



**FINAL  
ENVIRONMENTAL  
ASSESSMENT**

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**REBUILD OF THE NORTH LOOP  
230 KV ELECTRICAL TRANSMISSION  
LINE HANFORD SITE  
WASHINGTON**

**APRIL 2018**

**U.S. Department of Energy**

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## ACRONYMS AND ABBREVIATIONS

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APE	area of potential effect
AR	alternative route
BMP	best management practice
BPA	Bonneville Power Administration
BRMP	<i>Biological Resource Management Plan</i>
CEQ	Council on Environmental Quality
CERCLA	<i>Comprehensive Environmental Response Compensation and Liability Act</i>
CFR	<i>Code of Federal Regulations</i>
CRR	cultural resources review
DOE	U.S. Department of Energy
EA	environmental assessment
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FFRMS	Federal Flood Risk Management Standard
FR	<i>Federal Register</i>
FVA	Freeboard Value Approach
kV	kilovolt
NEPA	<i>National Environmental Policy Act</i>
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHPA	<i>National Historic Preservation Act</i>
NRHP	National Register of Historic Places
PNNL	Pacific Northwest National Laboratory
RCRA	<i>Resource Conservation and Recovery Act</i>
RL	Richland Operations Office
ROW	right of way
SHPO	State Historic Preservation Officer
SR	State Route
TCP	traditional cultural property
USACE	U.S. Army Corps of Engineers
U.S.C.	<i>United States Code</i>
WAC	<i>Washington Administrative Code</i>

**GLOSSARY**

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100-Year Flood	This designates a flood magnitude that has an average recurrence interval of 100 years. (Flood magnitude values are location specific.) Statistically, this is a flood magnitude that has a 1 in 100 chance (i.e., 1 percent chance) of being equaled or exceeded in any 1 year.
Access Road	A road or road spur that provides access to the transmission line corridor and transmission line structure sites during construction and operation and maintenance.
Alternating Current	In alternating current, the flow of electric charge periodically reverses direction as compared to direct current, where the flow of electric charge is only in one direction.
Alternative Route	One of two or more possible routes for building the transmission line that reasonably would meet the proposed project objectives and agency mission.
Archaeological District	A specific, definable geographic area with a grouping of archaeological sites related primarily by their common components
Area of Potential Effect	The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.
Attainment	A geographic region where the concentration of one or more criteria air pollutants do not exceed national ambient air quality standards.
Best Management Practice (BMP)	Various practices that are effective and practical means of avoiding or reducing impacts during implementation of the Proposed Action. At the Hanford Site, BMPs are specified in site policies, plans, and procedures that are integral to the protection of workers, project assets, and the environment. For example, they may include functional design criteria, site evaluations for land-use requests on the Hanford Site, construction management, environmental protection processes, biological and cultural resource management, weed management, revegetation and ecological restoration, and fire protection restrictions.
Central Plateau	The elevated area in the center of the Hanford Site where the 200 East and 200 West Areas are located.
Circuit	A system of conductors through which an electric current is intended to flow; a single circuit transmission line consists of one alternating current transmission line, made up of three conductors; a double circuit transmission line consists of two alternating current transmission lines, which would have two sets of three conductors.
Conductors	Wire cables strung along a transmission line through which electricity flows.
Criteria Pollutants	Air pollutants having National Ambient Air Quality Standards.
Designated Critical Habitat	The specific areas within the geographic area, occupied by the species at the time it was listed, that contain the physical or biological features that are essential to the conservation of endangered and threatened species and that may need special management or protection.
Distribution Line	A local utility transmission line that is a lower voltage system (between 4 and 35 kV) and is used to deliver electric power to end users (utility customers).

Electrical Hardware	Equipment and materials used to attach conductor cables to support structures, which typically include insulators, support arms, and fasteners.
Floodplain	That portion of a river valley adjacent to the stream channel which is covered with water when the stream overflows its banks during flood stage. A 100-year floodplain is the area inundated by a 100-year flood event.
Ground Wire	Wire on a transmission line that would take the charge during a lightning strike, which is then directed down to the base of the structure and into the ground; used to protect electrical equipment from electrical surges.
Habitat	The combination of biotic (living) and abiotic (nonliving) components that provides the natural home or environment of an animal, plant, or other organism.
Hanford Reach	The section of the Columbia River extending from 15 miles upstream of the mouth of the Yakima River to Priest Rapids Dam.
Historic District	A specific, definable geographic area with a significant number of historic buildings, features, structures, or objects that are united by historical events or aesthetic associations.
Historic Property	Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places
Mixed Waste	Waste that contains radioactive material/contamination subject to the Atomic Energy Act of 1954 as well as a hazardous component subject to the Resource Conservation and Recovery Act, or RCRA.
Municipal Solid Waste	Commonly known as trash or garbage, it consists of everyday items used and then thrown away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, and newspapers. It typically comes from homes, schools, hospitals, and businesses. In this document, it includes the miscellaneous debris that would be generated by project activities.
Outage	An event caused by a disturbance on the electrical system that requires the electrical provider to remove a piece of equipment or a portion or all of a line from service; caused by human actions or natural events.
Precontact	Of or relating to the period before contact of an indigenous people with an outside culture.
Pulling Sites	Areas located along the transmission line where equipment (i.e., a puller) is set up and used to pull the conductor through portions of the transmission system.
Route Segment	A section of an alternative route.
Sensitive Species	Defined in WAC 232-12-297, Section 2.6, to include “any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.”
Staging Areas	Multi-use construction areas (also referred to as laydown areas) established to stage construction personnel and equipment and to store and stockpile new and removed support structures, conductors, electrical hardware, trucks, cranes, and other equipment.
Stringing	Process of attaching of electrical conductor cable onto support structures from spools of cable.

Switching Station	A particular type of substation where energy is routed either to or from different Switching stations often contain circuit breakers and other automated mechanisms when system faults occur.
Tensioning and Pulling	Process by which electrical conductor cables are pulled on the support structures to achieve the appropriate tension or sag between structures.
Tensioning Sites	Temporary construction areas located along the transmission line where tensioning equipment is set up and used to tighten the conductor in order to achieve the required conductor sag between structures.
Threatened or Endangered Species	Plant or animal species that are at risk of either becoming extinct throughout all or a significant part of their range (endangered) or of becoming endangered in the near future throughout all or a significant part of their range (threatened). Threatened or endangered status is formally designated by a listing process under the Endangered Species Act (16 U.S.C. § 1531 et seq.).
Traditional Cultural Property	Site that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community.
Transmission Line	A system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. Lines are operated at relatively high voltages varying from 69 kV up to 765 kV, and are capable of transmitting large quantities of electricity over long distances.
Transmission Support Structures	Structures that are used to support overhead power lines (i.e., conductors). Support structures are typically wooden poles, steel lattice towers, or tubular steel monopoles.

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# 1.0 INTRODUCTION AND PURPOSE AND NEED FOR ACTION

## 1.1 INTRODUCTION

The Hanford Site is an area of approximately 580 square miles owned by the federal government and managed by the U.S. Department of Energy (DOE) Richland Operations Office (RL) in southeastern Washington (Figure 1-1). Bonneville Power Administration (BPA), a power marketing agency within DOE, operates a portion of the electrical transmission facilities within the Hanford Site. A portion of the electric power needs of the Hanford Site mission and BPA is provided from the North Loop electrical transmission line, which is part of an existing 230 kilovolt (kV) system that was built in the 1940s.

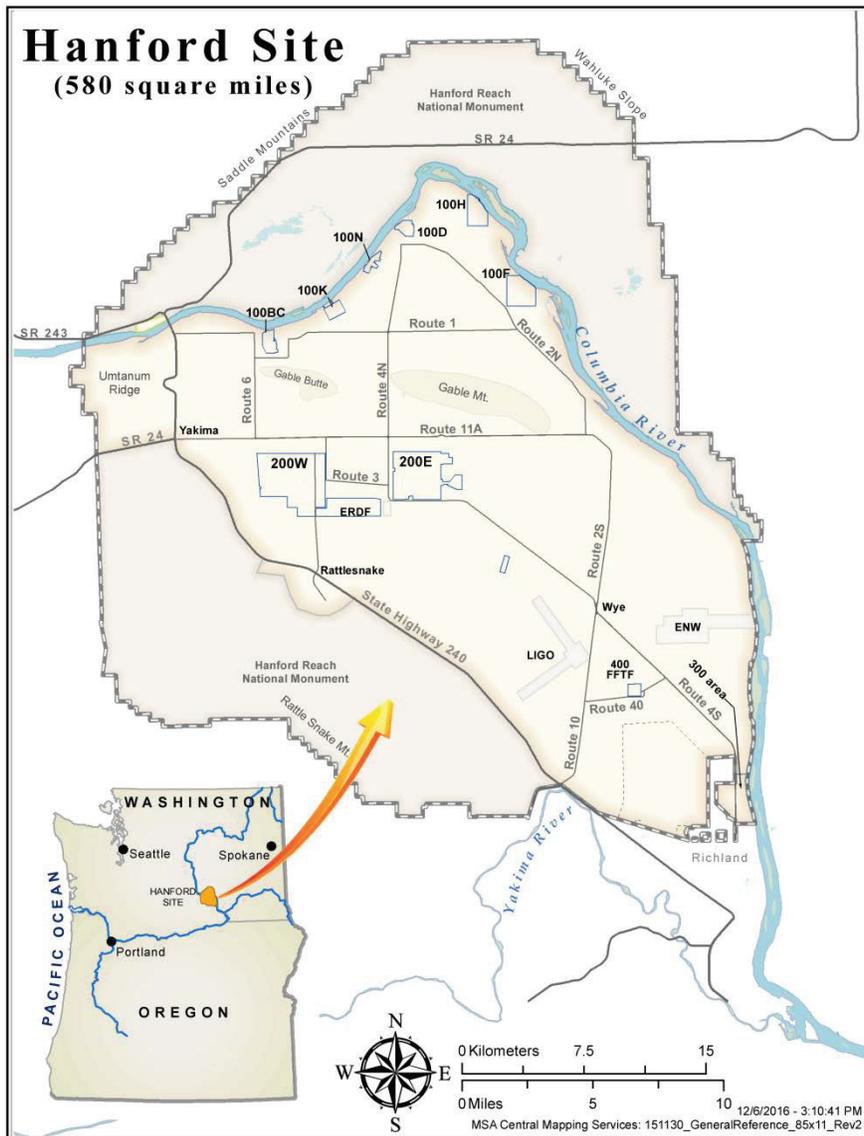


Figure 1-1. The Hanford Site

To provide reliable power for DOE requirements, the DOE proposes to rebuild approximately 28 miles of the existing North Loop transmission line in the northern part of the Hanford Site with approximately 20 miles of 230 kV, single- and double-circuit transmission line. The proposed North Loop

Project would require reconfiguring of switching stations and substation components, installing of transmission line equipment and conductors, building new and reconditioning existing access roads, and installing and performing other ancillary components and activities.

## 1.2 BACKGROUND

DOE operates and maintains the Hanford Site 230 kV transmission system as a source of electric power for the Site’s 100 Area facilities and the Central Plateau facilities (the 200 and 600 areas). The transmission system is a loop-type system, is approximately 53 miles long, and comprises two separate transmission lines (North Loop and South Loop) and three active substations (Figure 1-2). Power is provided to the transmission system from the Midway substation located in the northwest corner of the Hanford Site. The North Loop delivers power to the A9 substation in the 100-K Area and terminates at the A22 Ashe tap switching station. The South Loop delivers power to the A8 substation (200 Area) and the Waste Treatment Plant A6 substation and also terminates at the Ashe tap switching station. The North Loop was originally built in the 1940s to support several 100 Area facilities along the Columbia River that have since been removed. Because of the age of the North Loop system and deteriorating condition of the conductors, hardware (e.g., insulators), and support structures (lattice steel towers or wood poles), the existing North Loop will not support the continued long-term cleanup mission of the Hanford Site Central Plateau, which is projected until at least 2060.

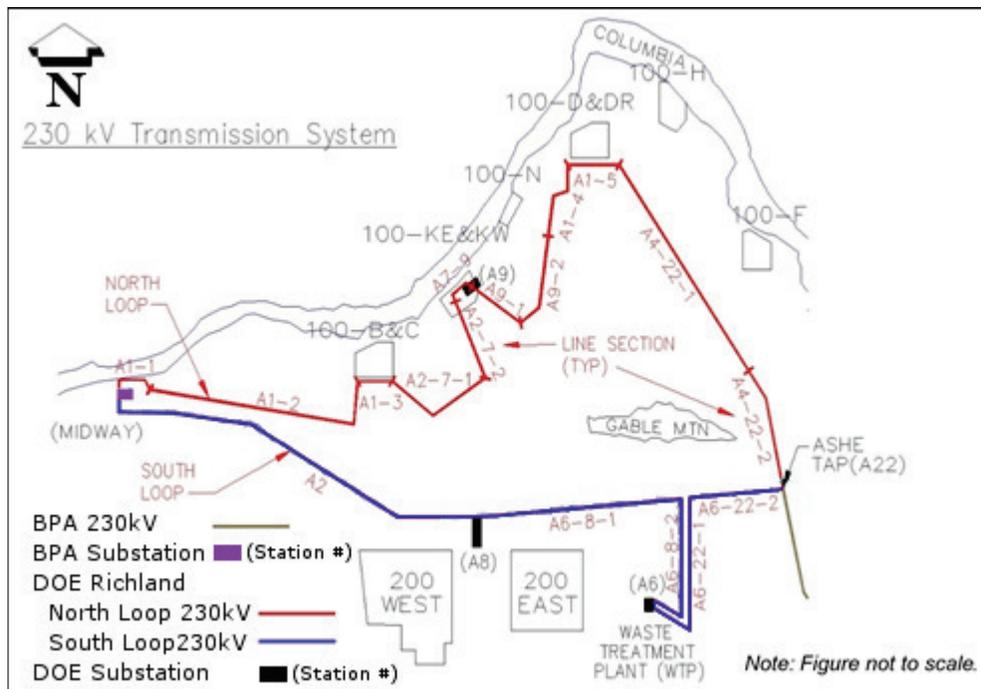


Figure 1-2. Hanford Site 230 kV Transmission System

## 1.3 NEED FOR ACTION

The Hanford Site 230 kV transmission system provides highly reliable electric power for the cleanup mission at the Hanford Site, backup power requirements for the Columbia Generating Station (a commercial nuclear energy facility owned and operated by Energy Northwest and depicted in Figure 1-1 as ENW), and service to electrical utilities in and around the Tri-Cities of the Columbia Basin (i.e., Richland, Kennewick, and Pasco). The looped transmission system supplies dual feeds to each Hanford Site substation, thereby satisfying the electrical requirements for the cleanup mission and the

need for redundant sources. However, the northern half of this transmission loop has well exceeded its service life and is showing signs of deteriorating hardware. Much of the South Loop (about 72 percent) was built in 1982, is of newer construction than the North Loop, and does not require rebuilding at this time. DOE also uses the transmission system to supply electricity to the Columbia Generating Station and utilities in the Tri-Cities area.

DOE is proposing two separate circuits, one for RL and the other for BPA. Because BPA utilizes the Hanford transmission system to provide for the electrical needs of the Columbia Generating Station and the Tri-Cities area, the system is considered part of the Bulk Electric System, as defined by the Federal Energy Regulatory Commission (FERC). RL and BPA are both registered entities responsible for compliance with numerous North American Electric Reliability Corporation (NERC) electric reliability standards and hundreds of requirements. However, these standards apply only to the power that BPA passes through the Hanford Site, not the power that RL consumes onsite, yet both RL and BPA currently bear the costly, duplicative operational and administrative burden of compliance caused by using the same circuit. Separation from FERC and NERC requirements would create efficiencies in operating and reporting requirements for the rebuilt North Loop line (see Section 2.1).

#### **1.4 PURPOSES OF ACTION**

Purposes are defined here as goals to be achieved while meeting the need for the Proposed Action. DOE has identified the following purposes that it will use to help evaluate the alternatives:

- Maintain transmission system reliability to DOE mission requirements,
- Continue to meet DOE's contractual and statutory obligations,
- Minimize impacts on the environment,
- Improve safety for transmission line workers,
- Maximize life cycle cost-effectiveness, and
- Use facilities and resources efficiently.

#### **1.5 NATIONAL ENVIRONMENTAL POLICY ACT AND RELATED PROCEDURES**

The *National Environmental Policy Act* (42 U.S.C. § 4321 et seq.; NEPA), the Council on Environmental Quality (CEQ) NEPA regulations [40 Code of Federal Regulation (CFR) Parts 1500 to 1508], and the DOE's NEPA implementing procedures (10 CFR Part 1021) require that DOE consider the potential environmental impacts of a proposed action before making a decision on federal actions that could have environmental effects.

In compliance with these regulations and DOE's procedures, this *Environmental Assessment for the Rebuild of the North Loop 230 kV Transmission Line on the Hanford Site, Washington (DOE/EA-2033)* (hereinafter, North Loop EA):

- Describes the purpose and need and objectives for the Proposed Action, and the criteria used for evaluating and comparing the impacts of the various alternatives;
- Examines the potential environmental impacts of the Proposed Action, reasonable alternatives, and the No Action Alternative; and
- Analyzes past, present, and reasonably foreseeable actions to evaluate potential cumulative impacts.

This EA provides DOE decisionmakers with information regarding the environmental consequences, as well as the ability to meet project goals (as identified in Section 1.4), in order to decide whether to choose the No Action or one of the action alternatives for rebuilding the North Loop line.

On May 23, 2017, the Draft EA was provided to the Washington State Department of Ecology for a 30-day review with comments requested by June 22, 2017; no comments were received from the agency.

## 2.0 PROPOSED ACTION AND ALTERNATIVES

### 2.1 PROPOSED ACTION AND PROJECT DESCRIPTION

The Proposed Action is to rebuild the existing North Loop transmission line, decommission and remove the deactivated portions of the existing North Loop line, and conduct ongoing operations and maintenance of the completed system. The Proposed Action would replace the components (conductors, hardware, and support structures), shorten the circuit length, separate the BPA circuit serving the Ashe substation from the circuit serving the A6, A8, and A9 substations, and would be a critical step in achieving long-term reliability of the system. The rebuilt North Loop line would originate at the Midway substation, terminate approximately 2 miles west of the existing Ashe tap, and supply electric power to the A9 substation in the 100-K Area and the A8 and A6 substations in the 200 Area. The existing Ashe tap provides the current interconnection between the existing North Loop, South Loop, and the Ashe substation. The new BPA Midway-Ashe circuit would also originate at the Midway substation and connect to the existing line approximately 2 miles west of the existing Ashe tap to supply electric power to the Ashe substation. The Proposed Action would reduce the North Loop line by up to 8 miles. The existing North Loop transmission system would be decommissioned and removed following completion of the replacement North Loop. Table 2-1 identifies and compares general characteristics of the existing North Loop line and the proposed rebuilt North Loop line.

**Table 2-1. General Characteristics of Existing North Loop Line and the Proposed Rebuilt Line**

Project Element	Existing Transmission Line	Rebuilt Transmission Line
Operating Voltage	230 kV	230 kV
Number of Circuits	1 <sup>a</sup>	2 <sup>b</sup>
Number of Wood Pole Structures	225	0 to 15
Number of Steel Structures	43	143 to 147 <sup>c</sup>
Structure Height Range	60 to 100 feet	100 to 150 feet (steel)

a. Shared circuit for DOE and BPA electrical power requirements.

b. Separate, independent circuits for DOE and BPA electrical power requirements.

c. Approximate range of number of steel structures consists of reused and new installations of the rebuilt North Loop line. The final number of steel structures would be dependent on the final design along the selected route alternative.

The proposed project includes the following activities:

- Establish temporary construction areas for storage of materials and staging of personnel and equipment;
- Construct new and/or improve existing access roads;
- Remove vegetation in work areas as needed (e.g., new support structures);
- Remove existing support structures or conductor and hardware as necessary;
- Install new support structures;
- Install new conductors, ground wires, fiber optic cables, and insulators;
- Install new switches, circuit breakers, lightning arrestors, and related monitoring, control, and communications equipment in the field, substation yards, and substation control buildings;
- Revegetate areas disturbed by construction and not needed for operations and maintenance;
- Decommission and remove the existing North Loop transmission system;
- Conduct waste management; and
- Operate and maintain associated systems.

The following sections discuss characteristics and details of these project components and activities.

### **2.1.1 Temporary Construction Areas**

Four multi-use construction areas (also referred to as staging or laydown areas) would be established to stage construction personnel and equipment and to store and stockpile new and removed support structures, conductors, electrical hardware, trucks, cranes, and other equipment. The size of each area would depend on the type and amount of materials and equipment to be stored and the availability of suitable sites. The construction areas would range in size from approximately 5 to 34 acres, making use of previously disturbed areas. One area would utilize an existing construction yard located between the northern boundary of the 200 East Area and Route 11A, two additional areas would be located at existing borrow pits at the corners of Routes 11A and 6 and Routes 1 and 4N, and the fourth would be located adjacent to the Midway substation. These laydown areas are shown in Figure 2-3 in Section 2.3 of this EA. If helicopters are used for structure installation, additional support areas could be needed (e.g., refueling operations), which would consist of prior-disturbed locations or areas already used for helicopter operations on the Hanford Site. Per Hanford Site requirements, additional support areas needed for project activities would be subject to completing the required environmental clearance process.

In addition to construction yards, construction activities would require tensioning or pulling sites adjacent to certain support structures. These sites would be temporary and would hold the stringing equipment required to pull the conductor through a series of structures or to tension the conductor to the required sag between structures. Because the stringing equipment would need to be located a sufficient distance away from structures during pulling or tensioning, these sites could extend as far as 500 feet from the base of a structure. Tensioning or pulling sites typically would be two to three miles apart to accommodate the maximum distance of a single conductor pull. Land requirements for typical tensioning or pulling sites would be entirely within a 200-foot right of way (ROW). At locations where the transmission line turns or ends, a temporary construction ROW would extend approximately 500 feet in a straight line to allow tensioning and pulling of the conductor.

### **2.1.2 Access Roads**

Access roads would be necessary to transport equipment, materials, and workers to install new or rebuild existing support structures, conductors, ground wires, and insulators. After construction, some access roads could continue to be used to support operations and maintenance work. New access roads would be required for all action alternatives. Although most of the new construction would occur parallel and adjacent to existing transmission lines and roads, existing access roads likely would require upgrading (e.g., grading) to allow large equipment to move support structures and spools of conductors. Figure 2-1 shows an existing access road on the Hanford Site that could be used to construct a segment of the rebuilt North Loop transmission line.

Access roads would be constructed (or upgraded) using bulldozers, road graders, frontend loaders, backhoes, and roller compactors. The standard width of the access roads would be 14 feet. Where existing access roads are used, new, short roads may be necessary to access each new support structure. The estimated lengths of the new access roads are presented by alternative route (see Section 2.3). Crews would apply water to the roads during construction to suppress fugitive dust. Following completion of construction, any access roads not needed for operations and maintenance would be revegetated with native species in accordance with the *Hanford Site Biological Resource Management Plan* (DOE 2017) and the *Hanford Site Revegetation Manual* (DOE 2013a).



**Figure 2-1. Existing Access Road on the Hanford Site**

### **2.1.3 North Loop Transmission Line**

The rebuilt North Loop transmission line would be a 230 kV line constructed as a double-circuit system incorporating a single-circuit radial tap to the A9 substation depending on the selected route. During construction of the rebuilt North Loop line, the existing North Loop transmission system would remain energized to supply power for the Hanford Site transmission system and the Ashe substation. Therefore, the rebuilt North Loop line would involve emplacement of new transmission lines, fiber optic cable, and grounding wires and the refurbishment of existing lines not currently part of the existing North Loop transmission system. The Midway substation would continue to supply power to the rebuilt RL and BPA transmission systems.

#### **2.1.3.1 Right of Way**

Construction activities would take place within a 200-foot ROW, centered approximately on the transmission line. As discussed in Section 2.1.1, in addition to pulling and tensioning sites every 2 to 3 miles along the segments of line, the construction ROW would extend approximately 500 feet from support structures to accommodate tensioning and pulling activities beyond where the transmission line turns or ends. Land disturbance would be limited to that area actually needed for construction and would not include the entire 200-foot ROW. Within the ROW, two 2-foot-wide trenches would be excavated approximately 100 feet out from the sides of each structure to a depth of 18 inches for installation of an electrical grounding system. The trenches would be located within the construction footprint of each structure and would be filled and revegetated after installation of the grounding system. All work would be performed in accordance with established environmental requirements and Hanford Site protocols. A clearance of 100 feet or more would be maintained between other existing transmission lines and the rebuilt North Loop line, except where the lines would cross or join together, consistent with the National Electrical Safety Code (NESC).

#### **2.1.3.2 Support Structures**

The support structures used for the rebuilt North Loop line would mainly include both tubular steel (monopole) and lattice steel for the transmission system. Depending on the route alternative, a

limited number of wood-pole structures would be installed in the vicinity of the Midway substation for conductors or fiber optic cable; however, for purposes of impact analyses, steel structures represent a conservative approach and therefore were assumed for all new installations. Table 2-2 summarizes the dimensions and land requirements of the support structures. The height of the potential support structures would vary by structure type. Structure heights, span lengths, and vertical clearance would be determined in accordance with the NESC, the project functional design criteria, terrain and land use, and applicable Hanford Site engineering procedures. The steel lattice towers would require approximately five support structures per mile and seven per mile for steel tubular poles depending on location. Geotechnical boreholes would be drilled at periodic locations within the construction footprint to evaluate subsurface conditions for placement of structure foundations.

**Table 2-2. Dimensions and Land Requirements of Support Structures**

Attribute	Steel Lattice Towers	Tubular Steel Poles
Height (feet)	100–150	
Number per mile	5	7
Construction area (feet)	200 × 200	200 × 200
Structural footprint (feet)	50 × 50	8 × 8
<b>Structure Foundations</b>		
Number of holes	4	1
Hole diameter (feet)	12	8
Hole depth (feet)	20–25	20–25

During construction, the base area (i.e., footprint) of each support structure site and a surrounding construction area would be cleared of vegetation as needed. Holes would be drilled or excavated for placement of support structures. Blasting to excavate foundation holes is not expected. Foundations would likely utilize steel plates for lattice towers or direct embedment for monopoles. If concrete is used for structure foundations (steel lattice or tubular steel), the associated materials would be hauled from an offsite concrete batch plant. Excess excavated material would be spread around the base of each support structure to restore the area to its natural setting. Support structures would be lifted in place with cranes or flown in by helicopter.

Two types of helicopters may be used for construction; a smaller craft to string the rope line in the towers, and a larger “sky crane” to set the steel support structures. The smaller aircraft would pull a lighter rope line, which would then be used to pull in a hard line, which then pulls in the new conductor. Flights would occur at a low elevation and time would be spent at each tower conducting the stringing operations. Installation of all three phase conductors and the ground wire can be accomplished using this method. The small craft usually do not operate with co-pilots; however, the large helicopters do. The larger helicopters also fly at a low elevation with time spent at each tower location to place the structure. Multiple landing zones may be required along the project area to support the helicopter missions.

Segments of the rebuilt North Loop system that would use existing transmission system components would involve activities similar to construction of new line. However, if support components were in poor condition, or could not accommodate the conductors and hardware required for a double-circuit system, new support structures would be required. In this case, existing conductors and electrical hardware would be removed and replaced with new conductors and hardware, and existing structures or structural elements, including wood, metal, and foundational components would be removed and replaced. Materials may remain in the ROW after disassembly while awaiting removal. Any materials removed during refurbishment of existing transmission lines may be collected at one of the staging areas for disposition.

