Schultz-Hanford Area Transmission Line Project

Final Environmental Impact Statement

Summary

Bonneville Power Administration
U.S. Department of Energy

Bureau of Land Management
Bureau of Reclamation
Fish and Wildlife Service
U.S. Department of Interior

Department of Army
U.S. Department of Defense

January 2003

Final Environmental Impact Statement

Responsible Agencies: U.S. Department of Energy, Bonneville Power Administration (BPA), Richland Operations Office (RL); U.S. Department of Defense, Department of Army (USDOA); U.S. Department of Interior, Bureau of Land Management (BLM), Bureau of Reclamation (BOR), Fish and Wildlife Service (USFWS).

Title of Proposed Project: Schultz-Hanford Area Transmission Line Project – DOE/EIS-0325

State Involved: Washington

Abstract: BPA proposes to construct a new 500-kilovolt (kV) transmission line in central Washington. This project would increase transmission system capacity north of Hanford. Since the mid 1990's, transmission lines in central Washington have grown increasingly constrained. During spring and early summer months, the amount of power that needs to move through this area exceeds the carrying capacity of the existing transmission lines. Not having enough transmission capacity can compromise safety and decrease transmission system reliability. Four construction alternatives, all involving construction of new transmission lines, and a No Action alternative are being considered. Each construction alternative begins at BPA's Schultz Substation approximately 9 miles north of Ellensburg, Washington. The alternatives terminate in northern Benton County at one of two locations, BPA's Hanford Substation or a new substation (Wautoma Substation) just east of the Benton REA Blackrock Substation. The Preferred Alternative (Alternative 2) is approximately 64 miles long. This alternative would terminate at the new Wautoma Substation. Most of the new line would parallel existing transmission lines with separation varying between 125 feet and 1375 feet. About 8 miles of the line would be a rebuild of the existing line to double-circuit to hold both the existing and new transmission line. This would reduce ROW impacts and the need for new access roads through agriculture. Alternative 1 is approximately 63 miles long and would terminate at Hanford Substation. This alternative would establish a new ROW in the vicinity of, but not directly adjacent to an existing ROW. There would be impacts to agricultural practices and rangeland. Alternative 3 is approximately 58 miles long and would terminate at the new Wautoma Substation. About 30 miles of the route would be a new ROW through the Yakima Training Center causing disruption to Army uses of land as well as impacts to shrub-steppe habitat and known cultural resource sites. Alternative 1A is approximately 70 miles long and ends at Hanford Substation. This alternative would establish about 14 miles of new ROW, with the remaining being in the vicinity of, but not directly adjacent to an existing ROW. There would be impacts to shrub-steppe habitat and rangeland. BPA is also considering a No Action Alternative (Environmentally Preferred). This alternative would not create any construction related environmental impacts and would not meet the purpose or need for the project.

The USDOA, BLM, BOR, and USFWS, as cooperating agencies, must select an alternative based on their needs and objectives, decide if the project complies with currently approved management plans/objectives, and decide if they would issue the appropriate permits/easements for the construction, operation, and maintenance of project facilities. The RL, while not a cooperating agency, would make joint decisions with BPA.

The comments received on the Draft EIS and responses to the comments are in Chapter 6.

The Final EIS looks much like the Draft EIS. Additions and changes are underlined. Deletions are not marked. Additional appendices have been added to respond to comments and clarify information. A listing of the general changes in each chapter is listed on the next page.

BPA expects to issue a Record of Decision (ROD) in February 2003. The ROD will be mailed to agencies, groups, and individuals on the mailing list.

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For more copies of this document, please call 1-800-622-4520 and ask for the document by name. The Summary is also available on the Internet at *www.efw.bpa.gov*. Click on *Environmental Planning/Analysis, Active Projects*.

For additional information on DOE NEPA activities, please contact Carol Borgstrom, Director, Office of NEPA oversight, EH-25, U.S. Department of Energy, 1000 Independence Avenue S.W., Washington D.C. 20585, phone: 1-800-472-2756.

Summary

In this Summary:

- **Purpose and Need for Action**
- **Alternatives**
- **Affected Environment**
- **Impacts**

This summary covers the major points of the Final ***Environmental Impact Statement*** (***EIS***) prepared for the Schultz-Hanford Area Transmission Line Project proposed by the Bonneville Power Administration (***BPA***). The project involves constructing a new 500-kilovolt (***kV***) line in central Washington, north of Hanford. The new line would begin at the Schultz Substation near Ellensburg and and end at a new or existing substation in the Hanford area (see Map S-1). The project may also involve constructing a new substation to accommodate the new transmission line. As a federal agency, BPA is required by the National Environmental Policy Act (***NEPA***) to take into account potential environmental consequences of its proposal and take action to protect, restore, and enhance the environment during and after construction. Preparation of this EIS assists in meeting those requirements.

➡ For Your Information

Words and acronyms in bold and italics are defined in Chapter 10, Glossary and Acronyms, in the Final EIS. Some are also defined in sidebars.

S.1 Purposes and Need for Action

S.1.1 Need

BPA owns and operates a system of transmission lines that move electricity through central Washington. Since the mid-1990's, the transmission lines that move electricity in a north-to-south direction on the east side of the Cascades, north of the U.S. Department of Energy Hanford Reservation (Hanford Site), have grown increasingly constrained. During spring and early summer months, the amount of power that needs to move through this area exceeds the carrying capacity of the existing transmission lines. Not having enough ***transmission capacity*** can compromise safety and decrease transmission ***system reliability***.

In the event of an ***outage***, additional power cannot be moved through the existing transmission system because the lines would overheat and sag below acceptable levels potentially causing fires and further equipment failure. This can lead to ***brownouts*** or, under certain conditions, a ***blackout***. Therefore, BPA needs to increase transmission capacity ***north of Hanford*** to move additional power through this area.

Transmission capacity *refers to the maximum load that a transmission line or network of transmission lines can carry.*

System reliability *is the ability of a power system to provide uninterrupted service.*

A transmission line that is not in service, either planned or unplanned, is called an ***outage****.*

A ***brownout*** *is a partial reduction of electrical voltages that causes lights to dim and motor-driven devices to lose efficiency.*

A ***blackout*** *is the disconnection of the source of electricity from all electrical loads in a certain geographical area.*

For Your Information

By optimizing transmission system usage, congestion is relieved on constrained transmission paths, thereby delaying transmission reinforcement.

*The **energization date** is when the project has been built and is operational.*

In order to meet the requirements of the 2000 Biological Opinion, BPA needs to plan and construct a project in the Hanford area by 2004 or 2005.

Investments included cost-effective measures such as remedial action schemes; automatic measures like generation and/or load dropping that ensure acceptable transmission system performance.

***Regional power transfers** are the exchange of electricity between the Pacific Northwest and California or Canada when one region has a surplus of energy and demand is high in another.*

***Spring run-off** refers to water from the snow melting in the spring that adds to the amount of water flowing in the Columbia River.*

*In the process of **spilling** water, dam gates are opened and water flows out. The water does not go through the turbines, which could injure fish.*

S.1.2 BPA's Purposes

Purposes are goals to be achieved while meeting the need for the project. They are used to evaluate project alternatives. BPA will use the following purposes to choose among the alternatives:

- Maintain transmission system reliability;
- Optimize transmission system usage;
- Minimize environmental impacts;
- Minimize costs; and
- Meet ***energization date*** of late 2004.

S.1.3 Background

BPA has limited transmission capacity north of Hanford primarily because of two main reasons:

- Wholesale power deregulation; and
- Obligations to threatened and endangered species (fish).

Wholesale power deregulation started in 1992, causing BPA to cut costs in many ways in order to stay competitive in an open market. BPA had not built any major transmission lines since the mid-1980's, and this continued after deregulation. Investments in the transmission system (including maintenance) were small, inexpensive, and quickly energized compared to building expensive transmission lines. However, this allowed BPA to squeeze more performance out of the existing transmission system and continue to meet growing load. Over the past five years, there has been an increase in the usage of the transmission system due to an increase in ***regional power transfers***. The increased transmission usage in the Northwest has outrun the capacity of the existing transmission system.

Since the early 1990's, 12 distinct populations of salmon species have been listed as threatened or endangered under the Endangered Species Act (**ESA**) within the northwestern United States. Federal agencies that operate the dams in the Northwest are required to take specific actions to help salmon survive. During the ***spring run-off***, water in the Lower Snake and Columbia Rivers that had previously been used to generate electricity at dams (Lower Granite to Bonneville) is now used to help transport juvenile salmon down river to the ocean. ***Spilling*** water over these dams causes less water to go through the turbines which results in less power being generated. To make up for the loss of generation, dams along the mid- and upper-Columbia River in northern Washington (e.g., Grand Coulee and Chief Joe) need to generate additional power to meet market

demands during the spring and summer months. This is in addition to power coming from Canada.

As electricity is generated at the mid- and upper-Columbia River dams, it moves south through central Washington to load centers like Portland and Seattle, and to the ***Southern Intertie***. It also flows west over the Cascade Mountains and then south through the Seattle area. The transmission capacity across the north of Hanford area cannot accommodate the amount of electricity needing to flow through the area to the south.

For Your Information

*The **Southern Intertie** is a collective group of transmission lines that move power north and south between Oregon and California.*

S.1.4 Draft EIS Public Comment Period

The Draft EIS (DEIS) was made available to the public on February 8, 2002. 251 copies of the DEIS were mailed to interested members of the public. 99 copies of the summary were also mailed. Comments were collected at public meetings held in Desert Aire, Ellensburg, and Richland, Washington. Comments were also received via phone, mail, and e-mail. The comment period ended on March 25, 2002.

This Summary and Final EIS (FEIS) provides updated information based on comments received as well as additional information that has become available. Additions to the document are displayed with underlined text.

S.2 Alternatives

After identifying existing and future electrical needs in the area, BPA began to develop alternatives to meet that need. BPA did long range 6-year studies to determine what actions could meet the need, what each would cost, and how each could affect the transmission system.

This ***Environmental Impact Statement (EIS)*** refines these actions or alternatives based on comments from agencies and the public. Several alternatives were evaluated. These alternatives – the Preferred Alternative (Alternative 2), and Alternatives 1, 3, and 1A – are discussed in this EIS, as well as the No Action Alternative.

S.2.1 Segments

The construction alternatives are divided into Segments A through F. All segments are ***single-circuit*** lines unless otherwise specified.

*A **single-circuit** line has one electrical circuit per structure.*

Segment A, common to all alternatives, starts at the BPA Schultz Substation and goes southeast, following the existing Vantage – Schultz 500-kV transmission line. In order to make room for the new line and improve the configuration of the existing lines, BPA would relocate the first mile of the existing Sickler-Schultz 500-kV

For Your Information

*A **bay** is an area set aside in a substation for special equipment.*

The decision of whether to use Option 1 or 2 of the Sickler-Schultz Reroute would depend on negotiations with the landowners.

transmission line from its current location, to a new ***bay*** on the north side of the substation. This redesign is referred to as the Sickler-Schultz Reroute and has two options.

From the substation, the line would head northeast along one of two optional routes for approximately 1 mile to intersect with the existing Rocky Reach–Maple Valley 345-kV line. The two Sickler-Schultz Reroute options are approximately 1200 feet apart on the south side and converge to the same tower on the north. The second route option was developed in response to landowner concerns. Option 2 would result in the construction of one more tower than Option 1. From the tower where the two options converge, the line would follow the Rocky Reach–Maple Valley line for approximately 1.5 miles to the northeast. At this point, the relocated Sickler-Schultz line would reconnect with the existing Sickler-Schultz line and continue to the northeast.

