Schultz-Hanford Area Transmission Line Project

Draft 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

February 2002

Summary

In this Summary:

- The Purposes and Need for Action
- Alternatives
- Affected Environment
- Impacts

This summary covers the major points of the Draft ***Environmental Impact Statement*** (***EIS***) prepared for the BPA Schultz-Hanford Transmission 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 connect to an existing line at the Schultz Substation near Ellensburg and to 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 9, Glossary and Acronyms. 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***.

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

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.

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.

For Your Information

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

S.1.3 Background

BPA has limited transmission capacity north of Hanford 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, several species of salmon have been listed as threatened or endangered under the Endangered Species Act (**ESA**). Federal agencies that operate the dams in the Northwest 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

For security purposes,

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have been removed

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

As electricity is generated at the mid- and upper-Columbia 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.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 (5- to 10-year) studies to determine what actions could meet the need, what each would cost, and how each could affect the transmission system. Several alternatives were identified. 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

Segments A through F make up the routes for the construction alternatives being considered. 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 transmission line. Segment A is about 29.4 mi long and ends south of Interstate 90 (I-90).

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 9.5 miles long.

B_{SOUTH} initially runs farther to the south and then heads east immediately parallel to an existing 230-kV wood pole transmission line on the south side of the John Wayne Trail. Just before the

Columbia River, B_{SOUTH} angles slightly to the north towards the Schultz-Vantage line and crosses the Columbia River adjacent to the existing Schultz-Vantage line river crossing. B_{SOUTH} ends at the BPA Vantage Substation. B_{SOUTH} is 10.4 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 29.8 miles long.

Segment D starts in the area just south of Vantage Substation. It would head in a southeasterly direction, directly adjacent and parallel to the existing Midway-Vantage 230-kV line on the west side. The segment would cross Crab Creek and climb the Saddle Mountains.

For Your Information

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

Starting at about 9 mi south of the Vantage Substation, the Midway-Vantage line would be removed and ***double-circuit*** towers built in its place to carry both lines through the irrigated area (about 8 mi long). Beyond the irrigated areas, 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 and continue south to the new substation site, while immediately paralleling the existing Midway-Big Eddy 230-kV line on the west side. Segment D is 27.3 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 23.2 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 32.1 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 nine miles north of Ellensburg, Washington, and a new substation (Wautoma Substation) in Benton County, two miles south of Hwy 24. The Preferred Alternative is Alternative 2 and is made up of Segments A, $B_{SOUTH,}$ and D.

The Preferred Alternative would cost approximately $76,500,000 (2001 dollars).

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. On YTC land, flat configuration 500-kV single-circuit structures would be used. Outside of the YTC, delta configuration structures would be used for single-circuit structures. In one area of 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 structures would average 135 feet high. The double-circuit structures would average 170 feet high.

S.2.2.2. Conductors and Insulators

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.

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. Where the new line would parallel an existing 500-kV line (Segment A) the new line would be up to 1,400 feet from the existing line. 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, to increase the ROW from the existing 100 feet to 125 feet. Where the new line is parallel to the 230-kV line in Segment D, the new 150 feet ROW would be directly adjacent to the existing ROW.

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. It is not anticipated that a large number of trees will need to be cleared for this project; however, because of safety considerations, there may be some trees at water crossings that would need to be cut.

At the structure sites, all trees and brush would be cut and removed within a quarter acre 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. The Preferred Alternative would require an estimated 71 acres to be cleared for structure sites along the 67-mile route.

S.2.2.5. Road System

Access roads on and off the ROW would be used to construct and maintain a new line. Where the new line would be 1,200 feet to 1,400 feet from the existing line, a new road system would be built. Where the new line would be built directly adjacent to the existing line, existing access roads would be used, with ***spur roads*** constructed to the new structures.

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 16 feet wide, with additional road widths of up to 25 feet for curves. When needed, a 5-foot ditch would be added to one side of the road. Roads would be dirt, gravel, or rock. Approximately 64.7 mi of new roads and 74.6 mi of improved roads would be built.

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.

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.*

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 one acre in size and located every 2.5 miles. The Preferred Alternative would require an estimated 28 acres to be cleared for the pulling and reeling areas along the route.

