts.

Water Resources and Water Quality

Past, present, and future actions in the project vicinity that have cumulatively affected water resources and water quality in the project area include construction and maintenance of transportation infrastructure, utility infrastructure construction and maintenance, development of gas pipelines, recreational, residential, and industrial development, operation of the Rock Island Dam, ranching, and agricultural activities.

The Proposed Action could result in increased erosion and minimal overland transport of suspended sediments to surface waters. Compared with the extent of ground disturbance

associated with other actions, the Proposed Action would contribute a minor amount to cumulative waterways and water quality impacts. The Proposed Action would result in a decrease in TDG levels at the Wells and Rocky Reach dams, which would have positive effects on water quality. Overall, the Proposed Action is not expected to contribute noticeably to cumulative changes in waterways or water quality, because impacts would be temporary and localized under all of the action alternatives. The incremental contribution of the Proposed Action to cumulative impacts on water resources and water quality would be low.

Wetlands

Past and present actions in the project vicinity have cumulatively affected wetlands through destruction or modification of hydrology, soils, and vegetation resulting in degradation of wetlands. Actions that have affected wetlands in the project area include construction and maintenance of transportation infrastructure, utility infrastructure construction and maintenance, development of gas pipelines, residential, commercial, and industrial development, ranching, and agricultural activities. The construction of the Rock Island and Wanapum dams likely led to inundation of ***riverine wetlands***. The introduction of non-native plant species resulted in the loss of native wetland vegetation. Wetland areas have been cumulatively degraded through impacts to native wetland species as a result of grazing.

Two of the Proposed Action alternatives would minimally contribute to these cumulative impacts on wetlands. West Route D-F has no wetlands and if this action alternative was implemented there would be no cumulative effects to wetlands. The other action alternatives would result in low impacts to wetland quality and function to a few low-quality wetlands and is not expected to result in any destruction of wetlands through filling or alteration of hydrology. Because of the temporary and localized nature of the project activities, the relatively low amount of impact to existing wetlands, and implementation of the mitigation measures, the contribution of the Proposed Action to cumulative impacts on wetlands would be low.

Floodplains

Past, present, and future activities in the project vicinity that have cumulatively adversely affected floodplains include the construction of the Rock Island and Wanapum dams, rail construction and maintenance, utility and road construction and maintenance, industrial and residential development, ranching, and agricultural activities.

The Proposed Action alternatives would not contribute to these cumulative impacts on floodplains because no work is proposed in floodplains.

Visual Quality

Visual resources in the project vicinity have incrementally changed due to past and present development, although current views are not expected to change much in the foreseeable future. Visual resources in the project area have changed due to past and present development, including road, rail, and utility infrastructure, industrial development including the Rock Island and Wanapum dams, residential and commercial development, ranching, and agricultural activities. This trend is expected to continue incrementally in the future. Cumulatively, this development has increased the presence of human-made elements, such as buildings, roads, utilities, and agriculture.

Visual impacts from the Proposed Action would be temporary and localized during construction. The construction of the transmission line would result in new access roads and permanent changes to views in some areas where there are currently no transmission lines. Because most of the West Route already has existing transmission lines and few sensitive viewers, the contribution of the Proposed Action to cumulative impacts on visual resources would be low to moderate, depending on the location. If the East Route was visible on the top of the high plateau from the west side of the Columbia River, the contribution of the Proposed Action to cumulative impacts on visual resources would be moderate to high, depending on the level of visibility.

Cultural Resources

Past and present development and other activities have had a cumulative adverse impact on cultural resources in the project vicinity. Some impacts to cultural resources are likely to have occurred as a result of inadvertent disturbance or destruction during ground-disturbing activities including construction and maintenance of transportation infrastructure, utility infrastructure construction and maintenance, development of gas pipelines, residential, commercial, and industrial development, ranching, and agricultural activities. The extent of looting and vandalism to cultural resources in the project vicinity is unknown. These cumulative impacts include disturbance of cultural sites, reduction of the cultural integrity of certain sites, and removal of cultural artifacts.

Because the Proposed Action could impact cultural resources, it could contribute incrementally to these cumulative impacts. Implementation of the mitigation measures included above in Section 3.11.3 would minimize impacts and would reduce the potential for the Proposed Action to contribute incrementally to cumulative impacts on cultural resources. In the event that previously undiscovered cultural resources were encountered during construction or operation, potential impacts would depend on the level and amount of disturbance and whether the affected resource is eligible for listing on the National Register. If the Proposed Action adversely affects previously undiscovered cultural resources or artifacts, it would contribute incrementally to the adverse cumulative impact to cultural resources in the area. Impacts would be low to moderate, depending on the level and amount of disturbance and type of mitigation implemented.

Air Quality

Sources of air pollutants that have and will continue to emit pollutants in the project area include construction, use and maintenance of transportation infrastructure; utility infrastructure construction, maintenance, and operation; operation of industrial facilities, ranching, and agricultural activities. Two recent wildfires burned vegetation in portions of two route alternatives, leaving soil in the project area more prone to wind erosion. This could potentially increase particulates in the project area until vegetation is reestablished.

Current activities in the study area do not currently violate NAAQS. While the Proposed Action would cumulatively contribute a small amount to overall air pollutant levels, it is unlikely that cumulative concentrations would result in new violations of the NAAQS, or exacerbate existing violations of the NAAQS. Therefore, cumulative impacts would be low.

Climate Change

There has likely been a cumulative effect on GHG contributions from past and current activities in the project area including construction, use and maintenance of transportation infrastructure; utility infrastructure construction, maintenance, and operation; operation of industrial facilities, ranching, and agricultural activities. As described above in Section 3.13, the impacts of the Proposed Action on GHG concentrations would be low. Impacts would be further reduced through implementation of the mitigation measures. All levels of GHG emissions contribute to global GHG concentrations and climate change; however, given the small amount of contribution, the Proposed Action's incremental impact on GHG concentrations and climate change would be minimal. This would also be the case when combined with other reasonably foreseeable future projects and activities in the project area, which are expected to be minimal and consisting of operation and maintenance of existing infrastructure, some residential development, and ongoing ranching and agricultural activities.

Socioeconomics and Public Services

Past and present population growth, residential development, utility, energy, and transportation infrastructure development, operation, and maintenance, ranching, and agricultural activities, and public service operations have occurred in the project vicinity. Growth and development trends are expected to continue, but would not change much in the near future. The areas that the transmission line traverses are mostly rural in nature, which is likely to remain the same.

The reasonably foreseeable projects identified in the project area are the development of Ravenwing Ranch and some tourism-related development. The redevelopment potential of the American Silicon Technologies site is currently unknown. Some residential development and additional ranching and farming operations may also occur, but it will likely be limited. The Proposed Action would result in impacts similar to planned or ongoing road work projects, including an increase in temporary housing/lodging demand, minor economic benefits during construction, ranching and agricultural production impacts, and property value impacts, which would result in a cumulative socioeconomic impact. However, because of the temporary and localized nature of these activities and low impact to existing socioeconomics and public services within the two-county study area, the incremental contribution of the Proposed Action along with the reasonably foreseeable projects would have a low cumulative impact on socioeconomics and public services. Additionally, the mitigation measures identified above would further reduce the contribution of the Proposed Action to potential cumulative impacts on socioeconomics. Further, the Proposed Action would provide more reliable, electrical power which would have a cumulative socioeconomic benefit in the northern mid-Columbia region.

Noise

Noise levels in the project vicinity are cumulatively affected by the existing transmission lines, use of rail lines, existing traffic, infrastructure maintenance projects, recreational activities, existing urban and residential uses and any residential construction in the area, commercial business operation, operation of Alcoa and the Rock Island Dam, ranching, and agricultural activities. Depending on the timing and proximity of these other activities, the Proposed Action in combination with any nearby and concurrent activities could result in cumulatively increased noise levels in the short term during project construction. However, because construction noise

impacts would be temporary, they would not contribute to long-term cumulative noise impacts in the project vicinity. Because noise levels from operation and maintenance of the new transmission would be similar to existing conditions, the contribution to cumulative noise impacts in the project area would be low.

Public Health and Safety

EMF levels in the project vicinity are cumulatively affected by existing transmission lines. The Proposed Action would result in a slight increase of EMF levels along the right-of-way where existing transmission lines exist. The southern portion of the East Route and a portion of West Route D- E would generate new EMF levels because there are no existing transmission lines in those areas. Cumulative levels of EMF or EMI would increase above the existing levels Because EMF levels would be within national and international guidelines and BPA design standards, the contribution to cumulative EMF impacts in the project area would be low.

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Chapter 4 Environmental Consultation, Review, and Permit Requirements

This chapter addresses statutes, implementing regulations, and executive orders potentially applicable to the Proposed Action. BPA will send this environmental assessment (EA) to federal and state agencies, tribes, and state and local governments as part of the consultation process for the Proposed Action. Persons, Tribes, agencies, and governmental entities consulted or notified are listed in Chapter 5 of this EA.

4.1. NATIONAL ENVIRONMENTAL POLICY ACT

This EA was prepared pursuant to regulations implementing the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.), which requires federal agencies to assess the impacts that their actions may have on the environment. NEPA requires preparation of an environmental impact statement (EIS) for major federal actions significantly affecting the quality of the human environment. BPA prepared this draft EA to determine if the Joint Project would create any significant environmental impacts that would warrant preparing an EIS, or if a finding of no significant impact (FONSI) is justified.

4.2. FISH, WILDLIFE, AND VEGETATION

4.2.1. Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 USC 1536), as amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants, and the preservation of the ecosystems on which they depend. The ESA is administered by the U.S. Fish and Wildlife Service (USFWS) for terrestrial wildlife, plants, and freshwater species, and by the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries), also known as the National Marine Fisheries Service (NMFS), for anadromous fish and marine species.

Section 7(a) 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 critical habitat. Section 7(c) of the ESA and other federal regulations require that federal agencies prepare a biological assessment (BA) addressing the potential effects of their actions on listed and proposed endangered species and designated critical habitat. BPA would fund a portion of Douglas PUD's construction activities and would carry out construction activities at the BPA Columbia Substation as part of the Joint Project. Therefore, BPA will consult with USFWS and NOAA Fisheries on proposed and listed species and designated critical habitat that could be affected by the Joint Project.

BPA used the following resources to determine which proposed and listed endangered and threatened species and critical habitat occur in the study area as defined in Section 3.4, Vegetation and Section 3.6, Wildlife:

- USFWS lists of fish, wildlife, and plant species for Douglas and Chelan Counties; listing species that could occur that are protected under the ESA and listing designated critical habitat (USFWS 2014c, 2014d)
- NOAA Fisheries list of fish species and designated critical habitat protected under the ESA (NMFS 2013)
- Washington Natural Heritage Program database records of known occurrences of special status species in the study area
- Washington Department of Fish and Wildlife (WDFW) database records of priority habitats and species in the study area

USFWS Consultation

Federally-listed animal species on USFWS lists for Chelan and Douglas counties include bull trout, gray wolf, pygmy rabbit, Canada lynx, grizzly bear, marbled murrelet, and northern spotted owl (USFWS 2014c, 2014d). In addition to the species on the USFWS list, yellow-billed cuckoo was listed effective October 3, 2014 (Federal Register 2014). Federally-listed plant species include showy stickseed, Ute ladies'-tresses, and Wenatchee Mountains checker-mallow.

Designated critical habitat for bull trout is the only critical habitat in the Joint Project area for species under USFWS jurisdiction (USFWS 2014a).

Although the North American wolverine is listed on the USFWS species lists for Douglas and Chelan Counties, a decision was made by USFWS to withdraw the listing proposal on August 14, 2014 (USFWS 2014b, 2014c, 2014d). Therefore, there are currently no species proposed for listing in Douglas and Chelan Counties.

BPA entered in pre-consultation with USFWS concerning potential effects from the Proposed Action on federally-listed species in the study area. BPA and Douglas PUD participated in pre-consultation activities with USFWS staff. Douglas PUD hosted a site tour with USFWS and WDFW staff on December 17, 2012. USFWS provided fish and wildlife study recommendations by email on January 4, 2013, and comments on the project by letter dated January 23, 2013. BPA, Douglas PUD, and USFWS participated in a conference call meeting to discuss the project and the species that would need to be included in consultation on January 24, 2013. USFWS staff members were provided the draft survey plans for review and comment on February 1, 2013, and provided comments on the draft survey plans February 15, 2013. USFWS, BLM, DNR, and WDFW staff members were provided copies of the NMC Joint Project Wildlife Resources Report on May 13, 2014. USFWS provided comments on the report on May 29, 2014.

Based on existing information and discussions with USFWS, it was determined that there would be no effect to the following listed species because no suitable habitat for these species occurs in the Joint Project area: Canada lynx, grizzly bear, marbled murrelet, northern spotted owl, showy stickseed, and Wenatchee Mountains checker-mallow. BPA will consult with USFWS regarding the potential effects on the remaining listed species – Ute ladies'-tresses, bull trout and bull trout designated critical habitat, gray wolf, yellow-billed cuckoo, and pygmy rabbit.

The USFWS list for Chelan and Douglas Counties includes four ***candidate species*** for listing including greater sage-grouse (Columba Basin distinct population segment), Washington ground

squirrel, whitebark pine, and northern wormwood. No suitable habitat for whitebark pine is present in the Joint Project area. Potential habitat for greater sage-grouse may occur in the study area. Washington ground squirrel is known to occur in the study area.

BPA will prepare a BA for USFWS that addresses potential effects of the Proposed Action on listed species (bull trout, gray wolf, pygmy rabbit, and Ute ladies'-tresses) and candidate species (greater sage grouse, Washington ground squirrel, and northern wormwood) that may occur in the Joint Project area. The BA will also address potential effects to designated critical habitat for bull trout in the Joint Project area. BPA will request concurrence with its determination of effect on these species and the designated critical habitat for bull trout. The potential effects on these species and on bull trout designated critical habitat are discussed in Section 3.4, Vegetation, Section 3.5, Fish, and Section 3.6, Wildlife.