Since the DEIS, BPA determined that the existing structures on the Schultz-Vantage line between the substation and Naneum Crossing would not be able to support the new conductor and would have to be replaced.

The existing Schultz-Vantage 500-kV line from Schultz Substation to the Naneum Crossing would be rebuilt. The line would then be connected with the new transmission line running parallel to the existing Schultz-Vantage line to the southeast. The existing Schultz-Vantage line would be connected to the vacated portion of the Sickler-Schultz line running into the Schultz Substation. The portion of the Sickler-Schultz line that runs due north from the Naneum crossing would be removed because it would no longer be needed. This combination of rerouting and reconnecting lines would eliminate the existing 500-kV line crossings.

Southeast of Naneum crossing the new transmission line would be constructed roughly parallel to the existing Schultz-Vantage line. The new line would be located on the north side of the existing line starting with a 200-foot separation for approximately 6 miles and then a 400-foot separation for approximately 4 miles. The remaining 13 miles would have a variable separation ranging from 500 feet to 1,375 feet. Segment A would cross the Vantage Highway. Segment A is 27.5 miles long, including the 2.25 miles of relocated Sickler-Schultz line and 2 miles of rebuilt line between Schultz Substation and the Naneum Crossing.

There is a potential reroute within Segment A. This reroute was introduced when BPA identified a potential difficulty in acquiring the rights to build the new line parallel to the existing Schultz-Vantage Line across a large parcel northwest of Colockum Road. This parcel of land is under Tribal Allotment status, with Native American landowners. The Segment A Reroute would be located around the land parcel in question. BPA's right to keep the existing Schultz-

Vantage Line on the property was also in question; therefore, the Segment A Reroute includes the relocation of the existing line.

If the Segment A Reroute were to be chosen, a little more than a mile of the existing Schultz-Vantage Line would be removed. Please see Appendix B, *Description and Comparison of Impacts Along Segment A Reroute,* for greater detail of the Segment A Reroute.

BPA's preference is to keep the existing line where it is and to build the new line along Segment A.

Segment B starts where the new transmission line would cross to the south side of the existing Schultz-Vantage line south of I-90 and has two route options: B_{NORTH} and B_{SOUTH}.

B_{NORTH} runs to the east, parallel to and 1,200 feet south of the Schultz-Vantage line. This route option follows the existing line across the Columbia River and ends at the BPA Vantage Substation. B_{NORTH} is 9.1 miles long.

B_{SOUTH} would initially run to the southeast, then cross two other transmission lines and turn almost due east. The new line would parallel an existing 230-kV wood pole transmission line on the south side of the John Wayne Trail for approximately 5 miles. Just before the Columbia River, B_{SOUTH} would angle slightly to the north towards the Schultz-Vantage line. The two lines would parallel one another with a 300-foot separation and would cross the Columbia River. B_{SOUTH} ends at the south end of the BPA Vantage Substation. B_{SOUTH} is approximately 9.5 miles long.

Segment C starts in the same place as Segment B (where the new line would cross the existing Schultz-Vantage line). The segment would turn south, crossing the Yakima Training Center (YTC). This segment would not parallel an existing line. The segment would angle southeast, leave the YTC, cross Highway 24 and end where it intersects the existing Hanford-Ostrander and Hanford-John Day 500-kV transmission lines. This intersection of lines would be the site of a new substation, called Wautoma Substation. Segment C is 30.1 miles long.

Segment D starts in the area just south of Vantage Substation. It would head in a southeasterly direction, running parallel approximately 125 feet to the west of the existing Midway-Vantage 230-kV line. This separation would continue for approximately 4 miles and cross Crab Creek.

While climbing the Saddle Mountains, the separation between the new and existing lines would increase, with the widest point

For Your Information

Double-circuit *towers hold conductors for two transmission lines.*

(approximately 400 feet wide) at the top of the mountain. The separation would slowly decrease on the south side of the Saddle Mountains and the lines would be immediately adjacent to one another approximately 9 miles south of Vantage Substation.

Northeast of Mattawa, the Midway-Vantage line would be removed and replaced with ***double-circuit*** structures carrying the new line and the Midway-Vantage 230-kV line through irrigated areas. This double-circuit section would be about 8 miles long. Beyond the irrigated areas, just north of the Columbia River, Segment D would again parallel the Midway-Vantage line on the west side and cross the Columbia River. Segment D would pass the BPA Midway Substation on the west side and continue south up the Umtanum Ridge. The new line would parallel the existing Midway-Big Eddy 230-kV line 125 feet to the west. South of State Route 24, the new line would cross to the east side of the Midway-Big Eddy where it crosses two other lines. The new line would angle away from the existing lines as it climbs and descends the Yakima Ridge, terminating in the new Wautoma Substation. Segment D is 26.7 miles long.

Segment E begins at Vantage Substation and heads south, paralleling the existing Vantage-Hanford 500-kV line 1,200 feet to the north. It would cross Crab Creek, climb the Saddle Mountains and head southeast, crossing the Saddle Mountain Unit of the Hanford Reach National Monument. After crossing the Columbia River, Segment E would end at the existing BPA Hanford Substation. Segment E is 25.3 miles long.

Segment F begins at Vantage Substation and heads east, then south crossing Crab Creek and climbing the Saddle Mountains. It would then follow the Vantage-Hanford line for a short length before turning due east. Segment F would traverse about 14 miles along the south slope of the Saddle Mountains, and then intersect the Grand Coulee-Hanford 500-kV transmission line. It would then turn south and parallel the existing Grand Coulee-Hanford line 1,200 feet to the east across the Wahluke Slope. After crossing the Columbia River, the segment ends at the Hanford Substation. Segment F is 32.8 miles long.

S.2.2 Preferred Alternative–Alternative 2

BPA is proposing to construct a new 500-kV transmission line between the Schultz Substation, almost 9 miles north of Ellensburg, Washington, and a new substation (Wautoma Substation) in Benton County, 2 miles south of Highway 24. The Preferred Alternative is Alternative 2, is made up of Segments A (including Option 1 of the

Sickler-Schultz Reroute), $B_{SOUTH,}$ and D, and is 63.7 miles long. It does not include the Segment A Reroute.

The Preferred Alternative would cost approximately $107,000,000 (2002 dollars).

For Your Information

BPA completed a detailed cost estimate for the Preferred Alternative. The new cost is approximately 40% greater than the cost stated in the DEIS. Detailed cost estimates were not completed for the other alternatives. To be able to compare costs of alternatives, the estimated costs from the DEIS were increased by 40%.

A transmission line designed to hold one electrical circuit is called ***single-circuit.***

S.2.2.1. Structures

The Preferred Alternative would primarily use 500-kV, ***single-circuit*** steel lattice structures, also called towers, to support the transmission line conductors. More than half of the structures would be delta configuration. Flat configuration structures would be used in three selected areas. The first area would be approximately 16.2 miles, from approximately 1 mile north of Interstate 90 (I-90) in Segment A, south through the YTC and across the Columbia River in B_{SOUTH}. The next section would be in Segment D starting just north of Crab Creek going south up and over the Saddle Mountains across BLM land for 4.4 miles. The last section of flat configuration would start after the agricultural area just north of the Columbia River. Flat configuration would be used over the Columbia River, past Midway Substation and up Umtanum Ridge. The length of this last section would be approximately 3.2 miles, most of the Hanford Monument crossed.

Through the agricultural area in Segment D, 500-kV double-circuit lattice structures would be used to hold the new 500-kV and the existing 230-kV line. The height of each structure would vary by location and surrounding land forms. Single-circuit delta structures would average 135 feet high. Flat configuration structures would average 90 feet high. The double-circuit structures would average 170 feet high.

S.2.2.2. Conductors

The wires or lines that carry the electrical current in a transmission line are called conductors. ***Alternating current*** transmission lines, like the new line, require three sets of wires to make up a circuit. For a single-circuit 500-kV transmission line, there would be three sets of wires and for a double-circuit line (Segment D) there would be six sets of wires.

Alternating current *is an electrical current that reverses directions at regular intervals.*

Conductors are not covered with insulating material, but rather use the air for insulation. Conductors are attached to the structure using porcelain or fiberglass insulators. Insulators prevent the electricity in the conductors from moving to other conductors, the structure, and the ground.

Two smaller wires, called overhead ground wires, are attached to the top of transmission structures. Overhead ground wires protect the transmission line from lightning damage. To disseminate the electrical

power from lightning, the power is routed to the ground at each tower through wires called counterpoise.

S.2.2.3. Right-of-Way

New ROW would be needed for the new structures and line. The new ROW would be 150 feet wide for the delta configuration structures and 180 feet wide for flat configuration. The wider ROW for the flat configuration provides adequate electrical clearance for the conductors. Where the new line would parallel an existing 500-kV line (Segment A), the centerline of the new line would be from 200 to 1,375 feet from the existing line. The land between the two transmission lines may (depending on landowner preference) be included in the easement BPA would acquire from the landowner. The distance from the new line centerline to the nearest edge of ROW would depend on the type of structure, 75 feet for delta and 90 feet for flat (to provide adequate electrical clearances).

From I-90 south in the YTC, the new line would be located in a 180-foot-wide ROW until it joins a 115-kV line along the John Wayne Trail. In this portion of the line, the ROW would be 150 feet wide directly adjacent to the ROW of the other line. Once these two lines diverge, the new line would join the Schultz-Vantage line at a 300-foot separation and cross the Columbia River. The distance from the centerline of the new line to the outside of the ROW would be 100 feet.

In Segment D, where the existing line would be replaced with a double-circuit line, the existing ROW would be expanded 25 feet on the west side, increasing the ROW from the existing 100 feet to 125 feet. Where the new line is parallel to the 230-kV line using a delta configuration, the new ROW would be 150 feet wide. Where flat configuration would be used, the new ROW would be 180 feet wide.

BPA would obtain easements from landowners for new ROW. Fee title to the land covered by the easement generally remains with the owner, and is subject to the provisions of the easement.

S.2.2.4. Clearing

Vegetation within the ROW is restricted by height. This is required for the safe and uninterrupted operation of the line. Approximately 45 trees surrounding 5 creeks would be removed from within new ROW. In addition, there are a few trees outside of the ROW near Cooke Creek that would potentially need to be cut. These trees are tall enough cause an outage if they were to fall. Tree specialists would examine the trees, if the trees are stable they could remain standing, but if they are dying or diseased then they would be cut.

Trees that would not typically grow taller than BPA safety limits would not cleared from the ROW.

At the structure sites, all trees and brush would be cut and removed within a 100-by-150-foot area, with root systems being removed from a 50-by-50-foot area for the tower footings. A portion of the site would be graded to provide a relatively level work surface for the erection crane, unless helicopter erection is used. The footprint of the structures would be considered permanent disturbance for vegetation. The average footprints are 25 by 25 feet for flat configuration, 27 by 27 feet for delta configuration, and 32 by 32 feet for the double-circuit structures. The total permanent disturbance as a result of the 298 structures in the Preferred Alternative would be 5.8 acres. Temporary disturbance from the equipment movement around the structures would be 119.2 acres. If Option 2 of the Sickler-Schultz Reroute is selected, the structure count would increase by 2, permanent disturbance would increase by 0.05 acre and temporary disturbance would increase by 0.8 acre.