### **2.1.3.3 Switching Stations**

Switching stations, or taps, are connections among the conductors of different transmission lines to route electric power. The connections occur aboveground at the conductors and require construction of ground supports for three or four separate switches and related control, monitoring, and communication equipment powered by a transformer connected to an adjacent distribution line or similar source. Installation of the switching stations would involve temporary construction activities using bucket trucks and equipment delivery trucks. The existing Ashe tap along Route 11A, which connects the existing North and South loops of the Hanford transmission system to the 230 kV transmission line that continues to the south, would be converted to a simple pass-through, and switches would be bypassed and removed. One of the alternative routes being considered (see Section 2.3) would require the installation of a switching station near Cutoff Road and the existing, but currently out of service, 230 kV A3 transmission line. All alternative routes would require installation of a switching station adjacent to the A8 substation.

### **2.1.4 Substation Modifications**

The Midway substation would require new switches; a circuit breaker; lightning arrestors; and related conductors, monitoring, control, and communications equipment in the yard and in the control building. Foundations of equipment removed from service in the past would be removed and new foundations placed. Existing lines connected to the Midway 230 kV electrical bus could be moved to a new connection bay or removed completely to accommodate the new circuit. The A8 substation would require the same types of modifications as the Midway substation. All substations, including Midway, Ashe, A6, A8, and A9 would require modification of relays and associated monitoring and control equipment to account for the changes taking place to the transmission system. All modifications to the substations would occur within the existing fence line and footprint of the substation and would not include any new land disturbance.

### **2.1.5 Decommissioning and Removal of the Existing North Loop Transmission System**

Following completion of the rebuilt North Loop line, the deactivated portions of the existing North Loop transmission system would be decommissioned and removed. Decommissioning activities would be similar to those during construction. The existing North Loop structures that would be removed consist of approximately 43 steel and 225 wood structures spanning approximately 28 miles from the Midway substation to the Ashe tap. Figure 2-2 shows an example of the existing wood structures that would be removed. Existing access roads provide access to the line and support structures. Some road improvement may be required for access by larger equipment, such as cranes, for the removal of support structures. Heavy-equipment operators would remove and spool conductors and collect and transport other electrical hardware to a temporary staging area(s) on the Hanford Site. In addition to removal of the structures, foundations would also likely be removed. All removed structures would be transported to staging areas for disposition. The deactivated structure sites and any access roads not needed for future activity would be revegetated in accordance with the *Hanford Site Biological Resource Management Plan* (DOE 2017) and *Hanford Site Revegetation Manual* (DOE 2013a).

### **2.1.6 Equipment and Personnel**

The Proposed Action would require operation and use of different types of equipment (Table 2-3). Required personnel would include heavy-equipment operators, electrical workers, project managers, administrative staff, and support staff with expertise in environmental protection, permitting, and radiological surveillance. The expected maximum workforce during construction is approximately 70 full-time-equivalent workers. Decommissioning and removal activities would require approximately 10 full-time-equivalent workers.



**Figure 2-2. Example of Wood Structures that Would Be Removed under the Proposed Action**

**Table 2-3. Equipment Used in Construction of the Rebuilt North Loop Line and Removal of the Existing North Loop Transmission System**

Equipment Type	Fuel	Project Activity
Bulldozers	Diesel	Access road construction
Excavators and loaders (large and small)	Diesel	Access road and transmission line construction, North Loop removal
Dump trucks	Diesel	Access road and transmission line construction
Cranes	Diesel	Transmission line construction, North Loop removal
Road grader	Diesel	Access road and transmission line construction, North Loop removal
Roller compactor	Diesel	Access road construction
Cable trucks (conductor spools, cable tensioning, bucket trucks)	Diesel	Transmission line construction, North Loop removal
Work trucks	Diesel/Gasoline	All activities
Semi-tractor trailers and flatbed trucks	Diesel	Transmission line construction, North Loop removal
Concrete trucks	Diesel	Transmission line construction
Water trucks	Diesel	All activities
Drill trucks or tractors	Diesel	Transmission line construction

### **2.1.7 Operations and Maintenance**

Operations and maintenance activities for the rebuilt North Loop line would be similar to those for the existing North Loop system and would include surveillances, planned maintenance, and emergency repairs. Surveillance would consist of periodic inspections of the transmission line components. Because the rebuilt North Loop line would comprise mostly new transmission components, planned maintenance would be less than that on the existing North Loop line. Emergency repairs would still be required for unforeseen events, such as extreme weather (e.g., wind or ice storms) and fire damage. Operations and maintenance activities would require access to the system components for the life of the system.

### **2.1.8 Proposed Schedule**

The construction duration for rebuilding the North Loop electrical transmission system, to include separate RL and BPA circuits, is estimated to be 12 months. Possible early construction and energization of a portion of the RL circuit (Midway substation to A9 substation) will be evaluated during project design. Due to necessary Ashe tap modifications associated with separating the RL and BPA circuits, removal and deactivation of the existing North Loop line from the Midway substation to the Ashe tap would coincide with a scheduled outage at the Columbia Generating Station to minimize disrupting service. Once the existing North Loop is de-energized, the construction duration for demolition is approximately 12 months.

## **2.2 NO ACTION ALTERNATIVE**

Under the No Action Alternative, the existing North Loop line would continue to operate as currently configured. The existing North Loop line would require ongoing maintenance and repairs. Repairs would require heavy equipment and vehicles to access transmission structures, and access roads would be upgraded and maintained. Access roads, some sections of which have been used infrequently and now support substantial amounts of vegetation, may require grading, application of gravel, and/or herbicide application for continued use.

An assessment of the existing North Loop has determined that many of the structures, conductors, and other electrical hardware are in a deteriorating condition or of advanced age (Carlson 2015). Unplanned outages related to equipment failures have occurred and would be expected to occur in the future, probably at an increased frequency. It might be possible to plan some of this maintenance, but it is expected that the majority of repairs would occur on an emergency basis as various parts of the line continue to deteriorate. The cleanup mission would likewise be affected, as an outage of even a few seconds could interrupt hundreds of workers for an entire 10-hour shift. Over time, this could threaten the ability of DOE to complete court-mandated cleanup milestones<sup>1</sup>. The amount and cost of maintenance of the North Loop under the No Action Alternative is expected to increase over time.

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<sup>1</sup> DOE, the U.S. Environmental Protection Agency, and the State of Washington Department of Ecology signed a comprehensive cleanup and compliance agreement on May 15, 1989. The Hanford Federal Facility Agreement and Consent Order, or Tri-Party Agreement, is an agreement for achieving compliance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) remedial action provisions and with the Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal unit regulations and corrective action provisions. More specifically, the Tri-Party Agreement (1) defines and ranks CERCLA and RCRA cleanup commitments, (2) establishes responsibilities, (3) provides a basis for budgeting, and 4) reflects a concerted goal of achieving full regulatory compliance and remediation, with enforceable milestones in an aggressive manner.

## 2.3 PROPOSED ACTION ALTERNATIVES

DOE is considering four alternative routes with multiple route segments for the rebuilt North Loop line, as shown in Figure 2-3. Because the alternative routes share some common route segments (i.e., route segments shared by two or more alternatives), a preferred route could comprise route segments from multiple route alternatives. Therefore, the route segments within each of the route alternatives are discussed to provide flexibility in identifying a preferred route. Figure 2-3 shows the route segments with letter designators. Table 2-4 identifies the characteristics of each alternative route and segments within the routes. Table 2-5 provides the construction activity (i.e., access roads and transmission lines) required for each alternative route. Potential land disturbance calculations for access roads, transmission structures, and staging areas are presented in Section 3.3.1.2.2.

All alternative routes would start at the Midway substation and extend north and loop around to the east and south in various configurations before continuing east on the Hanford Site. Under all alternative routes, the existing RL circuit conductor and hardware would be replaced with new conductor, hardware, and fiber optic cable from the Midway station to the first double circuit structure. Likewise, under all alternative routes, the Ashe tap (A22 switching station) would be eliminated as a switching station by reduction to a continuous single circuit. The switches would be removed and the remaining continuous circuit would utilize existing structures. All alternatives, including the No Action Alternative, would continue to use the existing line from the A6 junction to A6 substation. No construction would be required for this segment.

### 2.3.1 Alternative Route 1

Alternative Route 1 (AR-1) would exit the Midway substation northward as two, single circuits (one each for RL and BPA) from the northwest and northeast quadrants, respectively, join up as a double circuit, turn to the east (Segment A), and continue to the 100-B/C Area, paralleling the existing North Loop transmission line (Segment B). AR-1 would then parallel the southern boundary of the 100-B/C Area (Segment C). From the 100-B/C Area, AR-1 would turn to parallel Cutoff Road to the southeast, where it would intersect the out-of-service A3 transmission line (Segment D). A new Cutoff Road switching station, or tap, would be installed to route electric power northward on the A3 line to the A9 substation (Segment E1) and south to the A8 substation near the 200 Area (Segment E2). The existing A3 transmission line structures along Segment E1 would be refurbished with new conductors and electrical hardware to accommodate a radial tap configuration to the A9 substation. The A3 structures, conductors, and electrical hardware along Segment E2 would be replaced to accommodate a double-circuit configuration to the A8 substation. At the A8 substation, the route would turn eastward on the north side of Route 11A, run parallel to the existing South Loop transmission line, and then terminate just east of the existing A6 junction location (Segment F). AR-1 is composed of seven route segments.

### 2.3.2 Alternative Route 2

To accommodate the double-circuit transmission line for RL's and BPA's electricity requirements as well as the space limitations within the substation footprint, Alternative Route 2 (AR-2) would exit the Midway substation as two, single-circuit transmission lines. One circuit would exit the substation from the northwest quadrant and loop around some existing structures before turning south to converge with the second circuit (line), which would exit from the northeast quadrant of the substation. The convergence point would be near the northeast corner of the substation. The double-circuit line would then continue along the north side of Riverland Road east (Segment G) to the southern boundary of 100-B/C Area (Segment C). From the end of Segment C, AR-2 would follow the east side of 100-B/C Area northward and then turn northeast to the A9 substation in the 100-K Area (Segment H). AR-2 would use the existing A3 transmission line corridor southward from the A9 substation to the A8 substation

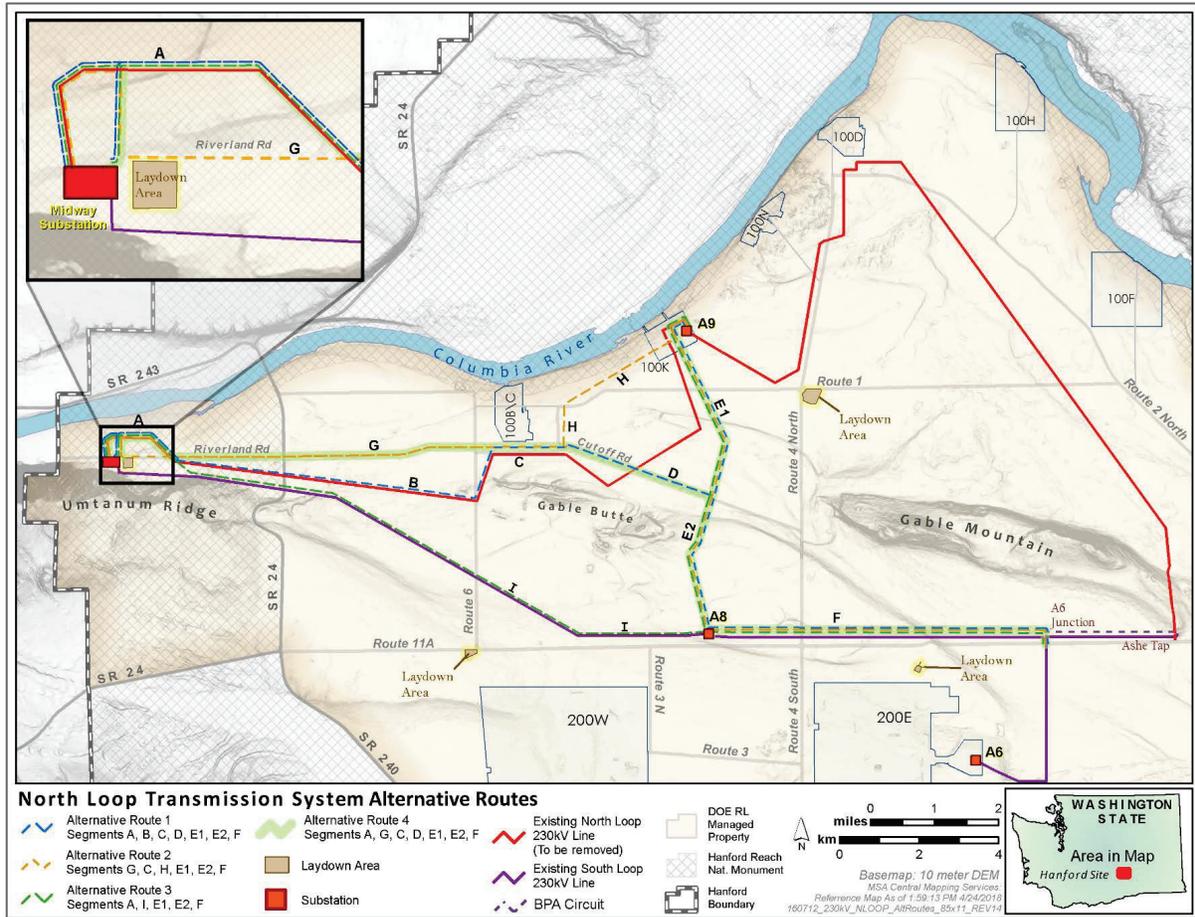


Figure 2-3. Alternative Routes for the Rebuilt North Loop Line Showing Route Segments

**Table 2-4. Description of the Route Segments and Line Connections for the Alternative Routes of the Proposed Project<sup>a</sup>**

Areas Along Routes	Alternative Route 1	Alternative Route 2	Alternative Route 3	Alternative Route 4
Midway substation and vicinity	Segment A – This segment would have two separate lines (RL and BPA) exiting the substation before converging north of the substation and turning east then southeast to an intersection with Riverland Road and the existing North Loop. This segment is 1.8 miles.	Segment G – The beginning of this segment would have two separate lines exiting the substation before converging near the northeast corner of the substation. This portion of Segment G is 0.8 mile.	Segment A – Same configuration and distance (1.8 miles) as AR-1.	Segment A – Same configuration and distance (1.8 miles) as AR-1.
Riverland Road/North Loop intersection to the 100-B/C Area	Segment B – This segment parallels the existing North Loop from its intersection with Riverland Road east and then north to the southern boundary of the 100-B/C Area. Segment B would be a new transmission line constructed adjacent to the existing North Loop. This segment is 5.8 miles.	Segment G – This segment follows Riverland Road east from the northeast corner of the Midway substation, crossing Route 24 to near the southwest corner of the 100-B/C Area. This segment would be a new transmission line constructed adjacent to Riverland Road and existing Riverland electrical feeder line. An abandoned railroad bed also exists along this segment. This portion of Segment G is 5.8 miles.	Segment I – This segment of AR-3 is the primary difference between this alternative and AR-1, AR-2, and AR-4. The remainder of AR-3 is shared in common with the other three alternative routes. From the intersection of Riverland Road and the existing North Loop, this segment parallels the existing South Loop southeast to the A8 substation. This segment would be a new transmission line. This segment is 9.0 miles.	Segment G – This segment begins at the intersection of Riverland Road and the existing North Loop and heads east to the southwest corner of the 100-B/C Area. This portion of Segment G is 5.0 miles.
100-B/C Area southern boundary	Segment C – AR-1 and AR-2 would parallel (to the north) the existing North Loop line along the southern boundary of the 100-B/C Area. New structures and electrical components would be installed along this segment. This segment is 1.0 mile.		N/A	Segment C – Same configuration and distance (1.0 mile) as AR-1 and AR-2.
100-B/C Area to A9 substation	Segment D – This line segment would be a newly constructed line from the end of Segment C parallel to Cutoff Road to the existing out-of-service 230 kV A3 line. This segment is 2.5 miles.	Segment H – At the end of Segment C, a new transmission line would be constructed to run north along the east side of the 100-B/C Area and then northeast to the 100-K Area and A9 substation. This segment is 2.4 miles.	N/A	Segment D – Same configuration and distance (2.5 miles) as AR-1.

**Table 2-4. Description of the Route Segments and Line Connections for the Alternative Routes of the Proposed Project<sup>a</sup> (continued)**

Areas Along Routes	Alternative Route 1	Alternative Route 2	Alternative Route 3	Alternative Route 4
A9 to A8 substation	Segments E1/E2 – Line A3 is a 230 kV transmission line with steel lattice towers that extends from the 100-K Area A9 substation to the A8 substation in the 200 Area and is currently out of service. Segments E1 and E2 are common to all four alternative routes and are used to provide electric power to the A9 substation. New conductors and insulators would be placed on the A3 line where existing structures would be re-used for AR-1, AR-3, and AR-4. Existing structures would be replaced for the entire length for AR-2 and south of the Cutoff Road switch station for AR-1 and AR-4 to accommodate double-circuit conductors and components. AR-3 would utilize the existing structures, as appropriate, for the entire length of the segment. Some new structures may be required to route power in and out of the A9 substation for AR-2, and new structures may be required to get under existing lines for AR-1, AR-2, and AR-4. The four alternative routes would connect to the A3 line at three different locations: AR-1 and AR-4, at a new switch station (described below) at Cutoff Road; AR-2, through the A9 substation; and AR-3, at the A8 substation through a new switch near the substation (described below). The segment is 5.1 miles.			
A8 substation to A6 junction	Segment F– A new transmission line would be constructed north of and adjacent to the existing South Loop line from the A8 substation to the east side of the A6 junction. The route would terminate at the new A6 junction. Segment F is common to all four alternative routes. This segment is 5.3 miles long. With this reconfiguration, the existing South Loop line between the A6 junction and the existing Ashe tap would no longer be part of the South Loop. However, the line between the A6 junction and Ashe tap (2.0 miles) would be used to connect the Ashe substation (farther south) line to the new A6 junction.			
100-K/A9 substation connection	At the 100-K Area, electrical lines would be reconfigured or constructed as needed to connect the currently out-of-service A3 line to the A9 substation.			
Switch stations	A new switch station, or tap, would be constructed at the intersection of Segment D and Segment E1/E2 and the A3 line to route power northward to the A9 substation and southward to the A8 substation.	N/A	N/A	Same configuration as AR-1.
	A new switch station or tap would be constructed adjacent to the A8 substation for all four alternative routes.			
Ashe tap and A6 junction	The Ashe tap is a switching station that connects the Ashe transmission line to the North and South loop transmission line. The existing Ashe tap is approximately 2 miles east of the proposed new A6 junction. All four alternative routes would bypass the Ashe tap, and the new A6 junction would be constructed to transition from double-circuit structures to the existing single-circuit structures.			

a. Descriptions merged across the route alternatives are common to those alternatives.

**Table 2-5. Length of Transmission Lines and New Access Roads for Each Alternative Route**

Proposed Activity	AR-1	AR-2	AR-3	AR-4
<b>Transmission Lines</b>				
New construction (structures and hardware)	18.4 miles	19.9 miles	15.6 miles	17.6 miles
Rebuild of existing steel structure line (hardware)	3.1 miles	0.5 mile	5.6 miles	3.1 miles
Total construction length	21.5 miles	20.4 miles	21.2 miles	20.7 miles
Number of new steel support structures <sup>a</sup>	129	139	109	123
<b>Access Roads</b>				
New access roads	N/A	End of Segment C to the A9 substation: 1.7 miles	Riverland Road/ North Loop intersection to the A8 substation: 9.0 miles	N/A
	A8 substation to the A6 junction: 5.3 miles			

a. Length of new transmission line multiplied by typical number of monopole steel support structures (7) per mile (see Table 2-2).

(Segments E1 and E2); however, the A3 structures, conductors, and electrical hardware along Segment E2 would be replaced to accommodate a double-circuit configuration to the A8 substation. AR-2 would then follow the same segment as AR-1 (Segment F). AR-2 is composed of six route segments.

**2.3.3 Alternative Route 3**

Alternative Route 3 (AR-3) would exit the Midway substation along the same route as AR-1 (Segment A), but would continue to the south and parallel the existing South Loop route to the A8 substation (Segment I). A new switching station adjacent to the A8 substation would be installed to route electric power northward on the out-of-service A3 transmission line as a radial tap to the A9 substation and a short distance south to the A8 substation; the route in this location would consist of Segments E1 and E2. The existing A3 transmission line would be refurbished with new conductors and electrical hardware utilizing the existing structures. From the A8 substation, AR-3 would follow the same segment as AR-1 and AR-2 (Segment F). AR-3 is composed of five route segments.

**2.3.4 Alternative Route 4**

Alternative Route 4 (AR-4) would follow the same route as AR-1 from the Midway substation to an intersection with Riverland Road and the existing North Loop and then follow adjacent to Riverland Road through the 100-B/C Area (Segments G and C). From the end of Segment C, AR-4 would follow Segment D along Cutoff Road, where it would intersect the out-of-service A3 transmission line (Segments E1 and E2) and continue along the same remaining segments with the same equipment configuration as AR-1. AR-4 is composed of seven route segments.

**2.4 BEST MANAGEMENT PRACTICES**

DOE maintains an extensive and rigorous safety, security, and environmental protection program. Construction, operations and maintenance, and decommissioning activities of the proposed project would be planned, coordinated, and conducted in compliance with these existing programs to avoid or minimize potential impacts. Best management practices (BMPs) are specified in policies, plans, and procedures that are integral to the protection of workers, project assets, and the environment. Some of the key programs

and documents that would be used during the design, construction, and operation of the rebuilt North Loop system and demolition of the existing North Loop line are summarized below. These programs and documents, along with the BMPs they cover, are considered in the analysis of impacts and mitigation actions discussed in the remainder of this EA.

- Functional design criteria are developed to address design concepts including minimum performance capabilities/margins, design basis criteria, reliability, environmental protection, and health and safety protection. These criteria incorporate organizational requirements, DOE directives, regulatory requirements, industry codes and standards, and engineering experience. Functional design criteria that would be used for the design of the Proposed Action are captured in HNF-59660, *Functional Design Criteria for Project L-612, 230 kV Transmission System Reconditioning and Sustainability Repairs* (Parkhill 2016). Project functions specifically addressed in this document include provisions for environmental protection, waste generation and management, safeguards and security, and fire protection among others.
- Site evaluation is performed for all land-use requests on the Hanford Site, including for the construction of new structures (including utility corridors, new roads, and laydown areas) and for the installation or relocation of portable structures (e.g., trailers and portable storage containers). Site procedures set out the requirements for the site review, which is conducted by an evaluation team composed of subject matter experts representing all functional areas responsible for attributes of Hanford land and its use. Functional areas reviewed during the site evaluation process include environmental compliance, cultural and historic resources, industrial safety and health, waste information data system, groundwater and wells, telecommunications, electrical utilities, emergency preparedness, fire protection, traffic safety, water utilities, roads and grounds, and industrial hygiene.
- Construction management is implemented through a series of planning and work management documents that address the overall planning, coordination, and management of construction work scope from constructability reviews through design transition, contracting, mobilization, work execution, testing, and closeout. Highlighted in these work documents are the processes used to ensure project implementation and compliance with the Integrated Safety Management System as well as the need to screen activities for environmental impacts.
- Environmental protection processes are defined in internal work management documents. These processes were developed to protect human health and the environment and meet applicable federal, state, and local environmental regulations, environmental permits, and compliance agreements/orders. These documents address the processes (including BMPs) to be used by Hanford Site projects throughout all phases of their lifecycle from design to closure and decommissioning of facilities, equipment, or processes. Environmental protection processes covered include, but are not limited to, the following areas:
  - Identifying applicable environmental requirements,
  - Obtaining environmental approvals and documentation,
  - Managing and disposing of waste,
  - Pollution prevention/waste minimization and recycling,
  - Finding special status animals or plants on the Hanford Site,
  - Identifying toxic air emission sources,
  - Purchasing goods or services (e.g., pesticides and pesticide applicators),
  - Excavating or otherwise disturbing soil,
  - Environmental release prevention and preparedness,

- Discharging wastewaters to the land surface, and
- Discontinuing use of facilities, processes, and equipment.
  
- Biological resource management at Hanford is done in accordance with the *Hanford Site Biological Resource Management Plan* (BRMP), DOE/RL 96-32 (DOE 2017). This management plan provides general directives that apply to all actions occurring on the Hanford Site including the following:
  - Actions and activities that potentially affect biological resources require an ecological compliance review and determination of potential impacts before proceeding.
  - Work onsite is conducted in accordance with access restrictions and administrative designations related to resource protection areas. These protected sites include areas with rare plant communities (element occurrences), mitigation/restoration areas, collection/propagation areas for native plant materials, and control areas for species of concern, which include bald eagle roost and nest buffer zones, ferruginous hawk and burrowing owl buffer zones, and known populations of plant species of concern.
  - New facilities or new road/utility corridors should be built within previously disturbed areas or collocated within existing roads or corridors to minimize habitat fragmentation or degrade existing native habitats.
  - Prohibit vehicular travel off established roads unless specifically approved by the Hanford Fire Department for conducting work activities or in emergency situations.
  
- Cultural and historic resource management on the Hanford Site is described in the *Hanford Cultural and Historic Resources Management Plan*, DOE/RL-98-10 (DOE 2003). This plan provides the guidance and strategies for protecting cultural and historic resources. Adherence to these guidelines will minimize the impacts on cultural and historic resources. Some BMPs specified in this document include the following:
  - Procedures for requesting and carrying out cultural resource compliance reviews, which are required by the *National Historic Preservation Act* (NHPA) (54 U.S.C. § 300101 et seq.) for site activities that potentially can affect cultural resources and historic properties.
  - Methods to be used for compliance with the *Archaeological Resources Protection Act of 1979* (16 U.S.C. § 470aa et seq.), including reporting suspected violations.
  - Methods for compliance with the *Native American Graves Protection and Repatriation Act of 1990* (25 U.S.C. § 3001).
  
- Weed management is accomplished by Hanford's Integrated Biological Control program. This program is responsible for weed control and tumbleweed cleanup, which is done in accordance with program plans. Control of noxious weeds, industrial weeds, and other vegetation is done for the purposes of protecting employees, the public, and Hanford Site cultural and environmental (including biological) resources.
  - Industrial weeds (e.g., tumbleweeds) are controlled to prevent the spread of radioactive contamination and mitigate potential fire hazards.

- Noxious weeds (e.g., yellow starthistle and rush skeleton weed) are controlled for regulatory compliance, to prevent adverse impacts to high-quality stands of native vegetation and neighboring agricultural operators, and to keep new, deep-rooted vegetation from invading Hanford waste sites.
- Revegetation and ecological restoration on the Hanford Site is performed in accordance with the *Hanford Site Revegetation Manual*, DOE/RL-2011-116 (DOE 2013a). This manual provides guidance for the planning and implementation of revegetation actions into project planning.
  - Guidelines and specifications for revegetation projects in various combinations of soil types and with differing revegetation objectives.
  - Development of site-specific revegetation planning documents.
  - Methodology for revegetation site management including monitoring to ensure compliance with predetermined success criteria, and implementation of corrective actions when needed.
- Fire protection restrictions and guidelines for off-road travel and working in areas with natural vegetation on the Hanford Site, such as would be encountered for the Proposed Action, are mandated by the Hanford Fire Marshal via AB07-001, *Fire Marshal Advisory Bulletin – Off-Road Vehicle Use and Travel* (Revision 10). The restrictions and guidelines in this bulletin are dependent on the fire danger level at the time work is being performed, and include requirements for notification, restrictions on travel, types of equipment that must be carried in the vehicle, and fire watch protocols.

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### **3.0 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES**

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This chapter includes an analysis of the potential environmental consequences or impacts that could result from the Proposed Action and the No Action Alternative. The affected or existing environment is the result of past and present activities and provides the baseline from which to compare impacts from the Proposed Action, as well as the baseline to which reasonably foreseeable future actions and the incremental impact of the Proposed Action are added for the cumulative impacts analysis.

