3.16 WATER RESOURCES

This section addresses potential impacts to surface water and groundwater from the Proposed Route and Route Alternatives during construction, operations, and decommissioning.

3.16.1 Affected Environment

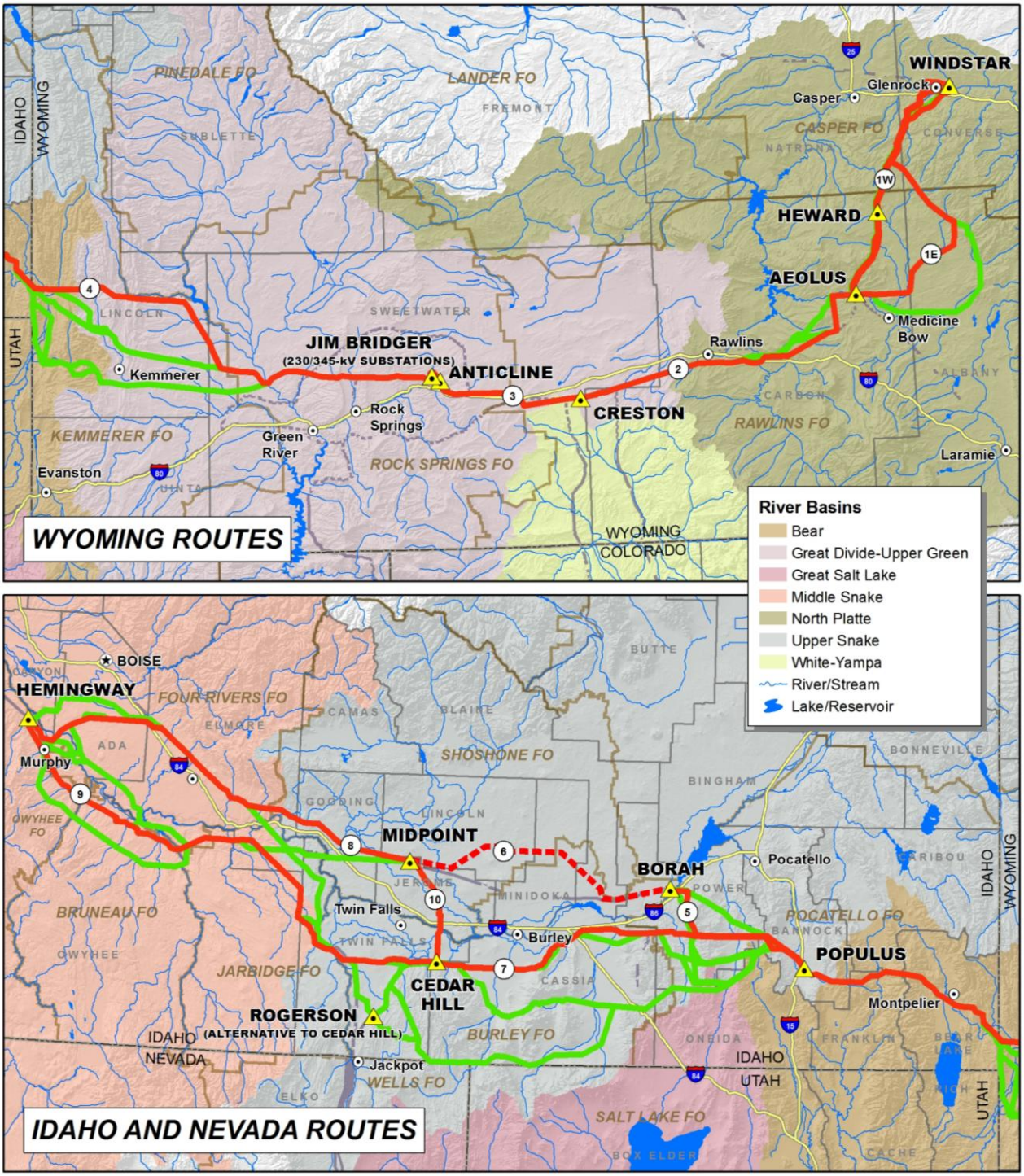
This section describes the existing surface water features and groundwater that could be impacted within the Analysis Area. It starts with a discussion of the Analysis Area considered, identifies the issues that have driven the analysis, and characterizes the existing conditions across the Proposed Route and Route Alternatives.

3.16.1.1 Analysis Area

The Project area is located across six river basins and several major surface watersheds, as shown on Figure 3.16-1. From east to west, they include the North Platte, White-Yampa, Great Divide-Upper Green, and Bear River watersheds in Wyoming. The North Platte is located east of the continental divide and ultimately discharges into the Missouri/Mississippi River systems. The White-Yampa and Green Rivers are tributaries to the Colorado River. The Bear River drainage is part of a closed basin system that ends in the Great Salt Lake. The Bear River and Snake River watersheds are located in Idaho. The Snake River is part of the Columbia River system. In Idaho, surface water from natural drainages is extensively diverted into canals and drainage ditches for flood irrigation of crop land. These surface diversions are crossed by the transmission line routes, and are included in the evaluation of surface water crossings.

Groundwater occurs in several major aquifers throughout the Project area. Valleys within the eastern portion of Wyoming contain Tertiary and Cretaceous sandstone aquifers (Segments 1, 2, and 3). Western Wyoming is underlain by the northern portion of the Colorado Plateau aquifer (Segment 4). Southeast Idaho contains small Basin and Range valley fill aquifers (Segments 4 and 5). Southern and southwest Idaho is underlain by the Snake River Plain aquifer (Segments 5 through 10).

The Eastern Snake River Plain Aquifer is a sole-source aquifer. USEPA defines a sole- or principal-source aquifer as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas may have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend on the aquifer for drinking water. For convenience, all designated sole- or principal-source aquifers are referred to as “sole-source aquifers” (SSAs). The designation protects an area's groundwater resource by requiring USEPA to review certain proposed projects within the designated area. All proposed projects receiving federal funds are subject to review to ensure that they do not endanger the water source.


WINDSTAR
Glenrock
Casper
HEWARD
AEOLUS
Medicine Bow
Rawlins
JIM BRIDGER
(230/345-kV SUBSTATIONS)
ANTICLINE
CRESTON
Kemmerer
Rock Springs
Green River
Evanston
Laramie
PINEDALE FO
LANDER FO
CASPER FO
KEMMERER FO
ROCK SPRINGS FO
RAWLINS FO
IDAHO
WYOMING
UTAH
WYOMING
COLORADO
WYOMING ROUTES
River Basins
Bear
Great Divide-Upper Green
Great Salt Lake
Middle Snake
North Platte
Upper Snake
White-Yampa
River/Stream
Lake/Reservoir
BOISE
HEMINGWAY
Murphy
FOUR RIVERS FO
SHOSHONE FO
BRUNEAU FO
JARBIDGE FO
BURLEY FO
WELLS FO
SALT LAKE FO
MIDPOINT
BORAH
Pocatello
Twin Falls
Burley
CEDAR HILL
ROGERSON
(ALTERNATIVE TO CEDAR HILL)
POPULUS
Montpelier
IDAHO
NEVADA
IDAHO
UTAH
IDAHO AND NEVADA ROUTES
0 10 20 30 40
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
Route Features
Proposed Route
Feasible Alternative
Energize Existing 345kV line to 500kV
Project Features
Substation Location
West-Wide Energy Corridor
Segment Number
Administrative
City, Town
State Capital
County Boundary
State Boundary
Transportation
Interstate
airports
Gateway West
Transmission Line Project
Idaho, Nevada, Wyoming
River Basins
FIGURE 3.16-1

Shallow groundwater often occurs above the regional aquifers. The source of shallow groundwater is usually from infiltration from surface water sources. In Idaho, the quantity of shallow groundwater is enhanced by the widespread flood irrigation that occurs in agricultural areas. In some portions of the Project area, depth to groundwater is so shallow that facility foundations may extend into the groundwater.

The Analysis Area for surface water and groundwater resources was defined in a GIS file by buffering the centerlines of the Proposed Route and Route Alternatives out 0.5-mile on either side of the centerlines and dissolving the buffers into a single polygon for each segment. This distance was used because it encompasses the area of greatest activity during construction and operations, and it is estimated any Project impacts (changes in water quality, including sedimentation or temperature change) to surface or groundwater due to the Project would occur within 0.5 mile of the disturbance.

3.16.1.2 Issues to be Analyzed

The following water-related issues were brought up by the public during public scoping (Tetra Tech 2009a), were raised by federal and state agencies during scoping and agency discussions, or are issues that must be considered as stipulated in law or regulation:

- Whether there would be impacts to water quality from roads and other causes of erosion;
- Whether state water quality standards would be met;
- Determining which pollutants could enter waterbodies and what the impacts would be from them;
- What the impacts would be on drinking water, wells, and springs;
- Whether municipal water service to individual properties would be affected;
- What the handling procedures would be for hazardous materials near waterbodies and wells;
- Whether water would be drawn from surface waterbodies, and what the effects of that would be;
- What stormwater permits would be required, and whether there their stipulations would be met;
- Whether there would be any impacts on water rights;
- What the impacts would be from sedimentation and temperature increases in sediment and temperature-impaired waterbodies;
- Whether there would be a risk of floods;
- Whether groundwater would be affected;
- Riparian vegetation removal for road and transmission line construction could cause erosion, resulting in sedimentation within surface water, and may cause an increase in temperature in streams, including but not limited to those already listed under the CWA 303(d) as temperature-impaired waterbodies; and

- Potential of structures located in flood-prone areas to impede or redirect flood flows.

3.16.1.3 Regulatory Framework

Federal and State

The CWA (33 U.S.C. § 1251 et seq., formerly the Federal Water Pollution Control Act of 1972), was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non-point source discharges to surface water.

- Point and non-point discharges are regulated by the NPDES permit process (CWA Section 402). NPDES permitting authority is administered by USEPA in Idaho, WDEQ in Wyoming, and Nevada Division of Environmental Protection (NDEP) in Nevada. Projects that disturb one or more acres are required to obtain a Construction General Permit (CGP). The CGPs require the development and implementation of a SWPPP. The SWPPP describes BMPs the Proponent would use to protect surface water from stormwater runoff.
- If hazardous materials, including fuels and lubricants, are used or stored in quantities exceeding certain minimal quantities, an SPCC Plan is required. Section 311 (j)(1)(c) of the CWA contains the regulations preventing discharge of oil to surface water.
- Section 401 of the CWA requires that any activity, including river or stream crossings during road, pipeline, or transmission line construction that may result in a discharge into a state waterbody must be certified by IDEQ or WDEQ. This certification ensures that the proposed activity does not violate state and/or federal water quality standards.
- Section 404 of the CWA authorizes the USACE to regulate the discharge of dredged or fill material to the waters of the United States. Discharges are authorized through issuance of nationwide permits or individual permits for specific activities.
- Section 303(d) of the CWA requires states to establish TMDL programs, which are approved by the USEPA for streams and lakes that do not meet certain water quality standards. In compliance with the federal CWA, the IDEQ and the WDEQ have identified Section 303(d) water quality limited streams and lakes for development of TMDL criteria. A TMDL includes a quantitative assessment of water quality problems, contributing sources, and load reductions or control actions needed to restore and protect bodies of water. Stream segments within the Analysis Area have been identified on the 303(d) list as impaired due to either sedimentation (sediment-impaired streams) or high temperatures (temperature-impaired streams). TMDLs have been established for surface waters in Idaho and Nevada and are in the development process in Wyoming. IDEQ assesses impaired streams on a subbasin level, which is the same as a USGS fourth-field hydrologic unit, or HUC. Therefore, if it has been established that a stream segment does meet water quality standards, all the streams within

that HUC do not meet the standard. NPDES permits address point-source pollution to surface waters. Non-point source pollution is addressed by the application of BMPs, EPMs, and mitigation measures during the construction and operation of the proposed Project. BMPs recommended by IDEQ to protect water quality were compared to the Proponents' EPMs and Agency-recommended mitigation measures. EPMs and mitigation measures are generally compatible with the state BMPs.

The Upper Colorado Endangered Fish Recovery Program was established in 1988, and serves as conservation measures to minimize adverse effects to the endangered fishes and their critical habitat caused by a project's water depletions. Under this program, any amount of water removed from the Colorado River system is considered to be a depletion of water and requires formal consultation with the USFWS for downstream impacts to threatened and endangered species. To streamline the process, the USFWS will issue a tiered BO based on the amount of the depletion. *De minimis* depletions (less than 0.1 acre-foot/year) require no depletion fee. Small depletions (projects that would withdraw between 0.1 and 100 acre-feet/year) require no depletion fee. Any depletions greater than 100 acre-feet/year require a one-time depletion fee (for which this Project qualifies). However, the USFWS has indicated that if the entirety of this depletion is drawn from existing water rights (i.e. if the Proponents purchase existing water rights and only draw water in accordance with these existing water rights), this would constitute a historical withdrawal (Kantola 2010). Withdrawals of this nature would still require formal consultation with the USFWS, but would not require a depletion fee (Kantola 2010). If the entirety of water withdrawals cannot come for existing rights, then depletion impacts can be offset by accomplishment of activities necessary to recover the endangered fishes as specified under the Recovery Implementation Program Recovery Action Plan and the one-time contribution to the Recovery Program for new depletions greater than 100 acre-feet/year.

The PRRIP, established in 1997, implements actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the states of Wyoming, Nebraska, and Colorado, as well as the U.S. Department of the Interior. The PRRIP addresses the adverse impacts of existing and certain new water-related activities on the Platte River target species and associated habitats, and provides ESA compliance for effects to the target species. The State of Wyoming is in compliance with its obligations under the PRRIP.

The Wyoming State Engineers Office is responsible for determining if a water withdrawal is an existing or new water withdrawal and what level of withdrawal it constituted. The level of withdrawal for a temporary industrial use would depend on the amount of depletion, and the existing conditions of the river at the time of the depletion. Furthermore, if the entirely of the withdrawal was taken from existing rights (i.e. if the Proponents purchase existing water rights and only draw water in accordance with these existing water rights) then this would constitute an existing depletion as it relates to the Wyoming State Engineers' Depletion Report (Hoobles 2010). Unlike the Upper Colorado Endangered Fish Recovery Program, there is no depletion fee associated with the PRRIP.

EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities."