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. Prior to construction these would be determined and agreements with landowners made.

S.2.2.8. Substation Facilities

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, switches, **buswork**, **potential transformers (PT's)**, and substation dead-end towers.

Wautoma Substation – A new substation would be constructed in Benton County, two miles south of Hwy. 24 (T12N, R24E, sec 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 tied into the new substation. A parcel of approximately 25 acres would be needed for the new substation. Land for the new substation would be acquired in fee and would remain in BPA and federal government ownership.

The footprint of the substation would be approximately 800 feet by 500 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 760 feet by 450 feet. 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 (about 27.3 miles) and from Vantage Substation north to the BPA Columbia Substation (about 32 miles).

From Vantage to Columbia Substation, fiber would be strung on existing transmission line structures. From Vantage to the new Wautoma Substation, the fiber would either be strung on the new transmission line or existing lines, where available. Detailed design is still to be determined.

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.

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 right-of-way. 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

Alternative 1 would start at the Schultz Substation and follow the Schultz-Vantage line along Segments A and B. It would then follow the existing Vantage-Hanford 500-kV line 1,200 feet to the north along Segment E. The new line would end at the existing Hanford Substation.

This alternative has an estimated cost of $88,000,000.

S.2.3.1. Structures

Alternative 1 would use 500-kV single-circuit steel lattice structures. The height of each structure would vary by location and surrounding land forms, with an average height of 135 feet.

S.2.3.2. Conductors and Insulators

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

New ROW would be needed for the new structures and line. The new ROW would be 150 feet wide and offset from the existing 500-kV line up to 1,400 feet along Segment A, as described for the Preferred Alternative. Where the new ROW would parallel existing 500-kV lines along Segments B and E, the offset would be 1,200 feet.

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. Alternative 1 would require an estimated 63 acres to be disturbed for structure sites along the 63-mile route.

S.2.3.5. Road System

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 16 feet wide, with additional road widths of up to 25 feet for curves. When needed, a 5-foot ditch would be added to one side of the road. Roads would be dirt, gravel, or rock. Approximately 94.9 mi of new roads and 85.5 mi of improved roads would be built.

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 27 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.

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 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.

This alternative has an estimated cost of $67,000,000. No land costs were added to the estimate for the purchase of easements across the YTC. It is possible that in lieu of an easement payment, BPA would compensate the Army for the loss of the use of land used for maneuvers (i.e., purchasing adjoining land).

S.2.4.1. Transmission Line

Structures and conductor would be the same as described earlier for Alternative 1.

S.2.4.2. Right-of-Way

New ROW would be needed for the new structures and line. The new ROW would be 150 feet wide and offset from the existing 500-kV line up to 1,400 feet along Segment A. In Segment C, the transmission line would be in a new ROW and not 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. Alternative 3 would require an estimated 62 acres to be disturbed for structure sites along the 59-mile route.

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 Alternative 1. Approximately 130.4 mi of new roads and 98.0 mi of improved roads would be built.

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 would require an estimated 24 acres to be cleared for the pulling and reeling areas along the route.

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

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

As part of Alternative 3, 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). BPA would also install fiber from Midway Substation to the new Wautoma Substation using a combination of existing lines and the new transmission line.

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. 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 outside limits of the Hanford Substation would not need to be expanded for this alternative.

This alternative has an estimated cost of $67,000,000.

S.2.5.1. Transmission Line

Structures and conductor would be the same as described earlier for Alternative 1.

S.2.5.2. Right-of-Way

New ROW would be needed for the new structures and line. The new ROW would be 150 feet wide and offset from the existing 500-kV line up to 1,400 feet along Segment A, as described in the Preferred Alternative. Where the new ROW would parallel existing 500-kV lines along Segments B and F, the offset would be 1,200 feet. A new 150 feet wide ROW would also be acquired in the areas of Segment F that are not parallel to an existing line.

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

S.2.5.3. Clearing

Clearing requirements would be the same as those discussed earlier for the Preferred Alternative. Alternative 1A would require an estimated 75 acres to be disturbed for structure sites along the 72-mile route.

S.2.5.4. 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 112.9 mi of new roads and 71.2 mi of improved roads would be built.