Section 3.1 presents an assessment of environmental resource areas and identifies those subject areas that were considered and dismissed from detailed study. Section 3.2 identifies the past, present, and reasonably foreseeable future actions that are considered in the analysis of cumulative impacts. Section 3.3 presents the affected environment, potential environmental consequences, mitigation measures, unavoidable adverse impacts, and cumulative impacts estimated for each of the subject areas analyzed in detail. Section 3.4 provides a summary of the potential environmental impacts and a comparison of the potential impacts between the No Action Alternative and the action alternatives. Section 3.5 provides a discussion of DOE's preferred alternative.

To identify potential impacts on a resource or subject area, a defined area is considered and referred to as the "study area," which is also sometimes referred to as the "region of influence." The term "project area" is used to describe the area in the immediate vicinity of the project. The locations of potentially affected resources are identified by local landmarks, route alternatives, or route alternative segments. For some resources, the study area includes locations where direct physical impacts could occur as a result of project activities and is the same as or very similar to the project area. Because the project could result in impacts on resources that are geographically removed from the project area, the study area for some resources may extend beyond the project area.

This EA considers the potential direct, indirect, and cumulative impacts associated with the Proposed Action and No Action Alternative. Beneficial impacts are discussed where applicable. Direct impacts are those that would occur as a direct result of the Proposed Action. Indirect impacts are those that are caused by the proposed project, but would occur later in time and/or farther away in distance; perhaps outside of the study area. Cumulative impacts are impacts that result when the incremental impacts on resources from the Proposed Action are added to impacts that have occurred or could occur to that resource from other actions, including past, ongoing, or reasonably foreseeable future actions (as identified in Section 3.2).

#### **3.1 SUBJECTS CONSIDERED AND DISMISSED FROM DETAILED ANALYSIS**

Consistent with the CEQ and DOE NEPA implementing regulations and guidance, the analysis in this EA focuses on the subjects that are relevant to the Proposed Action. As stated in the CEQ regulations:

"Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues. As in a finding of no significant impact, there should be only enough discussion to show why more study is not warranted (40 CFR 1502.2(b))."

Table 3-1 presents evaluations of the subjects dismissed from detailed analysis.

**Table 3-1. Evaluation of Subjects Dismissed from Detailed Analysis**

Subject Area	Project Activities Evaluated	Evaluation
Soils	Grading, excavations, vegetation removal, off-road driving	The project site has relatively low relief, and erosion control would be implemented. The potential for soil erosion issues would be minimal due to the implementation of BMPs (see Section 2.4 for a general description of BMPs at the Hanford Site).
Mineral resources	Grading and excavations	There are no active mineral exploitation operations in the area underneath the alternative routes.
Geologic hazards	Grading, excavations, operations, maintenance, removal of existing North Loop line	<p><u>Seismicity and Faults</u> – The Hanford Site and adjacent areas are seismically active and the alternative routes pass through the Coyote Rapids Swarm Area, an area where earthquakes tend to occur in clusters, as well as through an area with known faults. However, typical activity consists of small earthquakes generally in the 1 to 4 magnitude range. The transmission line, including structures and foundations, would be designed to modern earthquake engineering standards and would be expected to remain operational following typical earthquake events, including minor fault movement. Numerous existing transmission lines on the Hanford Site have not experienced damage from past seismic activity.</p> <p><u>Volcanic Activity</u> – There has been no volcanic activity in the project region during the last 6 million years, although there is geologic record of several ashfalls from Cascade Range volcanoes reaching the Columbia Plateau since the Pleistocene epoch (DOE 2012). A completed transmission line could be affected by such ashfall; however, ashfall events are not expected to affect the transmission line's design.</p> <p><u>Surface Stability</u> – The easternmost ends of the alternative routes, where they overlap, approach the southern end of Gable Mountain, but do not extend up into areas of steep slopes. No areas of the alternative routes would be expected to experience surface stability problems.</p>
Air quality and climate	Grading, excavations, off-road driving, equipment emissions	The proposed project area is located in an attainment area for criteria pollutants and does not exceed any national ambient air quality standards. Fugitive dust and equipment emissions are the only potential air quality impacts. Fugitive dust would be mitigated through watering and would be a temporary impact during construction. Equipment emissions would be temporary and minor.
Surface water	Grading, excavations, dust control, stormwater runoff from construction areas	The Columbia River is the only surface water in the vicinity of the proposed project area. In a couple of areas near the Midway substation and along Segment G of AR-1, construction would be approximately one-third mile from the river. Areas of loosened or compacted soils would be relatively small. Shallow topographic relief and the relatively large distances between construction locations and the nearest surface water limit the possibility for stormwater runoff to reach the river. In addition, BMPs for erosion control and revegetation of disturbed areas would further reduce the potential for surface water impacts.

**Table 3-1. Evaluation of Subjects Dismissed from Detailed Analysis (continued)**

Subject Area	Project Activities Evaluated	Evaluation
Groundwater	Grading, excavations, dust control, equipment wash-down	Ground-disturbing activities would not be expected to affect groundwater quantity or quality because these activities would not result in deep excavations that would directly reach groundwater resources. The potential to impact groundwater recharge is extremely small because the area where construction would occur is very small compared to the surrounding landscape where groundwater is recharged. Therefore, there would be no impact on groundwater.
Wetlands	Grading, excavations, removal of existing North Loop line	Wetlands are not present along any of the alternative routes or the existing North Loop line proposed for decommissioning and removal. No impacts to wetlands would occur.
Visual resources	Grading, excavations, structure type, removal of existing North Loop line	The project area has numerous existing electrical transmission and distribution lines (see Section 3.3.5, Figure 3-15). Replacing the North Loop transmission line wood poles with mostly steel poles would alter the view. However, except for limited public access (and views) in the vicinity of State Route (SR) 24 and Riverland Road, the vast majority of the rebuilt line, regardless of route alternative, is not open to general public access, and the transmission line would be in the distant background and would not significantly alter the visual characteristics of the area. Removal of the existing North Loop transmission system components on Gable Mountain and other culturally sensitive locations (e.g., historic properties) would have a beneficial impact to the visual character of the area and be consistent with the <i>Gable Mountain and Gable Butte Resource Management Plan</i> (DOE 2008) and <i>Hanford Cultural Resources Management Plan</i> (DOE 2003).
Land use	Grading, excavations, structure type, removal of existing North Loop line	Transmission lines are present throughout the proposed project area (see Section 3.3.5, Figure 3-15). The proposed project would not change or alter the land use designations, map, policies, or procedures the <i>Hanford Comprehensive Land Use Plan</i> (DOE 1999) established at the project site and would be consistent with existing uses. The new lines would be in an area of existing transmission lines and would replace an existing line. In addition, the proposed project would result in approximately eight fewer miles of transmission line than currently exists.

**Table 3-1. Evaluation of Subjects Dismissed from Detailed Analysis (continued)**

Subject Area	Project Activities Evaluated	Evaluation
Noise	Construction equipment use, corona noise	Noise from construction activities would be temporary, and sensitive public noise receptors are not present in the project vicinity. Sensitive wildlife receptors include eagles, raptors, and bird rookeries. Eagle nests and bird rookeries are generally located near the Columbia River and are not sufficiently close to proposed project activities to be affected. Raptor nests are scattered and may be sensitive during some stages of nesting/rearing of young; however, impacts would be temporary and would be minimized through established ecological BMPs and protocols. Transmission system operations are not expected to create significant noise impacts in the area. Transmission line noise (also called corona noise) is caused by the partial electrical breakdown of the insulating properties of air around the electrical conductors and overhead power lines. It is typically described as a hum. Because the proposed project would be replacing an existing 230 kV line, the corona noise from the new line would be similar to the noise from the existing line.
Socioeconomics and environmental justice	Proposed project workforce, transmission system siting	The proposed project would not require a large workforce for either construction or operations and, therefore, would not result in impacts to typical socioeconomic parameters (e.g., housing, schools, emergency services, and in-migration of workers). There are no low-income or minority populations near the proposed project and, therefore, environmental justice impacts would not occur. DOE has consulted with Native American tribes under Section 106 of the <i>National Historic Preservation Act</i> .
Water use	Dust control, equipment wash-down, potable water use	Water demands associated with construction, operations, and maintenance of the transmission line would be negligible. The majority of water use would be during the temporary period of construction and would not be expected to exceed the range from 5,000 to 10,000 gallons per day. Water use during operations and maintenance would mainly be for periodic dust control and would represent a very small amount.
Transportation system	Construction equipment and delivery vehicle use and timing	Approximately 70 tractor-trailer deliveries would be needed to deliver project materials and equipment. Another 60 tractor-trailer loads may be required to haul decommissioned materials to recycling centers or solid waste disposal sites. These would be short-term, one-time trips spread across multiple days. No impact to the transportation system is expected. Some short-term (several hours) delays may occur while stringing new conductors across SR 24 east of Midway substation. The routing and scheduling of construction traffic would be coordinated with the Washington State Department of Transportation and county road staff to minimize interruptions to local traffic.
Public health and safety	Construction and operation, construction traffic, removal of the existing North Loop structures	Members of the general public do not have routine access to the Hanford Site and thus would not be near construction activities. Members of the public do, however, travel on SR 24 and Riverland Road in the vicinity of the Midway substation. It is expected that, except for farming residents west of the Midway substation, public access to Riverland Road west of SR 24 would be controlled during temporary construction. Members of the public travelling north or south on SR 24 where any of the alternative routes would cross SR 24 would only be traversing a very temporary construction zone; therefore, potential health and safety impacts to those receptors would be minimal.

**Table 3-1. Evaluation of Subjects Dismissed from Detailed Analysis (continued)**

Subject Area	Project Activities Evaluated	Evaluation
Aircraft operations (air traffic overflights)	Construction and the presence of transmission system structures and lines	The Federal Aviation Administration (FAA) has categorized the airspace above the Hanford Site as a National Security Area. The specific instructions depicted on local aeronautical charts in the vicinity of the Hanford Site state, "For reasons of national security, pilots are requested to avoid flight at and below 1,800 feet" (FAA 2016a). Due to this designation and the fact that the transmission system would be less than 200 feet in height, air traffic in the vicinity is not expected to be in a situation where impacts to project components are possible. Potential helicopter use during structure installation and line and conductor stringing is discussed in Section 2.1.3.2 and addressed in potential impacts to biological resources in Section 3.3.1. Any possible use of aircraft associated with Hanford Site activities would be coordinated with the Hanford Site Aviation Safety Officer to ensure that there would be no operational conflicts.

## **3.2 PAST, PRESENT, AND FUTURE ACTIONS CONSIDERED FOR ADDRESSING CUMULATIVE IMPACTS**

The cumulative impact analyses for each resource or subject area are presented in subsections of Section 3.3 below. The CEQ regulations (40 CFR 1508.7) that implement NEPA define cumulative impacts as the “impact on the environment which results from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

Current actions are those projects, developments, and other actions that are underway, under construction, or are occurring on an ongoing basis. Reasonably foreseeable future actions generally include those actions formally proposed or planned, or highly likely to occur based on available information. Various sources, including local, state, and federal agency websites and county staff, were consulted to obtain information about any current and reasonably foreseeable future development in the project vicinity. The following subsections describe these past, current, and reasonably foreseeable future actions.

The Hanford Site main mission is environmental cleanup, and much ongoing work on the site centers around the removal of past waste sites and demolition of the facilities and infrastructure associated with the site’s previous weapons production mission. In addition, rebuilding of aging infrastructure is necessary to support the Hanford cleanup mission. Both of these elements have changed the area where the North Loop rebuild would occur and are expected to continue to affect the area for the foreseeable future.

### **3.2.1 Footprint Reduction of Cleanup Sites**

One key objective of Hanford Site cleanup is shrinking the footprint of the active cleanup area. The Hanford Site’s near-term strategy sought to reduce the footprint of Hanford Site cleanup by 90 percent by Calendar Year 2015 and efforts are ongoing. Over the past seven years, significant progress has been made by Hanford contractors and the area of the Hanford Site being used for active cleanup operations is expected to continue to shrink.

Past and present footprint reduction activities within the study area have significantly reduced the infrastructure. Six of the nine surplus production reactors have been transitioned to interim safe storage, waste sites have been remediated, and numerous support structures, mobile offices, and utilities have been removed from service. Many of the areas affected by the cleanup have also been remediated, which often included revegetation with native shrubs, grasses, and forbs. Future cleanup activities aimed at reducing the footprint in areas surrounding the location of the 230-kV transmission rebuild include the following:

- Demolition of the K West Basin and completion of K Area cleanup, including placing the K East and K West Reactors into interim safe storage.
- Deactivation of the electrical substation in the 100-K Area and removal and/or rerouting of electrical lines no longer needed for mission support.
- Conversion of approximately 8 miles of roads north of Route 11A to restricted access. As proposed, this will affect a number of road segments in the study area including parts of Routes 1 and 6, the Cutoff Road, Federal Avenue, and smaller access road in the 100-D, 100-H, and 100-F Areas.

- Elimination of the 182-D reservoir (basin adjacent to the 100-D area relatively close to proposed removal activities associated with the existing North Loop line) and cutting and capping of water lines no longer needed for mission support.

### 3.2.2 Infrastructure Upgrades

Infrastructure obsolescence at the Hanford Site is a continuing concern, and the Hanford Site's long-term mission is expected to continue for at least another 50 years. Some of the infrastructure exceeds 70 years of age and has exceeded or is rapidly approaching the end of its design life.

The Hanford Site has developed a list of capital projects for utility systems such as electrical, water, and sewer to address these concerns (Mathes and Jones 2016). Many of these proposed projects are located within or close to the study area for the proposed rebuild of the North Loop line (which is one of the proposed projects listed). These proposed projects include the following:

- Electrical – Replace the site's aging power poles and reroute/replace distribution lines to assure continued high availability of power to operating facilities; downsize and isolate distribution as loads are no longer needed; deactivate the A9 substation as area cleanup is completed.
- Water – Refurbish and replace aging export water supply lines to maintain high reliability of water to the Central Plateau; refurbish and replace aging potable water supply lines at various sites in the 100 and 200 Areas; eliminate 100-D and 100-B export water reservoirs.
- Sewer – Install new pumping systems to route septage from failing drain fields to the sewage lagoon; replace other failing drain fields.
- Roads – Eliminate maintenance costs associated with a significant portion of 100 Area roads while establishing restricted access; widen and overlay several core roads on the Central Plateau; conduct road upgrades to support Navy mission needs.
- Natural Gas Pipeline – Bring natural gas onto the Hanford Site.

## 3.3 SUBJECTS EVALUATED IN FURTHER DETAIL

This section of the EA analyzes the potential environmental impacts of the Proposed Action and No Action Alternative. The affected environment for each subject area represents existing conditions in the study area from impacts of past and present activities. Most potential impacts would occur during construction associated with rebuilding the North Loop line and removal of the deactivated portions of the existing North Loop transmission system. The impacts discussion also addresses potential impacts associated with operations and maintenance activities.

### 3.3.1 Biological Resources

The evaluation of biological resources considers vegetation, terrestrial wildlife, and threatened or endangered and special status species as well as overall habitat quality as defined in the Hanford Site BRMP (DOE 2017).

#### 3.3.1.1 Affected Environment

For the Proposed Action, the general study area for biological resources consists of two contiguous areas separated by SR 24 (see Figure 2-3). The larger area lies to the east of SR 24 and to the

north of the Hanford Site Central Plateau, and is bounded by Route 11A to the south and the Columbia River to the north and the east. Within this general area are several areas where neither the existing North Loop line nor any of the alternative routes are found, and are therefore not considered to be part of the study area; these areas include the riparian area along the shoreline of the Columbia River and the higher elevation areas of Gable Mountain and Gable Butte. The smaller Riverlands area is located west of SR 24 and is bounded by the Midway substation to the west and bordered to the north by the Columbia River and to the south by the base of Umtanum Ridge. This study area encompasses the existing North Loop line as well as the alternative routes evaluated in this EA.

The Hanford Reach National Monument (the Monument) encompasses approximately 300 square miles around the Hanford Site and includes or abuts the northernmost portions of the project study area. Established in 2000 by Presidential Proclamation (65 FR 37253; June 9, 2000), the Monument is considered a “biological treasure, embracing important riparian, aquatic, and upland shrub-steppe habitats that are rare or in decline in other areas.” The USFWS manages several portions of the Monument and, under existing permits from DOE, is responsible for protecting and managing Monument resources and access to Monument lands under its control. The DOE is the underlying landholder and retains approval authority over certain management aspects on the Monument that could affect DOE operations, such as safety or security buffers; access to and operation of research sites; or seismic, meteorological, or environmental monitoring sites.

Vegetation and wildlife field surveys were conducted in April of 2016 within a smaller subset of the study area (MSA 2016). The area surveyed for each of the alternative routes consists of a 100-foot-wide corridor along the length of the project (50 feet on either side of the proposed line and access road); at the ends and elbows of the lines, this area increases to 200 feet. The field survey area for the existing line consists of a 50-foot area around the current line and access road (25 feet on either side).

### **3.3.1.1.1 Vegetation**

The proposed project lies within the northern portion of the central Hanford Site, which is within the interior, low-elevation Columbia Basin that covers the arid interior of eastern Washington extending west to the Cascade Mountains, north to the Okanogan Valley, and south into portions of north-central Oregon (DOE 2017). The study area averages about 7.1 inches of annual precipitation with more than half occurring during the colder months from November through February. Summers are typically hot and relatively dry with low humidity (Duncan 2007). Vegetation within this region is predominately shrub-steppe, that is, habitats dominated by shrubs and steppe grasses. Within the shrub-steppe zone, a number of different community types exist according to climatic conditions, topographic conditions, soil type and depth, and disturbance history.

Prior to the early 1940s, the primary biological impacts in the study area were from agricultural development, irrigation system construction, and grazing. Ungrazed sagebrush-steppe in the Intermountain West is a critically endangered ecosystem that has experienced more than a 98 percent decline since European settlement (Noss et al. 1995). The Hanford Site, including the proposed project area, contains some of the largest stands of undisturbed shrub-steppe remaining in the region. Shrub-steppe plant communities occurring in the study area are typically characterized by shrub overstories consisting of species of sagebrush (*Artemisia* spp.), bitterbrush (*Purshia tridentata*), spiny hopsage (*Grayia spinosa*), rabbitbrush (*Ericameria nauseosa* or *Chrysothamnus viscidiflorus*), grayball sage (*Salvia dorii*), or occasionally buckwheat (*Eriogonum* spp.) with perennial bunchgrass understories often dominated by bluebunch wheatgrass (*Pseudoregnaria spicata*), Sandberg’s bluegrass (*Poa secunda*), Indian ricegrass (*Achnatherum hymenoides*), or needle-and-thread grass (*Hesperostipa comata*) (Duncan 2007; DOE 2013a).

Since the establishment of the Hanford Site over 70 years ago, impacts to the biological resources in this area occurred through industrial development of nuclear facilities including reactors, fuel storage pools, waste sites, and support facilities; drilling of groundwater monitoring and injection wells and treatment facilities; road construction; utility infrastructure construction; and wildfires. These actions have contributed to the conversion of historic shrub-steppe and perennial grassland plant communities to nonnative annual grasslands dominated by cheatgrass (*Bromus tectorum*), and disturbed areas dominated by nonnative species. Past and present activities have also resulted in the introduction and spread of noxious weeds in the area.

The vegetation communities in the transmission line project area have experienced less frequent wildland fires than other areas on the Hanford Site (DOE 2013a). Fire and human disturbances have altered some of the vegetation within the project area, but the project area contains stands of relatively undisturbed shrub-steppe vegetation.

The study area consists of a mosaic of plant community types, ranging from industrial areas with scant vegetation (Figure 3-1) and communities dominated by nonnative weedy species like cheatgrass (Figure 3-2) to areas dominated by a mixture of nonnative species and early successional native species like Sandberg's bluegrass and rabbitbrush (Figure 3-3) and mature communities with a native shrub overstory and either nonnative or native grasses in the understory (Figures 3-4 and 3-5). Several exceptional stands of native vegetation also occur in the study area. These areas have been designated as element occurrences,<sup>2</sup> and are tracked by the Washington Natural Heritage Program (Figure 3-6). Figures 3-1 through 3-6 below depict the range of vegetation communities found in the study area.

In accordance with the Hanford Site BRMP (DOE 2017), vegetation community types are assigned to a resource level based upon the resource quality. Resource levels assigned based on the vegetation present range from Levels 0 to 5, with 5 indicating the highest quality areas. Level 5 "Irreplaceable Resources" are assigned to community element occurrences, which are recorded by the Washington State Natural Heritage Program. Level 4 "Essential Resources" include mature vegetation communities with a native shrub overstory and a native grass understory, and Level 3 "Important Resources" are characterized by a mature native shrub overstory and a mix of native and nonnative grasses in the understory. Level 2 are "Mid-Successional" communities, and Level 1 resources are "Marginal Habitat Resources." Level 0 is generally reserved for nonnative species occurring in industrial areas. Figures 3-1 through 3-6 depict common plant communities designated as Levels 0 through 5, respectively. Figure 3-7 is a map that indicates the distribution of BRMP resource levels based on vegetation type in the study area for the Proposed Action.

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<sup>2</sup> An element occurrence is an observation of a rare species or ecosystem. What constitutes an element occurrence varies by element or element type. For rare plant species, an element occurrence is generally defined as a "population;" for terrestrial ecosystems, minimum size and condition standards must met to be considered an element occurrence. Element occurrences in Washington state are tracked by the Washington Natural Heritage Program (<http://www.dnr.wa.gov/NHPspecies>).



**Figure 3-1. Example of BRMP Level 0 Habitat in the Study Area (100-K)**



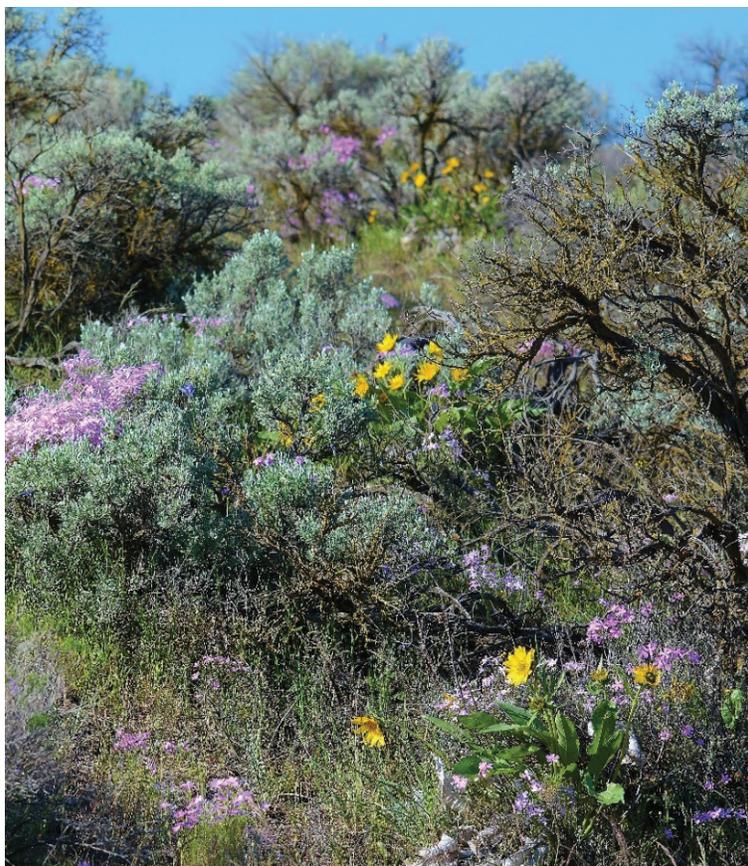
**Figure 3-2. Example of BRMP Level 1 Habitat in the Study Area (showing an upland stand dominated by nonnative cheatgrass with no shrub overstory)**



**Figure 3-3. Example of BRMP Level 2 Habitat in the Study Area (showing an upland stand dominated by gray rabbitbrush with an understory dominated by cheatgrass)**



**Figure 3-4. Example of BRMP Level 3 Habitat in the Study Area (showing an upland stand dominated by big sagebrush and spiny hopsage with a mix of native and nonnative grasses in the understory)**



**Figure 3-5. Example of BRMP Level 4 Habitat in the Study Area (showing an upland stand dominated by big sagebrush with primarily native grasses and forbs in the understory)**



**Figure 3-6. Example of BRMP Level 5 Habitat in the Study Area (showing a sand dune element occurrence with Indian ricegrass)**

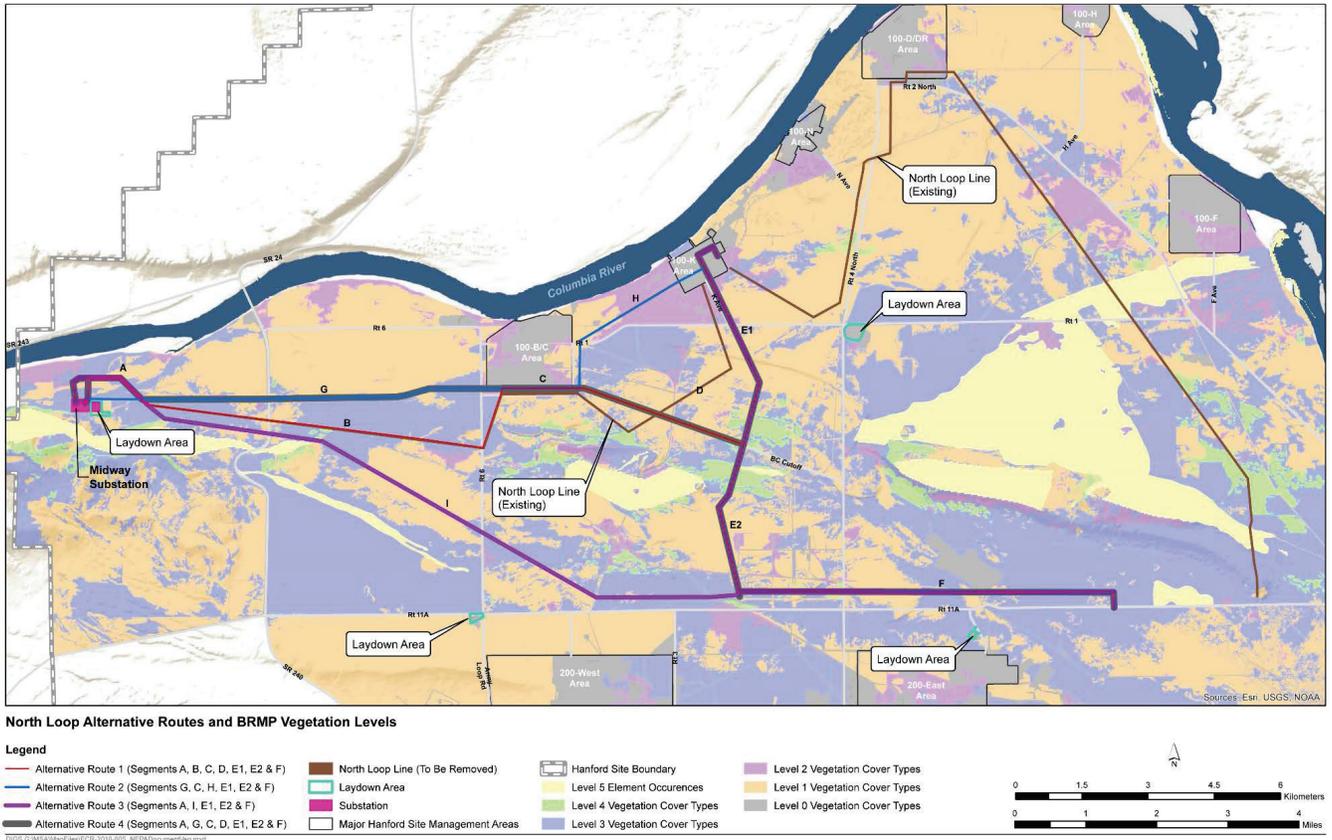


Figure 3-7. Distribution of Vegetation Communities in the Study Area based on the BRMP Resource Levels

### 3.3.1.1.2 Terrestrial Wildlife

The study area provides habitat for a variety of mammals, birds, reptiles, amphibians, and invertebrates. The wildlife species discussed in this section or signs of their presence were observed during field surveys in the spring of 2016 or have been documented in the study area during routine Hanford Site monitoring studies.

