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NorthWestern Energy

Mountain States Transmission Intertie

MAJOR FACILITY SITING ACT (MFSA)

WATER RESOURCES AND WETLANDS TECHNICAL REPORT

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112100

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1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

NorthWestern Energy (NorthWestern) proposes to construct, operate and maintain the MSTI 500kV transmission line to address the requests for transmission service from customers and relieve constraints on the high-voltage transmission system in the region. The new transmission line would begin at Townsend Substation which would be constructed in southwestern Montana about five miles south of Townsend, Montana, east of U.S. Highway 287 (US 287) in Broadwater County. The line would proceed south into southeastern Idaho connecting to Idaho Power Company's (IPCO) existing Midpoint Substation, 12 miles northeast of Jerome, Idaho. Figure 1.1-1 shows the substation locations and the alternative routes being considered.

The major projects components of the proposed action include the 500kV alternating current (AC) transmission line, a new Townsend Substation; construction of a new facility next to the existing Mill Creek Substation near Anaconda, Montana for the installation of a bank of phase shifting transformers and modifications to the existing Midpoint Substation in Idaho. Brief descriptions of the major project components are presented in the following sections.

1.1.1 New 500kV Transmission Line

The MSTI 500kV AC transmission line would interconnect the new Townsend Substation with IPCO's existing Midpoint Substation. The MSTI 500kV transmission line would be between 400 and 430 miles long.

Various alternative route links have been identified as part of the siting study for the transmission line. During the route selection process, some of these alternative route links were combined into a limited number of end-to-end route and subroute alternatives. A preferred route was selected based on environmental and other considerations. Alternative route links, shown in Figure 1.1-1, cross Silver Bow, Jefferson, Broadwater, Deer Lodge, Beaverhead, and Madison counties in southwestern Montana, and Clark, Jefferson, Blaine, Butte, Bingham, Bonneville Power, Minidoka, Lincoln, and Jerome counties in southeastern Idaho. The links cross private, state (Idaho and Montana) and federal (primarily Bureau of Land Management [BLM] and U.S Forest Service [USFS]) land. There are a total of 1,150 miles of alternative route links, 582 miles in Montana and 568 miles in Idaho.

The MSTI 500kV transmission would be constructed mainly on guyed V steel lattice structures approximately 125 feet high. Less frequently, self-supporting steel lattice structures or self-supporting tubular steel structures approximately 125 feet high would be used. The guyed V structure would be used for most tangent segments of the line. Self-supporting steel lattice structures would be used in mountainous areas and at points where a line changes direction or terminates. Tubular steel monopoles may be used in areas of narrow right-of-way or where permanent land disturbance or the amount of land required for the structure must be minimized (e.g., agricultural land, developed and urban land, and some river and perennial stream crossings). The land permanently required for the structures would vary depending on structure type and terrain, ranging from 100 square feet for steel

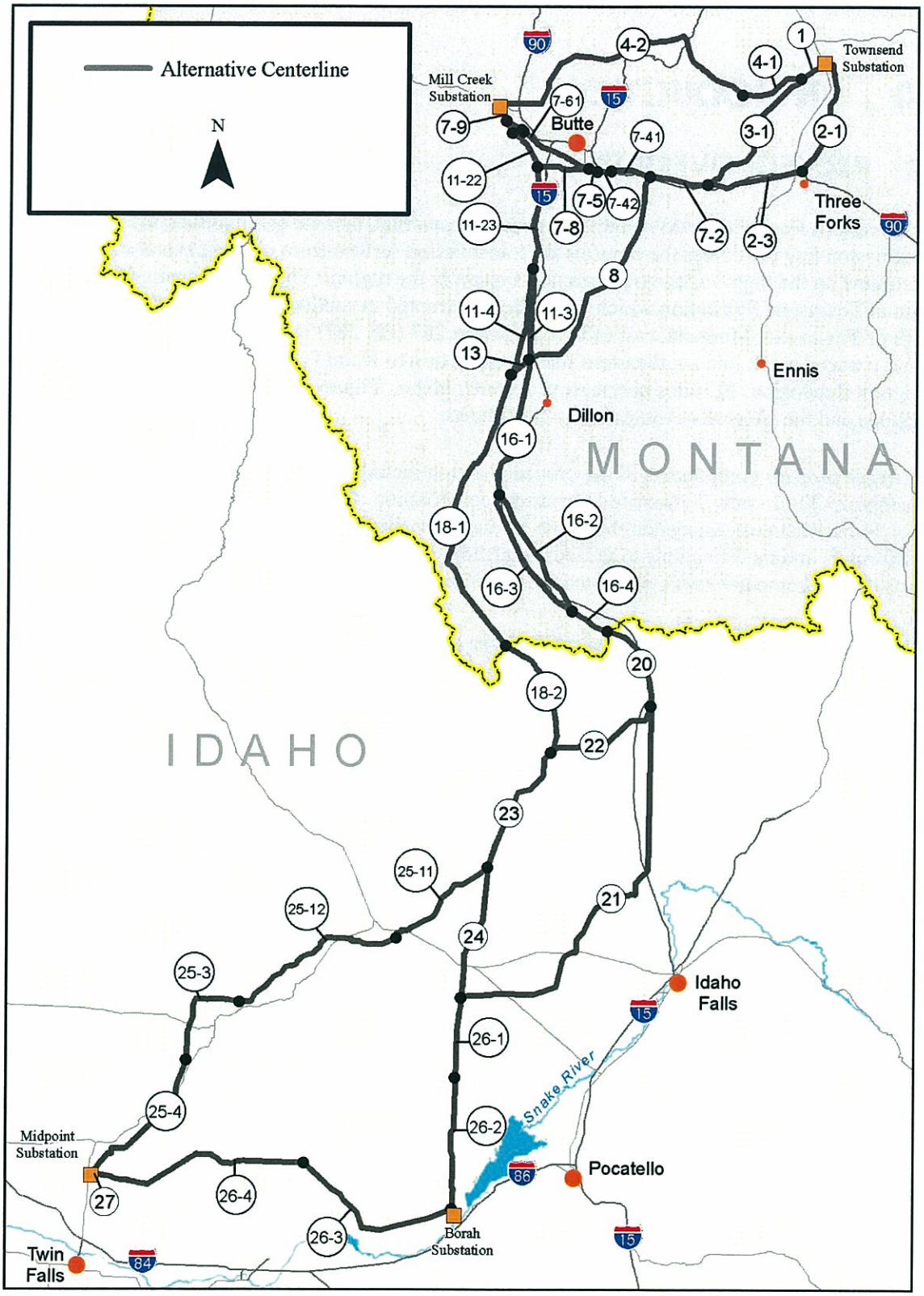

Figure 1.1-1 Project Area and Alternative Transmission Line Routes

monopoles to 22,500 square feet for the guyed V structures. An area of approximately 200 by 200 feet (0.9 acre) per structure may be temporarily disturbed during construction.

The required right-of-way width is 220 feet and the average span length between the transmission structures would be approximately 1,400 feet (4 per mile) for the guyed V structures, 1,200 feet (4 per mile) for the self-supporting steel lattice structures, and 900 feet (6 per mile) for the self-supporting tubular steel monopole structures.

Access along the transmission line right-of-way would include using existing improved roads, using existing roads that require improvement, and building new roads in flat, sloping, steep, or very steep terrain. Permanent new roads would be graded to a travel service width of 14 feet.

In addition, during construction of the transmission line there would be temporary pulling and tensioning sites, material staging sites, and concrete batch plants.

1.1.2 NEW TOWNSEND SUBSTATION

The new Townsend 500kV substation would be located in southwestern Montana, five miles south of Townsend, Montana, east of US 287 in Broadwater County, Montana. The current land use of the site is center-pivot irrigation. The parcel contains agricultural outbuildings and a residence, located about 1,030-feet south of the substation site. Adjacent land use is a mixture of center-pivot irrigation and pasture. The total size of the Townsend Substation site would be approximately 52 acres

1.1.3 Mill Creek Substation

A new facility would be built adjacent to NorthWestern's existing Mill Creek Substation, located approximately three miles south of Anaconda, Montana. The proposed facility would be built to accommodate a bank of phase shifting transformers and other series capacitor banks and associated substation equipment. The MSTI 500kV line would not connect directly to or require modification of the existing substation. Engineering studies will be completed to determine the final layout of this new facility.

1.1.4 Midpoint Substation Modifications

IPCO's existing Midpoint Substation located 10 miles north of Interstate 84 (I-84) in Jerome County, Idaho would be modified to accommodate the new MSTI 500kV transmission line. Engineering studies with IPCO will be completed to determine the ultimate modifications required at the Midpoint substation.

1.2 RESOURCE ISSUES

This technical report reviews the main resource issues related to water resources and wetlands, the regulatory framework, inventory methods, data categories, inventory results, impacts methods, and impact results for NWE's proposed project area. Refer to the water resource map and Missouri River crossing map located in Volume III of the MFSA application.

During the course of data acquisition, field inventories, and meetings with public, resource managers, government agencies, business leaders, and elected officials, key water resource issues within the project study area were identified and were considered exclusion areas or constraints for routing. These issues are discussed below.

1.2.1 SURFACE WATER

The transmission line would have to cross the Missouri River along with other rivers, streams, and associated wetlands regardless of the route. The Missouri River and other water resources support sensitive, threatened, and endangered species habitat and wetlands. The presence of surface water was a key routing criterion.

1.2.2 NAVIGABLE WATERWAYS

The Missouri River is listed as a navigable waterway by the State of Montana (MDNRC 2008). Silver Creek is listed as a right-of-way navigable waterway regulated only by the State of Idaho (Idaho Department of Lands [IDL] n.d.). Crossing the Missouri River would require permitting from the U.S. Army Corps of Engineers (USACE) and MDNRC. Navigable waterways were an important routing criterion.

1.2.3 WETLANDS

Wetlands were identified using the National Wetland Inventory (NWI), land use cover, and hydric soils information. Wetland systems provide valuable riparian habitat for fish and wildlife, habitat connectivity, pollutant removal, sediment transport and storage, water temperature control, riverbank stability, flood water retention, groundwater recharge, and energy and nutrient cycling.

The state of Montana has lost about 27 percent of the wetlands present before 1800 and the Montana Department of Environmental Quality (MDEQ) has established an overarching goal of no overall net loss of the state's remaining wetland resource base (MDEQ 2008). The state of Idaho has lost 56 percent of its wetland acreage since about 1860, when mining and farming began (USGS 1996). As a result, the Idaho Department of Fish and Game (IDFG) and private organizations and groups have prioritized their efforts on wetland habitat protection and restoration. These factors combined to make wetlands a key routing criterion.

1.2.4 FLOODPLAINS

While there was no data available for approximately 70 percent of the route links (see Tables 4.3-1 and 4.3-2), the presence of 100-year floodplains was a key routing criterion. Functioning floodplains provide flood management, acting as temporary storage of flood water. This storage of water decreases run-off velocity, reduces flood peaks, and distributes storm flows over longer time periods, causing tributary and main channels to peak at different times. They also provide important and rich habitats because of the associated riparian and wetland systems.