NOAA Fisheries Consultation

BPA entered into pre-consultation with NOAA Fisheries concerning potential effects on ESA-listed anadromous fish species in the upper Columbia River and its tributaries. BPA and Douglas PUD participated in pre-consultation activities with NOAA Fisheries staff. BPA, Douglas PUD, and NOAA Fisheries participated in a conference call to discuss the project and the species that would need to be included in consultation on May 7, 2013. The potential effects on Upper Columbia River spring-run Chinook and Upper Columbia River steelhead and their designated critical habitat are discussed in Section 3.5, Fish.

Pursuant to the requirements of Section 7(c) of the ESA, BPA will prepare a BA that will be submitted to NOAA Fisheries. The BA will address the potential effects of the Proposed Action on Upper Columbia River spring-run Chinook salmon and Upper Columbia River steelhead. The BA will also address potential effects to the designated critical habitat for both these species. BPA will request concurrence with its determination of effect on these species and their designated critical habitat.

4.2.2. Fish and Wildlife Conservation and Coordination Acts

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages federal agencies to conserve and promote conservation of non-game fish and wildlife and their habitats. The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires federal agencies with projects affecting water resources to consult with USFWS and the state agency responsible for fish and wildlife resources. The analysis in Sections 3.5, Fish, and 3.6, Wildlife, indicates that the alternatives would have impacts on fish and wildlife, which would be minimized with implementation of appropriate mitigation.

BPA and Douglas PUD coordinated with WDFW biologists concerning project activities with the potential to affect fish and wildlife. Douglas PUD hosted a site tour with USFWS and WDFW staff on December 17, 2012. Douglas PUD subsequently conferred with WDFW and USFWS via email and telephone regarding wildlife species and habitat in the study area and discussed the types of field surveys that would be needed in the study area. WDFW provided comments on the wildlife study by email on January 9, 2013, and USFWS provided comments by email on January 4, 2013, and by letter dated January 23, 2013. A conference call was scheduled with both agencies for January 24, 2013, but only USFWS was able to participate.

Douglas PUD sent a draft wildlife and botanical study plan to USFWS, BLM, the Washington Department of Natural Resources (DNR), and WDFW on February 1, 2013 for review. BLM and WDFW approved the draft plan without revisions, USFWS provided additional comments by email February 15, 2013, and DNR did not respond to the draft plan but included stipulations in the land use license issued to Douglas PUD for the project (License No. 50-089562). USFWS, BLM, WDFW, and DNR were provided the opportunity to review the wildlife study reports on May 13, 2014. USFWS provided comments on May 29, 2014.

Local fish and wildlife biologists provided valuable input concerning the presence of fish and wildlife species and potential effects, via phone and email communications, throughout the environmental review process. Mitigation measures designed to conserve fish and wildlife and their habitats are listed in Sections 3.4, Vegetation; 3.5, Fish; and 3.6, Wildlife.

BPA and Douglas PUD consulted with USFWS and NOAA Fisheries staff regarding the potential effects on federally proposed and listed species, designated critical habitat, and candidate species (See 4.2.1 above). BPA and Douglas PUD are coordinating with USFWS and WDFW on potential effects on bald and golden eagles and migratory birds (See Sections 4.2.5 and 4.2.6 below).

4.2.3. Essential Fish Habitat

Public Law 104–297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act. Under Section 305(b)(4) of the act, BPA is required to consult with NOAA Fisheries for actions that adversely affect essential fish habitat (EFH). NOAA Fisheries is required to respond and provide EFH conservation and enhancement recommendations.

Chinook and coho salmon, which are administered under the amended Magnuson-Stevenson Fishery Conservation and Management Act, are found in rivers and streams in or near the project vicinity. BPA determined that the Proposed Action does not have the potential to adversely affect EFH. There is no in-stream work proposed in fish-bearing waters and project work areas are far enough from waterways that the implementation of best management practices and mitigation measures would avoid erosion, sedimentation, and an increase in turbidity in fish-bearing waters. Mitigation measures designed to conserve fish and their habitats are listed in Section 3.5, Fish.

4.2.4. Migratory Bird Treaty Act

The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and other countries, including Canada, Japan, Mexico, and the former Soviet Union, for the protection of migratory birds (16 USC 703–712, July 3, 1918, as amended in 1936, 1960, 1968, 1969, 1974, 1978, 1986, 1989). Under the act, taking, killing, or possessing migratory birds, or their eggs or nests, is unlawful. The act classifies most species of birds as migratory, except for upland and non-native birds such as ring-necked pheasant, chukar, gray partridge, house sparrow, European starling, and rock dove. In addition, Executive Order 13186 directs federal agencies whose actions may negatively affect migratory bird populations to work with USFWS to develop an agreement to conserve migratory birds.

The U.S. ***Department of Energy*** (DOE) and USFWS have a memorandum of understanding (MOU) that addresses migratory bird conservation in accordance with Executive Order 13186, discussed below (U.S. Department of Energy and U.S. Fish and Wildlife Service 2013). The MOU addresses how both agencies can work cooperatively to address migratory bird conservation and includes specific measures to consider applying during project planning and implementation. BPA follows this MOU to minimize potential impacts on migratory birds and Douglas PUD would follow this MOU for the Proposed Action.

Field studies were conducted to determine the avian species and bird habitats present in the study area. Spring and fall avian point count field studies were conducted and vetted by USFWS and WDFW. Based on this information, the Proposed Action could affect migratory birds through loss of habitat and the potential for collisions with the transmission line. Potential effects to avian species and their habitats are discussed in Sections 3.6, Wildlife.

Douglas PUD will implement feasible measures, including the design of the transmission line, to minimize the potential for avian collisions. Generally, the north-south alignment of much of the transmission line along each routing alternative is less problematic for migratory birds than an east-west alignment. Because this is a 230-kV transmission line, the conductors would be spaced far enough apart to prevent electrocution of raptors. Douglas PUD will also implement measures to avoid or minimize impacts on migratory birds, including:

- Explain wildlife-related mitigation measures and permit conditions to construction contractors and inspectors during a preconstruction meeting covering environmental requirements.
- Avoid construction activities within 0.6 mile of any active raptor nest during the raptor nesting season (e.g., March 1 to August 15 for ferruginous hawks, February 15 to July 15 for golden eagles), if possible. Install spiral bird diverters or other appropriate marking device on conductors in areas with a high potential for bird collisions.

4.2.5. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668–668d, June 8, 1940, as amended in 1959, 1962, 1972, and 1978) addresses take of eagles, which includes both the disturbance of eagles or killing eagles. Bald and golden eagles are known to occur in the study area year round and golden eagle sightings regularly occur within and near the project area. Three occupied golden eagle nesting territories encompass portions of the action alternatives. Bald eagle abundance along the Columbia River in the Project Area increases in winter.

USFWS and WDFW provided information on the current status of bald and golden eagle nests in the project area. A Douglas PUD biologist surveyed known golden eagle nest sites for occupancy during several field surveys in February to April 2013. In addition, an aerial raptor nesting survey was conducted in May 2013 to examine known nest sites and search for additional nest sites within two miles of the action alternatives (Douglas County PUD and West, Inc. 2014). Spring and fall raptor surveys were conducted and avian interaction surveys were conducted at transmission line crossings on the Columbia River using study methods vetted by USFWS and WDFW to assess the potential impacts on eagles from the Joint Project.

Washington Natural Heritage Program records indicate two known golden eagle nesting sites within 1.1 and 1.3 miles of the East Route alternative, as confirmed by the aerial survey. In 2013, both territories were occupied by adult golden eagle pairs, with one nest occupied and the other apparently not nesting.

One known golden eagle nesting territory occurs within 1.5 miles of West Route alternative Segment E and 1.7 miles of West Route alternative Segment F. This territory was occupied in 2013 but no nesting was detected. An inactive, previously unknown eagle nest was detected within 0.6 mile of Segment D of both West Route alternatives; while the species could not be determined it is more likely the nest of a golden eagle than a bald eagle.

Under the Bald and Golden Eagle Protection Act, "whoever . . . shall knowingly, or with wanton disregard for the consequences of his act take, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import" bald or golden eagles or their parts, nest, or eggs without a permit will be subject to criminal and/or civil sanctions (16 USC 668a). As discussed in Section 3.6, Wildlife, there are no known occurrences of eagle collisions with the existing transmission lines in the project area (Douglas County PUD and West, Inc. 2014).

Douglas PUD will work with USFWS and WDFW to identify any areas where the conductors would be marked to help avoid collisions. This mitigation would help avoid or minimize impacts on eagles and other birds. Because the Proposed Action would not involve knowing take or other acts of wanton disregard of bald or golden eagles, implementation of the Joint Project would not be expected to violate provisions of the Bald and Golden Eagle Protection Act. Depending on the potential for impacts on bald and golden eagles from the Joint Project, Douglas PUD may develop an Eagle Conservation Plan in consultation with USFWS and WDFW.

4.3. FLOODPLAINS, WETLANDS, WATERWAYS, AND WATER QUALITY

As part of the NEPA review, U.S. Department of Energy NEPA regulations require that impacts on floodplains and wetlands be assessed and that 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 and 11990. An evaluation of impacts of the Proposed Action on water resources is discussed below and in more detail in Section 3.7, Water Resources and Water Quality, Section 3.8, Wetlands, and Section 3.9, Floodplains.

During the Joint Project design phase, efforts were made to avoid and minimize impacts on floodplains and wetlands. Based on the location of 100-year floodplains, project design staff was able to site project activities outside floodplains. Wetlands were identified along the East Route and West Route D-E, but there are no wetlands along the West Route D-F alternative. Efforts were made to avoid or minimize impacts on each wetland area and it is not expected that any wetland fill would be required for Joint Project implementation. If any wetlands would be unavoidably impacted, BPA would send notice of proposed wetland and floodplain impacts to appropriate government agencies, including the Federal Emergency Management Agency regional office, the Washington Department of Ecology (Ecology), tribes, and local governments and Douglas PUD would conduct all necessary permitting.

Wetland and waterway management, regulation, and protection are addressed in several sections of the Clean Water Act, including Sections 401, 402, and 404. The 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. Washington's current turbidity standard (WAC 173-201A-200) requires that turbidity not increase more than a certain percentage from background levels as measured at an upstream control point. If a Section 401 permit is needed, Ecology would review Douglas PUD's Joint Project's Section 401 permit application for compliance.

Section 402 – This section authorizes stormwater discharges under the National Pollutant Discharge Elimination System (NPDES). EPA Region 10 has a general permit for discharges from construction activities. Douglas PUD would prepare a stormwater pollution prevention plan (SWPP Plan) to address stabilization practices, structural practices, stormwater management, and other controls.

Section 404 – Authorization from the U.S. Army Corps of Engineers (USACE) is required, in accordance with the provisions of Section 404 of the Clean Water Act, when dredged or fill material is discharged into waters of the U.S., including wetlands. The Proposed Action is not expected to result in any temporary or permanent fill in wetlands from structure installation, culvert installation, and road reconstruction. If the Joint Project includes any work in wetlands, Douglas PUD will apply for a permit under Section 404 for unavoidable wetlands impacts.

Section 10 of the Rivers and Harbors Act of 1899 (33 USC § 403) regulates all work in or affecting navigable waters of the United States. The Rivers and Harbors Act is administered by the USACE. It addresses structures or work that affect the course, location, condition, or capacity of navigable waterways. Within the project area, the Columbia River is a navigable water as defined by the Rivers and Harbors Act.

Section 10 permits are required for transmission lines crossings of navigable waters of the United States unless those lines are part of a water power project subject to the regulatory authorities of the U.S. Department of Energy under the Federal Power Act of 1920 (33 CFR §322). Both West Route alternatives include two crossings of the navigable waters of the Columbia River, while the East Route alternative would not require any river crossings. For both West Route alternatives, the conductor would span the river, while the transmission line structures would be on the banks above the river. Therefore, if either of the West Route alternatives is selected, Douglas PUD would submit a Section 10 permit application for the Joint Project.

4.4. STATE, AREA-WIDE, AND LOCAL PLAN AND PROGRAM CONSISTENCY

Douglas PUD is required to comply with the requirements associated with obtaining federal, state, and local land-use approvals for construction of the transmission line facilities. Douglas PUD will or may be required to obtain the permits identified in Table 4.4-1.

Table 4.4-1. Potentially Applicable Permits for the Joint Project

PERMITTING AGENCY/ENTITY	PERMIT
Army Corps of Engineers	Nationwide Permit 12-Utility Line Activities, if needed
Environmental Protection Agency	Section 401; Clean Water Act Compliance
Bonneville Power Administration	Line Crossing Permit(s) and Access Permit
Burlington Northern Railroad	Right of Way Crossing Permit(s)
Bureau of Land Management	Right of Way Permit
WA State Department of Natural Resources	Land Use License/Permit
WA Department of Ecology	Section 401; Water Quality Compliance NPDES Permit – SWPP Plan
WA Department of Transportation	Aerial Right-of-Way Crossing Permit/Easement
Chelan County PUD No.1	Aerial Crossing Permit
Grant County PUD No.1	Aerial Crossing Permit
Douglas and Chelan County	Substantial Shoreline Development Permit(s)
Douglas and Chelan County	Critical Areas Report
Chelan County	Right-of-Way Aerial Crossing Permit

The following local land use plans guide development in the area affected by the Joint Project:

Douglas County Comprehensive Plan

The Douglas County Comprehensive Plan was adopted in 1991 and updated in 2009. Land crossed by the transmission line routing alternatives in Douglas County falls under one of the following zoning designations (Douglas County 2012):

- **Rural Resource (density of 1 unit per 20 acres).** This designation is intended to encourage and maintain the county's rural character and to provide opportunities for compatible agricultural, grazing, forestry and other rural land uses.
- **Commercial Agriculture (density of 1 unit per 10 acres).** This designation is intended to protect lands that meet the criteria for agricultural lands of long-term commercial significance and to protect the primary use of the land as agricultural and to protect the primary use of the land as agricultural and agricultural related activities.