As discussed in Section 3.9 – Wetlands and Riparian Areas, the NFS has identified AIZs based on a specific width on either side of a stream. These areas provide a buffer between a stream or waterbody and the upland areas, and can influence water quality. The Caribou NF has delineated about 63,000 acres of AIZ on its 1.1 million acres (Forest Service 2003e). The Sawtooth NF has delineated about 66,210 acres of AIZ on its 596,791 acres. Based on methodology provided by the Medicine Bow-Routt NFs, about 13,619 acres of WIZs on its174,300 acres has been delineated within the southern portion of the Douglas Ranger District. Land management agencies' plans (RMPs and Forest Plans) that have standards, guidelines, stipulations, or avoidance buffers for activity near surface waters would be adhered to.

State

The Idaho Stream Channel Protection Act requires that the stream channels of the state and their environment be protected against alteration for the protection of fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, and water quality. The Act requires a stream channel alteration permit from IDWR before one can begin any work that would alter the stream channel. A stream channel alteration is defined as any activity that would obstruct, diminish, destroy, alter, modify, relocate, or change the natural existing shape or direction of water flow of any stream channel. This includes taking material out of the channel or placing material or structures in or across the channel where the potential exists to affect flow in the channel.

Under authority of the federal CWA, IDEQ has issued Water Quality Standards (IDAPA 58.01.02). The standards include a description of hydrologic units, a list of priority pollutants, a list of the water quality impaired streams within each subbasin, and the parameters for which the stream is impaired.

WDEQ maintains similar water quality standards (Water Quality Rules and Regulations, Chapter 1) that also contain priority and non-priority pollutants, and water quality standards for Wyoming surface water.

NDEP maintains water quality standards in the Nevada Administrative Code, Chapter 445A.118-445A.225 for surface water. Under the CWA, NDEP prepares nonpoint source assessment reports to identify waterbodies that are not likely to meet water quality standards or goals and identify contributing sources of pollution.

Local

To protect property purchases, some cities or counties may have floodplain and drainage regulations for floodplain development. These protections generally appear as part of city or county zoning ordinances. Where established, they typically prohibit floodplain development that would result in flooding of the development (i.e., within a 100-year floodplain), and prohibit floodplain development that would result in adverse

flooding impacts on other property. For instance, floodplain encroachments that raise water levels on other property may be prohibited, as are diversions and concentrations of flow.

3.16.1.4 Methods

The environmental effects analyses completed for this assessment were conducted using readily available data and GIS files derived from preliminary centerline and component design for the Proposed Route and Route Alternatives (see Section 3.1 – Introduction, for details on development of these files). In all cases, after analysis of impacts was complete and where impacts were identified, Proponent-proposed measures to reduce impacts were reviewed for sufficiency. Where those measures were determined to be insufficient, additional measures were identified.

Surface Water

Stream Type

The USGS National Database for Streams and Waterbodies of the United States was used to evaluate the number of surface waterbodies that would be crossed by the Project, including any natural or human-made surface water structure that would be crossed by roads associated with the Project. In order to identify water resources within the Analysis Area, estimates of stream flow along the transmission line were made using USGS regression models created using data gathered from established stream gages. Independent variables such as drainage area, average annual precipitation, elevation, and basin slope are used within the models to create the flow estimates. These models were used to estimate stream flow at ungaged sites within the Analysis Area. Estimates of flow presence for this Project (used to determine whether a culvert is necessary) were based on average 2-year recurrence intervals. Measurements garnered from identified sixth-field HUCs were used in the regression models.

After the estimated flows were calculated for the terminal stream order within each HUC, determinations were made on the likelihood of encountering active flow at proposed crossings within that HUC.

Natural streams were characterized as perennial, intermittent-dry, intermittent-wet, or ephemeral. Perennial streams included streams that contain water throughout the year except during periods of drought. Ephemeral streams included those that contain water only briefly and in direct response to precipitation; the beds of these types of streams are always above the water table of the adjacent region. Intermittent streams included those that contain water for extended periods but only at certain times of the year, such as when it receives seasonal flow from springs or melting snow. The term intermittent-wet refers to intermittent streams that would be crossed while water is present; intermittent-dry are those that would be crossed while they are likely dry. The database also counted human-made structures, such as ditches, aqueducts or canals, and artificial paths. These five surface waterbody types; perennial, intermittent-wet, intermittent-dry, ephemeral, and artificial listed in the USGS database were included in the analysis. Wetlands are not evaluated in this section and are addressed in Section 3.9 – Wetlands and Riparian Areas.

Surface Water Crossings

Section 1.5 of Appendix B describes vehicle access roads and the types of stream crossings that would be necessary for this Project. Three types of waterbody crossings, plus stream avoidance, are assumed for this Project as detailed in Section 1.5 of Appendix B and briefly summarized here:

- **Type 1—Drive through:** Crossing of a channel with only minimal vegetation removal and no cut or fill needed. This is typical for much of the low-precipitation sagebrush country with rolling topography and streams that rarely flow with water.
- **Type 2—Ford:** Crossing of a channel that includes grading and stabilization. Streambanks and approaches would be graded to allow vehicle passage and stabilized with rock or other erosion control devices. The streambed would in some areas be reinforced with coarse rock material, where approved by the land-management agency, to support vehicle loads, prevent erosion and minimize sedimentation into the waterway. The rock would be installed in the streambed such that it would not raise the level of the streambed, thus allowing continued movement of water, fish, and debris. A ford crossing results in an average disturbance profile of 25 feet wide (along the waterbody) and 50 feet long (along the roadway) for 1,000 square feet or 0.02 acre at each crossing. Disturbance amount is estimated based on need to get equipment into the riparian area to build the 14-foot-wide travelway and protect it from erosion by adding armoring.
- **Type 3— Culvert:** Culvert installation would also include a stable road surface established over the culvert for vehicle passage. Culverts would be used on intermittent and perennial streams. Whether flow is preset at a particular stream crossing would be determined using a 2-year return interval; streams that are normally dry do not need a culvert. Culverts would be designed and installed under the guidance of a qualified engineer who, in collaboration with a hydrologist and aquatic biologist where required by the land-management agency, would recommend placement locations; culvert gradient, height, and sizing; and proper construction methods. Culvert design would consider bedload and debris size and volume. The disturbance footprint for culvert installation is estimated to be 50 feet wide (along the waterbody) and 150 feet long (along the road) for 7,500 square feet or 0.17 acre at each crossing. Ground-disturbing activities would comply with Agency-approved BMPs. Construction would occur during periods of low water or normal flow. The use of equipment in streams would be minimized. All culverts would be designed and installed to meet desired riparian conditions, as identified in applicable unit management plans. Culvert slope would not exceed stream gradient. Typically, culverts would be partially buried in the streambed to maintain streambed material in the culvert. Sandbags or other non-erosive material would be placed around the culverts to prevent scour or water flow around the culvert. Adjacent sediment control structures such as silt fences, check dams, rock armoring, or riprap may be necessary to prevent erosion or sedimentation. Streambanks and approaches may be stabilized with rock or other erosion control devices. Culverts would be inspected and maintained annually for the life of the Project (estimated at 50 years or longer) for proper operation and to protect water quality.

- **Avoid Crossing:** Where constructing a new waterbody crossing is impractical or would require a bridge or a very large (>48-inch-diameter) culvert, existing waterbody crossings would be used and access redesigned to avoid a new crossing. All canals and ditches would be avoided by using existing crossings, as would all large perennial bodies like rivers.

For non-listed waterbodies or listed waterbodies that are dry, the crossing options include Type 1 through 3, requiring agency consultation for crossings on federal lands. For TMDL and 303(d) listed streams for sediment, additional erosion and sediment control devices such as haybales, and/or turbidity curtains would be used if flow is present during installation of in-stream structures. The installation of culverts constitutes the greatest disturbance to a stream, and in sensitive stream systems, these impacts may not be justifiable (IDEQ 2005). The specific loads and the stream conditions will dictate what type of stream crossing to employ. The performance of culverts and low-water stream crossings would be monitored for the life of the access road, and maintained, repaired, or replaced as necessary to protect water quality.

All waterbody and wetland disturbances would be completed under the terms of a USACE CWA Section 404 permit, the NPDES Construction Stormwater Permit (CWA 402), and State 401 water quality certification requirements that govern activities within any waters of the United States. In Idaho, there is an additional requirement for a stream channel alteration permit for activities in streambeds.

The Project at this stage of design does not identify exact locations of stream crossings. The type of crossing used would depend largely on the flow and stream channel conditions at the location and time of the crossing.

Natural and man-made stream channels were analyzed to estimate the number of crossing types and included stream orders up to a seventh order system. Crossings were broken into five categories based on stream type and expected crossing type which include:

- Ephemeral – Dry Crossing
- Intermittent – Dry Crossing
- Intermittent – Wet Crossing
- Perennial – Culvert Installation
- Perennial – Avoid Waterway

To estimate the number and type of stream crossings, the Project GIS data file showing the indicative road layout was obtained from the Project engineer. The GIS roads layer was overlaid on the GIS file from the USGS database describing surface waterbodies. Several factors were used to estimate the road crossing types anticipated for the Project. They included stream type (perennial, intermittent, ephemeral), and flow volume. The topographic maps in the GIS file were also reviewed to determine the degree of slope leading into drainages and the amount of drainage incisement, to predict crossings that might require cut and fill. After the number and types of stream crossings were initially estimated, the Project engineers were invited to review the estimates and to provide comments based on their past experience with similar utility

projects in the general Project area. Based on the practical experience comments from the engineers, further refinements were made to the stream crossing type estimates. The centerlines of the Proposed Route and Route Alternatives in each segment were overlaid on the stream crossing GIS data file and the number of each crossing type was counted.

Similar methods were used to estimate the acreage of impacts that would occur due to waterbody crossings by roads. Disturbance areas along each waterbody crossing were designated based on the widths described above for the four types of waterbody crossings. These disturbance areas were compared with the GIS files for the locations of each proposed waterbody crossing type, in order to calculate the acreage of disturbance for road crossings.

Flood Hazard Rankings

FEMA and the OPS *National Disaster Study, National Pipeline Risk Index Technical Report* (1996) were used to evaluate the flood hazard rankings for the Analysis Area, construction disturbance area, and operations disturbance area. The OPS data provide flood hazard rankings for the United States, including those portions of Idaho and Wyoming near the Project. Soil type and flooding risk (based on FEMA mapping) were used to produce flood hazard rankings from zero to 100, where zero represents the lowest flood hazard and 100 represents the highest. Flood hazard rankings of 85 to 100 were assumed to have high risk from flooding, rankings between 70 and 84 were considered to have medium risk, and areas less than 70 were assigned a low risk.

To evaluate areas where flood risks may occur, the OPS GIS data file for flood risks was used to determine the areas of medium and high flood risks within the disturbance areas. The area (in acres) of medium and high floods risk within the disturbance areas was calculated and expressed as a percentage of disturbance area for the Proposed Route to Route Alternatives. The acreage of flood hazard areas occurring within the Analysis Area was summarized by segment.

Surface Water Diversions

Established by Executive Order, the State of Idaho via the University of Idaho has established a clearinghouse for geospatial data. This service (InsideIdaho) was reviewed to evaluate surface water diversions within the Analysis Area. Similar information for Wyoming was collected from their Water Resources Data System. Surface water diversions were not described by use. Most diversions are for irrigation; however, some may be potable water sources.

To quantify the number of surface water diversions by Analysis Area, the Analysis Area was overlaid on the InsideIdaho GIS data file for surface water diversions and the number of diversions was counted. To compare the Proposed Route to Route Alternatives, the number of surface water diversions was counted by alternative. The percent of surface water diversions by each segment or alternative was based on the number of diversions in the segment as compared to the number of diversions in the Analysis Area.

Total Maximum Daily Loads

Lists of waterbodies with TMDLs and 303(d) listed waterbodies were obtained from GIS files maintained by the IDEQ, NDEP, and WDEQ Web sites. To quantify the number of TMDL and 303(d) listed waterbodies by Analysis Area, the Analysis Area was overlaid on the IDEQ and NDEP GIS databases (there are no listed streams along the portion of the Project located in Wyoming) for impaired waterbodies, and the number of impaired waterbodies was counted for sediment and temperature TMDLs and 303(d) for sediment and temperature impairment. To compare the Proposed Route to Route Alternatives, the number of impaired waterbodies within the Analysis Area was counted by alternative. In addition, the number of road crossings of impaired waterbodies was counted by alternative and categorized by stream type.

The effects to TMDL and 303(d) listed sediment-impaired streams were further analyzed by comparing the GIS construction and operations disturbance areas to the location of impaired streams. To assess the effects on sediment-impaired streams, the GIS data file from IDEQ for impaired streams was overlaid on the GIS disturbance area file. Disturbance acreage within 500 feet of the impaired stream was noted. The 500-foot distance was selected because that distance should provide adequate buffer to place stormwater BMPs between the disturbance and the impaired stream to prevent further sediment degradation, and several RMPs include a 500-foot buffer to protect water quality in surface waterbodies. To compare the Proposed Route to Route Alternatives, the construction and operations disturbance areas within 500 feet of sediment-impaired streams were compared by alternative.

For TMDL and 303(d) listed temperature-impaired streams, the effects from removal of shading vegetation on temperature degradation were analyzed. To assess the effects on temperature-impaired streams, the GIS data file for impaired streams was overlaid on the GIS construction and operations disturbance area files. These files were then compared with the GIS files for woody vegetation, including the location of trees and shrubs. Acres of woody vegetation removed within 500 feet of the temperature impaired stream were calculated. The 500-foot distance was selected to be consistent with RMP buffers used to protect water quality.

Groundwater

Shallow Groundwater

The NRCS STATSGO database was used to identify shallow groundwater within the Analysis Area and disturbance areas. Shallow groundwater may complicate construction of footings of transmission line towers, which require a foundation as deep as 20 feet. The GIS files of the Analysis Area and disturbance area were overlaid on the GIS file from the STATSGO database. To evaluate the possible interactions between shallow depth to groundwater and the Project, the acreage of the disturbance footprint underlain by shallow depth to groundwater for the entire Proposed Route by segment and for those portions of each segment where Route Alternatives were proposed was identified. Acres of disturbance over shallow depth to groundwater areas were then compared for each segment by alternative. Acreage of shallow depth to groundwater areas within the Analysis Area were summarized by segment.

Water Wells

IDWR and the Wyoming State Engineer's Office databases were used to identify potable water wells and total water wells within the Analysis Area. To identify the number of water wells in the Analysis Area, the GIS file of the Analysis Area was overlaid on the GIS file from the Idaho and Wyoming water entities. The numbers of both potable water wells and total wells were determined by segment. To compare the number of wells between the Proposed Route and Route Alternatives, the numbers of total wells and potable wells within the 1-mile route buffer were counted by alternative.