1.3 STUDY PERSONNEL

POWER Engineers, Inc. (POWER): Linda Erdmann, Water Resources Specialist and Professional Wetland Scientist; Tim Hazekamp, geographic information system (GIS) Specialist; and Wendy Hosman, Environmental Specialist.

2.0 REGULATORY FRAMEWORK

2.1 CLEAN WATER ACT (CWA)

2.1.1 SECTION 404

Waters of the U.S., including wetlands, are subject to USACE jurisdiction under Section 404 of the 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 of the USACE provides regulatory review and permitting services for the Idaho portion of the project.

2.1.2 SECTION 401 CWA

Pursuant to Section 401 of the CWA, the Idaho Department of Environmental Quality (IDEQ) and the MDEQ provide water quality certification to determine if a proposed project will violate applicable state water quality standards. Water quality certification is mandatory for all projects requiring a Section 404 permit.

2.1.3 CONSTRUCTION STORM WATER PROGRAM

Construction activities in both states must comply with the National Pollutant Discharge Elimination System (NPDES) for discharges of storm water runoff associated with a construction activity.

2.1.3.1 Montana

In Montana, the MDEQ Water Protection Bureau regulates storm water requirements for construction activity. The Montana Water Protection Bureau requires permitting for discharge of storm water from construction activities including clearing, grading, and excavation that result in disturbance of equal to or greater than one acre of total land area (General Permit for Storm Water Discharges Associated with Construction Activity, Permit No.: MTR100000). Construction activity subject to this permit includes clearing, grading, excavation, stockpiling earth materials, and other placement or removal of earth material performed during construction projects. Construction activity includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb one acre or more.

The Montana General Permit for Storm Water Discharges Associated with Construction Activity requires a Notice of Intent (NOI) form, Storm Water 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 scheduled; and estimates of the total area of the site and the area expected to undergo disturbance. 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); location of all erosion and sediment control measures or structures; areas where vegetative measures are to be implemented; the location of impervious structures after construction; the location of all state surface waters on or near to the construction activity site, the boundary of the 100-year floodplain; and a north arrow and map scale. The SWPPP must list Best Management Practices (BMPs) and Storm Water Management Controls the discharger will use to manage storm water runoff. BMPs must minimize or prevent "significant sediment" from leaving the construction site.

2.1.3.2 Idaho

In Idaho, NPDES storm water permits are issued by the Environmental Protection Agency (EPA).

The NPDES storm water program requires operators of construction sites one acre or larger (including smaller sites that are part of a larger common plan of development) to obtain authorization to discharge storm water under an NPDES construction storm water 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 (CGP). The NPDES requires submission of an NOI and SWPPP. The SWPPP must identify all potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site; describe practices to be used to reduce pollutants in storm water discharges from the construction site; and assure compliance with the terms and conditions of the permit.

2.2 NAVIGABLE WATERWAYS

The USACE regulates activities regarding navigable waterways. Section 10 of the River and Harbor Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable water of the United States (USACE 1999). The construction of any structure in or over any navigable water of the U.S., or any accomplishment of 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.

The Missouri River is the only navigable river being crossed by the proposed MSTI 500kV transmission line and an application for the transmission line crossing would need to consider the following: public interest; effect on wetlands; fish and wildlife; water quality; historic; cultural, scenic, recreational value; interference with adjacent properties or water resource projects; other federal, state, or local requirements; safety of impoundment structures; flood plain management; water supply and conservation; energy conservation and development; and navigation. A permit application would be submitted to the Helena District Office of the USACE.

2.3 WATER QUALITY

Federal and state laws regulate the quality of surface waters in Montana and Idaho, including the Federal CWA; Montana Code Annotated (MCA) Title 75, Environmental Protection; and Chapter 58.01.02 of the Idaho Administrative Code, "Water Quality Standards and Wastewater Treatment Requirements." MDEQ and IDEQ are responsible for protecting and regulating the beneficial uses of each state's surface waters and they rely on the water quality standards set forth by the EPA for identifying potential causes of impairment. MDEQ and IDEQ designate uses for specific waterbodies 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.

2.4 LOCAL FLOODPLAIN PERMITS

A number of 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. The Montana counties requiring floodplain permits include Beaverhead, Madison, Silver Bow, Jefferson, Broadwater, and Gallatin and the Idaho counties include Bonneville and Blaine. A permit application and fee must be submitted to the appropriate county government.

3.0 INVENTORY METHODS

For water and wetland resources the MSTI study corridors extend one mile on either side of the centerline of each alternative route link. The study corridors start at the new Townsend Substation in Montana and proceed south and then west to the existing Midpoint Substation in south-central Idaho, seven miles south of Shoshone.

Water and wetland resource data for the states of Montana and Idaho were obtained from a regional study conducted by POWER Engineers in 2006 (see Volume IV of the MFSA application). Additional water resource data was collected from government agencies; review of relevant studies, scientific literature, and agency programs; agency consultation; and inspection of resources in the field.

Baseline data requirements were followed as outlined in MDEQ's MFSA Application Requirements for Linear Facilities (MDEQ 2004a). As specified, water resources include the following if they occurred within the impact zone:

- Municipal watersheds;
- Streams and rivers listed in Montana Department of Fish, Wildlife and Parks (MFWP) river database as being class I or II streams or rivers;
- Streams listed by the department pursuant to 75-5-702, Montana Code Annotated (MCA), that are not attaining designated beneficial uses of water;
- Any undeveloped land or water areas that contain known natural features of unusual scientific, educational or recreational significance;
- Standing water bodies, including any lake, wetland, marsh or reservoir; and intermittent water bodies and internally drained basins that reach a surface area of 20 acres or more at least one year out of ten;
- Surface supplies of potable water.

3.1 DATA CATEGORIES

Water resources data collected for the alternative route links includes surface water, navigable waterways, wetlands, land use/land cover, floodplains, hydric soils, and water quality. The project area comprises a total of 205 quadrangle maps at a scale of 24K: Montana, 121; Idaho, 84.

3.1.1 SURFACE WATER

Stream crossing data includes rivers, perennial and intermittent streams, and canals or ditches. A river is a large natural flow of water that is larger than a stream or creek. A perennial stream is defined as a stream that normally has water in its channel at all times. An intermittent stream is defined as a stream that flows only when it receives water from rainfall runoff or springs, or from some surface source such as melting snow. Canals or ditches are manmade channels used to move water from one location to another, usually for agricultural purposes.

Stream crossing data was obtained from U.S. Fish and Wildlife Service (USFWS) NWI and the national hydrologic database from U.S. Geological Survey (USGS).

3.1.2 NAVIGABLE WATERWAYS

Navigable waterways are administered at the federal level by the USACE and at the state level by the Montana Department of Natural Resources and Conservation (MDNRC) Trust Land Management Division and IDL. Navigable waterways are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity. Navigable river information was gathered from the USACE website, MDNRC Trust Land Management Division, and IDL.

3.1.3 WETLANDS

The regulatory definition of Section 404 CWA jurisdictional wetlands according to the U.S. EPA and USACE are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions."

Digital and hard copy NWI maps were obtained from the USFWS but were not available for all quadrangles for the project area. Hard copy maps were digitized by POWER. NWI provides approximate locations of wetlands one acre or larger that may or may not be jurisdictional based on the 1987 USACE Wetlands Delineation Manual.

Aerial photographs and National Gap Analysis Program (GAP) digital data for Idaho and Montana was used to interpret land cover within the study area in order to identify wetlands. Four categories of land use/land cover identified potential wetlands: marsh, mud flat, riparian shrub, and riparian tree. A marsh is defined as a water-saturated, poorly drained area, intermittently or permanently water covered, having aquatic and grasslike vegetation. A mud flat is defined as a relatively level area of fine silt along a shore or around an island, alternately covered and uncovered by the tide, or covered by shallow water. Riparian shrub cover is defined as the area pertaining to, or situated on, the bank of a natural body of flowing water that is predominately covered with shrubs. Riparian tree cover is defined as the area pertaining to, or situated on, the bank of a natural body of flowing water that is predominately covered with trees (USGS 1996).

A combination of land cover and hydric soils were used to identify wetlands not mapped by NWI.

The Montana Natural Resource Information System (NRIS) is currently mapping the wetlands in the project area, but information is not available for official use at this time. Maps for the project area may be available during the summer of 2009.

Wetlands can be vegetated or nonvegetated and are classified on the basis of their hydrology, vegetation, and substrate. In this report, wetlands are classified according to the system proposed by Cowardin et al. (1979), which is used by the NWI to map and inventory the Nation's wetlands.

3.1.4 HYDRIC SOILS

The definition of a hydric soil is soil that is wet long enough to periodically produce anaerobic conditions, thereby influencing the growth of plants. Some series, designated as hydric, have phases that are not hydric depending on water table, flooding, and ponding characteristics.

Digital soils data for the Soil Survey Geographic (SSURGO) were obtained from the Natural Resource Conservation Service (NRCS) and were available for most quadrangles in the project area. The SSURGO data are classified as all hydric soils, partially hydric soils, not hydric, and no data available. Partially hydric soils are non-hydric soils with hydric soil inclusions that can vary from 5 percent to 99 percent of the total soil area.

Hydric soils were used in combination with the land cover to identify wetlands not mapped by NWI.

3.1.5 FLOODPLAINS

A floodplain is the area on the sides of a stream, river, or watercourse that is subject to periodic flooding. The extent of the floodplain is dependent on soil type, topography, and water flow characteristics. A 100-year flood is a flood stage that statistically has a 1 percent probability of occurring in any given year.

Digital floodplain data was available from the Federal Emergency Management Agency (FEMA) for approximately 30 percent of the project area. Floodplain categories in the study area included 100-year floodplain zones (Zone A) and no flood zones (Zone X), which are outside the 100 and 500-year floodplains. Flood Insurance Risk Zone A are areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no base flood elevation or depths are available.

3.1.6 WATER QUALITY

Water quality information, 303(d) listing, for streams and rivers in the study corridors was obtained from MDEQ and IDEQ. Information on the fisheries resource values of major rivers, municipal watersheds, and surface supplies of potable water was obtained for Montana but was not available for Idaho.

3.1.6.1 CLASS I AND II RIVERS

The State of Montana has classified all major rivers as to their fisheries resource value. The resource value was determined by MFWP and federal land management fisheries biologists as an assessment of fish abundance, fishing pressure, esthetics and ingress. Class I and II stream fishery classifications were obtained from MFWP.

The State of Idaho does not classify rivers in this manner.

3.1.6.2 MUNICIPAL WATERSHEDS

A watershed is an area of land that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or even the ocean. Municipal watersheds are important sources of surface water for domestic, industrial, and commercial use.

Municipal watershed information was collected from MDEQ. The State of Idaho has no designated municipal watersheds within the state.

3.1.6.3 SURFACE SUPPLIES OF POTABLE WATER

Potable water is water that is safe for human consumption, better known as drinking water.

Information regarding surface supplies of potable water was obtained from the MDEQ Source Water Protection Program. Information was reviewed for the following six counties: Beaverhead, Broadwater, Deer Lodge, Jefferson, Madison, and Silver Bow.

Information regarding surface supplies of potable water was obtained from the following IDEQ district offices: Twin Falls, Pocatello, and Idaho Falls.

