3.12 WATER AND WETLAND RESOURCES

This section addresses the potential effects of the proposed project on water and wetland resources within the general project area. Water resources are discussed first followed by a discussion of wetland resources. Fish resources are discussed in Section 3.3.

3.12.1 Environmental Setting

The proposed project traverses 10 counties in Idaho and 9 counties in Montana. Private, state, and federal jurisdictional lands are crossed in both states, including lands managed by the BLM, USFS, State of Idaho, State of Montana, U.S. Sheep Experiment Station, Idaho National Laboratory, and the U.S. Bureau of Reclamation (BOR). The discussion below is adapted from the MFSA technical report mentioned above (NorthWestern 2008a) and updated.

In Montana, most of the project area lies east of the continental divide (Figure 2-1). Major rivers in this area include the Beaverhead, Big Hole, Boulder, Jefferson, Madison, Missouri, and Red Rock. The northwest portion of the project area in the vicinity of Butte and Anaconda, Montana, is west of the divide and is drained by the Clark Fork River. Valley floor elevations range from 3,800 feet to 5,500 feet above mean sea level (AMSL) with a high elevation of 6,800 feet AMSL at Monida Pass on the border with Idaho. Average annual precipitation ranges from 10 to 14 inches, while average annual snowfall ranges from 23 inches to 72 inches (WRCC 2007). Montana generally is influenced by a continental climate, with long, cold winters. Snow accumulation accounts for a substantial portion of the overall precipitation. Snow accumulations of 300 inches or more are common in the mountains. Winters are typically followed by cool moist springs, while summers are generally hot and dry. Spring snowmelt dominates the annual hydrograph throughout the Montana portion of the project area (NorthWestern 2008a).

The major river drainages in the Idaho portion of the study area include the Upper Snake River, Beaver Creek, Camas Creek, Medicine Lodge Creek, Birch Creek, and Little Lost River. All of these streams lie on the western slope of the continental divide. Idaho is influenced by maritime air, borne eastward on the prevailing westerly winds. These westerly winds bring winter snow and spring rains to the Idaho project area, which lies almost exclusively in the high desert region of the Snake River Basin. The elevation ranges between 3,800 feet to 6,000 feet AMSL in the desert regions and peaks at 6,800 feet AMSL at Monida Pass. The average precipitation in the Snake River Basin is between 8 inches and 16 inches per year, and the average annual snowfall ranges from 28 inches at Shoshone to 89 inches at the Craters of the Moon National Monument and Preserve (WRCC 2007). Precipitation falls mainly in the winter and spring. July is typically the driest month. Summer precipitation is primarily provided by thunderstorms that may cause flooding in local streams. High surface water flows occur in the spring and low flows occur in the summer. Spring floods may result from the melting of high snow pack levels and/or quick spring snowmelt, particularly when combined with heavy rains (NorthWestern 2008a).

3.12.2 Regulatory Setting

3.12.2.1 Federal Regulations

Clean Water Act Section 404. Waters of the U.S., including wetlands, are subject to U.S. Army Corps of Engineers (USACE) jurisdiction under Section 404 of the Clean Water Act (CWA). A Section 404 permit is required for the discharge of dredged or fill material into Waters of the U.S. The Seattle and Omaha districts of the USACE provide regulatory review and permitting services for the Montana portion of the project, and the Walla Walla District provides regulatory review and permitting services for the Idaho portion of the project area (NorthWestern 2008a).

For transmission line projects, USACE typically issues a Nationwide 12 Permit for Utility Lines. However, a Nationwide 12 Permit can be issued only in cases where USACE determines that impacts to waters of the U.S. are minimal. When significant impacts are anticipated, USACE requires an individual 404 permit. The USACE must review the proposed project to determine which permit is applicable (T. Tillinger personal communication).

Clean Water Act Section 401. Pursuant to Section 401 of the CWA, the IDEQ and the MDEQ provide water quality certification to determine whether CWA Section 404 permits are in compliance with applicable state water quality standards. Water quality certification is mandatory for all projects requiring a Section 404 permit, and both IDEQ and MDEQ will require 401 certification for the proposed project even if USACE issues a Nationwide 12 permit for the project (J. Ryan personal communication; J. Sandow personal communication).

Rivers and Harbors Act of 1899. The USACE regulates activities regarding navigable waterways. Section 10 of the Rivers and Harbors Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable Water of the U.S. (USACE 1999). The construction of any structure in or over any navigable Water of the U.S., or any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended and authorized by the Chief of Engineers of the USACE.

The Missouri River in Montana is the only navigable river that would be crossed by the proposed project and an application for the transmission line crossing would need to consider the public interest, effects on wetlands, fish and wildlife, water quality, cultural resources, scenic and recreational values, interference with adjacent properties or water resource projects, other federal, state, or local requirements, safety of impoundment structures, floodplain management, water supply and conservation, energy conservation and development, and navigation. A permit application for this crossing would be submitted to the Helena District Office of the USACE (NWE 2008a).

Wild and Scenic Rivers. No rivers classified as wild and scenic are located in the project area. Under the approved RMP for the Butte BLM Field Office (BLM 2009a), 2.6 miles of Muskrat Creek has been recommended as suitable for inclusion into the National Wild and Scenic River System. This portion of Muskrat Creek falls within the Montana portion of the analysis area, but would not be crossed by any alternatives.

3.12.2.2 State Regulations

Construction Stormwater Programs. Construction activities in Montana must be covered by the Montana Pollutant Discharge Elimination System (MPDES) Permit for Discharges of Stormwater Runoff Associated with Construction Activity. In Montana, the MDEQ Water Protection Bureau regulates stormwater requirements for construction activity. The Water Protection Bureau requires permit coverage for discharge of stormwater from construction activities including clearing, grading, and excavation that result in disturbance of equal to or greater than 1 acre of total land area (General Permit for Stormwater Discharges Associated with Construction Activity, Permit No.: MTR100000). Construction activity that includes the disturbance of less than 1 acre of total land area that is part of a larger common plan of development or sale would still require a permit if the larger common plan would ultimately disturb 1 acre or more.

The Montana General Permit for Stormwater Discharges Associated with Construction Activity requires a Notice of Intent (NOI) form, Stormwater Pollution Prevention Plan (SWPPP), application fee, and annual fee(s). Receipt by the Water Protection Bureau of the complete NOI package constitutes a full agreement by the permitee to meet and comply with all requirements stated in the General Permit. Coverage under the General Permit remains in effect until the permittee submits a Notice of Termination (NOT).

The Montana General Permit requires the development and implementation of a SWPPP. Any SWPPP that is prepared for a construction activity must be developed and implemented using standard engineering practices. The SWPPP must include a site description including the nature of the activity and proposed, implementation schedule, estimates of the total area of the site, and the area expected to be disturbed. The SWPPP must also include a site map indicating areas of total development and, at a minimum, areas of disturbance; drainage patterns; approximate slopes after major grading; areas used for the storage of soils or wastes; areas used for the storage of fuel(s); locations of all erosion and sediment control measures or structures; areas where vegetative measures are to be implemented; locations of impervious structures after construction; locations of all state surface waters on or near the construction activity site; the boundary of the 100-year floodplain; and a north arrow and map scale. The SWPPP must list the BMPs and Stormwater Management Controls the discharger will use to manage stormwater runoff. The BMPs must minimize or prevent "significant sediment" from leaving the construction site (NorthWestern 2008a).

In Idaho, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained. The NPDES stormwater permits are issued by the EPA. The NPDES stormwater program requires operators of construction sites 1 acre or larger (including smaller sites that are part of a larger common plan of development) to obtain authorization to discharge stormwater under an NPDES Construction Stormwater General Permit. For construction (and other land disturbing activities) in areas where EPA is the permitting authority, operators must meet the requirements of the EPA Construction General Permit. The NPDES requires submission of an NOI and SWPPP. The SWPPP must generally contain the elements previously identified for the MPDES permit.

Stream Channel Protection Acts

Idaho Stream Channel Protection Act. The Idaho Stream Channel Protection Act of 1971 (Title 42, Chapter 38, Idaho Code) requires that a permit be obtained from the Idaho Department of Water Resources (IDWR) for any alterations within the beds and banks of continuously flowing natural streams in Idaho. Before any work starts, the party intending to alter a stream channel must complete a Joint Application form for use by the IDWR, and, where needed, the Department of Lands and the USACE. If necessary, the IDWR routes applications to the other agencies and issues the required permit (NorthWestern 2008a).

Montana Natural Streambed and Land Preservation Act. Montana has similar requirements to Idaho, but under the Montana Natural Streambed and Land Preservation Act (310 Permit). However, the Certificate of Compliance (75-20-401 MCA) that is required as part of the MFSA application process will supersede most other state and local permitting requirements in Montana; therefore, no 310 permit will be required for the project.

Navigable Waterways

In Montana, the proposed project would require a Montana Land-Use License or Easement on Navigable Waters if any portion of the project occurs on lands below the low water mark of the Missouri River, the only navigable waterway crossed by the proposed transmission line. The easement program is administered by the MDNRC. No navigable waterways would be crossed in Idaho.

Water Quality

Relevant state laws regulating the quality of surface waters in Montana and Idaho include the MCA Title 75, Environmental Protection, and Chapter 58.01.02 of the Idaho Administrative Code, *Water Quality Standards and Wastewater Treatment Requirements*. The MDEQ is responsible for protecting existing and potential beneficial uses of surface and ground water in Montana by regulating water quality, while the quantity of water needed for the project is regulated by Montana DNRC. The IDEQ is responsible for protecting and regulating the beneficial uses of surface waters in Idaho. Both agencies rely on the methods set forth by the EPA for identifying potential causes of impairment. The MDEQ and IDEQ designate beneficial uses for specific water bodies of each state. The degree of support or attainment of a designated use for a particular stream is determined by an analysis of biological, physiochemical, physical-habitat, and toxicity data. Each designated use is assessed as full support (good), partial support (fair), or nonsupport (poor). Streams in which at least one designated use is not fully supported are considered "impaired" and submitted to the EPA under Section 303(d) of the CWA as a prioritized list of impaired waters or 303(d) list (NorthWestern 2008a). The 2008 303(d) status of water bodies within the 4-mile study corridor is in Appendix C.12.1.

The MDEQ also requires a short-term water quality standard for turbidity (318 Authorization) for activities that may cause short-term violations of state surface water standards for total suspended sediment and turbidity. For the purposes of the proposed project, 318 authorization would be issued at the time of the MFSA Certificate of Compliance is issued (J. Ryan personal communication). A draft 318 Authorization has been prepared by MDEQ (Appendix C.12.2).

Total Maximum Daily Loads

Nonpoint source pollution reduction efforts in both Montana and Idaho focus predominantly on implementing recommendations prescribed in water quality improvement plans known as Total Maximum Daily Loads (TMDL). Narrowly defined, a TMDL is the maximum amount of a pollutant a water body can receive and still meet water quality standards. In both states, however, the term is also used to refer to a wider watershed management strategy designed to protect and restore beneficial uses and to prevent significant threats from present and future activities from degrading water quality. Through a stream-specific evaluation process, TMDLs have been completed for numerous surface waters in both states (Appendix C.12.1). All non-point pollution source reduction strategies in Montana and Idaho are voluntary in nature and neither state enforces compliance with TMDL goals. The application of BMPs comprises the bulk of the pollutant reduction strategies in the TMDLs that have been competed in the project area, and the mitigation measures suggested for the proposed project are generally compatible with TMDL recommendations. Several citizens groups, in cooperation with MDEQ and IDEQ, are engaged in TMDL implementation in the project area. In Montana and Idaho these groups include:

- The Jefferson River Watershed Council, which is working to implement the Upper Jefferson River Tributaries Sediment TMDLs
- The Big Hole River Foundation and Big Hole Watershed Committee, which are working to implement the Middle and Lower Big Hole Planning Area TMDLs
- The Continental Divide Watershed Advisory Group, which is working to implement the Camas Creek TMDL

Local Floodplain Permits

Counties in Montana and Idaho have floodplain ordinances and require permits for proposed actions, such as construction of buried or suspended utility lines, material and equipment storage, and construction activity, and structure placement in the floodplain. A permit application and fee must be submitted to the appropriate county government (NorthWestern 2008a). In Montana, however, no additional county permits are required after a MFSA Certificate of Compliance is issued (75-20-103 and 75-20-401, MCA), unless the permit would protect worker health and safety or if there is a property ownership right.

3.12.3 Road Network

As part of the MFSA application process, NorthWestern developed a preliminary estimate of the network of new roads and overland routes that would be required for each alternative. Since the submittal of the MFSA application, NorthWestern has updated the road network analysis to include all of the alternatives and LROs discussed in this EIS. Because the proposed network has the potential to adversely affect water and wetland resources in the project area, it is discussed in this EIS. No estimate is currently available for the miles of existing roads that would need to be improved for use in the proposed project. The potential network of new access roads and overland routes is preliminary at this time and would be revised as engineering is completed on the preferred alternative selected at the conclusion of the environmental review process. For these reasons, the discussion of miles of new roads or overland routes is only an estimate prepared to allow comparison of alternatives.

This section describes the travel network that would be required by the proposed project. A discussion of the impacts this travel network could have on water resources is in Section 3.12.4.3. Road-related impacts to other resource areas such as wildlife and vegetation are discussed in Sections 3.3 and 3.10, respectively. Additional details on the proposed road network are in the Traffic and Transportation Management Plan from the Plan of Development (POD) (Appendix B.4). The proposed travel network's compliance with relevant agency resource management plans is evaluated in Chapter 5.

The miles of new roads required for an alternative is directly proportional to both the length of the alternative, the terrain crossed, and the existing road network. Using the GIS data for the proposed network of access roads, a summary of proposed new roads and overland routes by alternative and land ownership/management was created (Table 3.12-1).

Zone 1. Of the four Zone 1 alternatives, Alternative 1A would require the most miles of new travel routes (roads and overland routes combined), with 70.3 miles, slightly more than Alternative 1C, which would require 68 miles. Alternatives 1B and 1D would require similar lengths of new travel routes, with 50.2 and 49.7 miles, respectively. The distribution of new road requirements follows a similar pattern. Alternative 1A has the largest number of miles (57.9), followed by 47.6 miles for Alternative 1B, 38.4 miles for Alternative 1C, and 37.1 miles for Alternative 1D. For all Zone 1 alternatives, the largest portion of the proposed new roads and overland routes would be located on private lands. For Alternative 1A, BLM and USFS lands would also contain a substantial portion of the proposed new travel network.

Zone 2. Zone 2 has a fairly clear ranking of road and overland routes impacts. Alternative 2C has the most, with 89.6 miles of proposed new travel routes, including 73.9 miles of new roads. Alternative 2D is next, with 66.2 miles of proposed new travel routes, including 57.5 miles of new roads. It is followed by Alternative 2B, with 39.4 miles of new travel routes, including 26.8 miles of new roads. Alternative 2A has the fewest, with 24.7 miles of proposed new travel routes, including 13.3 miles of new roads. For Alternative 2A, private lands would see the bulk of the new road construction and overland route placement. For the other alternatives, BLM, State of Montana, and USFS lands would also be crossed by substantial portions of the proposed travel network.

Table 3-12-1. Preliminary New Roads and Overland Routes Proposed for the Project Area, by Zone Alternative and Land Ownership/Management

		Road Network Ownership (Miles)								
Alternative	**Road Type (Miles)**	**BLM**	**BOR**	**Montana Trust Lands**	**Private**	**USFS**	**State of Idaho**	**USDA**	**DOE**	**Total Miles**
1A	New Roads	10.5	0	0.4	23.6	23.4	0	0	0	57.9
	Overland Routes	0.5	0	0	11.9	0	0	0	0	12.4
	Alternative Subtotal	11	0	0.4	35.5	23.4	0	0	0	**70.3**
1B	New Roads	3.6	0	9.4	33.3	1.4	0	0	0	47.7
	Overland Routes	0.3	0	0.5	23.1	1.8	0	0	0	25.7
	Alternative Subtotal	3.9	0	9.9	33.2	3.2	0	0	0	**50.2**
1C	New Roads	1.7	1	4.8	29.6	1.4	0	0	0	38.5
	Overland Routes	0	0	1.2	27.7	1.7	0	0	0	30.6
	Alternative Subtotal	1.7	0	6	57.2	3.1	0	0	0	**68**
1D	New Roads	3.6	0	7	26.6	0	0	0	0	37.2
	Overland Routes	0.3	0	0.5	11.8	0	0	0	0	12.6
	Alternative Subtotal	3.9	0	7.5	38.3	0	0	0	0	**49.7**
2A	New Roads	2.5	0	3.7	7.1	0	0	0	0	13.3
	Overland Routes	0.1	0	0	11.2	0.1	0	0	0	11.4
	Alternative Subtotal	2.6	0	3.7	18.3	0.1	0	0	0	**24.7**
2B	New Roads	6.3	0	8.6	11.9	0	0	0	0	26.8
	Overland Routes	1.7	0	0.8	10	0.1	0	0	0	12.6
	Alternative Subtotal	8	0	9.4	21.9	0.1	0	0	0	**39.4**
2C	New Roads	30.2	0	19.8	22.3	1.6	0	0	0	73.9
	Overland Routes	0	0	1.1	12.8	1.8	0	0	0	15.7
	Alternative Subtotal	30.2	0	20.9	35.1	3.4	0	0	0	**89.6**
2D	New Roads	27.8	0	13.1	3.7	12.9	0	0	0	57.5
	Overland Routes	0	0	2.4	6.3	0	0	0	0	8.7
	Alternative Subtotal	27.8	0	15.5	10	12.9	0	0	0	**66.2**

Table 3-12-1. Preliminary New Roads and Overland Routes Proposed for the Project Area, by Zone Alternative and Land Ownership/Management