Shallow bedrock within the Project area could require the use of blasting to set Project foundations. Blasting in shallow bedrock is more fully described in Section 3.14 – Geologic Hazards. Blasting in shallow bedrock could damage nearby structures, including wells. Wells within 200 feet of the blasting areas could be especially susceptible to damage. To assess the number of water wells within 200 of the blasting zones, the GIS file of the Analysis Area was overlaid on the GIS file from the Idaho and Wyoming water entities. The number of total wells within 200 feet of the Project centerline was determined by segment. To compare the number of wells within 200 feet of centerline between the Proposed Route and Route Alternatives, the number of total wells within 200 feet of centerline was counted by alternative.

Sole-source Aquifers

The USEPA Regions 8 and 10 Web sites were searched to identify locations of SSAs. To identify the Project areas located within SSAs, the GIS file of the Analysis Area was overlaid on the GIS file from the USEPA database showing SSAs. The acreage of each Analysis Area within the SSA was calculated and presented as a percentage of the total Analysis Area by segment. To compare the effects on SSAs between the Proposed Route and Route Alternatives, the Analysis Area within SSAs was compared by alternative.

3.16.1.5 Existing Conditions

The Analysis Area is located in areas with perennial, intermittent, and ephemeral streams. Most of the surface waterbodies in Wyoming are natural waterways. In Idaho, there are thousands of stream diversions to support an extensive irrigation system that facilitates agriculture in the Bear River and Snake River Valleys. Groundwater occurs under most portions of the Analysis Area. The Project would not come into contact with groundwater deeper than 20 feet (i.e., the depth of the deepest structure foundations considered for this Project).

Surface Water

Project roads would cross many natural and human-made surface waterbodies. Table 3.16-1 presents the miles of streams located within each segment's Analysis Area. There are 5,090 miles of streams located within the Analysis Area. Segments 1, 4, and 7 each have over 800 miles of streams. However, the Analysis Area encompasses arid areas with low precipitation. Average rainfall is about 10 inches per year. Most of the streams are ephemeral, fed by stormwater.

Table 3.16-1. Water Resources in Analysis Area

Segment	Streams (miles)[1/]	TMDL or 303(d) listed Streams – Sediment (miles)	TMDL or 303(d) listed Streams – Temperature (miles)	Surface Water Diversions (total number)	Flood Areas Medium or High Risk (acres)[1/]	Shallow Groundwater (acres)
1 (1W and 1E)	860	–	–	258	13,254	15
2	372	–	–	58	8,896	–
3	150	–	–	26	3,217	–
4	1,192	18	5	198	53,356	15,437
5	370	111	2	290	30,708	2,539
6	2	–	–	5	343	–
7	1,069	231	58	2,450	30,024	10,532
8	439	100	28	1,284	29,169	–
9	595	91	39	1,172	43,603	–
10	50	9	1	145	2,540	–

1/ Mileages and acreages are rounded to nearest whole number.

The miles of TMDL and 303(d) listed streams that are located in the Analysis Area are included in Table 3.16-1. The percentage of TMDL and 303(d) listed streams for sediment are highest in Segments 5 (20 percent), 7 (41 percent), and 8 (18 percent). The percentage of TMDL and 303(d) listed streams for temperature are highest in Segments 7 (44 percent), 8 (21 percent), and 9 (29 percent). No temperature- or sediment-impaired streams were found in the Wyoming portion of the Project area.

Only one temperature-impaired stream was found in the Nevada portion of the Project area.

This analysis identified a total of 5,886 surface water diversions within the Analysis Area (Table 3.16-1). The most diversions are found in Segments 7, 8, and 9. Although the purpose for diversions was not found in the InsideIdaho database, the majority of these likely support the extensive agricultural flood irrigation practices in southern Idaho.

Areas of medium to high flood risk are located within the Analysis Area. Segment 4 contains the most acres of the Analysis Area located within medium to high flood hazard risks. This segment would also cross a mountainous region, where there are many drainages.

Groundwater

Shallow groundwater is of limited extent within the Analysis Area (Table 3.16-1) Shallow groundwater (i.e., 13 feet deep or less) is found in Segments 1, 4, 5, and 7.

The Project is located within only one SSA. The Eastern Snake River Plain (ESRP) Aquifer occurs in southern Idaho. Portions of Segments 5 through 10 are located on the ESRP. The ESRP Aquifer occupies about 10,800 square miles in southern Idaho and contains approximately one billion acre-feet of water. The aquifer is several hundred feet thick, with the most permeable zone located in the upper 200 to 300 feet. The ESRP Aquifer is often overlain by other, more shallow perched groundwater units, usually the result of infiltration from the extensive flood irrigation practices in the area. Miles of ESRP crossed by each segment and alternative are included in Table D.16-11

in Appendix D. Excavation for transmission line towers or other structures or blasting that could be required in areas of shallow bedrock could cause contact with shallow perched groundwater. However, given the size of this aquifer and the depth of productive units, the Project would not impact this SSA.

Groundwater is the major potable source in southern Idaho. Water wells and potable water wells are found in all portions of the Analysis Area (Table 3.16-2). Table 3.16-2 presents the total number of wells and the number of potable wells within the Analysis Area for each segment (i.e., along the Proposed Route and all Route Alternatives combined). Segment 8 has the greatest number of potable wells (316) within the Analysis Area, followed by Segment 7 (214 potable wells), and Segment 9 (129 potable wells). All other segments have fewer than 100 potable wells within the Analysis Area. Table 3.16-2 also indicates the number of those wells that would be located near areas of shallow bedrock where blasting may be necessary.

Table 3.16-2. Wells within the Analysis Area and Wells near Potential Blasting Areas

Segment Number[1/]	Potable Water Wells	Potable Wells Near Shallow Bedrock	Total Water Wells	Total Wells Near Shallow Bedrock	Total Wells Within 200 Feet of Centerline in Shallow Bedrock
1	79	14	220	25	3
2	14	–	55	–	–
3	3	2	22	14	2
4	49	11	92	22	1
5	66	5	95	5	–
6	5	3	5	5	–
7	214	52	283	82	12
8	316	297	509	373	6
9	129	100	176	133	1
10	62	11	74	13	2

1/ This includes the total number of wells and number of potable wells within the buffered analysis area around each proposed transmission line segment and all of its alternatives. For a breakdown of potable wells along the Proposed Route and Route Alternatives, see Table D.16-10 in Appendix D.

3.16.2 Direct and Indirect Effects

This section is organized to present effects to surface water and groundwater resources from construction, then operations, followed by decommissioning activities for the proposed Project. Route Alternatives are analyzed in detail below in Section 3.16.2.3. There is a Design Variation involving the use of two single-circuit structures proposed by the Proponent for Segments 2, 3, and 4 (see Section 2.2 for details), which is analyzed below in Section 3.16.2.4, and a Structure Variation that is analyzed in Section 3.16.2.5. The Proponents have also proposed a Schedule Variation, analyzed in Section 3.16.2.6, in which one of the two single circuits to be constructed in Segments 2, 3, and 4 and a portion of Segment 1W would be built on an extended schedule with construction beginning approximately 2.5 years after completion of the initial construction.

Mitigation measures or EPMs are presented in detail within this section only if it is the first time they have been discussed in Chapter 3; all other measures are referenced or

summarized. A comprehensive list of all Proponent-proposed EPMs and Agency-required mitigation measures can be found in Table 2.7-1 of Chapter 2.

Plan Amendments

Proposed amendments are summarized in Table 2.2-1 of Chapter 2 and detailed in Appendices F and G. Amendments are needed to permit the Project to cross various areas of BLM-managed and NFS lands. Effects described for areas requiring an amendment in order for the Project to be built would only occur if the amendment were approved. Amendments that alter land management designations could change future use of these areas. No amendments specific to water resources are proposed for the Project and no impacts to water resources resulting from approving the amendments beyond the impacts of the Project are anticipated.

3.16.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be constructed or operated. No Project-related impacts to surface water or groundwater resources would occur.

3.16.2.2 Effects Common to All Action Alternatives

Construction

Impacts to Surface Water

Access roads would need to cross streams as part of the proposed Project. There are no assigned site-specific crossing types. Road crossings were estimated based on the data available, and would depend on site-specific conditions at the site location. A summary of the percentage of the types of road crossings and stream types for the Proposed Route are included in Table 3.16-3. Most of the crossing types would be drive through, estimated at 41 percent, followed by fords (37 percent), and 8 percent of the crossings would be culverts. Sensitive stream crossings (7 percent) would need additional mitigation measures (e.g., OM-22, Table 2.7-1), and 9 percent of the stream crossings would be avoided.

Table 3.16-3. Percentage of Crossing Type and Stream Type on Proposed Route

Road Crossing Type	Percent	Stream Type	Percent
Drive through	41	Ephemeral	73
Ford	37	Intermittent	15
Culvert	8	Perennial	5
Sensitive (TMDL/303[d])	7	Artificial	7
Avoid	9		

Because the Project would be located in an arid area, most of the crossings would be ephemeral streams, representing 73 percent of the total. Intermittent streams would account for 15 percent of the types of streams crossed, human-made structures (canals, aqueducts, ditches, drains, channelized natural streams) would be 7 percent of streams crossed, while perennial streams would account for only about 5 percent of the total along the Proposed Route.

Table D.16-1 in Appendix D shows the distribution of types of road crossings over different stream types by Proposed Route segments and the Route Alternatives. The number of crossings for TMDL and 303(d) listed streams are also included in Table D.16-1. Table D.16-6 identifies the types of streams that are crossed by segment and alternative.

The construction of Project components (e.g., transmission line towers, substations, pull sites, staging areas, fly yards, and access roads) would require excavation, grading, and the subsequent removal of vegetation. In areas where the transmission line would cross forested riparian areas, tree heights would need to be kept below the transmission line for safety and maintenance reasons (see Section 3.6 – Vegetation Communities). Riparian areas would be avoided by 500 feet to the extent possible. Transmission poles would not be constructed within river or spring habitats, as avoiding placing poles within these areas is a standard engineering practice. Areas under the transmission line would not be cleared of tall vegetation during initial construction or during ROW maintenance if the distance between the conductor and the top of mature trees or shrubs is greater than 50 feet (e.g., a canyon or ravine crossing with high ground clearance at mid-span). At this time the exact number and location of where the conductor clearances would be greater than 50 feet is uncertain; therefore, impact values for forest and riparian clearing have conservatively calculated ROW impacts as a complete removal of forested vegetation within the ROW, regardless of conductor clearance height. This means that the impact values reported for ROW maintenance are an overestimate of the true impacts that would actually occur, as forested vegetation (including riparian areas) would not be maintained along the entire ROW if the top of mature vegetation is 50 feet or more below the transmission line.

Loss of riparian vegetation resulting from construction activities can reduce stream summer shading, LWD input, terrestrial organic input, as well as increase bank instability, average water temperatures, and erosion potential. In areas where the roots of riparian vegetation are the primary bank stabilizing force, loss of riparian vegetation can result in stream migration. In addition, soil disturbances can increase soil erosion, (or water runoff in areas with compacted soils), and result in an increase in suspended sediments within adjacent waterbodies (Naiman and Bilby 1998). These impacts would be greatest where waterbodies would be crossed by roads due to the extent of direct disturbances to banks and riparian vegetation.

Impacts resulting from the spanning of waterbodies by the transmission line would primarily result from ROW vegetative clearing and maintenance of tree heights. Effects from the spanning of waterbodies by the transmission line would be mitigated to minimize or eliminate changes in stream temperatures, sedimentation, or water quality.

Erosion, sedimentation, and stream stability would be controlled with the use of BMPs as well as the revegetation efforts described in Section 3.6 – Vegetation Communities, and Section 3.15 – Soils. Loss of riparian vegetation and trees along the transmission line crossings may cause a slight localized increase in temperature (immeasurable on most perennial streams) because stream temperature dynamics in forested settings can be strongly regulated by shade. These impacts would be greatest along small, slow-moving, shallow waterbodies. Removal of vegetation and direct solar radiance can result in high local temperature increases. As stream temperature is constantly striving

to gain equilibrium with air temperature, influences of direct solar radiance can be substantial. However, even though gaps in canopy cover can result in an immediate increase in stream temperature, stream temperatures do not continue to increase at an accelerated rate as canopy cover resumes downstream (Danehy et al. 2005). Vegetation removal associated with crossings in forested settings is expected to be minimal and localized, without an overall increase in stream temperatures. The majority of the Analysis Area consists of low grassland and shrub environments; therefore, the majority of stream crossings would occur outside of forested areas (see Section 3.6 – Vegetation Communities). Minimal research has been conducted regarding the effects of riparian vegetation removal on stream temperatures in shrub-steppe ecosystems. Disregarding the influence of groundwater or low-order tributaries, stream temperatures in shrub-steppe systems can be expected to be generally higher than those of forested systems, due to a lack of canopy cover. Furthermore, existing canopy cover likely has a limiting effect within shrub-steppe systems due to its minimal contribution of shade; as shrub canopy cover is typically concentrated only along the edges of a stream (i.e., when the sun is directly overhead it is imparting maximum solar radiance directly onto the middle / deeper portions of the stream). Based on this, changes in stream temperature related to riparian vegetation removal in shrub-steppe systems is likely to be immeasurable. However, in order to further limit the potential impact on adjacent water resources (related to the initial clearing of riparian vegetation in the ROW), the Agencies have identified the mitigation measures SOIL-4, VEG-3, VEG-6, FISH-1, and FISH-2.

Impacts to waterbodies from road crossings would depend on the type of crossing. Table D.16-1 in Appendix D presents an estimate of the number and type of road crossings that are expected to occur, by segment and alternative. These road crossings could result in a potential for localized increases in erosion and surface water sedimentation, as well as direct impacts to streambanks and adjacent vegetation. These impacts would be greatest in areas that contain forested riparian vegetation; however, the Project has been routed to avoid these areas to the extent practical.

As listed in Table D.16-1 and summarized in Table 3.16-3, drive-through crossings on ephemeral or intermittent dry streams account for 41 percent of the total crossings. One impact to stream habitat from drive-through crossings is sedimentation, as sediment loosened during drive-throughs while the channel is dry would become suspended when flow did commence. Erosion of streambanks may also occur. Erosion effects would be mitigated with erosion control measures as needed. Drive-through crossings could also disturb and disrupt appropriate substrate habitat for some aquatic fauna.