3.2 FIELD VERIFICATION

Field investigation and verification were conducted where necessary during the fall of 2007 and spring of 2008. Field checking consisted of groundtruthing GIS data, and capturing GPS and photo points of check locations. Field verification trips were conducted during the weeks of September 16, 2007; October 14, 2007; and January 20, 2008. A total of 247 (as of April 29, 2008) field points have been checked and a total of 233 photo points have been taken (as of April 29, 2008) in Montana and Idaho (see the Biological Resources Technical Report).

4.0 INVENTORY RESULTS

4.1 WATERSHED SETTING

The proposed 500kV transmission line alternative route links begin at the Townsend Substation in Montana on the east side of the Rocky Mountains, cross the continental divide at the Montana and Idaho state border, and end at the Midpoint Substation south of Shoshone, Idaho, on the west side of the Rocky Mountains.

The hydrologic setting and functions of Montana and Idaho's water resources differ regionally because of differences in climate, soils, geology, vegetation, and physiography (Omernik 1987). Omernik related these characteristics in order to develop regional patterns that are used to define ecoregions. The ecoregions and watersheds for each state are described below.

4.1.1 MONTANA

The ecoregions in the Montana project study area include the Northern Rocky Mountains and Middle Rocky Mountains. The Northern Rockies ecoregion is dominated by glaciation. Glacial till and moraines have allowed the formation of wetlands and lakes; alpine lakes fill cirques; and low-velocity streams and rivers in broad U-shaped glaciated mountain valleys. Downstream from glaciated valleys, running water has eroded steep, V-shaped valleys with wetlands along streams and springs and impoundments created by landslides (Windell et al. 1986). The mountain ranges in the Middle Rockies ecoregion are separated by valleys and in places, broad basins. The alluvial and outwash deposits in the valleys are porous and permeable and can store and yield large volumes of water.

There are nine major watersheds within the Montana portion of the study area in the Northern Rockies ecoregion: Beaverhead, Big Hole, Boulder, Gallatin, Jefferson, Madison, Red Rock, Red Ruby, and Upper Missouri (EPA n.d.). These watersheds lie on the eastern slope of the continental divide and these waters eventually flow ultimately into the Mississippi and the Gulf of Mexico.

4.1.2 IDAHO

The ecoregions in the Idaho project study area include the Middle Rocky Mountains and the Snake River Basin/High Desert. The Middle Rockies ecoregion includes small portions of Montana and is described above. The Snake River Basin/High Desert ecoregion is a gently sloping, semiarid plain that contains rivers and small streams, wetlands, and playas.

There are nine major watersheds within the Idaho portion of the study area in the Middle Rockies and Snake River Basin/High Desert ecoregions: American Falls, Beaver-Camas, Big Wood, Birch, Idaho Falls, Little Lost, Little Wood, Medicine Lodge, and Upper Henrys (EPA n.d.). These watersheds lie on the western slope of the continental divide and these waters eventually flow into the Columbia River, which flows into the Pacific Ocean.

4.2 CLIMATE

4.2.1 MONTANA

The Montana portion of the project area lies entirely on the eastern side of the Continental Divide which exerts a marked influence on the climate of adjacent areas. Climatic characteristics are decidedly continental with somewhat greater range between winter and summer temperatures and a reversal in the wet winter-dry summer pattern. The valley floor elevation ranges from 3,800 to 5,500 feet, with a high elevation of 6,800 feet at the Continental Divide. The average annual precipitation ranges from 10 to 14 inches. The average annual snowfall ranges from 23 inches to 72 inches (WRCC 2007). The greatest precipitation falls in the months of May through August. February is typically the driest month. High surface water flows occur in the spring and early summer months with the melting of the winter snowpack. Heavy rains falling during the spring thaw constitute a serious flood threat. Flash floods, although restricted in scope, are probably the most numerous and result from locally heavy rainstorms in the spring and summer.

4.2.2 IDAHO

Despite being located some 300 miles from the Pacific Ocean, Idaho is influenced by maritime air, borne eastward on the prevailing westerly winds. These westerly winds bring winter snow and spring rains to the project area which lies almost exclusively in the high desert region of the Snake River Basin. The elevation ranges between 3,800 to 6,000 feet in the desert regions and peaks at 6,800 feet at the Continental Divide. The average precipitation in the Snake River Basin is between 8 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 (WRCC 2007). Precipitation falls mainly in the winter and spring. July is typically the driest month. Summer precipitation is primarily in the form of thunderstorms, which 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.

4.3 WATER AND WETLAND RESOURCES

This section describes the water resources within the 2-mile-wide study corridors. The descriptions are arranged by resource and further subdivided by state and by route link. The section also describes the water resources present at the locations of the proposed Townsend Substation, and existing Mill Creek and Midpoint Substations (refer to the water resource map located in Volume III).

Tables 4.3-1 and 4.3-2 summarize the water resources potentially affected by the 500kV alternative routes by state and by route link.

Table 4.3-1 Inventory of Water Resources by Link for Montana (within 2-mile corridor)

Link	No. Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
1	Perennial – 2 (Missouri River) Intermittent – 11 Canal, ditch – 0 Total – 13	Hydric – 8 Not hydric – 21 No data – 11	0/10	Zone A – 8 Zone X – 32 No data – 0
2-1	Perennial – 4 (Missouri River) Intermittent – 44 Canal, ditch – 3 Total – 51	Hydric – 0 Not hydric – 149 No data – 0	0/12	Zone A – 3 Zone X – 146 No data – 0
2-2	Perennial – 2 (Boulder River) Intermittent – 25 Canal, ditch – 0 Total – 27	Hydric – 13 Not hydric – 96 No data – 8	0/12	Zone A – 0 Zone X – 22 No data – 95
2-3	Perennial – 2 (Boulder River) Intermittent – 20 Canal, ditch – 0 Total – 22	Hydric – 15 Not hydric – 73 No data – 9	0/16	Zone A – 0 Zone X – 19 No data – 78
3-1	Perennial – 4 (Boulder River) Intermittent – 63 Canal, ditch – 2 Total – 68	Hydric – 7 Not hydric – 163 No data – 30	0/10	Zone A – 0 Zone X – 97 No data – 103
3-2	0	Hydric – 0 Not hydric – 1 No data – 0	0/0	Zone A – 0 Zone X – 0 No data – 1
4-1	Perennial – 3 Intermittent – 21 Canal, ditch – 4 Total – 28	Hydric – 1 Not hydric – 75 No data – 13	0/7	Zone A – 0 Zone X – 71 No data – 18
4-2	Perennial – 33 Intermittent – 39 Canal, ditch – 4 Total – 76	Hydric – 107 Not hydric – 155 No data – 135	0/40	Zone A – 6 Zone X – 97 No data – 294
4-3	Perennial – 5 (Boulder River) Intermittent – 52 Canal, ditch – 0 Total – 57	Hydric – 19 Not hydric – 135 No data – 41	0/16	Zone A – 0 Zone X – 0 No data – 196
4-4	0	Hydric – 0 Not hydric – 1 No data – 0	0/0	Zone A – 0 Zone X – 0 No data – 1

Table 4.3-1 Inventory of Water Resources by Link for Montana (within 2-mile corridor)

Link	No. Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
7-1	Perennial – 1 Intermittent – 29 Canal, ditch – 0 Total – 30	Hydric – 2 Not hydric – 62 No data – 9	0/2	Zone A – 0 Zone X – 0 No data – 73
7-2	Perennial – 1 Intermittent – 32 Canal, ditch – 0 Total – 33	Hydric – 4 Not hydric – 57 No data – 16	0/1	Zone A – 0 Zone X – 0 No data – 77
7-3	Perennial – 5 Intermittent – 13 Canal, ditch – 0 Total – 18	Hydric – 10 Not hydric – 17 No data – 16	0/5	Zone A – 0 Zone X – 0 No data – 43
7-41	Perennial – 2 Intermittent – 9 Canal, ditch – 0 Total – 11	Hydric – 9 Not hydric – 13 No data – 24	0/5	Zone A – 0 Zone X – 0 No data – 46
7-42	Perennial – 3 (Homestake Lake) Intermittent – 2 Canal, ditch – 0 Total - 5	Hydric – 9 Not hydric – 0 No data – 13	0/8	Zone A – 0 Zone X – 0 No data – 22
7-43	Perennial – 2 Intermittent – 7 Canal, ditch – 0 Total – 9	Hydric – 3 Not hydric – 5 No data – 12	0/3	Zone A – 0 Zone X – 0 No data – 20
7-5	Perennial – 1 Intermittent – 2 Canal, ditch – 0 Total – 3	Hydric – 2 Not hydric – 0 No data - 5	0/2	Zone A – 0 Zone X – 0 No data - 7
7-61	Perennial – 4 Intermittent – 12 Canal, ditch – 2 Total – 18	Hydric – 25 Not hydric – 23 No data – 32	0/11	Zone A – 0 Zone X – 0 No data – 80
7-62	Perennial – 0 Intermittent – 0 Canal, ditch – 0 Total – 0	Hydric – 0 Not hydric – 0 No data – 3	0/0	Zone A – 0 Zone X – 0 No data – 3
7-63	Perennial – 5 Intermittent – 8 Canal, ditch – 0 Total – 13	Hydric – 23 Not hydric – 19 No data – 6	0/21	Zone A – 8 Zone X – 35 No data - 5
7-71	Perennial – 1 Intermittent – 3 Canal, ditch – 0 Total – 4	Hydric – 3 Not hydric – 7 No data – 6	0/2	Zone A – 0 Zone X – 0 No data – 16

Table 4.3-1 Inventory of Water Resources by Link for Montana (within 2-mile corridor)

Link	No. Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
7-72	Perennial – 3 Intermittent – 4 Canal, ditch – 0 Total – 7	Hydric – 4 Not hydric – 15 No data – 3	0/6	Zone A – 0 Zone X – 16 No data – 6
7-8	Perennial – 3 Intermittent – 10 Canal, ditch – 3 Total – 16	Hydric – 25 Not hydric – 13 No data – 23	0/2	Zone A – 0 Zone X – 0 No data – 61
7-9	Perennial – 2 Intermittent – 4 Canal, ditch – 2 Total – 8	Hydric – 9 Not hydric – 14 No data – 1	0/11	Zone A – 4 Zone X – 20 No data – 0
8	Perennial – 9 (Big Hole River) Intermittent – 84 Canal, ditch – 6 Total – 99	Hydric – 13 Not hydric – 286 No data – 5	0/10	Zone A – 0 Zone X – 0 No data – 304
11-21	Perennial – 2 Intermittent – 3 Canal, ditch – 0 Total – 5	Hydric – 6 Not hydric – 10 No data – 9	0/5	Zone A – 0 Zone X – 11 No data – 14
11-22	Perennial – 1 Intermittent – 14 Canal, ditch – 0 Total – 15	Hydric – 18 Not hydric – 5 No data – 30	0/7	Zone A – 0 Zone X – 0 No data – 53
11-23	Perennial – 7 (Big Hole River) Intermittent – 51 Canal, ditch – 4 Total - 62	Hydric – 54 Not hydric – 80 No data – 40	0/26	Zone A – 0 Zone X – 0 No data - 174
11-3	Perennial – 2 Intermittent – 47 Canal, ditch – 4 Total – 53	Hydric – 26 Not hydric – 96 No data – 30	0/36	Zone A – 0 Zone X – 0 No data – 152
11-4	Perennial – 3 Intermittent – 42 Canal, ditch – 2 Total – 47	Hydric – 20 Not hydric – 66 No data – 23	0/17	Zone A – 0 Zone X – 0 No data – 109
13	Perennial – 0 Intermittent – 6 Canal, ditch – 0 Total – 6	Hydric – 0 Not hydric – 8 No data – 17	0/1	Zone A – 0 Zone X – 0 No data – 25