#### **Mammals**

Common mammals that occupy and use the study area include large animals such as Rocky Mountain elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*); predators such as coyote (*Canis latrans*), and badger (*Taxidea taxus*); and small herbivores, including, northern pocket gopher (*Thomomys talpoides*), Nuttall's cottontail rabbit (*Sylvilagus nuttallii*), and black-tailed jackrabbits (*Lepus californicus*) (Duncan 2007). All of these mammals or their scat or tracks were observed in the project area during the field surveys of the study area in May of 2016. Other mammal species that, although not directly observed, are known to be present in the study area include the Great Basin pocket mouse (*Perognathus parvus*), deer mice (*Peromyscus maniculatus*), harvest mice (*Reithrodontomys megalotis*), voles (*Lagurus* spp., *Microtus* spp.), and a variety of bat species (*Myotis* spp., *Antrozous pallidus*, *Eptesicus fuscus*, *Lasionycteris noctivagans*, and *Parastrellus hesperus*).

DOE conducts periodic monitoring for several mammal species occurring in the study area; the following bullets provide a short summary of recent monitoring for each of these species.

- Rocky Mountain elk occurring in the study area are part of the Rattlesnake Hills elk herd. During the winter of 2015–2016, the largest herd seen contained 80 individuals and was found in the eastern portion of the study area near the existing 230-kV line (DOE 2017). Besides their importance to wildlife resource agencies and local tribes as an indicator of overall habitat quality, elk migrating across highways and major roadways pose potential hazards and conflicts with automobile traffic.
- During the winter of 2015–16, approximately two-third of the mule deer observed were found along the northern survey route, which is located entirely within the study area (Grzyb et al. 2016a). The largest number of mule deer observed in this area on a single day was 64, and the number of fawns per 100 does was estimated to be 44 in this region, both of which are within the ranges seen in this area of the Hanford site since monitoring began in 1994.
- Badger monitoring was initiated on the Hanford Site in 2015. Badgers or their burrows were found more frequently in the northern portion of the Hanford Site, which includes the study area for the proposed project. Several areas within the study area had 16 to 24 badger holes per 1,640-foot segment, the highest density found onsite (Grzyb 2016).
- The black-tailed jackrabbit is a sagebrush-obligate species that exploits areas of rabbitbrush and antelope bitterbrush, which are common in the study area. Roughly 70 percent of the area found to support jackrabbits during monitoring on the Hanford Site from 2013 to 2015 were located in the study area (Grzyb et al. 2016b). Based on recent monitoring, jackrabbit presence on the Hanford Site appears to be decreasing compared to historical levels.
- Because of the proximity of potential roost sites and the river, most of the research on bats at Hanford has been focused within the study area for the proposed project. Maternity, day, night, and winter (hibernation) roosting sites are important resources for bats to use for resting, raising young, and gaining protection from cold temperatures. Known and potential roost sites include

manmade structures in the 100 Area, which are within the study area, and cliff habitat in areas directly adjacent to the study area, such as Gable Mountain, Gable Butte, and Umtanum Ridge. Eight species of bats were detected during the recent monitoring: little brown bat (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), California myotis (*Myotis californicus*), Western small-footed myotis (*Myotis ciliolabrum*), canyon bat (*Parastrellus hesperus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), and pallid bat (*Antrozous pallidus*) (Lindsey et al. 2013a).

## **Birds**

The sage-steppe and grassland habitats found in the study area support a variety of bird species, including species that are dependent on undisturbed shrub habitat. Common shrub-steppe and grassland species that were seen during the field survey or that are known to occur in the proposed project area include western meadowlarks (*Sturnella neglecta*), horned larks (*Eremophila alpestris*), common starling (*Sturnus vulgaris*), common raven (*Corvus corax*), loggerhead shrike (*Lanius ludovicianus*), lark sparrow (*Chondestes grammacus*), sagebrush sparrow (*Artemisiospiza nevadensis*) (formerly sage sparrow), long-billed curlew (*Numenius americanus*), and vesper sparrow (*Pooecetes gramineus*) (Duncan 2007; Wilde 2015; MSA 2016). With the exception of the common starling, all of these species are protected under the *Migratory Bird Treaty Act*.

As a sagebrush-obligate species limited to sites dominated by sagebrush (approximately 10 to 25 percent) or bitterbrush, the sagebrush sparrow (Figure 3-8) is a good indicator species for high-quality, mature shrub-steppe habitat. For this reason, a habitat suitability index model for the sagebrush sparrow was developed for the central Hanford Site (Duberstein et al. 2008). The habitat areas defined by this model, which integrates both vegetation characteristics and potential occupancy by sagebrush sparrows, are considered to be BRMP Level 4 “Essential Resources” at Hanford. Figure 3-9 shows the extent of sagebrush sparrow habitat in the study area.



**Figure 3-8. A Sage Sparrow (a sagebrush obligate species found in the study area and a Washington state candidate species)**

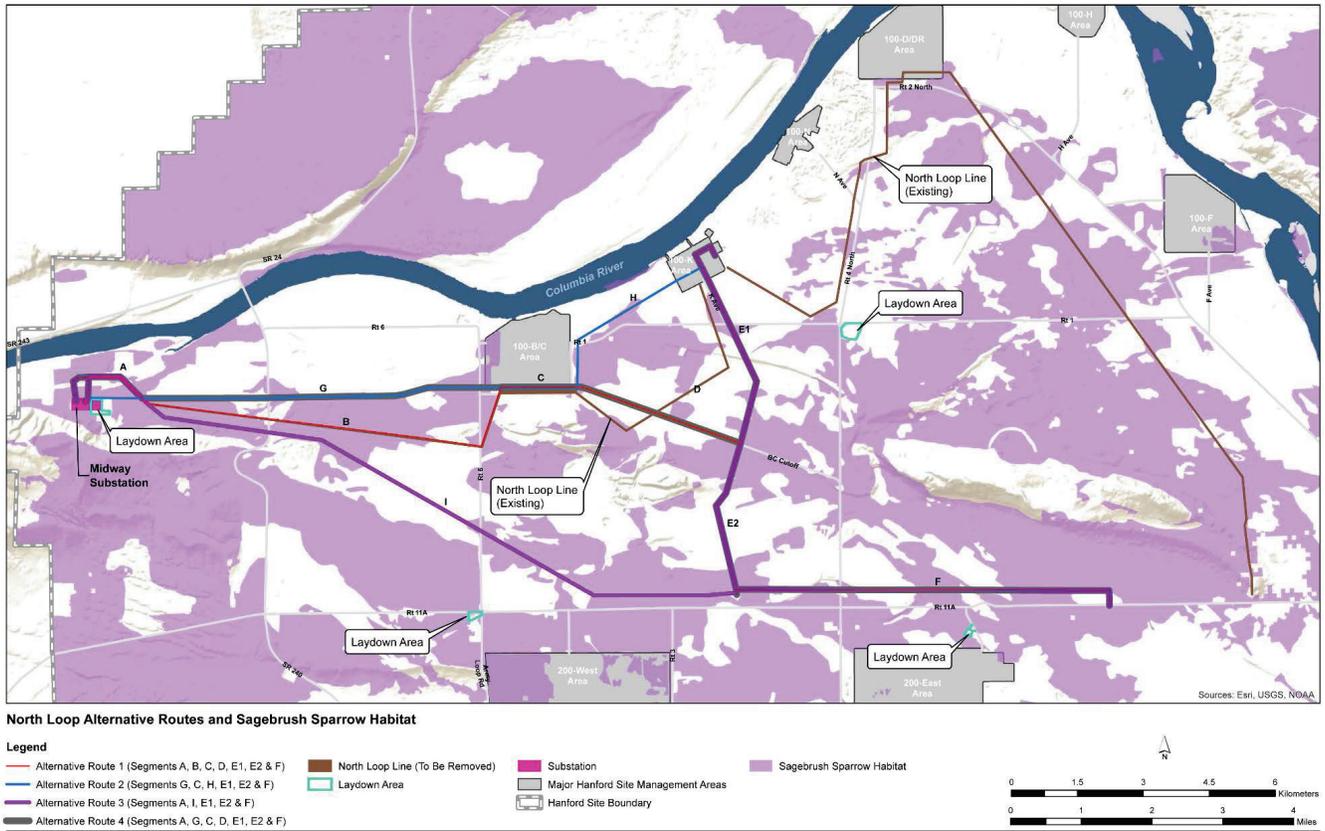


Figure 3-9. BRMP Level 4 Sagebrush Sparrow Habitat in the Vicinity of the Proposed Project, based on a Sagebrush Sparrow Habitat Suitability Model (Dubenstein et al. 2008)

Eight raptor species are known to have nested in the study area, or on the cliffs directly adjacent to the study area, in 2015. Several nests of Swainson’s hawks (*Buteo swainsoni*), red-tailed hawks (*Buteo jamaicensis*), and prairie falcons (*Falco mexicanus*) occur near the four alternative routes; nests of the Swainson’s and red-tailed hawks, prairie falcon, and long-eared owl occur along or near the existing North Loop route. American kestrel (*Falco sparverius*), great-horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), and burrowing owl (*Athene cucinularia*) nests were also observed in the study area, but farther away from the proposed or existing transmission lines (Nugent et al. 2016).

Although no nests were observed in 2015, other common raptor species that use shrub and grassland habitat present in the study area include the ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), and barn owl (*Tyto Alba*). During the winter months, bald eagles (*Haliaeetus leucophalus*) roost along the Columbia River around the study area. Many of these raptor species, as well as the common raven, use the trees that were planted near now-abandoned homesteads and manmade structures, such as buildings, transmission towers, and utility poles. DOE regularly monitors for burrowing owls, bald eagles, and the nesting of raptor species (Wilde et al. 2013; Cranna et al 2015; Nugent et al. 2016).

### **Reptiles and Amphibians**

The study area contains remnants of native shrub-steppe habitat that have been relatively untouched by agriculture and large-scale development; these habitats are refuge for many species of reptiles. The side-blotched lizard (*Uta stansburiana*), which occurs in most native upland habitats, is the most abundant reptile species on the Hanford Site and is likely present in the study area (DOE 2016a). Short-horned (*Phrynosoma douglassii*) and sagebrush (*Sceloporus graciosus*) lizards are also found on the Hanford Site, but occur infrequently. The most common snake species include gopher snake (*Pituophis melanoleucus*), yellow-bellied racer (*Coluber constrictor*), and western rattlesnake (*Crotalus viridis*). Snakes use hibernacula to avoid cold temperatures. Twenty-three hibernacula have been identified on the Hanford Site through the last survey in 2013 (Lindsey et al. 2013b). Some of the hibernacula occur in the general vicinity of AR-3. No habitat for any amphibian species occurs within the transmission line project area.

#### **3.3.1.1.3 Threatened or Endangered and Special Status Species**

No plant or animal species protected under the *Endangered Species Act of 1973* (16 U.S.C. § 1531 et seq.), candidates for such protection, or species listed by the State of Washington as threatened or endangered were observed during field surveys or are expected to occur in the vicinity of the proposed project. The proposed project area also does not contain any designated critical habitat.

Species present in the study area that, while not listed as threatened or endangered, have a federal or state conservation status are discussed briefly below:

- Four Washington State-listed sensitive<sup>3</sup> plant species (WNHP 2016) are found in the transmission line project area. Gray cryptantha (*Cryptantha leucophaea*) and Thompson’s sandwort (*Eremogone franklinii* var *thompsonii*) were noted in the vicinity of the existing North Loop line southeast of the 100-D Area (Figure 3-10). Hoover’s desert parsley (*Lomatium tuberosum*) and caespitose evening primrose (*Oenothera caespitosa* var *caespitosa*) are known to occur just

<sup>3</sup> A taxon listed as “sensitive” is considered to be vulnerable or declining and could become endangered or threatened in the state without active management or removal of threats.

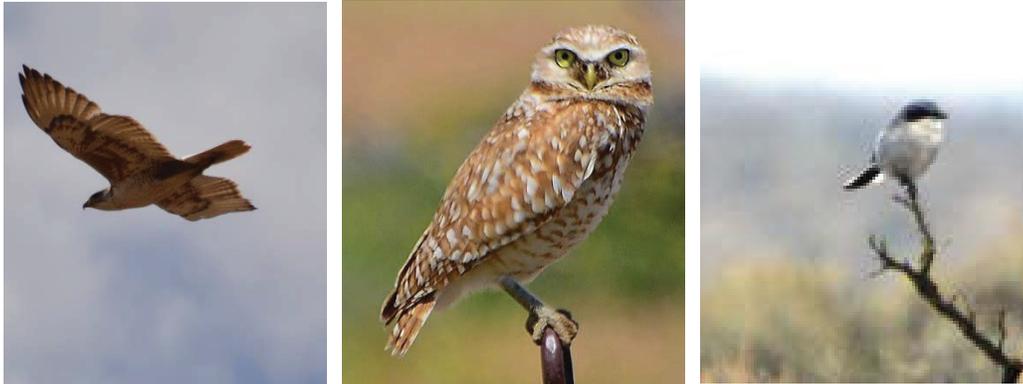
outside of the transmission line routes near the eastern end of the four alternative routes and the existing North Loop in the vicinity of the Midway substation.



**Figure 3-10. Gray Cryptantha (left) and Thompson's Sandwort (right) are Washington state sensitive species found in the study area**

- Black-tailed jackrabbits are currently candidates for listing on Washington's threatened, endangered, or sensitive species list (WDFW 2016). In addition, the Washington Department of Fish and Wildlife lists the American badger as a state monitor species; state monitor species are not considered species of concern, but are monitored for status and distribution to prevent them from becoming endangered, threatened, or sensitive (WDFW 2016). Both of these species are found throughout the study area in close proximity to the proposed transmission line.
- The ferruginous hawk is listed as a threatened species by state, and it, as well as other raptor species, use nesting habitat provided by transmission towers and wooden utility poles (Nugent et al. 2016). Although the four ferruginous hawk nests documented in the 2015 nest survey were outside the transmission line project area, potential nest sites are present within the study area and have been used by this species in the past.
- The loggerhead shrike and burrowing owl were observed during field surveys, and the sagebrush sparrow is a common resident in sagebrush areas and very likely occurs in the North Loop project area (MSA 2016; Wilde 2015) (Figure 3-11). All three species are Washington state candidate species for threatened, endangered, or sensitive status. In addition to being a state candidate species, the burrowing owl is also a federal species of concern. Several active burrows occur near the existing North Loop line southeast of the 100-D Area; however, no active burrowing owl burrows occur near the four alternative routes (Wilde et al. 2013).
- Although removed from the endangered species list in 2007, bald eagles are listed as a Washington sensitive species and a federal species of concern, and are protected under the *Bald and Golden Eagle Protection Act*. Bald eagles winter along the Columbia River both east and north of the transmission line project area. Bald eagles use the area along the Hanford Reach for foraging, daytime perching, and nighttime roosting (Cranna et al. 2015). At this time, no successful nests have been confirmed in the study area although pairs exhibiting nesting behavior have been noted in the past year. DOE has prepared a bald eagle management plan to guide management of this species on the Hanford Site (DOE 2013b). Seasonal buffer zones are established around nighttime roosts and nests on an annual basis to minimize potential

disturbances. Based on the fiscal year 2015 notice of protected winter roost sites<sup>4</sup>, the Proposed Action is located outside of any bald eagle buffer zones. While they are rarely seen along the Hanford Reach, golden eagles are infrequent visitors to the study area and are listed as a Washington state candidate species. Like bald eagles, golden eagles are protected under the *Bald and Golden Eagle Protection Act*.



**Figure 3-11. Ferruginous Hawk (left), Burrowing Owl (middle), and Loggerhead Shrike (right) are Washington State Threatened Species (Ferruginous Hawk), and State Candidate Species (Burrowing Owl and Loggerhead Shrike)**

#### 3.3.1.1.4 Management of Biological Resources on the Hanford Site

DOE follows its BRMP (DOE 2017) to manage biological resources (i.e., protect, monitor, mitigate, and restore) on the Hanford Site. Specifically, DOE prioritizes resources based on a hierarchical classification of relative resource value. Rare (e.g., individual species or vegetation communities) or largely intact resources (i.e., unaltered by natural or human disturbances) may receive priority management compared with more common or partially disturbed or altered resources.

Resources defined by species, habitat, or a combination of both are assigned a resource priority level of 0 to 5, with 5 representing the highest value resource. Each priority level has differing management goals, levels of protections, monitoring requirements, and mitigation requirements. Typically, Level 2 through Level 4 require mitigation at varying replacement ratios. For Level 5 resources, mitigation is determined on a case-by-case basis. Table 3-2 defines the criteria used for assigning the resource levels. The existing North Loop route includes resources ranked from BRMP 0 to 5 (Figure 3-12).

#### 3.3.1.2 Environmental Consequences

This section discusses the potential ecological impacts associated with the following actions:

- No Action Alternative;
- Proposed construction and operation of a new transmission line, including a comparison of the relative differences among the four alternatives routes; and
- Decommissioning and removal of the existing North Loop transmission line.

<sup>4</sup> Every year, DOE provides a location map of buffer zones around bald eagle roosting and nesting sites to its staff and contractors. The 2016 map indicates the proposed project would be outside any seasonally restricted areas. See [http://www.hanford.gov/files.cfm/Eagle\\_Buffer\\_Map\\_Notice.pdf](http://www.hanford.gov/files.cfm/Eagle_Buffer_Map_Notice.pdf).

**Table 3-2. Criteria Used to Classify Biological Resources on the Hanford Site**

BRMP Level	Species	Habitat
5 Irreplaceable Resource	<ul style="list-style-type: none"> <li>Federal threatened or endangered</li> <li>Proposed federal threatened or endangered</li> </ul>	<ul style="list-style-type: none"> <li>Rare habitats, including cliffs, lithosols, dune fields, ephemeral streams, and vernal pools as well as fall Chinook salmon and steelhead spawning areas</li> </ul>
4 Essential Resource	<ul style="list-style-type: none"> <li>State threatened or endangered</li> <li>Federal candidate</li> </ul>	<ul style="list-style-type: none"> <li>Upland stands with a native climax shrub overstory and a native grass understory</li> <li>Wetlands and riparian habitats</li> </ul>
3 Important Resource	<ul style="list-style-type: none"> <li>State sensitive or review plants</li> <li>State sensitive or candidate wildlife</li> <li>Federal species of concern (see Table 4.3)</li> <li>Washington Department of Fish and Wildlife priority</li> <li>Culturally important</li> </ul>	<ul style="list-style-type: none"> <li>Shrub-steppe with a native climax shrub overstory that have cheatgrass co-dominant in the understory along with native grasses</li> <li>Shrub-steppe stands with a successional shrub overstory and a predominately native understory</li> <li>Native stands of steppe vegetation</li> <li>Snake hibernacula</li> <li>Bat colonial roost sites</li> <li>Wading bird rookeries</li> </ul>
2 Mid-successional or low priority species	<ul style="list-style-type: none"> <li>Migratory birds</li> <li>State Watch list plants</li> <li>State Monitor wildlife</li> <li>Recreationally and Commercially important species</li> </ul>	<ul style="list-style-type: none"> <li>Upland stands with a sparse climax or successional shrub overstory and nonnative understory</li> <li>Steppe stands with native plants co-dominant with nonnative plants</li> </ul>
1 Marginal or common species	<ul style="list-style-type: none"> <li>Common native fish, wildlife, invertebrate, plant, and nonvascular species not otherwise included in higher BRMP levels</li> </ul>	<ul style="list-style-type: none"> <li>Upland stands of nonnative plants.</li> <li>Abandoned agricultural fields</li> <li>Very small, isolated patches of shrub-steppe surrounded by industrial areas or other Level 0 habitats</li> </ul>
0 Developed or nonnative species	<ul style="list-style-type: none"> <li>Nonnative plants and animals not already categorized as Level 1-5 resources</li> </ul>	<ul style="list-style-type: none"> <li>Nonvegetated areas</li> <li>Industrial sites such as paved and compacted gravel areas</li> </ul>

Source: DOE 2017.

BRMP = Hanford Site Biological Resource Management Plan.

Because no plant or animal species protected under the *Endangered Species Act*, candidates for such protection, or designated critical habitat occurs within the project area, the Proposed Action would not affect any plant or animal species protected under the Act.

**3.3.1.2.1 No Action Alternative**

Under the No Action Alternative, the impacts of the Proposed Action, to rebuild the deteriorating North Loop line, would not occur. The existing North Loop line would require ongoing maintenance and repairs. Repairs would require heavy equipment and vehicles to access transmission structures, and access roads would be upgraded and maintained. Access roads, some sections of which have been used infrequently and now support substantial amounts of vegetation, may require grading, application of gravel, and/or herbicide application for continued use. Because long sections of this line traverse high-quality habitat, including two Washington state plant community element occurrences, road upgrades and increased use of these roads may destroy habitat adjacent to the roads, disrupt animal corridors, and serve as a conduit for nonnative weed species to be introduced into sensitive habitats.

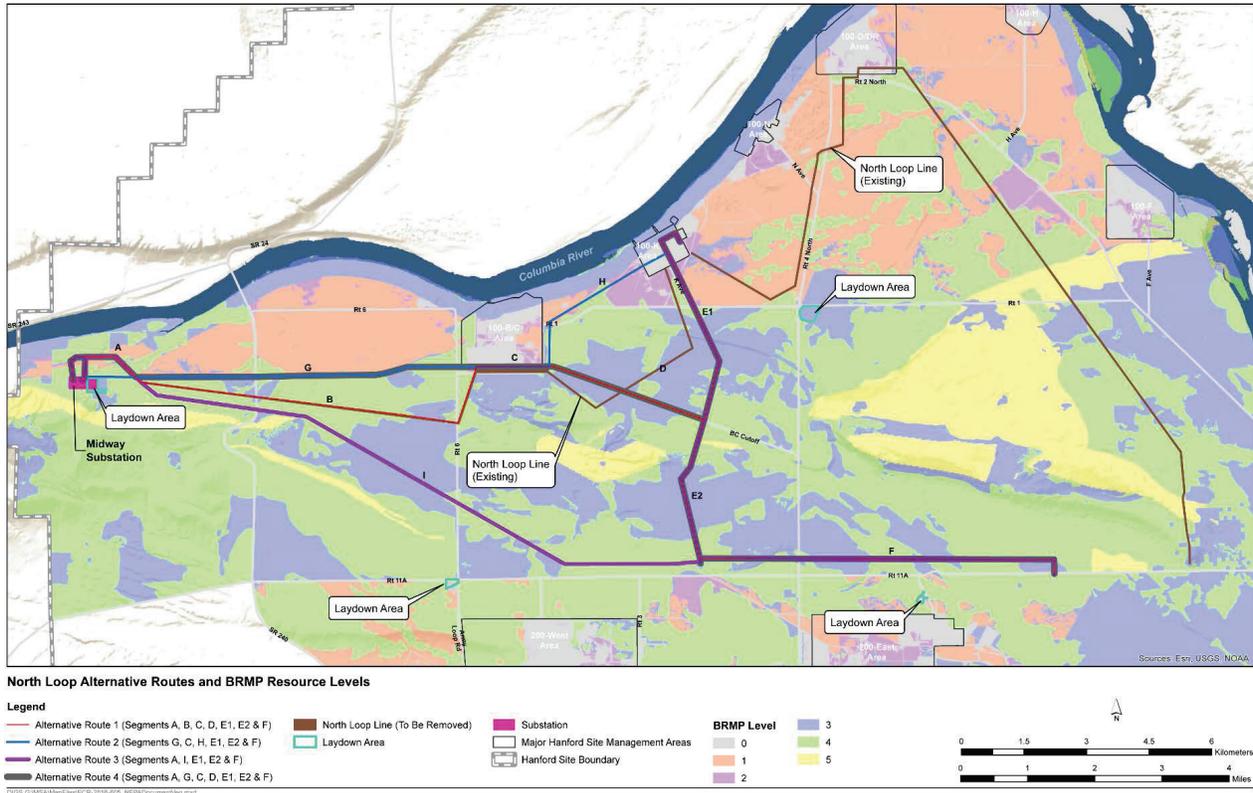


Figure 3-12. Distribution of Biological Resources in the Study Area Based on BRMP Resource Levels

Continuing degradation of the North Loop transmission line also increases the risk of a hazardous energy release that could result in a wildland fire. As one of the few areas on the Hanford Site that has not burned in over 35 years (DOE 2017), large swaths of mature shrub-steppe surround the easternmost portions of the existing North Loop line. In addition to supporting stands of mature sagebrush, bitterbrush, and spiny hopsage, this area supports several special status plant and animal species and is home to a variety of sage-obligate species. A fire in this area would most likely be followed by colonization of the area with nonnative species, including cheatgrass and other annual weeds, and could result in the long-term loss of irreplaceable habitat.

Finally, if the existing North Loop and the access roads supporting the line remain in service, the transmission system and support facilities would not be removed and/or rebuilt. This area would remain in its current state, and restoration of habitat, including revegetation with native plant species, would not occur.

### **3.3.1.2.2 Construction and Operation of the Proposed Action**

Areas that would be affected by the construction and operation of the rebuilt North Loop line include the sites where new structures and access roads would be located, sites that would be needed for the pulling and tensioning of the new line, and construction support areas (lay-down areas).

- Access road construction would require grubbing and clearing of existing vegetation; excavating, grading, compacting soils, and placing or manipulating new fill material and aggregate, if needed.
- Upgrades to existing access roads would include blading and mowing vegetation in and along the sides of the roadway and application of gravel or overfill material, as needed. Herbicide application would be used to minimize future plant growth. These processes may result in berms created by road grading, nonvegetated road margins, and damage to areas adjacent to the road from heavy machinery use.
- Installation of structures (including counterpoise and guy wires) would be limited to areas in and around individual structure sites and would not affect the entire ROW for the transmission line. North Loop structures would be emplaced either using ground equipment or helicopters. The extent of impacts on biological resources at each transmission line structure installation site would depend on the method used to install the structure, the quality of the existing vegetation and wildlife present, soils, and site topography.
- Pulling and tensioning sites would be located away from the structures and typically would be spaced every 2 to 3 miles along the line. This activity would involve driving and parking equipment for a short period of time, without digging or other ground disturbance. Workers would set up equipment once, so the entire pulling and tensioning site would not be disturbed. Although the specific areas needed for pulling and tensioning are not yet defined, these activities could include the clearing and crushing of vegetation, damage of plant roots from soil compaction, and soil crust disturbance. The impact intensity and duration of pulling and tensioning activities is considerably less than structure installation and access road construction, and most of the impacts from pulling and tensioning activities would be temporary and could be reduced by implementing the mitigation measures presented below.
- Construction support areas provide lay-down areas, temporary construction force offices, support facilities, and parking areas. All four proposed construction support areas are located on previously disturbed sites, and range in size from roughly 5 to 34 acres. Two of the laydown areas are almost entirely characterized as Resource Level 0 (industrial areas) and would not create new

land disturbances. The majority of the remaining two areas also comprise Level 0 resources; however, higher-quality habitat is also present in these areas. If helicopters are used for structure installation, additional support areas could be needed (e.g., refueling operations) and would consist of prior-disturbed locations or areas already used for helicopter operations on the Hanford Site.

### **Construction Impacts**

Transmission line structure removal and installation, access road work, and pulling and tensioning would remove plants and cause ground disturbance. Clearing and grading activities would remove vegetation and the upper, most biologically active portion of the soil. Heavy equipment would crush vegetation and compact soils, potentially damaging plant roots. New structure installation and access road work would permanently remove vegetated areas. Loss of plant cover and disturbance of soil from these activities would disrupt biological functions, including nutrient retention and recycling, and thus degrade plant habitat, at least temporarily.