Ford crossings on ephemeral or intermittent dry streams account for 37 percent of the total crossings. Sedimentation impacts from dry ford crossings may result when water is present. Sedimentation impacts would be mitigated with sediment controls devices. Erosion of streambanks may occur from dry ford crossings, and effects would be mitigation with erosion control measures. Another impact could be disturbance of suitable substrate habitat for some aquatic fauna, if present.

The installation of culverts on intermittent and perennial streams account for 7 percent of the total crossings. Culverts require in-stream work that may cause an increase in

erosion and sedimentation in the waterbody at the construction site with effects extending downstream. Other impacts from culverts could include scouring, changes in channel geometry and gradient, aggradation or degradation of the stream channel, and changes to habitat for aquatic fauna.

The Agencies have identified the following mitigation measures to reduce the impact of road crossings on aquatic resources; and the Proponents have adopted them as part of their Project description:

WQA-1 Avoid placement of road bed material in channels (perennial, intermittent or ephemeral). Road bed material contains considerable fines that would create sedimentation in coarse cobble dominated stream channels. Even in seasonally dry reaches those fines could be transported during flow periods and negatively impact fish spawning reaches below.

WQA-2 On federal lands, consult with appropriate land management agency staff prior to siting and design for stream crossings (location, alignment, and approach for culvert, drive-through, and ford crossings). This may include a hydrologist, engineer and, for perennial and many intermittent streams, an aquatic biologist.

In addition, the Agencies have identified BIO-3 (in Section 3.6 – Vegetation Communities), which requires that access roads be constructed and sited in such a way as to minimize the number of trees that would need to be removed. Based on the current Project design, approximately 1 acre or less of forested riparian vegetation would be impacted along each segment, resulting from the crossings of waterbodies by roads (for a total of approximately 2 acres of riparian forests impacted by road crossings of waterbodies along the entire length of the Project). To reduce the impacts of unavoidable waterbody crossings by roads, the BLM and cooperating agencies have identified BIO-6 (in Section 3.6 – Vegetation Communities), BIO-28 (in Section 3.10 – General Wildlife and Fish), as well as SOIL-5 and SOIL-6 (in Section 3.15 – Soils) which establish restoration efforts that would need to be conducted in order to re-establish pre-construction conditions along these waterbodies.

Some of the road crossings would include the installation of a culvert (see Table D.16-1 in Appendix D). If culverts are designed or installed improperly, they can isolate wetlands, reduce water flow, change a stream's hydrodynamics, and impede fish passage. Therefore, all culverts would be designed and installed to ensure the continued free flow of water, as well as to allow both the upstream and downstream movement of aquatic organisms. The Proponents would conduct construction and decommissioning of culverts under a CGP required for stormwater operations; which includes the development of BMPs to protect water from stormwater runoff. BMPs would also be employed to minimize sedimentation to waterbodies due to construction activities. In addition, culverts would be inspected regularly by staff approved by the applicable land-management agencies (permanent culverts inspected annually during operations) to ensure that they are not plugged and are functioning properly. The Proponents' responsibility for inspecting culverts, as well as conducting all necessary repairs, would continue as long as the culverts are present within the watershed (this would continue for the life of the Project). The BLM and Forest Service have specific

requirements regarding culvert design and installation on lands they manage. The Proponents would consult with the Forest Service and BLM prior to construction regarding design, layout, and decommissioning requirements for each culvert that would be located on federal lands. All culverts located on federal lands would be constructed in accordance with the applicable federal agencies' management plan standards. In all other areas where more restrictive regulations are not in place, the culvert specifications outlined in Appendix B would be used. The Agencies have identified the following mitigation measures regarding culverts that would need to be applied on federal lands, and the Proponents have adopted them as part of their Project description.

WQA-3 All culverts on NFS lands, both permanent and temporary, shall be designed and installed to meet desired conditions for riparian and aquatic species as identified in the applicable Forest Plan. Culverts should not be hydraulically controlled. Hydraulically controlled culverts create passage problems for aquatic organisms. Culvert slope should not exceed stream gradient and should be designed and implemented (typically by partial burial in the streambed) to maintain streambed material in the culvert.

WQA-4 Culvert sizing on NFS lands shall comply with *Guidance for Aquatic Species Passage Design, Forest Service Northern Region & Intermountain Region* (Forest Service 2003f), and culvert sizing on BLM-administered lands shall comply with BLM Manual 9113.

The Proponents have agreed to the following measure:

WQA-5 On non-federal lands, culvert placement should comply with state BMPs. The minimum size culvert will be 12 inches in diameter. If a channel width exceeds 3 feet, additional pipes may be used until the cross-sectional area of the pipes is greater than 60 percent of the cross-sectional area of the existing channel. Filter cloth should be placed on the streambed and banks prior to placement of the pipe, and the culvert should be covered with a minimum of 1 foot of aggregate.

As part of the SWPPP, the Proponents have proposed the following EPMs related to prevention of erosion and sedimentation:

SW-1 The appropriate NPDES permits for construction activities that disturb 1 acre or more of land will be obtained from the Department of Environmental Quality and USEPA or their designees.

SW-4 The SWPPPs will be modified as necessary to account for changing construction conditions.

SW-5 The SWPPPs will identify areas with critical erosion conditions that may require special construction activities or additional BMPs to minimize soil erosion.

SW-6 Migration of construction-related sediment to all adjacent surface waterbodies will be prevented.

SW-7 Stormwater BMPs will be maintained on all disturbed lands during construction activities, as described in the SWPPP.

SW-8 Approved sediment and erosion control BMPs will be installed and maintained until disturbed areas meet final stabilization criteria.

SW-9 Temporary BMPs will be used to control erosion and sediment at staging areas (equipment storage yards, fly yards, laydown areas) and substations.

SW-10 The construction schedule may be modified to minimize construction activities in rain-soaked or muddy conditions.

SW-12 Upon completion of construction, permanent erosion and sediment BMPs will be installed along the transmission line within the ROW, at substations, and at related facilities in accordance with the SWPPP.

Based on the implementation of this SWPPP, direct and indirect impacts to vegetation from erosion and sedimentation are expected to be minor and would be limited to temporary loss or disturbance of vegetation at sites where BMPs are installed and some disturbance resulting from erosion of soils or deposition of sediment. An additional mitigation measure to reduce compaction is found in Section 3.15 – Soils. Reclamation, however, would take a number of years to implement, depending on the habitat type impacted, and the beneficial functions of streamside vegetation, such as shading and bank stability, will not recover immediately.

Construction of access roads and stream crossings would result in impacts to TMDL and 303(d) listed sediment-impaired streams due to soil disturbance during construction, but this would be minimized by the BMPs, EPMs, and mitigation measures discussed above. Named streams that have TMDLs or are on the 303(d) list for sediment or temperature are included in Table D.16-13 in Appendix D.

TMDL and 303(d) listed temperature-impaired streams would also be impacted during construction. Any crossings of these streams that occur at points that do not currently contain forested vegetation (which serves as summer stream shade) would not have a measurable impact to average stream temperatures. However, as discussed above, tree removal would be necessary in forested riparian areas in order to provide clearance for energized lines, and this tree removal could contribute to increases in stream temperatures if substantial areas are cleared. Table 3.16-4 includes the number of acres of woody vegetation that would be impacted due to construction and operations disturbance within 500 feet of a TMDL or 303(d) listed stream for temperature. Alternatives in Segments 4, 7, 8, and 9 include removal of woody vegetation within 500 feet of a temperature-impaired stream.

Table 3.16-4. Acres of Woody Vegetation within 500 Feet of Temperature Impaired Streams Impacted by Construction and Operation Disturbance

		Construction Disturbance			Operation Disturbance			Two Single-Circuit Construction Disturbance		
Segment Number	Proposed Alternative or Route Name	TMDL and 303(d) Listed Temperature (acres)	%	Total Acres	TMDL and 303(d) Listed Temperature (acres)	%	Total Acres	TMDL and 303(d) Listed Temperature (acres)	%	Total Acres
4	Proposed 4	0.3	<0.1	2,846	0.2	<0.1	651	0.3	<0.1	3,705
7	Alternative 7H	0.3	<0.1	2,118	0	0	340	0	0	2,118

Table 3.16-4. Acres of Woody Vegetation within 500 Feet of Temperature Impaired Streams Impacted by Construction and Operation Disturbance (continued)

Segment Number	Proposed Alternative or Route Name	Construction Disturbance			Operation Disturbance			Two Single-Circuit Construction Disturbance		
		TMDL and 303(d) Listed Temperature (acres)	%	Total Acres	TMDL and 303(d) Listed Temperature (acres)	%	Total Acres	TMDL and 303(d) Listed Temperature (acres)	%	Total Acres
7	Alternative 7I	7.6	0.3	2,735	1.2	0.3	450	7.6	0.3	2,735
	Alternative 7J	4.1	0.1	3,180	0.7	0.1	512	4.1	0.1	3,180
8	Proposed 8	0.2	<0.1	2,125	0.01	<0.1	246	0.2	<0.1	2,125
	Proposed 8, compare to 8B	0.2	<0.1	2,125	0.01	<0.1	87	0.2	<0.1	2,125
	Alternative 8B	0.01	<0.1	779	0	0	69	0.01	<0.1	779
9	Alternative 9D	0.001	<0.1	815	0.000004	<0.1	80	0.001	<0.1	815
	Alternative 9F	0.001	<0.1	971	0.000004	<0.1	93	0.001	<0.1	971
	Alternative 9G	0.001	<0.1	848	0.000004	<0.1	83	0.001	<0.1	848
	Alternative 9H	0.001	<0.1	979	0.000004	<0.1	96	0.001	<0.1	979

1/ Total acres of surface disturbance along riparian areas.

Alternatives 7H and 7I would impact 0.3 and 7.6 acres of woody vegetation during construction (Alternative 7H would not impact woody vegetation during operations. The construction impact area is due to the construction buffer around a deadend pulling yard used during construction that would be revegetated after construction is complete). Alternative 7J includes a total impact of 4.1 acres of woody vegetation spread over four different streams. Segment 8 of the Proposed Route would impact 0.2 acre of woody vegetation during construction, while Alternative 8B would impact less than 0.1 acre (Alternative 8B would not impact woody vegetation for operations. The construction impact area is due to the tower pad construction disturbance buffer area that would be revegetated after completion of construction). Route Alternatives within Segment 9 would impact less than 0.1 acre of woody vegetation within 500 feet of temperature impaired streams.

Accidental spills or disposal of harmful materials used during construction could wash into and pollute surface water. Materials that could contaminate the construction area include lead-based paint flakes, diesel fuel, gasoline, lubrication oil, cement slurry, hydraulic fluid, antifreeze, transmission fluid, lubricating grease, or other toxic fluids. Downstream beneficial uses could be adversely affected if these chemicals enter into waterbodies. The Project SWPPP (Appendix C-1, Attachment B) would include procedures for promptly reporting and cleaning up spills generated during construction. The Proponents have committed to EPMs, which includes measures for temporary and permanent erosion and sediment controls that would be used during construction, operations, and maintenance of the Project, as well as an SPCC Plan (SW-1 through SW-12 in Appendix C-1, Attachment C). The EPMs would also include measures for spill prevention practices, requirements for refueling and equipment operation near waterbodies, procedures for emergency response and incident reporting, and training requirements. Actions taken in accordance with these EPMs should assist in mitigation of impacts to surface water. In addition, the Agencies have identified SOIL-1 (in Section 3.15 – Soils), which creates additional requirements for the SWPPP, to limit potential impacts.

Water would be necessary for construction of the transmission lines and associated facilities. Water would be used for mixing of portland cement concrete as well as for dust control on service or access roads. Water usage for dust control provides a benefit by preventing air quality degradation. The Proponents would use municipal and local sources for construction water and would contract for the water rights prior to Project initiation; water would not be withdrawn from public waterways or surface sources without agreement by appropriate entities. The Proponents intend to draw water from existing developed water rights (i.e., purchasing existing water rights and only draw water in accordance with these existing water rights); therefore, if the entirety of this water use was diverted from existing rights, there would be no depletion of water beyond existing depletions related to existing water rights (Kantola 2010; Hoobles 2010). However, at this time it is uncertain if the Proponents would be able to purchase enough existing water rights to cover the Project's needs, and as such, there may be a depletion of water from the affected systems (in addition to current water depletions related to existing rights). The water estimates for transmission line construction along all segments would be about 4,200 to 9,200 gallons per day (see Table D.16-12 in Appendix D), or about one to two large water truckloads per day (a typical construction water truck holds approximately 4,000 to 5,000 gallons). The water estimates for all segments are dependent on a number of factors (weather, soil type, length of construction, construction sequencing, and others) and the actual construction water usage would likely vary from these preliminary estimates. Water use for substation construction would range from an estimated total of 1 million gallons (3 acre-feet) at Heward to 19 million gallons (58.8 acre-feet) at Anticline (see Table B-10, Appendix B). Water used from the North Platte River and Colorado River basins would be under consultation with the USFWS (see Section 3.7 – Special Status Plants, and Section 3.11 – Special Status Wildlife and Fish Species). Mitigation measure TESWL-17 is required to comply with the USFWS tiered BO under the Upper Colorado Endangered Fish Recovery Program, due to the water withdrawals from the Colorado River (as initially described in Section 3.7 – Special Status Plants). This measure would be applied Project-wide regardless of land ownership.

Impacts to Groundwater

Due to the shallow excavations required for Project foundations it is unlikely that this Project would affect groundwater. Shallow groundwater of 14 feet or less is present only in Segments 1, 4, 5, and 7. Any impacts to groundwater would be of short duration and consist mainly of temporary sedimentation. Excavations for transmission line structures may contact shallow groundwater; however, the groundwater contact would be unlikely to adversely impact this resource, unless an accidental chemical spill occurs near an open excavation. The Proponents have committed that materials such as fuels, other petroleum products, chemicals, and hazardous materials including wastes would be located in upland areas at least 500 feet away from streams, 400 feet for public wells, and 200 feet from private wells. The Proponents would adhere to state requirements for containment of hazardous materials. Typically, contact with construction equipment would not impact groundwater quality except to increase turbidity temporarily, and only in a limited area.

The Project could temporarily impact water quality in potable water wells to a limited extent from excess sediment influx into the potable water wells located near Project

excavations. The greatest risk to water wells of any use would be from damage that could occur during blasting of shallow bedrock. Many wells in southern Idaho are constructed as an "open hole," meaning they are not cased along their entire interval. If nearby blasting causes the dislodging of a rock from the boring sidewall, the rock can fall down the well and trap the submersible pump. This could result in temporary or permanent damage to the well. The effects of well damage could be loss of a potable water supply or loss of irrigation water flow to farmlands. In the Proponents' Blasting Plan (as required by mitigation measure GEO-1 of Section 3.14 – Geologic Hazards), damage to nearby wells would be repaired or replaced. If access is given by well owners, the Proponents propose to conduct pre-blast and post-blast inspections of wells within 200 feet of blasting areas.