The *Douglas County Countywide Master Plan* states that: "Douglas County will promote inter-jurisdictional consistency for identifying and siting essential public facilities." The comprehensive plan includes several policies in Section 11.1.1 and criteria in Section 11.1.2 specific to utilities. Criteria B states that "Siting criteria will reflect the facility needs to support projected growth over 20 years and provide flexibility to accommodate technological advances."

Douglas County zoning within the project area includes Commercial Agriculture 10 (AC-10), Rural Resource 20 (RR-20), and potentially Dryland Agriculture (A-D) (Figure 3.2-2). Utilities are considered permitted uses in all of these zones.

Under the *Douglas County Shoreline Master Program (SMP)*, Douglas County regulates activities within 200 feet of the ordinary high water mark (OHWM) of the Columbia River. Douglas County would require a Shoreline Conditional Use Permit for structures within 200 feet

of the OHWM of the Columbia, as well as the crossings of the Columbia. Douglas County also maintains a franchise agreement with Douglas PUD and would need to review the franchise agreement in relation to the Proposed Action.

Chelan County Comprehensive Plan

The Chelan County Comprehensive Plan was adopted in 2000 and was last updated in 2009. The *Chelan County Comprehensive Plan* addresses utilities and lists the following goals and policies to guide development of utilities:

- Enhance the efficiency and quality of service from utility providers through the coordination of utility, land use and transportation planning
- Provide utilities in a manner which maintains the visual qualities of the county
- Ensure that adequate public utilities are provided to meet the projected and desired land use patterns within the county

The Chelan County Code defines transmission lines as a low impact utility (Section 14.98.1920), which is a permitted use in the Rural Residential and Rural Industrial zones. Land crossed by the transmission line routing alternatives in Chelan County falls under one of the following zoning designations (Chelan County 2009):

- **Rural Industrial.** This designation is considered an implementation of a Type 1 Limited Areas of More Intense Rural Development. It recognizes the need for rural industrial and resource-based industrial activities within the rural areas. This designation provides the opportunity for the development, redevelopment, and infill of existing rural industrial developments or former industrial sites consistent with the rural character and rural development provisions. Uses appropriate for these areas include industrial facilities and services, intensification of development on lots containing isolated nonresidential uses, agriculture, forestry, caretaker residence for industrial facilities, and natural resource support facilities and services.
- **RR5 - Rural Residential/Resource (density of 1 unit per 5 acres).** This designation provides opportunities for small-scale agricultural activities and rural development consistent with the rural character and rural development provisions outlined in goals and policies of the comprehensive plan. Uses appropriate for these areas include open space, residential, agriculture, and forestry.
- **RR10 - Rural Residential/Resource (density of 1 unit per 10 acres).** This designation allows for rural development, forestry, and agricultural uses consistent with the rural character and rural development provisions outlined in the goals and policies of the comprehensive plan. Uses appropriate for these areas include open space, residential, agriculture, and forestry.
- **RR20 - Rural Residential/Resource (density of 1 unit per 20 acres).** This designation allows for low-intensity rural development, agricultural, and forestry uses which do not require the extension of services or infrastructure. These areas provide greater opportunities for protecting sensitive environmental areas and creating open space typical of a rural setting. Uses appropriate for these areas include open space, residential, agriculture, and forestry.

Under the *Chelan County Shoreline Master Program*, Chelan County regulates activities within 200 feet of the OHWM of the Columbia River. Chelan County would require shoreline permitting similar to that of Douglas County. Chelan County would also need to initiate a franchise agreement with Douglas PUD in relation to the Proposed Action.

Greater East Wenatchee Sub-area Comprehensive Plan

The *Greater East Wenatchee Sub-area Comprehensive Plan* was adopted by Douglas County in 2011 and by the City of East Wenatchee in 2012.

Land use regulation follows the City of East Wenatchee and City of Rock Island Comprehensive plans and zoning code. Chapter 7 of the plan addresses utilities in the area, which include transmission lines. The plan identifies Douglas PUD as the electrical provider for the area. The plan identifies the future need for additional energy sources in the county. The plan also presents a general overarching utility goal and a specific series of goals and policies regarding electric utilities which include the following:

- **General Goal:** Facilitate the development of all utilities at the appropriate levels of service to accommodate growth that is anticipated to occur in the area, in a fair and timely manner.
- **Electric Utilities Goal:** Provide for the expansion of electric utility facilities to meet future load requirements. Support conservation measures to aid in meeting future growth needs.
    - **Policy 1:** Douglas County users shall be the top priority for electric power generated by Douglas County PUD.
    - **Policy 2:** Recognize energy facility needs and future demand in the Greater East Wenatchee Area; ensure that facilities will be properly located to increase effectiveness of the resource, protect the public, health safety and welfare, address land use compatibility, and the environment.
    - **Policy 3:** Develop standards and criteria for consideration when locating major types of energy facilities in the County.; energy facilities and associated uses may include a variety of differing energy facilities and needs including: solar, wind, fuel cells, hydroelectric, thermal, waste energy, ethanol, methane, gasification, nuclear and petroleum based facilities; standards and criteria should address, type, size or scale of development, classes of areas sensitive to differing energy facilities, general layout, principles for assessment of cumulative impacts and public input.

City of Rock Island Comprehensive Plan

The *City of Rock Island Comprehensive Plan* includes one goal for utilities: "To facilitate the development of all utilities at the appropriate levels of service to accommodate growth that is anticipated to occur in the area in a fair and timely manner." The comprehensive plan map shows the existing power line corridor near the Rapids Switchyard with a residential comprehensive plan designation, but the comprehensive plan states that the area underneath the power line easement is assumed to be unbuildable (Rock Island 2007). Douglas PUD's Rapids Switchyard is within the City's urban growth boundary but not within City limits. Proposed transmission line Structures 6E through 17E are located within the city limits of Rock Island, on the south side of

SR 28. These lands are designated as Undeveloped, Residential, Service Commercial, and Recreational.

City of Rock Island Zoning Code

The City of Rock Island City Council sets forth the applicable zoning districts within the city limits of Rock Island in Douglas County. Lands crossed by the transmission line alternatives in Rock Island fall under one of the following ***zoning*** designations (17.40.020 Rock Island Zoning Code):

- **Low Residential Zoning District -** This district is intended to preserve residential neighborhoods, promote efficient use of land within such neighborhoods, protect the community water system, and to encourage development of land areas in accordance with the Douglas County comprehensive plan and any subsequent subarea plans.
- **General Commercial Zoning District -** This district is intended to encourage the development of commercial facilities in well-defined and integrated centers.
- **General Industrial Zoning District -** This district is intended to supply sufficient area organized in a concentrated form for activities that promote a broad range of industrial uses, and subordinate commercial uses, consistent with standards that protect surrounding properties by minimizing traffic congestion, noise, glare, vibration, odors, airborne particulates, and toxic substances.
- **Recreation Mixed Use Zoning District -** This district is intended to supply sufficient areas arranged in a concentrated form that allow a mix of recreational and residential land uses. New development in this district is intended to be people-oriented and provide for the needs, activities, and interests of a variety of people. This district is intended to provide areas suitable for recreational uses where it may also be desirable for multiple residences and summer homes, resorts, motels, and other uses that accommodate tourists and vacationers.
- **Public Facilities Zoning District -** This district is intended to preserve areas for public facilities owned by governmental agencies where such facilities are used by the general public and/or may serve the needs of the community.

The proposed alignment of the East Route crosses the following City of Rock Island zoning designations: Public Facility (PF), Low Residential (R-L), General Commercial (C-G), and General Industrial (I-G). The district use chart indicates utilities are a conditional use in R-L, PF, and I-G zones (17.40.020 Rock Island Zoning Code). The district use chart indicates that utilities are not an allowed use in the C-G zone. The City plans to revise the ordinance to designate utilities as a conditional use in a future plan update. At this time, a variance would be required for utility uses in the C-G zone (Driver 2013 personal communication).

4.5. CULTURAL AND HISTORICAL RESOURCES

Preserving cultural resources allows Americans to have an understanding and appreciation of their origins and history. A cultural resource is an object, structure, building, site or district that provides irreplaceable evidence of natural or human history of national, state or local significance. Historic properties include National Landmarks, prehistoric sites, historic sites,

properties of traditional religious and cultural importance to a Native American tribe (also known as Traditional Cultural Properties), and other properties listed (or eligible for listing) on the National Register of Historic Places (NRHP). American Indian tribes have rights under specific laws, as well as the opportunity to voice concerns about issues under these laws when their aboriginal territory falls within a proposed project area.

Cultural resource laws, regulations, and other directives include:

- Antiquities Act of 1906 (16 USC 431–433)
- Historic Sites Act of 1935 (16 USC 461–467)
- Section 106 of National Historic Preservation Act (16 USC 470 et seq.), as amended
- Archaeological Data Preservation Act of 1974 (16 USC 469 a-c)
- Archaeological Resources Protection Act of 1979 (16 USC 470 et seq.), as amended
- Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.)
- Executive Order 13007 Indian Sacred Sites
- Various Washington state laws, including Advisory Council on Historic Preservation (WAC 25-12), Archeological Sites and Records (RCW 27.53), Abandoned and Historic Cemeteries and Historic Graves (RCW 68.60), Indian Graves and Records (RCW 27.44), Discovery of Human Remains (RCW 27.44)

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of their actions on historic properties. The NHPA provides a process, known as the Section 106 process, which requires agencies to consult with states, interested and affected tribes, and other parties on various aspects of the process. It also requires agencies to identify and evaluate historic properties, and assess impacts to historic properties. Agencies then consult on ways to avoid, minimize, and mitigate for these impacts.

Through the Section 106 process and consultation, BPA is providing information about the Proposed Action to consulting parties including the Washington State Historic Preservation Office (SHPO), Washington state archaeologist, BLM archaeologist, DNR archaeologist, and the following consulting tribes:

- The Confederated Tribes and Bands of the Yakama Nation
- Confederated Tribes of the Colville Reservation
- Wanapum Band

BPA requested input on the level and type of proposed identification and evaluation efforts from the consulting parties. BPA also asked for information on cultural resources in the study area.

BPA previously evaluated the Columbia Substation, a historic transmission facility as described in Section 3.11, Cultural Resources, and determined that it is eligible for inclusion on the NRHP. BPA will make a determination of effect on the Columbia Substation as a result of the Joint Project and request SHPO concurrence.

Background research within the project area identified the presence of historic and archaeological resources, and ethnographic resources that may be eligible for the NRHP. Field surveys were conducted in 2013 and in 2014 to identify cultural sites that could be impacted if they could not be avoided. Survey results were submitted to the consulting tribes, SHPO, BLM, and DNR for review and comment. As much as possible, Douglas PUD is proposing and incorporating design changes to avoid impacts to identified cultural resources.

If any cultural sites cannot be avoided, BPA will consult with the SHPO, consulting tribes, and affected federal and state agency land managing agencies to determine if those cultural sites are eligible for listing on the NRHP. If they are, effects will be evaluated in consultation and appropriate mitigation agreed upon with consulting parties. If, during construction, previously unidentified cultural resources are found that would be adversely affected by the project, Douglas PUD would follow all required procedures and BPA would reinitiate consultation.

The potential effects of the Joint Project on cultural resources are discussed in Section 3.11, Cultural Resources.

4.6. AIR QUALITY

The federal ***Clean Air Act (CAA),*** as revised in 1990 (Public Law [PL] 101–542 (42 USC 7401)), requires EPA and individual states to carry out a wide range of regulatory programs intended to assure attainment of National Ambient Air Quality Standards (NAAQS). In Washington, EPA has delegated authority to Ecology. Because the Joint Project would occur in an area that is currently in attainment for meeting the NAAQS and because no stationary sources of air emissions would occur, construction activities associated with the Joint Project are exempted from state regulation. The potential effects of the Joint Project on air quality are discussed in Section 3.12, Air Quality.

4.7. GREENHOUSE GAS EMISSIONS

Gases that absorb radiation and prevent heat loss to space are called greenhouse gases (GHGs). Models predict that atmospheric concentrations of all GHGs will increase over the next century, but 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 the following:

- The Clean Air Act is a federal law that establishes regulations to control emissions from large generation sources such as power plants. Limited regulation of GHG emissions occurs through New Source Review requirements.
- The EPA 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 of GHGs are required to submit annual reports to the EPA (EPA 2010).
- Executive Orders 13423 and 13514 require federal agencies to measure, manage, and reduce GHG emissions by agency-defined target amounts and dates. In Washington, Executive Orders 07-02, 09-05, and 14-04 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 (Ecology 2010).

- In Washington, 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 (Ecology 2010).

GHG emissions were estimated for Joint Project activities that would produce GHG emissions, including transportation-related direct emissions resulting from construction activities, direct emissions from substation equipment that would be installed, and ongoing operations and maintenance activities for the estimated 100-year operational life of the transmission line. GHG emissions would be below EPA's mandatory reporting threshold. The impact of the Proposed Action on GHG concentrations would be low, as discussed in Section 3.13, Climate Change.

4.8. HAZARDOUS MATERIALS

The application of several regulations that pertain to the management and use of hazardous materials to the Joint Project are summarized below.

4.8.1. The Spill Prevention Control and Countermeasures Act

The Spill Prevention Control and Countermeasures Act is intended to prevent discharges of oil and oil-related materials from reaching navigable waters and adjoining shorelines. It applies to facilities with total aboveground oil storage capacity (not actual gallons on site) of greater than 1,320 gallons and facilities with underground storage capacity of 42,000 gallons. No on-site storage of oil or oil-related materials is proposed as part of the Joint Project.