Removal of existing vegetation and the creation of nonvegetated berms could alter native plant communities by increasing the potential for the introduction and spread of nonnative plant species and noxious weeds. Bare, disturbed, and compacted soils are vulnerable to weed invasion through natural dispersal, such as wind-blown seeds, or through dispersal by vehicles and machinery moving from site to site. Weeds could displace native plants and degrade vegetation communities, whether natural or managed, and could alter the natural fire regime by increasing the frequency or intensity of wildfires.

Although steep slopes occur only in a few small areas over the alternative routes, impacts from construction activities could also include localized minor sheet erosion and the formation of some small channels, which could degrade downslope vegetation communities.

Within all habitat areas, removal and installation of transmission structures and the use of trucks and other construction equipment (e.g., boom cranes, backhoes, line trucks, and helicopters) would temporarily reduce the value of the habitat for wildlife in these areas.

- Previous helicopter flights over Hanford have been observed to create a panic response in terrestrial mammals, particularly elk and mule deer (Newsome 2017). During the winter months, elk are often seen along SR 24 and SR 240, increasing the risk of a panicked animal entering traffic.
- Individual animals or important habitat features, such as burrows, could be crushed by equipment during construction. Incidental mortality from these activities would be avoided for most wildlife species because the species are typically highly mobile and would quickly flee if startled by construction equipment. However, small mammals and reptiles that take refuge and hibernate underground could be harmed or killed during construction.
- Helicopter use could result in some bird mortality. Over 90 percent of reported bird strikes occur at or below 3,000 feet above ground level, although strikes at higher altitudes are common during bird migration, with ducks and geese frequently observed up to 7,000 feet above ground level (FAA 2016b). Based on the Air Force Avoidance Model (<http://www.usahas.com/>), the risk of bird strikes over the northeastern corner of the Hanford Site, which is within the study area, is classified as severe. This area is located along the Pacific Flyway, and the nearby Columbia River serves as a resting area for migrating waterfowl, especially from March to May and late August through November.

Incidents of wildlife mortality are expected to be rare. These impacts would occur at the level of the individual(s) and would not result in local or regional population level impacts. Therefore, incidental mortality impacts from construction activities related to removal of existing structures and installation of new structures would be low. Permanent removal or temporary disturbance of habitats would result in the loss of opportunities for movement, foraging, nesting, and denning by wildlife. Wildlife near work areas where noise and activity are present would be displaced during construction. Noise and activity during structure removal and installation activities can also cause the displacement of birds during the nesting period, resulting in failed nesting attempts. During the spring and summer, when some species depend on specific locations (e.g., territories and nest sites) to breed, nest, and brood their young, disturbance may cause territory or nest abandonment if located close to the activities. Species such as the sagebrush sparrow and loggerhead shrike may be displaced if the line passed through their breeding territory or close to their nests. For nesting raptors, the disturbance effect may extend out 0.25 mile or more. Raptor nests exist in the project area between the Midway substation and the 100 Area. No nests occur along the alternative routes; those that occur in the vicinity have sufficient buffer distance from the transmission line (Whittington and Allen 2008).

### **Operational Impacts**

Impacts from operation and maintenance currently take place and would continue to occur throughout the use of the North Loop line as a result of routine inspections, maintenance, and repairs. Periodic inspections of structures would include use of access road and the cleared areas surrounding each structure by heavy vehicles, such as bucket trucks. Maintenance and repairs to these areas could include additional grading, mechanical and/or chemical weed control, and additional applications of gravel or fill material.

### **Comparison of Biological Impacts for the Alternative Routes**

As shown in Figure 3-7, the study area for each alternative route would cross an area characterized by a wide range of habitats and biological resources, including relatively undisturbed areas of shrub-steppe vegetation. Characterized by mature plant communities, these areas also support plant and animal species of conservation concern, including sagebrush obligate species like the sagebrush sparrow and loggerhead shrike. The study area for each alternative route was defined as the total area within a 100-foot corridor (50 feet on either side of the proposed route). Additional areas included in the study area were 200-foot extension areas at the ends and elbows of the lines for pulling and tensioning conductors and additional work areas around the substations and taps. The study area or potentially affected area includes the area within which disturbances from construction of access roads, erection of structures, and pulling and tensioning conductors would occur. This potentially affected area was partitioned among the BRMP resource levels used to describe and manage habitat on the Hanford Site. Table 3-3 provides a summary of the quality of habitat crossed by the 100-foot wide corridor or study area for each alternative route. Project construction would use existing access roads where available and only 5 to 7 new structures per mile would be erected; therefore, most of the study area for each alternative route would not be disturbed.

Because any temporary disturbance impacts to wildlife are likely to be comparable between the alternative routes and incidents of wildlife mortality are expected to be rare, the comparison of impacts between the alternative routes was based on the estimated total amount of land and vegetation disturbance caused by access road construction and installation of structures and the expected amount of long-term (i.e., permanent) vegetation disturbance that would remain after accounting for areas that would be revegetated after completion of construction. Additional disturbances associated with construction support areas are discussed separately as those disturbances would be common to any of the four alternative routes. The disturbance associated with the decommissioning and removal of the existing

North Loop transmission line is discussed in a separate section as those impacts would occur regardless of which alternative routes was constructed.

**Table 3-3. Total Acreage and BRMP Resource Levels Crossed by the Alternative Routes in the Project Area**

Alternative Route	Total Acres	Total Acres (Percentage of Total) by BRMP Resource Level					
		Level 5	Level 4	Level 3	Level 2	Level 1	Level 0
AR-1	827	22 (2.7%)	425 (51.3%)	285 (34.5%)	25 (3.0%)	42 (5.1%)	28 (3.3%)
AR-2	827	22 (2.7%)	386 (46.6%)	234 (28.2%)	49 (5.9%)	90 (10.8%)	47 (5.7%)
AR-3	793	22 (2.8%)	453 (57.2%)	265 (33.5%)	8 (1.0%)	18 (2.3%)	25 (3.2%)
AR-4	817	22 (2.7%)	373 (45.7%)	272 (33.3%)	37 (4.5%)	78 (9.6%)	34 (4.2%)

Level 5 resources represent the highest quality (irreplaceable) habitats and Level 0 resources represent the lowest quality (industrial areas) habitats. The four alternative routes would cross an area where 78 to 93 percent of the potentially affected area is considered higher-quality habitat [i.e., irreplaceable (Level 5), essential (Level 4), or important (Level 3) habitat]. The study area of AR-2 and AR-4 contain the least amount of potentially affected higher-quality habitat, with 78 percent and 82 percent, respectively. AR-1 contains about 89 percent higher-quality habitats, while AR-3 contains 93 percent. Each of the alternative routes would cross areas that have been previously disturbed. Approximately 5.5 to 16.5 percent of the area in which impacts could occur from the four alternative routes is considered to contain marginal habitats (Level 1) or industrial areas (Level 0). AR-2 and AR-4 contain the highest percentage, 16.5 percent and 13.8 percent, respectively, of marginal quality habitat. AR-3 contains the least amount of marginal habitat, with only 5.5 percent.

Four construction support areas would also be temporarily affected by the proposed construction activities (Table 3-4). These four areas would support construction of any of the alternative routes. Therefore, any potential impacts to land or vegetation in the construction support areas would be common to all four alternative routes. Two of the laydown areas are almost entirely characterized as Resource Level 0 (industrial areas) and would not create new land disturbances. The majority of the remaining two areas also comprise Level 0 resources; however, a small percentage of higher-quality habitats is also present in these areas.

**Table 3-4. Estimated Acreage Potentially Affected in Construction Support Areas Classified by BRMP Resource Level Category**

Construction Support Area	Acres	BRMP Resource Levels
Area Adjacent to Midway substation	15.1	>99% of this area is designated as Resource Level 0
Pit 25, at Corner of Routes 11A and 6	11.1	68% is Level 0; 5% is Level 1; and 7% is Level 3
Pit 23, at Corner of Routes 1 and 4N	34.2	87% is Level 0, 1% is Level 1, and 12% is Level 2
Existing Construction Yard between the Northern Boundary of 200 East and Route 11A	5.1	>99% of this area is designated as Resource Level 0

***Area Affected by the Construction of Access Roads and Structures for Each Alternative***

Impacts from access road construction and installation of transmission system structures and components would include the removal of vegetation, loss of wildlife habitat, and soil compaction in addition to many of the other impacts discussed above. Because the access roads would be used throughout the design life of the North Loop line, the impacts resulting from road construction would be

permanent. Installation of the structures would initially affect the entire construction area; however, an estimated two-thirds of the initially affected area would be reseeded after construction is completed.

Table 3-5 depicts the estimated area of construction impacts associated with each alternative route. The affected area associated with new access road construction was determined by multiplying the proposed length of the new road (see Table 2-5) by the standard road surface width of 14 feet. Only Segments F, H, and I would require new access road construction; the remaining line segments would use existing roads for line access. The construction area for each new structure is estimated to be about 0.92 acre (see Table 2-2).

**Table 3-5. Estimated Acreage Affected during the Construction of Each Alternative Route.**

Proposed Activity	AR-1	AR-2	AR-3	AR-4
Access roads by route segment <sup>a</sup>	N/A	Segment H: 4.8 acres	Segment I: 15.3 acres	N/A
		Segment F: 9.3 acres		
Total access roads	9.3	14.1	24.6	9.3
Transmission line structures <sup>b</sup>	118.7	127.9	100.3	113.2
Total area of disturbance <sup>c</sup>	128.0	142.0	124.9	122.5

- a. Length of new access roads (Table 2-5) multiplied by standard road surface width of 14 feet.
- b. Construction area (0.92 acre) per new structure (Table 2-2) multiplied by number of structures (Table 2-5).
- c. New access roads and transmission line structures.

The land area that would initially be disturbed during construction ranges from approximately 123 acres for AR-4 to 142 acres for AR-2. This difference is largely due to the replacement of all existing tower structures on Segments E1 and E2 between substations A8 and A9 for AR-2 to accommodate a double-circuit line and loop configuration through the A9 substation, and a new access road required for the construction on Segment H. Potential land disturbance for AR-1 and AR-3 are similar, approximately 128 and 125 acres, respectively.

**Area with Permanent Modification of Vegetation and Wildlife Communities**

Once construction is complete, an estimated two-thirds of the area around each of the structures would be replanted or reseeded with native plants. The area directly adjacent to the structure, which is estimated to be roughly a third of the construction area, would be maintained free of vegetation so that the structure is accessible for routine maintenance and inspection as well as repairs. Permanent impacts<sup>5</sup> from the construction of the North Loop due to access roads and structures would range from 47 acres for AR-4 to 58 acres for AR-2 and AR-3. AR-1 would have permanent impacts of about 49 acres (Table 3-6).

To evaluate the permanent impacts to shrub-steppe vegetation and wildlife habitat for each alternative route, the estimated land disturbance in Table 3-6, was apportioned among the BRMP resource levels using the percentage of area in each alternative route located in each resource level. The potential permanent impact on higher-quality resources (Level 3, 4, and 5) is comparable between all four alternatives except for AR-3 which would permanently impact about 9 to 11 more acres of Level 4 resources than the other three alternative routes (Table 3-7). All alternatives would have the same impact on Level 5 resources. It is possible through preconstruction surveys and site-specific decisions on placement of tower structures that disturbances to Level 5 resources could be reduced.

<sup>5</sup> Permanent impacts are those that result in the modification of a vegetation community to the extent that it would not return to preconstruction conditions during the life of the project. Temporary impacts are those that result in the disturbance of vegetation, but do not prevent the reestablishment of vegetation communities similar to the pre-disturbed vegetation communities within five years.

**Table 3-6. Estimated Acreage Permanently Affected for Each Alternative Route**

Proposed Activity	AR-1	AR-2	AR-3	AR-4
Access roads by route segment <sup>a</sup>	N/A	Segment H: 4.8 acres	Segment I: 15.3 acres	N/A
	Segment F: 9.3 acres			
Total access roads	9.3	14.1	24.6	9.3
Transmission line structures <sup>b</sup>	39.5	42.6	33.4	37.7
Total area of disturbance <sup>c</sup>	48.8	57.7	58.0	47.0

- a. Length of new access roads (Table 2-5) multiplied by standard road surface width of 14 feet.
- b. One third of the construction area (0.92 acre) per new structure (Table 2-5) multiplied by number of structures.
- c. New access roads and permanent area removed around transmission line structures.

**Table 3-7. Estimated Acreage that May Be Permanently Disturbed Classified by BRMP Resource Level**

Alternative Route	BRMP Resource Level Classification					
	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0
1	2	21	15	2	4	6
2	2	22	16	4	6	7
3	2	32	15	2	3	5
4	2	23	15	2	4	2

**3.3.1.2.3 Decommissioning and Removal of the Existing North Loop Line**

As indicated in Table 3-8, the habitat in the existing North Loop corridor is some of the highest quality occurring on the Hanford Site. Over 50 percent of this area is either designated as an element occurrence (Level 5 “Irreplaceable” resource) or as a Level 4 “Essential” resource. This area contains some of the largest tracts of sagebrush steppe habitat on the Hanford Site, and several state-listed sensitive species, including gray cryptantha and Thompson’s sandwort, occur within this corridor. The area between the 100-K Area and Ashe tap is also home to the resident Central Hanford Rocky Mountain elk herd, mule deer, black-tailed jackrabbits, burrowing owls, and several sagebrush obligate birds, including the sagebrush sparrow and loggerhead shrike.

**Table 3-8. Number of Acres within 50 feet of the Existing North Loop by Resource Level**

BRMP Resource Level	Number of Acres	Percentage of Total Acres
0	12.0	3.4
1	64.1	18.1
2	8.0	2.2
3	78.0	22.0
4	175.6	49.5
5	17.4	4.9

Areas that would be affected by the decommissioning and removal of the existing North Loop line within this corridor include access roads; sites where structures will be taken down; areas needed for the laydown and spooling of conductor lines removed from the structures; staging areas for the temporary storage of hardware, poles, and sections from the disassembly of steel structures; and construction support areas and lay-down yards.

- Removal of conductor lines, wooden poles, steel structures, and associated hardware – Many of the structures have existing surface disturbances around the base from the existing access road, past construction disturbance, and ongoing maintenance work. In order to access the structures to

be removed, vegetation would be cleared around the base of each structure. Vegetation removal would be done using large mowers or brush cutters (i.e., brush hogs), back hoes, and other mechanical equipment. Removal of vegetation would be limited to that required to work around the base of the structures and to position cranes and bucket trucks.

- Access road reconditioning – Reconditioning and repair of access roads would be needed to support the movement of bucket trucks, excavation equipment, cranes, and other heavy machinery need for the removal of the existing North Loop. The reconditioning of these roads would remove shrubs, grasses, and forbs that have become established in the road bed or along road shoulders, and depending on local conditions, could require grading and the placement of gravel.
- Construction support areas – Such areas would provide temporary storage areas for trucks, trailers, and heavy equipment needed for the decommissioning of the existing line, temporary construction force offices and support facilities, and parking areas. The spools used for collection of the transmission line would also be stored in these areas. These areas are the same as those used for constructing the rebuilt North Loop transmission line (Table 3-5).

### **Line Removal Impacts**

The removal of the existing 225 wood structures and 43 steel structures and the lines and hardware they support, would remove or damage an estimated 100-foot by 100-foot area (roughly 0.2 acre) around each structure, resulting in a total impact of 54 acres for this activity.

- Vegetation may be completely cleared within roughly 40 feet of each structure. The vegetation present around the existing structures often includes mature shrubs (e.g., sagebrush, bitterbrush, hopsage, and rabbitbrush) and native grasses and forbs that have become established in the decades since the line was built. Wildlife using the area may be displaced by loss of burrow or nesting sites.
- Removal of wood structures or steel structures and their cement foundations would require the use of heavy equipment such as bucket trucks, cranes, and excavation equipment. The use of this equipment would result in soil compaction, damage to existing vegetation, and an increase in the potential for weed seeds to be introduced to the area as well as the creation of unvegetated areas where those weeds could become established. Birds using the structures for nesting sites or hunting perches would also be displaced.
- Staging of the roughly 55-foot poles removed on site and the subsequent size reduction of those poles would result in damage to surrounding vegetation through crushing or breaking. Any nests or burrows in the affected area may also be destroyed or made inaccessible. Depending on the time of year, the presence of the debris on the ground may also inhibit seed germination and plant growth in the area. This impact would be mitigated by prompt size reduction of the poles and clean-up of the debris left at the site.
- Conductor lines would be removed from the structures and laid down on top of existing vegetation. Removal and spooling of those conductor lines would require that trucks or truck-trailer combinations be staged in line with the downed lines at roughly one-mile intervals. Cleared or previously disturbed areas would be used for staging the pulling truck and spooling equipment where available. Pulling and spooling of lines would result in temporary impacts including some breakage and crushing of local vegetation as well as disruption or dislocation of wildlife species including nesting birds. The truck/equipment staging areas would result in soil

compaction, damage to existing vegetation, and an increase in the potential for weed seeds to be introduced.

### **Road Reconditioning Impacts**

In addition to line removal, much of the work to decommission and remove the existing North Loop structures would be done using the existing access road along the route. Although these roads have been previously disturbed, some areas have native vegetation growing in the ROW or in the road shoulder. Impacts from access road construction would include the removal of vegetation, loss of wildlife habitat, and soil compaction. Removal of existing vegetation and the creation of nonvegetated berms could increase the potential for the introduction and spread of nonnative plant species and noxious weeds.

### **Revegetation of the Area Vacated by Removal of the Existing North Loop**

Once the North Loop lines and structures were removed, the structure sites as well as the access roads that have been vacated would be remediated as part of the Proposed Action. The estimated land area that would be disturbed by the structure removal for all 268 structures is approximately 54 acres (see discussion above), and the total area that would be affected by the removal of the 28 miles of existing North Loop roads, assuming a 14-foot road width, is estimated to be 48 acres. Site remediation would occur on a total of 102 acres.

Remediation would include site preparation (e.g., soil preparation, removal of noxious weeds via herbicide application, etc.) and revegetation of the site using locally derived native plants. All revegetation, stabilization, and ecological restoration activities would be performed in accordance with the *Hanford Site Revegetation Manual*, DOE/RL-2011-116 (DOE 2013a).

### **3.3.1.3 Mitigation**

#### **3.3.1.3.1 Specific Management Practices**

Mitigation of the impacts of the Proposed Action on biological resources would begin by employing the management practices specified in Hanford Site policies, plans and procedures (see Section 2.4). Chief among these mitigation processes are those specified in the BRMP. The BRMP establishes the biological resource mitigation strategy on the Hanford Site and focuses (in order of preference) on avoidance, minimization, rectification, and compensation (DOE 2017). The intent is to direct potential impacts toward lower priority resources. The following BMPs have been identified to reduce impacts to biological resources:

- Conduct preconstruction surveys as applicable prior to land disturbance or construction to identify potential resources to avoid such as candidate plant species, nesting birds, snake hibernacula, owl burrows, and other important biological resources that would be disturbed by the Proposed Action.
- Perform land clearing to the extent practicable during the non-nesting season for migratory birds. Bird nests surveys would be complete prior to the start of any construction activities that occur during nesting season.
- Use existing access roads to the extent practicable to minimize the number of new access roads and clearing of vegetation.

- To the extent practicable, avoid undisturbed stands of sagebrush and other mature shrubs when constructing access roads and siting tower locations.
- Wash the under carriage and tires of vehicles when leaving areas with known infestations of weedy or invasive plant species.
- Restore areas temporarily disturbed by construction as well as the decommissioned portions of the existing North Loop transmission line following guidelines in the Hanford *Site Revegetation Manual* (DOE 2013a).

Other specific BMPs that have a key role in protecting biological resources considered in the preceding section include the following:

- Comply with Hanford Fire Marshal restrictions and guidelines for driving off road and operation of machinery in vegetated areas during times with elevated fire danger (MSA 2016).
- Control of invasive and noxious weeds during construction and operations as well as in preparation for revegetation.
- Identify known special-status plant populations, including a 25-foot buffer, as sensitive areas to be avoided, if possible, in construction documents and maps used by construction contractors.
- Install signage, fences, or flagging to restrict vehicles and equipment to designated routes and work areas in areas with high-quality plant communities or special-status species.
- Use vehicle and equipment cleaning stations to minimize the introduction and spread of weeds during construction by cleaning vehicles and equipment prior to entering and as soon as possible after leaving each work area.
- Use weed-free mulch on revegetation sites.
- Use local sources of rock for road construction, if possible, and obtain road fill materials from noxious weed-free quarries.
- Cut or crush vegetation rather than blading or clearing areas that would remain vegetated.
- Control noxious weeds in construction work areas manually, mechanically, and/or chemically as recommended for each species, prior to construction, if needed, with a focus on species with small, contained infestations to reduce the potential for widespread establishment and the need for long-term management.
- Reseed disturbed areas after construction activities are complete, at the appropriate time period for germination, using a native seed mix based on the requirements in the *Hanford Site Revegetation Manual* (DOE 2013a).
- Include native plant species in revegetation seed mixes that are of cultural importance to tribes, based on tribal input.
- Monitor seed germination of seeded areas until site stabilization is achieved (defined by an appropriate level of cover by native or acceptable nonnative species for this geographic area) and

implement contingency measures and reseed to ensure adequate revegetation of disturbed soils if vegetative cover is inadequate.

- Conduct a post-construction noxious weed survey approximately 1 year after construction of all areas disturbed by construction activities to determine if there are new noxious weed infestations; implement appropriate control measures of noxious weed infestations.
- Brief helicopter pilots on the potential for bird strikes and terrestrial mammal disturbances based on the time of year and other relevant considerations. This would reduce the risk of bird strikes and impacts on terrestrial mammals during helicopter operations, especially during the March to May and late August through November time periods. Conduct transit to and from the project area at 3,000 feet above ground level<sup>6</sup>.
- Refer to the Natural Resources Protective Buffer Map for bald eagles and ferruginous hawks (<http://www.hanford.govpage.cfm/EcologicalMonitoring>) and maintain a 1,300-foot “no-fly” slant distance<sup>7</sup> from nest sites in order to limit disturbance and avoid nest abandonment by these birds during active nesting and/or roosting times. This slant distance is based on the slant distance thresholds for behavior effects on raptors, including eagles, from aircraft (ORNL 2001).
- Maintain helicopter refueling operations a safe distance from any waterways.

### 3.3.1.3.2 Revegetation of Disturbed Areas

Many of the impacts that would result from the Proposed Action would be mitigated by replanting or reseeding as soon as practicable after disturbance. Recovery of habitat to the level existing at the location before the Proposed Action would be expected to occur within 5 years of the initial disturbance. Wildlife that would be displaced by the construction or removal of parts of the line would be expected to resume normal use of the area.

### 3.3.1.3.3 Compensatory Mitigation Measures

The BRMP establishes a mitigation policy that defines the appropriate compensation for impacts on resources that cannot be avoided (DOE 2017). Resources in each of the six BRMP resource levels (defined in Table 3-2 above) are associated with mitigation actions commensurate with the quality of the affected resource. Compensatory mitigation is defined in the BRMP as actions taken to replace lost habitat or resource values at locations away from the project site and can be accomplished through habitat improvement or acquisition and protection of substitute, high quality resources. For Level 5 resources, compensatory mitigation is determined on a case-by-case basis. Level 4 resource areas are compensated

<sup>6</sup> Note also that the 3,000 foot altitude exceeds the FAA recommendation that pilots maintain a minimum altitude of 2,000 feet above ground level in National Parks, Monuments, and Wildlife Refuge areas (i.e., Hanford Reach National Monument – including Rattlesnake Mountain and Arid Lands Ecology Reserve, and the new Manhattan Project National Historic Site) (FAA 2014).

<sup>7</sup> A common measure of exposure is the distance from the aircraft to the endpoint. This measure has two advantages: (1) distance is sometimes a better predictor of wildlife response than sound pressure, and (2) distance incorporates both the acoustic and visual stressors associated with overflights. Distance is often expressed in terms of “slant distance.” Slant distance is the hypotenuse of the right triangle that includes the altitude and lateral distance to the assessment endpoint (in this case, the nest site). If the overflight is almost overhead, slant distance may be assumed to be equivalent to altitude. If the altitude is low (e.g., 1,000 feet or below), the lateral distance is a close approximation of the slant distance.

at a ratio of 5 acres for every acre of permanent impact; Level 3 areas are compensated at a ratio of 3:1; and Level 2 areas are compensated at a 1:1 ratio. No compensatory compensation is required for disturbance of Resource Levels 0 and 1.

While most areas would be revegetated as soon as practicable after construction is completed, access roads and areas maintained around the base of the structures would remain clear of vegetation throughout the operation of the North Loop. As described above, the proposed project would disturb approximately 121 to 142 acres of shrub-steppe vegetation for new access roads and towers depending on the alternative route. This assumes a 0.92 acre (200 feet by 200 feet) disturbance for each support structure. Following construction, approximately two-thirds of each tower construction area would be revegetated with native vegetation; however, the remaining disturbed area for each support structure used for operation and maintenance access (approximately one-third of the original disturbed area) would require compensatory mitigation. The permanent impact would be about 40 to 51 acres of BRMP Level 2, 3, 4, and 5 vegetation (Table 3-7). Based on the land area classified as BRMP resource Level 2, 3, and 4 estimated to be permanently affected by the Proposed Action, the minimum amount of compensatory mitigation that would be required for the construction of the North Loop would be 152 acres for AR-1; 162 acres for AR-2; 207 acres for AR-3; and 162 acres for AR-4. Note that these estimates do not include any compensatory mitigation for the small amount of Level 5 resources that could be permanently disturbed. For the Proposed Action, a potential mitigation based on an identified need could consist of installing an area with 10 to 12 artificial burrowing owl burrows. Burrowing owls are found within the study area, and historically colonies were once located in the area where the existing North Loop line is to be removed.

#### **3.3.1.4 Unavoidable Adverse Impacts**

The Proposed Action would temporarily remove some areas with vegetation communities that are predominantly composed of native plant species. This would include priority resources, including special-status plant species and native plant communities. Implementation of the mitigation measures identified above would reduce or mitigate impacts on these habitats. Therefore, some impacts are anticipated to be temporary, with unavoidable adverse impacts occurring during the lag-time between the on-site losses and achievement of successful restoration of areas disturbed by construction of the proposed line and removal of the existing North Loop.

Construction of new access roads and the areas surrounding the transmission structures would permanently remove vegetation and wildlife habitat. The loss of Level 2, 3, and 4 resources requires compensatory mitigation per BRMP, as described above. The result would be a net replacement of habitat on the Hanford Site, although not necessarily within the study area. In addition, a very small amount of the area (less than 2 acres for all alternatives) permanently affected by the Proposed Action is in Level 5 resource areas. Mitigation for the loss of irreplaceable resources (i.e., Level 5 resources) is determined on a case-by-case basis following BRMP protocols and DOE and contractor recommendations.

Construction-related ground disturbance could result in noxious weeds colonizing disturbed areas. Due to the difficulty of controlling weeds in disturbed areas, the project could result in some increases in noxious weeds within areas disturbed by project construction. A number of the BMPs listed in the previous section are focused on preventing or reducing the potential for weed dispersal and colonization. During initial revegetation activities, control of noxious weeds would be a priority activity. Subsequent monitoring would also identify the presence of noxious weeds in replanted areas and spot spraying would be used to ensure the spread of these species is minimized.

### 3.3.1.5 Cumulative Impacts

Some of the reasonably foreseeable future actions identified in Section 3.2 above could also cause permanent or temporary impacts on vegetation and wildlife. While most of these actions would not result in the same level of impact as past actions, incremental disturbance of native habitats and special-status species could continue to occur. Because some of these activities would be coupled with mitigation and restoration efforts as required by BRMP (DOE 2017), these impacts would likely be temporary in the short term, but positive in the long-term. Nonetheless, it would take some time to re-establish the functions and values (e.g., wildlife habitat, soil stabilization) provided by those communities, if affected.