Alternative	Road Type (Miles)	Road Network Ownership (Miles)								
		BLM	BOR	Montana Trust Lands	Private	USFS	State of Idaho	USDA	DOE	Total Miles
2E	New Roads	30.2	0	17.5	15.5	0.2	0	0	0	63.4
	Overland Routes	0	0	1.1	1.6	0	0	0	0	2.7
	Alternative Subtotal	30.2	0	18.6	17.2	0.2	0	0	0	**66.2**
3A	New Roads	11.1	0	8.9	18.6	0	0	0	0	38.6
	Overland Routes	1.5	0	4.3	4.4	0	0	0	0	10.2
	Alternative Subtotal	12.6	0	13.2	23	0	0	0	0	**48.8**
3B	New Roads	21.3	0	22.1	28.9	0	0	0	0	72.3
	Overland Routes	1.4	0	2.5	6.4	0	0	0	0	10.3
	Alternative Subtotal	22.7	0	24.6	35.4	0	0	0	0	**82.7**
3C	New Roads	37.1	0	20.2	23.5	0	0	0	0	80.8
	Overland Routes	2.6	0	2.5	2.2	0	0	0	0	7.3
	Alternative Subtotal	39.8	0	22.7	25.7	0	0	0	0	**88.2**
4A	New Roads	0	0	0	4.4	4.9	0	0	0	9.3
	Overland Routes	0	0	0	3.4	1.4	0	0.1	0	4.9
	Alternative Subtotal	0	0	0	7.8	6.3	0	0.1	0	**14.2**
5A	New Roads	6.4	0	0	0.3	0	1.4	0	0	8.1
	Overland Routes	5	0	0	4	0	1.3	3.4	4.2	17.9
	Alternative Subtotal	11.4	0	0	4.3	0	2.7	3.3	0	**21.7**
5B	New Roads	10.8	0	0	2.7	0	5.2	0	0	18.7
	Overland Routes	7.4	0	0	5.4	0	0.1	3	0	15.9
	Alternative Subtotal	18.1	0	0	8.1	0	5.3	3	0	**34.5**
5C	New Roads	11.2	0	0	6.8	0	0	0	0	18
	Overland Routes	10.4	0	0	15.3	0	0	3	0	28.7
	Alternative Subtotal	21.7	0	0	22.1	0	0	3	0	**46.8**

Table 3-12-1. Preliminary New Roads and Overland Routes Proposed for the Project Area, by Zone Alternative and Land Ownership/Management

		Road Network Ownership (Miles)								
Alternative	**Road Type (Miles)**	**BLM**	**BOR**	**Montana Trust Lands**	**Private**	**USFS**	**State of Idaho**	**USDA**	**DOE**	**Total Miles**
5D	New Roads	6	0	0	3.2	0	7.8	0	0	17.1
	Overland Routes	15.3	0	0	7	0	1.4	3	0	26.6
	Alternative Subtotal	21.2	0	0	10.2	0	9.2	3	0	**43.6**
6A	New Roads	47.4	0	0	8	0	3.3	0	0	58.7
	Overland Routes	23.8	0.2	0	1.1	0	0.5	0	0	25.6
	Alternative Subtotal	70.2	0.2	0	9.1	0	3.8	0	0	**84.3**

Zone 3. Of the three alternatives in Zone 3, Alternatives 3B and 3C stand out for travel network requirements, with 82.7 and 88.2 miles of proposed new travel network, respectively. Alternative 3C would require the most new roads (80.8 miles), while Alternative 3B would require 72.3 miles of new roads. The proposed new travel network is considerably smaller for Alternative 3A, for which 48.8 miles of new travel network have been proposed, including 38.6 miles of new roads. For all three alternatives in Zone 3, the proposed new travel network would cross private, BLM, and Montana State Trust lands.

Zone 4. Alternative 4A is the only proposed route in Zone 4, for which 9.3 miles of new roads and 4.9 miles of overland routes have been proposed, for a total new travel network of 14.2 miles. Most of the new travel network would be located on private and USFS lands.

Zone 5. Of the four Zone 5 alternatives, Alternative 5C would require the largest number of miles of new travel routes (roads and overland routes combined), with 46.8 miles, compared to 43.6, 34.5, and 21.7 miles for Alternatives 5D, 5B, and 5A, respectively. Alternatives 5B, 5C, and 5D would require a similar number of new road miles, with 18.6, 18.1, and 17, respectively. Alternative 5A would require substantially fewer, with 8.1 miles of proposed new roads. In general, the proposed new travel network is distributed across a wide range of ownerships, with private and BLM lands containing the largest portion of the proposed miles.

Zone 6. In Zone 6 the only alternative is Alternative 6A, for which 58.7 miles of new roads and 25.6 miles of overland routes have been proposed for a total new travel network of 84.3 miles. Most of the roads and overland routes would occur on BLM lands, with BOR, USFS, and State of Idaho lands also receiving a portion of the proposed travel network.

3.12.4 Physical Setting

The surface water discussion addresses perennial and intermittent streams, ditches and canals, lakes, ponds, reservoirs, and other non-flowing water resources. It also addresses water quality issues. For a discussion of wetland and riparian resources, see Section 3.12.5. For a discussion of fish resources, see Section 3.3.

3.12.4.1 Water Resources

This section describes the water resources existing within the project area, which for water resources was defined as a 4-mile study corridor (2 miles on each side of the proposed alternatives). Water resources that were evaluated for each alternative include open water (including lakes, ponds, reservoirs, and other non-flowing water resources), perennial and intermittent streams, ditches and canals, and stream crossings (Table 3.12-2). The section also describes the water resources present at the locations of the proposed Townsend Substation and existing Mill Creek and Midpoint substations. A summary of water resources associated with the LROs is in Table 3.12-3. Table 3.12-2 presents all waters within the 4-mile study corridor by name and by associated alternative.

Table 3.12-2. Water Resources within 2-Mile Buffer of the Alternatives

Alternative	Open Water* (Acres)	Stream Miles		Stream Crossings	
		Type	Miles	Type	Count
1A	825	Perennial Stream	284	Perennial Stream	47
		Intermittent Stream	546	Intermittent Stream	86
		Ditch/Canal	75	Ditch/Canal	9
		Subtotal	**905**	**Subtotal**	**142**
1B	418	Perennial Stream	210	Perennial Stream	22
		Intermittent Stream	876	Intermittent Stream	168
		Ditch/Canal	100	Ditch/Canal	14
		Subtotal	**1,186**	**Subtotal**	**204**
1C	554	Perennial Stream	231	Perennial Stream	19
		Intermittent Stream	838	Intermittent Stream	143
		Ditch/Canal	121	Ditch/Canal	14
		Subtotal	**1,190**	**Subtotal**	**176**
1D	372	Perennial Stream	122	Perennial Stream	9
		Intermittent Stream	645	Intermittent Stream	127
		Ditch/Canal	74	Ditch/Canal	8
		Subtotal	**841**	**Subtotal**	**144**
2A	205	Perennial Stream	145	Perennial Stream	17
		Intermittent Stream	550	Intermittent Stream	123
		Ditch/Canal	131	Ditch/Canal	17
		Subtotal	**826**	**Subtotal**	**157**
2B	254	Perennial Stream	149	Perennial Stream	17
		Intermittent Stream	601	Intermittent Stream	131
		Ditch/Canal	155	Ditch/Canal	24
		Subtotal	905	Subtotal	172
2C	133	Perennial Stream	163	Perennial Stream	21
		Intermittent Stream	769	Intermittent Stream	141
		Ditch/Canal	135	Ditch/Canal	16
		Subtotal	**1,067**	**Subtotal**	**178**
2D	224	Perennial Stream	153	Perennial Stream	27
		Intermittent Stream	560	Intermittent Stream	84
		Ditch/Canal	110	Ditch/Canal	16
		Subtotal	**823**	**Subtotal**	**127**
2E	87	Perennial Stream	75	Perennial Stream	8
		Intermittent Stream	540	Intermittent Stream	100
		Ditch/Canal	89	Ditch/Canal	10
		Subtotal	**704**	**Subtotal**	**118**

Table 3.12-2. Water Resources within 2-Mile Buffer of the Alternatives

Alternative	Open Water* (Acres)	Stream Miles		Stream Crossings	
		Type	Miles	Type	Count
3A	2,457	Perennial Stream	129	Perennial Stream	15
		Intermittent Stream	695	Intermittent Stream	121
		Ditch/Canal	38	Ditch/Canal	2
		Subtotal	**862**	**Subtotal**	**138**
3B	3,348	Perennial Stream	145	Perennial Stream	15
		Intermittent Stream	767	Intermittent Stream	172
		Ditch/Canal	60	Ditch/Canal	1
		Subtotal	**972**	**Subtotal**	**188**
3C	3,337	Perennial Stream	150	Perennial Stream	16
		Intermittent Stream	733	Intermittent Stream	160
		Ditch/Canal	34	Ditch/Canal	0
		Subtotal	**917**	**Subtotal**	**176**
4A	42	Perennial Stream	105	Perennial Stream	12
		Intermittent Stream	146	Intermittent Stream	23
		Ditch/Canal	1	Ditch/Canal	0
		Subtotal	**252**	**Subtotal**	**35**
5A	1,474	Perennial Stream	36	Perennial Stream	1
		Intermittent Stream	626	Intermittent Stream	91
		Ditch/Canal	58	Ditch/Canal	9
		Subtotal	**720**	**Subtotal**	**101**
5B	587	Perennial Stream	25	Perennial Stream	1
		Intermittent Stream	521	Intermittent Stream	86
		Ditch/Canal	33	Ditch/Canal	6
		Subtotal	**579**	**Subtotal**	**93**
5C	684	Perennial Stream	43	Perennial Stream	1
		Intermittent Stream	197	Intermittent Stream	23
		Ditch/Canal	162	Ditch/Canal	9
		Subtotal	**402**	**Subtotal**	**33**
5D	658	Perennial Stream	38	Perennial Stream	1
		Intermittent Stream	372	Intermittent Stream	50
		Ditch/Canal	40	Ditch/Canal	6
		Subtotal	**450**	**Subtotal**	**57**
6A	954	Perennial Stream	0	Perennial Stream	0
		Intermittent Stream	202	Intermittent Stream	23
		Ditch/Canal	59	Ditch/Canal	2
		Subtotal	**361**	**Subtotal**	**25**

* "Open Water" includes lakes, ponds, reservoirs, and other non-flowing water resources.

Table 3.12-3. Water Resources within 2-Mile Buffer of the Local Routing Options

LRO	Alt	Open Water[1] (Acres)	Stream Miles		Stream Crossings by LRO	
			Type	Miles	Type	Count
Radersburg	1A	1.7	Perennial Stream	9	Perennial Stream	0
			Intermittent Stream	106	Intermittent Stream	15
			Ditch/Canal	19	Ditch/Canal	0
			Subtotal	**134**	**Subtotal**	**15**
Boulder Hill	1A	11.6	Perennial Stream	38	Perennial Stream	2
			Intermittent Stream	14	Intermittent Stream	1
			Ditch/Canal	6	Ditch/Canal	2
			Subtotal	**58**	**Subtotal**	**5**
Upper Boulder 1[2]	1B 1D	1.2	Perennial Stream	10	Perennial Stream	2
			Intermittent Stream	202	Intermittent Stream	19
			Ditch/Canal	0	Ditch/Canal	0
			Subtotal	**212**	**Subtotal**	**21**
Upper Boulder 2[3]	1B 1D	1.4	Perennial Stream	8	Perennial Stream	2
			Intermittent Stream	191	Intermittent Stream	21
			Ditch/Canal		Ditch/Canal	0
			Subtotal	**199**	**Subtotal**	**23**
Lower Boulder[4]	1B 1D	24	Perennial Stream	18	Perennial Stream	1
			Intermittent Stream	174	Intermittent Stream	13
			Ditch/Canal	0	Ditch/Canal	0
			Subtotal	**192**	**Subtotal**	**14**
South of Butte 1	1B 1C 2C	11.1	Perennial Stream	19	Perennial Stream	2
			Intermittent Stream	45	Intermittent Stream	4
			Ditch/Canal	0	Ditch/Canal	0
			Subtotal	**64**	**Subtotal**	**6**
Beef Trail	1B 2C	6.2	Perennial Stream	13	Perennial Stream	0
			Intermittent Stream	27	Intermittent Stream	2
			Ditch/Canal	6	Ditch/Canal	1
			Subtotal	**46**	**Subtotal**	**3**
North of Buxton	1B 2C	68.8	Perennial Stream	8	Perennial Stream	0
			Intermittent Stream	73	Intermittent Stream	6
			Ditch/Canal	96	Ditch/Canal	3
			Subtotal	**54**	**Subtotal**	**9**

Table 3.12-3. Water Resources within 2-Mile Buffer of the Local Routing Options

LRO	Alt	Open Water[1] (Acres)	Stream Miles: Type	Stream Miles: Miles	Stream Crossings by LRO: Type	Stream Crossings by LRO: Count
Mount Haggin	1B 2A 2B 2C	13.9	Perennial Stream	20	Perennial Stream	1
			Intermittent Stream	28	Intermittent Stream	2
			Ditch/Canal	7	Ditch/Canal	0
			Subtotal	**55**	**Subtotal**	**3**
Maiden Rock	2A 2B	5	Perennial Stream	29	Perennial Stream	1
			Intermittent Stream	106	Intermittent Stream	15
			Ditch/Canal	27	Ditch/Canal	5
			Subtotal	**162**	**Subtotal**	**21**
Willow Creek	2B	1.5	Perennial Stream	6	Perennial Stream	0
			Intermittent Stream	62	Intermittent Stream	3
			Ditch/Canal	12	Ditch/Canal	0
			Subtotal	**80**	**Subtotal**	**3**
Fleecer	2D	7.3	Perennial Stream	25	Perennial Stream	1
			Intermittent Stream	40	Intermittent Stream	4
			Ditch/Canal	25	Ditch/Canal	1
			Subtotal	**90**	**Subtotal**	**6**
Rock Creek	2D	0.8	Perennial Stream	17	Perennial Stream	2
			Intermittent Stream	57	Intermittent Stream	5
			Ditch/Canal	7	Ditch/Canal	0
			Subtotal	**81**	**Subtotal**	**7**
Frying Pan Gulch	3B	6.6	Perennial Stream	0	Perennial Stream	0
			Intermittent Stream	108	Intermittent Stream	13
			Ditch/Canal	13	Ditch/Canal	0
			Subtotal	**121**	**Subtotal**	**13**
Clark Canyon East	3B 3C	1,563	Perennial Stream	27	Perennial Stream	1
			Intermittent Stream	113	Intermittent Stream	21
			Ditch/Canal	5	Ditch/Canal	0
			Subtotal	**145**	**Subtotal**	**22**
Lima	3A 3B 3C	0.1	Perennial Stream	21	Perennial Stream	1
			Intermittent Stream	7	Intermittent Stream	14
			Ditch/Canal	0	Ditch/Canal	0
			Subtotal	**28**	**Subtotal**	**15**
Diamond Butte	3A 3B 3C	1.3	Perennial Stream	29	Perennial Stream	2
			Intermittent Stream	65	Intermittent Stream	1
			Ditch/Canal	0	Ditch/Canal	0
			Subtotal	**94**	**Subtotal**	**3**

1 "Open Water" includes lakes, ponds, reservoirs, and other non-flowing water resources.
2 Crossing total for the Upper Boulder 1 LRO includes links LRO4-2a-1 and LRO4-2a-3.
3 Crossing total for the Upper Boulder 2 LRO includes Links LRO4-2a-2 and LRO4-2a-3.
4 Crossing total for the Lower Boulder LRO includes Links LRO4-2b and Link 3-2.

Zone 1. Of the four alternatives in Zone 1, Alternative 1A has the greatest acreage (825) of open water within its study corridor. Alternative 1C has the second greatest with 554 acres, Alternative 1B has 418 acres, and 1D has 372 acres. Alternative 1C has the most stream miles (1,190) in its study corridor, followed by Alternative 1B with 1,186 miles. Alternative 1A has 905 miles, and Alternative 1D has 841 miles of streams within the study corridor. Alternative 1B crosses the most streams, 204, followed by Alternative 1C, which crosses 176 streams. Alternatives 1D and 1A cross 144 and 142 streams, respectively. Although Alternative 1A crosses the fewest total number of streams, it includes 47 crossings of perennial streams, the highest number of any of the alternatives in Zone 1 (Table 3.12-2). All four Alternatives in Zone 1 would cross the Missouri River in the vicinity of Toston, Montana (Figure 2-9).

Zone 2. Of the five alternatives in Zone 2, Alternative 2B has the greatest acreage (254) of open water within its study corridor. Alternative 2D has 224 acres and Alternative 2A has 205 acres. Alternatives 2C and 2E have considerably fewer acres of open water within their study corridors, with 133 and 87 acres, respectively. Alternative 2C has the most stream miles (1,067) in its study corridor. Alternative 2B is second with 905 miles of streams within its study corridor. Alternatives 2A and 2D are nearly equal, with 826 and 823 miles of streams within their study corridors, respectively. Alternative 2E has the fewest miles of streams in its study corridor (704). A similar ranking holds for the number of stream crossings where Alternative 2C has the most crossings at 178, and Alternatives 2B, 2A, 2D, and 2E have 172, 157, 127, and 118 crossings within their study corridors, respectively (Table 3.12-2).

All of the alternatives in Zone 2 would cross the Big Hole River. Alternatives 2A, 2B, and 2D would cross in the vicinity of the Maiden Rock FAS, north of Melrose, Montana, while Alternatives 2C and 2E would cross the Big Hole River at a location southwest of Glen, Montana (Figure 2-10).

Zone 3. Zone 3 has three alternatives. Alternatives 3B and 3C have similar acreages of open water within their study corridors, with 3,348 acres and 3,337 acres, respectively. Alternative 3A has slightly fewer open water acres within its study corridor (2,457). These are relatively large acreages when compared to the other zone alternatives and result from the proposed alignments being located near Clark Canyon Reservoir, south of Dillon, Montana. There are 972 miles of streams within the study corridor of Alternative 3B, 917 miles of streams within the study corridor of Alternative 3D, and 862 miles in the study corridor of Alternative 3A. Alternative 3B would cross 188 streams, Alternative 3C would cross 176 streams, and Alternative 3A would cross 138 streams (Table 3.12-2).