4.8.2. Title III of the Superfund Amendments Act

Title III of the Superfund Amendments and Reauthorization Act provides funding for hazardous materials training in emergency planning, preparedness, mitigation implementation, response, and recovery. Eligible individuals include public officials, emergency service providers, medical personnel, and other tribal response and planning personnel.

Segment D of both West Route alternatives crosses a portion of the former American Silicon Technologies plant (plant) site located along the Columbia River in Rock Island, Washington. The plant was originally built by the U.S. Department of Defense in the 1940s for the production of ferro alloys during World War II. Since that time the plant has operated on and off under a series of corporate owners utilizing a similar production process and the plant is no longer operating. The site includes settling ponds that were used to precipitate silica fume waste, a well that was contaminated, and the building itself, which contained laboratories.

The plant site has been the subject of numerous environmental studies and investigations over the years to determine the nature and extent of any potential hazardous waste contamination that might pose a threat to human health and the environment (Environmental Engineering & Consulting, Inc. 1988, 1991, E&E 2013). In the late 1980s, the site was cited for air quality violations due to excessive dust emissions, which led to a consent agreement with Ecology. Concerns were raised about the potential for groundwater contamination by heavy

metals/contaminants including chromium, cadmium, antimony, arsenic, copper, lead, mercury, nickel, silver and zinc, from the silica fume waste.

Analyses of silica fume waste and dust determined that it did not meet the definition of dangerous waste as defined by Washington regulations. Groundwater sampling of monitoring wells found no contaminants above EPA drinking water standards (Environmental Engineering & Consulting, Inc. 1988). A 1991 lab analysis of five fume waste samples indicated that no samples exceeded the EPA Toxicity Characteristic Leaching Procedure regulatory limits (Environmental Engineering & Consulting, Inc. 1991).

In April 2013, EPA Region X conducted a site inspection under the provisions of Superfund to determine the potential threat to public health or the environment posed by the site, the potential for a release of hazardous constituents into the environment, and the potential for placement of the site on the National Priorities List under Superfund (E&E 2013). This effort was undertaken partially in response to concerns raised about groundwater contamination detected in wells in the area of Rock Island and to determine if the plant site was a potential source of this contamination.

While the silica fume waste material was found to contain elevated levels of cadmium, copper, lead, selenium, silver, and zinc, as compared to background concentrations, it did not appear that it was impacting groundwater with the possible exception of zinc; however, there are no EPA or Ecology standards established for zinc. Based on the site investigation, EPA determined that no further action under the Federal Superfund Program is warranted at the former Rock Island Silicon Plant site (Tonel 2013). The plant site was determined to not be the source of area groundwater issues, which have now been linked to historic orchard herbicide application practices.

Based on the alignment of the West Route alternatives, four transmission structures and their associated access roads would be located on the western portion of the plant site near the silica fume waste area. One proposed structure would be located outside of the silica fume waste area, near the railroad right-of-way. Three proposed structures would be located near the banks of the Columbia River, near the edge of the silica fume waste area. Portions of access roads would cross short sections of the silica fume waste.

Because these structures are near the silica fume waste areas and settling ponds and portions of access roads would cross some areas with silica fume waste, installation could disturb some of the silica fume waste. Douglas PUD would work with Ecology to determine if any special procedures would need to be followed when vehicles and construction equipment work in and traverse these areas.

If the Joint Project is implemented, Douglas PUD would notify the appropriate agencies if any hazardous materials are found during construction.

4.8.3. Uniform Fire Code

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

4.8.4. Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) is intended to protect human health and the environment from toxic chemicals. Section 6 of TSCA 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 Joint Project would not contain PCBs. Any equipment removed that may have PCBs would be handled according to the disposal provisions of TSCA.

4.8.5. Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act registers and regulates pesticides. Douglas PUD uses herbicides (a kind of pesticide) during vegetation management. Herbicides are used on transmission line rights-of-way, along access roads, and in substation yards to control vegetation, including noxious weeds, when needed. When Douglas PUD uses herbicides, the date, volume, concentration, and chemicals used are recorded and reported to state government officials. Herbicide containers are disposed of according to Resource Conservation and Recovery Act (RCRA) standards.

4.8.6. Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of this 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. Typical transmission line and substation bay construction and maintenance activities, in BPA's and Douglas PUD's experience, have generated small amounts of these hazardous wastes: solvents, pesticides, paint products, motor and lubricating oils, and cleaners. Small amounts of hazardous wastes may be generated by the project. These materials would be disposed of according to state law and RCRA.

If hazardous material, toxic substance, or petroleum products are discovered that could pose an immediate threat to human health or the environment, Douglas PUD requires that the contractor notify the appropriate Douglas PUD staff immediately. Other conditions such as large dump sites, drums of unknown substances, suspicious odors, and stained soil must also be reported immediately to Douglas PUD. In addition, the contractor would not be allowed to disturb such conditions until the Douglas PUD and the appropriate authorities have given the notice to proceed.

4.9. EXECUTIVE ORDER ON ENVIRONMENTAL JUSTICE

In February 1994, Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, was released to federal agencies. The order states that federal agencies shall 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.

Guidelines provided by CEQ (1997) and EPA (1998) state that a minority community may be defined where either the minority population comprises more than 50 percent of the total population, or the minority population of the affected area is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison. Minority communities may consist of a group of individuals living in geographic proximity to one another or a geographically dispersed set of individuals who experience common conditions of an environmental effect. Further, a minority population exists if there is "more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997). Section 3.14, Socioeconomics, Environmental Justice, and Public Services, contains an analysis of potential impacts to Environmental Justice populations from the Joint Project.

4.10. NOISE

The Federal Noise Control Act of 1972 (42 USC 4901) requires that federal entities, such as BPA, comply with state and local noise requirements. Environmental noise is regulated by the state of Washington, which establishes limits on level and duration of noise (Ecology 2013d). Construction noise (including blasting) and sounds created by the installation or repair of essential utility services are exempted from state noise regulations (WAS 173-60-050).

Some federal and state noise level guidelines apply to operating transmission lines. The Environmental Protection Agency (EPA) has established a guideline of 55 dBA for an average day-night noise level (Ldn) and 45 dBA for night-time noise levels (between 10 p.m. and 7 a.m.) in outdoor areas (EPA 1978). The state of Washington has similar guidelines for maximum permissible noise levels of 60 dBA (Ldn) and 50 dBA (night-time) that would intrude into residential property (Washington State 1975). Washington state noise regulations (WAC 173-60-040) are generally equivalent to or more stringent than Chelan and Douglas Counties' noise regulations.

During operation of high-voltage transmission lines, audible noise occurs as a result of conductor corona activity (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 (foul-weather).

BPA calculated audible noise levels during operation of the proposed transmission line during wet conditions, as discussed in Section 3.15, Noise. The calculated foul-weather corona noise levels for the proposed transmission line would be comparable to, or less, than those from existing 230-kV lines in Washington. The impact from transmission line operation would be low because although there would be in increase in audible noise levels near residences, it is expected to be below Washington State night-time noise limits for a new source.

Noise levels generated during maintenance activities are not expected to exceed state standards, would be infrequent and temporary in nature, and therefore would result in low impacts.

4.11. TRANSPORTATION

4.11.1. Washington State Department of Transportation

The Washington State Department of Transportation requires a utility permit for utilities that cross state highways and for utility projects that are located within 300 feet of highway rights-of-way. The East Route includes three crossings of SR 28 while the West Route alternatives only include one crossing of SR 28 by the transmission line.

Oversize load and overweight load permits for transportation of large construction materials would be required on state highways. Any loads larger than 8 feet in width, 14 feet in height, or 53 feet in length would require an oversize load permit. Any load more than 16 feet in height or width would require a superload permit, which would be coordinated with the Washington State Department of Transportation in Olympia. Section 3.2, Land Use, Recreation and Transportation, contains an analysis of potential impacts to transportation from the Joint Project.

4.12. FEDERAL COMMUNICATIONS COMMISSION

Federal Communications Commission (FCC) regulations require that transmission lines be operated so that radio and television reception would not be seriously degraded or repeatedly interrupted. The FCC regulations require that impacts to reception be mitigated. It is expected that the Proposed Action would cause no interference with radio, television, or other reception, as discussed in Section 3.16, Public Health and Safety. Douglas PUD would comply with FCC requirements and investigate any complaints about electromagnetic interference, if any interference occurs.

4.13. FARMLAND PROTECTION ACT

The Farmland Protection Policy Act (7 USC 4201 et seq.) directs federal agencies to identify and quantify adverse impacts of federal programs on farmlands. The purpose of this act is to minimize the number of federal programs, on farmlands, that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses.

As discussed in Section 3.2, Land Use, the Joint Project would impact about 82.4 acres of PF and 50.8 acres of FSWI on the East Route, about 96.2 acres of PF and 23.1 acres of FSWI on West Route D-E, and about 120.8 acres of PF and 30.0 acres of FSWI on West Route D-F for access roads and transmission structure footprints. It would also include the removal of about 0.75 acre of orchard trees on the East Route, about 0.5 acre of orchard trees on West Route D-E, and about 0.45 acre of orchard trees on the West Route D-F. Other potential impacts on agricultural lands are discussed in Section 3.2, Land Use, Recreation, and Transportation, and Section 3.14, Socioeconomics, Environmental Justice and Public Services.

4.14. NOTICE TO THE FEDERAL AVIATION ADMINISTRATION

As part of the transmission line design, Douglas PUD will comply with Federal Aviation Administration (FAA) procedures and submit final structure locations and structure heights to FAA, if required. The northern portion of the project is located within the approach distance to Pangborn Memorial Airport in Wenatchee.

4.15. PERMITS FOR RIGHT-OF-WAY ON PUBLIC LANDS

The East Route Alternative would cross land administered by BLM. Douglas PUD is coordinating with BLM to meet its requirements for crossing lands and has submitted an SF299 form detailing all proposed activities to the Spokane District BLM Realty staff.

4.16. REQUIREMENTS NOT APPLICABLE TO THIS PROJECT

4.16.1. Permits for Structures in Navigable Waters

The Joint Project would not involve construction, removal, or rehabilitation of any structures in navigable waters.

4.16.2. Safe Drinking Water Act

No drinking water systems are affected by the Joint Project, and no pollutants are expected to reach drinking water supplies.

4.16.3. Energy Conservation at Federal Facilities

Energy conservation practices are not relevant because no federal buildings would be constructed.

4.16.4. Recreation Resource

No recreation resource permits or approval are expected to be needed for the Joint Project.

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Chapter 5 Persons, Tribes, and Agencies Consulted

5.1. INTRODUCTION

The mailing list for the Northern Mid-Columbia Joint Project includes local, state, and federal agencies; public officials; tribes, landowners, and trustees in the project vicinity; utilities; nonprofit organizations; libraries; media; and others who expressed an interest in the Project. Specific individuals were contacted to gather information and data about the project vicinity and applicable requirements, as part of consultation, or for permit applications.

5.2. FEDERAL

The following federal agencies and representatives were contacted:

- U.S. Department of the Interior, Bureau of Indian Affairs, Yakama Agency, Toppenish, WA
- U.S. Department of the Interior, Bureau of Indian Affairs, Colville Agency, Nespelem, WA
- Federal Aviation Administration, Northwest Mountain Region, Renton, WA
- U.S. Department of the Interior, Fish & Wildlife Service, Division of Endangered Species, Eastside Federal Complex, Portland, OR
- U.S. Department of the Interior, Fish & Wildlife Service, Washington Fish and Wildlife Office, Lacey, WA
- U.S. Department of the Interior, Fish & Wildlife Service, Wenatchee Field Office, Wenatchee, WA
- U.S. Department of the Interior, Fish & Wildlife Service, Migratory Bird Coordinator Office, Portland, OR
- U.S. Department of the Interior, Bureau of Land Management, Spokane District, Wenatchee Resource Area Office, Wenatchee, WA
- National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Portland, OR
- National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Washington State Habitat Director, Seattle, WA
- U.S. Federal Emergency Management Agency, Region X, Bothell, WA
- U.S. Army Corps of Engineers, Seattle District, Regulatory Branch, Seattle, WA
- US Environmental Protection Agency, Region 10, Seattle, WA
- USDA, Natural Resources Conservation Service, Spokane, WA
- USDA, Natural Resources Conservation Service, Central Area Office, Ephrata, WA

- USDA, Natural Resources Conservation Service, Wenatchee Service Center, Wenatchee, WA
- U.S. Representatives and Senators for districts encompassing the project area

5.3. STATE

The following state agencies and representatives were contacted:

- Office of the Governor, Natural Resource Office
- State of Washington, Energy Facility Site Evaluation Council
- State of Washington, Department of Commerce
- State of Washington, Department of Archaeology & Historic Preservation
- State of Washington, Washington Department of Fish and Wildlife
- State of Washington, Washington Department of Fish and Wildlife, Habitat Program
- State of Washington, Washington Department of Fish and Wildlife, North Central Region
- State of Washington, Washington Department of Fish and Wildlife, North Central Region 2, Wenatchee Field Office
- State of Washington, Department of Ecology Environmental Review
- State of Washington, Department of Ecology, Central Regional Office
- State of Washington, Department of Natural Resources, Washington Natural Heritage Program
- State of Washington Right of Way Program, Department of Natural Resources
- State of Washington, Department of Natural Resources
- State of Washington, Department of Natural Resources Rivers District
- State of Washington, Department of Natural Resources, Office of the Commissioner of Public Lands
- State of Washington, Department of Natural Resources, Marketing and Leasing Division
- State of Washington, Department of Natural Resources, Southeast Region
- State of Washington, Department of Transportation, North Central Region
- State of Washington, Department of Transportation, Aviation Division
- State of Washington, Parks & Recreation Commission
- State of Washington Representatives and Senators for districts encompassing the project area