Table 4.3-1 Inventory of Water Resources by Link for Montana (within 2-mile corridor)

Link	No. Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
16-1	Perennial – 3 (Beaverhead River) Intermittent – 51 Canal, ditch – 3 Total - 57	Hydric – 12 Not hydric – 65 No data – 123	6/21 Palustrine – 1 (PEM – 1) Riverine – 5 (R4 – 5) Total - 27	Zone A – 0 Zone X – 0 No data - 200
16-2	Perennial – 2 (Red Rock River) Intermittent – 83 Canal, ditch – 0 Total - 85	Hydric – 0 Not hydric – 0 No data – 197	44/0 Palustrine – 10 (PEM – 6) (PSS – 4) Riverine – 34 (R2 – 1) (R3 – 1) (R4 – 32) Total – 44	Zone A – 0 Zone X – 0 No data – 197
16-3	Perennial – 2 (Red Rock River) Intermittent – 49 Canal, ditch – 0 Total – 51	Hydric – 0 Not hydric – 0 No data – 154	56/0 Palustrine – 40 (PEM – 31) (PSS – 5) (PAB – 2) (PUB – 2) Riverine – 16 (R2 – 1) (R3 – 1) (R4 – 14) Total – 56	Zone A – 0 Zone X – 0 No data – 154
16-4	Perennial – 7 Intermittent – 15 Canal, ditch – 0 Total – 22	Hydric – 0 Not hydric – 0 No data - 70	27/0 Palustrine – 26 (PEM – 13) (PSS – 6) Riverine – 1 (R4 – 1) Total – 27	Zone A – 0 Zone X – 0 No data – 70
18-1	Perennial – 25 Intermittent – 68 Canal, ditch – 0 Total – 93	Hydric – 22 Not hydric – 51 No data – 221	73/42 Palustrine – 64 (PEM – 60) (PSS – 3) (PAB – 1) Riverine – 9 (R3 – 3) (R4 – 6) Total – 115	Zone A – 0 Zone X – 0 No data – 294

*In addition to NWI data, hydric soils and land use cover (marsh, mud flat, riparian shrubs and trees) information was used to identify wetlands. For this document, wetlands identified through this process are called "Interpreted Wetlands".

Table 4.3-2 Inventory of Water Resources by Link for Idaho

Link	No. of Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
18-2	Perennial – 7 Intermittent – 24 Canal, ditch – 0 Total – 31	No data – all (117)	19/0 Palustrine – 12 (PEM – 10 (PSS – 2) Riverine – 7 (R4 – 7) Total – 19	Zone A – 0 Zone X – 0 No data – 117
20	Perennial – 12 Intermittent – 21 Canal, ditch – 0 Total – 33	No data – all (113)	30/0 Palustrine – 30 (PEM – 18) (PSS – 12) Riverine – 0 Total – 30	Zone A – 0 Zone X – 0 No data – 113
21	Perennial – 1 Intermittent – 62 Canal, ditch – 6 Total – 69	Hydric – 5 Not hydric – 221 No data – 50	4/0 Palustrine – 1 (PSS – 1) Riverine – 3 (R3 – 2) (R4 – 1) Total – 4	Zone A – 20 Zone X – 206 No data – 50
22	Perennial – 0 Intermittent – 24 Canal, ditch – 0 Total – 24	No data – all (98)	5/0 Palustrine – 2 (PEM – 2) Riverine – 3 (R3 – 1) (R4 – 2) Total – 5	Zone A – 0 Zone X – 0 No data – 98
23	Perennial – 0 Intermittent – 29 Canal, ditch – 1 Total – 30	Hydric – 0 Not hydric – 6 No data – 65	4/0 Palustrine – 2 (PEM – 1) (PSS – 1) Riverine – 2 (R4 – 2) Total – 4	Zone A – 0 Zone X – 6 No data – 65
24	Perennial – 0 Intermittent – 17 (Big Lost River) Canal, ditch – 4 Total – 21	Hydric – 0 Not hydric – 14 No data – 39	2/0 Palustrine – 0 Riverine – 2 (R4 – 2) Total – 2	Zone A – 0 Zone X – 8 No data – 45
25-11	Perennial – 0 Intermittent – 17 (Big Lost River Sinks) Canal, ditch – 1 Total – 18	Hydric -0 Not hydric – 45 No data – 26	7/0 Palustrine – 7 (PEM – 7) Riverine – 0 Total – 7	Zone A – 0 Zone X – 0 No data – 71

Table 4.3-2 Inventory of Water Resources by Link for Idaho

Link	No. of Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
25-12	Perennial – 1 Intermittent – 38 (Big Lost River and Nichols Reservoir) Canal, ditch – 1 Total – 40	Hydric – 2 Not hydric – 143 No data – 0	1/0 Palustrine – 1 (PSS – 1) Riverine – 0 Total – 1	Zone A – 0 Zone X – 53 No data – 92
25-2	Perennial – 2 (Silver Creek, Little Wood River, and Carey Lake) Intermittent – 15 Canal, ditch – 1 Total – 18	Hydric – 51 Not hydric – 57 No data – 0	20/2 Palustrine – 20 (PEM – 14) (PUS – 6) Riverine – 0 Total – 22	Zone A – 34 Zone X – 73 No data – 1
25-3	Perennial – 1 (Silver Creek) Intermittent – 17 Canal, ditch – 4 Total – 22	Hydric – 29 Not hydric – 68 No data – 0	0/3	Zone A – 3 Zone X – 93 No data – 1
25-4	Perennial – 6 (Little Wood River) Intermittent – 9 Canal, ditch – 9 Total – 24	Hydric – 16 Not hydric – 80 No data – 0	0/10	Zone A – 0 Zone X – 0 No data – 96
26-1	Perennial – 0 Intermittent – 10 Canal, ditch – 0 Total – 10	Hydric – 0 Not hydric – 25 No data – 0	0/0	Zone A – 0 Zone X – 25 No data – 0
26-2	Perennial – 0 Intermittent – 34 Canal, ditch – 0 Total – 34	Hydric – 0 Not hydric – 87 No data – 0	0/0	Zone A – 0 Zone X – 65 No data – 22
26-3	0	Hydric – 2 Not hydric – 68 No data – 0	0/0	Zone A – 0 Zone X – 45 No data – 25
26-4	Perennial – 0 Intermittent – 4 (Sid Lake and Sand Lake) Canal, ditch – 1 Total – 5	Hydric – 27 Not hydric – 82 No data – 0	0/0	Zone A – 0 Zone X – 0 No data – 109
27	0	Hydric – 1 Not hydric – 0 No data – 0	0/0	Zone A – 0 Zone X – 0 No data – 1

Table 4.3-2 Inventory of Water Resources by Link for Idaho

Link	No. of Stream or Water Crossings	No. Hydric Soil Crossings (all & partial)	No. Wetland Crossings NWI/Interpreted*	No. FEMA Floodplain Crossings
28	Perennial – 0 Intermittent – 0 Canal, ditch – 1 Total – 1	Hydric – 0 Not hydric – 10 No data – 0	1/0 Palustrine – 1 (PUB – 1) Riverine – 0 Total – 1	Zone A – 0 Zone X – 0 No data – 10
29	Perennial – 0 Intermittent – 25 (Big Lost River) Canal, ditch – 0 Total – 25	Hydric – 0 Not hydric – 122 No data – 0	0/0	Zone A – 0 Zone X – 35 No data – 87
30	Perennial – 0 Intermittent – 5 Canal, ditch – 0 Total – 5	Hydric – 0 Not hydric – 35 No data – 0	0/0	Zone A – 0 Zone X – 33 No data – 2
31	0	Hydric – 0 Not hydric – 26 No data 0	0/0	Zone A – 0 Zone X – 21 No data – 5

*In addition to NWI data, hydric soils and land use cover (marsh, mud flat, riparian shrubs and trees) information was used to identify wetlands. For this document, wetlands identified through this process are called "Interpreted Wetlands".

TOWNSEND SUBSTATION

The proposed Townsend Substation site is located on the east side of the Missouri River, which is approximately 3,500 feet (0.75 mile) away. US 287 runs between the proposed substation and the Missouri River and it is approximately 1,375 feet (0.25 mile) from the substation, blocking surface flow between the site and the river. The proposed site is outside the areas identified as containing potential wetlands.

MILL CREEK SUBSTATION

The existing Mill Creek Substation site is located in an arid landscape. There are partially hydric soils and a small drainage system west of the site; otherwise, there are no major water resources associated with this site.

MIDPOINT SUBSTATION MODIFICATION

The existing Midpoint Substation is located between irrigated agriculture lands and native sagebrush steppe habitat. The soil survey map shows partically 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 indicates there are no major water resources on or surrounding this site.

4.3.1 SURFACE WATER

Surface waters include rivers, perennial streams, intermittent streams, canals or ditches, lakes, and reservoirs.

4.3.1.1 MONTANA

There are nine major watersheds within the Montana portion of the study area: Beaverhead, Big Hole, Boulder, Jefferson, Upper Clark Fork, and Upper Missouri (EPA n.d.). The major rivers within these watersheds are the Beaverhead, Big Hole, Boulder, Jefferson, Red Rock, and Missouri. The major lakes and reservoirs in these watersheds include the Whitetail Reservoir, Delmoe Lake, Clark Canyon Reservoir, and Lima Reservoir.

Three rivers would be crossed regardless of the route selected: Missouri River (Links 1, 2-1), Boulder River (Links 2-2, 2-3, 3-1, 4-3), and Big Hole River (Links 8, 11-23) (Table 4.3-1).

The Missouri River begins near the town of Three Forks, formed by the confluence of the Gallatin River, the Jefferson River, and the Madison River. From its origin, it travels for more than 700 miles across the entire state of Montana. The Missouri River at its origin flows through a wide-open valley, flanked by buttes and small mountains that are thinly forested. Grass and agricultural fields line the Missouri River, broken up by cottonwood trees along the riverbank (MDEQ 2004). Soon after its origin, the Missouri River flows over Totson Dam and flows for another 22 miles before it reaches the 33-mile-long Canyon Ferry Reservoir near the town of Townsend. The Missouri River is designated as a navigable waterway beginning at the headwaters near Three Forks (refer to the State of Montana navigable waterway map in Appendix B.