Major rivers crossed in Zone 3 include the Beaverhead and Red Rock. Alternatives 3B and 3C cross the Beaverhead at slightly different locations south of Dillon, Montana, in the vicinity of the Grasshopper Creek confluence. Alternative 3A crosses the Red Rock River north of Dell, Montana, and then all of the Zone 3 alternatives cross the Red Rock just east of Lima, Montana (Figure 2-11).

Zone 4. There are 42 acres of open water and 252 miles of streams within the study corridor of Alternative 4A, the only alternative in Zone 4. Alternative 4A would cross 35 streams (Table 3.12-2). Zone 4 has no major river crossings (Figure 2-12).

Zone 5. Of the four alternatives in Zone 5, Alternative 5A has the most water resources within its study corridor with 1,474 acres of open water, 720 miles of streams, and 101 stream crossings. Among the remaining three alternatives, Alternative 5C has the most acreage of open water in its study corridor at 684 acres, compared to 658 acres of open water in Alternative 5D and 587 acres in Alternative 5B. The ranking is reversed for stream miles and crossings; Alternative 5B has 587 miles of streams and 93 stream crossings, Alternative 5D has 450 miles of streams and 57 stream crossings, and Alternative 5C has 402 stream miles and 33 stream crossings within its study corridor (Table 3.12-2).

Zone 5 has no major river crossings. Alternative 5A crosses Birch Creek, and Alternatives 5B and 5C cross Camas Creek; these are the only perennial stream crossings in Zone 5. Both streams are hydrologically isolated “sink drainages,” meaning that they have no surface water connection with any other stream, a common feature of streams in the area (Figure 2-13).

Zone 6. There are 954 acres of open water and 361 stream miles within the study corridor of Alternative 6A, the only alternative in Zone 6. Alternative 6A would cross 23 intermittent streams and two ditches (Table 3.12-2). Zone 6 has no major river or perennial stream crossings (Figure 2-14).

Townsend Substation

The proposed Townsend Substation site is located approximately 3,500 feet (0.75 miles) from the Missouri River on its east side. No surface water features are associated with the proposed substation location (NorthWestern 2008a).

Mill Creek Substation

The existing Mill Creek Substation is located approximately 500 feet west of Mill Creek, a perennial stream that appears on Montana’s 303(d) list as impaired by metals. The substation is slightly closer to an unnamed intermittent tributary to Mill Creek, which merges with Mill Creek near the southeast corner of the existing substation. An irrigation ditch is approximately 1,000 feet to the northwest of the existing substation.

Midpoint Substation

The existing Midpoint Substation is located between irrigated agriculture lands and native sagebrush steppe habitat. The soil survey map shows partially hydric soils on and surrounding the site. The site is located between two low rolling hills, but the desert habitat and lack of streams or drainages indicate no major water resources on or surrounding this site (NorthWestern 2008a).

Potable Surface Water Supplies

The MFSA application in Montana requires the identification of surface supplies of potable water. For consistency of analysis between the states, an attempt was made to identify similar features in Idaho; however, no surface supplies of water were located in the 4-mile study corridor in Idaho.

Butte is the only municipality in the Montana portion of the study area with designated municipal watersheds. The Butte Silver Bow Water Department (BSBWD) obtains its water via four surface water intakes in the vicinity of Butte. Intakes on the Big Hole River and the South Fork of Divide Creek Reservoir are located in the Big Hole watershed within the proposed project area. The remaining two intakes, the Basin Creek Reservoir and Moulton Reservoir, are located in the Upper Clark Fork watershed outside of the proposed project area (BSBWD 2003; NorthWestern 2008a). Portions of the Butte municipal water intake system are within the study corridors of Alternative 2D and the Fleecer LRO; however, the centerlines of both Alternative 2D and the Fleecer LRO are just outside of the Butte Municipal Watershed, to the east of South Fork Divide Reservoir.

The only other potable water supply in the area is for Golden Sunlight Mines, Inc., which draws water from the Jefferson Slough of the left fork of the Jefferson River north of Whitehall, Montana, between the Burlington Northern Railroad tracks and I-90 in southern Jefferson County. Golden Sunlight Mines, Inc., constructed a new package treatment plant that became operational in 2000 to treat the raw source water before making it available as drinking water (NorthWestern 2008a). This water source is within the study corridor of Alternatives 1B, 1C, and 1D, but the centerlines of the alternatives are approximately 1 mile from the water intake location.

3.12.4.2 Water Resources Analysis Methods

The process for assessing potential impacts to water resources involved determining location-proposed project features in relation to surface water features. Several assumptions were made in this analysis. First, the power line itself would free-span all streams, and no structures would be placed in active channels to support the power line. This means that direct impacts to water resources could occur only through road crossings. The MFSA application indicates that the streams crossed by the access roads would be accomplished through installation of new or improved existing culverts (NorthWestern 2008a). The following assumptions were made in relation to the roadways:

- All new road crossings of streams would require installation of culverts.
- Overland travel may require modification of the stream channels to allow crossing by heavy equipment. Details of these crossings have not been supplied by the applicant, but are expected to include temporary culverts, bank modification, installation of temporary hardened substrate to support equipment, or temporary bridges.
- Improved roads were not quantified and are assumed to include minor repairs and widening necessary to support heavy equipment but not installation of new culverts. Existing culverts and bridges may need to be replaced or improved to accommodate construction traffic.

The potential network of access roads is preliminary at this time and would be revised as engineering is completed on the preferred alternative selected in the Record of Decision. For this reason, the discussion of roads in this section is therefore more of a disturbance index useful in differentiating potential impacts between alternatives. Discussions of miles of new roads or overland routes are only estimates that have been prepared to allow comparison of alternatives.

The proposed new roads and overland routes were incorporated into a GIS database that included streams and other surface water resources. For each analysis zone, the GIS was queried to generate the number of streams and acres of open water that are proposed to be crossed by roads and overland routes associated with each alternative or LRO. In addition, the number of stream miles and acres of open water within a 0.25-mile buffer (0.5-mile corridor) of each proposed road and overland route were calculated as a measure of potential impacts from near-stream roads. The impact of each alternative within each zone was determined by comparing the number of surface water resources potentially impacted by each alternative. All GIS queries are summarized by alternative for this discussion. The LROs are compared to the mainline links that they would replace (Section 3.12.4.4).

The 0.25-mile buffer is intended to evaluate impacts conservatively by including all resources that could conceivably be impacted. This approach may overestimate the potential impact to water resources in cases where the water resources are up-gradient of the proposed roads and overland routes. However, in light of the preliminary nature of the proposed new travel network, inherent inaccuracies in the hydrology dataset, and potential error associated with GIS analysis, the 0.25-mile buffer was selected as a reasonable compromise. Because it has been applied consistently throughout this analysis, it provides a reliable measure of the relative level of impacts between alternatives.

Direct impacts (short-term, long-term, and permanent) are related to the construction and operation of access roads associated with the power line, particularly stream crossings. Indirect impacts of roads on water resources are generally related to water quality issues (such as sedimentation) and are discussed in the sections below. Additional indirect impacts to surface water resources would result from disturbed areas associated with project infrastructure including towers, splicing sites, tensioning sites, material staging areas, and concrete batch plants. These impacts were calculated using a GIS overlay process and the application of the general disturbance model developed for the proposed project by NorthWestern. As shown in the disturbance model in Section 3.1, these are calculated as 26.7 acres of permanent impact per mile of transmission line. The proposed transmission line, its towers, and other related infrastructure also would have direct impacts on wetland resources (Section 3.12.5).

3.12.4.3 Water Resources Impact Analysis

No Action Alternative
Under the no action alternative, there would be no impacts, either adverse or beneficial, to water resources in the study corridor from the proposed project.

Proposed Project

Indirect Impacts
Indirect impacts are foreseeable effects that occur away from the proposed project in time, space, or both. By their very nature, indirect impacts are difficult to measure, and at the current level of design, an accurate accounting of potential indirect impacts is difficult to provide. Indirect impacts to water resources are discussed in a qualitative nature below.

The proposed new travel network represents an indirect and potentially long-term effect to water resources. The primary concern with the construction and maintenance of new travel networks is an increased rate of erosion (MacDonald et al. 1991). Increased rates of erosion can negatively impact water quality thereby adversely affecting fish and other aquatic life. According to USEPA (1999):

> "Excessive sediments deposited on stream and lake bottoms can choke spawning gravels (reducing survival and growth rates), impair fish food sources, fill in rearing pools (reducing cover from prey and thermal refugia), and reduce habitat complexity in stream channels. Excessive suspended sediments can make it more difficult for fish to find prey and at high levels can cause direct physical harm, such as clogged gills" (USEPA 1999, pg 2-1).

In variable amounts, depending on the nature of the eroding materials, sediment from roads is also a potential source of organic matter and nutrients, particularly phosphorus, that is attached to soil particles. Organic matter and nutrients can both contribute to eutrophication, algal blooms, and reduced concentrations of dissolved oxygen (Liken et al. 1970; Hauer and Hill 1997). At higher levels, excessive sediment loading can clog irrigation and drinking water intake systems and degrade aesthetics for recreationists.

Although sediment production from new road construction is typically high in the first year after construction and then quickly decreases in subsequent years (Ketcheson and Megahan 1996), roads and culverts at stream crossings could have potential long-term impacts to stream geomorphology and water quality. Problems with culverts generally arise from undersizing and lack of maintenance. Typical problems associated with undersized culverts include plugging by transport of large wood, sediment deposition at the culvert inlet because of backwater effects, and high velocity flows exiting the culvert and resulting in channel scour. Lack of maintenance exacerbates these problems. Partially plugged inlets are more prone to complete plugging and failure under high flow conditions (Castro 2003).

Plugging of culverts during high flows is particularly damaging to streams and to road-related infrastructure. When floodwaters overtop plugged culverts, failure of the road prism can occur, resulting in the deposition of road fill materials directly into the stream. At partially plugged culverts, bank erosion and plunge pools can develop at the downstream ends of culverts because of flow constriction and high water velocities (Castro 2003).

Improperly constructed roads have the potential to become an extension of the stream channel network by reducing infiltration, intercepting shallow groundwater flow paths, diverting the water along the roadway, and routing it efficiently to streams at road crossings. The concentration of such flows can increase erosion and can transport contaminants directly to surface waters. This includes the transport of both natural pollutants such as sediment and nutrients, and anthropogenic pollutants such as herbicides used to control roadside weeds and petroleum products released by vehicles. Where riparian vegetation is cleared for stream crossings or near-stream roads, surface waters are potentially exposed to increase solar radiation, which can in turn increase water temperatures (Trombulak and Frissell 2000).

Indirect, short-term impacts to water quality could also result from accidental spills and leaks of petroleum, oil, and lubricants from equipment and vehicles used during construction of the proposed project.

Overall, the proposed project has the potential to have a substantial adverse impact to water quality primarily through indirect effects of the required roadway network. The proposed travel network would potentially provide access to areas previously inaccessible by vehicular traffic, thereby increasing the risks of human-caused fire and subsequent erosion.

Clearing of right of way vegetation also has the potential to impact water quality by increasing soil exposure to wind and precipitation and thus increasing erosion. Where the right of way parallels a stream for a long distance, it may also decrease shading and thus potentially increase stream temperatures. However, most right of way clearing would occur in upland areas away from water resources, and low lying vegetation would be allowed to grow within the right of way, providing a substantial measure of protection against erosion even in formerly forested areas. For these reasons, impacts to water quality from clearing the right of way are expected to be minor and short-lived.

The compliance and mitigation measures described in Section 3.12.7 are intended to minimize all indirect impacts and protect water quality.

Direct Impacts

As previously discussed, the analysis of direct impacts was based on the assumption that the power line itself would free-span all streams and no structures would be placed within active channels to support the power line; therefore, direct impacts to water resources could occur only through road crossings.

Zone 1. Alternative 1B is projected to have the highest potential for adverse direct impact to surface water resources of the four alternatives in this zone (Table 3.12-4). Alternative 1B has the most (147) miles of streams within the 0.25-mile road buffer, including 93 miles of streams near new roads and 54 miles of stream near overland routes. It would also require the most stream crossings (120) including 76 crossings by new roads and 44 crossings by overland routes. It also has the most open water within the road buffer (98.6 acres). For the remaining alternatives, the potential direct impacts to water resources are more mixed; however, Alternative 1C appears to have the next highest level of impacts to water resources. Although it has the fewest acres of open water within the 0.25-mile road buffer (18.9), it is a close second to Alternative 1B for miles of stream within the 0.25-mile road buffer (132 miles, including 65 miles of new roads and 67 miles of overland routes), and it would require79 stream crossings, including 44 by new roads and 35 by overland routes. For the remaining two alternatives in the zone, 1A and 1D, open water acres within the 0.25-mile buffer are 128.1 and 85.7, respectively. Alternative 1A would result in 141 miles of streams within the 0.25-mile buffer, while Alternative 1D would result in only 112. However, Alternative 1A would require only 60 stream crossings (37 by new roads and 23 by overland routes), while Alternative 1D would require 92 (65 by new roads and 27 by overland routes). Given that road crossings are clearly a potentially substantial direct impact to water resources, while miles of streams within the 0.25-mile travel network buffer is intended as a proxy measure of potential impacts, the lower number of crossings results in Alternative 1A potentially having the fewest impacts in Zone 1 from a water quality perspective.

Zone 2. Of the five alternatives in Zone 2, Alternative 2A stands out as having the fewest potential direct impacts to surface water resources, with only 66 miles of new travel network within the 0.25-mile buffer (34 miles near new roads and 32 miles near overland routes), 52 stream crossings (29 by new roads and 23 by overland routes), and less than 1 acre of open water within the 0.25-mile buffer (Table 3.12-4). Alternative 2E has the second fewest potential impacts, with 102 miles of streams and 5.8 acres of open water within the 0.25-mile buffer (including 99 miles of streams near new roads and 3 miles near overland routes) and 64 stream crossings (60 by new roads and 4 by overland routes). Alternative 2B has the third fewest impacts with 115 miles of streams and 33 acres of open water within the 0.25-mile buffer (including 69 miles of streams near new roads and 46 miles near overland routes) and would require 73 stream crossings (53 by new roads and 21 by overland routes). Alternative 2D would result in fewer miles of streams within the 0.25-mile buffer, with 115 miles compared to 144 miles for 2C, and acres of open water within the buffer and total number of stream crossings are close, suggesting that Alternative 2D would result in fewer impacts. However, a closer examination of the crossing data indicates that Alternative 2C would require 7 crossings of perennial streams, including 6 by new roads, while Alternative 2D would require 14 crossings of perennial streams, including 10 by new roads. The greater number of perennial stream crossings, and particularly the greater number of new road crossing of perennial streams required by Alternative 2D, results in a greater potential impact to water quality than the additional miles of stream within the 0.25-mile buffer required by 2C. For this reason, Alternative 2C would likely have less of an impact to surface water resources than Alternative 2D.

Zone 3. With 107 miles of streams within the 0.25-mile travel network buffer (76 miles near new roads and 31 miles near overland routes) and 58 crossings (42 by new roads and 16 by overland routes), Alternative 3A would have the fewest potential direct impacts to surface water resources of the three alternatives in Zone 3 (Table 3.12-4). Alternative 3C would have the next highest level of potential impact because it would result in 143 miles of streams within the 0.25-mile buffer (119 miles near new roads and 24 miles near overland routes) and 130 stream crossings (121 by new roads and 9 by overland routes). Finally, Alternative 3B would have the most potential impacts of all the alternative in Zone 3, with 155 miles of streams within the 0.25 mile buffer (123 miles near new roads and 32 miles near overland routes) and 138 stream crossings (124 by new roads and 14 by overland routes).

Zone 4. Alternative 4A is the only alternative in Zone 4. It would result in 34 miles of streams within the 0.25-mile buffer of new roads and overland routes (new travel network) buffer (21 near new roads and 13 near overland routes) and 9 stream crossings (7 by new roads and 2 by overland routes) (Table 3.12-4).