S.2.2.5. Access Roads

Access roads on and off the ROW would be used to construct and maintain a new line. A combination of new roads, upgraded existing roads, and existing roads would be used to access the new line. Existing access roads would be used whenever possible, with ***spur roads*** constructed to the new structures.

➡ For Your Information

Spur roads *are short road segments branching off the trunk roads that go to each structure if the structure is not located on a trunk road.*

New roads would be located within the ROW wherever possible. Where conditions require, such as at steep cliffs, roads would be constructed and used outside the ROW. BPA normally acquires easements for the right to develop and maintain permanent over-ground access for wheeled vehicle travel to each structure. No permanent access road construction would be allowed in cultivated or fallow fields unless previously agreed to by the landowner. After construction of the line is completed, BPA would allow any roads in cropland to be returned to crop production.

New access roads surfaces would be 14 feet wide, with a 3-foot temporary disturbance area on either side of the road. New and existing road beds would be gravel or rock. Approximately 18 miles of new roads would be built and 56.3 miles of existing roads would be improved.

Existing access roads would be upgraded to 14 feet. In areas where helicopter construction would be used, road widths would be reduced to 12 feet.

For Your Information

Waterbars *are smooth shallow ditches excavated at an angle across a road to decrease water velocity and divert the water off and away from the road surface.*

Dips, culverts, and ***waterbars*** would be installed within the roadbed to provide drainage. Fences, gates, cattle guards, and additional rock would be added to access roads where necessary.

S.2.2.6. Pulling and Reeling Areas

Pulling and reeling areas would be needed for the installation of the conductor. Each pulling and reeling area would be 1/4 acre in size and located every 3.5 miles along the transmission line. The Preferred Alternative would require an estimated 4.25 acres to be cleared for the pulling and reeling areas along the route. Most of the pulling and reeling sites would be located within the ROW. Some would extend beyond the ROW at angles in the line.

S.2.2.7. Staging Areas

During construction of the transmission line, areas would be needed off the main highways, near the ROW, where equipment such as steel, spools of conductor, and other construction materials would be stored until material is needed. Where helicopters would be used to build the transmission line, staging areas would be used to pre-assemble the towers for helicopter delivery to tower sites. These sites would be close to the line and spaced about 8 to 10 miles apart.

Staging area locations would be determined by the construction contractor just before or during construction. The size of each site would vary. The construction contractor would negotiate with the landowner for the use of staging sites. An environmental review would be done before the use of a staging site is approved.

At this time, staging area locations are not known.

S.2.2.8. Substations

The term ***buswork*** *describes all equipment associated with the bus tubing. Bus tubing is rigid aluminum pipes used within a substation to move electricity. The tubing is supported and vertically elevated by pedestals called bus pedestals.*

A potential transformers (PT) *is a type of transformer that uses low-voltage to monitor the high-voltage system.*

For the Preferred Alternative, a new transmission line would begin at Schultz Substation and terminate at a new substation, called Wautoma Substation. Additions and modifications would occur at Schultz Substation. No work would be needed at the Vantage or Midway Substations.

Schultz Substation – A new bay would be constructed within the existing fenced yard of the substation. New equipment within the substation would include power circuit breakers, motor-operated disconnect switches, ***buswork***, ***potential transformers (PT's)***, and substation dead-end towers.

Wautoma Substation – A new substation would be constructed in Benton County, 2 miles south of Highway 24 (T12N, R24E, Section 20). The new substation would be sited at the intersection of the new

transmission line and the Hanford-Ostrander 500-kV and Hanford-John Day 500-kV transmission lines. These two lines would be looped through the new substation. A parcel of approximately 47 acres would be purchased for the new substation. Land for the new substation would be acquired in fee and would remain in BPA and federal government ownership. A substation access road, just less than a mile long, would be built from SR 241 to the new substation.

The footprint of the substation would be approximately 820 feet by 530 feet. This area would include the substation yard (equipment within the fence) and grading outside of the fence. The actual fenced area would be about 780 feet by 490 feet. This substation would be built slightly differently than the standard substation because existing lines cross the substation site and there are existing towers within the footprint of the substation. These lines would not be taken out of service during construction of the substation, so construction would occur under energized lines. Equipment such as breakers, buswork, switches, and PT's would be installed in the yard, and the control rack would be installed in the control house.

S.2.2.9. Communications Equipment

BPA substations are electronically connected to BPA's transmission system control centers. Microwave communication sites and fiber-optic communication lines connect BPA's high-voltage substations to system control centers located in Vancouver and Spokane, Washington.

As part of the Preferred Alternative, BPA would install fiber optic cable between Vantage Substation and the new Wautoma Substation (approximately 27 miles) and from Vantage Substation north to the BPA Columbia Substation (approximately 32 miles). The new fiber would enable remote operation of the new substation as well as reinforce BPA's communication network.

From Vantage to Columbia Substation, fiber would be strung on existing transmission line structures. No new ROW would be needed and existing roads would be used for fiber installation. From Vantage to the new Wautoma Substation, the fiber would be strung on a combination of the new double-circuit transmission structures and existing lines. A combination of existing roads and new roads that would be built for the new transmission line would be used for fiber installation. From the new Wautoma Substation, fiber would also be installed on existing structures to loop back to the Midway Substation. Existing access roads would be used for fiber installation and no road improvements are expected.

The fiber cable would be less than 1 inch in diameter and would be mounted under the conductors. Every 3 to 5 miles there would be a splice box/reeling location for the stringing and tensioning of the fiber optic line. The splice box would be located on a transmission tower and an area approximately 1/4 acre in size in line with the conductors would be temporarily disturbed by a reeling truck and tensioning equipment. Five acres of temporary disturbance for the Preferred Alternative would be associated with the fiber line.

S.2.2.10. Maintenance

BPA would perform routine, periodic maintenance and emergency repairs on structures, substations, and accessory equipment. These activities typically include replacing insulators, inspections of structures, and vegetation control. Within the substations, BPA may need to periodically replace equipment.

Existing and new permanent access roads to structures would remain throughout the life of the line so that BPA can perform routine and emergency maintenance on the transmission line. Road maintenance could include grading and clearing, and repairing ditches and culverts.

For Your Information

The BPA Transmission System Vegetation Management Program EIS was completed in August 2000, and describes the planning steps, agencies and landowners to be coordinated with, and the tools to be used to control vegetation along BPA facilities. This document is available for review on the Web at http://www.efw.bpa.gov/cgi-bin/PSA/NEPA/SUMMARIES/VegetationManagement_EIS0285.

A large part of maintenance activities is vegetation control. In Central Washington, this primarily focuses on the spread of noxious weeds. Tall growing vegetation would also need to be managed in and adjacent to the ROW, primarily where the line crosses water bodies. Vegetation maintenance activities would follow the guidelines set in the BPA Transmission System Vegetation Management Program EIS. When vegetation control is needed, a vegetation management checklist would be developed for the ROW. It would identify sensitive resources and the methods to be used to manage vegetation. Substations are periodically sprayed with herbicide to keep plants from growing and creating a safety hazard.

S.2.3 Alternative 1

Reminder

Detailed cost estimates were not completed for the other alternatives. To be able to compare costs of alternatives, the estimated costs from the DEIS were increased by 40%.

Alternative 1 would start at the Schultz Substation and follow the Schultz-Vantage line along Segments A and B_{SOUTH}. As with the Preferred Alternative, Alternative 1 would not include the Segment A Reroute. It would then follow the existing Vantage-Hanford 500-kV line 1,200 feet to the north along Segment E, and would be 62.3miles long. The new line would end at the existing Hanford Substation.

This alternative has an estimated cost of $124,000,000.

S.2.3.1. Structures

Alternative 1 would use 500-kV delta and flat configuration single-circuit steel lattice structures. The height of each structure would vary by location and surrounding land forms; the delta configuration structures would have an average height of 135 feet, while the flat configuration structures would average 90 feet.

S.2.3.2. Conductors

The single-circuit transmission line would be made up of three sets of wires. The insulators and overhead ground wires would be the same as discussed earlier for the Preferred Alternative.

S.2.3.3. Right-of-Way

The ROW would be 150 feet wide for the delta configuration structures and 180 feet wide for the flat configuration structures. The distances and ROW widths for Segments A and B_{SOUTH} would be the same as described in the Preferred Alternative. Along Segment E, similar to in Segment A, where the line separation would be 1,200 feet, BPA would acquire easement rights from the landowners for the land between the two lines, including the new ROW.

Easement provisions would be the same as those discussed earlier for the Preferred Alternative.

S.2.3.4. Clearing

Clearing requirements would be the same as those discussed earlier for the Preferred Alternative. The structure footprints would be the same as described earlier for the single-circuit structures. The total permanent disturbance as a result of the 281 structures would be approximately 5.6 acres. Temporary disturbance from the equipment movement around the structures would be approximately 114.3 acres. If Option 2 of the Sickler-Schultz Reroute is selected, the structure count would increase by 2, permanent disturbance would increase by 0.05 acre and temporary disturbance would increase by 0.8 acre.

S.2.3.5. Access Roads

A new access road system would be built for the majority of Alternative 1. Wherever possible, the access roads would be located on the ROW. BPA normally acquires easements for the right to develop and maintain permanent over-ground access for wheeled vehicle travel to each structure. No permanent access road construction would be allowed in cultivated or fallow fields. Any roads in cropland would be removed and the ground would be

restored to the original contour when construction of the line is completed.

New access roads surfaces would be 14 feet wide, with a 3-foot temporary disturbance area on either side. New and existing road beds would be gravel or rock. Approximately 22.6 miles of new roads would be built and 87.6 miles of existing roads would be improved.

Existing access roads would be upgraded to 14 feet. In areas where helicopter construction would be used, road widths would be reduced to 12 feet.

Drainage, fences, and gates would be installed where needed as described earlier for the Preferred Alternative.

S.2.3.6. Pulling and Reeling Areas

Pulling and reeling area requirements would be the same as those discussed earlier for the Preferred Alternative. Alternative 1 would require an estimated 4.5 acres to be cleared for the pulling and reeling areas along the route.

S.2.3.7. Staging Areas

Staging areas would be located and used similar to those described earlier for the Preferred Alternative.

S.2.3.8. Substations

For Alternative 1, a new transmission line would begin at the Schultz Substation and end at Hanford Substation. The line would pass through the Vantage Substation, but no electrical equipment would be installed within the Substation as part of this project.

Schultz Substation – The new equipment installed at Schultz Substation would be the same as described earlier for the Preferred Alternative.

Hanford Substation – A new bay would be constructed within the existing fenced yard of the substation. Outside of the substation fence, one or two of the existing transmission line structures may need to be relocated in order to align with the readjusted substation equipment. The new equipment within the substation would include breakers, switches, buswork, and PT's.

Vantage Substation – The line would pass through the Vantage Substation in order to get from the west to east side of existing lines. A new bay and dead end would be constructed within the existing

fenced yard of the substation. Some existing transmission line towers may need to be moved to make room for the new line.

S.2.3.9. Communications Equipment

As part of Alternative 1, BPA would install fiber optic cable between Vantage Substation and Midway Substation (about 19.3 miles) and from Vantage Substation north to the BPA Columbia Substation (about 32 miles). The new fiber would reinforce BPA's communication network and make the fiber optic system more reliable.

The fiber optic cable would be strung on existing transmission line structures. The fiber cable would be less than 1 inch in diameter. As described in the Preferred Alternative, every 3 to 5 miles there would be a splice box/reeling location for the stringing and tensioning of the fiber optic line. These sites would result in 1/4 acre of temporary disturbance each or approximately 4.25 acres for the new fiber to be installed as part of Alternative 1.