Since the early 1990s, the Hanford Site has been engaged in an effort to remove Cold War facilities and remediate much of the study area. Footprint reduction activities within the study area have significantly reduced, and will continue to reduce, the number of contaminated waste sites and manmade infrastructure, including other utility lines, in this area. Remediated areas would continue to be revegetated with native shrubs, grasses, and forbs.

The removal of the existing North Loop line and the decommissioning of the proposed line between the 100-K Area and Ashe tap would ultimately reduce manmade infrastructure and increase the total acreage for native shrub-steppe communities. While the short-term impact of the existing North Loop removal is to temporarily remove or damage local vegetation, disturb or displace local wildlife, and disrupt normal movement in established wildlife corridors, the long-term impact of the Proposed Action would be to increase the habitat available to support native plants and animals and decrease the frequency of human impacts on those habitats.

### 3.3.2 Cultural Resources and Historic Properties

Cultural resources and historic properties must be evaluated for federal actions in accordance with NEPA and NHPA. As explained in *A Handbook for Integrating NEPA and Section 106* (CEQ and ACHP 2013), cultural resource effects assessed under NEPA (40 CFR 1508.8) consider both cultural resources and historic properties. The term “cultural resources” covers a wider range of resources than “historic properties,” such as sacred sites, archaeological sites not eligible for the *National Register of Historic Places* (NRHP), and archaeological collections. In general, cultural resources include all aspects of the human environment, for example, cultural uses of the natural environment, the built environment, and human social institutions. A historic property is defined as any district, site, building, structure or object that is either listed, or eligible for listing, in the NRHP, which is maintained by the Secretary of the Interior.<sup>8</sup> Properties of traditional religious and cultural importance to an Indian tribe may be determined eligible for inclusion in the National Register.

During 1990, the National Park Service published *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, which formalized the concept of a traditional cultural property (TCP) as a means to identify and protect cultural landscapes, places, and objects that have special cultural significance to American Indians and other ethnic groups (Parker and King 1990).

The process for identifying and evaluating cultural resources for NRHP eligibility and assessing project effects to historic properties is outlined in Section 106, “Protection of Historic Properties,” of the

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<sup>8</sup> Historic properties are defined in the Advisory Council on Historic Preservation regulations implementing the NHPA [36 CFR 800.16(l)(1)], and include artifacts, records, and remains that are related to and located within such properties. Historic properties also include properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

NHPA and the Advisory Council on Historic Preservation regulations implementing Section 106 (36 CFR Part 800). Specifically, Section 106 requires agencies to determine whether the undertaking has the potential to cause effects on historic properties; identify historic properties within an area of potential effect (APE); assess whether those historic properties may be adversely affected by the undertaking;<sup>9</sup> and resolve those effects through avoidance, minimization, or mitigation. Under NEPA and NHPA, the meaning of “effects” is different. The comparison of defined terms in Table 3-9 of this EA is taken from the NEPA and NHPA guidance for integration (CEQ and ACHP 2013).

**Table 3-9. Meaning of “Effects” Under NEPA and NHPA**

	NEPA	NHPA
Types of Effects or Impacts	Effects and impacts are synonymous terms under NEPA. The magnitude, duration, and timing of the effect to different aspects of the human environment are evaluated in the impact section of an EA or an environmental impact statement for their significance. Effects can be beneficial or adverse, and direct, indirect or cumulative (40 CFR 1508.8)	An “effect” means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR 800.16(i)).
Direct Effects	An impact that occurs as a result of the proposal or alternative in the same place and at the same time as the action. Direct effects include actual changes to cultural or historic resources (40 CFR 1508.8).	A direct effect to a historic property would include demolition of a historic building, major disturbance of an archeological site, or any other actions that occur to the property itself.
Indirect Effects	Reasonably foreseeable impacts that occur later in time or are further removed in distance from the Proposed Action (40 CFR 1508.8).	Indirect effects may change the character of the property’s use or physical features within the property’s setting that contribute to its historic significance; are often audible, atmospheric, and visual effects; and may relate to viewshed issues.

Source: Adapted from CEQ and ACHP 2013.

**3.3.2.1 Affected Environment**

For the Proposed Action, the project area for cultural resources and historic properties consists of a 200-foot-wide corridor around each alternative route, including a 200-foot buffer surrounding the 500-foot extensions at the ends and elbows for pulling and tensioning activities, and a 100-foot-wide corridor around where the decommissioning activities of the deactivated North Loop line would take place. The study area for evaluation of cultural and historic resources impacts was based on a detailed literature review and consisted of a 1,640-foot buffer around the project area. The historic and cultural context may include a larger area such as the Hanford Site or Columbia River region, but the analysis comparison of potential impacts for the alternative routes is within the study area. After identifying the preferred alternative (see Section 3.5), DOE focused the study area to an approximate 1,174-acre APE<sup>10</sup> in consultation with the State Historic Preservation Officer (SHPO) and affected tribes. Methodology and

<sup>9</sup> An “adverse effect” is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative [36 CFR 800.5(a)(1)].

<sup>10</sup> The APE is defined as “...the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist...” (36 CFR 800.16(d)).”

results of a field survey conducted in support of NHPA Section 106 compliance for the preferred alternative is presented in Section 3.3.2.2.4.

### 3.3.2.1.1 Background

The Hanford Site has been inhabited by humans for more than 10,000 years. The site is one of the richest cultural resource areas remaining in the western Columbia Plateau, owing to the proximity to the Columbia River, which influenced precontact and historic settlement in the region. Many decades of archaeological and ethnographic studies in the area have contributed to an extensive government and private research database of information that provides interpretation of resources present and the stories told by Indian tribes and individuals. Rather than provide an exhaustive review of this information, the details of these studies can be found in the numerous publications on the subject and through referral to references provided herein. The general precontact history and historical development provided in this EA is from the historical and cultural review of the region completed for the *NRHP Multiple Property Documentation Form-Historic, Archaeological, and Traditional Cultural Properties of the Hanford Site* (DOE 1997), *Hanford Site NEPA Characterization* (Duncan 2007), and previous archaeological investigations in the area.

The Hanford Site comprises the cumulative record of multiple occupations by both Native and non-Native Americans representing precontact, ethnographic, and historic periods. Numerous archaeological and aboveground resources are associated with these time periods. Period resources include archaeological sites that are thousands of years old, places of Native American religious and cultural significance, and buildings and structures from the pre-Hanford, Manhattan Project, and Cold War eras. Sitewide management of Hanford's cultural resources and historic properties is in accordance with the *Hanford Cultural Resource Management Plan* (DOE 2003).

Precontact occupation of the area is characterized by Paleo-Indian groups relying upon hunting wild game and gathering wild plant foods with the eventual emergence of semi-subterranean house-dwellings. Groups still remained mobile, however, as environmental changes fluctuated, reducing large mammal hunting due to decreased large mammal populations from gradual drought in the area. When Europeans first arrived in the Northwest, the descendants of ancient Native peoples were still living a traditional lifestyle. Native peoples that lived and used the area and its resources included the Chamnapum, the Wanapum, the Walla Walla, Yakama, the Umatilla, the Nez Perce Tribe, the Palouse, and others. When the treaties of 1855 were signed, many of these peoples and their descendants moved to reservations, while some, such as the Wanapum, remained in the area of the Columbia River. The descendants of these groups continue to live in the region and still highly value the Hanford Site lands and resources.

The early settlers and farming landscape is composed of those areas on the Hanford Site where people, mainly of European descent, and some of other ethnicities, settled in the Columbia River Plateau prior to the start of the Manhattan Project in 1943. Non-Native American presence in the mid-Columbia began during 1805 with the arrival of the Lewis and Clark Expedition. It was not until the late 19<sup>th</sup> and early 20<sup>th</sup> century, however, that non-Native peoples began intensive settlement on the Hanford Site lands. Other visitors included fur trappers, military units, and miners who traveled through the Hanford Site on their way to lands up and down the Columbia River and across the Columbia Basin. It was not until the 1860s that merchants set up stores, a freight depot, and the White Bluffs Ferry on what is now known as the Hanford Reach of the river. Chinese miners began to work the gravel bars for gold during the 1860s. Cattle ranches were established in the 1880s and farmers followed during the next two decades. Agricultural development, irrigation districts, and roads were established in the eastern portion of the central Hanford Site. Several small towns, including Hanford, White Bluffs, Richland, and Ringold, grew up along the riverbanks during the early 20<sup>th</sup> century. In 1913, the communities' accessibility to outside markets expanded with the arrival of the railroad.

Ferries were established in association with the larger communities along the river. The towns and nearly all other structures were razed in the years after the U.S. Government acquired the land for the Hanford Engineer Works in 1943.

Since 1943, the Hanford Site has existed as a protected area for activities primarily related to the production of radioactive materials for national defense uses and, in more recent times, environmental cleanup associated with past defense production activities. For cultural resources on the Hanford Site, establishment of the nuclear reservation as a high-security area, with public access restricted, has resulted in a well-protected status, although no deliberate resource protection measures were in effect to mitigate effects of facilities construction and associated activities. Thus, the Hanford Site contains an extensive record of precontact archaeological sites and Native American cultural properties, along with pre-Hanford Euro-American sites (primarily archaeological resources), and a considerable number of Manhattan Project/Cold War-era buildings and structures some of which are included as part of the Manhattan Project National Historic Site.

Today, descendants of Native Americans with historical ties to the area are generally enrolled members of the following federally recognized groups: the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe. In addition, the Wanapum who still live near the Hanford Site at Priest Rapids are a non-federally recognized tribe who have strong cultural ties to the site and have consulted with DOE since its formation in the 1940s. DOE maintains an ongoing consultation and interaction program with the above four tribes for activities conducted at the Hanford Site.

### 3.3.2.1.2 Identification of Cultural Resources and Historic Properties

DOE conducted a literature review of DOE’s cultural and historic program records and electronic database for the study area (Mendez 2016). The review focused on the identification of all previously recorded archaeological sites, cultural resources, and historic properties located within and surrounding each alternative route. Table 3-10 presents the type and number of cultural and historic resources identified during the literature review, and Table 3-11 identifies the status of NRHP eligibility determinations for the identified resources. It is expected that one or all of the alternative routes may overlap additional, currently undocumented archaeological resources, districts, sacred sites, or TCPs (Mendez 2016).

**Table 3-10. Cultural and Historic Resources by Alternative Route**

Alternative Route	Historic	Prehistoric	Multi-Component	Unknown	Total Resources
AR-1	82	74	3	2	161
AR-2	92	65	4	4	165
AR-3	83	75	3	1	162
AR-4	76	69	4	4	152

Source: Mendez 2016.

**Table 3-11. Cultural and Historic Resources NRHP Eligibility Determinations**

Alternative Route	Total Resources	Recommended NRHP-Eligible	Recommended Not Eligible	Unevaluated
AR-1	161	23	18	120
AR-2	165	20	21	124
AR-3	162	23	18	121
AR-4	152	20	18	114

Source: Mendez 2016.

The cultural and historic resources study area for all alternative routes overlaps one NRHP-eligible cultural district. AR-2 also overlaps an archaeological district in the vicinity of the 100-K Area. The cultural district and related cultural resources would be in close proximity to various activities and structures associated with all alternative routes, mainly in the north-to-south corridor between substations A9 and A8 and along Cutoff Road (Segments E1/E2 and D, respectively). Archaeological features in the district include isolated and clustered rock features and pits, with occasional rock alignments and lithic scatters (Chatters and Cadoret 1989). A portion of AR-2 between the 100-B/C and 100-K areas (Segment H) would traverse a NRHP-eligible archaeological district. This area has significant documented archaeological material and history of Native American use (most notably the Wanapum people) and evidence of Euro-American settlement and defense activities associated with the Hanford Site (Harrison and Mendez 2013). All individual resources within the districts that overlap with the study area are included in the total resource count in Tables 3-10 and 3-11.

Historic properties related to a BPA town site associated with construction and early operation of the Midway substation may be located in the vicinity of the substation and adjacent, proposed construction laydown area. The eligibility of these potential resources is unevaluated and the sites are considered potentially eligible for inclusion on the NRHP.

The Proposed Action includes decommissioning and demolition of the deactivated portion of the existing North Loop transmission system once a new system is in place and operating. Portions of the demolition locations would occur in the vicinity of a historic district near the White Bluffs boat launch and within a TCP in the 100-K and 100-D areas (Mendez 2016).

### **3.3.2.2 Environmental Consequences**

DOE conducted the impact evaluation through the literature review to address impacts associated with all alternative routes for input in choosing a preferred alternative. In addition, results of a field survey conducted within the APE in support of NHPA Section 106 compliance for the preferred alternative is presented in Section 3.3.2.2.4. The following information is presented for purposes of providing cultural and historic resources criteria to contribute to the evaluation of impacts and comparison among the alternatives. The potential for cultural and historic resources impacts is affected by the following:

- Presence and quantity of known cultural resources and historic properties, and
- Proximity to the Columbia River.

#### **3.3.2.2.1 No Action Alternative**

Under the No Action Alternative, the impacts of the Proposed Action (as identified below in Section 3.3.2.2.2) to rebuild the deteriorating North Loop line, would not occur. The existing North Loop line would require an increased frequency of ongoing maintenance and repairs and existing access roads would continue to be upgraded and maintained. Continuing to utilize the existing North Loop line would not achieve the benefit of removal of components from sensitive cultural locations (e.g., existing transmission structures on Gable Mountain). Conversely, there would not be additional new surface disturbances and resultant potential impacts to cultural and historic resources associated with the siting and construction of the rebuilt North Loop transmission line.

### **3.3.2.2.2 Construction and Operation of the Rebuilt Transmission Line**

#### **All Alternative Routes**

There is no meaningful difference in the number of known historic properties associated with the four alternative routes. All routes have the potential to impact one or more historic, cultural, or archaeological district during construction and operations through direct disturbance of resources or indirect impacts to historic properties that may occur beyond the proposed project footprint. Potential historic resources in the vicinity of the Midway substation and adjacent, proposed construction laydown area may result in restriction of North Loop construction activities near the substation or size of the laydown area. Based on information gathered from the literature review, cultural and historic impacts most likely would occur along Segments E1 and E2. Unique consequences of each alternative route are listed below.

- AR-1 has the potential to impact one known NRHP-eligible cultural district, most likely in the vicinity of the north-to-south corridor between substations A9 and A8 and Cutoff Road (Segments E1 and E2). AR-1 is not near the Columbia River; therefore, the route has a low potential for disturbing unrecorded archaeological resources.
- AR-2 has the potential to impact the same NRHP-eligible cultural district as AR-1 and one NRHP-eligible archaeological district. A portion of AR-2 is near the Columbia River; therefore, is the route with a higher likelihood of encountering unknown archaeological resources along Segments H, E1 and E2.
- AR-3 has the potential to impact one known NRHP-eligible cultural district, most likely in the vicinity of the north-to-south corridor between substations A9 and A8 (Segments E1 and E2). The majority of AR-3 is not near the Columbia River; therefore, it has a low likelihood of encountering unknown archaeological resources.
- AR-4 has the potential to impact one known NRHP-eligible cultural district. AR-4 is not near the Columbia River; therefore, the route has a low likelihood of encountering unknown archaeological resources.

### **3.3.2.2.3 Decommissioning and Removal of Existing North Loop Line**

The presence of workers and equipment along the northeastern portions of the deactivated transmission system and the physical demolition and removal of structures and associated components has the potential to temporarily impact many historic properties, one cultural district, one NRHP-eligible archaeological district (the same as those identified for the alternative routes analysis discussed above), one TCP, a historic district, and a number of other archaeological resources and historic properties. Nevertheless, the rebuilt North Loop transmission line has been designed in an effort to minimize impacts to cultural resources and historic properties in the area. Following demolition and removal of components along several miles of the corridor, it would be expected that the absence of the system in those areas would be favorable to tribal entities and have beneficial outcomes for the TCPs, districts, and resources in the area. The long-term beneficial impacts would include the decreased need for maintenance personnel and vehicle traffic in the sensitive areas coupled with the decreased visual, audible, and direct impacts associated with operation and maintenance of the line.

#### **3.3.2.2.4 Results of Field Survey in Support of NHPA Section 106 Compliance**

DOE used a comparative analysis of the potential for impacts to cultural and historic properties (as presented in Section 3.3.2.2.2 of this EA) to inform its selection of AR-4 as the preferred alternative (Section 3.5). To ensure that DOE fully evaluated the significance of impacts to potential historic properties in accordance with 40 CFR 1508.27, DOE focused the scope of more detailed field evaluations to those cultural resources and historic properties within the APE associated with the preferred alternative (AR-4). Focusing the analysis to the preferred alternative did not (1) have an adverse environmental impact because the activity was limited to consultation and field survey, or (2) limit the choice of reasonable alternatives because if DOE ultimately selected a different route based on the findings of the survey or other factors, it would reinitiate consultation and potentially conduct further surveys, in accordance with 40 CFR 1506.1.

After identifying the preferred alternative, DOE refined the study area to an approximate 1,174-acre APE in consultation with the SHPO and tribes. RL transmitted the APE for this project to the SHPO and affected tribes on November 10, 2016, in accordance with 36 CFR 800.4(a). The SHPO concurred with the APE on November 10, 2016. DOE received and responded to comments from the Nez Perce Tribe and the Confederated Tribes of the Umatilla Reservation Cultural Resources Program in November 2016.

DOE continued consultations with the SHPO and affected tribes under Section 106 of NHPA through the development of a cultural resources review (CRR), which included a field survey. The CRR was conducted in accordance with the NHPA, as amended, and implementing regulation 36 CFR Part 800. The preparation of the CRR included a reasonable and good faith effort to identify historic properties that may be present within the APE. Preliminary research and a literature review conducted specifically for the APE for the preferred alternative (AR-4) established the presence of seven previously recorded sites, including two known TCPs. A formal archaeological pedestrian survey of the APE was conducted as part of the NHPA Section 106 review beginning on March 7, 2017, and ending on March 15, 2017. The entire APE was surveyed for archaeological resources, resulting in the recordation of four new archaeological sites. The survey identified 11 archaeological sites or TCPs within the APE. In addition, DOE and tribal representatives conducted an ethnobotanical information survey.

Based on consultation with the SHPO and tribes, of the 11 archaeological sites or TCPs within the APE, DOE has determined that 6 of the sites are eligible for listing on the NRHP, 3 are not eligible for listing on the NRHP, and 2 are unevaluated and considered potentially eligible for listing on the NRHP.

The proposed project would avoid all archaeological sites identified in the CRR except those determined not eligible for listing. In addition to specific cultural resources, one avoidance area was identified based on comments received during the 30-day review period for the CRR. A portion of the proposed laydown area adjacent to the Midway substation would be avoided, as this location may contain archaeological material related to the historic BPA town site, which housed personnel during construction and early operation of the substation.

Because the undertaking would cause demolition and other construction activity impacts to historic properties, specifically to a TCP and a cultural district (also identified by tribes to include properties of religious and cultural significance), both of which are eligible for listing in the NRHP, DOE, in consultation with the SHPO and tribes, has determined that the undertaking would result in a finding of "Adverse Effect," as defined in 36 CFR 800.4(d)(1). These impacts are considered both unavoidable and adverse, although the long-term result would be beneficial because access to those areas by maintenance personnel would be reduced.

### 3.3.2.3 Mitigation

The Proposed Action would be planned, coordinated, and conducted in a manner that protects the cultural and historic resources and mitigates or minimizes potential impacts described above. Mitigation of the potential impacts of the Proposed Action on cultural and historic resources would begin by employing the management practices specified in Hanford Site policies, plans and procedures (see Section 2.4) and in compliance with the *Hanford Cultural Resources Management Plan* (DOE 2003). As part of the NHPA Section 106 process, a memorandum of agreement has been prepared that establishes mitigations, stipulations, and actions through consultation with the SHPO and affected tribes to resolve adverse effects to NRHP-eligible TCPs and a cultural district, which includes properties of religious and cultural significance to Indian tribes.

As mentioned above, the implementation of the Proposed Action would involve the decommissioning and removal of transmission facilities and structures from areas sensitive to affected Indian tribes. The activities undertaken during the action would be managed in accordance with the memorandum of agreement described above to mitigate any adverse effects. The long-term benefit of the action on the cultural resources of the area would be realized after implementation of the Proposed Action.

### 3.3.2.4 Unavoidable Adverse Impacts

Although implementation of mitigations, stipulations, and actions identified in the memorandum of agreement would reduce the potential for (and severity of) impacts, construction of the new electrical transmission system and removal of the decommissioned North Loop line would likely result in direct or indirect impacts to some archaeological and cultural resources and historic properties, as described above.

### 3.3.2.5 Cumulative Impacts

The reasonably foreseeable future actions identified in Section 3.2 above will occur in the central plateau and northern regions of the Hanford Site, which also encompasses the study area for cultural and historic resources. The evaluation of cumulative impacts on cultural and historic resources considers the incremental impact of the Proposed Action with the reasonably foreseeable actions in that larger study area. Some of the reasonably foreseeable future actions could also cause impacts on cultural and historic resources. While most of these actions would not result in the same level of impact as past actions, incremental disturbance of resources could continue to occur. Because some of these activities would be coupled with Hanford Site BMPs and mitigation efforts as part of the NHPA Section 106 process, these impacts would likely be mitigated or minimized.

Facility footprint reduction activities within the study area have significantly reduced, and will continue to reduce, the number of facilities, including other utility lines, in this area. Most areas are in locations of prior disturbance and do not have a high likelihood of impacting known or previously unknown resources. Removal of the existing North Loop line would have an incremental beneficial cumulative impact with other facility footprint reduction activities, especially in culturally sensitive locations known to occur in the study area.

Infrastructure upgrades to electrical transmission and distribution systems, water supply and delivery systems, sewer facilities, roads, and natural gas delivery would result in direct and indirect cultural and historic resource impacts. Construction of the rebuilt North Loop line would result in an incremental cumulative impact to resources in the study area. Infrastructure upgrades would be subject to the NHPA Section 106 process, as applicable, to ensure impacts are mitigated.

### 3.3.3 Flooding and Floodplains

DOE is required to evaluate potential impacts from flood hazards for any actions it proposes to take in a qualifying floodplain (10 CFR Part 1022). The evaluation for this EA was prepared prior to cancellation of Executive Order 13690,<sup>11</sup> and DOE used the Federal Flood Risk Management Standard (FFRMS) and amendments for determining the vertical flood elevation and corresponding horizontal floodplain for federally funded projects. The FFRMS is not meant to be an elevation standard but rather a resilience standard. The vertical flood elevation and corresponding horizontal floodplain determined using the approaches in the FFRMS establish the area in which a structure or facility must be resilient. This may include using structural or nonstructural methods to reduce or prevent damage; elevating a structure; or, where appropriate, designing it to adapt to, withstand, and rapidly recover from a flood event. Specifically, the FEMA guidelines state:

“For federally funded projects, agencies must, at a minimum, use one of the following approaches to determine the vertical flood elevation and corresponding horizontal floodplain for a given action:

1. Climate-informed Science Approach – use the best available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science.
2. Freeboard Value Approach (FVA) – use the Base Flood Elevation (or 1-percent-annual-chance flood determined using best available data) and an additional height to calculate the freeboard value. The additional height is 2 feet for noncritical actions and 3 feet in elevation for critical actions.
3. The 0.2-percent-annual-chance Flood Approach – use the 0.2-percent-annual-chance flood elevation (also known as the 500-year flood elevation).”

The North Loop project is not a “critical action” per DOE’s definition in 10 CFR 1022.4(3):

“Critical action means any DOE action for which even a slight chance of flooding would be too great. Such actions may include, but are not limited to, the storage of highly volatile, toxic, or water reactive materials.”

PNNL conducted a flooding and floodplain analysis for the Proposed Action using the FVA (consistent with a noncritical action), with the 100-year floodplain plus 2.0 feet as the criterion (PNNL 2017). The analysis simulated the Columbia River elevations and mapped the 100-year plus 2.0 feet floodplain to determine if the rebuilt North Loop would be located within this floodplain. Much of the following information is taken from the PNNL analysis.

#### 3.3.3.1 Affected Environment

For the proposed project, the study area for flooding and floodplains is the Columbia River along the Hanford Reach where portions of the existing and proposed North Loop project are as close as

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<sup>11</sup> Executive Order 13690 (January 2015) amended Executive Order 11988. DOE’s floodplain analysis conducted by Pacific Northwest National Laboratory (PNNL) in January 2017 was prepared to be compliant with Executive Order 13690. However, Executive Order 13690 was revoked in August 2017. The methodology used in the analysis prior to cancellation of the Executive Order still conforms to the floodplain environmental review requirements contained in 10 CFR Part 1022 and Executive Order 11988 and is still appropriate and informative for addressing floodplain protection.

approximately one-third mile from the river. The North Loop transmission line structures that exit from the Midway substation and the A9 substation in the 100-K Area are closest to the river (see Figure 2-1).

Because it is federal property, Federal Emergency Management Administration flood maps have not been developed for the Hanford Site. To characterize the flood hazard from the Columbia River, the analysis researched flood frequency and discharge rates in the river, and used select values for input to a numerical hydraulic river model. Modeling included the Hanford Reach, the area between Priest Rapids and McNary dams, and the influence of the Yakima and Snake rivers. The resulting simulated water surface elevations for the 100-year flood were then used to map a floodplain for using the FVA for a noncritical action.

#### **3.3.3.1.1 Columbia River Floods**

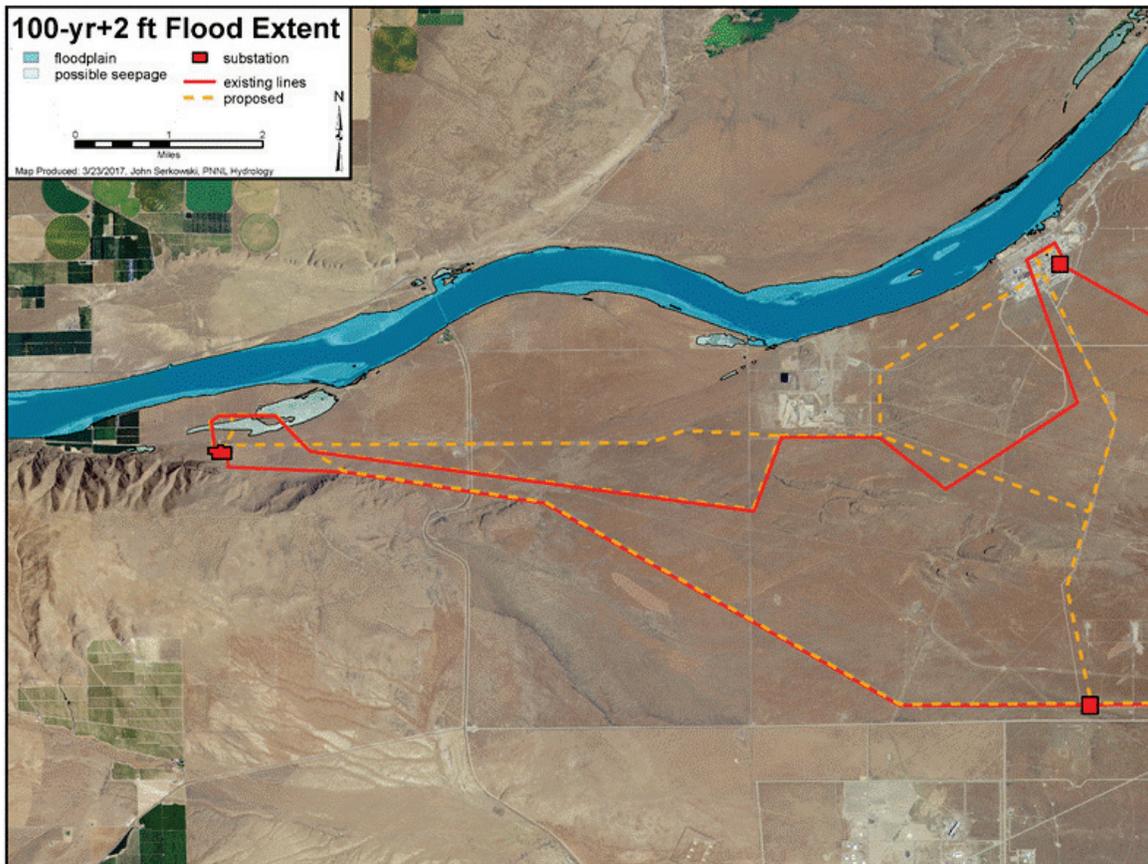
PNNL reviewed previous reports containing measured and estimated flood flow rates. Flooding from high water elevations of the Columbia River could be caused by incomplete infiltration of precipitation and snowmelt, however, the analysis determined this flooding risk to be negligible. The analysis identified no known events that would cause flooding on the inland portions of the project site. Per the 2015 Guidelines (FEMA 2015), the relevant flow rate used for the analysis was the 100-year flood. The regulated (i.e., with the current dams in the Columbia River hydrosystem in place and functioning) flow rate was selected as being most realistic and representative of the potential hazard for the Hanford Site. The U.S. Army Corps of Engineers (USACE) and Grant County Public Utility District provided the most current information regarding estimates for the 100-year flood in the Columbia, Yakima, and Snake rivers. (To simulate the Columbia River in the Hanford Reach, flows from the Yakima and Snake rivers were also required as inputs to the hydraulic model, but their influence on the Columbia River in the vicinity of the proposed project was negligible.) The analysis used USACE data that present the relationship between discharge vs. probability for three flows: (1) Columbia River downstream of Priest Rapids Dam, (2) Columbia plus the Yakima River, and (3) Columbia plus the Yakima River plus the Snake River. These flood frequency curves were interpolated at the 100-year flow level for all three rivers for use in the modeling effort. The 100-year Columbia River discharge below Priest Rapids Dam as used in the analysis was 445,000 cubic feet per second.