Zone 5. Of the four alternatives in Zone 5, Alternative 5C would have the fewest potential direct impacts to surface water resources. Alternative 5C would have10.7 acres of open water and 17 miles of streams within the 0.25-mile new travel network buffer (3 miles near new roads and 14 miles near overland routes). It would require 13 stream crossings (3 by new roads and 10 by overland routes) (Table 3.12-4). The ranking of the remaining three alternatives in Zone 5 is less clear. Alternatives 5D and 5B would each result in 27 stream crossings, but Alternative 5D would have fewer total miles of stream within the 0.25-mile new travel network buffer and would thus result in fewer total impacts than Alternative 5B. Alternative 5A would result in a total of 83 miles of streams within the new travel network buffer (14 miles near new roads and 69 miles near overland routes), almost twice as many as Alternative 5B, but would have only 21 stream crossings (7 by new roads and 14 by overland routes) compared with 27 crossings for 5D (18 by new roads and 9 by overland routes). Given that each new road crossing would

Table 3.12-4. Potential Road Impacts to Surface Water Resources by Alternative

Alternative	Within 0.25-Mile Buffer of New Roads				Within 0.25-Mile Buffer of Overland Routes			
	Streams			Open Water (Acres)*	Streams			Open Water (Acres)*
	Type	Miles	No. of Crossings		Type	Miles	No. of Crossings	
1A	Perennial Stream	36	4	34.6	Perennial Stream	7	4	93.5
	Intermittent Stream	69	32		Intermittent Stream	18	12	
	Ditch/Canal	2	1		Ditch/Canal	9	7	
	Subtotal	**107**	**37**		**Subtotal**	**34**	**23**	
1B	Perennial Stream	7	4	4.7	Perennial Stream	11	3	93.9
	Intermittent Stream	81	69		Intermittent Stream	38	31	
	Ditch/Canal	5	3		Ditch/Canal	5	10	
	Subtotal	**93**	**76**		**Subtotal**	**54**	**44**	
1C	Perennial Stream	3	2	0.7	Perennial Stream	11	4	18.2
	Intermittent Stream	57	38		Intermittent Stream	50	27	
	Ditch/Canal	5	4		Ditch/Canal	6	4	
	Subtotal	**65**	**44**		**Subtotal**	**67**	**35**	
1D	Perennial Stream	5	2	0.8	Perennial Stream	5	2	85.7
	Intermittent Stream	71	63		Intermittent Stream	25	19	
	Ditch/Canal	1	0		Ditch/Canal	5	6	
	Subtotal	**77**	**65**		**Subtotal**	**35**	**27**	
2A	Perennial Stream	4	0	4.6	Perennial Stream	6	2	0.7
	Intermittent Stream	27	27		Intermittent Stream	18	14	
	Ditch/Canal	3	2		Ditch/Canal	8	7	
	Subtotal	**34**	**29**		**Subtotal**	**32**	**23**	

Table 3.12-4. Potential Road Impacts to Surface Water Resources by Alternative

	Within 0.25-Mile Buffer of New Roads				Within 0.25-Mile Buffer of Overland Routes			
	Streams			Open Water (Acres)*	Streams			Open Water (Acres)*
Alternative	**Type**	**Miles**	**No. of Crossings**		**Type**	**Miles**	**No. of Crossings**	
2B	Perennial Stream	4	0	8	Perennial Stream	6	2	25
	Intermittent Stream	55	49		Intermittent Stream	29	17	
	Ditch/Canal	10	3		Ditch/Canal	11	2	
	Subtotal	**69**	**52**		**Subtotal**	**46**	**21**	
2C	Perennial Stream	8	6	6.9	Perennial Stream	8	1	8.2
	Intermittent Stream	93	61		Intermittent Stream	20	14	
	Ditch/Canal	13	4		Ditch/Canal	2	3	
	Subtotal	**114**	**71**		**Subtotal**	**30**	**18**	
2D	Perennial Stream	15	10	8.5	Perennial Stream	12	4	10.2
	Intermittent Stream	65	61		Intermittent Stream	6	5	
	Ditch/Canal	11	9		Ditch/Canal	6	2	
	Subtotal	**91**	**80**		**Subtotal**	**24**	**11**	
2E	Perennial Stream	6	4	2.9	Perennial Stream	0	0	2.9
	Intermittent Stream	83	55		Intermittent Stream	3	2	
	Ditch/Canal	10	1		Ditch/Canal	0	2	
	Subtotal	**99**	**60**		**Subtotal**	**3**	**4**	
3A	Perennial Stream	10	1	0	Perennial Stream	4	1	0
	Intermittent Stream	66	41		Intermittent Stream	26	15	
	Ditch/Canal	0	0		Ditch/Canal	1	0	
	Subtotal	**76**	**42**		**Subtotal**	**31**	**16**	

Table 3.12-4. Potential Road Impacts to Surface Water Resources by Alternative

Alternative	Within 0.25-Mile Buffer of New Roads				Within 0.25-Mile Buffer of Overland Routes			
	Streams			Open Water (Acres)*	Streams			Open Water (Acres)*
	Type	Miles	No. of Crossings		Type	Miles	No. of Crossings	
3B	Perennial Stream	11	1	1.4	Perennial Stream	4	0	0
	Intermittent Stream	112	123		Intermittent Stream	26	14	
	Ditch/Canal	0	0		Ditch/Canal	2	0	
	Subtotal	**123**	**124**		**Subtotal**	**32**	**14**	
3C	Perennial Stream	13	2	1.4	Perennial Stream	3	0	0
	Intermittent Stream	106	119		Intermittent Stream	19	9	
	Ditch/Canal	0	0		Ditch/Canal	2	0	
	Subtotal	**119**	**121**		**Subtotal**	**24**	**9**	
4A	Perennial Stream	8	0	0.6	Perennial Stream	9	0	0
	Intermittent Stream	13	7		Intermittent Stream	4	2	
	Ditch/Canal	0	0		Ditch/Canal	0	0	
	Subtotal	**21**	**7**		**Subtotal**	**13**	**2**	
5A	Perennial Stream	0	0	0	Perennial Stream	1	0	45.6
	Intermittent Stream	14	7		Intermittent Stream	60	12	
	Ditch/Canal	0	0		Ditch/Canal	8	2	
	Subtotal	**14**	**7**		**Subtotal**	**69**	**14**	
5B	Perennial Stream	0	0	0.7	Perennial Stream	0	0	9.4
	Intermittent Stream	22	19		Intermittent Stream	17	5	
	Ditch/Canal	2	2		Ditch/Canal	2	1	
	Subtotal	**24**	**21**		**Subtotal**	**19**	**6**	
5C	Perennial Stream	0	0	0.2	Perennial Stream	0	0	10.5
	Intermittent Stream	1	1		Intermittent Stream	8	7	
	Ditch/Canal	2	2		Ditch/Canal	6	3	
	Subtotal	**3**	**3**		**Subtotal**	**14**	**10**	

Table 3.12-4. Potential Road Impacts to Surface Water Resources by Alternative

Alternative	Within 0.25-Mile Buffer of New Roads				Within 0.25-Mile Buffer of Overland Routes			
	Streams			Open Water (Acres)*	Streams			Open Water (Acres)*
	Type	Miles	No. of Crossings		Type	Miles	No. of Crossings	
5D	Perennial Stream	0	0	0	Perennial Stream	0	0	7.2
	Intermittent Stream	17	16		Intermittent Stream	10	8	
	Ditch/Canal	2	2		Ditch/Canal	2	1	
	Subtotal	**19**	**18**		**Subtotal**	**12**	**9**	
6A	Perennial Stream	0	0	68.6	Perennial Stream	0	0	19.2
	Intermittent Stream	17	11		Intermittent Stream	1	0	
	Ditch/Canal	1	0		Ditch/Canal	0	1	
	Subtotal	**18**	**11**		**Subtotal**	**1**	**1**	

* "Open water acres" includes lakes, ponds, reservoirs, and other lentic water resources.

likely require the installation of a culvert, the additional stream crossings associated with Alternative 5D probably outweigh the additional near stream road miles associated with 5A. Thus the preferred ranking of Zone 5 alternatives in descending order from a water quality perspective is 5C, 5A, 5D, and 5B.

Zone 6. Alternative 6A is the only alternative in Zone 6. It would result in 19 miles of near stream roads (18 miles of new roads and 1 mile of overland routes) and 87.8 acres of open water within the 0.25-mile new travel network buffer (Table 3.12-4). It would also result in 12 stream crossings by the new travel network (11 by new roads and 1 by overland routes).

Operation

Expected routine maintenance along the right-of-way would include minor roadwork and culvert repairs as required over the life of the project. Work to repair failing culverts would have approximately the same potential to impact surface water resources as was previously discussed for project construction. Failure to conduct routine maintenance activities would result in substantially greater impacts as culverts become plugged and fail and ditches overtop and could generate substantial erosion and sediment loading in creeks.

Alteration of Floodplains

Locations where the proposed project would cross floodplains that have been mapped by FEMA are indicated in Appendix C.12.3. Any structures placed in a floodplain would be designed so they do not impede or redirect flood flows or measurably raise the flood elevation. NorthWestern would comply with regional and federal floodplain and navigable river regulations measures to minimize impacts (NorthWestern 2008a).

Total Maximum Daily Loads

Many of the streams in Montana and Idaho are listed as impaired under 303(d) regulations; TMDLs have been completed for some of these streams (Appendix C.12.1). Additional discharges of pollutants from construction operation, maintenance, and decommissioning of the proposed project and the accompanying road network would contribute to the exceedance of the water quality standards. The mitigation measures proposed for the project in Section 3.12.7 would minimize these impacts. For streams in which TMDLs have been completed, construction of the proposed project must comply with TMDL recommendations and ensure that no further impairment of beneficial uses occurs as a result of the proposed project.

Townsend Substation

The proposed Townsend Substation would require approximately 52 acres of ground disturbance. The site is currently being used as irrigated farmland. Adjacent land use to the north, east, and south is a mixture of center-pivot irrigation and pasture. Hydric soils and wetland land cover associated with the Missouri River are located approximately 375 feet west and down gradient from the proposed site and could receive stormwater runoff from the site during construction and operation. The MPDES permit obtained by NorthWestern would require the development and implementation of a SWPPP to protect receiving waters from stormwater runoff during and after construction. NorthWestern would implement BMPs including stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment, thereby minimizing impacts to these receiving waters.

Substation operation and maintenance may adversely impact surface waters from accidental spills from oil-filled electrical equipment. Oil would be stored on the substation site for the operation and maintenance of transformers. The substation is designed with a perimeter berm, open bottom, and rock-filled pit to contain potential oil spills. In addition, NorthWestern would prepare a Spill Prevention, Countermeasure, and Control (SPCC) plan for the substation to comply with EPA's Oil Pollution Prevention regulation (40 CFR Part 112). An SPCC plan is required for facilities with aggregate aboveground oil storage capacity of greater than 1,320 gallons and a reasonable expectation of discharge into navigable Waters of the U.S. The secondary oil containment design and SPCC plan would minimize the potential for accidental oil spills and contamination of receiving waters (NorthWestern 2008a).

Mill Creek Substation

The existing Mill Creek Substation is located approximately 500 feet west of Mill Creek, a perennial stream that appears on Montana's 303(d) list as impaired from metals contamination. The substation is slightly closer to an unnamed intermittent tributary to Mill Creek, which merges with Mill Creek near the southeast corner of the existing substation. An irrigation ditch is approximately 1,000 feet to the northwest of the existing substation. The same permitting would apply as described for the Townsend Substation, thereby reducing impacts to water quality.

Midpoint Substation

The proposed modifications to the Midpoint Substation cannot be completed in the existing substation area; therefore, expansion of this facility would be required. The adjacent land to the south is irrigated farmland, and the adjacent land to the west, north, and east is sagebrush steppe habitat that has been disturbed by grazing and fire. All of these features could receive stormwater runoff from the site during construction. The same permitting would apply as described for the Townsend Substation, except that stormwater permitting would be conducted under the jurisdiction of IDEQ, as described in Section 3.12.2.2 (NorthWestern 2008a).

Water Used During Construction

Construction of the proposed project would require the use of locally obtained water. According to the application, water would be used for foundation construction and right-of-way dust control. The required water would be procured from municipal sources and/or landowners (NorthWestern 2008a). The Idaho Department of Water Resources and the MDNRC would require applications for temporary water appropriations where the proposed project would use existing water rights for construction purposes. No new permits would be required for water from municipal sources. Proposed mitigation measures and the SWPPP described in Section 3.12.2.2 would prevent construction water from impacting water quality.

3.12.4.4 Local Routing Options

LROs are alternative routes for the proposed transmission line that have been developed to avoid or minimize potential impacts to particular resources. They are proposed for areas where agencies or the public have raised concerns about a particular proposed alignment. In most cases, the LROs under consideration for the proposed project were not developed as a result of issues pertaining to water resources. As with the zone alternatives, the primary direct threat to water resources and water quality resulting from LRO construction would be from the new road and overland routes network. The number of stream crossings for each LRO is compared to the main alternative links they would replace (Table 3.12-6).

Radersburg LRO (Link 2-2). New roads along the Radersburg LRO would require four intermittent stream crossings (Table 3.12-5). The section of mainline alternative the LRO would replace would require seven crossings of intermittent streams, three by new roads and four by overland routes (Table 3.12-6). The Radersburg LRO would thus probably have less of a potential impact to water quality than the main line alternative it would replace.

Boulder Hill LRO (Link 2-3b). The Boulder Hill LRO would require four new road crossings of water course including an intermittent stream, two perennial streams, and one ditch/canal (Table 3.12-5). The section of mainline alternative it would replace would require only two crossings, both by new roads, including one perennial stream and one ditch/canal (Table 3.12-6). The LRO is thus likely to have a greater potential impact to water quality than the section of mainline alternative it would replace.

Upper Boulder 1 LRO (Links 4-1a-1 and 4-2a-3). The Upper Boulder 1 LRO would require 16 stream crossings, all by new roads, including 15 crossings on intermittent streams and 1 perennial stream crossing (Table 3.12-5). The section of mainline alternative it would replace would require 20 stream crossings, all by new roads, including 1 crossing of a perennial stream (Table 3.12-6). The LRO is thus likely to have fewer water quality impacts than the mainline alternative.

Upper Boulder 2 LRO (Link 4-2a-2 and 4-2a-3). The Upper Boulder 2 LRO would require 13 intermittent stream crossings, all by new roads (Table 3.12-5). The section of mainline alternative it would replace would require 18 intermittent stream crossings, all by new roads (Table 3.12-6). The LRO is thus likely to have fewer water quality impacts than the mainline alternative it replaces.

Lower Boulder LRO (Link 4-2b and Link 3-2). New roads for the Lower Boulder LRO would require three intermittent stream crossings (Table 3.12-5). The section of mainline alternative it would replace would require new roads to cross 13 intermittent streams (Table 3.12-6). Implementation of this LRO requires the use of mainline Link 3-2. The LRO is thus likely to have fewer water quality impacts than the mainline alternative.

South of Butte 1 LRO (Link 6-2). There would be no substantial differences to water resources from implementation of this LRO compared to the mainline link. Both the LRO and the mainline link require one stream crossing (Table 3.12-6).

Beef Trail LRO (Link 7-2). The Beef Trail LRO would require no stream crossing by the proposed new travel network (Table 3.12-5). The section of mainline alterative it would replace would require one new road crossing of an intermittent stream (Table 3.12-6). The LRO would thus have a smaller potential impact to water resources.

North of Buxton LRO (Link 7-4). New road for the North of Buxton LRO would cross two intermittent stream (Table 3.12-5). New roads for the section of mainline alternative would require seven stream crossings including four crossings by new roads (two of perennial streams and two of intermittent streams) and three crossings by overland routes, all of intermittent streams (Table 3.12-6). The LRO is thus expected to have lower water quality impacts.

Mount Haggin LRO (Link 9-3). There would be no substantial differences to water resources from implementation of this LRO compared to the mainline link. Neither the LRO nor the mainline link would require stream crossings by the proposed travel network (Table 3-12.6).

Maiden Rock LRO (Link 32). New roads for the Maiden Rock LRO would cross 12 intermittent streams (Table 3.12-5). The section of mainline alternative the LRO would replace would require new road crossings of 10 streams, including 9 crossings of intermittent streams and 1 crossing of a ditch or canal (Table 3.12-6). The mainline alternative would be expected to have slightly lower water quality impacts.

Willow Creek LRO (Link 14-2). The Willow Creek LRO would require new roads to cross two intermittent streams (Table 3.12-5). New roads for the mainline alternative would require seven intermittent stream crossings (Table 3.12-6). The LRO would be expected to have slightly lower water quality impacts.

Fleecer LRO (Link 28). The Fleecer LRO would require no stream crossings by the proposed new travel network (Table 3.12-5). New roads for the mainline alternative would cross five streams two perennial and three intermittent streams (Table 3.12-6). The LRO would have fewer adverse water quality impacts.

Table 3.12-5. Number of Stream Crossings by Local Routing Option for New Roads and Overland Routes

Alternative[2]	LRO	New Road Crossings[1]				Overland Crossings[1]			
		Intermittent	Perennial	Canals	Total	Intermittent	Perennial	Canals	Total
1A	Radersburg	4	0	0	4	0	0	0	0
1A	Boulder Hill	1	2	1	4	0	0	0	0
1B 1D	Upper Boulder 1[3]	15	1	0	16	0	0	0	0
1B 1D	Upper Boulder 2[4]	13	0	0	13	0	0	0	0
1B 1D	Lower Boulder[5]	3	0	0	3	0	0	0	0
1B 1C 2C	South of Butte 1	1	0	0	1	0	0	0	0
1B 2C	Beef Trail	0	0	0	0	0	0	0	0
1B 2C	North of Buxton	2	0	0	2	0	0	0	0
1B 2A 2B 2C	Mount Haggin	0	0	0	0	0	0	0	0
2A 2B	Maiden Rock	12	0	0	12	0	0	0	0
2B	Willow Creek	2	0	0	2	0	0	0	0
2D	Fleecer	0	0	0	0	0	0	0	0
2D	Rock Creek	5	2	0	7	0	0	0	0
3B	Frying Pan Gulch	8	0	0	8	0	0	0	0
3B 3C	Clark Canyon East	21	1	0	22	0	0	0	0
3A 3B 3C	Lima	2	0	0	2	1	0	0	1
3A 3B 3C	Diamond Butte	1	0	0	1	0	0	0	0

1 Road crossings generated from indicative roads dataset from NorthWestern dated October 28, 2009.

2 Multiple alternatives are listed for some LROs because they could be used in multiple alternatives.

3 Crossing total for the Upper Boulder 1 LRO includes Links LRO4-2a-1 and LRO4-2a-3.

4 Crossing total for the Upper Boulder 2 LRO includes Links LRO4-2a-2 and LRO4-2a-3

5 Crossing total for the Lower Boulder LRO includes Links LRO4-2b and 3-2.

Table 3.12-6. Comparison of Stream Crossings for Local Routing Options and Corresponding Mainline Alternative Links

			LRO[1]					
			Mainline Alternative			Link[1]		
Alternative	Links[2]	LRO	New Roads	Overland Route	Total	New Roads	Overland Route	Total
1A	2-2	Radersburg	4	0	4	3	4	7
1A	2-3b	Boulder Hill	4[6]	0	4	2[4]	0	2
1B 1D	4-1b 4-2a	Upper Boulder 1[3]	16[4]	0	16	20		20
1B 1D	4-2a	Upper Boulder 2[5]	13	0	13	18	0	18
1B 1D	4-2b	Lower Boulder[7]	3	0	3	13	0	13
1B 1C 2C	6-2	South of Butte 1	1	0	1	0	1	1
1B 2C	7-2	Beef Trail	0	0	0	1	0	1
1B 2C	7-4	North of Buxton	2	0	2	4[4]	3	7
1B 2A 2B 2C	9-3	Mount Haggin	0	0	0	0	0	0
2A 2B	11-3 11-4	Maiden Rock	12	0	12	10	0	10
2B	14-2	Willow Creek	2	0	2	7	0	7
2D	28	Fleecer	0	0	0	5[4]	0	5
2D	32	Rock Creek	7[6]	0	7	7[6]	0	7
3B	16-2	Frying Pan Gulch	8	0	8	6	0	6
3B 3C	16-3c	Clark Canyon East	22[4]	0	22	22	0	22
3A 3B 3C	17-2	Lima	2	1	3	6	2	8
3A 3B 3C	17-4	Diamond Butte	1	0	1	3[4]	0	3

1 Road crossings generated from indicative roads dataset from NorthWestern dated October 28, 2009.
2 Mainline links that would be replaced by the LRO.
3 Crossing total for the Upper Boulder 1 LRO includes links LRO4-2a-1 and LRO402a-3.
4 Includes one perennial stream crossing.
5 Crossing total for the Upper Boulder 2 LRO includes Links LRO4-2a-2 and LRO4-2a-3.
6 Includes two perennial stream crossings.
7 Crossing total for the Lower Boulder LRO includes Links LRO4-2b and mainline link 3-2.