S.2.3.10. Maintenance

Maintenance activities would be similar to those described earlier for the Preferred Alternative.

S.2.4 Alternative 3

Alternative 3 would start at the Schultz Substation and follow Segment A. It would not include the Segment A Reroute. It would then turn south and follow Segment C through the YTC. South of the YTC in Benton County, the line would terminate at the new Wautoma Substation as described earlier for the Preferred Alternative and would be 57.6 miles long.

Reminder

Detailed cost estimates were not completed for the other alternatives. To be able to compare costs of alternatives, the estimated costs from the DEIS were increased by 40%.

This alternative has an estimated cost of $94,000,000. No land costs were added to the estimate for the purchase of easements across the YTC. Due to the large impact to the Army, BPA would possibly need to compensate the Army for the loss of the use of land used for maneuvers, thereby potentially increasing the cost of Alternative 3.

S.2.4.1. Transmission Line

The structures used in Segment A would be the same as described in the Preferred Alternative. The structures within Segment C across the YTC would be flat configuration for approximately 24 miles. Outside of the YTC land, delta configuration structures would be used for approximately 6 miles.

S.2.4.2. Right-of-Way

The ROW would be 180 feet wide for the flat configuration structures and 150 feet wide for the delta configuration structures. The distances and ROW widths for Segment A would be the same as described in the Preferred Alternative. Along Segment C, the ROW width would reflect the width needed for the particular structures; this portion of the line would not be parallel to any existing lines.

Easement provisions would be the same as those discussed earlier for the Preferred Alternative.

S.2.4.3. Clearing

Clearing requirements would be the same as those discussed earlier for the Preferred Alternative. The structure footprints would be the same as described earlier for the single-circuit structures. The total permanent disturbance as a result of the 269 structures would be approximately 4.7 acres. Temporary disturbance from the equipment movement around the structures would be approximately 110 acres.

S.2.4.4. Access Roads

New access roads would be built for the majority of Alternative 3. Roads would be built as described earlier for the Preferred Alternative. Approximately 95.2 miles of new roads would be built and 98.3 miles of existing roads would be improved.

S.2.4.5. Pulling and Reeling Areas

Pulling and reeling area requirements would be the same as those discussed earlier for the Preferred Alternative. Alternative 3 would require an estimated 4.75 acres to be cleared for the pulling and reeling areas along the route. If Option 2 of the Sickler-Schultz Reroute is selected, the structure count would increase by 2, permanent disturbance would increase by 0.05 acre and temporary disturbance would increase by 0.8 acre.

S.2.4.6. Staging Areas

Staging areas would be located and used similar to those described earlier for the Preferred Alternative.

S.2.4.7. Substations

For Alternative 3, a new transmission line would begin at the Schultz Substation and end at the new Wautoma Substation.

Schultz Substation – The new equipment installed at Schultz Substation would be the same as described earlier for the Preferred Alternative.

Wautoma Substation – The construction of the substation would be the same as described earlier for the Preferred Alternative.

S.2.4.8. Communication Equipment

Alternative 3 would include the installation of fiber optic cable between Vantage Substation north to Columbia Substation as well as south to the new Wautoma Substation as described in the Preferred Alternative. Between Vantage and the new Wautoma Substations, the fiber would be added to existing lines. The number of reeling and tensioning sites and the amount of disturbance caused by those would be approximately the same as that of the Preferred Alternative.

S.2.4.9. Maintenance

Maintenance activities would be similar to those described earlier for the Preferred Alternative.

S.2.5 Alternative 1A

Alternative 1A would start at the Schultz Substation and follow Segments A and B_{SOUTH}. As with the Preferred Alternative, Alternative 1A would not include the Segment A Reroute. The new line would enter the Vantage Substation and cross to the east side of the existing transmission lines. The line would then follow Segment F into Hanford Substation. The line would be approximately 69.8 miles long. The outside limits of the Hanford Substation would not need to be expanded for this alternative.

Reminder

Detailed cost estimates were not completed for the other alternatives. To be able to compare costs of alternatives, the estimated costs from the DEIS were increased by 40%.

This alternative has an estimated cost of $94,000,000.

S.2.5.1. Structures

In Segment F, delta configuration structures would be used out of Vantage Substation, but just north of Crab Creek flat configuration structures would be used continuing south up the Saddle Mountains. Due to wildlife concerns, flat configuration would be used along the Saddle Mountains, through the Hanford Monument, and into Hanford Substation.

S.2.5.2. Conductors

The conductors and overhead groundwire would be the same as discussed earlier for the Preferred Alternative.

S.2.5.3. Right-of-Way

The ROW would be 150 feet wide for the delta configuration structures and 180 feet wide for the flat configuration structures. The distances and ROW widths for Segments A and B_{SOUTH} would be the

same as described in the Preferred Alternative. Along Segment F, the ROW width would be 180 feet wide for the flat configuration. Where the line would turn south and parallel the existing 500-kV transmission line, the separation would be 1,200 feet. BPA would acquire easement rights from the landowners for the land between the two lines, including the new ROW.

Easement provisions would be the same as those discussed earlier for the Preferred Alternative.

S.2.5.4. Clearing

Clearing requirements would be the same as those discussed earlier for the Preferred Alternative. The structure footprints would be the same as described earlier for the single-circuit structures. The total permanent disturbance as a result of the 326 structures would be approximately 6.5 acres. Temporary disturbance from the equipment movement around the structures would be approximately 133.2 acres. If Option 2 of the Sickler-Schultz Reroute is selected, the structure count would increase by 2, permanent disturbance would increase by 0.05 acre and temporary disturbance would increase by 0.8 acre.

S.2.5.5. Access Roads

New access roads would be built for the majority of Alternative 1A. Roads would be built as described earlier in Alternative 1. Approximately 43.4 miles of new roads would be built and 69.8 miles of existing roads would be improved.

S.2.5.6. Pulling and Reeling Areas

Pulling and reeling area requirements would be the same as those discussed earlier for the Preferred Alternative. Alternative 1A would require an estimated 5 acres to be cleared for the pulling and reeling areas along the route.

S.2.5.7. Staging Areas

Staging areas would be located and used similar to those described earlier for the Preferred Alternative.

S.2.5.8. Substations

For Alternative 1A, a new transmission line would begin at the Schultz Substation and end at Hanford Substation. The line would pass through Vantage Substation.

Schultz Substation – The new equipment installed at Schultz Substation would be the same as described earlier for the Preferred Alternative.

Hanford Substation – The new equipment installed at the Hanford Substation would be the same as described earlier for Alternative 1.

Vantage Substation – The line would pass through the Vantage Substation in order to get from the west to east side of existing lines as described earlier for Alternative 1.

S.2.5.9. Communication Equipment

BPA would install fiber optic cable similar to what is described earlier for Alternative 1.

S.2.5.10. Maintenance

Maintenance activities would be similar to those described earlier for the Preferred Alternative.

S.2.6 No Action Alternative (Environmentally Preferred)

The No Action Alternative is traditionally defined as the no build alternative and, for this project, is the Environmentally Preferred Alternative. This alternative would mean that a new transmission line would not be built, and no other equipment would be added to the transmission system. Maintenance and operation of the existing transmission line and substations would continue unchanged.

S.2.7 Alternatives Eliminated from Detailed Consideration

BPA studied a variety of alternatives to meet the need for the project. After preliminary study, the following alternatives were eliminated from detailed consideration for technical or economic reasons.

S.2.7.1. Alternative 4 Transmission Line

BPA studied the possibility of paralleling the existing Columbia-Ellensburg-Moxee-Midway 115-kV transmission line. The new line would begin at Schultz Substation and be routed through Ellensburg and Yakima, west of the YTC and into a new substation. This was referred to as Alternative 4 during the scoping period. BPA received a large number of comments from the public in opposition to this alternative. The existing 115-kV line is adjacent to many homes. Early estimates showed that the cost to buy property and relocate residents would be over $60,000,000. This did not include new transmission equipment, substation equipment, or construction costs. This alternative was eliminated from further study due to cost.

S.2.7.2. Schultz-Ashe Transmission Line

During the scoping process, maps presented by BPA showed a possible route going through the Hanford Substation and on to the BPA Ashe Substation located on the Hanford Site. Transmission system studies showed that line termination at the Ashe Substation, rather than the Hanford Substation, did not improve reliability. Termination of the line at the Ashe Substation also did not improve transfer capability over the Hanford Substation or Wautoma Substation alternatives. The 17 additional miles of transmission line needed for this alternative would increase the cost of construction by about $13,000,000.

This alternative was eliminated from further study because the system studies did not show an electrical benefit versus the added cost associated with the added miles of transmission line.

S.2.7.3. Undergrounding

During the scoping process, some people suggested burying the transmission line. Occasionally BPA has used underground transmission cables for new lines. Transmission line cables are highly complex in comparison to overhead transmission lines. For a 500-kV line, the underground cable could be 10 to 15 times the cost of an overhead design. Because of cost, BPA uses underground cable in limited situations, such as for long water crossings or in urban areas.

Underground transmission cables used by BPA are short in comparison to typical overhead transmission lines. BPA's longest underground transmission cable (at 115-kV) is 8 miles.

Underground cable remains a tool available for special situations, but because of its high cost it was eliminated from further consideration.

S.2.7.4. Non-Transmission Alternatives

During the comment period of the DEIS, comments were received asking BPA to examine alternatives such as energy conservation and demand reduction measures, or load and generation curtailment during outage conditions. These types of alternatives are collectively referred to as non-transmission alternatives. BPA had examined these types of alternatives, but had not included them in the DEIS.

To meet the need described in Chapter 1, BPA considered non-transmission alternatives, including energy conservation and demand reduction measures to reduce overload on the transmission system, as well as load and generation curtailment during outage conditions. Results of this study are in a report entitled "Expansion of BPA Transmission Planning Capabilities," which has been incorporated by

reference in this EIS (Energy and Environmental Economics, Nov. 2001). This report concluded that conservation and demand management alternatives would only make the problem worse by increasing the amount of electricity that must cross the north of Hanford area. Other non-transmission alternatives that were considered included ***locational pricing*** and ***time-of-use rates***. These pricing alternatives provide price signals to encourage parties to use limited transmission capability more efficiently. The report concluded that these pricing alternatives would not be feasible because they would require spilling water during the spring and early summer months, which would violate ESA conditions.

S.3 Affected Environment

This section summarizes the existing environment that may be affected by the alternatives. Each section describes a specific resource. The natural environment is discussed first, then the human environment.

S.3.1 Water Resources

S.3.1.1. Precipitation

Most of the study area is in the rain shadow of the Cascades, which results in a semiarid climate. Most precipitation in the study area falls as rain, with as little as 7 to 8 in of precipitation per year at lower elevations.

S.3.1.2. Watersheds

River basins crossed by all of the alternatives are the Central Columbia and Yakima. Within these basins the streams crossed by the segments, including the Vantage-Columbia fiber optic line, fall into six watersheds: the Lower Yakima, Upper-Columbia-Priest Rapids, Lower Crab, Upper Yakima, Upper Columbia-Entiat, and Moses Coulee. Some of the ***perennial streams*** crossed include Lower Crab Creek, Naneum Creek, and Wilson Creek, in addition to the Columbia River. Due to low precipitation in the study area, streams are generally small and ***intermittent***.