The headwaters of the Boulder River are in the Beaverhead-Deerlodge National Forest west of the town of Boulder. Upstream from the town the river has a narrow floodplain and the riparian vegetation is dominated by willow, alder, conifer, and to a lesser extent, cottonwood and aspen. At the lower elevations, downstream from the town of Boulder, the river meanders with a gradual gradient and the riparian vegetation consists of cottonwood, aspen, and willow (USGS n.d.). It flows south from Boulder for approximately 28 miles through the Boulder Valley and joins the Jefferson River near Whitehall. The river runs along State Highway 69 from Boulder to Interstate 90.

The Big Hole River begins at Skinner Lake, which is tucked away in the Beaverhead Mountains near the Idaho border, and it flows for 155 miles before emptying into the Jefferson River at Twin Bridges. At its origin, towering mountains surround the river, but it soon leaves the mountains and enters the Big Hole River Valley. The river flows north through the valley for more than 60 miles, picking up velocity and volume from the numerous feeder creeks that spill in from the high mountains. It then turns eastward where it enters a canyon, initially heavily forested, but the forest lessens as the river travels further eastward and loses elevation. The canyon stretch continues for 30 miles and then emerges from the canyon near the town of Divide, which is located along Interstate 15. From here, the river turns south and flows through primarily arid country, with cottonwood trees frequently lining its banks, to the town of Glen. After 25 miles, the river makes one final turn and begins to flow to the northeast, through very arid terrain, towards the confluence with the Jefferson River at Twin Bridges.

The Beaverhead River would be crossed by Link 16-1 (Table 4.3-1).

The Beaverhead River begins at Clark Canyon Dam, near Dillon, and flows for 80 miles to the confluence with the Jefferson River. For the first 16 miles, to Barretts Dam, the river flows through arid hillsides. Traversing this section of river, the Beaverhead is rarely in a straight line for long, as it constantly twists and turns in its route through the hills. The banks of the river are lined with willows, cottonwood trees, and grass. Below Barretts Dam, the Beaverhead River flows into the valley. Irrigation takes a heavy toll on the Beaverhead from Barretts Siding down to Dillon. In late summer during low water years, this section of river may have very low water levels. Below Dillon, irrigation use is somewhat less, but the river flows very slowly through predominantly private land.

The Red Rock River would be crossed by Link 16-2 and 16-3 (Table 4.3-1).

The Red Rock River begins at Lillian Lake in the Centennial Mountains. It flows from the mountains into the Centennial Valley, where it flows through the Red Rock Lakes National Wildlife Refuge. While flowing through the refuge, it passes through Upper Red Rock Lake and Lower Red Rock Lake. As the river flows through large marshes in the wildlife refuge, numerous reeds and willows are found along its banks. After it leaves the wildlife refuge, the river flows quite slowly through private property, where the water is warm and the banks are heavily grazed. The countryside is very arid and open below the wildlife refuge, in stark contrast to the upper river. The Red Rock River enters Lima Reservoir 60 miles from its origin. After the reservoir, the flows increase and cottonwood trees line the bank amidst the arid landscape. The river flows for more than 50 miles through similar country below the dam before entering Clark Canyon Reservoir.

The perennial and intermittent streams feed into the five major rivers described above. Link 4-2 would have the most perennial stream crossings at 33, then Link 18-1 at 25 crossings, and Link 8 (9 crossings), and Links 11-23 and 16-4 at 7 crossings each (Table 4.3-1). Homestake Lake would be the only lake or reservoir crossing in Link 7-42 in Jefferson County. Homestake Lake is a relatively small lake and is part of the Homestake Lake Recreation Area, a day-use only site. The lake is used by picnickers, fishermen, and swimmers.

4.3.1.2 Idaho

There are nine major watersheds within the Idaho portion of the study area: American Falls, Beaver-Camas, Big Wood, Birch, Idaho Falls, Little Lost, Little Wood, Medicine Lodge, and Upper Henrys (EPA 2002). The major rivers in these watersheds include the Snake River, Big Lost River, Big Wood River, and Little Wood River. The major lakes and reservoirs in these watersheds include American Falls Reservoir, Magic Reservoir, Mud Lake, and Lake Walcott.

There are two river crossings in Idaho depending on the route selected: Big Lost River (Links 24, 25-11, 25-12, 29) and Little Wood River (Links 25-2 and 25-4) (Table 4.3-2).

The Big Lost River is about 120 miles long and begins in the Pioneer Mountains. The river meanders southeast through the Big Lost River Valley until it reaches Mackay Reservoir. Below the reservoir, the river flows towards the town of Mackay, where the banks are lined with tall cottonwoods and lush grassland, and is seldom wider than 20 to 30 feet. Below Mackay, the agricultural demand for water is high and high temperatures affect the quality of water. Near Arco the river enters the Snake River Plain, curves east and then northeast and enters a depression, called the Big Lost River Sinks, where the water flows underground (Link 25-11). Near the sinks there is a dry tributary called Dry Channel Big Lost River, which flows intermittently (Link 24).

The Little Wood River is 90 miles long, originating in the Pioneer Mountains of northern Blaine County and flows south through the Little Wood Reservoir near Carey. Below the reservoir, Silver Creek joins the Little Wood and then the river flows south past Richfield, then west past Shoshone and enters Gooding County. Just west of Gooding, the Little Wood River joins the Big Wood River to form the Malad River. The Little Wood River is the key source of irrigation water for eastern Blaine County and most of Lincoln County. Its water was a major attraction for the region's first permanent settlement at Carey. The river's water flow is regulated by reservoirs and affected by diversions of water into irrigation canals.

Silver Creek would be crossed by Links 25-2 and 25-3 (Table 4.3-2). Silver Creek is a globally unique high desert, cold-spring ecosystem featuring one of the highest densities of stream insects in North American. Silver Creek supports a world-class fishery, 150 species of birds, and the small yellow ladyslipper orchid, a state plant species of concern (TNC n.d.). The headwaters are found just south of Gannet in marshy plains surrounded by ranches, brush, and scattered trees. Dozens of springs bubble up from an aquifer to form small streams that converge to form Silver Creek. The creek's bed is lined with weeds which provide nutrients and places for fish to hide. The banks are lined with willows and lush grass. Being spring fed, Silver Creek is not affected by the winter snowpack runoff. Silver Creek is also a right-of-way navigable waterway under authority of the State of Idaho. As a right-of-way navigable river, Silver Creek is open to public use for all recreation activities such as boating, swimming, and fishing and the public access area extends to the river's high water mark.

The perennial and intermittent streams feed into the five major rivers in the area. Link 20 would have the most perennial stream crossings at 12, then Link 18-2 at seven crossings, and Link 25-4 at six crossings (Table 4.3-2). There are a number of intermittent lake and reservoir crossings: Big Lost River sinks (Link 25-11), Nichols Reservoir (Link 25-12), Sid Lake (Link 26-4), and Sand Lake (Link 26-4) (Table 4.3-2). The only perennial lake crossing is Carey Lake (Link 25-2) northeast from the town of Carey. It is a shallow 400 acre lake and marsh which is part of the Carey Lake Wildlife Management Area (WMA). Carey Lake receives considerable use from fishermen, early-season waterfowl hunters, and bird watchers.

4.3.2 WETLANDS

The NWI identifies two major wetland systems occurring within the study corridor: palustrine and riverine. The palustrine system includes all non-tidal wetlands dominated by vegetation and small, shallow, permanent or intermittent ponds. The palustrine wetlands in the Montana portion of the study area include aquatic bed (PAB), emergent (PEM), scrub-shrub (PSS), unconsolidated bottom (PUB), and unconsolidated shore (PUS) (USFWS 1979). Water regimes of the palustrine wetlands are characterized as intermittently, semi-permanently, temporarily, seasonally, and permanently flooded as well as saturated.

The riverine wetland system includes all wetlands and deepwater habitats contained within a channel. The three riverine wetland types identified by NWI in the study area in Montana are lower perennial (R2), upper perennial (R3), and intermittent (R4). The water regimes of the riverine wetlands are characterized as intermittently, semi-permanently, temporarily, seasonally, and permanently flooded.

In addition to NWI data, hydric soils and land use cover (marsh, mud flat, riparian shrubs and trees) information was used to identify wetlands. For this document, wetlands identified through this process are called "Interpreted Wetlands" (see Tables 4.3-1 and 4.3-2).

4.3.2.1 Montana

Wetlands occur throughout the Montana portion of the study area. Montana wetlands include scrub-shrub wetlands with willow thickets, greasewood scrubland adjacent to rivers, and persistent-emergent wetlands such as marshes, fens, and wet meadows (Tiner 1984). None of the alternative route links cross major wetland complexes.

The combination of hydric soils and land use cover (marsh, mud flat, riparian shrubs and trees) shows interpreted wetlands displayed in column one of Table 4.3-3. Link 18-1 has the greatest number of interpreted wetlands followed by Links 4-2, 11-3, and 11-23.

The total miles of NWI wetlands crossed by route link were identified within the study corridor (one mile each side of the centerline) along the 500kV alternative route links to determine the extent of potentially affected wetlands by type in Montana. The majority of wetlands within the study corridor in Montana are PEM and R4 associated with perennial and intermittent rivers and streams as shown in Table 4.3-3. Links 16-1, 16-2, 16-3, 16-4 and 18-1 are the only links in Montana with NWI identified wetlands.

Using a combination of NWI wetlands and interpreted wetlands as shown in the right side totals column in Table 4.3.-3, Link 18-1 has the greatest number of wetland resources followed by Links 16-3, 16-2, 4-2, and 11-3.

As shown in Table 4.3-3, Link 16-3 crosses the following NWI identified wetlands: 4.4 miles of palustrine wetlands and 1.6 miles of riverine wetlands for a total of 6.0 miles. There are two perennial stream crossings associated with the riverine wetlands: Red Rock River and Big Sheep Creek. The palustrine wetlands are associated with these two perennial streams and the following named intermittent streams: Limekiln Canyon, Bell Canyon, McKenzie Canyon, Little Sheep Creek, Willow Creek, Alder Creek, and Dutch Hollow.

Link 18-1 crosses the following NWI identified wetlands: 6.8 miles of palustrine wetlands and 0.9 miles of riverine wetlands for a total of 7.7 miles. There are 11 perennial stream crossings associated with the palustrine wetlands: Medicine Lodge Creek, Cabin Creek, Simpson Creek, Tex Creek, Meadow Creek, Rock Creek, Nicholia Creek, Deadman Creek, and three unnamed creeks. There are three perennial stream crossings associated with the riverine wetlands: Cabin Creek, Rock Creek, and Nicholia Creek.