Rock Creek LRO (Link 32). New roads for the Rock Creek LRO and mainline alternative would cross seven streams five intermittent streams and two perennial streams (Table 3.12-6). Thus there is no difference between the LRO and mainline alternative from a water quality perspective.

Frying Pan Gulch LRO (Link 16-2). New roads for the Frying Plan Gulch LRO would cross eight intermittent streams (Table 3.12-5). While new roads for the mainline alternative would cross six intermittent streams (Table 3.12-6). The mainline alternative would be expected to have slightly lower adverse impacts.

Clark Canyon East LRO (Link 16-3c). New roads for the Clark Canyon East LRO would cross 21 intermittent and 1 perennial streams (Table 3.12-5). This is essentially the same as the mainline link that it would replace (Link 16-3c), except that the mainline link would not require crossing of a perennial stream (Table 3.12-6). The mainline would thus have a slightly smaller potential impact to water quality.

Lima LRO (Link 17-2). The Lima LRO would require two new road crossings of intermittent streams (Table 3-12.5). The section of mainline alternative it would replace would require eight crossings, six by new roads and two by overland routes, all of intermittent streams (Table 3.12-6). Thus the LRO would have lower water quality impacts.

Diamond Butte LRO (Link 17-4). The Diamond Butte LRO would require one new road crossing of an intermittent stream (Table 3.12-5). New roads for the mainline alternative would cross two perennial streams and one intermittent stream (Table 3.12-6). The LRO is expected to have fewer water quality impacts.

3.12.5 Wetlands

Generally, riparian/wetland areas can be identified in the project area during the summer months as the green belt of vegetation adjacent to streams, rivers, lakes, and reservoirs. They can also occur as seeps, sloughs, or wet meadows in areas where groundwater is close to the soil surface. Drought conditions can make identification of riparian/wetland areas problematic. It is beyond the scope of this EIS to distinguish between mapped riparian areas and wetlands; therefore, the term riparian/wetland area is used throughout this EIS.

Wetland and riparian science and federal and state water quality laws are still evolving. Definitions of terminology used in this section are provided below so that all readers have a clear understanding of the terminology used and the conclusions made.

Riparian Areas. Many definitions of riparian areas have been used by various agencies (NRC 2002). For the purposes of this section, riparian areas are defined as:

> . . . areas that are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines" (NRC 2002, p. 33).

Wetlands. The interaction of a site's hydrology, vegetation, and anaerobic soils results in the development of characteristics unique to wetlands. The term wetland has a specific definition (see 33 CFR 328.3). Wetlands are typically found in the wettest portions of a riparian area. Wetlands are commonly referred to as playas, swamps, marshes, wet meadows, willow carrs, bogs, and fens. In the project area, wetlands are most commonly associated with bodies of water such as ponds, lakes, and streams. Activities in wetlands are regulated by the USACE.

Waters of the U.S. The term Waters of the U.S. is a legal term and is defined in 33 CFR 328.3. It generally includes all historically navigable waterways (e.g., streams, rivers, lakes, and reservoirs) and their tributaries, water bodies used in some way for interstate or foreign commerce, and wetlands adjacent to these water bodies. Activities in Waters of the U.S. are regulated by the USACE under the CWA.

3.12.5.1 Wetlands Physical Setting

Riparian/wetland areas can be distinguished from other plant community types by the unique combination of hydrology, soils, and vegetation. A site's hydrology is the overriding characteristic that distinguishes riparian/wetland areas from adjacent uplands. The hydrology of any site or region is ultimately linked to precipitation, but the development of riparian/wetland areas is dependent on the longer-term presence of available water. In much of the western U.S., annual precipitation is less than 20 inches and annual evapotranspiration is more than 30 inches (WRCC 2009b), indicating a water deficit and that precipitation alone is insufficient to support the establishment or persistence of riparian/wetland areas. These conditions hold true for the proposed project area. Because of this water deficit, the hydrology of riparian/wetland areas in the project area originates primarily from surface water, groundwater, or a combination of the two.

Soils in riparian/wetland areas differ from upland soils by their formation and the prolonged presence of water. Riparian/wetland soils form under conditions characterized as flowing (lotic) or standing water (lentic) environments (Lewis et al. 2003). Soils in lotic environments, such as floodplains, typically exhibit a high level of stratification developed by successive depositional events during floods. Organic matter in these areas can often be found as deposits derived from offsite sources. Soils in lentic environments, such as in depressional areas or lakes, frequently have higher levels of organic matter accumulation than either lotic environments or uplands (Lewis et al. 2003). The amount of organic matter accumulation in lentic areas is affected by the type of vegetation and the amount of wave action the site receives, among other factors (Lewis et al. 2003).

When a soil becomes saturated with water, the bio-geochemical processes change because of the lack of oxygen (the environment is anaerobic). These changes in soil chemistry are unique to saturated soils and have been termed "hydric." Hydric soil is defined as "a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (NRCS 2007a). Hydric soils are most commonly found in wetland areas and can be identified by field indicators such as mottling, gleying, and darker color (i.e., chroma), among others (NRCS 2006). Hydric soils within the project area can be expected on active floodplains, floodplain terraces, depressional areas, swales, playas, and drainages. Hydric soils can also be found as inclusions in other typically non-hydric soil types. A total of 158 hydric soil series have been identified and mapped in the proposed project area by the NRCS (2007b) (see Appendix C.12.4 for a complete list).

Riparian/wetland areas in the project area occur as forested, scrub-shrub, and emergent (i.e., herbaceous) communities. Overall riparian/wetland areas comprise roughly 3 percent of the project area. Project alternatives where riparian/wetland areas comprise 5 percent or more of the project area are 4A (8 percent) 3B (7 percent), 2B and 3C (6 percent), and 1A, 2A, 2D, and 3A (5 percent). Riparian/wetland areas comprise less than 1 percent of the plant communities found in the Idaho alternatives (5A through 5D and 6A).

Emergent wetlands typically contain different assemblages of grasses, sedges, rushes, and forb species (e.g., wet meadows and marshes) and are also present in the study area. Some of the more common plant species present in emergent wetlands include sedges, rushes, spikerushes, cattails, and bulrushes. Many of these same species can also occur in the understory of forested or scrub-shrub riparian/wetland areas. Alternatives containing relatively high amounts of emergent riparian/wetland areas are 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, and 4A (Table 3.12-7).

Shrub-dominated riparian/wetland areas typically contain a variety of willow species and may also include species such as red-osier dogwood (*Cornus sericea*), alder (*Alnus* spp.), black hawthorn (*Crataegus douglasii*), and water birch (*Betula occidentalis*). Alternatives containing relatively high amounts of scrub-shrub riparian/wetland areas are 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D, 3A, 3B, 3C, and 4A (Table 3.12-7).

In the project area, forested riparian/wetland areas are dominated by conifers, broadleaf species, or a mixture of both. Cottonwood trees (*Populus* spp.) are the most common riparian/wetland tree species in the project area. Alternatives containing relatively more forested riparian/wetland areas are 1A, 2A, 2B, and 2D. Alternatives with no forested riparian/wetland areas present are 5B, 5C, 5D, and 6A.

Open water areas include lakes, ponds, and portions of stream or river channels wide enough to be mapped as such. Alternatives containing relatively more open water are 1A, 1B, 1C, 1D, 3B, 3C, 5B, 5C, and 5D. Open water areas are a relatively minor component of each alternative and have been combined with emergent riparian/wetland areas for the remainder of this discussion.

Table 3.12-7. Summary of Riparian/Wetland Vegetation Types Occurring within the Proposed Project Alternatives

Zone	Alternative/LRO		Riparian/Wetland Type				
			Emergent	Scrub-Shrub	Forested	Water	Total
1	1A	Acres	406	3,928	1,011	196	5,542
		% of Alt.	7	71	18	4	100
	1B	Acres	1,026	2,780	894	396	5,095
		% of Alt.	20	55	18	8	100
	1C	Acres	1,164	2,064	589	762	4,580
		% of Alt.	25	45	13	17	100
	1D	Acres	94	1,749	389	386	2,618
		% of Alt.	4	67	15	15	100
2	2A	Acres	1,208	1,454	1,015	13	3,690
		% of Alt.	33	39	27	0	100
	2B	Acres	1,563	1,624	1,143	16	4,346
		% of Alt.	36	37	26	0	100
	2C	Acres	1,198	1,802	903	11	3,914
		% of Alt.	31	46	23	0	100
	2D	Acres	692	1,735	1,283	67	3,776
		% of Alt.	18	46	34	2	100
	2E	Acres	266	771	399	1	1,438
		% of Alt.	19	54	28	0	100

Table 3.12-7. Summary of Riparian/Wetland Vegetation Types Occurring within the Proposed Project Alternatives

Zone	Alternative/LRO			Riparian/Wetland Type: Emergent	Scrub-Shrub	Forested	Water	Total
3	3A		Acres	2,904	1,422	415	28	4,769
			% of Alt.	61	30	9	1	100
	3B		Acres	2,352	2,331	729	452	5,863
			% of Alt.	40	40	12	8	100
	3C		Acres	2,354	2,272	894	447	5,967
			% of Alt.	39	38	15	7	100
4	4A		Acres	1,134	1,101	2	0	2,237
			% of Alt.	51	49	0	0	100
5	5A		Acres	291	129	47	64	531
			% of Alt.	55	24	9	12	100
	5B		Acres	198	69	0	117	383
			% of Alt.	52	18	0	31	100
	5C		Acres	336	69	0	344	749
			% of Alt.	45	9	0	46	100
	5D		Acres	243	69	0	171	483
			% of Alt.	50	14	0	35	100
6	6A		Acres	259	240	0	48	547
			% of Alt.	47	44	0	9	100
LROs	1A	Radersburg	Acres	0	0	20	0	20
			% of LRO	0	0	100	0	100
	1B 1D	Upper Boulder 1	Acres	1	39	11	5	55
			% of LRO	2	70	19	8	100
	1B 1D	Upper Boulder 2	Acres	1	49	11	5	66
			% of LRO	2	75	17	7	100
	1B 1D	Lower Boulder 1	Acres	14	217	21	82	335
			% of LRO	4	65	6	25	100
	1B 1C 2C	South of Butte 1	Acres	204	17	216	0	437
			% of LRO	47	49	4		100
	1B 2C	Beef Trail	Acres	126	119	105	2	352
			% of LRO	36	34	30	1	100
	1B 2C	North of Buxton	Acres	110	167	70	1	349
			% of LRO	32	48	20	0	100

Table 3.12-7. Summary of Riparian/Wetland Vegetation Types Occurring within the Proposed Project Alternatives

Zone	Alternative/LRO			Riparian/Wetland Type: Emergent	Scrub-Shrub	Forested	Water	Total
LROs	1B 2A 2B 2C	Mount Haggin	Acres	153	135	33	0	321
			% of LRO	48	42	10	0	100
	2A 2B	Maiden Rock	Acres	205	151	207	6	569
			% of LRO	36	27	36	1	100
	2B	Willow Creek	Acres	0	126	61	0	187
			% of LRO	0	33	67	0	100
	2D	Fleecer	Acres	105	154	89	4	353
			% of LRO	30	44	25	1	100
	2D	Rock Creek	Acres	0	176	65	0	241
			% of LRO	0	73	27	0	100
	3B	Frying Pan Gulch	Acres	0	0	0	1	1
			% of LRO	0	0	0	100	100
	3B 3C	Clark Canyon East	Acres	192	48	131	0	371
			% of LRO	52	13	35	0	100
	3A 3B 3C	Lima	Acres	244	0	209	1	453
			% of LRO	54	0	46	0	100
	3A 3B 3C	Diamond Butte	Acres	659	276	0	0	935
			% of LRO	70	30	0	0	100

3.12.5.2 Wetlands Analysis Methods

Riparian/wetland mapping was completed for the proposed project area. The detailed methods used are described in Appendix C.12.5. Direct impacts were evaluated by projecting permanent and short- and long-term direct impacts to riparian/wetland areas caused by the transmission line itself as well as associated new access roads and overland routes. Direct permanent impacts associated with the proposed transmission line include permanent impacts from the towers and clearing of right-of-way in forested environments. Direct short- and long-term impacts associated with the proposed transmission line include tower installation, splicing sites, tensioning sites, material staging areas, and concrete batch plants. Direct permanent impacts and direct short- and long-term impacts would also be caused by the construction of new roads and overland routes. Indirect impacts are discussed qualitatively.

Direct permanent and short- and long-term impacts to riparian/wetland areas that would be caused by transmission line alternatives were calculated using a GIS overlay process and the application of the general disturbance model developed for the proposed project by NorthWestern. As shown in the disturbance model (Tables 3.1-1 and 3.1-2), impacts in forested areas, including forested riparian areas, are calculated as 26.7 acres of permanent impact per mile of transmission line. A detailed description of the general process used to calculate impacts to vegetation is in Section 3.10.

Direct impacts caused by new access road and overland routes construction were also assessed using a GIS overlay process, which is described in detail in Section 3.10. New access roads are defined as roads that would require vegetation clearing, excavation, grading, and other actions associated with road construction; these were considered to be permanent impacts. Overland routes are defined as routes required during the construction of the proposed project that would not require vegetation clearing, excavation, or grading, and are considered to be short- or long-term impacts.

3.12.5.3 Wetlands Impact Analysis

Impacts can occur directly or indirectly and be short-term, long-term, or permanent. Direct impacts are the result of the physical destruction or degradation of a resource within a proposed project alternative. An example of a direct impact is the excavation and grading of riparian/wetland habitat during the construction of a road. Indirect impacts are foreseeable effects that are somewhat distant from the project in time and/or space (see 40 CFR 1508.8). A relatively common example of an indirect impact is the introduction and establishment of noxious weeds on newly disturbed soils. The noxious weeds become established and begin to out-compete native plant species and can eventually lead to the degradation of riparian/wetland habitats.

Short-term impacts are temporary and usually restored to pre-impact functionality within 5 years. When not permanent, impacts to emergent wetlands are often considered short term because these communities recover more quickly than plant communities possessing a woody plant component. Long-term impacts take longer than 5 years to revert to pre-impact functionality, but do eventually recover from the impact. Long-term impacts can be expected to occur more frequently in riparian/wetland areas with a tree and shrub component because these woody plants generally take longer to become established and grow to maturity than herbaceous species.

Permanent impacts are those impacts where a complete change in functionality occurs (i.e., land conversion) and persist for the lifetime of the facility. Related to permanent impacts, residual impacts are those impacts that persist after mitigation activities are fully implemented. These residual impacts are discussed in Section 3.12.8.

Indirect impacts are expected to be similar among the alternatives and LROs.

No Action Alternative

Under the no action alternative the transmission line and associated infrastructure would not be constructed. Impacts caused by other ongoing activities and/or maintenance associated with existing transmission lines and land management actions would continue to occur.

Proposed Project

Indirect Impacts

Indirect impacts are foreseeable effects that occur away from the proposed project in time, space, or both. By their very nature, indirect impacts are difficult to quantify before a project is designed. The general types of indirect impacts to riparian/wetland resources are discussed in more detail below.

- *Changes in Drainage or Flow Routes.* Construction of any of the proposed alternatives and associated roads could change the way water is routed across the landscape resulting in higher, lower, or no substantial change in surface water or groundwater levels. These changes could be caused by increasing the total amount of impervious cover (i.e., road surface) in an area, and thereby increasing stormwater runoff; crossing natural drainages and interrupting sheetflow on a hillside so that water runs down a roadside ditch instead of down a hillside; constructing roadside ditches to carry stormwater runoff to designated discharge points; among other unforeseeable consequences. An increase in water availability at a riparian/wetland area could cause a shift in plant species toward those more adapted to relatively higher soil moistures or lower soil oxygen regimes. A decrease in water availability at a site would likely result in the site drying and a shift in dominance to species that are better adapted to relatively drier conditions (i.e., higher levels of soil oxygen).