For Your Information

*A **perennial stream** flows throughout the year.*

*An **intermittent stream** flows only seasonally.*

S.3.1.3. Water Quality

The Lower Yakima and Upper Columbia-Priest Rapids are identified as having serious water quality problems, such that aquatic conditions are well below state and tribal water quality goals (EPA, 2000). The remaining three watersheds (Lower Crab, Upper Yakima, and Upper Columbia-Entiat) have less serious problems, although their aquatic conditions are also below state or tribal water quality goals (EPA, 2000). Lower Crab Creek, Mattawa Drain, Sand Hallow, and the

For Your Information

Water quality limited *under Section 303(d) of the Federal Clean Water Act refers to streams that do not meet current water quality standards.*

Columbia River are listed as ***water quality limited*** under Section 303(d) of the Federal Clean Water Act.

S.3.1.4. Shorelines

The Washington State Shoreline Management Act allows for cities or counties to guide the planning and management necessary to prevent the potential harmful effects of uncontrolled development along the shorelines of Washington State. The segments cross one river (Columbia), two creeks (Naneum and Lower Crab), and one lake (Nunnally) that have been designated as shorelines.

S.3.1.5. Aquifers

Aquifers between Miocene basaltic rocks are prominent in the Columbia Plateau basaltic aquifer system. Groundwater quality in the proposed study area is variable, depending on the layer of basalt from which the groundwater is taken. The Columbia Plateau basaltic aquifer system is a major source of water for municipal, agricultural, and domestic uses (USGS 1991).

S.3.2 Floodplains and Wetlands

S.3.2.1. Floodplains

Eleven floodplains associated with the following water features would potentially be crossed within the study area: Wilson/Naneum Creek crossings, Cooke Creek, Columbia River crossings, Lower Crab Creek, Nunnally Lake, and Dry Creek. The Vantage-Columbia fiber optic line would cross: Mosses Coulee, Lynch Coulee, Quincy Lakes, an unnamed creek, and Sand Hallow Creek. The Columbia River 100-year floodplain is relatively narrow because dams in the study area regulate flows. It is very unlikely that large scale flooding would occur because of the construction of several flood control/water-storage dams upstream of the study area.

S.3.2.2. Wetlands

Wetlands are uncommon within the shrub-steppe areas of eastern Washington. Wetlands found in this area typically are supported by water sources such as springs, surface runoff, and riparian areas. The presence of wetlands in the study area (500 feet either side of the proposed line) was initially investigated using National Wetlands Inventory (NWI) maps. NWI maps depict natural and human-made wetlands and other special aquatic features.

Twenty-five NWI features were identified within the study area for the Preferred Alternative. Of those, 7 were field verified as wetlands. Alternative 1 has 29 NWI features, Alternative 3 has 31 NWI features,

and Alternative 1A has 28 NWI features. Wetlands along Alternatives 1, 3, and 1 A have not been field verified.

S.3.3 Soils and Geology

Diverse landforms and geologic features exist within the study area, which is in the Columbia Plateau ***physiographic*** province. The landscape within the plateau consists mostly of large and small hills with flat tops, extensive plateaus, ***incised*** rivers, and ***anticline*** ridges. The ***Miocene Columbia River Basalt Group*** underlies the region and is interbedded by ***Neogene*** terrestrial sediments (DNR, 1991).

Geologic hazards in the study area include steep slopes and erosion. Soil blowing and water erosion are the most active erosion processes due to the area's high relief, steepness of slope, and restricted available water capacity for the production of ***forage*** (USDA, 1984).

S.3.4 Vegetation

S.3.4.1. Cover Types

The study area lies within the Columbia River Basin province of eastern Washington and Oregon (Franklin and Dyrness, 1973). The ***plant community*** found in most of the study area is referred to as shrub–steppe. With the exception of several riparian areas, there are few trees in the study area. The dominant woody vegetation on most upland sites consists of shrub species, predominantly sagebrush species. The understory of herbaceous plants in shrub-steppe was dominated by native perennial bunchgrasses prior to European settlement. Within portions of the study area, native bunchgrass dominated communities are no longer as common due to invasion by annual grasses and non-native weedy species which colonize and spread after various types of disturbance (Quigley, 1999).

Shrub-steppe vegetation in the study area is characterized as a potential big sagebrush/bluebunch wheatgrass zone (Daubenmire, 1970). This is the community that is expected to occur without disturbance, alteration of habitat, or invasion by non-native species. Dominant shrubs currently existing in upland areas commonly include big sagebrush, threetip sagebrush, stiff sagebrush, low sagebrush, spiny hopsage, gray rabbitbrush, green rabbitbrush, and buckwheat species. In many areas today, non-native species, including cheatgrass, are now co-dominant with the shrubs. Other areas still have a bunchgrass layer of good quality. Common bunchgrass species include bluebunch wheatgrass, Sandberg's bluegrass, Cusick's bluegrass, Indian ricegrass, needle-and-thread grass, and Thurber's needlegrass.

➡ For Your Information

Physiography *is the study of the structure and phenomena of the earth's surface.*

Rivers that have carved a path through the bedrock of an area are ***incised****.*

Anticline *is an arching fold in layered rocks.*

Miocene *is the period in the Neogene lasting from 23 million years ago to 5 million years ago.*

The ***Columbia River Basalt Group****, composed of the Grand Ronde Basalt and the overlying Wanapuma and Saddle Mountains Basalt, comprises most of the aquifer system (USGS 1994).*

Neogene *is the geological period lasting from 23 million years ago to present day.*

Forage *is food for domestic animals, i.e. cattle, sheep, etc.*

Plant communities *(also known as plant associations) are assemblages of species that grow together in similar habitats and are found repeated across the landscape.*

While several riparian areas in the study area have a tree overstory, shrub-lined riparian areas are more common. These riparian areas typically have a narrow margin of upland shrubs, including black hawthorn, red-osier dogwood, mockorange, serviceberry, and big sagebrush. Invasive tree species, such as Russian olive, Siberian elm, and white mulberry grow in some riparian areas and wet areas.

The agricultural lands near the study area are irrigated croplands, vineyards and orchards. There may be small adjacent areas that have some remnants of native plant communities. These remnants typically have low biodiversity and are very weedy.

➡ For Your Information

High quality plant communities are *areas of native vegetation with little or no disturbance or exotic species.*

S.3.4.2. High Quality Plant Communities

The Washington Natural Heritage Program (WNHP) tracks the occurrences of "***high quality plant communities***" (WNHP Website). Two WNHP high quality plant communities occur within the study area. A Wyoming big sagebrush/bluebunch wheatgrass shrubland community occurs along a small portion of Segment A. And, a bitterbrush/Indian ricegrass shrubland community occurs in a broad band north of the Columbia River along segments D, E, and F.

Foot surveys for rare plants and vegetation communities took place along the Preferred Alternative (Segments A, Option B_{SOUTH} and D). Shrub-steppe vegetation communities along these segments was broken into four categories. The Preferred Alternative crossed 0.92mi of Washington Natural Heritage Program Areas, 25.85 mi of Moderate-High Quality Shrub-Steppe, 11.10 mi of Low Quality Shrub-Steppe, and 11.80 mi of ***Lithosol*** Areas.

Lithosols *are rocky soils that usually develop in areas underlain by basalt.*

S.3.4.3. Weeds

Some plant species are designated as weeds by federal or state law. Weed species reduce the quality of shrub-steppe by replacing native species and reducing ***biodiversity***. Washington State law designates some particularly troublesome weeds as "noxious weed" species. The list of noxious weed species is divided into three classes (A, B, and C) within each county, based on the state of invasion. Designated noxious weeds are present on all segments within the study area.

Biodiversity *refers to the different species of plants and animals in an environment.*

S.3.4.4. Rare Plants

The USFWS identified two federally listed species and three federal candidate species with the potential to occur within the study area (USFWS, 2001). Ute ladies' tresses, listed as threatened, is not known to occur in the study area. Wenatchee Mountains checker-mallow, listed as endangered, has the potential to occur 25 mi north of the eastern end of Segment A, but not within the study area. Two of the candidate species, northern wormwood and basalt daisy, are

not none to occur within 1 mile of the line segments. However, one population of a federal candidate species (Umtanum desert buckwheat) is known to occur near the Preferred Alternative. Nine BLM sensitive species have the potential to occur on BLM-administered lands along Segment F.

S.3.5 Wildlife

Approximately 150 wildlife species (birds, mammals, reptiles, and amphibians) are known to occupy shrub-steppe habitat, which represents the majority of available habitat within the study area. Of these species, approximately 50 are closely associated with shrub-steppe habitat, and the remaining species use shrub-steppe habitat occasionally or incidentally.

Analysis of wildlife focused on species that are: federally listed as threatened or endangered or candidate for listing; federal species of concern, and Washington state listed threatened, endangered, sensitive or monitor species.

S.3.5.1. Federally Listed or Candidate Species

Six federally listed threatened or endangered wildlife species and one proposed listed species were identified by USFWS as possibly occurring in the study area. Listed species include the grizzly bear, the gray wolf, the Canada lynx, the bald eagle, the northern spotted owl, and the marbled murrelet. The pygmy rabbit is proposed for listing as Endangered.

The grizzly bear, gray wolf, Canada lynx, northern spotted owl, and marbled murrelet are not known to currently exist in the project area, so the proposed project will have no impacts on these species.

Bald eagles are known to exist near water throughout the project area. The Columbia River crossings at Vantage, Midway, and the Hanford National Monument provide good open water foraging habitat and larger riparian trees for roosting. Wilson and Naneum creeks contain winter roost habitat for bald eagles. The YTC near Hanson and Alkali Canyon Creeks also contains winter roosting areas. No nest sites are known within 2 miles of any of the segments.

There have been no confirmed sightings of pygmy rabbits within the project area.

S.3.5.2. Federal Species of Concern

Approximately 23 federal species of concern are known to occur within the study area of the various alternatives.

S.3.5.3. Washington State Species

Approximately 45 wildlife species that are listed by Washington State as threatened, endangered, sensitive or monitor species are known to occur within the study area of the alternatives.

S.3.6 Fish Resources

The most significant fish resources found within the project area are endangered anadromous salmonids such as salmon and steelhead. These fish are born and rear in small streams, then migrate down the Columbia River to the ocean. After several years in the ocean, they migrate upstream back to their native streams to spawn. Resident salmonids such as bull trout and rainbow trout are also important resources, as are a number of other cold and warm water fish species.

S.3.6.1. Chinook Salmon

Upper Columbia spring-run Chinook would be encountered in the Columbia River, which juveniles and adults use as a migration corridor between the ocean and the headwater streams they spawn and rear in.

S.3.6.2. Steelhead Trout

The Upper Columbia River Steelhead would be encountered in the Columbia River and tributaries upstream of the Yakima River, which they would use for migrating, spawning and rearing purposes.

The Middle Columbia River Steelhead would be encountered in tributaries of the Yakima River, although these tributaries have blockages from dams and irrigation withdrawals that do not allow steelhead access to the area crossed by the project.

For Your Information

A Distinct Population Segment (DPS) *is a population of a species with a distinct evolutionary history as defined by the U.S. Fish and Wildlife Service.*

S.3.6.3. Bull Trout

The proposed study area is located within the Columbia River ***Distinct Population Segment*** (***DPS***) for bull trout. Bull trout may be found in small streams along Segment A and the Columbia River.

S.3.7 Land Use

The only portion of the project that crosses lands within Douglas County is the fiber optic line for roughly 5 miles. No land use issues would arise and no impacts would occur since the fiber optic line would be installed on existing structures and construction equipment would use existing roads.