Table 4.3-3 Miles of Interpreted and NWI Wetlands Crossed by Route Link in Montana

Link	Interpreted Wetland	NWI PAB	NWI PEM	NWI PSS	NWI PUB	NWI PUS	NWI R2	NWI R3	NWI R4	Totals
1	1.0	0	0	0	0	0	0	0	0	**1.0**
2-1	1.2	0	0	0	0	0	0	0	0	**1.2**
2-2	1.2	0	0	0	0	0	0	0	0	**1.2**
2-3	1.6	0	0	0	0	0	0	0	0	**1.6**
3-1	1.0	0	0	0	0	0	0	0	0	**1.0**
3-2	0	0	0	0	0	0	0	0	0	**0**
4-1	0.7	0	0	0	0	0	0	0	0	**0.7**
4-2	4.0	0	0	0	0	0	0	0	0	**4.0**
4-3	1.6	0	0	0	0	0	0	0	0	**1.6**
4-4	0	0	0	0	0	0	0	0	0	**0**
7-1	0.2	0	0	0	0	0	0	0	0	**0.2**
7-2	0.1	0	0	0	0	0	0	0	0	**0.1**
7-3	0.5	0	0	0	0	0	0	0	0	**0.5**
7-41	0.5	0	0	0	0	0	0	0	0	**0.5**
7-42	0.8	0	0	0	0	0	0	0	0	**0.8**
7-43	0.3	0	0	0	0	0	0	0	0	**0.3**
7-5	0.2	0	0	0	0	0	0	0	0	**0.2**
7-61	1.1	0	0	0	0	0	0	0	0	**1.1**
7-62	0	0	0	0	0	0	0	0	0	**0**
7-63	2.1	0	0	0	0	0	0	0	0	**2.1**
7-71	0.2	0	0	0	0	0	0	0	0	**0.2**
7-72	0.6	0	0	0	0	0	0	0	0	**0.6**
7-8	0.2	0	0	0	0	0	0	0	0	**0.2**
7-9	1.1	0	0	0	0	0	0	0	0	**1.1**
8	1.0	0	0	0	0	0	0	0	0	**1.0**
11-21	0.5	0	0	0	0	0	0	0	0	**0.5**
11-22	0.7	0	0	0	0	0	0	0	0	**0.7**
11-23	2.6	0	0	0	0	0	0	0	0	**2.6**
11-3	3.6	0	0	0	0	0	0	0	0	**3.6**
11-4	1.7	0	0	0	0	0	0	0	0	**1.7**
13	0.1	0	0	0	0	0	0	0	0	**0.1**
16-1	2.1	0	0.1	0	0	0	0	0	0.5	**2.7**
16-2	0	0	0.7	0.4	0	0	0.1	0.1	3.3	**4.6**
16-3	0	0.2	3.5	0.5	0.2	0	0.1	0.1	1.4	**6.0**
16-4	0	0	1.4	0.6	0	0	0	0	0.1	**2.1**
18-1	4.2	0.1	6.4	0.3	0	0	0	0.3	0.6	**11.9**
Total	**36.7**	**0.3**	**12.1**	**1.8**	**0.2**	**0**	**0.2**	**0.5**	**5.9**	**57.7**

4.3.2.2 Idaho

Wetlands occur throughout the Idaho portion of the study area. Most wetlands are either emergent wetlands vegetated by sedges and rushes or scrub-shrub wetlands dominated by alder, willow, and cottonwood (Omernik and Gallant, 1986). None of the links cross major wetland complexes.

The combination of hydric soils and land use cover (marsh, mud flat, riparian shrubs and trees) shows interpreted wetlands displayed in column one of Table 4.3-4. Links 25-4, 25-3, and 25-2 are the only links with interpreted wetlands.

The total miles of NWI wetlands crossed by route link were identified within the study area (one mile each side of the centerline) along the 500kV alternative route links to determine the extent of potentially affected wetlands by type in Idaho (see Table 4.3-4). The majority of wetlands within the 500kV study area in Idaho are PEM, PSS, and R4 associated with perennial and intermittent rivers and streams as shown in the following table. Links 18-2, 20, 21, 22, 23, 24, 25-11, 25-12, 25-2 and 28 are the only ones with NWI identified wetlands.

Using a combination of NWI wetlands and interpreted wetlands as shown in the right side totals column in Table 4.3.-4, Link 20 has the greatest number of wetland resources followed by Links 25-2, 18-2, 25-11, and 25-4.

Table 4.3-4 Miles of Interpreted and NWI Wetlands Crossed by Route Link in Idaho

Link	Interpreted Wetland	NWI PAB	NWI PEM	NWI PSS	NWI PUB	NWI PUS	NWI R2	NWI R3	NWI R4	Totals
18-2	0	0	1.0	0.2	0	0	0	0	0.7	**1.9**
20	0	0	1.6	1.4	0	0	0	0	0	**3.0**
21	0	0	0	0.1	0	0	0	0.2	0.1	**0.4**
22	0	0	0.2	0	0	0	0	0.1	0.2	**0.5**
23	0	0	0.1	0.1	0	0	0	0	0.2	**0.4**
24	0	0	0	0	0	0	0	0	0.3	**0.3**
25-11	0	0	1.3	0	0	0	0	0	0	**1.3**
25-12	0	0	0	0.1	0	0	0	0	0	**0.1**
25-2	0.2	0	1.9	0	0	0.5	0	0	0	**2.4**
25-3	0.3	0	0	0	0	0	0	0	0	**0.3**
25-4	1.0	0	0	0	0	0	0	0	0	**1.0**
26-1	0	0	0	0	0	0	0	0	0	**0**
26-2	0	0	0	0	0	0	0	0	0	**0**
26-3	0	0	0	0	0	0	0	0	0	**0**
26-4	0	0	0	0	0	0	0	0	0	**0**
27	0	0	0	0	0	0	0	0	0	**0**
28	0	0	0	0	0.1	0	0	0	0	**0.1**
29	0	0	0	0	0	0	0	0	0	**0**
30	0	0	0	0	0	0	0	0	0	**0**
31	0	0	0	0	0	0	0	0	0	**0**
Total	**1.5**	**0**	**6.1**	**1.9**	**0.1**	**0.5**	**0**	**0.3**	**1.5**	**11.9**

As shown in Table 4.3-4, Link 20 would cross the most miles of NWI identified wetlands at 3.0 miles. These are all palustrine wetlands and are associated with the following perennial streams: Modoc Creek, Idaho Creek, Flat Creek, and Beaver Creek. Link 25-2 crosses the next greatest miles of NWI wetlands at 2.4 miles, and they are all palustrine wetlands associated with Carey Lake WMA, Little Wood River, and Silver Creek. The link with the third greatest miles of NWI wetland crossings is 18-2 at 1.9 miles. Link 18-2 has 1.2 miles of palustrine wetlands associated with the following perennial streams: Divide Creek, Horse Creek, Cold Creek, Webber Creek, and Deep Creek. Link 18-2 also has 0.7 mile of riverine wetlands and is associated with only one perennial stream; Fritz Creek.

4.3.3 FLOODPLAINS

Two types of floodplains were identified in the project area: 100-year floodplains (Zone A) and no flood zones (Zone X), which are outside the 100 and 500-year floodplains. Data was unavailable for approximately 70 percent of the 2-mile-wide alternative route link corridors. Few floodplains in the project area are allowed to function naturally as all of the major rivers, except the Boulder and Big Hole Rivers in Montana, are regulated by dams and reservoirs. Despite flood regulation measures, flooding may still occur in high snowpack years or quick spring snowmelt.

4.3.3.1 Montana

The 100-year flood zones that were available for Montana are associated with the Missouri River (Link 1, 2-1), Silver Bow Creek (Links 4-2, 7-63), an unnamed perennial stream (4-2), Willow Creek (Links 4-2, 7-63, 7-9), and Mill Creek (Links 7-63, 7-9) (Table 4.3-1).

4.3.3.2 Idaho

The 100-year flood zones that were available for Idaho are associated with an unnamed stream (Link 21), Robinson Canal (Link 21), an unnamed canal or ditch (Link 21) and the Little Wood River (Link 25-2).

4.3.4 WATER QUALITY

Tables A-1 and A-2 in Appendix A provide a summary of the designated uses, impairments causes, and impairment source for each river and stream potentially affected by the transmission line route alternatives.

4.3.4.1 Montana

As shown in Table A-1 in Appendix A, in Montana the leading existing causes of aquatic life impairment are flow alterations, other habitat alterations, nutrients, siltation, alteration in streamside or littoral vegetative covers, and presence of contaminants such as copper, cadmium, zinc, arsenic and others. The source of impairments are flow regulation from dams and diversions, agriculture, grazing in the riparian zone, stream bank modifications, abandoned mine lands, and highways, roads, bridges, and infrastructure.

CLASS I AND II STREAMS

The Missouri River is a class I fisheries resource river between Sixteen Mile Creek and Canyon Ferry Lake. The Missouri River is crossed by Links 1 and 2-1 in this section.

The Big Hole River begins as a class II fisheries resource river and becomes a class I fisheries resource river until it joins the Jefferson River. The Big Hole River is a class I river where Links 11-23 and 8 cross it.

The Beaverhead River has both class I and class II fisheries resource values. It is a class I river where Link 16-1 crosses it above the Clark Canyon Reservoir (see MFWP Stream Fishery Classification map in Appendix C).

MUNICIPAL WATERSHEDS

Butte is the only municipality in the study area with designated municipal watersheds. The Butte Silver Bow Water Department obtains its water via four surface water intakes in the Butte vicinity. Intakes on the Big Hole River and off of the South Fork of Divide Creek Reservoir are located in the Big Hole watershed. The remaining two intakes, the Basin Creek Reservoir and Moulton Reservoir are located in the Upper Clark Fork watershed (Butte Silverbow Water Department 2003). None of

the alternative route links cross the Butte municipal watersheds or intake locations. Refer to the Butte Silverbow Water Department spill response and watershed map in Appendix D.

SURFACE SUPPLIES OF POTABLE WATER

There are six known locations where surface water is eventually used for drinking water within the study corridors (MDEQ n.d.). Four surface water locations for Butte were described under the Municipal Watersheds section. The alternative route links do not cross any of these surface water sources.

This surface water sources for the other two locations are technically not potable because the water is treated before it is considered suitable for human consumption.

The first source of surface water is located at the beginning of Link 7-2. Golden Sunlight Mines, Inc. draws water from the Jefferson Slough of the left fork of the Jefferson River north of Whitehall, between the Burlington Northern Railroad tracks and Interstate 90 in southern Jefferson County. Golden Sunlight Mines, Inc. constructed a new package treatment plant, operational in 2000, to treat the raw source water before making it available as drinking water.

The second source of surface water is located in Link 16-1 where Interstate 15 and the proposed transmission line cross the Beaverhead River. Armstead Campground is located approximately 17 miles south of Dillon on Highway 91 and just east of Interstate 15. The campground obtains water from an intake located along the Beaverhead River where it enters a cistern for filtration and disinfection and is then available for human consumption.

4.3.4.2 Idaho

As shown in Table A-2 (Appendix A) in Idaho, the leading existing causes of aquatic life impairment are flow alterations, other habitat alterations, nutrients, siltation, and thermal modifications. The source of impairments was not available. Information on fisheries resource values of major rivers, municipal water sheds and surface supplies of potable water is not available for Idaho.

CLASS I AND II STREAMS

This classification system does not exist in Idaho.

MUNICIPAL WATERSHEDS

There are no designated municipal watersheds in Idaho.

SURFACE SUPPLIES OF POTABLE WATER

There are no known surface supplies of potable water in the study area (IDEQ 2008).