- *Decrease in Water Quality*. Decreased water quality could affect the plant and animal species that inhabit a particular area; for example, an increase in sediment from road runoff could preclude amphibian species from using a particular marsh or water body. Water quality can generally be expected to decrease during construction as earth moving equipment removes vegetation and exposes soils to erosive forces. This type of impact is typically temporary and is addressed in a SWPPP and 318 Authorization requirements that specify BMPs to minimize these types of impacts.
- *Introduction of Invasive Plant Species*. Seeds and plant parts of noxious weeds and other invasive plant species could be carried into the project area on construction equipment (Fleming 2005), existing weed seeds can be spread during construction, and/or natural distribution methods (such as animals and wind) could deliver weed seeds to newly disturbed soils. These different ways for weeds to be spread in construction areas facilitate both the weed establishment and spread. Once established, they can spread into nearby undisturbed areas and would slowly degrade habitat quality for various wildlife species and result in a shift in the plant and animal species composition found in a particular area.
- *Loss of Functionality*. In some cases, direct impacts to riparian/wetland vegetation could have indirect impacts on functions performed by riparian/wetland areas. Preserving this functionality is the intent of the aquatic influence zones prescribed for riparian/wetland areas. One example of how the functionality may be indirectly affected by direct impacts to riparian/wetland areas is the removal of riparian trees to accommodate a road or the transmission line. Loss of these trees would clearly be a direct impact, but one potential indirect impact to the riparian/wetland area or associated stream may be the loss of shade to the stream which helps to maintain cooler water temperatures during the summer months and helps to support resident cold water fish populations. Loss of these trees in this example may also represent a loss of large woody material potentially delivered to the stream; an important element in fish habitat. Another unintended consequence of the removal of these trees may be the “release” of understory vegetation. This occurs when plants that were unable to survive in the shady environment under the tree suddenly find habitat conditions radically improved by the loss of overstory vegetation that restricted their growth, and rapid growth often results. Through their connection to the alluvial aquifer, both the loss of the riparian trees and the growth of this “new” vegetation could affect water availability in the stream and associated riparian/wetland area, increasing or decreasing water quantities and/or altering the timing of water delivery to the stream.
- *Habitat Fragmentation*. Habitat fragmentation could occur directly when the proposed transmission line or an associated road splits a contiguous habitat block into one or more pieces. It could also occur indirectly as a result of increased noise and/or dust, increased presence of humans or livestock, and other more subtle changes to the environment. A more detailed discussion of habitat fragmentation is in Section 3.3.

Direct Impacts

The following discussion describes the potential direct impacts caused by each proposed project alternative and the roads associated with each alternative. Direct impact estimates are considered “potential” impacts because it is anticipated that the vast majority of riparian/wetland impacts would be avoided by spanning these areas with the transmission line and avoiding them as much as possible with the new roads and overland routes. Milepost location information of where riparian/wetland areas occur within 250 feet on either side of the proposed project’s alternatives is in Appendix C.12.6.

Zone 1. Alternative 1A would have the greatest potential for adverse direct impact to riparian/wetland resources of the four alternatives in this zone (Table 3.12-8), impacting about 60 acres of forested and scrub-shrub riparian/wetland communities (Table 3.12-9). This is notable because re-establishing forested riparian/wetland areas (either on site or at an offsite mitigation location) typically takes longer than re-establishing scrub-shrub or emergent riparian/wetland areas because of the time needed for the plants to grow to maturity and be of similar stature to what was impacted. Roads that would be associated with Alternative 1A would have permanent impacts of about an acre more riparian/wetland habitat than the next closest alternative (1B) (Table 3.12-10). Alternative 1C is projected to impact the least amount of forested riparian/wetland acreage and would have the least amount of permanent impact; whereas Alternative 1D is anticipated to impact the least amount of scrub-shrub riparian/wetland area, but would have nearly twice the amount of total permanent impact than Alternative 1C (Table 3.12-8). From a riparian/wetland perspective, the lowest impact alternative in Zone 1 is Alternative 1C, which would affect a total of about 24 acres, followed by Alternatives 1D, 1B, and 1A.

Zone 2. Of the five Zone 2 alternatives, Alternative 2D would have the greatest overall impact to riparian/wetland areas, about 61 acres and would permanently impact the greatest amount of forested and scrub-shrub riparian/wetland areas (Table 3.12-8). This is contrasted with Alternative 2E, which would have the least potential to impact riparian/wetland areas and would have the least impact on forested or scrub-shrub riparian/wetland areas (Tables 3.12-8, 3.12-9, and 3.12-10). Based on this information, the lowest impact alternative in Zone 2 from a riparian/wetland standpoint is Alternative 2E, which would affect a total of about 17 acres, followed by Alternatives 2C, 2A, 2B, and 2D.

Zone 3. Alternative 3A is projected to have the greatest short-/long-term impact, greatest permanent impact, and the greatest overall impact to riparian/wetland areas of the three alternatives in Zone 3 (Table 3.12-8), affecting about 51 acres. In terms of overall impact, Alternatives 3B and 3C are similar, though Alternative 3C is projected to permanently impact more riparian/wetland areas than Alternative 3B. Alternative 3C is projected to impact the most forested riparian/wetland habitat in this zone (Tables 3.12-9 and 3.12-10). Alternatives 3A and 3B are projected to impact similar amounts of forested riparian/wetland areas. However, Alternative 3A would have the greatest permanent impact of the three alternatives in this zone to emergent and scrub-shrub riparian/wetland areas. For these reasons, Alternative 3B is the most favorable to riparian/wetland resources in this zone, which would affect a total of about 36 acres, followed by Alternatives 3C and 3A.

Zone 4. Alternative 4A is the only alternative evaluated in Zone 4. All direct impacts in this alternative would occur to scrub-shrub and emergent riparian/wetland areas, with the majority of impact being short-/long-term impacts rather than permanent (Tables 3.12-8, 3.12-9, and 3.12-10).

Zone 5. Because of their scarcity, impacts to riparian/wetland areas in Zone 5 are relatively minor compared to projected impacts in Zones 1 through 4 (Table 3.12-8). Alternative 5A comes very close (within approximately 100 feet) to the Big Lost River Sinks marsh complex, but does not cross it. Alternative 5A would have the least overall impact, affecting less than 2 acres total, but the majority of the impact is projected to be permanent and would be to forested riparian/wetland areas (Tables 3.12-9 and 3.12-10). Impacts in the other three alternatives in this zone are similar both in the amount of impact and in that the majority of impacts would be short-/long-term types. Based on this information, Alternatives 5B, 5C, or 5D would be preferable to Alternative 5A from a riparian/wetland viewpoint.

Zone 6. Alternative 6A is the only alternative evaluated in Zone 6. Direct impacts would potentially occur to scrub-shrub and emergent riparian/wetland areas under this alternative (Tables 3.12-8, 3.12-9, and 3.12-10).

Table 3.12-8. Summary of Potential Impacts to Riparian/Wetland Areas Caused by the Proposed Project and Associated Access Roads

	Transmission Line (Acres)			Roads (Acres)			Totals (Acres)		
Alternative	**Short-/ Long- Term**	**Permanent**	**Subtotal**	**Short-/ Long-Term**	**Permanent**	**Subtotal**	**Short-/ Long-Term**	**Permanent**	**Total**
Zone 1									
1A	32.5	35.6	68.1	3.2	3.1	6.3	35.7	38.6	74.4
1B	21	23.7	44.7	2.9	2.2	5	23.9	25.8	49.7
1C	20.9	6.2	27.1	2.1	1.3	3.4	22.9	7.5	30.4
1D	8.1	13.8	21.8	1.5	0.9	2.4	9.6	14.7	24.2
Zone 2									
2A	19.6	22.4	42	2	0.4	2.4	21.6	22.7	44.4
2B	21.1	26.9	48	2.5	0.4	2.9	23.6	27.4	51
2C	20.4	17.4	37.8	1.4	3.1	4.4	21.7	20.5	42.2
2D	24	30.3	54.3	3.4	3.5	6.8	27.4	33.7	61.1
2E	7.4	7.5	15	0	1.8	1.8	7.4	9.3	16.8
Zone 3									
3A	31.7	13	44.7	3.6	2.8	6.4	35.3	15.9	51.2
3B	21.3	10.4	31.7	1.2	3.3	4.5	22.5	13.8	36.2
3C	19.4	12.1	31.5	0.9	3.6	4.5	20.3	15.7	36.1
Zone 4									
4A	17.5	3.6	21.1	2.5	0.2	2.8	20	3.8	23.8
Zone 5									
5A	0.6	1	1.6	.05	0	0	0.6	1	1.7
5B	1.7	0.3	2	0.4	0	0.4	2.1	0.3	2.4
5C	1.8	0.4	2.2	0.4	0	0.4	2.2	0.4	2.6
5D	1.7	0.3	2	0.4	0	0.4	2.1	0.3	2.4
Zone 6									
6A	2.8	0.6	3.4	0.1	0.1	0.2	3.5	0.8	4.4

Table 3.12-9. Summary of Potential Direct Impacts to Riparian/Wetland Areas by Community Type Caused by the Proposed Project

Alternative	Impact Type	Estimated Impacts per Riparian/Wetland Community Type (Acres)			
		Forested	Scrub-Shrub	Emergent	Total
Zone 1					
1A	Miles Crossed	1.1	2.5	0.7	4.3
	Permanent (acres)	28.9	5.3	1.4	35.6
	Short-/Long-Term (acres)	0	25.6	7	32.5
	Total (acres)	28.9	30.8	8.4	68.1
1B	Miles Crossed	0.7	1.4	0.6	2.8
	Permanent (acres)	19.3	3	1.4	23.7
	Short-/Long-Term (acres)	0	14.4	6.6	21
	Total (acres)	19.3	17.4	7.9	44.7
1C	Miles Crossed	0.1	1.3	0.8	2.1
	Permanent (acres)	1.9	2.7	1.6	6.2
	Short-/Long-Term (acres)	0	13	7.8	20.9
	Total (acres)	1.9	15.7	9.4	27.1
1D	Miles Crossed	0.5	0.7	0.1	1.2
	Permanent (acres)	12.1	1.4	0.2	13.8
	Short-/Long-Term (acres)	0	7	1.1	8.1
	Total (acres)	12.1	8.4	1.3	21.8
Zone 2					
2A	Miles Crossed	0.7	1.3	0.6	2.6
	Permanent (acres)	18.3	2.7	1.4	22.4
	Short-/Long-Term (acres)	0	13.1	6.6	19.6
	Total (acres)	18.3	15.7	7.9	42
2B	Miles Crossed	0.8	1.4	0.6	2.9
	Permanent (acres)	22.6	3	1.4	26.9
	Short-/Long-Term (acres)	0	14.5	6.6	21.1
	Total (acres)	22.6	17.5	7.9	48
2C	Miles Crossed	0.5	1.3	0.7	2.5
	Permanent (acres)	13.2	2.7	1.5	17.4
	Short-/Long-Term (acres)	0	13.1	7.2	20.4
	Total (acres)	13.2	15.8	8.7	37.8

Table 3.12-9. Summary of Potential Direct Impacts to Riparian/Wetland Areas by Community Type Caused by the Proposed Project

Alternative	Impact Type	Estimated Impacts per Riparian/Wetland Community Type (Acres)			
		Forested	Scrub-Shrub	Emergent	Total
2D	Miles Crossed	0.9	1.8	0.5	3.3
	Permanent (acres)	25.3	3.8	1.1	30.3
	Short-/Long-Term (acres)	0	18.6	5.4	24
	Total (acres)	25.3	22.5	6.5	54.3
2E	Miles Crossed	0.2	0.6	0.2	1
	Permanent (acres)	6	1.2	0.4	7.5
	Short-/Long-Term (acres)	0	5.7	1.7	7.4
	Total (acres)	6	6.9	2.1	15
Zone 3					
3A	Miles Crossed	0.2	1	2.2	3.4
	Permanent (acres)	6.5	2	4.5	13
	Short-/Long-Term (acres)	0	9.7	22	31.7
	Total (acres)	6.5	11.8	26.5	44.7
3B	Miles Crossed	0.2	0.8	1.3	2.3
	Permanent (acres)	6	1.6	2.8	10.4
	Short-/Long-Term (acres)	0	7.9	13.4	21.3
	Total (acres)	6	9.5	16.2	31.7
3C	Miles Crossed	0.3	0.6	1.3	2.2
	Permanent (acres)	8.1	1.2	2.8	12.1
	Short-/Long-Term (acres)	0	6	13.4	19.4
	Total (acres)	8.1	7.2	16.2	31.5
Zone 4					
4A	Miles Crossed	0	1	0.8	1.7
	Permanent (acres)	0	2	1.6	3.6
	Short-/Long-Term (acres)	0	9.8	7.7	17.5
	Total (acres)	0	11.8	9.3	21.1

Table 3.12-9. Summary of Potential Direct Impacts to Riparian/Wetland Areas by Community Type Caused by the Proposed Project

Alternative	Impact Type	Estimated Impacts per Riparian/Wetland Community Type (Acres)			
		Forested	Scrub-Shrub	Emergent	Total
Zone 5					
5A	Miles Crossed	0	0	0	0.1
	Permanent (acres)	0.9	0.1	0	1
	Short-/Long-Term (acres)	0	0.5	0.1	0.6
	Total (acres)	0.9	0.6	0.1	1.6
5B	Miles Crossed	0	0	0.1	0.2
	Permanent (acres)	0	0.1	0.2	0.3
	Short-/Long-Term (acres)	0	0.5	1.2	1.7
	Total (acres)	0	0.6	1.4	2
5C	Miles Crossed	0	.05	0.1	0.2
	Permanent (acres)	0	0.1	0.3	0.4
	Short-/Long-Term (acres)	0	0.5	1.3	1.8
	Total (acres)	0	0.6	1.6	2.2
5D	Miles Crossed	0	.05	0.1	0.2
	Permanent (acres)	0	0.1	0.2	0.3
	Short-/Long-Term (acres)	0	0.5	1.2	1.7
	Total (acres)	0	0.6	1.4	2
Zone 6					
6A	Miles Crossed	0	0.1	0.2	0.3
	Permanent (acres)	0	0.2	0.3	0.6
	Short-/Long-Term (acres)	0	1.2	1.6	2.8
	Total (acres)	0	1.4	1.9	3.4

Table 3.12-10. Summary of Potential Road-Related Impacts to Riparian/Wetland Areas by Community Type in the Proposed Project Area

		Estimated Impacts per Riparian/Wetland Community Type (acres)			
Alternative	**Impact Type**	**Forested**	**Scrub-Shrub**	**Emergent**	**Total**
Zone 1					
1A	New Road (miles)	0.43	0.60	.03	1.06
	Permanent Impact (acres)	1.26	1.74	.09	3.09
	Overland Route (miles) *	.09	0.71	0.29	1.09
	Short-/Long-Term (acres)	0.27	2.08	0.83	3.18
1B	New Road (miles)	0.32	0.34	.09	0.75
	Permanent Impact (acres)	0.93	0.99	0.26	2.18
	Overland Route (miles)	0.27	0.39	0.33	0.98
	Short-/Long-Term (acres)	0.77	1.12	0.95	2.85
1C	New Road (miles)	.01	0.38	.05	0.44
	Permanent Impact (acres)	.03	1.09	0.15	1.27
	Overland Route (miles)	0	0.43	0.29	0.72
	Short-/Long-Term (acres)	0	1.25	0.83	2.08
1D	New Road (miles)	0.13	0.18	0	0.31
	Permanent Impact (acres)	0.39	0.52	0	0.90
	Overland Route (miles)	0.26	0.23	.02	0.51
	Short-/Long-Term (acres)	0.75	0.67	.06	1.49
Zone 2					
2A	New Road (miles)	.07	0	.06	0.13
	Permanent Impact (acres)	0.19	0	0.17	0.37
	Overland Route (miles)	.01	0.21	0.47	0.69
	Short-/Long-Term (acres)	.02	0.63	1.36	2
2B	New Road (miles)	.05	.04	.06	0.15
	Permanent Impact (acres)	0.16	0.11	0.17	0.44
	Overland Route (miles)	.07	0.31	0.46	0.84
	Short-/Long-Term (acres)	0.20	0.92	1.35	2.47
2C	New Road (miles)	0.45	0.47	0.13	1.06
	Permanent Impact (acres)	1.32	1.38	0.37	3.07
	Overland Route (miles)	.01	0.16	0.31	0.47
	Short-/Long-Term (acres)	.02	0.45	0.89	1.36

Table 3.12-10. Summary of Potential Road-Related Impacts to Riparian/Wetland Areas by Community Type in the Proposed Project Area

Alternative	Impact Type	Estimated Impacts per Riparian/Wetland Community Type (acres)			
		Forested	Scrub-Shrub	Emergent	Total
2D	New Road (miles)	0.48	0.57	0.14	1.19
	Permanent Impact (acres)	1.40	1.65	0.42	3.46
	Overland Route (miles)	.06	0.84	0.26	1.16
	Short-/Long-Term (acres)	0.17	2.45	0.76	3.38
2E	New Road (miles)	0.27	0.31	.04	0.62
	Permanent Impact (acres)	0.77	0.91	0.11	1.79
	Overland Route (miles)	0	0	0	0
	Short-/Long-Term (acres)	0	0	0	0
Zone 3					
3A	New Road (miles)	0	0.13	0.85	0.98
	Permanent Impact (acres)	0	0.37	2.48	2.85
	Overland Route (miles)	.03	0.26	0.94	1.23
	Short-/Long-Term (acres)	0.10	0.75	2.74	3.59
3B	New Road (miles)	0.13	0.15	0.85	1.14
	Permanent Impact (acres)	0.39	0.45	2.48	3.32
	Overland Route (miles)	.02	.09	0.29	0.40
	Short-/Long-Term (acres)	.06	0.26	0.85	1.17
3C	New Road (miles)	0.17	0.22	0.85	1.25
	Permanent Impact (acres)	0.51	0.65	2.48	3.63
	Overland Route (miles)	0	.01	0.29	0.30
	Short-/Long-Term (acres)	0	.04	0.85	0.89
Zone 4					
4A	New Road (miles)	0	0	.04	.08
	Permanent Impact (acres)	0	0.12	0.11	0.23
	Overland Route (miles)	0	0.41	0.47	0.88
	Short-/Long-Term (acres)	0	1.19	1.36	2.55
Zone 5					
5A	New Road (miles)	0	0	0	0
	Permanent Impact (acres)	0	0	0	0
	Overland Route (miles)	0	.02	0	.02
	Short-/Long-Term (acres)	0	.05	0	.05

Table 3.12-10. Summary of Potential Road-Related Impacts to Riparian/Wetland Areas by Community Type in the Proposed Project Area

		Estimated Impacts per Riparian/Wetland Community Type (acres)			
Alternative	**Impact Type**	**Forested**	**Scrub-Shrub**	**Emergent**	**Total**
5B	New Road (miles)	0	0	0	0
	Permanent Impact (acres)	0	0	0	0
	Overland Route (miles)	0	0	0.14	0.14
	Short-/Long-Term (acres)	0	0	0.42	0.42
5C	New Road (miles)	0	0	0	0
	Permanent Impact (acres)	0	0	0	0
	Overland Route (miles)	0	0	0.14	0.14
	Short-/Long-Term (acres)	0	0	0.42	0.42
5D	New Road (miles)	0	0	0	0
	Permanent Impact (acres)	0	0	0	0
	Overland Route (miles)	0	0	0.14	0.14
	Short-/Long-Term (acres)	0	0	0.42	0.42
Zone 6					
6A	New Road (miles)	0	.04	0	.04
	Permanent Impact (acres)	0	0.13	0	0.13
	Overland Route (miles)	0	.01	.01	.02
	Short-/Long-Term (acres)	0	.03	.03	.06

3.12.5.4 Local Routing Options

The following discussion compares LROs to the comparable segment of the corresponding alternative. The impact analyses presented in this section follow the same procedures described previously for riparian/wetland areas.