The project crosses through private lands and publicly administered lands in four Washington counties: Kittitas, Grant, Benton, Yakima, and Douglas.

S.3.7.1. Kittitas County

Kittitas County lies within the upper Yakima River watershed and on the east side of the Cascade Mountains. Mountains and steep hills ring an extensive irrigated area known as the Kittitas Valley where

most of the County's residents live. Major irrigation projects of the 1940's and 50's distributed water to the valley floor, turning arid lands into productive farmland.

Segment A is entirely within the County. The majority of Segment B and a portion of Segment C are also within the County. Segments A and B cross both private lands and publicly administered lands. Segment C in Kittitas County would be located completely on publicly administered lands.

S.3.7.2. Grant County

Grant County is bordered by the Columbia River to the west and southwest. The County is a state and national leader in the production of wheat, corn, hay, potatoes, and several tree fruits and is a major livestock production center. Agricultural areas are concentrated throughout the County and the location of agriculture has been strongly influenced by the construction of irrigation facilities.

A small portion of Segment B and the majority of Segments D, E, and F are located within the County. These line segments cross both private lands and publicly administered lands. Most of the fiber optic line is also in Grant County.

S.3.7.3. Benton County

Benton County is located in the central part of the Columbia Basin. The principal land use is commercial dryland and irrigated agriculture with its related industries such as storage, shipping, processing, and sales of chemicals and equipment. Irrigated crop production and dryland agriculture is located throughout the agricultural lands designation. It is estimated that 17 percent of Benton County is irrigated land and 50 percent is range and dryland agriculture. Major crops in Benton County are wheat, corn, potatoes, apples, cherries, hops, mint, alfalfa hay, and wine grapes. Beef cattle are also raised in the County.

Of the overall study area, a small portion of Segment D and even smaller portions of Segments C, E, and F traverse through and terminate in Benton County. Segments C and D would cross both private lands and publicly administered lands. Segments E and F would only cross publicly administered lands.

S.3.7.4. Yakima County

Yakima County has leading industries in agriculture and related sectors. The location of agriculture has been strongly influenced by the construction of irrigation facilities. Cultivated agriculture in Yakima County is heavily concentrated in and around the valley

floors, while grazing lands and most orchards are located along many of the hillsides.

Only Segment C would pass through Yakima county, on private lands as well as publicly administered lands.

S.3.7.5. Land Uses

Roughly 41 percent of the study area is located on privately owned land, which is characterized by open rangeland, agricultural land, open space, some rural residential, and a limited amount of quarrying.

The remaining 59 percent of the land in the study area is administered by seven public agencies. The public land areas crossed are under the administration of two Washington State agencies, Department of Natural Resources (DNR) and Washington Department of Fish and Wildlife (WDFW), and five federal agencies: Bureau of Land Management (BLM), Department of Defense (DOD), Bureau of Reclamation (BOR), U.S. Fish and Wildlife Service (USFWS), and Department of Energy (DOE).

Typical land uses on the publicly owned lands in the study area include predominantly rangeland, agricultural, wildlife habitat, recreation, and limited commercial, industrial, or transportation-related uses. The study area also includes crossing the BLM Saddle Mountain Management Area, the Saddle Mountain, Wahluke, and Columbia River Islands/Dunes Units of the Hanford Reach National Monument, Hanford Site, and Yakima Training Center.

➡ For Your Information

The only portion of the project that crosses lands within Douglas County is the fiber optic line for roughly 5 miles. No socio-economic issues would arise and no impacts would occur since the fiber optic line would be installed on existing structures and construction equipment would use existing roads.

S.3.8 Socioeconomics

Agriculture is an important industry sector that influences local economies as well as demographic composition. Correspondingly, the booms and busts of agriculture dependent industries are reflected in population and economic growth of the area. Other industries important to the area include service, retail trade, and manufacturing sectors. Kittitas, Grant, Yakima, and Benton Counties, in general, are less racially diverse, have lower per capita and median household incomes, and have a lower percentage of income derived from work earnings than the state.

S.3.8.1. Population

The population within the study area is primarily located in sparsely populated rural areas. Public lands are predominantly uninhabited in the study area. Caucasians comprise 86 percent of Benton County, 77 percent of Grant County, 92 percent of Kittitas County, and 66 percent of Yakima County populations. Hispanic origin varies greatly

across the area, ranging from 13 percent of Benton County, 30 percent of Grant County, 5 percent of Kittitas County, and 36 percent of Yakima County as compared to a statewide composition of 8 percent.

S.3.8.2. Economy

The service, retail trade, manufacturing, and agriculture sectors drive the central Washington economy in the private industry. Employment and income derived from government and government services also play a major role in the local economies. Kittitas County has the lowest median household income ($32.546) compared to $34.828 in Yakima County, $35, 276 in Grant County, and $47,044 in Benton County. All study area counties are lower that the state median household income of $45,776.

S.3.8.3. Employment

Agriculture is an important sector for Grant and Yakima Counties. Jobs in agriculture account for 17 percent of the wage earnings in Grant County and 14 percent of the wage earnings in Yakima County. Agriculture is less important in Benton County and Kittitas County (4 percent and 5 percent of the total earned wages, respectively).

S.3.9 Visual Resources

The study area's visual character and quality are primarily natural and rural, defined by rolling as well as steep and dramatic mountain ranges, consistent stretches of sagebrush and rabbitbrush, and agricultural uses including orchards, vineyards and ranches. Its visual character and quality are also defined by dispersed residential areas, existing transmission and generation facilities, the natural beauty of the Columbia River, and the way topography and vegetation relate to the sky and the changing patterns of light throughout the day and year. All of these factors contribute to the area's visual interest and perceived visual quality.

Four locations that are visually sensitive have been identified due to their visual quality, uniqueness, cultural significance, or ***viewer characteristics***. These areas include:

- **Viewpoint A**, the area near Colockum Pass, due to the number of residences with ***foreground*** views of the transmission line project;
- **Viewpoint B**, the north face of the Saddle Mountains near the Columbia River and Crab Creek, due to its unique and striking landform, relationship to adjacent water bodies and number of viewers on Route 243;

➡ For Your Information

Viewer Characteristics

Low Visual Sensitivity: most motorists, who would see transmission lines at limited locations from roads that they traverse.

Moderate Visual Sensitivity: Some recreationalists, such as bird watchers, hikers and/or recreationalists whose activity is specific to a finite geographic location, who are sensitive to man-made structures and their impact on the view of the natural environment.

High Visual Sensitivity: Residential viewers who own property within 500 ft of the proposed corridors and are concerned about transmission structures and how they impact the view of the natural environment.

***Foreground** views are those within 0.25 to 0.5 mile of the viewer.*

- **Viewpoint C**, the Saddle Mountain Ridgeline, due to its striking landform, recreational value, and potential impact from a ridgeline transmission line corridor placement; and
- **Viewpoint D**, the Vernita Bridge and Primitive Boat Launch Area, due to the number of recreationalists and potentially sensitive viewers, and the presence of natural water bodies and dramatic landforms.

S.3.10 Recreational Resources

Several resources have dedicated recreational activities. The John Wayne Trail is an abandoned railroad line ROW that has been converted to a multi-use trail extending 110 miles from North Bend, Washington to the Columbia River. Interpretive facilities are provided at the Wanapum Dam as part of the Native American Heritage Center and at the Dam Powerhouse and are considered dedicated recreational activities.

Other recreational activities within the study area are dispersed and include bird watching, boating, environmental education, falconry, field dog training, fishing, hang gliding, hiking, horseback riding, hunting, mountain biking, off-road vehicle use, paragliding, photography, primitive camping, rock hounding, sightseeing, snowmobiling, snowshoeing, water sports, and wildlife observation.

The Hanford Reach of the Columbia River was found suitable for inclusion in the National Wild and Scenic Rivers system. Recreation in the Hanford Reach National Monument is dispersed and dedicated. Activities include boating, sightseeing, hunting, hiking, wildlife observation, photography, fishing, and environmental education. However, the area lacks interpretive and service facilities typical of a national monument.

➡ For Your Information

Cultural resources *are those historic and archaeological properties, properties of traditional and cultural significance, sacred sites, Native American human remains and associated objects, and cultural landscapes which are entitled to special consideration under federal statute, regulations, and/or executive orders.*

S.3.11 Cultural Resources and Historic Properties

The Columbia, Kittitas, Wanapam, Wenatchee, and Yakama peoples lived in the vicinity of the study area at the time of the Lewis and Clark expedition of the Snake and Columbia Rivers in 1805 en route to the Pacific (Ray 1936). Their life was focused on an annual round anchored by specific times for gathering, hunting, fishing, and trading, but also for religious activities, visiting, courting, storytelling, dancing, and other such activities.

A period of exploration and trapping followed, with early travelers such as Wilson P. Hunt of the Astor Company, David Thompson of the Northwest Company, Alexander Ross, Ross Cox, and many others arriving in this area between 1805 and 1815. Gold mining brought

many Europeans, Euroamericans, and Chinese through the study area beginning around 1850, but it was ranching that kept them there. Transportation – particularly river crossings – provided the means for expansion and trading. Horse ranching and fruit farming increased in the latter half of the last century, but it was not until more efficient irrigation systems were organized around the turn of the century that fruit farming really became a major activity in this region.

S.3.11.1. Draft EIS Literature Review

A literature review was conducted for all of the alternatives and was summarized in the draft EIS. This review was performed by the Confederated Tribes of the Colville Reservation under contract to the BPA. The literature review indicated that 36-40 sensitive areas (currently recorded sites and unsurveyed areas that have a high probability for yielding significant cultural resources and historic properties) are located near each alternative, which covers approximately 7.2 to 8.3 sq mi. The actual presence or absence of significant or potentially significant cultural resources and historic properties along the Preferred Alternative would be determined through subsequent field surveys.

S.3.11.2. Survey Results for the Preferred Alternative (Alternative 2) Right-of-Way

A pedestrian survey was conducted for the entire length of the Preferred Alternative right-of-way (except for four small areas where access was denied to archaeologists by private landowners), access roads, and fiber optic line. The survey was conducted by Archaeological Frontiers under contract to the Yakama Indian Nation and BPA.

The results of the pedestrian survey along the right-of-way indicated that 47 prehistoric and 9 historic "newly identified" resources and properties are located within the Preferred Alternative's ***Area of Potential Effect (APE)***. Of these totals, 27 prehistoric and 3 historic resources are considered to be eligible or potentially eligible for listing on the NRHP.

In addition to the newly identified prehistoric and historic resources, attempts were made to field verify 15 previously recorded cultural resource sites. Nine of the 15 earlier recorded sites were found to lie within the APE; however, only seven (five are prehistoric and two are historic) were field verified during the pedestrian survey. Each of the seven previously recorded sites that were located again is considered potentially significant to the NRHP. Of the two sites that could not be relocated, the prehistoric site is also considered potentially significant.

➡ For Your Information

All unsurveyed areas that have denied BPA access would be surveyed after BPA purchases the easements for the new line. These surveys would be completed before construction is begun.

*The **Area of Potential Effect (APE)** for this project is defined as the entire ROW for the length of the proposed transmission line, access roads, and fiber optic line.*

S.3.11.3. Survey Results for the Preferred Alternative (Alternative 2) Access Roads and Fiber Optic Line

Twenty-six prehistoric resources and one paleontological site were newly identified along Preferred Alternative's access roads and the fiber optic line. Sixteen newly identified prehistoric resources (15 sites and 1 resource) and 11 of the earlier identified prehistoric resources (10 sites and 1 resource) are considered to be potentially significant and eligible for inclusion to the NRHP. No newly or previously identified historic artifacts were located along the access roads or fiber optic line.