5.4. TRIBES

The following Indian Tribes were contacted:

- The Confederated Tribes and Bands of the Yakama Nation
- Confederated Tribes of the Colville Reservation
- Wanapum Band

5.5. LOCAL GOVERNMENT

The following county and city agencies and representatives were contacted:

- Douglas County Board of Commissioners
- Douglas County Sheriff's Office
- Douglas County Transportation and Land Services
- Douglas County Farm Service Agency
- Douglas County Noxious Weed Management Task Force, Foster Creek Conservation District
- Douglas County Fire District #2
- Chelan County Board of Commissioners
- Chelan-Douglas Health District
- Chelan County Department of Community Development
- Chelan County Noxious Weed Control Board
- Grant County Board of Commissioners
- Mayor and City Councilmen from the City of Rock Island
- City of Rock Island Planner

5.6. UTILITIES

The following utilities were contacted:

- Grant Public Utility District
- Douglas Public Utility District
- Chelan Public Utility District

5.7. LIBRARIES

The following libraries were contacted:

- Office of Secretary of State, Washington State Library

- Wenatchee Community Library

5.8. MEDIA

The following media were contacted:

- The Wenatchee World
- Douglas County Empire Press
- Wenatchee Business Journal
- El Mundo Communications

5.9. NONPROFIT GROUPS AND OTHER ORGANIZATIONS

The following non-profit groups were contacted:

- Douglas County Historical Society
- Chelan County Historical Society
- Washington Rivers Conservancy
- Washington Native Plant Society, Headquarters
- Washington Native Plant Society, Wenatchee Valley Chapter
- Audubon Society, North Central WA Chapter
- Washington Environmental Council
- American Rivers
- Natural Resources Defense Coalition
- Save Our Wild Salmon Coalition
- Rock Island Community Church
- Habitat for Humanity of the Greater Wenatchee Area

5.10. LANDOWNERS AND TRUSTEES IN THE PROJECT AREA

The following landowners and trustees in the project area were contacted:

3DS Rice Group LLC
A Home Doctor Inc.
Buell R. and Alice M. Adams
Lenora Alene Adams
Phillip W. Agnew
Alcoa Inc.
Allemandi Investments LLC
Deborah D. Allen
Barnes O. Alyse
Betty E. Anderson
Charles Anderson
Carmen Andonaegui

Rosalio Andrade
Rosalio N. and Alicia Bedolla Andrade
Jesus Casas and Teresa Anzaldo
Keith J. and Kathleen A. Archibald
Francisco and Joyce Armendariz
Dennis Arndt
Sylvia P. Arndt
Steven L. Ball
Alyse O. Barnes
Eleanor Barrett
Barth Golf LLC
Donald Barth
Douglas and Melodee Batcheller
Battermann Enterprises
Linda Loud Beebe
Lisa G. Bell
Esmeralda Bernal
Leobardo and Garcia Betancourt
BK Duffin LLC
Lynn Julia Black
Robert L. Black
BNSF Railway Co-Tax Dept
Robert C. Boersma
Irene Boyce
Donald R. and Sandra J. Brandenburg
Clarence G. Brincefield
Ronald D. Brixey
Carl E. Brunette
Scott D. and Diane S. Bullock
Butch E. and Karen A. Bye
Mary Ann Cahill
Caffrey Irrevokable Living Trust
Randall Callihan
Conger E.K. Carver
Jorge and Rosalia Cervantes
Don A. and Barbara L. Christensen
Curtis C. Church
Katie L. Clark
Russell D. Clark
Mandy J. Collins
Col Park LLC
Columbia River Ranch LLC
Columbia Ventures Corp
David S. Comrie
Antonia Villela and Noel A. Cornelio
Crown Royal Orchards LLC
Thomas B. and Dawn M. Cummings
Tim D. Cutright
D & D Investments / Washington LLC
Audra L. Davies
Jessie W. Davies
Misti Kay Lynn Reiman and Billy Joe Davis
DGAS Lands LLC
Roberto Felipe and Suza de Felipe Diaz
Derry and Janna Donoghue
Gary M. Downes
Paul J. Downs
Bert Drake
Leah Sue Eddings
Emory LLC
Dorothy M. England
Jesus Escalera
Luis Escalera
Estate of Renee H. Green
Harold O. Evenhus
Andy Feil
Dale B. Fichtner
Ricardo Figueroa
Terrance Ian and Dale Rae Finney
Jim Foreman
Juanita Freeman
Frontier Communications Northwest
Hansen WM Frosty
Leroy W. Galloway
Alfredo Garcia
Alfredo Garcia Flores and Juanita Marcias Garcia
Fidel R. Rodriguez and Nathllely Garcia
Luanne Garside
GBI Holding Co.
Patricia L. Matthews and Steve S. George
Larry D. Gere
Frances P. Gibbs
Cleo W. Gilstrap
Pamela and Marshall E. Godwin
William G. Golden
Victor Gomez
Brenda J. and Rigoberto A. Gonzales
Jose C. Gonzales
Jamie and Maria Granados
James C. and June I. Graves
Robert B. and Lynann M. Griffith

Rose Gronlund
Steve L. Gronlund
Maurice A. Guerin
Adrian Guerra
Dale E. and Candy L. Gullickson
Hector and Maria Gutierrez
Rogelio Cortez and Maria Eduvyes Gutierrez
Angela M. Hall
Bob J. and Joanna M. Hall
C. Glen Hampton
Glen C. Hampton
Lona and Hedy L. Hankins
Hansen William Frosty Etal
James J. Hansen
Harden Roberta Truste
Hollie Harden
Randall S. Harriso
David V. Hausken
Duane A. and Sherry L. Hawkins
Allen Hendren
Charlotte J. Henton
Martin J. Gonzales and Juana Angelica Herrera
Reyes Herrera
Stephen L. Hirsch
Brian J. Horne
Gwendolyn Houck
Jana C. Howard
Alan S. Huff
Kevin W. Huff
Zella Huff
Leonard and Betty Hunt
Leonard C. Hurst
Kathy M. Jackon
Jack A. and Janet C. Jackson
Jeffrey S. and Michele L. James
Julie Ann Jaspers
Jennings Family LLC
Elva Jean Johnson
Peggy Jones
K-V Ranch Inc.
Robert W. and Vickie C. King Jr.
Scott Kane
Keane Estate Etals
Lucille M. Keane
David L. and Margaret L. Kernoul Sr.
Hyung J. Kim
Diane King
Scottie King
Maurice Kinzebach
James E. Koempel
Alyce K. Lahd
Allen M. and Barbara J. Lake
Lynn W. Landon
Wayne W. Landon
James D. Largent
Larry Pearson Etals
Clyde A. Laughlin
Wendy J. and John M. Laws
Keith Ledbetter
Keith P. Ledbetter
Lacey Ledbetter
Kevin S. Lee
Daniel M. and Stephanie M. Lehman
Carl W. Lewis
Lojo Orchards LLC
Juan and Catalina Lopez
Maria Lopez
Ernesto and Fabiola Lopez-Diaz
Kary A. Loveall
Gary W. Lumsden
Chris L. and Lisa A. Lytle
Chris L. Lytle
Joseph F. Mandoli
Barry M. Marker
Mark and Nancy Marlow
David R. and Lisa K. Martin
Robert F. Martin
Antonio Martinez-Rico and Maria Martinez
Gilmar and Gloria Martinez
Manuel R. and Maria G. Martinez
Marcos and Maria Martinez
Marcos R. Martinez
Nancy G. McClain
Maria R. Mendoza
Rafael and Dinora Mercado
Edward A. Mier Jr.
Dale F. and Patricia A. Mikkelsen
Roy M. Miller
Carlos and Eva A. Mojica-Mendez
Jeffrey Monda

Amanda G. Monesmith
Richard Monroe
Efren and Nichael O. Montes
Danielle Mooney
Gary S. and Ramona R. Moore
Guadalupoe E. Moreno
Ramiro and Maria E. Morfin
Helen L. Morrill
Morris West Orchards LLC
Ronald O. and Marlene B. Morris
Jeffrey and Jennifer Moser
Arthur and Cynthia Murison
Edwin and Judith Myers
Billy A. Nelson
Rolund Nelson
Jose S. Ochoa
Reyna Molina and Guadalupe Ontiveros
Esperanza Oseguera
William J. Patty
Palmer B. Pearson
William Robert Pearson
Miguel S. Pena
Roben and Hermalinda Perez
Carl L. Peters
Dorothy R. Peterson
Marilyn M. Peterson
Jon Port
Charles Porter
Gail G. and Priscilla Porter
Scott and Tricia Prazer
Tiffany Lane Quint
Mario Montes Fajardo and Barbara Quinteros
Carmeo Gonzalez and Piedad Ramirez
Esteban and Maria Valdez Ramirez
Juan D. and Larinda G. Ramirez
Teresita Ramirez
Humberto Ramos
Ravenwing Farm LLC
Ravenwing Ranch LLC
Thomas J. Reid Jr.
Hipolito Reyes
Georgia L. Ridge
Charles H. and Rekayalla J. Riibe
James A. Ritter
RLF Wenatchee Land Holdings LLC
Linda Suzanne Robertson
Betty Rose Rockstad
Elva Rodriguez
Andrew W. and Christina A. Romppel
Richard C. Romppel
Maria L. Rosas
Kenneth R. Rosenberger
Jose and Socorro Ruiz and Luis Ruiz
Sachs Farms Inc
Sachs Ranch Holdings LLC
Michael A. Sachs
Shelley Sachs
Daniel C. Sadewasser
Maria G. Sanchez
Rigoberto Sanchez
Zane Sand
Trudy Saul
Julie Ann Sauve
John W. Savage
Dale D. and Jeanine P. Schall
Carey M. and Cathleen M. Schenck
Jerry L. Schlaman
David Schmelzer
Deeann Beckett Schnibbe
School District #115/246
School District #206
Daniel and Usanee Scott
Katrina M. Scott
William C. Scroggie
Myrna Loy Sedlacek
Dora M. and Douglas M. Shirk
Luis A. Silva
James R. Simmons
Robert K. and Terri L. Simpson
Richard A. Sindelar
Jamie L. Skelton
Josefina and Ivan Slone Jr.
Timothy D. Smith
Michael and Paula R. Somers Jr.
John and Rachel Stanton
Bobby Jerold Stubbs
Trina K. Stubbs
Bert and Gail J. Swain
Mrs. V. M. Syring
T & B Real Property LLC

Ronald Dean Brandenburg and Arloa Jean Taggart
Jose R. and Maria Angelica Tapia
Delira F. Taylor
Loye W. Taylor
Ruperto Tellez-Meza
Darel and Patricia Thompson
David Thornock
Helen Tidwell
Ignacia and Andres Torres
Jesus and Irma Alonso Torres
Jose Tovar
Miguel Villa and Cornelia Valencia
Ivan T. and Connie Vance
Terrence Michael Vance
Jesus Vasquez
Jose and Irma Vazquez
Victor Hugo and Guadalupe C. Vega
Jose Venegas
Ernesto and Lucia Villa
Ernesto and Xiomara Y. Villa and Rodolfo and Maria C. Villa
Terry A. Volkman
George and Iona Voss Jr.
Mamie Walls
Mark and Karon Weishaar
David L. Weller
Bryan C. and Janice West
Genevieve J. Wheatley
Malcom D. and Ruth A. Whitaker
Janice S. Williams
Joseph I. Wilson
Diane Winters
Pamela J. Wolfe
Verla Wood
Thomas J. Wrenfrow
Thomas Wayne Yoakum
Steve A. York

Chapter 6 Glossary

100-year floodplain – An area that has a 1 percent chance of being flooded in a given year; designated by the Federal Emergency Management Agency (FEMA)

Access road – A road or road spur that provides access to the transmission line and transmission line structure sites during construction and operation and maintenance

Ambient noise – Background noise generated by existing noise sources present in the surrounding area

Anadromous fish – Species of fish that hatch and initially grow in freshwater, migrate to and mature in the ocean, and return to freshwater as adults to spawn and reproduce (such as salmon or steelhead trout)

A-weighted decibel (dBA) – A logarithmic unit of sound measurement based on an A-weighted scale commonly used for measuring environmental and industrial noise levels

Basalt – Lava with a composition that is relatively high in iron and manganese

Bedrock – Solid rock at the surface, or underlying other surface materials, of relatively great thickness and extent in its native location, as distinguished from boulders

Best management practices (BMPs) – A practice or combination of practices that are effective and practical means of avoiding or reducing impacts while an action is being implemented, implemented during construction to prevent or reduce the amount of pollution generated by non-point sources to a level compatible with water quality goals; these practices also benefit other resources by reducing construction disturbance areas.

Buffer (vegetative) – A strip of permanent vegetation between waterways and human land uses

Bull trout – Members of the char subgroup of the salmon family (salmonids), which also include the Dolly Varden, lake trout, and Arctic char

Candidate species (Federal) – Species identified by the U.S. Fish and Wildlife Service or NOAA Fisheries, which have sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities

Candidate species (State) – Wildlife species that are under review by the Washington Department of Fish and Wildlife (WDFW) for possible listing as endangered, threatened, or sensitive

Capacity – A measure of the ability of a transmission line, groups of transmission lines (path), or a transmission system to carry electricity; the maximum load that a generator, piece of equipment, substation, transmission line or system can carry under existing service conditions

CO_2e – A unit of measure used by the Intergovernmental Panel on Climate Change and government agencies such as the EPA to describe the global warming potential of different greenhouse gases by setting them equivalent to the relative effects of CO_2

Circuit – A system of conductors through which an electric current is intended to flow; a single circuit transmission line consists of one alternating current transmission line, made up of three conductors; a double circuit transmission line consists of two alternating current transmission lines, which would have two sets of three conductors.