Potential direct impacts to riparian/wetland areas caused by LROs would vary from none to approximately 8.7 acres (Table 3.12-11). The Frying Pan Gulch, Radersburg, and Willow Creek LROs would not directly impact riparian/wetland communities. The Boulder Hill and Diamond Butte LROs would have the greatest potential for direct impact to riparian/wetland areas, each affecting about 9 acres. The majority of potential impacts caused by the LROs would be associated with temporary impacts caused during transmission line construction. Riparian/wetland impacts caused by new access roads associated with the LROs would be relatively minor and are expected at the Beef Trail, Clark Canyon East, Diamond Butte, Lower Boulder, North of Buxton, and Rock Creek LROs.

Table 3.12-11. Summary of Potential Impacts to Riparian/Wetland Areas by Local Routing Options and Associated Access Roads in the Project Area

Alternative(s)	LRO (Link)	Transmission Line (Acres)			Roads (Acres)			Totals (Acres)		
		Short-/Long-Term (Alt. Segment)	Permanent (Alt. Segment)	Subtotal (Alt. Segment)	Short-/Long-Term (Alt. Segment)	Permanent (Alt. Segment)	Subtotal (Alt. Segment)	Short-/Long-Term (Alt. Segment)	Permanent (Alt. Segment)	Total (Alt. Segment)
1A	Radersburg (Link 2-2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1A	Boulder Hill (Link 2-3b)	7.2 (10.9)	1.5 (2.3)	8.7 (13.2)	0 (0)	0 (0)	0 (0)	7.2 (10.9)	1.5 (2.3)	8.7 (13.2)
1B 1D	Upper Boulder 1 (Link 4-1b and 4-2a)	0.3 (0.1)	0.1 (.02)	0.4 (0.1)	0 (0)	0 (.04)	0 (.04)	0.3 (0.1)	0.1 (0.1)	0.4 (0.2)
1B 1D	Upper Boulder 2 (Link 4-2a)	0.3 (0.1)	0.1 (.01)	0.4 (0.1)	0 (0)	0 (.02)	0 (.02)	0.3 (0.1)	0.1 (.03)	0.4 (0.1)
1B 1D	Lower Boulder (Link 4-2b and 3-2)	2.3 (1.3)	0.5 (0.3)	2.8 (1.5)	0 (.02)	.02 (0)	0.2 (.02)	2.3 (1.3)	0.5 (0.3)	2.8 (1.5)
1B 1C 2C	South of Butte 1 (Link 6-2)	2.3 (2.1)	0.5 (0.4)	2.8 (2.5)	0 (0.1)	0 (0)	0 (0.1)	2.3 (2.2)	0.5 (0.4)	2.8 (2.6)
1B 2C	Beef Trail (Link 7-2)	0.4 (0.5)	1.1 (0.1)	1.5 (0.7)	0 (0)	0.6 (0.5)	0.6 (0.5)	0.4 (0.5)	1.7 (0.6)	2.1 (1.2)
1B 2C	North of Buxton (Link 7-4 and 9-1)	1.1 (2.4)	0.5 (0.5)	1.5 (2.8)	0 (0.6)	.01 (0.2)	.01 (0.8)	1.1 (3.0)	0.5 (0.7)	1.6 (3.6)
1B 2A 2B 2C	Mount Haggin (Link 9-3)	1 (2)	0.2 (0.4)	1.2 (2.4)	0 (0)	0 (0.1)	0 (0.1)	1 (2)	0.2 (0.5)	1.2 (2.5)
2A 2B	Maiden Rock (Link 11-3)	0.6 (1.6)	1.9 (0.3)	2.5 (2)	0 (0)	0 (0)	0 (0)	0.6 (1.6)	1.9 (0.3)	2.5 (2)
2B	Willow Creek (Link 14-2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2D	Fleecer (Link 28)	0.1 (0.4)	0.6 (0.1)	0.7 (0.5)	0 (0)	0 (0.2)	0 (0.2)	0.1 (0.4)	0.6 (0.3)	0.7 (0.7)
2D	Rock Creek (Link 32)	0.3 (1.6)	2.4 (0.3)	2.7 (1.9)	0 (0)	0.6 (0.5)	0.6 (0.5)	0.3 (1.6)	3 (0.8)	3.3 (2.4)
3B	Frying Pan Gulch (Link 16-2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3B 3C	Clark Canyon East (Link 16-3c)	0 (0)	1.4 (2.9)	1.4 (2.9)	0 (0)	0.4 (0.3)	0.4 (0.3)	0 (0)	1.8 (3.2)	1.8 (3.2)

Table 3.12-11. Summary of Potential Impacts to Riparian/Wetland Areas by Local Routing Options and Associated Access Roads in the Project Area

Alternative(s)	LRO (Link)	Transmission Line (Acres)			Roads (Acres)			Totals (Acres)		
		Short-/Long-Term (Alt. Segment)	Permanent (Alt. Segment)	Subtotal (Alt. Segment)	Short-/Long-Term (Alt. Segment)	Permanent (Alt. Segment)	Subtotal (Alt. Segment)	Short-/Long-Term (Alt. Segment)	Permanent (Alt. Segment)	Total (Alt. Segment)
3A 3B 3C	Lima (Link 17-2)	0.7 (6.6)	0.2 (1.4)	0.9 (8)	0 (0.8)	0 (0)	0 (0.8)	0.7 (7.4)	0.2 (1.4)	0.9 (8.8)
3A 3B 3C	Diamond Butte (Link 17-4)	6.3 (11.2)	1.3 (2.3)	7.6 (13.5)	0 (0)	1.2 (2.4)	1.2 (2.4)	6.3 (11.2)	2.5 (4.7)	8.7 (15.9)

Radersburg LRO. Neither the LRO nor the corresponding mainline link of Alternative 1A are projected to impact riparian/wetland areas.

Boulder Hill LRO. The Boulder Hill LRO would impact roughly 4.5 acres less riparian/wetland area than the corresponding link of Alternative 1A. The majority of impact caused by the corresponding link would be permanent impact to forested riparian/wetland areas. For this reason, the Boulder Hill LRO is would have less impact to riparian/wetland resources than the corresponding segment of Alternative 1A.

Upper Boulder 1 LRO. The Upper Boulder 1 LRO would replace a segment of Alternatives 1B and 1D. This LRO would primarily have a short- and long-term impact on the scrub-shrub and emergent riparian/wetland types (Table 3.12-11). The corresponding mainline link is anticipated to have an overall smaller impact on riparian/wetland areas than the LRO. The types of impacts (short-/long-term, scrub-shrub, and emergent) that the mainline link would have are similar to the impact types projected for the LRO.

Upper Boulder 2 LRO. The Upper Boulder 2 LRO would replace a segment of Alternatives 1B and 1D. This LRO would primarily have a short- and long-term impact on the scrub-shrub and emergent riparian/wetland types (Table 3.12-11). The corresponding mainline link is anticipated to have an overall smaller impact on riparian/wetland areas than the LRO. The types of impacts (short-/long-term, scrub-shrub, and emergent) that this link would have are similar to the impact types projected for the LRO.

Lower Boulder LRO. If selected, the Lower Boulder LRO would replace a mainline link common to Alternatives 1B and 1D. This mainline link would impact roughly half as much riparian/wetland area as the LRO.

South of Butte 1 LRO. The South of Butte 1 LRO would replace a mainline link common to Alternatives 1B, 1C, and 2C. Potential impacts to riparian/wetland areas are slightly higher for the LRO than the corresponding link. Both options would impact emergent and scrub-shrub areas (Table 3.12-11). The South of Butte 1 LRO would likely impact slightly more riparian/wetland area than the corresponding mainline link.

Beef Trail LRO. The Beef Trail LRO would impact roughly 2.1 acres of riparian/wetland areas, with the majority of that permanent impact to forested riparian/wetland areas (Table 3.12-11). Two alternatives

(1B and 2C) include a mainline link that corresponds to this LRO. This link would be replaced if this LRO is selected. This link would impact approximately 1.2 acres of riparian/wetland area, with the majority of permanent impact to forested/riparian/wetland areas. More forested riparian/wetland area is projected to be impacted by the corresponding mainline link than the LRO.

North of Buxton LRO. The North of Buxton LRO would replace a mainline link common to Alternatives 1B and 2C. Overall, this LRO is projected to have less impact, and less permanent impact than the corresponding mainline link. The LRO would also have less impact to forested riparian/wetland areas than the corresponding link.

Mount Haggin LRO. A mainline link common to Alternatives 1B, 2A, 2B, and 2C would be replaced by the Mount Haggin LRO. When compared to the LRO, this link would potentially impact 2.3 more acres of riparian/wetland area than the proposed LRO. In addition, the corresponding link would potentially impact forested and scrub-shrub riparian/wetland habitat, whereas the LRO would impact only riparian/wetland scrub-shrub areas (Table 3.12-11).

Maiden Rock LRO. The Maiden Rock LRO would replace a mainline link common to Alternatives 2A and 2B. In terms of overall direct impact, the LRO and the corresponding mainline link would have a similar effect; however, the LRO would permanently impact a greater amount of forested riparian/wetland area (Table 3.12-11).

Willow Creek LRO. Neither the Willow Creek LRO nor the corresponding mainline link of Alternative 2B would impact riparian/wetland areas.

Fleecer LRO. The Fleecer LRO would replace a link of Alternative 2D. This LRO is projected to impact primarily forested riparian/wetland areas (Table 3.12-11). The corresponding mainline link would impact slightly more riparian/wetland area, but would impact a similar amount of forested riparian/wetland. In this instance, the Fleecer LRO would have an overall slightly smaller impact to riparian/wetland areas.

Rock Creek LRO. The Rock Creek LRO would replace a mainline link of Alternative 2D. Total impacts for the LRO and link are projected to be similar; however, the Rock Creek LRO would potentially impact 1.3 acres more forested riparian/wetland area than the corresponding mainline link (Table 3.12-11).

Frying Pan Gulch LRO. No impacts to riparian/wetland areas would occur from this LRO or the corresponding mainline link of Alternative 3B.

Clark Canyon East LRO. The Clark Canyon East LRO would replace a link common to both Alternatives 3B and 3C. Permanent impacts to forested riparian/wetland areas are the main source of impact in the LRO (Table 3.12-11) as well as the corresponding link of Alternatives 3B and 3C. However, the Clark Canyon East LRO would permanently impact roughly 1.4 acres less riparian/wetland area than the corresponding mainline link.

Lima LRO. The Lima LRO would replace a mainline link common to Alternatives 3A, 3B, and 3C. Short- and long-term impacts to scrub-shrub and emergent riparian/wetland types would occur under this LRO (Table 3.12-11). The corresponding mainline link would impact roughly 8 acres more riparian/wetland area, though the bulk of that would be short-/long-term impacts. Overall the Lima LRO have a smaller impact to wetland resources than the corresponding mainline link.

Diamond Butte LRO. The Diamond Butte LRO corresponds to a mainline link that is common to Alternatives 3A, 3B, and 3C. The majority of the impact to riparian/wetland areas in this LRO are expected to be short- and long-term direct impacts that would primarily impact emergent riparian/wetland areas, and to a lesser extent, scrub-shrub riparian/wetland areas (Table 3.12-11). The corresponding mainline link is projected to impact roughly 7.2 acres more riparian/wetland area than the LRO. This link would also impact emergent and scrub-shrub riparian/wetland types. Overall the corresponding mainline link would have a substantially greater impact to riparian/wetland areas.

3.12.6 Climate Change

Climate change, water resources, vegetation communities (i.e., habitat), and wildlife are all interrelated. A detailed review of how climate change is likely to affect vegetative resources in the proposed project area is in Section 3.3. Climate change itself is discussed in Section 3.2. Based on projected changes in runoff during the growing season and lowered groundwater levels, it is anticipated that the extent of riparian/wetland areas would generally decrease in the proposed project area as a result of climate change. The degree or magnitude of this is unknown and impossible to predict. With changes in precipitation patterns, lowered water tables, and less flow in streams, water quality may also suffer. Surface water quality would also likely be degraded through increased temperatures (Chambers and Pellant, 2008), increased inputs of sediment loading resulting from decreased native shrub and grass cover, more frequent fire cycles, and increased soil erosion.

Depending on when and how rapidly the climate changes occur, the proposed project's affects in relation to water resources and wetland may be somewhat more extreme. For example, sedimentation from increased roads to be built by the proposed project could be more substantial under conditions of decreased precipitation, vegetation die backs, and increased wildfires predicted to occur under some climate change scenarios. Wetland resources may become scarcer within the study area. Much uncertainty exists about climate change, and shifts in precipitation and snowfall patterns are impossible to predict at this time. However, should they decline as some models predict, the proposed project's affects to water and wetland resources could be considered a more substantial adverse impact than that discussed in this EIS.

3.12.7 Mitigation Measures

3.12.7.1 Agency Stipulations

Impacts to water and wetland resources during construction and operation of proposed project would be reduced by implementation of the requirements in the USFS *Record of Decision (ROD) for the Designation of Section 368 Energy Corridors on National Forest System Land in 10 Western States* (USFS 2009b), and the BLM *Approved Resource Management Plan Amendments/ROD for Designation of Energy Corridors on Bureau of Land Management Administered Lands in 11 Western States* (BLM 2009c). These two RODs are included as appendices to the POD (Appendix B.4).

Impacts from the proposed project would also be reduced by implementation of the MDEQ draft Environmental Specifications (Appendix B.4). The MDEQ draft Environmental Specifications most relevant to water and wetland resources are listed by topic below.

Road construction and maintenance impacts would be minimized by MDEQ draft Environmental Specifications 1.1.3 through 1.1.6, 1.1.9, 2.1.7, 2.5.1, 2.5.3, 2.7.1 through 2.7.12, 2.8.3, 3.2.1, and 3.2.3.

Erosion and sedimentation would be minimized by MDEQ draft Environmental Specifications 2.1.1, 2.1.2, 2.1.5, 2.3.2, 2.3.3, 2.8.4, 2.8.7, 2.8.9, 2.9.5, 2.11.1 through 2.11.21, 3.2.4 through 3.2.14, 4.1.3, 4.1.4, 4.2.1, and 4.2.2.

Impacts from spills and hazardous wastes would be minimized by MDEQ draft Environmental Specifications 2.1.3, 2.14.2, 2.14.4, 2.14.5, 2.14.10, 3.1.1, 3.1.2, 4.4.3, and 4.4.4.

Impacts to streams and floodplains would be minimized by MDEQ draft Environmental Specifications 2.1.8, 2.9.11, 2.15.2, 2.15.9 through 2.15.11.

Impacts to riparian and wetland areas would be minimized by MDEQ draft Environmental Specifications 1.1.2, 2.9.12, 2.9.13, 2.11.16, 2.15.9, 2.15.10, and 3.2.8.

Impacts from weeds and destruction of vegetation would be minimized by MDEQ draft Environmental Specifications 2.8.8, 2.9.2, 2.9.3, 2.9.4, 2.9.7, 4.1.1, 4.4.1, 4.4.2, and 4.4.7.

Unauthorized access via the proposed new travel network would be minimized by MDEQ draft Environmental Specification 4.1.5.

3.12.7.2 Resource Specific Mitigation Measures

The following measures would ensure that all stream crossings are designed to not affect water quality or fish passage, involve all appropriate parties, and are properly installed:

WW-1 Design stream crossings in accordance with *Guidance for Aquatic Species Passage Design, Forest Service Northern Region & Intermountain Region* and *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings*.

WW-2 Design and build crossings in consultation with the appropriate agency staff after a site inspection.

WW-3 Invite affected landowner(s) or land management agency(ies), representatives of the local conservation district, and the local fisheries management biologist to participate in these inspections.

WW-4 Install new culverts with the culvert inlet and outlet at natural stream grade or ground level so that water velocities or positioning of culverts do not impair fish passage.

3.12.7.3 Compensatory Mitigation Measures for Wetlands

Compensatory riparian/wetland mitigation would likely be required by the USACE for unavoidable impacts to jurisdictional Waters of the U.S., including wetlands. Compensatory mitigation for non-jurisdictional riparian/wetland areas may also be required by the MDEQ or land management agencies. The jurisdictional status of each riparian/wetland area would be determined before or during the permitting process. For the purposes of this EIS, it has been assumed that compensatory mitigation would occur for all impacts to riparian/wetland areas, regardless of their jurisdictional status.

Compensatory mitigation is currently regulated as specified in the *Final Mitigation Rule* issued jointly by the USACE and the EPA on April 10, 2008 (73 FR 19687). According to the *Final Mitigation Rule* published in the *Federal Register,* compensatory mitigation should, ". . . be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources (including the availability of water rights), trends in land use, ecological benefits, and compatibility with adjacent land uses" (73 FR 19687).