S.3.12 Public Health and Safety

For Your Information

Electric and magnetic fields *(EMF) are the two kinds of fields produced around the electric wire or conductor when an electric transmission line or any electric wiring is in operation.*

Current *is the amount of electrical charge flowing through a conductor.*

S.3.12.1. Electric and Magnetic Fields

Transmission lines, like all electrical devices and equipment, produce ***electric and magnetic fields*** (EMF). The voltage, or force that drives the ***current***, is the source of the electric field. The current, or movement of electrons in a wire, produces the magnetic field. The strength of magnetic field depends on the current, design of the line, and the distance from the line. Field strength decreases rapidly with distance.

There are currently no national standards in the United States for electric and magnetic fields from transmission lines. The state of Washington does not have limits for either electric or magnetic fields from transmission lines. The BPA has maximum allowable electric fields of 9-kV/m on the ROW and 5-kV/m at the edge of the ROW.

S.3.12.2. Noise

Corona *is an electrical discharge, at the surface of a conductor.*

Transmission line noise – Audible noise can be produced by transmission line ***corona***. Corona-generated audible noise can be characterized as a hissing, crackling sound that under certain conditions is accompanied by a 120-Hz hum. The conductors of high-voltage transmission lines are designed to be corona-free under ideal conditions. However, a protrusion on the conductor surface – particularly water droplets on or dripping off the conductors – cause electric fields near the conductor surface to exceed corona onset levels, and corona occurs. Therefore, audible noise from transmission lines is generally a foul-weather (wet-conductor) phenomenon. However, during fair weather, insects and dust on the conductors can also serve as sources of corona.

Substation noise – Sound varies at the substation sites, as a result of weather and other factors such as background noise and the kind of equipment operating, and could be higher or lower on any given day or at any given time at these substations.

S.3.12.3. Radio and TV Interference

Corona on transmission line conductors can generate electromagnetic noise in the frequency bands used for radio and television signals. In rare circumstances, corona-generated ***electromagnetic interference (EMI)*** can also affect communication systems and sensitive receivers. Corona-caused television interference occurs during foul weather and is generally of concern only for conventional receivers within about 600 feet of a line. Cable and satellite television receivers are not affected.

For Your Information

Electromagnetic interference (EMI) *is high-frequency electrical noise that can cause radio and television interference.*

S.3.12.4. Toxic and Hazardous Materials

During construction, hazardous materials could be encountered anywhere along the proposed route and could include such things as illegally dumped waste, drug lab chemicals, spilled petroleum products, pesticides, and other wastes.

Minimal amounts of hazardous waste result from routine maintenance procedures performed on substation equipment and transmission lines. The type and volume of waste such as oily rags, minor leaks from vehicles, etc., depend on maintenance procedures.

S.3.12.5. Fire

Numerous wildfires have occurred on private and public land in and around the proposed routes over the past several years. They may have been caused by human actions such as vehicle ignitions from roads, unattended campfires, burning of adjacent agricultural lands and arson, or by natural causes such as lightning.

S.3.13 Air Quality

In the four counties where the study area is located, two local clean air authorities and two regional WDOE offices work together to control, monitor, and prevent air pollution:

- Benton Clean Air Authority: Benton County
- Yakima Regional Clean Air Authority: Yakima County
- Washington State Dept. of Ecology Central Regional Office: Kittitas County
- Washington State Dept. of Ecology Eastern Regional Office: Grant County

There are no nonattainment areas designated by the EPA or Class 1 areas designated by Section 160 of the Clean Air Act in the study area.

S.4 Impacts

For Your Information

Mitigation *describes measures that could be taken to lessen the impacts predicted for each resource. These measures may include reducing or minimizing a specific impact, avoiding it completely, or rectifying or compensating for the impact.*

Cumulative impacts *are created by the incremental effect of a specific action when added to other past, present, or reasonably foreseeable future actions.*

Section 303(d) streams, *as defined by the Federal Clean Water Act, are water quality limited streams that fall short of state surface water quality standards and are not expected to improve within the next four years.*

To analyze potential impacts for construction, operation, and maintenance activities, resource specialists have analyzed actions using a scale with four impact levels: high, moderate, low, and no impact. Impact discussions include recommended ***mitigation*** that could reduce both the direct, indirect, and ***cumulative impacts*** of the proposed alternatives.

S.4.1 Water Resources & Soils and Geology

Common to all alternatives, including the fiber optic lines, are the following impacts: sedimentation would be of short duration during construction with potential stream turbidity occurring in the short-term; no impacts to aquifers would result; and impacts to ***303(d) streams*** would not alter those parameters for which they are listed.

The **Preferred Alternative, Alternative 1 and Alternative 1A** would have **low to moderate** impacts that result from the abovementioned common impacts.

Alternative 3, in addition to the common impacts, would also have greater sedimentation and turbidity impacts. This is due to the larger quantity of new access roads that would be constructed. Overall impact to water resources and soils and geology: **moderate**.

For the **No Action Alternative,** ongoing maintenance of existing lines would cause **no to low** impacts to water resources, soils and geology.

S.4.2 Floodplains and Wetlands

Floodplains within the study area may be directly impacted by the placement of structures in several locations. It is not expected that constructing access roads to these structures would impact floodplains, because these new roads would not alter the amount of flood storage or the course that flood waters would take.

Most of the wetlands within the study area are not extensive, and would be spanned by structures placed in upland areas adjacent to wetlands. Roads and culvert crossings would be designed to minimize, but not completely avoid impacts to wetland areas.

The ongoing maintenance of transmission lines and access roads could impact wetlands through removing trees in wetlands, road grading and the inadvertent spread of noxious weeds.

The **Preferred Alternative** would affect 7 wetlands and 2 floodplains. The wetlands would receive low to moderate impacts due to tree

removal, construction of one structure, and road construction. Floodplain construction would involve constructing a new access road in the Dry Creek floodplain and a tower and new access road in Wilson/Naneum Creek floodplain. The overall impact to floodplains and wetlands: **moderate**.

Alternative 1 would affect approximately 12 wetlands and one floodplain. Floodplain construction would involve constructing a new access road in the Wilson/Naneum Creek floodplain. Overall impact to floodplains and wetlands: **moderate**.

Alternative 3 would affect approximately 18 wetlands and 2 floodplains. Floodplain construction would involve constructing a new access road in the Dry Creek floodplain and a tower and new access road in Wilson/Naneum Creek floodplain. Overall impact to floodplains and wetlands: **moderate**.

Alternative 1A would affect approximately 11 wetlands and one floodplain. Floodplain construction would involve constructing a new access road in the Wilson/Naneum Creek floodplain. Overall impact to floodplains and wetlands: **moderate**.

No Action Alternative would cause **no** impacts on floodplains and wetlands.

S.4.3 Vegetation

In general, shrub-steppe plant communities are slow to recover from disturbance. Some construction-related impacts would be temporary. Although the aboveground portion of shrubs would be broken or crushed by heavy machinery maneuvers, the roots and soils would not be disturbed, and vegetation would eventually return to pre-disturbance conditions.

The construction or replacement of structures would require vegetation removal and would compact soils. Construction of structures on ridges can decrease slope stability, which can lead to degradation of plant communities on the slope and in the riparian area. Vegetation would also be impacted by the disturbance of biological crusts, which would decrease soil fertility and increases the likelihood that an area would be invaded by non-native species. The removal of vegetation along waterways causes an increase in water temperature, increases water velocity, and decreases wildlife habitat. Disturbance of soil in or near riparian areas may lead to erosion of stream banks, which increases the deposition of sediment into waterways.

Fragmentation of some plant communities, especially shrub-steppe, by construction of roads and other disturbance can lead to a loss of

biodiversity and reduction in overall plant community health and quality. As plant communities become smaller and more fragmented, they become more susceptible to outside influences such as invasive weed species. They also become less able to sustain themselves because many plant species have limited seed dispersal ability so recolonization of disturbed areas may take many years or not occur at all due to competition from other species.

The construction of access roads would involve clearing vegetation. Impacts in the area of the finished roadbed and shoulder would be permanent.

Rare plant species and associated habitat may be directly or indirectly impacted by construction activities. Specific rare plants that may be affected are described below for each alternative.

After disturbance, bare land would likely be invaded by non-native species. The introduction and spread of noxious weeds would impact native vegetation reestablishment after the construction disturbance. Mitigation would be employed to avoid or minimize impacts to these species.

The **Preferred Alternative** would potentially affect habitat for two high-quality plant communities designated by the WNHP: Wyoming big sagebrush/bluebunch wheatgrass and bitterbrush/Indian ricegrass. Although no federally listed species are known to occur in the proposed ROW, potential habitat does occur in or near the ROW. There are no known occurrences of federally listed or candidate species along the fiber optic line. Overall impact to vegetation: **moderate to high**.

Alternative 1 would potentially affect two high-quality plant communities designated by the WNHP: Wyoming big sagebrush/bluebunch wheatgrass and bitterbrush/Indian ricegrass. Although no federally listed species are known to occur in the proposed ROW, potential habitat does occur in or near the ROW. There are no known occurrences of federally listed or candidate species along the fiber optic line. Overall impact to vegetation: **moderate**.

Alternative 3 would potentially affect one high-quality plant communities designated by the WNHP. A large amount of high quality shrub-steppe would be removed. Overall impact to vegetation: **high**.

Alternative 1A would potentially affect two high-quality plant communities designated by the WNHP: Wyoming big sagebrush/bluebunch wheatgrass and bitterbrush/Indian ricegrass.

Although no federally listed species are known to occur in the proposed ROW, potential habitat does occur in or near the ROW. There are no known occurrences of federally listed or candidate species along the fiber optic line. Known occurrences of the BLM special status species, Hoover's desert-parsley and dwarf evening primrose are in the immediate vicinity (within 500 feet) of Segment F and could be impacted by project activities. Overall impact to vegetation: **moderate to high**.

No Action Alternative would cause **no** impact on vegetation and rare plants.

S.4.4 Wildlife

Clearing areas of native shrub-steppe vegetation can increase the risk of predation for shrub-steppe dependant small mammal, reptile and bird species. In areas of undisturbed, native shrub-steppe habitat, clearing would constitute a high impact, because high-value habitat for state or federally listed shrub-steppe-dependant species (e.g., sage sparrows, sage thrashers and loggerhead shrikes) would be reduced. In areas of degraded shrub-steppe vegetation (e.g., vegetation infested with weed species), clearing would constitute a moderate impact, since the habitat is already degraded. Clearing in areas previously cleared or severely disturbed (such as agricultural lands) would result in minimal impacts to wildlife species.

Since the proposed transmission line would either span riparian areas or would be located upslope of stream channels, in most areas little or no riparian vegetation would need to be removed for transmission line clearance and tower construction. However, since riparian areas are extremely important wildlife habitat, clearing riparian vegetation for ROW or access road construction would cause moderate to high impacts to wildlife species, by disrupting movement corridors, removing nesting or foraging habitat, and compacting stream banks. Only Cooke, Coleman and Wilson Creeks would require riparian vegetation removal. Approximately 35 cottonwood trees would be removed at Cooke Creek, a high impact, while four cottonwoods would be removed at Wilson Creek, also a high impact, and two small cottonwoods at Coleman Creek, a moderate impact.