Construction dewatering could result in a local and temporary drawdown of groundwater levels, temporarily (i.e., during the withdrawal) reducing the yield of nearby shallow water wells and potentially adjacent surface water systems (such as wetlands; see Section 3.9 – Wetlands and Riparian Areas). In addition, blasting or drilling for tower foundations could reduce flows in wells and springs. However, water supply wells are typically deeper than the proposed maximum excavation depth of 20 feet, so a temporary drawdown limited to that depth is unlikely to affect water yield.

In no case would groundwater removed during construction be discharged to surface waters or storm drains without first obtaining any applicable permits or without approval of the applicable federal land-managing agency.

Operations

Impacts to Surface Water

The impacts from Project operations on surface water would be less in magnitude as compared to the impacts from construction, but longer in duration. The disturbed area of operations would be about approximately 30 percent of the construction area disturbance. For this reason, the erosion effects in the operation area should be much less than for construction areas, but would persist for a much longer time. Potential impacts to surface water from road crossings include erosion of streambanks and sedimentation of road runoff from stormwater. Culverts may get blocked by debris in streams and cause water to back up and flood areas. Use of roads during maintenance activities may promote erosion. Stormwater BMPs, including erosion and sediment control structures, as well as new culverts would require inspection, maintenance, and repair through the operational life of the Project to minimize soil erosion or sedimentation to surface water.

Some of the streams that would be crossed by the Project have delineated 100-year floodplains or flood hazard areas designated by FEMA. Flood hazard areas include streams in the North Platte River drainage near Windstar Substation, the Green River and tributaries in Sweetwater County (Segment 4), the Bear River in Oneida County, and tributaries of the Snake River in southern Idaho. The 100-year floodplain is the area that would be inundated by a flood with a recurrence interval of once in 100 years, on average. The Project would be designed to withstand flooding during all its phases. Building is permitted in flood-prone areas with certain restrictions. For instance, buildings are to be elevated such that the lowest floor is above the 100-year flood level, and an area of the watercourse is typically set aside for flow conveyance (the floodway).

Since floodplain mapping is usually done as an aid to local governments in urban areas or areas that are expected to be prone to urbanization, most watercourses in non-urban areas are not mapped even though they may be subject to substantial flood hazards. It is reasonable to assume that all watercourses that convey natural flows, whether mapped as floodplains, flood hazard areas, or not, present some level of flood hazard. The flood hazard is not limited to inundation; bank erosion and bed scour (a lowering or destabilization of the channel bed during a flow event) are also hazards that can occur due to flooding. On lands with restrictions in building within 100-year floodplains, requirements in Forest Plans/RMPs will apply.

Encroachment of a Project structure into a flood path could result in flooding of or erosion damage to the encroaching structure, diversion of flows and increased flood risk for adjacent property, or increased erosion on adjacent property. Impacts are likely to occur only where power poles or other permanent Project features are constructed in or closely adjacent to a watercourse; this will not occur per standard engineering practices. All towers within a flood hazard area subject to scour or lateral movement of a stream channel would be protected by burial beneath the 100-year scour depth, setbacks from the channel bank, or bank protection. Structures impacted from floods would be maintained or replaced.

The number of acres of operations disturbance located in medium- to high-risk flood zones is less than 18 percent of the total operations disturbance area. The Project includes small footprint structures; the permanent footprint of each structure adds up to a small percentage of the high-risk flood hazard area. A majority of the operations disturbance is access roads and maintenance of the ROW. Therefore, the Project is not likely to measurably impact flood flows. However, flood flows could impact the Project structures and roads. Therefore, Project structures would be placed to avoid impacts from floods, if possible. Structures would be designed to withstand impacts from flood waters.

Impacts to Groundwater

Groundwater would not be directly impacted during transmission line operation because all operations activities would occur above the ground surface, and there would be measures in place to protect against chemical spills (see Appendix C-1, Attachment B). During operations, insulating mineral oil is used in some electrical equipment at substations, such as transformers, and some reactors and circuit breakers. The POD indicates that oil-filled equipment would be placed within secondary containment structures to ensure that oil spills would not impact soil or groundwater. The containment structures take many forms, depending on site requirements, environmental conditions, and regulatory restrictions. Different varieties of containment structures include artificially lined sumps of sufficient volume to contain oil spills, and oil-water separators. The Proponents would adhere to state requirements for containment of hazardous materials. Because of the corrective measures built into the Project plan, chemical spills are not further discussed here.

Decommissioning

During decommissioning, all structures would be removed. Land managers or property owners would be contacted about the final disposition of roads installed for the Project. The effects from soil disturbances and water effects during decommissioning would be similar to those of construction, and are not discussed in detail separately.

Groundwater would not be affected during transmission line decommissioning. Foundations would be abandoned in place, or cut off below ground surface and buried. This makes contact with groundwater less likely than during construction.

3.16.2.3 Proposed Route and Alternatives by Segment

Tables D.16-1 through D.16-16 in Appendix D show the surface water and groundwater conditions for the Proposed Route and as well as a comparison between Route Alternatives and the comparison portion of the Proposed Route (i.e., the portion of the Proposed Route that starts and ends at the same nodes as the Route Alternative).

Segment 1E

Segment 1E, as proposed, would link the Windstar and Aeolus Substations in south-central Wyoming with a 100.6-mile 230-kV single-circuit transmission line. Twenty acres of the expansion of Windstar and Aeolus Substations and 0.5 acre for one regeneration site are attributed to Segment 1E. Alternative 1E-A is a 16.1-mile alternative along the north end of Segment 1E, which was the Proponents' initial proposal before moving the Proposed Route at the suggestion of local landowners to avoid the more settled area around Glenrock. Alternative 1E-B is 21.4 miles longer than the Proposed Route but is being considered by the Proponents because it would avoid a Wyoming-designated sage-grouse core area to the east. The BLM has required the consideration of Alternative 1E-C, which parallels the proposed and rebuilt Segment 1W 230-kV lines into the Aeolus Substation (see Appendix A, Figure A-2).

Construction

Surface Water

There would be 319 surface water crossings on the Proposed Route that would require an estimated 140 drive-through crossings, 144 fords, and 28 culverts for a total of 5 acres of disturbance (Table D.16-1 in Appendix D). Of the 319 crossings, 73 percent are non-listed ephemeral streams and there are no TMDL or 303(d) listed streams (Table D.16-6 in Appendix D). Alternative 1E-C contains 179 fewer crossings, 13 fewer culverts, 83 fewer fords, 78 fewer drive-through crossings, and 2 acres less disturbance than the comparison portion of the Proposed Route.

A total of 179 acres of construction disturbance for this segment or 16 percent of the disturbance area would be located within 500 feet of perennial and intermittent streams and 72 acres or 7 percent would be located within 100 feet of ephemeral streams (Table D.16-14 in Appendix D). Alternative 1E-C would have 71 less acres of disturbance within 500 feet of perennial streams and 37 less acres within 100 feet of ephemeral streams than the comparison portion of the Proposed Route.

Approximately 9 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). Alternative 1E-A has 5 percent less than the comparison portion or the Proposed Route.

There are 71 surface water diversions within 0.5 mile of this segment. Alternative 1E-A has approximately half the number of surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

Table 3.16-5 contains the number of stream crossings on NFS land. This segment includes 19 stream crossings on the Medicine Bow-Routt NFs. Of these 19 stream crossings, 3 are intermittent, and 16 are ephemeral. There are no TMDL or 303(d) listed streams located on NFS lands in Segment 1. Alternative 1E-C includes 12 fewer stream crossings than the comparison portion of the Proposed Route. See Section 3.9 – Wetlands and Riparian Areas for effects on riparian zones. With the application of the SWPPP and Reclamation, Revegetation, and Maintenance Plan, construction is not expected to result in a long-term reduction or loss of function for the streams within the Project area, due to the revegetation efforts and the measures to restrict sedimentation input to waterbodies. Site-specific crossing plans and measures to mitigate impacts will be submitted to Medicine Bow-Routt NF for approval prior to construction in these areas.

Groundwater

The overall risk to groundwater from construction of Segment 1E and its Alternatives would be low because shallow groundwater does not underlie these routes (Table D.16-7 in Appendix D). Segment 1E contains 57 potable water wells within 0.5 mile of the Proposed Route (Table D.16-10 in Appendix D). There are fewer wells located in proximity to Alternatives 1E-A and 1E-C than in the comparison portions of the Proposed Route. Three wells in the Segment 1 Analysis Area are located in shallow bedrock within 200 feet of the route centerline, which may be affected by blasting due to proximity (Table 3.16-2).

Table 3.16-5. Number of Stream Crossings in National Forests

Segment or Alternative[1/]	Perennial	Intermittent - Wet	Intermittent - Dry	Ephemeral	Total Crossings
Proposed Segment 1E – Total Length	–	–	3	16	19
Proposed – Comparison Portion for Alternative 1E-C	–	–	3	16	19
Alternative 1E-C	–	–	–	7	7
Proposed Segment 1W(a) – Total Length	–	–	–	15	15
Proposed Segment 1W(c) – Total Length	–	–	5	13	18
Proposed Segment 4 – Total Length	15	–	9	–	24
Alternative 7H	–	1	25	42	68
Alternative 7I (non-TDML/303[d] streams)	9	5	27	65	106
Alternative 7I TMDL and 303(d) Listed Sediment	3	–	–	–	3
Alternative 7I TMDL and 303(d) Listed Temperature	2	–	1	3	6
Alternative 7J (non-TDML/303[d] streams)	–	1	27	54	82
Alternative 7J TMDL and 303(d) Listed Temperature	2	–	1	3	6

1/ Segment 1: Medicine Bow-Routt NF; Segment 4: Caribou-Targhee NF; Segment 7: Sawtooth NF

Construction water usage for this segment would consist of approximately 2,200,000 gallons (6.6 acre-feet), given an estimate of approximately 1.2 years for construction. Alternative 1E-A would use a comparable amount of water as the comparison portion of the Proposed Route, whereas Alternative 1E-B would require greater water usage, and Alternative 1E-C would require less water usage during construction (Table D.16-12 in Appendix D).

Operations

This segment includes 49 acres of operations disturbance area within 500 feet of perennial and intermittent streams, or 17 percent of the operations disturbance area, and 25 acres within 100 feet of ephemeral streams, or 9 percent of the operations disturbance area (Table D.16-15 in Appendix D). Alternative 1E-C would have a total of 23 less acres of disturbance within 500 feet of perennial or intermittent streams and 10 less acres within 100 feet of ephemeral streams.

Approximately 13 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). Alternative 1E-A has a lower percent of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

The operations disturbance area does not overlay shallow groundwater (Table D.16-8 in Appendix D).

Segment 1W

Segment 1W is composed of two parts, Segments 1W(a) and 1W(c), both of which would consist of a new 230-kV line for part of their length and a reconstruction of an existing 230-kV line for the remaining part. Segment 1W(a) would be about 76.5 miles long, and would extend from the Windstar Substation to the Aeolus Substation. Segment 1W(c) would be about 70.6 miles long, and would extend from the Dave Johnson Power Plant to the Aeolus Substation. Alternative 1W-A is a 16.2-mile alternative located near the town of Glenrock, which was the Proponents' initial proposal before moving the Proposed Route at the suggestion of local landowners in order to avoid the more settled area around Glenrock. Twenty acres of the proposed expansion at the Windstar and Aeolus Substations are attributed to Segment 1W(a) and 3 acres of the expansion at the Heward Substation and 17 acres of the expansion at the Windstar and Aeolus Substations are attributed to Segment 1W(c). There are no Route Alternatives proposed south of that point (see Appendix A, Figure A-2).

Construction

Surface Water

There would be 165 surface water crossings on the Proposed Route that would require an estimated 73 drive-through crossings, 74 fords, and 16 culverts for a total of 3 acres of disturbance (Table D.16-1 in Appendix D). Of the 165 crossings, 73 percent are non-listed ephemeral streams and there are no TMDL or 303(d) listed streams (Table D.16-6 in Appendix D). Alternative 1W-A contains more crossings, culverts, and disturbance acreage than the comparison portion of the Proposed Route.

A total of 83 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 13 percent of the disturbance area, and

39 acres would be located within 100 feet of ephemeral streams (6 percent of the disturbance area (Table D.16-14 in Appendix D). Alternative 1W-A would have a total of 18 more acres of disturbance within 500 feet of perennial or intermittent streams and 1 more acre within 100 feet of ephemeral streams than the comparison portion of the Proposed Route.

Approximately 11 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2). Alternative 1W-A has a lower percent of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

There are 71 surface water diversions within 0.5 mile of this segment. Alternative 1W-A has fewer surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

Segment 1W(a) would include 15 stream crossings on the Medicine Bow-Routt NFs (Table 3.16-5). Of these 15 crossings, all would be of ephemeral streams. There are no TMDL or 303(d) listed streams located on NFS lands. The alternative would not contain stream crossings on NFS lands. Segment 1W(c) would include 13 ephemeral stream crossings and 5 intermittent dry crossings. See Section 3.9 – Wetlands and Riparian Areas for effects on riparian zones. With the application of the SWPPP and Reclamation, Revegetation, and Maintenance Plan, construction is not expected to result in a reduction or loss of function for the streams within the Project area, due to the revegetation efforts and the measures to restrict sedimentation input to waterbodies. Site-specific crossing plans and measures to mitigate impacts will be submitted to the Medicine Bow-Routt NFs for approval prior to construction in these areas.

Groundwater

The overall risk to groundwater from construction and operations of Segment 1W and its alternative would be low because shallow groundwater does not underlie this segment (Table D.16-7 in Appendix D). Segment 1W(a) would contain 53 potable water wells and Segment 1W(c) would contain 65 potable water wells within 0.5 mile of the Proposed Route (Table D.16-10 in Appendix D). There would be more wells located near Alternative 1W-A than the comparison portion of the Proposed Route (56 wells versus 51 wells, respectively; Table D.16-10 in Appendix D). Three wells in the Segment 1 Analysis Area would be located in shallow bedrock within 200 feet of the route centerline, which may be affected by blasting due to proximity (Table 3.16-2).