Clean Air Act (CAA) – A 1963 Federal law, amended several times since, giving the Federal government powers to limit air pollution; also a term loosely applied to the Air Quality Act of 1967, which gave the Federal government a stronger regulatory role; an especially important effect was the development of standards based on concentrations of pollutants in air.

Clean Water Act (CWA) – Also known as the Federal Water Pollution Control Act (33 USC §§ 1251 et seq.), the CWA regulates discharges into waters of the United States, including discharges of fill into wetlands and waterways, and discharges of pollutants which impact water quality; intended to restore and maintain the chemical, physical, and biological integrity of the nation's waters and secure water quality that provides for the protection and propagation of fish, shellfish, and wildlife, as well as for recreation in and on the water.

Clean Water Act 303(d) list – A list of water bodies that do not meet water quality standards as set by the Environmental Protection Agency (EPA) under the Clean Water Act (CWA)

Climate change – Term used to refer to all forms of climatic inconsistency, but especially to significant change from one prevailing climatic condition to another; in some cases, "climate change" has been used synonymously with the term "global warming"; scientists, however, tend to use the term climate change in a wider sense inclusive of natural changes in climate, including climatic cooling.

Columbia River Basin – The land area drained by the Columbia River and its tributaries; its principal boundaries are the Rocky Mountains to the east and north, the Cascade Range on the west, and the Great Basin to the south; also called the Columbia Basin

Conductor clearance – The distances required between conductors of various voltages and the ground; also the distance required between the line and trees, buildings, and other objects on, above or immediately adjacent to the right-of-way

Congestion – Also known as transmission congestion, the condition that exists when market participants seek to dispatch in a pattern which would result in power flows that cannot be physically accommodated by the transmission system; although the system will not normally be operated in an overloaded condition, it may be described as congested based on requested/desired schedules.

Conservation Reserve Program (CRP) lands – Lands enrolled in the Conservation Reserve Program, which provides enrolled farmers with annual payments to reestablish and maintain natural plant communities for a specified number of years in order to remove highly erodible or other sensitive land from production; administered by the US Natural Resources Conservation Service (NRCS)

Contingency – In a power system, the possibility of a fault or equipment failure; first contingency disturbances (outages) involve only one system element, such as a transmission line fault or a transformer failure; a second contingency disturbance would have one system element out of service and subject the system to a fault and loss of a second element.

Corona – A luminous electrical discharge due to the ionization of the air surrounding a conductor caused by a voltage gradient exceeding a certain critical value; can be seen as bluish tufts or streamers surrounding the conductor or conductor hardware, and generally a hissing sound can be heard; transmission line corona varies with atmospheric conditions and is more intense during wet weather.

Criteria pollutants – Air pollutants having National Ambient Air Quality Standards

Critical habitat – As defined in the federal Endangered Species Act (ESA), designated areas within the geographic area occupied by a listed species at the time of listing, on which are found biological and physical features essential to the conservation of the species and which may require special management considerations for protection

Culvert – A metal or concrete pipe used to carry or divert runoff water from a drainage, such as a ditch or stream; usually installed under roads to prevent washouts and erosion

Current – The amount of flow of electrical charge through a conductor (as compared to voltage, which is the force that drives the electrical charge)

Danger tree – A tree located outside of the acquired transmission line right-of-way, which is a present or future hazard to the transmission line because it could fall into, bend into, grow into, or with high winds, swing into the conductor or come close enough to cause a "flashover" of current from the conductor

dBA – The first two letters (dB) are an abbreviation for decibel, the unit in which sound is most commonly measured (see decibel); the last letter (A) is an abbreviation for the scale (A scale) on which the sound measurements are made.

Dead-end structure – A heavy transmission structure designed for use where the transmission line loads the tower primarily in tension (pull) rather than compression (downward push); such as where the transmission line turns large angles or where a line enters a substation

Decibel (dB) – A unit of sound measurement to describe the strength or intensity of a sound; in general, a sound doubles in loudness for every increase of ten decibels; one dB equals the least sound level detectable by the human ear, while 70 dB is equivalent to busy traffic and 150 dB is equal to a nearby jet taking off.

Demand (electrical) – In a consumer context, the amount of electricity used; in a public utility context, the rate at which electric energy is delivered to or by a system over any designated period; at BPA, the amount of electric energy, in kilowatts or mega-watts, needed at any given time to meet a BPA customer's or total BPA system load

Department of Energy (DOE) – The U.S. Department of Energy; also, various states have state departments of energy (DOE, or DoE)

Distinct population segment (DPS) – A subgroup of a vertebrate species that is treated as a separate species for the purposes of listing under the federal Endangered Species Act (ESA); it is required that the subgroup be separable from the remainder of and significant to the species to which it belongs; used for some fish species in the Pacific Northwest

Diversity – Also known as biodiversity, the variety of life and its processes, including the variety in genes, species, ecosystems, and the ecological processes that connect everything in ecosystems; as used in this EA, this definition specifically excludes diversity contributed by non-native species; also see non-native species.

Double circuit – To place two separate electrical circuits (for alternating current, each circuit consists of three separate conductors or bundles of conductors) on the same transmission structures

Easement – A grant of the right to use land in a manner granted under a formal agreement between two parties; utilities generally acquire easements for transmission lines and access roads to obtain the right to use the land for access, construction and improvements, and operation and maintenance of its transmission lines.

Ecosystem – Interacting system of elements in a biological community, together with interactions with the surrounding environment

Electric field strength – The invisible lines of electrical force caused by voltage and measured in volts-per-meter (V/m) or kilovolts-per-meter (kV/m); the field from all typical home sources averages around 10 V/m or less while the field at the edge of the right-of-way for a 500-kV line is about 2 kV/m.

Electromagnetic field (EMF) – Fields of force caused by electric voltage and current around the electric wire or conductor when an electric transmission line or any electrical wiring is in operation; magnetic fields exist only when current is flowing; electric fields are present in electrical appliances and cords whenever they are plugged in.

Electromagnetic interference (EMI) – Interference with the operation of an electrical device caused by the presence of an electromagnetic field

Emergent – An aquatic plant having its stem and leaves extending above the surface of the water

Endangered species (Federal) – Those plant and animal species officially designated (listed endangered) by the US Fish and Wildlife Service or NOAA Fisheries under the federal Endangered Species Act (ESA) as being in danger of extinction throughout all or a significant portion of their range because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of overexploitation, disease, predation, or other factors

Endangered species (State) – Those species native to the state of Washington that are seriously threatened with extinction throughout all or a significant portion of their range within the state

Endangered Species Act (ESA-Federal) – The ESA of 1973 (16 USC 1536) as amended in 1988, establishes a national program for the conservation of threatened and endangered species

of fish, wildlife and plants, and the preservation of the ecosystems on which they depend; administered by the US Fish and Wildlife Service (USFWS) for wildlife and freshwater species and by the National Marine Fisheries Service (NMFS), also known as NOAA Fisheries Service (NOAA Fisheries) for marine and anadromous species; these agencies decide whether to list species as threatened or endangered; federal agencies must avoid jeopardy to and aid the recovery of listed species; similar responsibilities apply to non-Federal entities.

Environmental Assessment (EA) – A document that provides one means of complying with the National Environmental Policy Act (NEPA) and defined at 40 CFR 1508.9; an EA evaluates the possible environmental effects of a Federal agency's proposed action and provides sufficient evidence to determine whether an environmental impact statement (EIS) or a finding of no significant impact (FONSI) is warranted.

Environmental Impact Statement (EIS) – A detailed statement of environmental impacts that could be caused by an action, as required by the National Environmental Policy Act (NEPA) and defined at 40 CFR 1508.11; the most intensive level of environmental analysis, public involvement and documentation, typically reserved for proposed actions that are expected to result in significant environmental impacts; the EIS discloses the impacts of the action and alternatives on all applicable environmental resources and the process includes: public scoping; coordination with state, federal, and local agencies, and tribes; a draft Environmental Impact Statement (EIS) sent to public for review and comment; a final Environmental Impact Statement (EIS); and a Record of Decision (ROD)

Environmental justice – Fair (or appearance of fair) treatment of people of all races and incomes with respect to actions affecting the environment; fair treatment implies that there is equity of the distribution of benefits and risks associated with a proposed project and that one group does not suffer disproportionate adverse effects

Ephemeral stream – A channel that carries water only during and immediately following rainstorms and whose channel is above the water table; sometimes referred to as a dry wash

Erosion – The wearing away of the land surface by wind or water that occurs naturally from weather or runoff but can be intensified by land-clearing practices related to such activities as farming, residential or industrial development, road building, or timber-cutting; a material wear mechanism resulting from suspended particles in a flow stream of water or other fluid

Essential fish habitat (EFH) – Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity as defined by the Magnuson Fishery Conservation and Management Act; under Section 305(b)(4) of the Act NOAA Fisheries is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH.

Evolutionarily Significant Unit (ESU) – An ESU is a distinctive group of Pacific salmon, steelhead, or sea-run cutthroat trout that is uniquely adapted to a particular area or environment and cannot be replaced

Exceedance levels (L levels) – Refers to the A weighted sound level that is exceeded for a specified percentage of the time during a specified period; for example, L10 refers to a particular sound level that exceeded 10 percent of the time.

Extirpated – A species that was once present in an area but is now locally extinct

Fallow land – Cropland that is not planted for a season; it may or may not be plowed.

Farmland of statewide importance (FSWI) – Land (in addition to prime farmlands) that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops; typically includes land that nearly meets the criteria for prime farmland and has the potential to economically produce high crop yields

Federal Columbia River Transmission System (FCRTS) – The electric transmission system in the Pacific Northwest built and operated by BPA; often referred to as the Federal transmission grid, or the BPA grid

Federally listed – Species listed as threatened or endangered under the federal Endangered Species Act (ESA) by the US Fish and Wildlife Service or NOAA Fisheries

Fiber optic cable – A type of wire installed on transmission lines that is used for communication between one location and another; fiber optic technology uses light pulses instead of radio or electrical signals to transmit messages.

Finding of no significant impact (FONSI) – A document by a Federal agency to comply with the National Environmental Policy Act (NEPA) that presents the reasons why an action will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared, as defined at 40 CFR 1508.13

Floodplains – Areas adjacent to rivers and streams that might be flooded during high water events unless protected artificially; as defined in Executive Order 11988, Floodplain Management, the floodplain of concern is the 100-year floodplain; also see 100-year floodplain

Forb – An herbaceous flowering plant species that is not a grass or grass-like species (sedge, rush or other similar species)

Fossil fuel – A combustible solid, liquid, or gaseous material, rich in carbon, formed from the remains of plants and animals; common fossil fuels include coal, natural gas, and derivatives of petroleum such as fuel oil and gasoline.

Fugitive dust – Any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly, as a result of human activities

Gauss – A unit of magnetic induction

Greenhouse effect – The warming of the lower atmosphere and the surface of the earth resulting from the reflection of infrared radiation by carbon dioxide, water vapor, and other gases in the atmosphere, resulting in higher temperatures than would exist in the absence of the effect

Greenhouse gases (GHG) – Chemical compounds in the form of gases found in the earth's atmosphere that absorb and trap infrared radiation, or heat, that is reradiated from the surface of the earth; includes carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (NO_x), nitrous oxide (NO_2), and water vapor (H_2O) that contribute to the greenhouse effect

Groundwater – Water that occurs below the surface of the earth, where it occupies spaces in soils or other geologic strata

Habitat – The combination of biotic (living) and abiotic (non-living) components that provides the ecological support system for plant or animal populations

Herbaceous – Plants that possess little or no woody tissue; does not include shrubs and trees

Herbicide – A chemical substance used to kill, slow, or suppress the growth of plants

High-voltage – Transmission lines with 230 kilovolt (kV) or greater electrical capacity; voltage is the driving force that causes a current to flow in an electrical circuit and the volt is the international system unit of electrical potential and electromotive force**.**

Hydrofluorocarbons (HFCs) – Organic compounds that contain only one or a few fluorine atoms; the most common type of industrial organofluorine compounds found and used as refrigerants; the atmospheric concentrations of HFCs are rapidly increasing causing international concern about their rising contribution to anthropogenic radiative forcing emissions (also known as global warming).

Hydrology – The science of the properties, distribution, and circulation of water

Hydrophytic vegetation – Plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content

Insulators – A component of the transmission line structure made of non-conducting material, such as ceramic or fiberglass, generally bell-shaped; connects the conductor to the suspension structure and prevents the transmission of electrical current from the conductor to the ground

Intermittent – Referring to periodic water flow in creeks or streams; streams that do not typically flow year round or have continuous flow but do have groundwater flows at times

Integrity (cultural resources) – The quality of a resource such that the location, setting, design, materials, workmanship, feeling, and association are retained

Interconnection (electrical) – A system consisting of two or more individual power systems operating with connecting lines to make a larger system, thus permitting the sharing of generation reserves and providing alternative transmission paths to serve customers during line outages; also refers to the connection between two power systems

Jurisdictional Waters of the U.S. – Areas, including wetlands and waterways, meeting regulatory criteria for wetlands and over which the county, state and/or US Army Corps of Engineers (ACOE) have regulatory control; areas which do not meet regulatory criteria are considered non-jurisdictional and referred to as uplands.

Kilovolt (kV) – One thousand volts

Landslide – Any mass movement process characterized by the downward transport of soil and rock, under gravitational stress, by sliding over a discrete failure surface, or the resultant landform

Lithosol – Rocky soil that is very thin and formed from the weathering of the underlying rocks.

Load – The amount of electric power or energy delivered or required at any specified point or points on an electrical system; load originates primarily at the energy consuming equipment of customers

Low-income population – A portion of the population that is below the current poverty line that could be disproportionately disadvantaged because of their limited financial resources

Magnetic field – The invisible lines of magnetic force produced by electric current flowing in a conductor, such as a transmission line, service wires in a house, or household appliances; measured in terms of lines of force per unit area with the measurement unit being tesla (T) or gauss (G) (one tesla equals 10,000 gauss); also see electric and magnetic fields

Metric ton – Weight equivalent to 2,204 pounds.