Mitigation for disturbance such as construction timing restrictions, placing markers on transmission lines or ground wires to reduce avian collisions, minimizing areas of disturbance and appropriate revegetation of disturbed areas would reduce overall impacts to wildlife species.

The **Preferred Alternative** has moderately disturbed shrub-steppe habitat on Segments A and B_{SOUTH} and D. Overall impacts to wildlife and habitat: **moderate to high**.

Alternative 1 has the same habitat areas on Segments A and B as the Preferred Alternative. Segment E is mostly disturbed agricultural area with low habitat value, except for the Hanford area, which is high quality, undisturbed shrub-steppe habitat. Overall impacts to wildlife and habitat: **moderate**.

Alternative 3 has the same habitat areas on Segment A as the Preferred Alternative. Existing habitat on Segment C is relative undisturbed and of high quality, especially on the YTC. Segment C has core sage grouse areas. Overall impacts to wildlife and habitat: **high**.

Alternative 1A has the same habitat areas on Segments A and B as the Preferred Alternative. Segment F along the Saddle Mountains is high elevation and has sensitive habitat this is relatively undisturbed. The Hanford area on Segment F is relatively undisturbed shrub-steppe habitat of high quality. Overall impacts to wildlife and habitat: **high**.

No Action Alternative would cause **no** impact on wildlife.

S.4.5 Fish Resources

Short-term construction disturbances, depending on the time of year and the location, could impact various fish species by causing sedimentation, habitat and/or individual fish disturbance, or the release of hazardous materials into a waterway. However, since most of the project construction will occur away from streams and include mitigation (such as construction timing restrictions and spill prevention and erosion measures), short-term construction-related disturbances should result in low or no impacts to all fish species.

Long-term impacts resulting from operation and maintenance could result mostly from habitat alteration due to clearing of riparian vegetation, changes in runoff and infiltration patterns (from upland vegetation clearing), sedimentation from cleared areas, and maintenance access across streams.

The **Preferred Alternative** would cross 9 fish bearing streams. Segment A would cross streams that may contain Middle Columbia River steelhead trout and bull trout. Neither species are known to currently occur in the reaches of these streams where the project crosses although steelhead are present in the lowest reaches of some streams. Upper Columbia River steelhead trout are present in the lower reaches of two streams spanned by Segments B and D, but not

where the project crosses them. Chinook salmon, Bull trout, and Upper Columbia River steelhead trout are present in the Columbia River, and could thus be impacted by Segments B and D. Overall impact to fish resources: **none to low**.

Alternative 1 would cross 12 fish bearing streams. It shares the same impacts as the Preferred Alternative on Segments A and B. Segment E would also span the Columbia River where Chinook salmon, Bull trout, and Upper Columbia River steelhead trout are present. Overall impact to fish resources: **none to low**.

Alternative 3 would cross 11 fish bearing streams. It shares the same impacts as the Preferred Alternative on Segment A. Upper Columbia River steelhead trout are present in the lower reaches of two streams spanned by Segment C. Overall impact to fish resources: **low to moderate**.

Alternative 1A would cross 11 fish bearing streams. It shares the same impacts as the Preferred Alternative on Segments A and B. Segment F would also span the Columbia River where Chinook salmon, Bull trout, and Upper Columbia River steelhead trout are present. Overall impact to fish resources: **none to low**.

No Action Alternative would cause **no** impact on fish resources.

S.4.6 Land Use Impacts

Common to all the alternatives, the following activities and associated impacts would occur to existing land uses:

- Heavy machinery used for construction would temporarily damage crops, compact soils, and disrupt land use activities on approximately 0.3 acre around each structure.
- To construct and maintain the proposed transmission line, some existing access roads would need to be improved and new access roads would need to be constructed.
- The area that would become new ROW would have limitations on the types of crops that may be located under the transmission lines.
- Activities such as grazing and the movement of livestock would be able to continue around the towers, underneath the transmission lines, and over any necessary access roads.
- The disturbance associated with the fiber optic line would be temporary and the landowners would be compensated for the use of their land; therefore land use impacts would be low.

Overhead transmission lines represent a hazard to low-flying aircraft such as those used in the military training exercises conducted at the Yakima Training Center. Overhead transmission towers and conductors would pose a hazard and affect the ability to operate the low flying aircraft. The towers and conductors would also affect the parachute drops used to bring in supplies during maneuvers. To reduce the profile of the proposed line where it crosses the YTC, the proposed towers and conductors in the YTC will be at a lower height above ground than elsewhere along the route. In the YTC standard airway marker balls would be installed on the overhead ground wires to enhance visibility of the conductors.

The **Preferred Alternative** would allow existing grazing uses to continue. On Segment A of this alternative, land use impacts to residential housing and quarry activities would be moderate to high. On Segment B as the line crosses the YTC, military maneuvers would continue under similar circumstances to the existing condition, a low to moderate impact. On Segment D, by using existing structures and double-circuiting where the line crosses irrigated farmlands, impacts to agricultural land use activities would be moderate. In areas designated for preservation, impacts would be high due to a loss and degradation of wildlife habitat, increased habitat fragmentation, and increased human disturbance to wildlife. Overall land use impact: **moderate to high**.

Alternative 1 would have the same impacts as the Preferred Alternative on Segments A and B. On Segment E, however, impacts to agricultural activities would be high. In addition, this alternative crosses the Columbia National Wildlife Refuge and an area designated as preservation land on the Hanford Reach National Monument. Impacts to preservation efforts would be high. BLM-administered lands crossed is primarily used for rangeland and wildlife habitat with some recreational use, associated land use impacts would be low. Overall land use impact: **high**.

Alternative 3 would have the same impacts as the Preferred Alternative along Segment A. Segment C is primarily located on the YTC and would not be adjacent to other transmission lines. A new line would eliminate the ability to perform military training, aviation, ground maneuvers that currently occur in this area, which would be a high impact. Overall land use impact: **high**.

Alternative 1A would have the same impacts as the Preferred Alternative along Segments A and B. Approximately 40 percent of Segment F would be a new utility corridor on BLM-administered lands. Impacts to mineral resources, rangelands, recreation and wildlife habitat on these lands would be low. In addition, this alternative crosses an area designated as preservation land on the

Hanford Reach National Monument. Impacts to preservation efforts would be high. Overall land use impact: **moderate to high**.

No Action Alternative would cause **no** impact on land use.

S.4.7 Socioeconomics

No impacts to local populations, including minority and low-income groups, are expected to occur. A small positive impact to local economies and sales tax revenues would result from construction-related jobs and expenditures. Two residences would be relocated as a result of the Preferred Alternative, which would be a negative impact. Decreases in property tax revenues would occur from the purchase of land by BPA to locate the new substation for the Preferred Alternative and Alternative 3. The new line is not expected to cause overall long-term adverse effects on property values.

All construction Alternatives would have **minimal** impacts, both positive and negative, on socioeconomics in the study area.

No Action Alternative may have negative impacts to the greater region, as a result of the lack of adequate transmission capacity to support expected growth in the Northwest.

S.4.8 Visual Resource

Transmission line facilities would be seen from a variety of potential viewpoints along all of the proposed routes, including private residences, highways, and recreation areas. Common to all alternatives is fiber optic installation. Since the towers and conductors already exist in the landscape, the addition of a smaller diameter fiber optic cable to these structures would be largely unnoticeable from existing conditions. Impacts to visually sensitive areas are discussed for each alternative.

The **Preferred Alternative** would pass near residences on Segment A, but would not dominate the view. On Segment B_{SOUTH}, the line would be visible to users of the John Wayne Trail, however, other transmission lines are visible from the trail. On Segment D, the line would be clearly visible to residents, tourists, and recreationists in the Saddle Mountain area and at the Columbia River west of the Vernita Bridge. Overall visual impact: **low to moderate**.

Alternative 1 would have the same impacts as the Preferred Alternative on Segments A and B. On Segment E, a new line in the Saddle Mountains would be slightly further away from most viewers. Overall visual impact: **low to moderate**.

Alternative 3 would have the same impacts along Segment A as in the Preferred Alternative. No visually sensitive areas were identified along Segment C. Overall visual impact: **low to moderate**.

Alternative 1A would have the same impacts along Segments A and B as in the Preferred Alternative. Segment F would cross the north face of the Saddle Mountains furthest from most viewers. Overall visual impact: **low to moderate**.

No Action Alternative would cause **no** impact on visual resources.

S.4.9 Recreational Resource

All of the alternatives would have temporary impacts related to construction. For safety reasons, during construction, recreation would not be allowed within the construction area. This could result in a temporary closure of existing access roads and trails and, consequently, temporarily limit access to some recreation areas. During conductor and fiber optic stringing, activities such as sightseeing, watersports, and boating would be limited in the construction area.

All alternatives would cross the Iron Horse State Park portion of the John Wayne Trail at least once while crossing the YTC. If construction was conducted during the peak use periods, and they would be low if conducted during the off-peak use periods.

All construction Alternatives would have a **low** impact on recreational activities.

No Action Alternative would cause **no** impact on recreation.

S.4.10 Cultural Resources and Historic Properties

Any ground-disturbing activity within the boundaries of a cultural resource or significant historic property could be destructive, resulting in the permanent, irreversible, and irretrievable loss of scientific information and/or cultural value. Ground disturbance activities associated with construction include clearing vegetation, grading and backfilling, using heavy equipment, constructing structures, and constructing access roads.

Non-ground-disturbing activities, such as acquiring new right-of-way, cutting vegetation, reseeding, changing access and use, and ongoing operations and maintenance may or may not have negative impacts on cultural resources or historic properties depending on the type of resource or property involved and the proximity of the activity to the resource or property.

The **Preferred Alternative** would avoid site-specific impacts to potentially significant properties by locating structures and access roads outside of known cultural resource and historic property boundaries. New cultural resources and historic properties could be discovered during construction.

Pedestrian surveys were conducted only for the Preferred Alternative, including access roads, ROW, and the fiber optic line. If an alternative other than the Preferred Alternative is chosen, further surveys would need to be conducted to identify potentially significant historic properties as well as site-specific avoidance and mitigation strategies.

No Action Alternative would cause **no** impact on cultural resources.

S.4.11 Public Health and Safety

All alternatives would have similar impacts to public health and safety. The BPA designs and operates transmission lines in compliance with NESC standards in order to minimize the impacts of EMF and safety hazards. Mitigation will be employed during construction, operation and maintenance activities to minimize radio/TV interference, impacts due to toxic and hazardous materials, and fire danger. Noise related to construction will comply with audible noise regulations. Transmission line and substation noise may increase during foul weather, which is typically of short duration.

The **Preferred Alternative** would have low to moderate impacts on public health and safety on Segments A and B, and moderate impacts on Segment D. Overall impacts to health and safety would be **low to moderate**. Impacts to noise would be **low**.

Alternative 1 would have low to moderate impacts on public health and safety on Segments A and B and moderate impacts on Segment E. Overall impacts to health and safety would be **low to moderate**. Impacts to noise would be **low**.

Alternative 3 and **Alternative 1A** would have **low** impacts on public health and safety. These alternatives would also have **low** impacts on noise.

No Action Alternative would cause **no** impact on public health and safety and **no** impact on noise.

S.4.12 Air Quality

On all of the proposed routes, construction vehicles and windblown dust from the construction sites would create short-term impacts.

Emissions would be short-term and would have low or no impact on air quality. No long-term impacts would occur.

All Alternatives, including the No Action Alternative, would have **no** impact to air quality.