Construction water usage for this segment would consist of approximately 1,700,000 gallons (5.3 acre-feet) over approximately one year of construction. Alternative 1W-A would use a comparable amount of water as the comparison portion of the Proposed Route (Table D.16-12 in Appendix D).

Operations

Segment 1W(a) would include 34 acres of operations disturbance area within 500 feet of perennial streams or 19 percent of the operations disturbance area, and 11 acres within 100 feet of ephemeral streams or 6 percent of the operations disturbance area (Table D.16-15 in Appendix D). Alternative 1W-A would have a total of 5 more acres of

disturbance within 500 feet of perennial streams and 1 acre within 100 feet of ephemeral streams than the comparison portion of the Proposed Route.

Approximately 18 and 12 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone for Segment 1W(a) and 1W(c), respectively (Table D.16-3 in Appendix D). Alternative 1W-A would have a lower percent of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

The operations disturbance area would not overlay shallow groundwater (Table D.16-8 in Appendix D).

Segment 2

Segment 2, as proposed, would link the Aeolus and Creston Substations in southeast Wyoming with two 500-kV circuits on one structure. One circuit would be operated at 230 kV during the initial phase of the Project. Its total proposed length is 96.7 miles. Fifty-two acres of the expansion of the Aeolus Substation and the construction of the Creston Substation and 0.5 acre for one regeneration site are attributed to Segment 2. There are three Route Alternatives, two of which are near the community of Fort Fred Steele. Alternative 2A at 28.4 miles long is being considered by the BLM because it remains in the WWE corridor nearer the town and the state historic site, and Alternative 2B, at 6.2 miles, is closer to the community than the comparison portion of the Proposed Route and was the initially proposed route before the Proponents responded to local suggestions and relocated the Proposed Route farther to the south. Alternative 2C is a 24.4-mile alternative located north of Hanna, Wyoming. It is being evaluated at the recommendation of the Wyoming Governor's office to follow a utility corridor approved by that office for minimizing effects to sage-grouse (see Appendix A, Figure A-3).

Construction

Surface Water

There would be 276 surface water crossings on the Proposed Route that would require an estimated 143 drive-through crossings, 105 fords, and 22 culverts for a total of 4 acres of disturbance (Table D.16-1 in Appendix D). Of the 276 crossings, 92 percent would be non-listed ephemeral streams and there would be no TMDL or 303(d) listed streams (Table D.16-6 in Appendix D). Only Alternative 2C contains fewer crossings, and culverts, and lower disturbance acreage than the comparison portion of the Proposed Route (Table D.16-1 in Appendix D).

A total of 102 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 7 percent of the construction disturbance area, and 122 acres would be located within 100 feet of ephemeral streams or 8 percent of the disturbance area (Table D.16-14 in Appendix D). Alternative 2C would have a total of 31 less acres of disturbance within 500 feet of perennial or intermittent streams and 33 less acres within 100 feet of ephemeral streams.

Approximately 13 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). All alternatives

would have higher percentages of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

There would be 36 surface water diversions within 0.5 mile of this segment. Alternative 2C would have fewer surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

Groundwater

The effects to groundwater in Segment 2 would be low because shallow groundwater does not underlie this segment (Table D.16-7 in Appendix D). There would be eight potable water wells within 0.5 mile of the proposed Segment 2 (Table D.16-10 in Appendix D). There would be more wells located near Alternative 2B than the comparison portion of the Proposed Route (12 wells and 1 well, respectively), and the same number located near Alternative 2A (3 wells; Table D.16-10 in Appendix D). There would be no wells located in shallow bedrock (Table 3.16-2); therefore, there would not be blasting near wells, and construction damage to the wells would not be expected under the Proposed Route or any of the Route Alternatives

An estimated 2,730,000 gallons (8.4 acre-feet) of water would be used for construction over a 1-year period. All Route Alternatives would use a similar amount of water as their comparison portions of the Proposed Route (Table D.16-12 in Appendix D).

The operations disturbance area would not overlay shallow groundwater (Table D.16-8 in Appendix D).

Operations

This segment would include 43 acres (11 percent) of operations disturbance area within 500 feet of perennial or intermittent streams, and 28 acres (7 percent) within 100 feet of ephemeral streams (Table D.16-15 in Appendix D). Alternative 2C would have 7 fewer acres of disturbance within 500 feet of perennial or intermittent streams and 6 fewer acres within 100 feet of ephemeral streams than the comparison portion of the Proposed Route.

Approximately 22 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). All alternatives would have higher percentages of disturbance area located within a flood zone than the comparison portions of the Proposed Route.

Segment 3

Segment 3, as proposed, would link the Creston and Anticline Substations in southeast Wyoming with two 500-kV circuits on one structure. One circuit would be operated at 230 kV during the initial phase of the Project. Its total proposed length between those two substations is 46.7 miles. Sixty-nine acres of the construction of the Anticline and Creston Substations are attributed to Segment 3. Segment 3 would also link the Anticline and Jim Bridger Substations with a 4.3-mile 230-kV line and a 5.5-mile 345-kV line and includes the 10-acre expansion of the Jim Bridger 345-kV Substation. There are no alternatives proposed along this segment (see Appendix A, Figure A-4).

Construction

There would be 127 stream crossings in this segment, requiring 52 drive-through crossings, 52 fords, and 20 culverts (Table D.16-1 in Appendix D). Approximately 66 percent of the crossings would be non-listed ephemeral drainages (Table D.16-6 in Appendix D). There would be no TMDL and 303(d) listed streams crossed by this segment.

There would be 27 surface water diversions along this segment (Table D.16-5 in Appendix D). Approximately 10 percent of the construction disturbance area and 10 percent of the operations disturbance area would be located within a moderate- to high-risk flood hazard area (Tables D.16-2 and D.16-3 in Appendix D).

A total of 111 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 13 percent of the construction disturbance area, and 63 acres would be located within 100 feet of ephemeral streams or 7 percent of the disturbance area (Table D.16-14 in Appendix D).

Three potable water wells would be located within the Segment 3 Analysis Area and 2 are located within 200 feet of the centerline in shallow bedrock and therefore at risk of damage during blasting (Table 3.16-2). Over an estimated 1.1-year construction interval, an estimated 1,700,000 gallons (5.1 acre-feet) of water would be required (Table D.16-12 in Appendix D).

Operations

The operations disturbance area would not overlay shallow groundwater (Table D.16-8 in Appendix D). This segment would include 19 acres of operations disturbance area within 500 feet of perennial or intermittent streams, or 9 percent of the operations disturbance area. Approximately 18 acres would be located within 100 feet of ephemeral streams, or 8 percent of the operations disturbance (Table D.16-15 in Appendix D).

Segment 4

Segment 4, as proposed, would link the Anticline Substation near the Jim Bridger Power Plant in southwestern Wyoming with the Populus Substation in Idaho with two 500-kV circuits on one structure. Its total proposed length is 203 miles. Eighty-nine acres of the construction of the Anticline Substation and the expansion of the Populus Substation and 1.5 acres for three regeneration sites are attributed to Segment 4. It has six Route Alternatives in the middle portion of its route but the first 52 miles to the east and the last 61 miles to the west (in Idaho) do not have any Route Alternatives. The middle section of the Proposed Route is 90.2 miles long, and its Route Alternatives vary from 85 to 102 miles long. These alternatives were proposed by the Wyoming Governor's office (4A, paralleling the existing 345-kV lines throughout); by the BLM Kemmerer FO (4B through 4E, including edits from various cooperating agencies), with the intent to avoid impacts to cultural resources to the extent practical; and by the Proponents (4F, attempting to avoid impacts to cultural resources while still remaining north of the existing lines) (see Appendix A, Figures A-5 and A-6).

Construction

Surface Water

There would be 414 surface water crossings on the Proposed Route that would require an estimated 154 drive-through crossings, 179 fords, and 38 culverts for a total of 6 acres of disturbance (Table D.16-1 in Appendix D). Of the 414 crossings, 69 percent would be non-listed ephemeral streams and there are 3 TMDL or 303(d) listed ephemeral streams for sediment (Table D.16-6 in Appendix D). Alternative 4F would contain fewer stream crossings, fords, and drive-through crossings but more culverts than the comparison portion of the Proposed Route (Table D.16-1 in Appendix D).

A total of 327 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 11 percent of the construction disturbance area, and 184 acres would be located within 100 feet of ephemeral streams or 7 percent of the disturbance area (Table D.16-14 in Appendix D). No alternative would have less acres of disturbance within 500 feet of perennial or intermittent streams than the comparison portion of the Proposed Route; however, Alternatives 4A and 4F would have 42 and 32 fewer acres, respectively, within 100 feet of ephemeral streams than the comparison portion of the Proposed Route, and the same disturbance acreage (5 acres) located within 500 feet of a TMDL or 303(d) listed stream for sediment.

There is no woody vegetation that is located within 500 feet of a temperature-impaired stream that would be disturbed due to construction of the Proposed Route (Table 3.16-4).

Approximately 25 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). All alternatives have less acreage located within a flood zone than the comparison portion of the Proposed Route.

There would be 121 surface water diversions within 0.5 mile of this segment. All alternatives would have more surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

This segment would include 24 stream crossings on the Caribou-Targhee NF (Table 3.16-5). Of these 24 stream crossings, 9 would be intermittent, and 15 would be perennial. There would be no TMDL or 303(d) listed streams located on NFS lands and none of the alternatives would include stream crossings on NFS land. See Section 3.9 – Wetlands and Riparian Areas for effects on riparian zones. With the application of the SWPPP and Reclamation, Revegetation, and Maintenance Plan, construction is not expected to result in a reduction or loss of function for the streams within the Project area, due to the revegetation efforts and the measures to restrict sedimentation input to waterbodies. Site-specific crossing plans and measures to mitigate impacts will be submitted to Caribou-Targhee NF for approval prior to construction in these areas.

Groundwater

Of the total number of wells within the Segment 4 Analysis Area, 59 percent would occur in shallow bedrock. However, none of the wells would be within 200 feet of the route centerline. There would be 23 potable water wells within 0.5 mile of the proposed Segment 4 (Table D.16-10 in Appendix D). All Route Alternatives would have more

potable wells within 0.5 mile than the comparison portion of the Proposed Route, the greatest number being under Alternatives 4C and 4E (12 potable wells). Therefore, the potential for well damage would be greater under the Route Alternatives than the Proposed Route.

Approximately 5 percent of the Segment 4 Analysis Area is underlain by shallow groundwater (less than or equal to 13 feet deep; Table D.16-7 in Appendix D). All of the alternatives in Segment 4 would affect more acres of shallow groundwater during construction than the Proposed Route. However, given its rarity along the segment and the Project SPCC Plan (Appendix C-1, Attachment C), risk of accidental contamination or sedimentation of groundwater during construction would be low.

Segment 4, the longest segment, would be constructed over a 2-year period and would require an estimated 5,900,000 gallons (8.1 acre-feet) of construction water. The Route Alternatives would use a comparable amount of water as the comparison portion of the Proposed Route (Table D.16-12 in Appendix D).

Operations

This segment would include 68 acres of operations disturbance area within 500 feet of perennial or intermittent streams, or 11 percent of the operations disturbance area. Approximately 40 acres would be located within 100 feet of ephemeral streams, or 6 percent of the operations disturbance (Table D.16-15 in Appendix D). No alternatives would have less acres of disturbance within 500 feet of perennial and intermittent streams. Alternatives 4A and 4F would have 7 and 6 fewer acres, respectively, within 100 feet of ephemeral streams than the comparison portion of the Proposed Route and each would have about the same acres of disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment.

There is no woody vegetation that is located within 500 feet of a temperature-impaired stream that would be disturbed due to operation of the Proposed Route or alternatives (Table 3.16-4).

Approximately 21 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). All the alternatives would have similar acreage and all would have less disturbance area located within a flood zone than the comparison portion of the Proposed Route.

There would be shallow groundwater in approximately 4 percent of the operations disturbance area of this segment. All Route Alternatives would have similar acreage of shallow groundwater.

Segment 5

Segment 5, as proposed, would link the Populus and Borah Substations with a 54.6-mile single-circuit 500-kV line. Forty-four acres of the expansion of the Populus and Borah Substations are attributed to Segment 5. There are five Route Alternatives including two proposed by the BLM to avoid the Deep Creek Mountains (5A and 5B; 8 miles and 19 miles longer than the comparison portion of the Proposed Route), one preferred by Power County that crosses the Fort Hall Indian Reservation (5C; 6 miles shorter than the comparison portion of the Proposed Route), one originally proposed by the Proponents (5D; 2 miles shorter than the comparison portion of the Proposed Route

but located within more agricultural lands), and one proposed by Power County as an alternative approach to the Borah Substation (5E) (see Appendix A, Figure A-7).

Construction

Surface Water

There would be 177 surface water crossings on the Proposed Route that would require an estimated 91 drive-through crossings, 39 fords, and no culverts for a total of 1 acre of disturbance (Table D.16-1 in Appendix D). Of the 177 crossings, 73 percent would be non-listed ephemeral streams and there would be 40 TMDL or 303(d) listed ephemeral streams for sediment (Table D.16-6 in Appendix D). Alternative 5A would contain fewer stream crossings, drive-through crossings, and fords than the comparison portion of the Proposed Route; however, it would contain 15 culverts, more than all other alternatives or the comparison portion of the Proposed Route (Table D.16-1 in Appendix D).

A total of 0.2 acre of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 0.02 percent of the construction disturbance area, and 118 acres would be located within 100 feet of ephemeral streams or 12 percent of the disturbance area (Table D.16-14 in Appendix D). Alternative 5E would have no disturbance within 500 feet of perennial or intermittent streams, the same as the comparison portion of the Proposed Route, and 2 fewer acres within 100 feet of ephemeral streams than the comparison portion of the Proposed Route, and no acres of disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment.

There would be no woody vegetation located within 500 feet of a temperature-impaired stream that would be disturbed due to construction of this segment or alternatives (Table 3.16-4).

Approximately 37 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). All alternatives would have a higher percentage of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

There would be 130 surface water diversions within 0.5 mile of this segment. Alternative 5E would have fewer surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

Groundwater

Approximately 1 percent of Segment 5 would be underlain by shallow groundwater (Table D.16-7 in Appendix D). Disturbance effects to areas with shallow groundwater during construction would be greater under Alternatives 5A and 5C than the comparison portions of the Proposed Route (Table D.16-7 in Appendix D). Alternatives 5D and 5E would not cross areas of shallow groundwater; however, given its rarity along the segment and the Project SPCC Plan (Appendix C-1, Attachment C), risk of accidental contamination or sedimentation of groundwater during construction would be low.