5.0 IMPACT METHODS

5.1 METHODS

A step in the process of selecting an environmentally preferred route for the project is determining initial and residual impact levels from each alternative route link. Potential effects on water resources were initially evaluated in the regional study and associated sensitivity analysis completed in November 2006 (See MFSA application, Volume IV). Many sensitive features were avoided through the regional study but it was not possible for every alternative route link to avoid all of them, including water resources. Consequently, it was necessary to map all known water resources within the 2-mile-wide study corridors of the alternative route links and prepare an impact assessment and mitigation planning procedure.

Impacts to water resources inventoried in Section 4.0 were evaluated considering the following factors:

1. Construction, operation, and maintenance related impacts
2. Occurrence of affected water resource areas
3. Water resource sensitivity levels
4. Access level category (level of impact expected from ground disturbance)
5. Mitigation measures to reduce initial impact levels

5.2 IMPACT MODEL

The impact assessment model combines resource sensitivity and access levels. The combination of these assessment variables determined the level of impact (high, moderate, low). The results of the impact assessment are presented in detail in the data tables in this section.

Once initial impacts levels were established along the route links, specific measures for mitigating or reducing predicted high or moderate impacts were applied. The "residual impact" represents the impacts remaining after applying the mitigation measures.

In order to determine impact intensity, an "impact model" was developed for water resources and is described below.

5.2.1 RESOURCE SENSITIVITY

Sensitivity is the measure of the probable adverse response that a use or resource would have to direct and indirect impacts associated with construction, operation, and maintenance of the proposed 500kV transmission line. The adverse effects to water resources were assessed using three major criteria: the susceptibility of the use or resource to the potential changes caused by construction and operation activities and the significance of the potential changes on the use or resource.

5.2.1.1 Determination of Potential Change

Changes are brought about by acquisition of land or easements to accommodate the facilities; installing the facilities; the physical presence and operation of the facilities; and managing the ROW and maintaining the facilities. This potential for change is predicted evaluating the environmental conditions, the project description, and implementation specifications.

5.2.1.2 Significance of the Changes

The effect of potential changes on resources is described in levels of significance. The significance of any change relates to the immediate and long-term effects that the change may have, either directly or indirectly on the resource. With these considerations in mind, a value of high, moderate, or low was assigned to water resources to represent the potential level of significance. A high sensitivity level was assigned to lands with occurrences of perennial rivers and streams; hydric and partially hydric soils; PSS wetlands; R2 and R3 wetlands; and riparian shrub and tree. A moderate sensitivity was assigned to floodplains (Zone A); PAB, PEM, PUS, and R4 wetlands; marsh; mud flats; and intermittent rivers/streams. A low sensitivity was assigned to PUB wetlands and lands not associated with a water resource feature or indicator. The sensitivity level is based on the function and value of the water resource and the level of impacts to that resource. For example, PSS wetlands are designated a high sensitivity level because they provide a high functional value and would be permanently impacted by clearing and ROW maintenance and filling for access road construction.

5.2.2 Access Levels and Ground Disturbance

Level 1 *Existing Improved Roads*: Previously disturbed. Roads generally are in good condition but may require small improvements at stream crossings, steep slope areas, and other locations. New ground disturbance would be minimal. New spur roads would be required to access each structure site; an average of 300 feet of new spur road for each structure. Spur roads would disturb approximately 0.4 acres per mile of transmission line.

Level 2 *Roads that Require Improvement*: Previously disturbed. Existing two-track or narrow unimproved roads would require improvement to make roads serviceable (e.g. mowing, grading) for construction. Low ground disturbance; assumed approximately 0.5 to 1.0 miles of road improvements for each mile of transmission line. Road improvements would disturb approximately 0.75 to 1.0 acres per mile of transmission line. An average of 300 feet of spur roads would be required to access each structure site. Spur roads would disturb about 0.4 acres per mile of transmission line.

Level 3 *Construct Road in Flat Terrain (0 to 8 percent)*: Low to moderate ground disturbance for new access road construction; assumed approximately 1.0 to 1.2 miles of new roads would be required for each mile of transmission line. Road construction would disturb approximately 1.7 to 2.0 acres per mile of transmission line.

Level 4 *Construct Road in Sloping Terrain (8 to 15 percent)*: Moderate ground disturbance for new access road construction; assumed 1.2 to 1.5 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 2.0 to 2.5 acres per mile of transmission line.

Level 5 *Construct Road in Steep Terrain (15 to 30 percent):* Moderate to high ground disturbance for new access road construction; assumed approximately 1.5 to 2.0 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 2.5 to 3.4 acres per mile of transmission line.

Level 6 *Construct Road in Very Steep Terrain (over 30 percent):* High to very high ground disturbance for new access road construction; assumed approximately 2.0 to 3.0 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 3.4 to 5.0 acres per mile of transmission line.

5.2.3 IMPACT LEVELS

Access level categories and resource sensitivity levels (described above) were the main factors used in estimating potential impact levels for water resources. The impact levels are defined as follows:

High – A high level of impact would result if the construction, operation, maintenance or abandonment of the proposed project would potentially cause a significant or substantial adverse change or stress to water resources such as violation of water quality standards, substantial degradation of water quality, substantial alteration of drainage patterns, substantial loss and degradation of wetlands, and redirection or impediment of flood flows.

Moderate – A moderate impact would result if the construction, operation, maintenance or abandonment of the proposed project would potentially cause some adverse change or stress (ranging between significant and insignificant) to water resources.

Low – A low impact would result if the construction, operation, maintenance or abandonment of the proposed project would potentially cause an insignificant or minor adverse change or stress to water resources.

No Identifiable Impact – No identifiable impact would be indicated where no measurable impact would occur to the specific resource under investigation.

5.2.4 SPECIFICALLY RECOMMENDED MITIGATION MEASURES

The Environmental Protection Measures described in this document are preliminary measures that are part of the project description, but are not finalized or committed to until further discussions with the MDEQ are conducted. Likewise, the Specifically Recommended Mitigation Measures are preliminary, and not committed to by NorthWestern, until discussions are held on this subject with the MDEQ.

The Environmental Protection Measures described below would be used generally throughout the project. Specifically recommended mitigation measures described below and indicated in Table 5.2-1 would be used on a site-specific basis to minimize impacts to water resources.

5.2.4.1 Environmental Protection Measures

- All construction vehicle movement outside the right of way normally will be restricted to pre-designated access, contractor-acquired access, or public roads.
- The areal limits of construction activities normally will be predetermined, with activity restricted to and confined within those limits.
- In construction areas where recontouring is not required, vegetation will be left in place wherever possible and original contour will be maintained to avoid excessive root damage and allow for resprouting. Disturbance would be limited to overland driving where feasible to minimize changes in the original contours.
- To reduce visual contrast and reduce siltation in construction areas (e.g., marshaling yards, structure sites, spur roads from existing access roads) where ground disturbance is substantial, surface preparation and reseeding would occur. The method of restoration would normally consist of loosening the soil surface, reseeding, installing cross drains for erosion control, placing water bars in the road, and filling ditches. Methods would be detailed in the Plan of Development (POD).
- A POD including specific plans to address mitigation requirements would be prepared in consultation with the Agencies prior to construction being authorized. These plans would detail additional measures required to minimize potential proposed project impacts on natural resources and human safety. Plans typically include reclamation and revegetation of the ROW, resource protection, noxious weed control, dust control, hazardous spill prevention, fire prevention and storm water pollution prevention.
- The POD would outline any required monitoring guidelines for the construction, operation, and maintenance of the line in order to avoid inadvertent impacts to resources. The Agencies would appoint an authorized inspector to oversee construction activities, authorize revisions or changes in the field, and determine if environmental protection is being done according to the approved POD. NorthWestern Energy would conduct a training program to inform construction crews of all permit requirements and restrictions relevant to Proposed Project construction.
- Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural, paleontological and ecological resources. To assist in this effort, the construction contract will address: (a) Federal, state and tribal laws regarding antiquities, fossils, plants and wildlife, including collection and removal; (b) the importance of these resources and the purpose and necessity of protecting them.
- All waste products and food garbage from construction sites would be deposited in covered waste receptacle, or removed daily. Garbage would be hauled to a suitable disposal facility.

5.2.4.2 Soil and Water Resource Environmental Protection Measures

- Roads will be built at right angles to the streams to the extent practicable. Existing public roads will be utilized to the extent possible. Culverts will be installed where needed. All construction and maintenance activities will be conducted in a manner that will minimize disturbance to vegetation, drainage channels and streambanks. In addition, road construction will include dust-control measures during construction in sensitive areas, as required. All existing roads will be left in a condition equal to the condition prior to the construction of the transmission line.

- Disturbed areas around structures, at pulling and tensioning sites, and on the edges of roadways will be rehabilitated following construction (as specified by the Agencies and the Authorized Officer)
- Structures located within river floodplains would be designed to minimize the catching of flood debris to prevent flow obstructions and scouring during flood flows.

5.2.4.3 Specifically Recommended Mitigation Measures

1. In areas of sensitive features to avoid disturbance, access roads will not be constructed. Rather, construction and maintenance traffic will use existing roads or cross-country access routes (including the right of way). To minimize ground disturbance, construction traffic routes must be clearly marked with temporary markers such as easily visible flagging. An authorized officer must approve the construction routes or other means of avoidance in advance of use.

2. To minimize ground disturbance and/or reduce scarring (visual contrast) of the landscape, the alignment of any new access roads or cross-country route will follow the landform contours in designated areas where practicable, providing that such alignment does not impact resource values additionally.

3. To limit new or improved accessibility into the area, all new access undesired or not required for maintenance will be closed using the most effective and least environmentally damaging methods appropriate to that area with concurrence of the landowner or land manager.

4. To minimize ground disturbance, operational conflicts and/or visual contrast, the tower design will be modified or an alternative tower type will be used.

5. To minimize sensitive feature disturbance in designated areas structures will be placed so as to avoid sensitive features such as, but not limited to, riparian areas, water courses and cultural sites and/or to allow conductors to clearly span the features, within limits of standard tower design.

6. Existing landscape features would be utilized to span the conductor over riparian scrub-shrub wetlands to avoid cutting woody vegetation.

The criteria for assessing the initial ground disturbance impacts to water resources, the specifically recommended mitigation measures, and residual impacts are summarized in Table 5.2-1.

Table 5.2-1 Impact Assessment Criteria

Water Resource Description	Resource Sensitivity	Access Level Category Initial/Residual Impact						Specifically Recommended Mitigation Measures
		1	2	3	4	5	6	
FEMA Zone A	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5
FEMA Zone X	None							
All Hydric soil	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 2, 4, 5
Partially Hydric soil	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 2, 4, 5
Not Hydric soil	None							
PAB	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5
PEM	Moderate	L/NI	L/NI	M/L	M/L	M/M	M/M	1, 5
PSS	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 5, 6
PUB	Low	NI/NI	NI/NI	L/L	L/L	M/L	M/L	1, 5
PUS	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5
R2	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 5, 6
R3	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 5, 6
R4	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5, 6
Marsh	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5
Mud Flat	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5
Riparian Shrub	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 5, 6
Riparian Tree	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 5, 6
Perennial river/stream	High	L/NI	L/NI	M/L	M/L	H/M	H/M	1, 5
Intermittent river/stream	Moderate	L/NI	L/NI	M/L	M/L	M/L	M/L	1, 5

NI – No impact, L – Low, M – Medium, H - High

6.0 IMPACT RESULTS

The impacts to water resources as a result of construction of the 500kV transmission line are summarized below. Impact levels are provided by link number in the impact tables in this section.