S.2.5.5. 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 30 acres to be cleared for the pulling and reeling areas along the route.

S.2.5.6. 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.2.5.7. Communication Equipment

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

S.2.5.8. Maintenance

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

S.2.6 No Action Alternative

The No Action Alternative is traditionally defined as the no build 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. None of BPA's purposes for this project would be met. Maintenance and operation of the existing transmission line and substations would continue unchanged.

S.2.7 Alternatives Considered by Eliminated from Detailed Study

BPA studied a variety of alternatives to meet the need for the project. After preliminary study, the following alternatives were eliminated from detailed consideration because they either could not meet the need for the project or they were considered unreasonable.

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 Yakima Training Center 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 waterbody crossings or in urban areas.

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

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

S.3 Affected 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 the project are the Central Columbia and Yakima. Within these basins the streams crossed by the line segments fall into five watersheds: the Lower Yakima, Upper-Columbia-Priest Rapids, Lower Crab, Upper Yakima, and Upper Columbia-Entiat. 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.

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 (U.S. 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 (U.S. EPA 2000). Lower Crab Creek and the 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 various line 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

Six floodplains associated with the following features would potentially be crossed within the study area: Wilson Spur/Naneum Creek crossings, Cooke Canyon Creek, Columbia River crossings, Lower Crab Creek, Nunnally Lake, and Dry 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

Many of the wetlands in the study area have been altered or disturbed by human activities, such as road crossings, agricultural uses

and grazing. Once wetlands have been disturbed, they are susceptible to invasion by non-native species that out-competes native wetland species and reduces the habitat function. The study area for wetlands included a 500-foot corridor along all of the line segments. The presence of wetlands in the study area was initially investigated using National Wetlands Inventory (NWI) maps. Sixty wetlands were identified in the study area. Wetland vegetation classes included palustrine emergent, scrub-shrub, open water, and forested. All alternatives would cross some wetlands.

S.3.3 Soils and Geology

Diverse landforms and geologic features exist within the proposed 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 proposed 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 vegetation type found in most of the study area is referred to as shrub–steppe, with some grasslands (Franklin, 1973). With the exception of some riparian areas, few trees are able to survive in this arid landscape. 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 the project area, native bunchgrass dominated communities are no longer common due to invasion by annual grasses and weedy species 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.

The dominant shrubs currently existing in upland areas commonly include several species of sagebrush, including big sagebrush, threetip

sagebrush, stiff sagebrush, low sagebrush, bitterbrush, and rabbitbrush. In most areas today, non-native species, including cheatgrass, are now dominant.

In the study area, very few riparian areas have a tree overstory, and shrub-lined riparian areas are more common. Drier riparian areas are typically vegetated with upland shrubs, including sagebrush. Russian olive (an invasive species) is the most common tree species in riparian areas and wet areas.

The agricultural lands in the valley are mainly in cropland with small adjacent areas that may have some remnants of native plant communities.

S.3.4.2. High Quality Plant Communities

The Washington Natural Heritage Program (WNHP) tracks the occurrence of "high quality plant communities" within "***high quality terrestrial ecosystems***" (WNHP Website). Two WNHP high quality plant communities occur along line segments: the Wyoming big sagebrush/bluebunch wheatgrass shrubland community and the bitterbrush/Indian ricegrass shrubland community.

S.3.4.3. Weeds

Some plant species are designated as weeds by federal or state law. Weed species reduce the native plant ***biodiversity*** of shrub-steppe communities. 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 alternatives within the study area.

S.3.4.4. Rare Plants

The USFWS identified one federally listed threatened 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. 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. BLM sensitive species may occur on BLM-administered lands along Alternative 1A.

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. These 150 species, however, do not represent the total number of species that may exist within the proposed study area. For example, a study of the Hanford Site documented 195 bird species in the general area where the project is proposed. Many of these species are associated with open water habitats along the Columbia River.