Mid-Columbia PUDs – Public utility district (PUD) owners of the Mid-Columbia projects; Chelan PUD No. 2, Douglas PUD No. 1, and Grant PUD No. 1; the Mid-Columbia projects include five privately owned dams on the mid-Columbia: Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids

Milligauss (mG) – A unit used to measure magnetic field strength; equivalent to one thousandth of a gauss

Minority population – Any readily identifiable group of minority persons who will be similarly affected by a proposed program, policy, or activity; a minority population is considered to be present if the minority population percentage of the affected area is greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Mitigation – Steps or measures taken to lessen the potential impacts or effects on a specific resource as the result of an action; mitigation could result in avoiding the impact completely, reducing or minimizing the impact, or compensating for the impact.

Multiplier effects – The total increase in income and employment that occurs in the local economy for each dollar of local project expenditure

National Electric Safety Code (NESC) – Written standards, providing basic requirements for the design, construction, maintenance, and operation of electric supply and communication lines, equipment, and supply stations in order to safeguard persons from hazards associated with those activities

Native – A species, plant community type, or habitat whose presence in an area is due to natural processes and not as a result of direct human manipulation; native species originated in a given ecological area; native biotic elements and natural processes contribute to biological diversity.

Nonattainment area – The status of an air basin when it is not in compliance with applicable air quality standards for a specific pollutant

Non-native – A species, plant community type, or habitat that has been introduced or modified as a result of human actions; non-native species may compete for space and nutrients with more desirable native species; non-native species are also referred to as introduced or exotic species.

North American Electric Reliability Corporation (NERC) – A council consisting of nine Regional Reliability Councils/Corporations, encompassing virtually all of the power systems in the U.S. and Canada; formed by the electric utility industry in 1968 and incorporated in 1975 to promote reliable and adequate supplies of bulk electric power

Noxious weeds – Invasive, nonnative plants that have been introduced into an environment outside their native range; identified by state law, they cause environmental and economic harm to some degree by negatively affecting public health, recreation, silviculture, crops, livestock, wildlife habitat, native plant communities, and other resources

Overload – Moving too much current flow over transmission facilities; electrical equipment have safeguards in the event of system overload, switches will disconnect sensitive equipment from the flow of electricity.

Overhead ground wire – A wire attached to the top of certain structures to route electricity from lightning to the ground through the structure, preventing damage to the electrical equipment in the substations

Ozone – A form of oxygen produced when an electric spark or ultraviolet light passes through air or oxygen

Particulate matter (PM) – Airborne particles including dust, smoke, fumes, mist, spray, and aerosols

Perennial – Refers to a stream or creek with continuous, generally year-round water flow in a well-defined channel; under the state water typing system perennial streams include Types 1 through 4; when this term refers to plants, it means species that live for several years.

Perfluorocarbons – Perfluorocarbons (PFCs) are compounds produced as a by-product of various industrial processes associated with aluminum production and the manufacturing of semiconductors. Like hydrofluorocarbons, PFCs generally have long atmospheric lifetimes and high global warming potentials.

Phase – A conductor or conductors or piece of electrical equipment that is associated with one of three separate phases of an alternating-current power system, designated A-phase, B-phase, and C-phase

Plant community – All the plant populations occurring in a shared habitat or environment

Polychlorinated biphenyls (PCBs) – Oily, persistent substance formerly manufactured for use in electrical equipment, primarily as a dielectric in capacitors, no longer used by BPA

Power circuit breakers – A breaker is a switching device that can automatically interrupt power flow on a transmission line at the time of a fault, such as a lightning strike, tree limb falling on the line, or other unusual event; breakers are installed at the substation to redirect power as needed.

Power outage – A short or long term interruption in the delivery of electrical power to an area when the electrical provider removes a piece of equipment or a portion or all of a line from service; may be planned, such as during maintenance, or inadvertent, resulting from system or equipment damage or failure

Prehistoric– Refers to cultural resources that predate European settlement in North America

Prime farmland – Federally designated land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses

Priority area or ecosystem – A specific plant community type identified by the Washington Natural Heritage Program as high quality or rare, based on global, national, and state data; because of rarity a focus of conservation efforts

Priority habitat – A habitat designated by the Washington Department of Fish and Wildlife as having unique or significant value to many wildlife species; a priority habitat may be described by a unique vegetation type, dominant plant species of primary importance to fish and wildlife, successional stage, or specific habitat element (e.g. talus slopes) that is of key value to fish or wildlife

Project – In this EA, a specific BPA undertaking including BPA-assisted activities, which may include design, construction, and operation of an individual facility; research, development, demonstration, and testing for a process or product; funding for a facility, process, or product; or similar activities, as discussed at 40 CFR 1508.18(b)(4)

Public Utility District (PUD) – A political subdivision, with territorial boundaries for an area wider than a single municipality and frequently covering more than one county, established by voters to supply electric or other utility service; called Public Utility Districts in Washington

Pulling and tensioning site – A staging area located at the beginning of a segment along the transmission line where equipment (i.e., a puller) is set up and used to pull the conductor through the transmission line

Raptor – A bird of prey that hunts and kills other animals for food, including small birds, fish, mammals, lizards and insects; raptors are powerful flyers that hunt with their large, strong talons and sharply hooked bills; there are many species of raptors, including bird families such as eagles, hawks, falcons and owls.

Redispatch - Management of generation patterns to overcome outage problems

Reinforcement – Improvement(s) in a transmission system to maintain or increase reliability, security, and/or transfer capability

Reliability – The measure of the ability of a power system to provide uninterrupted service, even while that system is under stress

Revegetate – Reestablishing vegetation on a disturbed site

Restoration – Renewing or repairing of a natural system so that its functions and qualities are comparable to its original, unaltered state

Right-of-way – An easement for a certain purpose over the land of another, such as a strip of land used for a road, electric transmission line, or pipeline

Riparian – Habitat or areas, usually adjacent to rivers, streams, or lakes, where the vegetation and microclimate are heavily influenced by water

Riparian habitat – The zone of vegetation that extends from the water's edge landward to the edge of the vegetative canopy; associated with watercourses such as streams, rivers, springs, ponds, lakes, or tidewater

Riverine wetlands – Wetland area that is adjacent to a stream or river, is underlain with hydric soils developed in fluvial conditions, derives a significant portion of its hydrology from bank full conditions, or overbank flooding, and is within, at a minimum, the 5-year floodplain area

S**coping –** The process described at 40 CFR 1501.7; "public scoping process" refers to that portion of the scoping process where the public is invited to participate and where significant issues are identified for detailed analysis, as described at 40 CFR 1501.7 (a)(1) and (b)(4).

Sedimentation – Any finely divided organic and/or mineral matter deposited by air or water in nonturbulent areas

Sensitive species (State) – A species native to the state of Washington that is vulnerable or declining and likely to become endangered or threatened without active management or the removal of the threats

Shrub-steppe – Plant communities in steppe which consist of one or more layers of perennial grass above which there rises a conspicuous by discontinuous layer of shrubs; typical shrub species in Washington shrub-steep include bitterbrush *(Purshia tridentata),* big sagebrush *(Artemesia tridentata),* and three-tip sagebrush *(A. tripartita);* see also steppe.

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

Silt – Fine-grained portion of soil that is nonplastic, or only very slightly plastic, and that exhibits little or no strength when air-dry

Single circuit structure – A structure that can only support one transmission line

Special-status species – Those species protected under the federal Endangered Species Act (ESA) as threatened, endangered, proposed, or candidate and those listed by the US Fish and Wildlife as Species of Concern and those listed for protection by the state of Washington

Species – A group of interbreeding individuals that are not interbreeding with another such group, similar and related species are grouped into a genus; Section 3 of the Endangered Species Act (ESA) defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which breeds when mature.

Species of concern – Species considered by the US Fish and Wildlife Service to potentially be in jeopardy, but for which sufficient information does not exist to support listing on the federal threatened or endangered species lists

Stability – The attribute that enables a dynamic system to develop restoring forces equal to or greater than disturbing forces so as to maintain a state of equilibrium

Steppe – Area that is semi-arid to arid, with low precipitation, warm/hot summers, and relatively cold winters; see also shrub-steppe

Subpopulation – Well-defined set of interacting individuals that compose a portion of a larger, interbreeding population

Substation – A non-generating electrical power station that serves to transform voltages to higher or lower levels, and serves as a delivery point to individual customers such as utilities or large industries; the BPA grid has more than 400 substations; see also switching stations

Surface water – All water naturally open to the atmosphere, such as rivers, lakes, reservoirs, streams, impoundments, seas, and estuaries

Suspension structure – A transmission line structure designed to support conductors strung along a virtually straight line with only small turning, descending, or ascending angles

Switch – Device used to mechanically disconnect or isolate equipment found on both sides of circuit breakers

Switching substation – An installation of equipment where several transmission lines are interconnected; does not include equipment for transforming voltage levels; also called a switching station; see also substation

Talus – Sloping accumulation of rock debris

Tap – The point at which a transmission line is connected to a substation or other electrical device to provide service to a local load

Threatened species (federal) – A species officially designated by the US Fish and Wildlife Service or NOAA Fisheries that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range, as defined in Section 3 of the Endangered Species Act (ESA)

Total Maximum Daily Loads (TMDL) – Technical analysis resulting in a determination of quantities of a given pollutant (load) that can be released into a given water body each day while still maintaining Water Quality standards (WQS), and allocates responsibilities to "contributors" for reductions in the pollutant load that are necessary to achieve WQS; often referred to as Water Quality Improvement Plans

Traditional Cultural Property (TCP) – Site that is eligible for inclusion in the National Register of Historic Places because of its association with 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

Transformer – Electrical equipment usually contained in a substation that is needed to change voltage on a transmission system

Transmission lines – The structures, insulators, conductors, and other equipment used to transmit electrical power at high voltage to electrical distribution facilities (substations)

Turbidity – A measure of the amount of particulate matter, such as suspended sediment, per unit volume of water, resulting in water that appears muddy or cloudy

Water bar – A road construction feature that consists of a diagonal channel across the road that prevents erosion by diverting surface water (that would otherwise flow down the whole length of the road) off the road and into a stable drain way; without water bars, road wash-outs and accelerated road degradation can occur.

Water pollution – Presence in water of harmful or objectionable material which damages the water's quality

Water quality – Description of the chemical, physical and biological characteristics of water, usually in respect to its suitability of use for a specific purpose

Watershed – A drainage basin defined by an elevated boundary area separating tributaries draining into different river systems

Western Electricity Coordinating Council (WECC) – The organization responsible for coordinating and promoting bulk electric system reliability of transmission operators within the western interconnection; WECC provides a forum for resolving transmission access disputes, and facilitates coordination of operating and planning activities among its members.

Wetland – An area where anaerobic conditions (lack of oxygen) develop in the soil because of prolonged saturation or inundation by water during the growing season; indicators of wetlands include plant species adapted to such conditions, characteristic soil colors and chemical properties, and hydrological conditions that result in evidence of flooding or waterlogged soils.

Wetland buffer – The area surrounding a wetland that performs important functions for wetlands, such as filtering sediment and other potential contaminants from water before it enters the wetland

Zoning – Regulations used to guide growth and development; typically involve legally adopted restrictions on uses and building sites in specific geographic areas to regulate private land use

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APPENDIX A. CLIMATE CHANGE IMPACT CALCULATIONS

1. 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 buildup of heat in the atmosphere due to increased GHG levels causes warming of the planet through a greenhouse-like effect (EIA 2014a). The average surface temperature on Earth has risen by almost 1.5º F over the past century (EPA 2014a). Most of the warming has been caused by GHG emissions (EPA 2014a). Scientists predict that the temperature will rise another 2º to 11.5º F over the next century (EPA 2014a).

The principal GHGs emitted into the atmosphere through human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (EPA 2014a).

- **Carbon dioxide** is the major GHG emitted through human activities (EPA 2014b). CO_2 enters the atmosphere as a result of activities such as land use changes, the burning of fossil fuels (e.g., coal, natural gas, oil, and wood products), and the manufacturing of cement. CO_2 emissions resulting from the combustion of coal, oil, and gas constitute 82 percent of all U.S. GHG emissions (EPA 2014b). Before the industrial revolution, CO_2 concentrations in the atmosphere were roughly stable at 280 parts per million. By 2010, CO_2 levels had increased to 390 parts per million, a 40 percent increase, as a result of human activities (EPA 2014a).
- **Methane** is emitted during the processing and transport of fossil fuels, through intensive animal farming, and by the degradation of organic waste. Concentrations of CH_4 in the atmosphere have increased to more than 2.5 times of preindustrial levels (EPA 2014a).
- **Nitrous oxide** is emitted during agricultural and industrial activities and during the combustion of fossil fuels and solid waste. Atmospheric levels of N_2O have increased 18 percent since the beginning of industrial activities (EPA 2014a).
- **Fluorinated gases**, including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6), are synthetic compounds emitted through industrial processes. They are sometimes used in place of 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 CO_2 and are considered gases with a high global warming potential (EPA 2014a).
- 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.

2. Activities That Would Contribute to Greenhouse Gas Emissions

The Proposed Action would involve building a transmission line in Douglas and/or Chelan Counties, Washington. Under the No Action alternative, the transmission line would not be constructed and no operation and maintenance activities related to a new transmission line would occur. Implementation of any of the Proposed Action alternatives 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 vegetation and tree clearing
- **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.

3. Methods Used to Calculate Greenhouse Gas Emissions

3.1. East Route

3.1.1 Construction

Project construction would take about 11 months. 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 the 11-month-long construction 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.

- 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.
- 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 2014c). Again, this is likely an overestimation as more efficient vehicles may be occasionally used.
- BPA employees would make a trip from Portland, Oregon, to Rock Island, Washington, once every 3 weeks during the 11-month period at a round-trip distance of 575 miles.