Impacts to riparian/wetland areas from the proposed project would be minimal in Idaho. Unavoidable impacts to riparian/wetland areas in Idaho would likely be small and therefore be mitigated onsite and in-kind. Because riparian/wetland areas are generally more abundant in the Montana portion of the proposed project area, there is a higher probability that unavoidable impacts to riparian/wetland areas in Montana would be more substantial than in Idaho. For this reason, a higher amount of compensatory mitigation would likely be required.

Several options for compensatory wetland mitigation are discussed in the *Final Mitigation Rule*. The preferred method for compensatory mitigation is the use of a wetland bank, although other options are discussed. The specific form of compensatory riparian/wetland mitigation would be determined during the permitting process, but mitigating riparian/wetland impacts at a wetland mitigation bank is attractive because it:

- Improves efficiency by allowing NorthWestern to focus its mitigation dollars in one area that is more easily constructed and monitored when compared to a piecemeal approach
- Streamlines (i.e., coordinates and expedites) permitting because of early and frequent negotiations and discussions with resource agencies and the public
- Reduces or eliminates the time lag between the impact and fully functioning mitigation habitat
- Creates more ecologically significant mitigation and promotes ecosystem sustainability thereby providing more environmental benefits than mitigation done in smaller patches near sites of impact
- Promotes better planning through an improved understanding of ecological issues and their relationship to human activities

Compensatory mitigation should be in-kind. For example, impacts to riparian/wetland scrub-shrub communities should be mitigated by restoring, creating, enhancing, and/or preserving other riparian/wetland scrub-shrub communities.

3.12.7.2 Mitigation Costs

To fulfill the MFSA application requirements, general cost estimates for mitigation actions applicable to water resources and wetlands are presented below.

Water Resources

The cost estimates for mitigation measures were developed based on the following assumptions. A site assessment for water resources would have to be done at each stream crossing. As part of the MFSA application process, site assessments have already been conducted at some crossing locations in Montana (Appendix C.12.7). Installation of arch or bottomless culverts would be required only on fish-bearing perennial streams (Section 3.3). The mitigation cost for the culverts is simply the cost differential from a standard round culvert to an arch or bottomless culvert and assumes that construction equipment would be on site to install the culvert as part of routine project construction. Overland crossings are assumed to simply require restoration of stream banks where they were modified for vehicular access. The costs for rolling dips and minor culverts at small drainages along access roads are assumed to be part of standard road construction and not estimated separately as mitigation. Perennial and intermittent streams were included in the estimates of mitigation costs; crossings of ditches and canals were not. The assumptions presented above are intended to allow a comparison of mitigation costs between the proposed alternatives. Actual crossing design would be conducted in consultation with appropriate agency staff and after the site inspection.

Mitigation costs range from about $12,000 for Alternatives 4A and 6A where there are very few stream crossings up to more than $150,000 for Alternative 3B and 3C where stream crossings are more numerous (Table 3.12-12). For the LROs, mitigation costs range from about $1,100 for the Diamond Butte LROs where there are relatively few stream crossings to more than $20,000 for the Lower Boulder and Clark Canyon East LROs where there are numerous stream crossings (Table 3.12-13).

Wetland Resources

Compensatory mitigation costs were developed to aid the MDEQ in its analysis (Table 3.12-14). Costs associated with avoidance and minimization cannot be estimated because avoidance and minimization measures are (1) part of the design and construction processes, (2) require site-specific analysis, (3) require a higher level of design than is currently available, and (4) frequently provide mitigation for several different resources. Compensatory mitigation costs provided here are estimates intended to be used only in the context of the proposed project and solely for approximate cost comparisons among the alternatives and LROs. Riparian/wetland compensatory mitigation was assumed to occur at a single location in each of the six zones. Mitigation ratios for riparian/wetland mitigation were assumed to be 1:1; that is, impacts to 1 acre would be considered by the USACE to be mitigated by 1 acre of riparian/wetland mitigation of the corresponding habitat. Actual mitigation ratios would likely be higher than this, but cannot be predicted at this time. Alternative-by-alternative cost estimates associated with the mitigation of permanent and short- and long-term impacts to riparian/wetland areas have also been developed (Table 3.12-15).

3.12.8 Residual Impacts

Residual impacts are those impacts that, after mitigation, are expected to persist for the life of the project. In general, implantation of mitigation measures would minimize residual effects of the proposed project.

Water Resources. Residual impacts to water resources are expected to be minimal. Final access road design would minimize the number of stream crossings to the maximum extent practicable. New access roads constructed for the proposed project would result in some increases in sediment delivery, but implementation of BMPs and mitigation measures described in Section 3.12.7 would minimize this affect.

Wetlands. Residual impacts to riparian/wetland areas are expected to be minimal. Compensatory mitigation is required by the USACE for impacts to wetland areas. For example, the typical requirement by the USACE for short- and long-term impacts to wetland areas is for site restoration to pre-impact conditions. As such, these impacts do not represent a residual impact. Similarly, permanent wetland impacts would be required to be mitigated at a minimum mitigation ratio of 1:1. For this reason, no net loss to wetland areas is expected, and no residual impacts to wetland areas are expected.

Riparian. Impacts to riparian areas other than wetlands may occur, and mitigation for those impacts is not currently required by the USACE, but may be by the MDEQ and other land management agencies. Short-/long-term impacts to riparian areas would be reclaimed similar to all upland areas. If not mitigated, permanent impacts to riparian areas other than wetlands would represent a residual impact. The level of this residual impact to non-wetland riparian areas cannot be quantified until an onsite evaluation of each riparian/wetland area crossed by the transmission line and new roads is completed and specific placement of the towers is known.

Table 3.12-12. Estimated Cost ($) of Mitigation for Measures Associated with New Roads and Overland Routes

Zone	Alternative	Site Assessments[1]	Crossing Restoration[2, 3]	Arch Culverts[4, 5, 6]	Total Cost
1	1A	57,200	16,000	600	73,800
	1B	117,700	34,000	600	152,300
	1C	78,100	31,000	600	109,700
	1D	94,600	21,000	600	116,200
2	2A	47,300	16,000	—	63,300
	2B	74,800	19,000	—	93,800
	2C	90,200	15,000	900	106,100
	2D	88,000	9,000	900	97,900
	2E	67,100	2,000	900	70,000
3	3A	63,800	16,000	—	79,800
	3B	151,800	14,000	300	166,100
	3C	143,000	9,000	600	152,600
4	4A	9,900	2,000	—	11,900
5	5A	20,900	12,000	—	32,900
	5B	26,400	5,000	—	31,400
	5C	8,800	7,000	—	15,800
	5D	26,400	8,000	—	34,400
6	6A	12,100	—	—	12,100

1 $1,100 per site, which includes water quality site assessments on perennial and intermittent streams only. Crossings of Ditches/Canals were not included in mitigation cost estimates.

2 $1,000 per site includes only minor re-contouring and revegetation of disturbed areas. Does not include long-term monitoring or maintenance. Assumes construction equipment is already on site.

3 Applies only to overland routes.

4 Assumes cost differential of $300 for bottomless arch or arch pipe culvert, compared to round corrugated metal pipe.

5 Construction costs are not included because the mitigation is the different culvert.

6 Applies to new roads on perennial fish-bearing streams only (Section 3.3).

Table 3.12-13. Estimated Cost ($) of Mitigation for Measures for New Roads and Overland Routes Associated with the Local Routing Options

Alternative	Link(s)	LRO	Site Assessments[1]	Crossing Restoration[2, 3]	Arch Culverts[4, 5, 6]	Total
1A	2-2	Radersburg	4,400	—	—	4,400
1A	2-3b	Boulder Hill	4,400	—	—	4,400
1B 1D	4-1b 4-2a	Upper Boulder 1[7]	17,600	—	—	17,600
1B 1D	4-2a	Upper Boulder 2[8]	14,300	—	—	14,300
1B 1D	4-2b	Lower Boulder[9]	3,300	—	—	3,300
1B 1C 2C	6-2	South of Butte 1	1,100	—	—	1,100
1B 2C	7-4	North of Buxton	2,200	—	—	2,200
2A 2B	11-3 11-4	Maiden Rock	13,200	—	—	13,200
2B	14-2	Willow Creek	2,200	—	—	2,200
2D	32	Rock Creek	7,700	—	300	8,000
3B	16-2	Frying Pan Gulch	8,800	—	—	8,800
3B 3C	16-3c	Clark Canyon East	24,200	—	300	24,500
3A 3B 3C	17-2	Lima	3,300	1,000	—	4,300
3A 3B 3C	17-4	Diamond Butte	1,100	—	—	1,100

1 $1,100 per site, which includes water quality site assessments on perennial and intermittent streams only. Crossings of Ditches/Canals were not included in mitigation cost estimates.

2 $1,000 per site, which includes only minor recontouring and revegetation of disturbed areas. Does not include long-term monitoring or maintenance. Assumes construction equipment is already on site.

3 Applies to overland routes only.

4 Assumes cost differential of $300 for bottomless arch or arch pipe culvert, compared to round corrugated metal pipe.

5 Construction costs are not included because the mitigation is the different culvert.

6 Applies to new roads on perennial fish-bearing streams only (Section 3.3).

7 Crossing total for the Upper Boulder 1 LRO includes links LRO4-2a-1 and LRO4-2a-3.

8 Crossing total for the Upper Boulder 2 LRO includes Links LRO4-2a-2 and LRO4-2a-3.

9 Crossing total for the Lower Boulder LRO includes Links LRO4-2b and mainline link 3-2.

Table 3.12-14. Estimates of Compensatory Riparian/Wetland Mitigation for the Proposed Project

Item	Cost Estimate ($)	No. of Years	Total ($)
Design and Construction (per acre)	37,000/year[1]	1	37,000
Monitoring (per site)	9,000/year[2] for sites over 1 acre 5,000/year for sites under 1 acre	5[4]	47,782 or 26,546
Noxious Weed Management (per acre)	70/year[3]	50	7,900
Restoration of Temporarily Impacted Riparian/wetland Areas			
Ripping to a depth of 10 inches (per acre)	1,300[5]	NA	1,300
Design and Recontouring (per acre)	3,000[6]	NA	3,000
Seeding (per acre)	500[7]	NA	500

1 Personal communication with T. Hinz, Montana Wetland Legacy Coordinator; inflated at an annual rate of 3 percent from 2005 to 2010.

2 Estimate based on PBS&J monitoring costs for other projects inflated at an annual rate of 3 percent from 2009 to 2014.

3 Personal Communication: Dynamecc Property Services, Bozeman, Montana. Inflated at an annual rate of 3% from 2009 to 2059.

4 Typical number of years required by USACE for mitigation monitoring.

5 RSMeans 2003.

6 Robert Secor, Secor Excavation, Inc., Bozeman, Montana (Secor 2009). Estimate includes use of three types of heavy equipment (ranging from $110-$300/hour) and up to 8 hours to recontour and lay 6 inches of topsoil; hours would vary depending on soil conditions (rock content) and topography. Total cost also includes estimates for mobilization, fuel, permitting, bonding, and per diem. Fuel costs based on $2.28/gallon.

7 Circle S Seeds, Three Forks, Montana. Price would vary based on species used and species availability. Seed may need to be added each year to compensate poor germination rates as a result of climate, animal consumption, or other environmental stressors; this cost is not incorporated into the estimate. Estimate also includes labor for seed application.

Table 3.12-15. Estimated Mitigation Costs for Permanent and Short- and Long-Term Impacts to Riparian/Wetland Areas in the Proposed Project Area*

Alternative or LRO	Permanent Impacts					Short-/Long-Term Impacts						Total
		Estimated Mitigation Costs ($)*					Estimated Mitigation Costs ($)*					
	Permanent Impact (Acres)	Design/ Construction	Monitoring	Weed Management	Subtotal	Short-/Long-Term Impact (Acres)	Site Ripping	Design/ Recontouring	Seeding	Weed Management	Subtotal	
Zone 1												
1A	38.6	1,430,000	48,000	305,000	1,783,000	35.7	46,000	80,000	18,000	282,000	426,000	2,209,000
1B	25.8	956,000	48,000	204,000	1,208,000	23.9	31,000	54,000	12,000	188,000	285,000	1,493,000
1C	7.5	277,000	48,000	59,000	384,000	22.9	30,000	52,000	11,000	181,000	274,000	658,000
1D	14.7	543,000	48,000	116,000	707,000	9.6	12,000	22,000	5,000	76,000	115,000	822,000
Zone 2												
2A	22.7	842,000	48,000	180,000	1,070,000	21.6	28,000	49,000	11,000	171,000	259,000	1,329,000
2B	27.4	1,012,000	48,000	216,000	1,276,000	22.9	30,000	52,000	11,000	181,000	274,000	1,550,000
2C	20.5	758,000	48,000	162,000	968,000	21.7	28,000	49,000	11,000	172,000	260,000	1,228,000
2D	33.7	1,248,000	48,000	266,000	1,562,000	27.4	36,000	62,000	14,000	216,000	328,000	1,890,000
2E	9.3	345,000	48,000	74,000	467,000	7.4	10,000	17,000	4,000	59,000	90,000	557,000
Zone 3												
3A	15.9	587,000	48,000	125,000	760,000	35.3	46,000	79,000	18,000	279,000	422,000	1,182,000
3B	13.8	509,000	48,000	109,000	666,000	22.5	29,000	51,000	11,000	177,000	268,000	934,000
3C	15.7	582,000	48,000	124,000	754,000	20.3	26,000	46,000	10,000	161,000	243,000	997,000
Zone 4												
4A	3.8	142,000	48,000	30,000	220,000	20	26,000	45,000	10,000	158,000	239,000	459,000

Table 3.12-15. Estimated Mitigation Costs for Permanent and Short- and Long-Term Impacts to Riparian/Wetland Areas in the Proposed Project Area*

Alternative or LRO	Permanent Impacts					Short-/Long-Term Impacts						Total
		Estimated Mitigation Costs ($)*					Estimated Mitigation Costs ($)*					
	Permanent Impact (Acres)	Design/ Construction	Monitoring	Weed Management	Subtotal	Short-/Long-Term Impact (Acres)	Site Ripping	Design/ Recontouring	Seeding	Weed Management	Subtotal	
Zone 5												
5A	1	39,000	27,000	8,000	74,000	0.6	1,000	1,000	300	5,000	7,300	81,300
5B	0.3	13,000	27,000	3,000	43,000	2.1	3,000	5,000	1,000	16,000	25,000	68,000
5C	0.4	14,000	27,000	3,000	44,000	2.2	3,000	5,000	1,000	17,000	26,000	70,000
5D	0.3	13,000	27,000	3,000	43,000	2.1	3,000	5,000	1,000	16,000	25,000	68,000
Zone 6												
6A	0.8	31,000	27,000	7,000	65,000	3.5	5,000	8,000	2,000	28,000	43,000	108,000
LRO												
Beef Trail	1.7	62,000	48,000	13,000	123,000	0.4	500	1,000	200	3,000	4,700	127,700
Boulder Hill	1.5	55,000	48,000	12,000	115,000	7.2	9,000	16,000	4,000	57,000	86,000	201,000
Clark Canyon East	1.8	68,000	48,000	14,000	130,000	0	0	0	0	0	0	130,000
Diamond Butte	2.5	91,000	48,000	19,000	158,000	6.3	8,000	14,000	3,000	50,000	75,000	233,000
Fleecer	0.6	22,000	27,000	5,000	54,000	0.1	200	300	100	1,000	1,600	55,600
Frying Pan Gulch	0	0	0	0	0	0	0	0	0	0	0	0
Lima	0.2	6,000	27,000	1,000	34,000	0.7	1,000	2,000	400	6,000	9,400	43,400
Lower Boulder	0.5	19,000	48,000	4,000	71,000	2.3	3,000	5,000	1,000	18,000	27,000	98,000
Maiden Rock	1.9	71,000	48,000	15,000	134,000	0.6	700	1,000	300	4,000	6,000	140,000

Table 3.12-15. Estimated Mitigation Costs for Permanent and Short- and Long-Term Impacts to Riparian/Wetland Areas in the Proposed Project Area*

Alternative or LRO	Permanent Impacts					Short-/Long-Term Impacts						Total
		Estimated Mitigation Costs ($)*					Estimated Mitigation Costs ($)*					
	Permanent Impact (Acres)	Design/ Construction	Monitoring	Weed Management	Subtotal	Short-/Long-Term Impact (Acres)	Site Ripping	Design/ Recontouring	Seeding	Weed Management	Subtotal	
Mount Haggin	0.2	7,000	27,000	2,000	36,000	1	1,000	2,000	500	8,000	11,500	47,500
North of Buxton	0.5	18,000	27,000	4,000	49,000	1.1	1,000	2,000	500	8,000	11,500	60,500
Potential Crossover	0	0	0	0	0	0	0	0	0	0	0	0
Radersburg	0	0	0	0	0	0	0	0	0	0	0	0
Rock Creek	3	113,000	48,000	24,000	185,000	0.3	300	600	100	2,000	3,000	188,000
South of Butte 1	0.5	18,000	27,000	4,000	49,000	2.3	3,000	5,000	1,000	18,000	27,000	76,000
Upper Boulder 1	0.1	4,000	27,000	1,000	32,000	0.3	0	1,000	0	2,000	3,000	35,000
Upper Boulder 2	0.1	4,000	27,000	1,000	32,000	0.3	0	1,000	0	2,000	3,000	35,000
Willow Creek	0	0	0	0	0	0	0	0	0	0	0	0

* Cost estimates are based on per-acre estimates (Table 3.12-14) and intended for comparisons among alternatives with a zone. Actual costs for riparian/wetland mitigation may vary substantially from those presented here. Estimated costs under $1,000 were rounded to the nearest $100. Estimated costs over $1,000 were rounded to the nearest $1,000.