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

The bald eagle, western sage grouse, Washington ground squirrel, and Mardon skipper butterfly were investigated for known occurrences in the study area. Core sage grouse habitat is located in the central Yakima Training Center along one segment, and the species is known to be occasionally present in the northern Yakima Training Center, which all alternatives cross. Wintering bald eagles are known to occur along the Columbia River, Wilson and Naneum Creeks, and streams within the YTC. Washington ground squirrels were historically present east of the Columbia River, but have no recent documented occurrences within the study area. Suitable habitat exists along all segments east of the Columbia River. The Mardon skipper butterfly is not present in the study area.

S.3.5.2. Federal Species of Concern

Approximately 20 federal species of concern are known to occur within the study area of the various alternatives.

S.3.5.3. Washington State Species

Approximately 50 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.

S.3.6.3. Bull Trout

The proposed study area is located within the Columbia River ***Distinct Population Segment*** (***DPS***) for bull trout. The only stream within the project area that has been documented as containing bull trout is Coleman Creek, but none have been observed since 1970.

S.3.7 Land Use

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

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.

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.

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.

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.

Roughly 35 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 65 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).

Public land uses in the study area are predominantly agriculture, rangeland, wildlife habitat, and recreation. The study area also includes crossing the BLM Saddle Mountains Management Area, the Saddle Mountains Unit of the Hanford Reach National Monument, Hanford Site, and Yakima Training Center.

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 agricultural 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 approximately 95 percent of the total population in Benton, Grant, and Kittitas counties. In Yakima County, however, Native Americans form 7 percent and Caucasians form 88 percent of the population. Hispanic origin varies greatly across the area, ranging from 11 percent of Benton County, 27 percent of Grant County, 5 percent of Kittitas County, and 37 percent of Yakima County as compared to a statewide composition of 6 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 ($26,770) compared to $30,979 in Grant County, $31,522 in Yakima County, and $44,219 in Benton County. All study area counties are lower that the state median household income of $46,080.

S.3.8.3. Employment

Agriculture is an important sector for Grant and Yakima counties. Jobs in agriculture account for 16 percent of the wage earnings in Grant County and 13 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.

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; and
- **Viewpoint C**, the Saddle Mountains Ridgeline, due to its striking landform, recreational value and potential impact from a ridgeline transmission line corridor placement.

S.3.10 Recreation Resources

Two resources have dedicated recreational activities. The John Wayne Pioneer Trail is an abandoned railroad line ROW that has been converted to a multi-use trail extending 110 mi from North Bend, Washington to the Columbia River. Also, the Wanapum Dam provides interpretive facilities as part of the Native American Heritage Center and the Dam Powerhouse.

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.

S.3.11 Cultural Resources

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 about the turn of the century that fruit farming really became a major activity in this region.

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.*

A search of recorded sites was conducted in the study area. ***Cultural resources*** located in the proposed study area include prehistoric camps, **lithic** scatters, prehistoric stone tool quarries, historic homesteads, historic railroad sites, and traditional root-gathering areas. There are no sacred sites recorded at this time in the study area.

S.3.12 Public Health and Safety

S.3.12.1. Electric and Magnetic Fields

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.*

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. A technical definition is included in Chapter 9 (Glossary and Acronyms).*

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.

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
- USDOE Central Regional Office: Kittitas County
- USDOE 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

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 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, o**ngoing 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. However, impacts would be avoided by placing structures in areas adjacent to floodplains.

Impacts to wetland areas generally impair or remove wetland functions, either temporarily or permanently. These impacts generally decrease a wetland's ability to provide food, water, or cover for wildlife. Building structures or roads near wetland areas could destabilize soils and slopes, and increase sedimentation in wetlands.

It is unlikely that any wetlands within the study area would be directly impacted by the placement of structures. Most of the wetlands within the study area are not extensive, and can be spanned by structures placed in upland areas adjacent to wetlands.

Some portions of wetland areas along creeks would need to be filled for road crossings. Roads and culvert crossings would be designed to minimize impacts to wetland areas.

The ongoing maintenance of transmission lines and access roads would impact wetlands in several ways. Some trees may need to be removed for safety reasons. Roads serve as a corridor for invasion by some weed species that tend to grow in wet areas.

The **Preferred Alternative** would potentially affect approximately 28 wetlands, locate one structure in the Columbia River floodplain, and involve constructing new access roads in the Caribou Creek floodplain. Overall impact to floodplains and wetlands: **moderate**.