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. Although it is difficult to develop an accurate estimate of total fuel consumption associated with heavy construction equipment operation, the following assumptions were used.

- The average size of the equipment would not exceed 266 horsepower. All equipment would operate at maximum power for 8 hours per day and 5 days per week throughout the construction phase. This is a significant overestimation because equipment commonly operates in idle or at reduced power.
- Equipment would operate at approximately 35 percent efficiency, representing the percentage of productive energy extracted from the diesel fuel relative to the maximum potential energy within the fuel (i.e., 128,450 British thermal units per gallon of diesel) (AFDC 2013).

Carbon storage loss related to permanent vegetation removal for the creation of new access roads and right-of-way clearing would also occur. However, due to the type of vegetation present in the project area (primarily shrub-steppe species), carbon storage loss is anticipated to small and was not calculated for new road construction and other clearing activities.

3.1.2 Operation and Maintenance

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

- Routine patrols (access road, structure, and vegetation inspections): One round trip per year from the Douglas PUD office in Wenatchee to the Columbia Substation: 32 miles.
- Maintenance of roads and structures and associated hardware: One round trip per year from the Douglas PUD office in Wenatchee to the Columbia Substation: 32 miles.

- Emergency maintenance to address line outages, landslides, and other unpredicted events: 0.25 round trip per year (approximately 1 trip every 4 years) from the Douglas PUD office in Wenatchee to the Columbia Substation, 32 miles.
- Natural resource review: 0.25 round trip per year (approximately 1 trip every 4 years) from the Douglas PUD office in Wenatchee to the Columbia Substation, 32 miles.

Vegetation management activities, including mowing along roadsides and controlling weeds, 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 included operation and maintenance work for the estimated 100-year life span of the rebuilt transmission line. All of the Proposed Action Alternatives are anticipated to have the same estimated GHG emissions for operation and maintenance activities.

3.1.3 Direct Emissions from Substation Equipment

The presence of SF_6 – containing equipment at the substations would contribute to total CO_2e[4] (equivalent carbon dioxide) emissions over the estimated 100-year life span of the rebuilt transmission line. Calculations of SF_6 and corresponding CO_2e emissions were therefore performed. All of the Proposed Action alternatives propose the same upgrades to substations.

3.1.4 Results

GHG emissions were calculated using the estimated values described above for two types of activities: construction of the East Route, ongoing annual operation and maintenance activities for the estimated 100-year life span of the transmission line and substation equipment emissions over the life span of the transmission line

Construction Emissions

Table A-1 displays the results of calculations for the construction activities that would contribute to GHG emissions. Construction of the East Route would result in an estimated 1,848 metric tons of CO_2e[5] (equivalent carbon dioxide) emissions.

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

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

Table A-1. Estimated Greenhouse Gas Emissions from East Route Project Construction

Estimated GHG Emissions of Construction Activities	Metric Tons			
	CO_2	CH_4 (CO_2e)[a]	N_2O (CO_2e)[b]	Total CO_2e[c]
Construction transportation	170.8	138.1	642.9	951.8
BPA employee transportation	4.7	3.1	16.2	23.9
Construction equipment operation	863.3	1.1	5.5	869.9
Total[c]	**1,038.4**	**142.7**	**664.7**	**1,845.7**

a CO_2 emission factors calculated from EIA 2014b. CH_4 and N_2O emission factors from EPA 2014b.

b CH_4 and N_2O emissions have been converted into units of equivalent carbon dioxide (CO_2e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH_4 and 310 GWP for N_2O (ICBE 2014).

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

Operation and Maintenance Emissions

Table A-2 displays the contribution to GHG emissions that would result from operation and maintenance activities. Proposed Action operation and maintenance activities would result in an estimated 21 metric tons of CO_2e emissions over the life of the project.

Table A-2. Estimated Greenhouse Gas Emissions from Operation and Maintenance for the Life of East Route

Type of Operation and Maintenance Activity	Metric Tons			
	CO_2	CH_4 (CO_2e)[a]	N_2O (CO_2e)[b]	Total CO_2e[c]
Routine patrols	1.7	0.5	6.3	8.5
Maintenance work	1.7	0.5	6.3	8.5
Emergency maintenance	0.4	0.1	1.6	2.1
Natural resource review	0.4	0.1	1.6	2.1
Total[c]	**4.2**	**1.3**	**15.7**	**21.2**

a CO_2 emission factors calculated from EIA 2014b. CH_4 and N_2O emission factors from EPA 2014b.

b CH_4 and N_2O emissions have been converted into units of equivalent carbon dioxide (CO_2e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH_4 and 310 GWP for N_2O (ICBE 2014).

c The sum of the individual entries may not match the total due to rounding.

Substation Equipment Emissions

Table A-3 displays the contribution to GHG emissions that would result from operation of SF_6 – containing equipment at the substations over the estimated 100-year life span of the rebuilt transmission line. Proposed Action substation equipment emission would result in an estimated 2,260 metric tons of CO_2e emissions over the life of the project.

Table A-3. Estimated Greenhouse Gas Emissions from Operation and Maintenance for the Life of East Route

Type of Equipment	SF_6	Total CO_2e
SF_6-FILLED - Breakers (BKRS)	**0.0**	**22.0**
SF_6-FILLED - BUSHINGS (BUSH)	**0.0**	**0.6**
SF_6-FILLED - Circuit Switch (CKTSWR)	**0.0**	**0.0**
SF_6-FILLED - Current Transformers (CTs)	**0.0**	**0.0**
SF_6-FILLED - Line Disconnects with LLS-II Interrupters (DIS)	**0.0**	**0.0**
SF_6-FILLED - Gas Insulated Switchgear (GIS)	**0.0**	**0.0**
SF_6-FILLED - High speed ground switch (HSGS)	**0.0**	**0.0**
Total	**0.0**	**22.6**

East Route Summary of Results

The East Route would result in an estimated 1,846 metric tons of CO_2e emissions. Ongoing operation and maintenance activities over the life of the project would yield an estimated 21 metric tons of CO_2e emissions. An estimated 22.6 metric tons of CO_2e emissions per year would occur related to direct emissions from substation equipment, resulting in approximately 2,260 metric tons of CO_2e emissions over the 100-year lifespan.

To provide context for this level of emissions, the EPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO_2e emitted annually (74 FR 56260). This threshold is comparable to the approximate amount of CO_2e generated by 5,263 passenger vehicles per year (EPA 2014b). Comparatively, the GHG emissions during project construction divided over the life of the project would be equivalent to the emissions generated by about 3 passenger vehicles per year. Direct emissions from substation equipment and from operation and maintenance activities would result in carbon dioxide emissions about equal to that of 4 passenger vehicles per year averaged over the 100 year life span of the transmission structures.

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 climate change would be low.

3.2 West Route D-E

3.2.1 Construction

GHG emission estimates for construction were calculated using the same method for West Route D-E as for the East Route except that an 8.5-month construction period was used.

3.2.2 Operation and Maintenance

Operation and maintenance activity GHG emission estimates were calculated using the same metrics as were used for the East Route since all activities were based on round-trip travel from the Douglas PUD office in Wenatchee to the Columbia Substation. All of the Proposed Action Alternatives are anticipated to have the same estimated GHG emissions for operation and maintenance activities.

3.2.3 Direct Emissions from Substation Equipment

Direct emissions from substation equipment was calculated using the same method for the East Route. All of the Proposed Action alternatives propose the same upgrades to substations.

3.2.4 Results

GHG emissions were calculated using the estimated values described above for two types of activities: construction of West Route D-E, ongoing annual operation and maintenance activities for the estimated 100-year life span of the transmission line and substation equipment emissions over the life span of the transmission line.

Construction Emissions

Table A-4 displays the results of calculations for the construction activities that would contribute to GHG emissions. Construction of West Route D-E would result in an estimated 1,426 metric tons of CO_2e emissions.

Table A-4. Estimated Greenhouse Gas Emissions from West Route D-E Project Construction

Estimated GHG Emissions of Construction Activities	Metric Tons			
	CO_2	CH_4 (CO_2e)[a]	N_2O (CO_2e)[b]	Total CO_2e[c]
Construction transportation	**132.0**	**106.7**	**496.8**	**735.5**
BPA employee transportation	**3.3**	**2.7**	**12.5**	**18.5**
Construction equipment operation	**667.1**	**0.8**	**4.3**	**672.2**
Total[3]	**802.4**	**110.2**	**513.6**	**1,426.2**

a CO_2 emission factors calculated from EIA 2014b. CH_4 and N_2O emission factors from EPA 2014b.

b CH_4 and N_2O emissions have been converted into units of equivalent carbon dioxide (CO_2e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH_4 and 310 GWP for N_2O (ICBE 2014).

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

Operation and Maintenance Emissions

All of the Proposed Action Alternatives are anticipated to have the same estimated GHG emissions for operation and maintenance activities. Table A-2 displays the estimated contribution to GHG emissions that would result from operation and maintenance activities.

Proposed Action operation and maintenance activities would result in an estimated 21.6 metric tons of CO_2e emissions over the life of the project.

Substation Equipment Emissions

Table A-3 displays the contribution to GHG emissions that would result from operation of SF_6 – containing equipment at the substations over the estimated 100-year life span of the rebuilt transmission line. Proposed Action substation equipment emissions would result in an estimated 2,260 metric tons of CO_2e emissions over the life of the project.

West Route D-E Summary of Results

West Route D-E would result in an estimated 1,426 metric tons of CO_2e emissions from construction. Ongoing operation and maintenance activities over the life of the project would yield an estimated 21 metric tons of CO_2e emissions. An estimated 22.6 metric tons of CO_2e emissions per year would occur related to direct emissions from substation equipment, resulting in approximately 2,260 metric tons of CO_2e emissions over the 100-year lifespan.

To provide context for this level of emissions, the EPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO_2e emitted annually (74 FR 56260). This threshold is comparable to the approximate amount of CO_2e generated by 5,263 passenger vehicles per year (EPA 2014b). Comparatively, the GHG emissions during project construction divided over the life of the project would be equivalent to the emissions generated by about 3 passenger vehicles per year. Direct emissions from substation equipment and from operation and maintenance activities would result in carbon dioxide emissions about equal to that of 4 passenger vehicles per year averaged over the 100 year life span of the transmission structures.

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 climate change would be low.

3.3 West Route D-F

3.3.1 Construction

GHG emission estimates for construction were calculated using the same method for West Route D-E as for the other two Proposed Action alternatives except that an 8 -month construction period was used.

3.3.2 Operation and Maintenance

Operation and maintenance activity GHG emission estimates were calculated using the same metrics as for other two Proposed Action alternatives since all activities were based on round-trip travel from the Douglas PUD office in Wenatchee to the Columbia Substation.

3.3.3 Direct Emissions from Substation Equipment

Direct emissions from substation equipment was calculated using the same method for the East Route. All of the Proposed Action alternatives propose the same upgrades to substations.

3.3.4 Results

GHG emissions were calculated using the estimated values described above for three types of activities: construction of West Route D-F, ongoing annual operation and maintenance activities for the estimated 100-year life span of the transmission line and substation equipment emissions over the life span of the transmission line. Each type of activity is discussed separately below.

Construction Emissions

Table A-5 displays the results of calculations for the construction activities that would contribute to GHG emissions. Construction of West Route D-F would result in an estimated 1,344 metric tons of CO_2e emissions.

Table A-5. Estimated Greenhouse Gas Emissions from West Route D-F Project Construction

Estimated GHG Emissions of Construction Activities	Metric Tons			
	CO_2	CH_4 (CO_2e)[a]	N_2O (CO_2e)[b]	Total CO_2e[c]
Construction Transportation	124.2	100.4	467.6	692.3
BPA Employee Transportation	3.1	2.5	11.8	17.4
Construction Equipment Operation	627.8	0.8	4.0	632.7
Total[c]	**755.2**	**103.8**	**483.4**	**1,342.3**

a CO_2 emission factors calculated from EIA 2014b. CH_4 and N_2O emission factors from EPA 2014b.

b CH_4 and N_2O emissions have been converted into units of equivalent carbon dioxide (CO_2e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH_4 and 310 GWP for N_2O (ICBE 2014).

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

Operation and Maintenance Emissions

All of the Proposed Action Alternatives are anticipated to have the same estimated GHG emissions for operation and maintenance activities. Table A-2 displays the estimated contribution to GHG emissions that would result from operation and maintenance activities. Proposed Action operation and maintenance activities would result in an estimated 21.6 metric tons of CO2e emissions over the life of the project.

Substation Equipment Emissions

Table A-3 displays the contribution to GHG emissions that would result from operation of SF_6 – containing equipment at the substations over the estimated 100-year life span of the rebuilt transmission line. Proposed Action substation equipment emissions would result in an estimated 2,260 metric tons of CO_2e emissions over the life of the project.

West Route D-F Summary of Results

West Route D-F would result in an estimated 1,342 metric tons of CO_2e emissions from construction. Ongoing operation and maintenance activities over the life of the project would yield an estimated 21 metric tons of CO_2e emissions. An estimated 22.6 metric tons of CO2e emissions per year would occur related to direct emissions from substation equipment, resulting in approximately 2,260 metric tons of CO_2e emissions over the 100-year lifespan.

To provide context for this level of emissions, the EPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO_2e emitted annually (74 FR 56260). This threshold is comparable to the approximate amount of CO_2e generated by 5,263 passenger vehicles per year (EPA 2014b). Comparatively, the GHG emissions during project construction divided over the life of the project would be equivalent to the emissions generated by about 2 passenger vehicles per year. Direct emissions from substation equipment and from operation and maintenance activities would result in carbon dioxide emissions about equal to that of 4 passenger vehicles per year averaged over the 100 year life span of the transmission structures.

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 climate change would be low.

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