#### **3.3.3.1.2 Floodplain Delineation**

The modeling output of water surface elevation plus 2.0 feet at the center of the river channel was assumed to extend out in a direction perpendicular to the river course. The resulting water surface elevation map was compared to a digital elevation model for the Hanford Site, and flooding was assumed to occur or potentially occur wherever the water surface was higher than ground surface. Areas not connected to the river by surface pathways but nevertheless lower than the water surface elevation were mapped as possible flooded areas (Figure 3-13). The highly permeable soils and sediments that comprise the shallow subsurface in this part of the Hanford Site would very likely permit seepage of river water to these low-lying areas.

#### **3.3.3.2 Environmental Consequences**

The impact evaluation is common to all four of the alternative routes and is applicable only to the area just north of the Midway substation since potential flooding or seepage areas do not occur near other proposed project components associated with the route alternatives or the area of the existing North Loop transmission line that would be removed. There are no appreciable differences in the impact evaluation among the route alternatives because project components, construction and operations processes, and structure footprints would be the same or similar in the seepage area north of the substation.



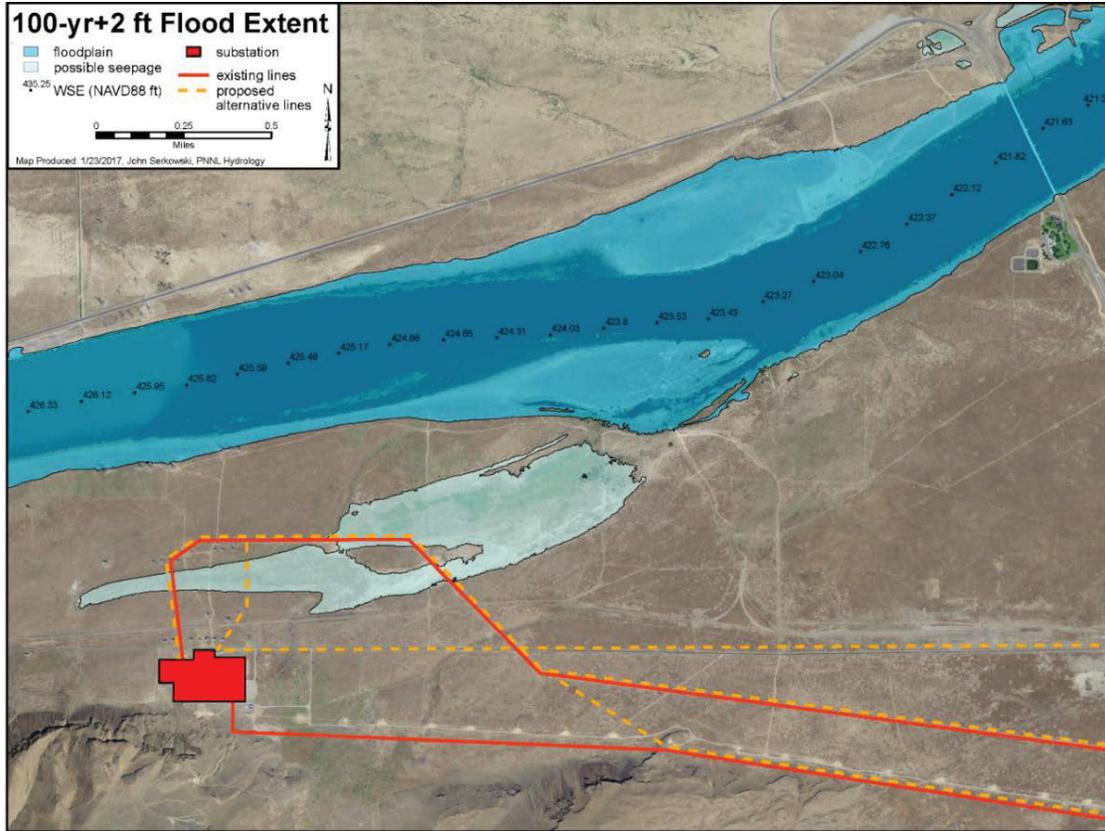
**Figure 3-13. Floodplain along the River Between Midway Substation and A9 Substation**

### 3.3.3.2.1 No Action Alternative

Under the No Action Alternative, the existing North Loop single-circuit exiting the Midway substation near the west end of the substation and continuing north and east toward Hanford Site facilities would continue to operate. The Midway substation, existing structures, and associated access roads are not within the 100-year plus 2.0 feet floodplain but some of the structures and access roads would remain in or in close proximity to seepage areas described above. The existing structures and operation of the North Loop line would not be affected by potential ponding from seepage.

### 3.3.3.2.2 Construction and Operations

The Midway substation and associated transmission structures and access roads are not located in the 100-year plus 2.0 feet floodplain. A few of the structures and associated access roads immediately north of the Midway substation could, however, be located in areas of potential seepage flooding. The maximum distance that any of the alternative routes and associated access roads would cross the areas of potential seepage flooding (Figure 3-14) would be approximately 0.25 mile. Considering that steel structures would typically be at least 750 feet apart, it is likely that less than three structures could be in this area of potential seepage flooding. The actual number of structures would depend on the final design and the alternative route selected. These few transmission line structures and associated access roads would be the only project components that could come into contact with the temporary ponds caused by seepage. Because any ponding from seepage would be short-lived (e.g., a few days), the structures would not be damaged by contact with standing water. The rest of the proposed project area would not be subjected to flooding or within the floodplain.



**Figure 3-14. Floodplain and Seepage Area near Midway Substation**

**3.3.3.3 Mitigation**

Because the transmission structures would not be adversely affected by the minor and short-lived ponding of water from potential seepage, mitigation measures are not necessary.

**3.3.3.4 Unavoidable Adverse Impacts**

There would be no unavoidable adverse impacts to structures or project operations.

**3.3.3.5 Cumulative Impacts**

The proposed project would not have an incremental cumulative impact on floodplains since neither existing nor proposed transmission line components are located within a floodplain.

**3.3.4 Health and Safety**

This section presents the analysis of potential worker health and safety impacts associated with the Proposed Action. The section also presents the analysis of potential intentional destructive acts in accordance with DOE guidance.

Transmission line projects must be designed to meet or exceed applicable safety and reliability criteria and requirements outlined by organizations and standards, such as the NESC, and other applicable federal, state, or local requirements. Appendix B of the NESC contains detailed requirements to ensure the safe design, construction, operations, and maintenance of transmission line projects. The NESC is published by the Institute of Electrical and Electronic Engineers (IEEE 2011).

### **3.3.4.1 Affected Environment**

The study area for health and safety includes the construction ROW for each alternative route and associated substations, switches, access roads and construction yards associated with rebuilding the North Loop line and decommissioning the existing transmission line. The Hanford Site has restricted and controlled access and there is limited opportunity for members of the general public to be near the proposed project during construction and operations. As discussed in Table 3-1, public health and safety was considered and dismissed from detailed study.

#### **3.3.4.1.1 General Health and Safety**

Industrial health and safety is concerned with occupational and worker hazards during construction and routine operations of the rebuilt North Loop line, and decommissioning and removal of the existing transmission line. The Proposed Action may result in a variety of conditions that present a risk to worker health and safety, generally occurring as a result of accidents in the workplace. Transmission lines, like all electrical wiring, can cause serious electric shocks if certain precautions are not taken. The rebuilt North Loop line would be designed and built to meet or exceed the NESC, which specifies the minimum allowable distance between conductors and the ground or other objects. These requirements determine the minimum distance to the edge of the ROW and the minimum height of the line; that is, the closest point that houses, other buildings, and vehicles are allowed to the line. These clearances are specified to prevent harmful shocks to people.

Besides serious shocks, transmission lines can also cause nuisance shocks when a grounded person touches an ungrounded object under or near a line, or when an ungrounded person touches a grounded object. Shocks may also be experienced beneath a transmission line, but they are not in and of themselves dangerous, as they are only momentary and are similar to “carpet” shocks (BPA 2016).

All electrical wires produce electric and magnetic fields; the flow of electrical current (the flow of electrical charges or moving electrons) produces the magnetic field, and voltage is the source of the electric field. Throughout a home, the electric field strength from wiring and appliances is typically less than approximately 0.01 kV per yard. However, fields of approximately 0.1 kV per yard and higher can be found very close to electric appliances. The strength of the electric field from transmission lines depends on the design of the transmission line and on the distance the electric field is measured from the transmission line. Electric field strength decreases rapidly with distance (BPA 2016). Alternating current electric power transmission lines operate at a frequency of 60 Hertz, which result from the voltage on the transmission line conductors with respect to the ground. Transmission line electric fields remain relatively constant over time because the voltage of the transmission line does not vary much from its rated nominal voltage. The state of Washington has no regulations regarding transmission line electric fields, and there are no nationally recognized regulatory standards/limits for electric fields from transmission lines except those inferred from the NESC. The general consensus among researchers and the medical and scientific communities is there is insufficient evidence to conclude whether magnetic fields are a cause of health issues.

#### **3.3.4.1.2 Intentional Destructive Acts**

Intentional destructive acts, such as acts of sabotage, terrorism, vandalism, and theft, sometimes occur at power facilities, including transmission lines and substations. Vandalism and theft are most common, especially theft of metal and other materials that can be sold. For example, BPA has seen a substantial increase in metal theft from its facilities over the past few years. Thefts increase when the price of metal is high on the salvage market. In the last 10 years, BPA has experienced over 200 thefts or

burglaries (BPA 2016). The impacts on the transmission system from vandalism and theft, though expensive, have not generally caused service disruptions to BPA's service area.

Acts of sabotage or terrorism on electrical facilities in the Pacific Northwest are rare, though some have occurred. In the past, these acts generally focused on attempts to destroy large steel transmission line towers. For example, in 1999, a large transmission line steel tower in Bend, Oregon, was toppled. In June 2011, at BPA's Alvey Substation near Eugene, Oregon, almost \$1 million in damages was incurred when unknown individuals breached a security fence and damaged equipment in the substation yard during an attempt to disrupt transmission service (BPA 2016). Federal and other utilities use physical deterrents, such as fencing, cameras, warning signs, and rewards to help deter theft, vandalism, and unauthorized access to facilities.

There are not any specific sources of information regarding acts of terrorism specific to Hanford Site infrastructure systems. Other than in the vicinity of the Midway substation (which has a publicly accessible road), remaining project areas are not readily accessed by the public, which further reduces the potential for sabotage or other intentional destructive acts.

### **3.3.4.2 Environmental Consequences**

The impacts discussed below are generally common to all four of the alternative routes as well as decommissioning activities associated with removal of the deactivated portions of the existing North Loop transmission system. There are no appreciable differences in health and safety impacts among the alternatives because project components, construction and operations processes, and facility footprints would be the same or similar. There are, however, slight differences between the alternative routes regarding accident risk potential from constructing the rebuilt North Loop line adjacent to still-energized transmission lines. Those differences are discussed in the alternative route comparison later in the section.

#### **3.3.4.2.1 No Action Alternative**

Under the No Action Alternative, the existing North Loop line and access roads would continue to be maintained and repaired to ensure reliable service. The degraded nature of the existing North Loop line would require more frequent maintenance and repairs than a rebuilt North Loop transmission system. The degraded system would increase the potential for accidents to occur increasing the health and safety risk to workers. Continuing to utilize the existing North Loop line, rather than rebuilding the system, would not be expected to affect the minimal potential for intentional destructive acts to occur.

#### **3.3.4.2.2 Construction, Operation, and Decommissioning**

Electrical transmission projects may affect worker health and safety during construction activities associated with a new transmission line and decommissioning and removal of the deactivated portions of the existing North Loop transmission system. Health and safety risks associated with the construction of the proposed project could include a risk of electrical shocks or fires from high-voltage equipment and a risk of fires and injury from the use of heavy equipment and hazardous materials, such as fuels, cranes, helicopters, and other activities associated with working near high-voltage lines.

#### **3.3.4.2.3 Comparison of Construction Accident Risk for Alternative Routes**

From an accident risk standpoint, construction immediately adjacent to a still-energized transmission line (either the existing North Loop or South Loop system) slightly increases the potential for accidental contact between the energized line and the equipment or personnel involved in the new construction or removal of the old system. The differentiating factor between the alternative routes is the

length of route where these adjacent construction and/or removal activities would occur. All four alternative routes would require construction adjacent to transmission system components exiting the Midway substation for up to approximately 1.5 miles (Segments A and G) and for approximately 5.3 miles between the A8 substation and A6 junction (Segment F). AR-1 would parallel the existing North Loop transmission line (until the existing North Loop system was removed) from a point east of the Midway substation to the 100-B/C Area for approximately 6.8 miles (Segment B). Except for Segment C along the southern boundary of the 100-B/C Area (approximately 1.0 mile), AR-2 and AR-4 would be separated from the existing North Loop and South Loop transmission lines until they reached the common point at the A8 substation; these alternative routes present the lowest potential construction accident risk of the four alternatives. AR-3, Segments I and F would parallel the existing South Loop transmission line for its entire route, thus resulting in the highest level of accident risk during construction of the three route alternatives.

### **3.3.4.3 Mitigation**

Construction, operations and maintenance, and decommissioning activities of the proposed project would be planned, coordinated, and conducted in a manner that would protect worker and public health and safety, and mitigate or minimize impacts as described above. Additionally, the DOE maintains an extensive and rigorous regulatory-driven safety and security program to help ensure potential intentional destructive acts do not occur. Existing practices, plans, and procedures as identified in Section 2.4 would be implemented to help ensure protection of workers from identified hazards.

### **3.3.4.4 Unavoidable Adverse Impacts**

Health and safety impacts associated with project construction could include a risk of electrical shocks or fires from high-voltage equipment and a risk of fires and injury from the use of heavy equipment, hazardous materials, and working at heights. Construction in relative close proximity to other energized lines would occur, slightly increasing the risk of accidents.

### **3.3.4.5 Cumulative Impacts**

Reasonably foreseeable future actions on the Hanford Site associated with facility footprint reduction and infrastructure upgrades will result in an increase in construction and decommissioning activities in the area. The Proposed Action also consists of footprint reduction and infrastructure replacement construction efforts through decommissioning of the existing North Loop line and rebuilding the system, respectively. Taking into consideration the existing and reasonably foreseeable actions, the Proposed Action would contribute a minor, incremental increase in the risk of health and safety impacts in the short term. In the long term, once the decommissioned system is removed and the rebuilt North Loop line is operational, a net beneficial cumulative impact to the health and safety of workers would be expected from a safer and more reliable electrical system.

## **3.3.5 Utilities and Infrastructure**

Utilities and infrastructure that would be affected by the project consists of the Hanford electrical transmission and distribution system.

### **3.3.5.1 Affected Environment**

The study area for utilities and infrastructure encompasses the existing North Loop transmission line, the four alternative routes evaluated in this EA for the proposed rebuild of the North Loop, Hanford facilities and infrastructure serviced by the transmission system, and BPA transmission systems connected to the rebuilt North Loop line.

### 3.3.5.1.1 Electrical Transmission and Distribution System

Electric power for the Hanford Site is provided primarily by the BPA and the City of Richland. The BPA provides approximately 95 percent of the electricity used onsite; the City of Richland provides the majority of the remaining power (DOE 2013c). In addition to the Hanford 230 kV transmission system, numerous other transmission and distribution lines exist within the general study area, which supply electrical power on the Hanford Site and to the surrounding region (Figure 3-15).

The purpose of the Hanford 230 kV transmission system is to provide reliable bulk power to substations in the 100 and 200 areas for distribution across the Hanford Site to support the DOE mission. However, the BPA also transmits electric power through the Hanford 230 kV transmission system as part of the BPA electrical distribution system. On the Hanford Site, the transmission system provides electric power to multiple infrastructure systems and important industrial operations. Peak demand through the Hanford 230 kV transmission system from 2013 to 2015 was approximately 220 megawatts (Parkhill 2016).

The Hanford 230 kV transmission system was designed and constructed on the principles of redundancy and independence. The system is constructed for redundancy using a loop configuration with two distinct lines: the North Loop and the South Loop (Parkhill 2016). The North Loop line extends from the Midway substation located at the northwestern site boundary of the Hanford Site through the 100 Areas and then to the Ashe tap switching station located on Gable Mountain. The South Loop line extends from the Midway substation southeast to the A8 substation on the north side of the 200 Area and then east to the Ashe tap switching station. The substations along the loop (A6, A8, and A9) were constructed with a redundant configuration with each loop terminating at a different bus section at the Midway substation. Power to the electrical system is provided from two sources: the Midway substation and a transmission line from the Ashe substation near Energy Northwest's Columbia Generating Station. The redundant configuration ensures that the Hanford substations will not lose power in the event of a transmission line failure or fault along any one segment. Transmission line segments are equipped with protective relays and breakers at each end to isolate faults and failures and substations are equipped with bypass buses. This redundant configuration substantially increases the system reliability. The loop configuration with separate breaker-protected segments also created system independence by geographically separating lines to minimize the probability of a local event such as a wildland fire causing a failure in both loops or at more than one substation.

The existing North Loop line consists of a mixture of steel lattice towers (15 percent) and wooden poles (85 percent) and dates from the early 1940s (Carlson 2015). Much of the South Loop line (about 72 percent) was built in 1982 and is of newer construction than the North Loop line. An assessment of the North Loop line documented hardware failures including deteriorating armor rod, broken insulators, and failed conductors with 89 percent of the components ranked from "impaired" to "poor" (Carlson 2015). Reliability of the Hanford 230 kV transmission system is of critical importance to the cleanup mission in the 200 Area that is expected to extend to at least the year 2060 and important for completing the cleanup missions in the 100 Area, including the K basins, and the groundwater pump-and-treat program by 2030.

### 3.3.5.2 Environmental Consequences

This section addresses potential environmental impacts to the electrical transmission and distribution system from the Proposed Action. After the rebuilt North Loop line is energized, the decommissioning and removal of the existing North Loop would have no impact on the electrical transmission and distribution system.

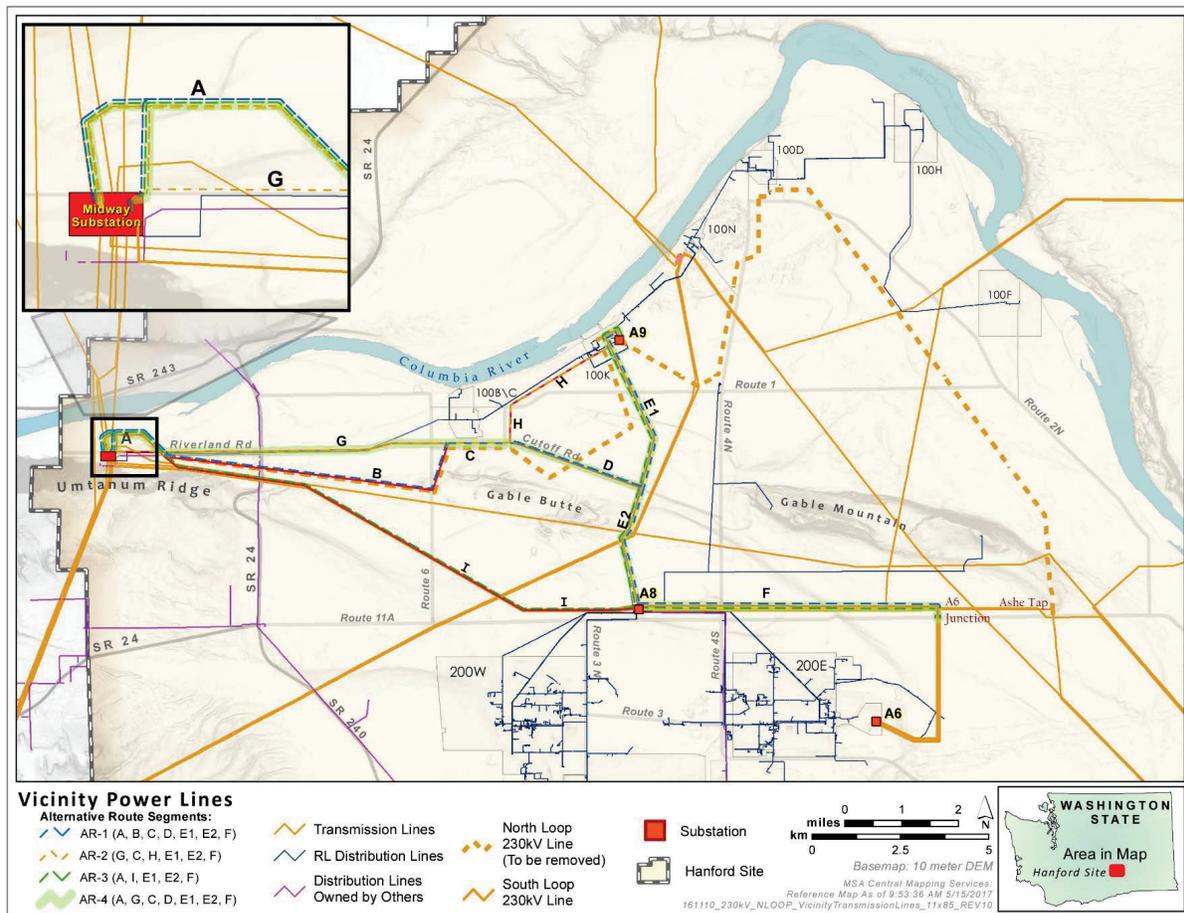


Figure 3-15. Other Transmission and Distribution Lines in the General Study Area of the North Loop Line

### 3.3.5.2.1 No Action Alternative

Because of the deteriorated condition of the existing transmission lines, it is likely that the No Action Alternative would result in more frequent maintenance and that more frequent access would be required to maintain them as they continue to deteriorate and fail over time. It might be possible to plan some of this maintenance, but it is expected that the majority of repairs would occur on an emergency basis as various parts of the line continue to deteriorate. Power outages have the potential to disrupt ongoing Hanford Site and BPA mission operations from the risk of operating in a single-point-failure mode when one of the two loops of the transmission line is shut down. A power outage of even a few seconds could interrupt hundreds of workers for an entire work shift. Over time, this could threaten the ability of DOE to complete court-mandated cleanup milestones and BPA's mission to market and distribute electricity.

### 3.3.5.2.2 Electrical Transmission and Distribution System

DOE and BPA currently share the Hanford 230 kV transmission system as BPA transmits electricity through the system for distribution to other non-DOE customers. The proposed project would provide BPA a separate, independent circuit through the proposed double-circuit configuration. As described in Section 1.3, the Hanford 230 kV transmission system is considered part of the Bulk Electric System by FERC because BPA transmits electricity through it and is therefore subject to numerous NERC electric reliability standards and requirements that would not apply to a DOE transmission system. The segregation of the BPA and DOE electric transmission through the double-circuit configuration would eliminate the duplicative operational and administrative tasks of compliance and improve efficiencies for both BPA and DOE.

All four of the alternative routes would shorten the North Loop line by approximately 8 miles, reducing the amount of transmission line that must be serviced and maintained in future years. Each of the alternatives would improve reliability of the North Loop system from the installation of new structures, conductors, insulators, and other associated hardware and would decrease the amount of potential maintenance required. Potential differences between the four alternative routes and route segments with respect to project construction and providing a reliable transmission line are discussed in the following paragraphs.

### Comparison of Operational Reliability for Alternative Routes

As identified in Section 2.3 and Figure 2-3, AR-1, AR-2, and AR-4 would run north of the existing South Loop from the Midway substation through the 100-K Area to the A9 substation. AR-3 would parallel the existing South Loop route from the Midway substation to the A8 substation (Segment I) at a distance of approximately one hundred to several hundred feet. The distance between AR-1, AR-2, and AR-4 from the South Loop compared with AR-3 would decrease the probability that a single event, such as a wildland fire, would simultaneously affect both the South and North Loop and maintain the independence built into the existing configuration. Therefore, AR-1, AR-2, and AR-4 would provide a more reliable configuration for the North Loop line than AR-3.

The existing configuration at the A6 and A8 substations would remain the same for all four alternative routes, and these two substations would not be vulnerable to single-point line failures. The routing and type of connection of the rebuilt North Loop line with the A9 substation in the 100-K Area would affect the potential reliability, flexibility, and built-in redundancy of the Hanford 230 kV transmission system. The connection with A9 substation would be either a loop configuration, like the existing system, or a radial tap depending on which of the four routes is selected. In the loop configuration, the A9 substation would be energized from both sides, so that in case of a power loss on

either side of the substation, the substation would remain energized. In a radial tap connection, the A9 substation would be connected by a single circuit feed from the rebuilt North Loop line and would be energized by one line. This configuration creates a single point of failure for the A9 substation which would lose power during a line fault or failure along the single circuit feed line. Therefore, a loop configuration provides a more reliable and redundant configuration.

AR-1 and AR-4 would have a radial tap (single-line feed) of approximately 2.6 miles from the intersection of Cutoff Road and the existing out-of-service A3 line to the A9 substation (Segment E1). AR-3 would require a longer radial tap to the A9 substation along Segments E1 and E2. This radial tap would be approximately 5 miles long and would increase the risk of a single point of failure. Segment H within AR-2 is the only route option that allows a loop configuration through the A9 substation that would maintain the existing redundant configuration for the entire Hanford 230 kV transmission system. However, the radial tap along Segment E1 for either AR-1 or AR-4 to A9 substation would be an acceptable operational risk considering that (1) the new single circuit line would be more reliable than the existing North Loop because of new conductors and electrical hardware, (2) the line is relatively short in length, and (3) the cleanup mission in the 100 Area, including the K basins and the groundwater pump-and-treat program has a limited duration (to approximately 2030) and electrical load requirements.

### **3.3.5.3 Mitigation**

DOE has not identified specific mitigation measures for utilities and infrastructure in addition to the programmatic BMPs discussed in Section 2.4. The proposed project would have positive impacts on the electrical distribution system and no mitigation measures would be required.

### **3.3.5.4 Unavoidable Adverse Impacts**

There would be no unavoidable adverse impacts to the electrical transmission and distribution system.