Segment 5 would cross 2.3 miles of the ESRP Aquifer, or about 4 percent of the Proposed Route length (Table D.16-11 in Appendix D). This Project would be almost entirely above ground and the productive portion of this aquifer is much deeper than any

Project foundation. Alternatives 5D and 5E would also cross this aquifer to the same extent as the comparison portion of the Proposed Route.

Approximately 5 percent of all the wells in the Analysis Area for Segment 5 are in shallow bedrock and none within 200 feet of the route centerline; therefore, risk of well damage due to blasting along Segment 5 would be low (Table 3.16-2). There would be 38 potable water wells within 0.5 mile of the Proposed Route. There would be a similar number of potable wells within 0.5 mile of the alternatives as the comparison portions of the Proposed Route, except Alternative 5D, where there would be 25 wells within 0.5 mile compared to 10 wells along the comparison portion of the Proposed Route (Table D.16-10 in Appendix D). Therefore, risk of well damage would be lower under the alternatives, with the exception of Alternative 5D, than under the Proposed Route.

Project construction would require about 1,600,000 gallons (5.0 acre-feet) of water over a 1-year period. The Route Alternatives would use about the same amount of water as the comparison portion of the Proposed Route (Table D.16-12 in Appendix D).

Operations

This segment would include 0.1 acre of operations disturbance area within 500 feet of perennial or intermittent streams, or 0.04 percent of the operations disturbance area. Approximately 28 acres would be located within 100 feet of ephemeral streams, or 16 percent of the operations disturbance (Table D.16-15 in Appendix D). Alternative 5E would have 0 acres of disturbance within 500 feet of perennial and intermittent streams, 1 acre within 100 feet of ephemeral streams, and 0 acres of disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment, same as the comparison portion of the Proposed Route.

There would be no woody vegetation located within 500 feet of a temperature-impaired stream that would be disturbed due to operations of the Proposed Route or Route Alternatives (Table 3.16-4).

Approximately 28 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). All alternatives would have a higher percentage of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

During operations, the number of acres of disturbance to areas with shallow groundwater would be similar to the Proposed Route, Alternatives 5A, 5C, and the comparison portions of the Proposed Route (Table D.16-8 in Appendix D). There would be no underlying shallow groundwater in Alternatives 5B, 5D, or 5E.

Segment 6

Segment 6 is an existing transmission line linking the Borah and Midpoint Substations; it is now operated at 345 kV but would be changed to operate at 500 kV. This segment has no Route Alternatives. Existing support structures would be used and impacts would be limited to within approximately 0.25 mile from each substation to allow for moving the entry point into the substation to the new 500-kV bay. Thirty-one acres of the expansion of the Borah and Midpoint Substations are attributed to Segment 6. Changes in the two substations would allow it to be operated at 500 kV (see Appendix A, Figure A-8).

Construction

Surface Water

A total of zero acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams, 3 acres would be located within 100 feet of ephemeral streams, or 5 percent of the construction disturbance area, and 0 acres of disturbance would be within 500 feet of a TMDL or 303(d) listed stream for sediment (Table D.16-14 in Appendix D). Approximately 32 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). There would be five surface water diversions within 0.5 mile of this segment (Table D.16-5 in Appendix D).

Groundwater

The Proposed Route would have three potable water wells within 0.5 mile of the centerline (Table D.16-10 in Appendix D). The entire length of the Proposed Route (0.5 miles) would cross the ESRP Aquifer (Table D.16-11 in Appendix D).

Operations

This segment would include zero acres of operations disturbance area within 500 feet of perennial or intermittent streams, 3 acres within 100 feet of ephemeral streams, or 5 percent of the operations disturbance area, and 0 acres of disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment (Table D.16-15 in Appendix D). Approximately 30 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). The operations disturbance area for Segment 6 would not overlay shallow groundwater (Table D.16-8 in Appendix D).

Segment 7

Segment 7, as proposed, would link the Populus and Cedar Hill Substations with a 118.1-mile single-circuit 500-kV line. Forty-two acres of the expansion of the Populus and the construction of the Cedar Hill Substations and 1 acre for two regeneration sites are attributed to Segment 7. In addition to the Proposed Route, which is principally on private lands, Route Alternatives have been proposed by the BLM to avoid the Deep Creek Mountains (7A and 7B, which are 5 miles and 11 miles longer than the comparison portion of the Proposed Route), by local landowners (7C, 7D, 7E, 7F, and 7G, which all represent minor adjustments proposed to address local issues), by local landowners to avoid private agricultural lands (7I or the State Line Route, which is 55 miles longer than the Proposed Route and would require 0.5 acre for an additional regeneration site), and by the Proponents to avoid the State Line Route (7H, which is 10 miles longer than the Proposed Route). Alternative 7J, which is a variant of the State Line Route also proposed by local landowners, would not terminate at the Cedar Hill Substation. This alternative, referred to as the Rogerson Alternative, would require a different substation be constructed near a 345-kV existing transmission line (approximately 24 miles southwest of the Cedar Hill Substation; see Appendix A, Figure A-9). The tables and discussion in this document compare 7J (202 miles) with the corresponding portion of Segment 7/9 (118.1 miles of Segment 7 and 25.8 miles of Segment 9, for a total of 143.9 miles). All other Segment 7 alternatives are compared to Segment 7 of the Proposed Route (118.1 miles) only.

Construction

Surface Water

There would be 209 surface water crossings on the Proposed Route that would require an estimated 50 drive-through crossings, 73 fords, and 35 culverts for a total of 5 acres of disturbance (Table D.16-1 in Appendix D). Of the 209 crossings, 59 percent would be non-listed ephemeral streams and there would be 15 TMDL or 303(d) listed ephemeral streams for sediment (Table D.16-6 in Appendix D). Only Alternative 7F would contain fewer stream crossings, fords, culverts, and lower disturbance acreage than the comparison portion of the Proposed Route.

A total of 193 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 11 percent of the construction disturbance area, and 104 acres would be located within 100 feet of ephemeral streams or 6 percent of the disturbance area (Table D.16-14 in Appendix D). Alternative 7G would have zero acres of disturbance within 500 feet of perennial or intermittent streams, same as the comparison portion, and 3 less acres within 100 feet of ephemeral streams than the comparison portion of the Proposed Route. However, it would have 5 more acres of construction disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment than the comparison portion of the Proposed Route. Alternatives 7D and 7E are approximately the same as the comparison portions of the Proposed Route, with similar acres of disturbance within 500 feet and 100 feet of streams, and no acres within 500 feet of TMDL or 303(d) listed streams for sediment.

The Proposed Route and most of the Route Alternatives do not include disturbance due to construction of woody vegetation within 500 feet of a temperature-impaired stream (Table 3.16-4). Alternative 7J would include 3.9 acres of disturbance of woody vegetation within 500 feet of four temperature-impaired streams: South Hannahs Fork, Willow Spring Creek, Middle Fork Hannahs Fork, and Little Piney Creek.

Approximately 22 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). All of the Route Alternatives would have a lower percentage of disturbance area located within a flood zone than the comparison portions of the Proposed Route.

There would be 700 surface water diversions within 0.5 mile of this segment. Alternatives 7H and 7I would have a higher number of surface water diversions than the comparison portions of the Proposed Route (Table D.16-5 in Appendix D).

Alternative 7H would include 68 stream crossings on the Caribou-Targhee NF (Table 3.16-5). Of these 68 stream crossings, 1 would be intermittent-wet, 25 would be intermittent-dry, and 42 would be ephemeral. There would be no TMDL or 303(d) listed streams located on NFS lands along Alternative 7H. Alternative 7I would include 115 stream crossings on the Sawtooth NF (Table 3.16-5) consisting of 106 non-TMDL/303(d) streams, and 9 TMDL or 303(d) listed streams. The 106 non-TMDL/303(d) streams along Alternative 7I would consist of 9 perennial, 5 intermittent-wet, 27 intermittent-dry, and 65 ephemeral streams. There would be 3 perennial TMDL or 303(d) listed streams for sediment along Alternative 7I. There would be 2 perennial, 1 intermittent-dry, and 3 ephemeral TMDL or 303(d) listed streams for temperature along Alternative 7I. Alternative 7J would include 88 total stream crossings on the

Sawtooth NF, consisting of 82 non-TMDL/303(d) streams, and 6 TMDL or 303(d) listed streams. Of the 82 non-TMDL/303(d) streams, 1 would be intermittent-west, 27 intermittent-dry, and 54 ephemeral. There would be no TMDL or 303(d) sediment listed streams located on NFS lands along Alternative 7J; however, the number of TMDL or 303(d) temperature listed streams along Alternative 7J is the same as Alternative 7I. See Section 3.9 – Wetlands and Riparian Areas for effects on riparian zones. With the application of the SWPPP and Reclamation, Revegetation, and Maintenance Plan, construction is not expected to result in a reduction or loss of function for the streams within the Project area, due to the revegetation efforts and the measures to restrict sedimentation input to waterbodies. Site-specific crossing plans and measures to mitigate impacts will be submitted to Sawtooth NF for approval prior to construction in these areas.

Groundwater

Approximately 11 percent of Segment 7 would be underlain by shallow groundwater (Table D.16-7 in Appendix D). Disturbance effects to areas with shallow groundwater during construction would be less under all of the Route Alternatives than the comparison portions of the Proposed Route (Table D.16-7 in Appendix D). However, given its rarity along the segment and the Project SPCC Plan (Appendix C-1, Attachment C), risk of accidental contamination or sedimentation of groundwater during construction would be low.

About 29 miles of Segment 7 would cross the ESRP Aquifer (Table D.16-11 in Appendix D). Alternatives 7E, 7F, 7H, 7I, and 7J would cross fewer miles of the aquifer than the comparison portion of the Proposed Route (Alternative 7F would not cross it at all). Alternative 7G would cross more miles of the aquifer than the comparison portion of the Proposed Route.

Roughly 30 percent of all the water wells in the Segment 7 Analysis Area would occur with shallow bedrock, 12 of which would be within 200 feet of the centerline and thus at most risk of damage due to blasting (Table 3.16-2). This segment would contain 81 potable water wells within 0.5 mile of the Proposed Route (Table D.16-10 in Appendix D). Alternatives 7A, 7B, 7C, and 7D would contain more potable water wells than the comparison portion of the Proposed Route. Alternatives 7E, 7F, 7H, 7I, and 7J would contain fewer potable wells than the comparison portion of the Proposed Route.

Construction of the Proposed Route along Segment 7 would require about 3,500,000 gallons (10.8 acre-feet) of water over a 1.3-year period. The Route Alternatives would use about the same amount of water during construction as the comparison portion of the Proposed Route, with the exception of Alternatives 7I and 7J, which would require 5,000,000 gallons (15.9 acre-feet) and 6,000,000 gallons (18.5 acre-feet), respectively. (Table D.16-12 in Appendix D).

Operations

This segment would include 22 acres of operations disturbance area within 500 feet of perennial or intermittent streams, or 9 percent of the operations disturbance area. Approximately 19 acres would be located within 100 feet of ephemeral streams, or 8 percent of the operations disturbance (Table D.16-15 in Appendix D). Alternatives 7C, 7D, 7E, 7F, and 7G would have similar acres of disturbance within 500 feet of perennial

and intermittent streams, similar acres within 100 feet of ephemeral streams, and similar acres within 500 feet of TMDL or 303(d) listed streams for sediment than the comparison portions.

The Proposed Route and most of the Route Alternatives would not include operations disturbance due of woody vegetation within 500 feet of a temperature-impaired stream (Table 3.16-4). Alternative 7J would include 0.6 acre of disturbance of woody vegetation.

Approximately 15 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). Alternatives 7E, 7F, and 7G would not include operations disturbance area within a flood zone. Alternatives 7A, 7B, 7H, 7I, and 7J would include less operations disturbance within a flood zone than the comparison portions of the Proposed Route.

There would be shallow groundwater in approximately 6 percent of the operations disturbance area of this segment. Alternatives 7C, 7D, 7E, 7F, and 7G would not overlay shallow groundwater. Alternatives 7A, 7B, 7H, 7I, and 7J would overlay shallow groundwater and have less acreage of shallow groundwater than the comparison portions of the Proposed Route (Table D.16-8 in Appendix D).

Segment 8

Segment 8, as proposed, would link the Midpoint and Hemingway Substations. This 131-mile single-circuit 500-kV transmission line would stay north of the Snake River until crossing through the SRBOP parallel to an existing 500-kV transmission line before ending at the Hemingway Substation. Thirteen acres of the expansion of the Midpoint Substation and 0.5 acre for a regeneration site are attributed to Segment 8. There are five Route Alternatives: 8A, which follows the WWE corridor but crosses the Snake River and I-84 twice (while the Proposed Route would stay north of this area); 8B and 8C, which represent the old routes originally proposed by the Proponents but that have now been changed to avoid the cities of Kuna and Mayfield, respectively; 8D, which represents a small revision involving a rebuild of the existing transmission line to move both away from the National Guard Maneuver Area; and 8E, which was proposed by the BLM in order to avoid crossing the Halverson Bar nonmotorized portion of the Guffey Butte-Black Butte Historical Area (see Appendix A, Figure A-10).

Construction

Surface Water

There would be 259 surface water crossings on the Proposed Route that would require an estimated 113 drive-through crossings, 66 fords, and 3 culverts for a total of 1 acre of disturbance (Table D.16-1 in Appendix D). Of the 259 crossings, 61 percent are non-listed ephemeral streams and there are 30 TMDL or 303(d) listed ephemeral streams (Table D.16-6 in Appendix D). Alternative 8B contains 94 fewer stream crossings, 24 fewer fords, and 42 fewer drive-through crossings than the comparison portion of the Proposed Route.

A total of 111 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 5 percent of the construction disturbance area, and 103 acres would be located within 100 feet of ephemeral streams or 5 percent

of the disturbance area (Table D.16-14 in Appendix D). Alternative 8A would have a total of 30 less acres of disturbance within 500 feet of perennial or intermittent streams and 3 more acres within 100 feet of ephemeral streams, and 12 less acres disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment than the comparison portion of the Proposed Route.

Approximately 0.2 acre of woody vegetation located within 500 feet of a temperature-impaired stream would be disturbed due to construction along this segment (Table 3.16-4). Only Alternative 8B would include construction disturbance within the 500-foot buffer with 0.01 acre disturbed. No other alternatives or comparison portions would contain disturbance of woody vegetation within 500 feet of a temperature-impaired stream.