Alternative 1 would affect approximately 32 wetlands, potentially locate one structure in the Columbia River floodplain, and involve constructing a new access road in the Caribou Creek floodplain. Overall impact to floodplains and wetlands: **moderate**.

Alternative 3 would affect approximately 28 wetlands and involve constructing new access roads in the Caribou Creek and Dry Creek floodplains. Overall impact to floodplains and wetlands: **moderate**.

Alternative 1A would affect approximately 31 wetlands, potentially locate one structure in the Columbia River floodplain, and involve constructing a new access road in the Caribou 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.

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. In addition, a Weed Management Plan would be developed to minimize the introduction and spread of noxious weeds.

The **Preferred Alternative** would potentially affect habitat for Umtanum wild buckwheat, Ute ladies' tresses, northern wormwood, basalt daisy, and several BLM sensitive species. Two high-quality plant communities designated by the WNHP would be impacted. Overall impact to vegetation: **moderate to high**.

Alternative 1 would potentially affect habitat for Ute ladies' tresses, northern wormwood, and several BLM sensitive species. Two high-quality plant communities designated by the WNHP would be impacted. Overall impact to vegetation: **moderate**.

Alternative 3 would potentially affect habitat for Ute ladies' tresses, basalt daisy, and several BLM sensitive species. One high-quality plant communities designated by the WNHP would be impacted. Overall impact to vegetation: **moderate**.

Alternative 1A would potentially affect habitat for Ute ladies' tresses, northern wormwood, and several BLM sensitive species. One high-quality plant communities designated by the WNHP would be impacted. Overall impact to vegetation: **moderate**.

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, 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.

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. Segment D, however, is highly degraded in terms of wildlife habitat. Overall impacts to wildlife and habitat: **low to moderate**.

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 would 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 10 fish bearing streams. Segment A would cross streams that are designated as critical habitat for Middle Columbia River steelhead trout and bull trout. Neither species are known to 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 and Upper Columbia River steelhead trout are present in the Columbia River, and would thus be spanned by Segments B and D. Overall impact to fish resources: **none to low**.

Alternative 1 would cross 11 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 and Upper Columbia River steelhead trout are present. Overall impact to fish resources: **none to low**.

Alternative 3 would cross 17 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 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.

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 and along the Columbia National Wildlife Refuge, impacts would be moderate due to the new line following an existing transmission line right-of-way. 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 and residential 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, 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. Impacts to agricultural lands crossed would be high; impacts to grazing activities would be low. 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. 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 Impacts

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.

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. 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 Recreation Resource Impacts

All the alternatives would have **low** impact on recreation in the area. There are no developed recreational sites in the study area that would be interfered with or limited by any of the transmission line routes. There could be low impacts to some recreation activities during construction. These activities are not limited to a specific area and could undergo a minor relocation without much interruption during the short duration of construction. On the YTC, the John Wayne Trail may be temporarily closed during construction.

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

S.4.10 Cultural Resources

Any ground-disturbing activity within the boundaries of a significant cultural resource would be destructive, resulting in the permanent, irreversible, and irretrievable loss of scientific information and/or cultural value. Non-ground-disturbing activities, such as cutting

vegetation and road easements, may or may not have negative impacts on cultural resources depending on the type of resource involved and the proximity of the activity to the resource.

Sensitive areas indicate the presence of potentially affected resources that should be avoided. When unavoidable, they should be mitigated. All cultural resource areas are important, thus no impact levels were assigned for the construction alternatives.

The **Preferred Alternative** would impact 36 sensitive areas totaling 7.2 mi^2.

Alternative 1 would impact 36 sensitive areas totaling 7.4 mi^2. The B_{SOUTH} option within this alternative would increase the number of sensitive areas by 2 and increase the total affected area by 0.3 mi^2.

Alternative 3 would impact 38 sensitive areas totaling 8.0 mi^2.

Alternative 1A would impact 38 sensitive areas totaling 7.8 mi^2. The B_{SOUTH} option within this alternative would increase the number of sensitive areas by 2 and increase the total affected area by 0.3 mi^2.

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 impacts on public health and safety on Segment 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 impacts on public health and safety on Segment 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 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.