### **3.3.5.5 Cumulative Impacts**

Construction of the North Loop project would have beneficial cumulative impacts to efforts to reduce the footprint of cleanup sites and to upgrade infrastructure. The rebuild of the Hanford 230-kV transmission system would reduce its length by 8 miles and allow the decommissioning and removal of the existing North Loop transmission line, removing approximately 28 miles of degrading transmission line. Through rebuilding the electrical components and increased reliability of the transmission system, the project would have a beneficial cumulative impact on other cleanup activities and infrastructure systems that depend on a reliable source of electrical power. The reduction in the amount of maintenance required for the rebuilt transmission system would reduce costs and allow redirection of resources to other cleanup activities or infrastructure projects thus providing a cumulative impact to the Hanford Site mission.

### **3.3.6 Waste Management**

The evaluation of waste management considers generation and disposal of regulated and non-regulated wastes from construction of the new North Loop system and decommissioning and removal of the existing North Loop line.

### 3.3.6.1 Affected Environment

The study area for waste management would include onsite and offsite landfills that would potentially be used to dispose of construction debris and structures, conductors, and electrical components from the decommissioning and removal of the existing North Loop line.

The Hanford Site manages a wide variety of waste types, or classifications, in numerous facilities, and by activities that include treatment, storage, and disposal. Many of these waste management activities are associated with radioactive, hazardous/dangerous chemical, and mixed waste resulting from past missions of the Site and ongoing remediation activities. The proposed project would generate waste materials, with the possibility that some materials may be classified as hazardous or radioactive. It is anticipated that most of the waste from the proposed project would consist of municipal solid waste, which could include construction- or demolition-type debris that could include recyclable or recoverable materials. Because the waste types would be limited, this section addresses management of only those types expected to be generated by the proposed project. All project wastes would be evaluated and characterized in accordance with Hanford Site protocols before determining the appropriate disposition. In the event that a waste stream was determined to qualify as hazardous/dangerous or radioactive waste, it would be managed in accordance with applicable rules and regulations.

Waste that is not hazardous (under federal regulations), dangerous (under state regulations), radioactive, or mixed is sometimes referred to as “nonregulated waste” within the Hanford Site (DOE 2015b). This waste is still subject to federal and state regulations and is referred to in this EA as municipal solid waste. Construction- or demolition-type waste, considered in this EA to be a subset of municipal solid waste, often consists of inert materials (e.g., cured concrete, used asphalt materials, masonry, ceramics, stainless steel) that do not generate leachate or emissions when disposed of or pose a threat to human health or the environment. If meeting criteria for inert waste (as defined in WAC-173-350-990), these materials can be disposed of in inert landfills, which have fewer requirements than landfills that accept all municipal solid waste.

Since 1999, essentially all municipal solid waste generated at the Hanford Site has been disposed of at offsite municipal or commercial solid waste disposal facilities (DOE 2015b). This waste, which includes construction debris, office trash, cafeteria waste, furniture and appliances, and demolition debris, currently goes to the Roosevelt Regional Landfill (DOE 2012), roughly 50 miles southwest of the Hanford Site and has 61.5 percent of the total statewide capacity for disposal of municipal solid waste (Ecology 2014).

In addition to the municipal solid waste going offsite for disposal, the Hanford Site operates an inert waste landfill, designated Pit 9. This facility is managed in accordance with state requirements for an inert waste landfill (WAC 173-350-410) and only accepts wastes meeting applicable criteria as defined by the state (WAC 173-350-990) and which are basically those described earlier in this section.

The Hanford Site also has active waste minimization and recycling programs. In 2014, almost 2,800 tons of nonhazardous materials were recycled, 61 percent of which consisted of various types of metals and 27 percent of paper materials. Other categories of waste recycled in smaller, but still notable quantities, included cardboard, furniture, plastic bottles, tires, and wood pallets (DOE 2015b).

### 3.3.6.2 Environmental Consequences

This section addresses potential environmental impacts to waste management from the Proposed Action. In most instances, potential impacts would be the same, or similar, regardless of which alternative route were selected.

### **3.3.6.2.1 No Action Alternative**

Because of the deteriorated condition of the existing transmission lines, it is likely that the No Action Alternative would result in more frequent maintenance and that more frequent access would be required to maintain them as they continue to deteriorate and fail over time. Wood structures and other electrical components would create a waste stream as repairs are done or sections of the North Loop are rebuilt to replace deteriorating components.

### **3.3.6.2.2 Construction and Operation**

Relatively small amounts of waste generation would be expected during construction and operation of the proposed transmission line. Most system components brought to the site would be prefabricated, requiring assembly and installation at the work site. Waste generated from these activities would be minor and likely limited to municipal solid waste. If any of the components could not be used for some reason or were excess, they would be removed for restocking with manufacturers/distributors or for recycling. Construction crews would be responsible for maintaining the work sites in a clean manner, collecting any trash or debris generated during the work, and ensuring the wastes were removed to an appropriate collection point.

All waste material generated during construction activities would be disposed of in accordance with applicable regulations. Materials encountered during excavations would be surveyed for radiological contamination in accordance with Hanford Site protocols. Municipal solid waste, including clean construction debris, would be disposed of offsite at the regional landfill; that is, with the exception that inert waste might also be disposed of at the onsite Pit 9 if applicable requirements are met. In any case, disposal capacity at these facilities is large in comparison to the small amounts of waste expected to be generated during construction of the proposed transmission line and, as a result, existing waste management systems should not be affected.

### **3.3.6.2.3 Decommissioning and Removal of the Existing North Loop Line**

The primary waste streams generated during this project phase would be the utility poles (approximately 43 steel and 225 wood structures), conductors (lines), and other electrical hardware. There is the potential for hardware in the existing North Loop system to include regulated materials (e.g., lead-tipped bolts) that would require special handling. As the hardware was removed and decommissioned, screening would be required to determine if hazardous/dangerous materials or radioactive contamination were present, and the materials would be handled according to Hanford environmental protection processes. The proposed project would not include handling or disposing of electrical components containing oils and therefore, polychlorinated biphenyls would not be present. Any other trash, debris, or excavated material would be relatively minor and would be managed as described above for the construction phase.

The metal that would be removed and disposed of would mainly consist of galvanized steel and aluminum. Galvanized steel and aluminum are not dangerous wastes under WAC 173-303. Galvanized steel is not an inert waste under WAC 173-350-990 but aluminum is. Ceramic insulators can also be disposed of as an inert waste. However, metal on the insulators could contain lead and then would be regulated according to WAC 173-303-090(8).

The metal structures, conductors, and other electrical hardware would be expected to be candidates for recycling. As described in Section 2.1.5, these materials would be collected (or spooled in the case of the conductors) and transported to a temporary staging area. Components would be inspected for radiological contamination in accordance with Hanford Site protocols prior to transport offsite. In the

case of the conductors, it is expected that surveying for radiological contamination would be performed before spooling in order to ensure a thorough survey of all surfaces. If verified to be free of radiological contamination, a recycler would pick up these materials and have them transported to a recycling facility. If any of these materials were found to have no recycling interest or value, they would be disposed of in a permitted landfill for inert construction-type debris or a permitted landfill for municipal solid waste.

The wood structures may be treated differently than other decommissioning waste because of chemical preservatives. Wood utility poles are typically preserved by treatment with chemicals such as pentachlorophenol, creosote, or inorganic arsenic and chromium. According to a 1988 background document published in the *Federal Register*, 60 percent of utility poles were preserved with pentachlorophenol, 23 percent with creosote, and 17 percent with inorganic formulations (Ecology 2016). According to Hanford Site personnel, the wood structures to be removed were last replaced in 1982 and their bottom sections were treated with pentachlorophenol. The State of Washington has developed specific rules and guidelines for the management of chemically preserved wood products when taken out of service. The state requirements for wood products with pentachlorophenol treatment are briefly summarized as follows (Ecology 2003):

“Wood Treated with Other Preservatives (WAC 173-303-071(3)(g)(ii)) – Wood treated with pentachlorophenol or creosote does not often qualify as hazardous for federal toxicity characteristics, but may qualify as dangerous under State criteria for toxicity or persistence. Treated wood in this grouping that does not qualify as hazardous under federal rules need not be managed as dangerous waste provided it is disposed of in a solid waste landfill permitted under WAC 173-351 (i.e., a lined landfill with a leachate collection system), or reused for normal treated wood applications.”

Considering the state exclusions for the management of treated wood, the most likely disposition options for the removed wood utility poles would be offsite disposal in a permitted municipal solid waste landfill or turning them over to an authorized recycler for reuse in normal treated wood applications. With appropriate concurrences (since the poles would not normally be considered remediation waste), the wood poles might also be disposed of at the onsite Environmental Restoration Disposal Facility. DOE would verify through testing or other means (e.g., records) that the poles do not qualify as hazardous under federal criteria for toxicity characteristics for pentachlorophenol, otherwise the utility poles would have to be disposed of as regulated hazardous waste.

The weight of a typical Douglas fir pole is about 1.8 tons, so 225 wood-pole structures and cross members would weigh more than 800 tons. This would represent a large amount of waste if disposed of at a landfill, but would still be a small portion of the 192-million-ton capacity of the (offsite) Roosevelt Regional Landfill, or the 18-million-ton capacity of the onsite Environmental Restoration Disposal Facility. Existing waste management actions on the Hanford Site and within the region would not consume a significant percentage of existing available landfill capacity.

### **3.3.6.3 Mitigation**

Given that wastes of all types are subject to federal and state regulations as well as DOE regulations in the case of radioactive contamination (including requirements to verify whether waste is contaminated), additional mitigation measures would not be required.

### **3.3.6.4 Unavoidable Adverse Impacts**

Solid waste would be generated during the Proposed Action and those waste materials not appropriate for recycling, or without reasonably available recycling avenues, would be disposed of in on- or offsite landfills.

### **3.3.6.5 Cumulative Impacts**

The potential impact of disposing of solid waste from construction activities and removal of the North Loop transmission line would be cumulative to other cleanup activities and infrastructure upgrade projects that also would generate solid waste. However, the cumulative impact would be minor considering that the amount of solid waste that would be generated is relatively small compared to the remaining disposal capacity.

## **3.4 COMPARISON OF THE PROPOSED ACTION AND NO ACTION ALTERNATIVE AND SUMMARY OF ENVIRONMENTAL CONSEQUENCES**

Section 1.4 outlined six programmatic project purposes (goals) to be achieved while meeting the need for the Proposed Action. Table 3-12 provides a comparison of the Proposed Action and No Action Alternative as they relate to those project purposes.

Table 3-13 presents a summary of subject area impacts for comparison among the No Action Alternative and four alternative routes. Comparisons addressing programmatic goals and detailed impact analyses presented in the previous sections along with the comparative summary analysis in this table support the discussion of the DOE preferred alternative in Section 3.5.

**Table 3-12. Comparison of How the Proposed Action and No Action Alternative Respond to the Project Purposes**

Purpose	Proposed Action	No Action
Maintain transmission system reliability to DOE mission requirements	Installation of new structures, conductors, and electrical components would reduce unplanned outages, minimize scheduled and emergency maintenance, and reduce operating costs, improving overall system reliability.	Due to deteriorating conditions of the existing North Loop transmission line, more frequent unplanned outages would be expected, requiring more frequent maintenance and access to the line. Overall reliability of the system would continue to decrease with time.
Continue to meet DOE’s contractual and statutory obligations	Increases in the reliability of the North Loop transmission system would directly improve DOE’s ability to perform its cleanup mission on the Hanford Site through upgrading and maintaining required utilities and infrastructure to support facility footprint reduction activities.	Continued deterioration of the existing North Loop transmission line and more frequent outages would reduce DOE’s capabilities to meet its mission to clean up the Hanford Site through facility footprint reduction activities.
Minimize impacts on the environment	Construction impacts would be low, primarily temporary, and would be minimized through BMPs and mitigation measures. The project would reduce the miles of existing transmission line and support the mission of reducing the physical footprint of DOE facilities, thereby improving environmental conditions on the Hanford Site.	Would not result in construction impacts but would increase potential environmental impacts from more frequent maintenance activity or wildland fire caused by an accidental energy release from failure of system components.
Improve safety for transmission line workers	The Proposed Action would reduce the length of transmission line that must be maintained and reduce the need for maintenance, thereby reducing exposure of workers to potentially unsafe work conditions including severe weather.	Would require continued worker exposure to deteriorating system components, increased maintenance effort, including during severe weather, increasing safety hazards to workers.
Maximize life cycle cost-effectiveness (MSA 2015)	The environmental review, design and engineering, and construction would create initial new costs but would reduce the long-term maintenance costs and costs associated with work delays and facility impacts from unplanned outages under the No Action Alternative.	Would not result in construction costs, but would incur higher maintenance costs from the ongoing need to replace components along the existing transmission line and from any costs from work delays created by unplanned outages.
Use facilities and resources efficiently	Minimizes maintenance efforts and allows redirection of facilities and resources to other mission requirements.	Requires continued piecemeal approach to maintaining deteriorating components of the existing line and potential impacts to work execution and planning from unplanned electrical outages at facilities and infrastructure systems.

**Table 3-13. Summary of Potential Environmental Impacts**

Resource Area	Summary of Impacts <sup>a</sup>				
	No Action	AR-1	AR-2	AR-3	AR-4
Biological resources	<ul style="list-style-type: none"> <li>Disturbance of vegetation from maintenance of access roads.</li> <li>Potential spread of nonnative weed species along graded access roads.</li> <li>Risks of wildland fire from energy release from deteriorated transmission line components.</li> </ul>	<ul style="list-style-type: none"> <li>The Proposed Action would not impact federal- or state-listed threatened or endangered species or their designated critical habitat as these resources do not occur in the study area.</li> <li>Potential disturbance and mortality impacts to wildlife are expected to be minimal, would occur at the level of the individual(s), and would not result in local or regional population level impacts.</li> <li>Potential spread of nonnative weed species along graded access roads.</li> </ul>			
		Total acres of land disturbance, not including construction support areas, would be approximately:			
		• 128	• 142	• 125	• 123
		Total acres of permanent land disturbance after revegetation would be approximately:			
		• 49	• 58	• 58	• 47
		Total acres of permanent land disturbance by resource level:			
		• Level 5: < 2	• Level 5: < 2	• Level 5: < 2	• Level 5: < 2
		• Level 4: 21	• Level 4: 22	• Level 4: 32	• Level 4: 23
• Level 3: 15	• Level 3: 16	• Level 3: 15	• Level 3: 15		
• Level 2: 2	• Level 2: 4	• Level 2: 2	• Level 2: 2		
• Level 1: 4	• Level 1: 6	• Level 1: 3	• Level 1: 4		
• Level 0: 6	• Level 0: 7	• Level 0: 5	• Level 0: 2		
<ul style="list-style-type: none"> <li>Approximately 0.8 acre of Level 3 and 4.1 acres of Level 2 resources would be disturbed for construction support areas. Ninety percent of the 65.5 acres of construction support areas are previously disturbed (BRMP Level 0 resources).</li> </ul>					

**Table 3-13. Summary of Potential Environmental Impacts (continued)**

Resource Area	No Action	Summary of Impacts <sup>a</sup>			
		AR-1	AR-2	AR-3	AR-4
Cultural resources and historic properties	<ul style="list-style-type: none"> <li>No beneficial outcome from removal of existing North Loop components from sensitive locations.</li> <li>No additional surface disturbances and resultant potential impacts to cultural and historic resources.</li> </ul>	<ul style="list-style-type: none"> <li>Potential impact to 161 known resources (23 are NRHP-eligible).</li> <li>Potential impact to one known NRHP-eligible cultural district.</li> <li>Low potential for impacts to unknown resources due to greater distance from the Columbia River.</li> </ul>	<ul style="list-style-type: none"> <li>Potential impact to 165 known resources (20 are NRHP-eligible).</li> <li>Potential impact to one known NRHP-eligible cultural district and one NRHP-eligible archaeological district.</li> <li>Higher potential for impacts to unknown resources due to relative close proximity to the Columbia River.</li> </ul>	<ul style="list-style-type: none"> <li>Potential impact to 162 known resources (23 are NRHP-eligible).</li> <li>Potential impact to one known NRHP-eligible cultural district.</li> <li>Lowest potential for impacts to unknown resources due to greatest distance from Columbia River.</li> </ul>	<ul style="list-style-type: none"> <li>Potential impact to 152 known resources (18 are NRHP-eligible).</li> <li>Potential impact to one known NRHP-eligible cultural district.</li> <li>Low potential for impacts to unknown resources due to greater distance from Columbia River.</li> </ul>
		<ul style="list-style-type: none"> <li>The Proposed Action could potentially impact one archaeological district, one TCP, one historic district, and a number of other archaeological resources from presence of workers and equipment during decommissioning and demolition of the existing North Loop system.</li> <li>Beneficial outcome from removal of existing North Loop system components (where replacement of components would not occur) in historic, cultural, and archaeological districts, historic properties and other cultural resources.</li> </ul>			
Flooding and floodplains	<ul style="list-style-type: none"> <li>Ongoing operation of the Midway substation and North Loop transmission line structures north of the substation would not be affected by minor ponding or seepage events.</li> </ul>	<ul style="list-style-type: none"> <li>The Midway substation and associated transmission line structures are not located in the 100-year plus 2.0 feet floodplain.</li> <li>No damage would occur to transmission line structures from short-lived ponding from seepage events north of the Midway substation.</li> </ul>			

**Table 3-13. Summary of Potential Environmental Impacts (continued)**

Resource Area	No Action	Summary of Impacts <sup>a</sup>			
		AR-1	AR-2	AR-3	AR-4
Health and safety	<ul style="list-style-type: none"> <li>Ongoing repair and maintenance of the existing, degraded system would increase the health and safety risk to workers.</li> <li>Operation of the existing, degraded system would have more potential for accidents to occur from electrical mishaps that could cause a fire hazard than with the action alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>Risk of electrical shocks or fires from working near high-voltage equipment.</li> <li>Risk of personnel accidents to cause injury during construction.</li> <li>Most of the study area is not accessible by the public and only small segments of public roads in the vicinity of the Midway substation might require safety controls during construction.</li> </ul>			
		<ul style="list-style-type: none"> <li>There would be a minimal potential for impacts from intentional destructive acts of terrorism or vandalism, theft, and other acts of mischief due to security protocols and restricted access to the Hanford Site.</li> </ul>	<ul style="list-style-type: none"> <li>There would be a relatively smaller potential for construction accidents to occur from building new system components adjacent to approximately 6.8 miles of the still-energized, existing North Loop line.</li> </ul>	<ul style="list-style-type: none"> <li>There would be a relatively smaller potential for construction accidents to occur from building new system components adjacent to approximately 1.0 mile of the still-energized, existing North Loop line.</li> </ul>	<ul style="list-style-type: none"> <li>There would be a relatively greater (but still minor) potential for construction accidents to occur from building new system components adjacent to the majority of the length of the existing South Loop line.</li> </ul>

**Table 3-13. Summary of Potential Environmental Impacts (continued)**

Resource Area	No Action	Summary of Impacts <sup>a</sup>			
		AR-1	AR-2	AR-3	AR-4
Utilities and infrastructure	<ul style="list-style-type: none"> <li>Deteriorated condition of existing North Loop would result in more frequent maintenance (and access required to maintain it) as it continues to deteriorate and fail over time.</li> <li>Unplanned outages.</li> <li>Disruption to cleanup mission on the Hanford Site.</li> <li>Disruption to BPA backup and routine electrical service.</li> </ul>	<ul style="list-style-type: none"> <li>The Proposed Action would result in a more reliable electrical transmission and distribution system.</li> </ul>		<ul style="list-style-type: none"> <li>Would not be spatially independent from the South Loop.</li> </ul>	Same as AR-1 and AR-2.
		<ul style="list-style-type: none"> <li>Would maintain spatial independence of the North Loop line from South Loop line.</li> </ul>	<ul style="list-style-type: none"> <li>The North Loop would have a partially redundant electrical system configuration with potential single point line failures along 2.6 miles of single circuit line to the A9 substation.</li> </ul>		
Waste management	<ul style="list-style-type: none"> <li>Wood structures and other electrical components would create a waste stream as repairs are done or sections of the North Loop are rebuilt.</li> </ul>	<ul style="list-style-type: none"> <li>Construction would generate relatively small amounts of waste, which would be removed and disposed of appropriately.</li> <li>Wood structures removed from the deactivated transmission line system would represent the project's largest waste stream and, because of typical chemical preservatives, could require special management. If these structures could not be reused for their intended purpose (either onsite or elsewhere), their disposal in an appropriate landfill would take up a portion of the landfill's capacity. More than 800 tons of wood pole waste could be generated, which is significantly less than available solid waste landfill capacity.</li> <li>As appropriate, wastes, including excavated soils, would be evaluated for the presence of hazardous/dangerous substances and radioactive contamination. If present, the waste would be managed accordingly in compliance with all local, state, and federal regulations.</li> </ul>			

a. Summary of impacts merged across the route alternatives is common to those alternatives.

### 3.5 PREFERRED ALTERNATIVE

AR-4 has been identified as the preferred alternative route for rebuilding the North Loop line (Figure 3-16). The preferred alternative best satisfies the requirement of providing redundancy and independence to ensure operational reliability and minimizing potential impacts to biological and cultural resources and accident risks. AR-4 provides the best option when collectively considering these evaluation criteria. The following paragraphs present additional detail illustrating the trade-offs between operational reliability and potential environmental impacts for the alternative routes.

**Redundancy.** AR-4 would maintain a redundant configuration to the A6 and A8 substations, which support the long-term DOE mission in the Central Plateau until 2060. AR-4 would provide a single-circuit line of 2.6 miles to the A9 substation in the 100 Area and would therefore be a potential single point of failure for the A9 substation. This is considered an acceptable operational risk given that: (1) the new single-circuit line would be more reliable than the existing transmission line because of the new conductors and electrical hardware, (2) the single-circuit line would be relatively short in length, and (3) the cleanup mission in the 100 Area, including the K basins and the groundwater pump-and-treat program, has a limited duration (to approximately 2030) and electrical load requirements. AR-2 would provide a fully redundant, double-circuit configuration to the DOE substations (A6, A8, and A9) with no single points of failure but would have potentially higher environmental impacts as discussed below.

**Independence.** Independence is built into the Hanford Site 230 kV transmission system through the loop configuration and geographic separation between the South and North Loops with tie-ins at separate, breaker-protected bus segments at the Midway substation. This independence of system components eliminates the opportunity for single local events to cause a failure in two substations at the same time. AR-4 maintains this independence between Midway and A8 substations as would AR-1 and AR-2.

**Biological Resources.** Construction of AR-4 would potentially disturb the least amount of land (123 acres). AR-2 would potentially disturb the most land (142 acres). An estimated two-thirds of the construction land disturbance would be revegetated with native plant species. Therefore, permanent land disturbance from construction of the project would be less. AR-4 would have the least amount of permanent land disturbance, with about 47 acres, comparable to the 49 acres for AR-1. Both AR-2 and AR-3 would permanently disturb about 58 acres. Each of the alternatives could potentially disturb up to 2 acres of Level 5 resources but would be minimized by spanning the conductors across these smaller areas of high-quality resources. AR-4 would disturb 15 and 23 acres of Level 3 and 4 resources, respectively, similar to AR-1 and AR-2.

**Cultural Resources and Historic Properties.** All alternative routes would potentially affect known historic properties and cultural resources. However, AR-4 avoids the higher probability of encountering unknown archaeological resources associated with segment H of AR-2, which would come within approximately 0.3 mile of the Columbia River.

**Accident Risk.** Constructing new electrical transmission lines adjacent to an existing energized transmission line would be a potential safety risk to workers and project components from accidental contact between equipment and energized lines. All alternative routes would require construction work adjacent to existing energized lines for some route segments. AR-4 minimizes this potential risk by avoiding construction adjacent to longer portions of the existing North Loop (Segment B) and South Loop (Segment I).

#### 3.5.1 Conclusion

Based on the collective attributes of operational risk and minimization of impacts to biological and cultural resources and from accidents, AR-4 represents the best routing option of the four alternatives evaluated in this EA and is the preferred alternative route.

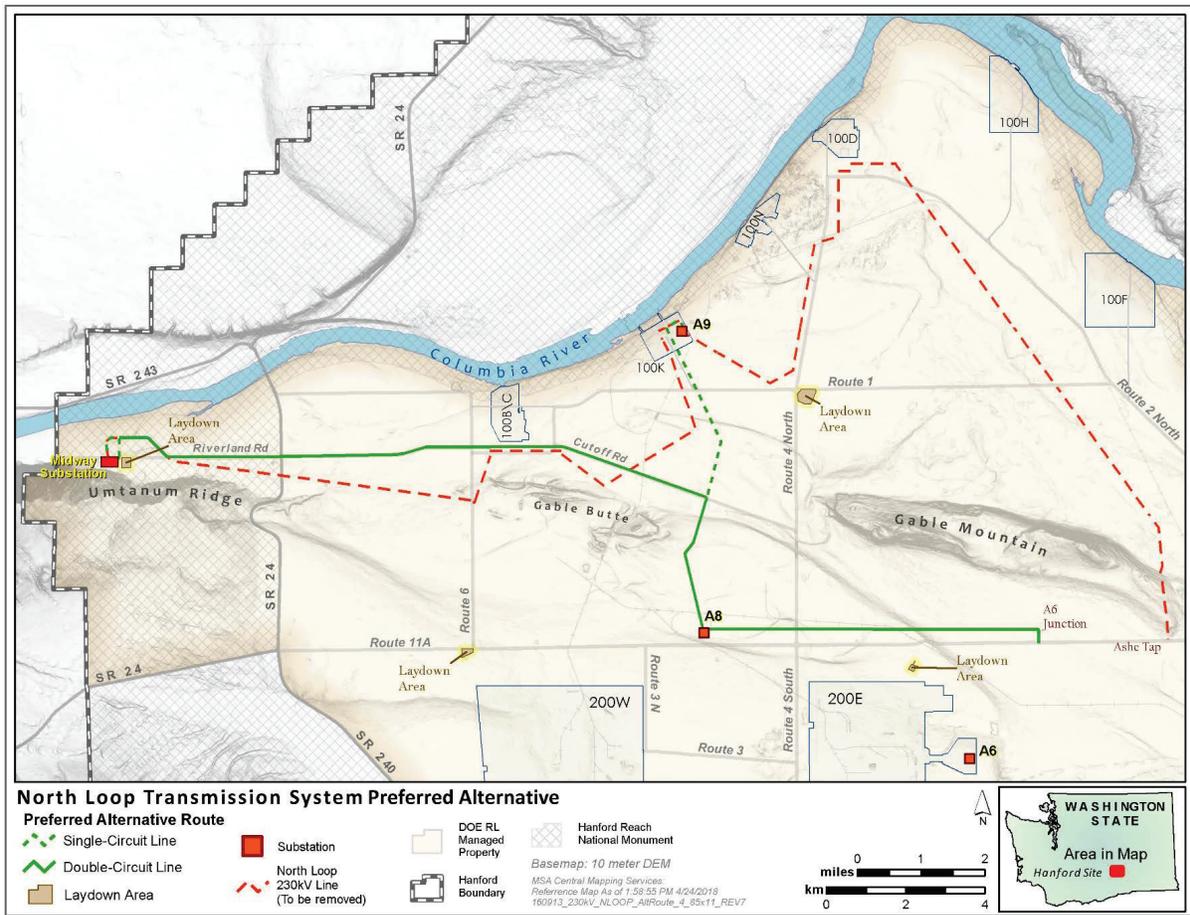


Figure 3-16. Preferred Alternative Route for the North Loop Project

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# **APPENDIX A**

# **AGENCIES AND PERSONS CONSULTED**

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## **APPENDIX A. AGENCIES AND PERSONS CONSULTED**

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The agencies and persons consulted during the development of this EA include:

1. Washington State Department of Ecology
2. U.S. Fish and Wildlife Service
3. Confederated Tribes of the Umatilla Indian Reservation
4. Nez Perce Tribe
5. Wanapum Tribe
6. Yakama Nation