There is no woody vegetation that is located within 500 feet of a temperature-impaired stream that would be disturbed due to construction of the Proposed Route or alternatives (Table 3.16-4).

There would be 327 surface water diversions within 0.5 mile of this segment. All alternatives except 8E would have a higher number of surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

Groundwater

Approximately 73 percent of all the wells in the Segment 8 Analysis Area are located in shallow bedrock, 6 of which are within 200 feet of the centerline and would be most at risk of damage due to blasting (Table 3.16-2). Along Segment 8 there would be 176 potable water wells within 0.5 mile of the Proposed Route. All of the Route Alternatives would have more potable water wells within 0.5 mile than the comparison portions of the Proposed Route (Table D.16-10 in Appendix D). Therefore, risk of well damage due to blasting would be higher under any of the Route Alternatives than the comparison portions of the Proposed Route.

Segment 8 would cross 42.5 miles of the ESRP Aquifer, or about 32 percent of the Proposed Route length (Table D.16-11 in Appendix D). This Project would be almost entirely above ground and the productive portion of this aquifer is much deeper than any Project foundation. Alternative 8A would cross fewer miles of the aquifer than the comparison portion of the Proposed Route. No other alternatives would cross the aquifer.

Project construction along Segment 8 would require about 3,800,000 gallons (1.7 acre-feet) of water over a 14-month period. The Route Alternatives would use about the same amount of water as their comparison portions of the Proposed Route except for Alterative 8E, which would use approximately 334,000 more gallons (1 acre-feet) than the comparison portion (Table D.16-12 in Appendix D).

Operations

This segment would include 18 acres of operations disturbance area within 500 feet of perennial or intermittent streams, or 7 percent of the operations disturbance area. Approximately 16 acres would be located within 100 feet of ephemeral streams, or 7 percent of the operations disturbance (Table D.16-15 in Appendix D). Alternative 8A would have a total of 5 less acres of disturbance within 500 feet of perennial and

intermittent streams, a similar number of acres within 100 feet of ephemeral streams, and the same number of acres of disturbance within 500 feet of TMDL or 303(d) listed streams for sediment than the comparison portion of the Proposed Route.

There is no woody vegetation that is located within 500 feet of a temperature-impaired stream that would be disturbed due to operations of the Proposed Route or alternatives (Table 3.16-4).

Approximately 16 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). Alternative 8A would have a lower percentage of disturbance area located within a flood zone than the comparison portion of the Proposed Route.

Segment 8 operations disturbance would not overlay shallow groundwater (Table D.16-8 in Appendix D).

Segment 9

Segment 9, as proposed, would link the Cedar Hill and Hemingway Substations with a 161.7 mile single-circuit 500-kV transmission line which skirts the Jarbidge and Owyhee Military Operating Areas to the north, then follows the WWE corridor just north of the Saylor Creek Air Force Range, passing through Owyhee County before entering into the Hemingway Substation. Fifteen acres of the construction of the Cedar Hill Substation and 1 acre for two regeneration sites are attributed to Segment 9. There are eight Route Alternatives proposed, including 9A, which was the Proponents' Proposed Route until moving to avoid the Hollister area; 9B, which is being considered by the BLM because it follows the WWE corridor and parallels existing utility corridors; 9C, which was the Proponents' Proposed Route until moving to avoid the Castleford area; and 9D and 9E, proposed by the Owyhee County taskforce, that cross more public lands north and south of the Proposed Route, respectively, than the Proposed Route. Most of Alternative 9D would be within the SRBOP. Alternatives 9F, 9G, and 9H were proposed to avoid crossing the nonmotorized area south of C.J. Strike Reservoir. Alternatives 9G and 9H provide an alternate route location south of Alternative 8E (see Appendix A, Figure A-11).

Construction

Surface Water

There would be 322 surface water crossings on the Proposed Route that would require an estimated 111 drive-through crossings, 92 fords, and 25 culverts for a total of 4 acres of disturbance (Table D.16-1 in Appendix D). Of the 322 crossings, 59 percent would be non-listed ephemeral streams and there would be 16 TMDL or 303(d) listed streams for sediment and 4 TMDL or 303(d) listed streams for temperature (Table D.16-6 in Appendix D). Alternative 9E would be the only alternative with more stream crossings.

A total of 131 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams or 5 percent of the construction disturbance area, and 120 acres would be located within 100 feet of ephemeral streams or 5 percent of the disturbance area (Table D.16-14 in Appendix D). Alternative 9D would have a total of 25 fewer acres of disturbance within 500 feet of perennial or intermittent streams and 34 fewer acres within 100 feet of ephemeral streams than the comparison portion of

the Proposed Route, and 3 fewer acres of disturbance area within 500 feet of a TMDL or 303(d) listed stream for sediment.

Less than 0.1 acre of woody vegetation located within 500 feet of a temperature-impaired stream would be disturbed due to construction of Alternatives 9F, 9G, or 9H, and no acres would be disturbed in the Proposed Route or any other Route Alternative (Table 3.16-4).

Approximately 19 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). All Route Alternatives would have similar percentages disturbance area located within a flood zone than the comparison portions of the Proposed Route.

There are 724 surface water diversions within 0.5 mile of this segment. Alternatives 9D, 9E, 9F, 9G, and 9H would have fewer surface water diversions than the comparison portion of the Proposed Route (Table D.16-5 in Appendix D).

Groundwater

The construction disturbance area for Segment 9 and the Route Alternatives would not overlay shallow groundwater (Table D.16-7 in Appendix D). Approximately 8.4 miles, or 5 percent, of the Proposed Route along Segment 9 would be located on the ESRP Aquifer. Alternatives 9A would cross fewer miles than the comparison portion of the Proposed Route. No other alternative would cross the aquiver (Table D.16-11 in Appendix D).

Approximately 75 percent all the wells within the Segment 9 Analysis Area would occur over shallow bedrock; one of the wells would be within 200 feet of the centerline and would be most at risk of damage from blasting (Table 3.16-2). Along the Proposed Route there would be 88 potable water wells within 0.5 mile of the centerline (Table D.16-10 in Appendix D). More wells would be located near Alternatives 9B and 9C than the comparison portions of the Proposed Route, and fewer wells would be near Alternatives 9A, 9D, 9E, 9F, 9G, and 9H (Table D.16-10 in Appendix D). Thus, the potential for well damage due to blasting would be greater than the comparison portion of the Proposed Route under Alternatives 9B and 9C, and less than the comparison portion of the Proposed Route under Alternatives 9A, 9D, and 9E.

Segment 9 would be constructed over a 17-month period and would require an estimated 4,700,000 gallons (14.3 acre-feet) of construction water. All of the alternatives would use about the same amount of water as the comparison portion of the Proposed Route (Table D.16-12 in Appendix D).

Operations

This segment would include 21 acres of operations disturbance area within 500 feet of perennial or intermittent streams, or 6 percent of the operations disturbance area. Approximately 23 acres would be located within 100 feet of ephemeral streams, or 7 percent of the operations disturbance (Table D.16-15 in Appendix D). Alternative 9D would have a total of 3 fewer acres of disturbance within 500 feet of perennial and intermittent streams and 7 fewer acres within 100 feet of ephemeral streams, and 1 less acre of disturbance within 500 feet of a TMDL or 303(d) listed stream for sediment than the comparison portion of the Proposed Route.

Less than 0.1 acre of woody vegetation located within 500 feet of a temperature-impaired stream would be disturbed due to operations of Alternatives 9F, 9G, or 9H, and no acres would be disturbed in the Proposed Route or any other alternative (Table 3.16-4).

Approximately 17 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in Appendix D). All alternatives have percentages of disturbance area located within a flood zone similar to those of the comparison portion of the Proposed Route.

The operations disturbance area for Segment 9 and its Route Alternatives would not overlay shallow groundwater (Table D.16-8 in Appendix D).

Segment 10

Segment 10, as proposed, would link the Cedar Hill and Midpoint Substations with a 33.6-mile single-circuit 500-kV line, following a WWE corridor for most of its distance. Twenty-eight acres of the expansion of the Midpoint Substation and of the construction of the Cedar Hill Substation are attributed to Segment 10. There are no Route Alternatives proposed along this segment (see Appendix A, Figure A-12).

Construction

Surface Water

There would be 16 surface water crossings on the Proposed Route and 9 artificial waterways that would need to be avoided (Table D.16-1 in Appendix D). Eight would be non-listed ephemeral streams (Table D.16-6 in Appendix D).

A total of 25 acres of construction disturbance for this segment would be located within 500 feet of perennial or intermittent streams and 19 acres would be located within 100 feet of ephemeral streams (Table D.16-14 in Appendix D). Approximately 9 percent of the construction disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-2 in Appendix D). There would be 145 surface water diversions within 0.5 mile of this segment.

Groundwater

Of all the wells within the Segment 10 Analysis Area, approximately 17 percent would occur in shallow bedrock and two of the wells would be within 200 feet of the route centerline (Table 3.16-2); therefore, the risk of well damage along this segment would be low. The Proposed Route would have 55 potable water wells within 0.5 mile of the centerline (Table D.16-10 in Appendix D). The entire length of the Proposed Route (33.6 miles) would cross the ESRP Aquifer (Table D.16-11 in Appendix D). Construction along Segment 10 would be expected to take less than one year, and require about 1,000,000 gallons (3.1 acre-feet) of construction water (Table D.16-12 in Appendix D).

Operations

This segment would include 1 acre of operations disturbance area within 500 feet of perennial or intermittent streams, and 2 acres within 100 feet of ephemeral streams (Table D.16-15 in Appendix D). Approximately 7 percent of the operations disturbance area would be located within the moderate- and high-risk flood zone (Table D.16-3 in

Appendix D). The operations disturbance area for Segment 10 would not overlay shallow groundwater (Table D.16-8 in Appendix D).

3.16.2.4 Design Variation

A Design Variation is being considered that would consist of constructing two single-circuit lines in Segments 2 through 4 instead of a single double-circuit line (which is the design assessed above). The disturbance footprint of the two single-circuit towers is greater than that of the double-circuit tower, in part because the requested ROW would be wider, but also because helicopter-assisted construction could be implemented in these areas due to the lighter weight of the towers, which would require additional fly yards. The additional ROW space and the fly yards would cause additional temporary disturbance during construction. Across Segments 2, 3, and 4, the additional disturbance of the single-circuit tower alternative ranges from 25 to 30 percent greater than the comparable portions of the double-circuit tower disturbance under the proposed design. The two single circuits require more ground disturbance, but would be designed and constructed to the same standards as the Proposed Action.

The vast majority of impacts to water resources would result from access road crossings, and there would be no difference in access roads with respect to water crossings between the Proposed Action and Design Variation. Impacts to water resources from vegetation management in riparian areas would be slightly larger because the border zone is slightly wider for the Design Variation. The Design Variation would have less disturbance acreage located within the moderate to high flood hazard areas than the Proposed Action (Table D.16-4 in Appendix D). The Design Variation Segment 4 would have more disturbance acreage located above shallow groundwater than the Proposed Action (Table D.16-9 in Appendix D). The Design Variation would have more disturbance acreage located within 500 feet of perennial and intermittent streams and 100 feet of ephemeral streams than the Proposed Action (Table D.16-16 in Appendix D).

3.16.2.5 Structure Variation

The proposed guyed Structure Variation would add four guy wires about 140 feet long from a point about 100 feet up in each tower to four guy anchors spaced in a square around the tower (Appendix B, Figure B-6). This would not change the amount of disturbance during construction or operations appreciably. Extra care would be needed where towers are near wetland and riparian areas to avoid placing guy wires in these areas. Self-supporting lattice towers would be used if, as a result, it would be possible to avoid impacts to wetland or riparian impacts. Therefore, there is no appreciable difference in impact on water resources from the use of this Structure Variation when compared to the use of self-supporting lattice towers.

3.16.2.6 Schedule Variation

The Schedule Variation uses the two single-circuit Design Variation described above but extends construction over a longer timeframe. Initially, only one of the eventual two single-circuit lines would be constructed with the second to be constructed at a later date. The Schedule Variation proposes that the first single-circuit transmission line in Segments 2, 3, and 4 would be built as soon as a ROW grant is issued, but that the second line would not begin construction until late 2018. This would mean nearly

2 years between the end of construction for the first line and beginning of construction for the second line. Any staging areas and fly yards that had been used for the first stage would have been revegetated after construction was complete and would have to be cleared again. There would be two sets of construction disturbances adding movement, noise, and dust to the area of construction in two instances in any given area.

The Schedule Variation would therefore have essentially double the adverse indirect impacts on adjacent habitats and populations as the simultaneous construction or double-circuit alternative, even though direct habitat disturbance overall would not be any greater.

3.16.3 Mitigation Measures

To minimize or avoid impacts on water resources, the Proponents have committed to EPMs that would be implemented Project-wide as outlined in this section and in Appendix C.

The following mitigation measures were identified by the Agencies and have been adopted by the Proponents.

WQA-1 Avoid placement of road bed material in channels (perennial, intermittent or ephemeral). Road bed material contains considerable fines that would create sedimentation in coarse cobble dominated stream channels. Even in seasonally dry reaches those fines could be transported during flow periods and negatively impact fish spawning reaches below.

WQA-2 On federal lands, consult with appropriate land management agency staff prior to siting and design for stream crossings (location, alignment, and approach for culvert, drive-through, and ford crossings). This may include a hydrologist, engineer and, for perennial and many intermittent streams, an aquatic biologist.

WQA-3 All culverts on NFS lands, both permanent and temporary, shall be designed and installed to meet desired conditions for riparian and aquatic species as identified in the applicable Forest Plan. Culverts should not be hydraulically controlled. Hydraulically controlled culverts create passage problems for aquatic organisms. Culvert slope should not exceed stream gradient and should be designed and implemented (typically by partial burial in the streambed) to maintain streambed material in the culvert.

WQA-4 Culvert sizing on Region 2 of NFS lands shall also comply with *Guidance for Aquatic Species Passage Design, Forest Service Northern Region & Intermountain Region* (Forest Service 2003f) , and culvert sizing on BLM-administered lands shall comply with BLM Manual 9113.

The Proponents have agreed to the following measure:

WQA-5 On non-federal lands, culvert placement should comply with state BMPs. The minimum size culvert will be 12 inches in diameter. If a channel width exceeds 3 feet, additional pipes may be used until the cross sectional area of the pipes is greater than 60 percent of the cross sectional area of the

existing channel. Filter cloth should be placed on the streambed and banks prior to placement of the pipe, and the culvert should be covered with a minimum of 1 foot of aggregate.