6.1 TYPES OF IMPACT

6.1.1 CONSTRUCTION RELATED IMPACTS

6.1.1.1 Alteration of Drainage Patterns

Direct, temporary impacts to existing drainage patterns may result from construction of the permanent access roads used during construction to access the transmission line right-of-way. Minor drainage diversions are expected as a result of grading. Stream and river courses would not be altered. New permanent access roads would be required in a number of areas and would be surfaced with pervious material such as gravel. Therefore, the volume and rate of storm water runoff is not expected to increase substantially from pre-construction levels in a manner that would result in off-site erosion and flooding. Runoff is not expected to exceed the capacity of existing or planned storm water drainage systems.

In addition to compliance with regional and state regulation, preliminary environmental protection measures and site-specific mitigation measures 1, 3, 4, and 5 would minimize impacts to less than significant levels.

6.1.1.2 Water Quality Degradation Caused by Storm Water Runoff

Indirect, short-term impacts to water quality could result from storm water runoff during construction of the 500kV transmission line. Overhead transmission line construction requires ground disturbing activities including clearing and grading for structure installation, work areas, and access road construction as described in Chapter 2, Volume I of the MFSA application. Disturbed soils accelerate erosion and increase sediment in storm water runoff to receiving waters causing increased turbidity and channel sedimentation.

In compliance with the CWA, NWE would obtain a NPDES construction general permit for storm water runoff associated with construction activities disturbing one or more acres of soil from Montana and Idaho. The permit requires the development and implementation of a SWPPP to protect receiving waters from storm water runoff during and after construction. NWE would implement BMPs including stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment.

NWE would also obtain a Section 401 water quality certification from IDEQ and MDEQ for Section 404 permit activities to certify the discharge complies with state water quality standards.

In addition to compliance with federal and state regulation, implementation of environmental protection measures and site-specific mitigation measures 1, 2, and 5 would minimize impacts to less than significant levels.

6.1.1.3 Water Quality Degradation Caused by Accidental Spills

Indirect, short-term impacts to water quality could result from accidental spills and leaks of petroleum, oil, and lubricants (POL) from equipment and vehicles used during construction of the 500kV transmission line.

Environmental protection measures would minimize potential residual impacts to less than significant levels.

6.1.1.4 Degradation and Loss of Waters of the U.S. (including wetlands)

Direct, permanent impacts to waters of the U.S. could result from the installation of tower and pole structure foundations. Each structure requires a permanent amount of land: guyed V structure requires 0.52 acre (22,500 square feet); each steel lattice structure requires 0.05 acre (2,500 square feet); and each steel tubular structure requires 0.002 acre (100 square feet). This may cause a permanent loss of waters of the U.S. from the discharge of fill material.

Direct, temporary impacts to waters of the U.S. could result from the construction of new permanent access roads needed to access the right-of-way during construction of the transmission line. Road construction may require grading and filling of wetlands and temporary bridge crossings of streams.

Direct, permanent impacts to PSS wetlands could result from vegetation clearing for construction of the transmission line right-of-way. Conversion of a PSS wetland to a PEM wetland is considered a permanent impact to wetland functions and values.

Direct, short to long term impacts to wetland vegetation, hydrology, and soils could result from temporary work areas associated with construction of the transmission line. Work areas would be cleared to some extent for the safe operation of construction equipment which would adversely impact wetland vegetation. Operation of heavy equipment has the potential to cause saoil compaction and rutting, which could in turn alter wetland hydrology.

In compliance with the federal CWA, NWE would obtain a 404 permit from the USACE for any permanent loss of waters of the U.S. as a result of the proposed project. As part of the permitting, NWE would be required to conduct a jurisdictional wetlands delineation of the affected project area and submit to either the USACE Helena field office or Boise field office (depending on the wetland location) for verification and approval. The delineation would provide surveyed locations of jurisdictional wetlands and waters of the U.S. for identifying the exact locations and areas of impact.

NWE would also obtain a Navigable Waterway Permit from the USACE Helena District for a transmission line span of the Missouri River.

Environmental protection measures would minimize potential residual impacts to less than significant levels.

6.1.1.5 Alteration of Floodplains

As required by final engineering design, transmission line structures could be placed within the 100-year floodplains and other drainages. These structures would potentially impede or redirect flood flows or raise the flood elevation. Any structures placed in a floodplain would be placed so it does not impede or redirect flood flows or raise the flood elevation.

NWE would comply with regional and federal regulations and implement the following environmental protection measures to minimize impacts to less than significant levels.

- Structures located within river floodplains would be designed to minimize the catching of flood debris to prevent flow obstructions and scouring during flood flows.

MONTANA

The following counties require permits for work within the floodplain: Beaverhead, Madison, Silver Bow, Jefferson, Broadwater, and Gallatin. NWE would submit the appropriate permit application and fee.

IDAHO

The following counties require permits for work within the floodplain: Bonneville and Blaine. NWE would submit the appropriate permit application and fee.

6.1.2 OPERATION AND MAINTENANCE RELATED IMPACTS

6.1.2.1 Degradation and Loss of Waters of the U.S. (including wetlands)

Direct, permanent impacts to PSS wetlands could result from maintenance of the transmission line right-of-way. Clearing of woody vegetation may be required to create adequate electrical clearance between the conductor and tops of vegetation. Conversion of a PSS wetland to a PEM wetland is considered a permanent impact to wetland functions and values.

In compliance with the federal CWA, NWE would obtain a 404 permit from the USACE for any permanent loss of waters of the U.S. as a result of the proposed project. As part of the permitting, NWE would be required to conduct a jurisdictional wetlands delineation of the affected project area and submit to either the USACE Helena field office or Boise field office (depending on the wetland location) for verification and approval. The delineation would provide surveyed locations of jurisdictional wetlands and waters of the U.S. for identifying the exact locations and areas of impact.

In addition to compliance with federal regulations, site specific mitigation measure 10 would minimize impacts to less than significant levels.

6.2 INITIAL IMPACTS

6.2.1 SURFACE WATER, WETLANDS, AND FLOODPLAINS

A summary of initial water resources impacts by state and route link are shown in Tables 6.2-1 and 6.2-2 below. All but three links have the potential for impacts to water resources.

6.2.1.1 Montana

All links in Montana except 3-2 and 4-4 cross water resources, either perennial or intermittent rivers and streams, canals/ditches, riverine and palustrine wetlands, or floodplains as shown in Table 4.3-1. As shown in Table 6.2-1 below, Link 4.2 would have the greatest total miles and highest level of initial impacts with 8.9 miles of low impacts, 5.8 miles of moderate impacts, and 9.3 miles of high impacts for a total of 24.0 miles of initial impacts. The links with the next greatest initial impact totals are 18-1 (17.0 miles), 8 (11.1 miles), 11-23 (11.0 miles), and 16-2 (10.6 miles). All other links have total initial impacts of 8.3 miles or less.

6.2.1.2 Idaho

All links in Idaho except Link 31, cross water resources, either perennial or intermittent rivers and streams, canals/ditches, riverine and palustrine wetlands, or floodplains as shown in Table 4.3-2 Inventory of Water Resources by Link in Idaho found in section 3.7.4.3. As shown in Table 6.2-2 below, Link 25-4 would have the greatest total miles of initial impacts with 11.1 miles of low impacts, 0.9 miles of moderate impacts, and 0 miles of high impacts for a total of 12.0 miles of initial impacts. The links with the next greatest total initial impacts are 21 (10.9 miles), 25-2 (9.4 miles), and 26-4 (8.8 miles). All other links have total initial impacts of 5.1 miles or less. Although Link 25-3 has only 4.6 miles of total impacts, this link has the greatest miles of high impacts at 1.1 miles.

Table 6.2-1 Summary of Initial Water Resource Impacts by Link for Montana

	INITIAL IMPACTS (Miles)				
Link	No Impact	Low	Moderate	High	Total Impacts
1	2.9	1.4	1.7	0	3.1
2-1	21.6	1.6	3.4	0	5.0
2-2	16.9	1.5	2.0	0.2	3.7
2-3	17.0	1.8	1.6	0.1	3.5
3-1	24.9	2.2	5.2	0	7.4
3-2	0.2	0	0	0	0
4-1	10.8	0.8	2.0	0	2.8
4-2	35.5	8.9	5.8	9.3	24.0
4-3	23.2	1.8	5.4	0.6	7.8
4-4	0.1	0	0	0	0
7-1	8.6	2.2	1.3	0	3.5
7-2	8.2	2.6	1.4	0	4.0
7-3	7.3	1.6	0.4	0.4	2.4
7-41	6.2	1.8	0.2	0.2	2.2
7-42	1.8	0.5	0.2	0.5	1.2
7-43	2.0	0.3	0.4	0	0.7
7-5	1.5	0.1	0.2	0	0.3
7-61	11.9	3.0	0.8	0.3	4.1
7-62	0.4	0	0	0	0
7-63	3.0	1.1	2.5	0	3.6
7-71	1.5	0.5	0.1	0.1	0.7
7-72	2.5	0.7	0.3	0.2	1.2
7-8	8.1	0.4	2.3	0.3	3.0
7-9	1.5	0.7	0.9	0.1	1.7
8	39.2	4.9	5.6	0.6	11.1
11-21	1.9	1.2	0.1	0	1.3
11-22	6.2	2.0	0.4	0.3	2.7
11-23	10.9	6.1	4.6	0.3	11.0
11-3	13.6	4.7	3.0	0.3	8.0
11-4	16.4	5.9	0.3	0.2	6.4
13	4.2	0.5	0.2	0	0.7
16-1	21.7	3.5	4.0	0.6	8.1
16-2	18.7	2.6	7.8	0.2	10.6
16-3	22.3	1.5	6.8	0	8.3
16-4	5.1	1.7	1.4	0.5	3.6
18-1	47.2	13.4	3.1	0.5	17.0

Table 6.2-2 Summary of Initial Water Resource Impacts by Link for Idaho

	INITIAL IMPACTS (Miles)				
Link	No Impact	Low	Moderate	High	Total Impacts
18-2	23.3	3.0	0.7	0.1	3.8
20	14.9	3.4	1.2	0.6	5.2
21	80.8	8.4	2.5	0	10.9
22	22.6	1.7	0.9	0.2	2.8
23	25.9	3.1	0.1	0	3.2
24	26.4	2.0	0	0	2.0
25-11	23.4	1.5	1.0	0	2.5
25-12	35.2	2.0	2.2	0.4	4.6
25-2	10.3	3.1	6.8	0.3	9.4
25-3	23.0	2.3	1.2	1.1	4.6
25-4	21.7	11.1	0.9	0	12.0
26-1	15.6	1.1	0	0	1.1
26-2	24.1	3.2	0.5	0	3.7
26-3	37.7	0.1	0.4	0	0.5
26-4	38.3	2.2	6.6	0	8.8
27	0	0.4	0	0	0.4
28	1.9	0.1	0	0	0.1
29	31.8	1.5	1.1	0	2.6
30	15.8	0	0.5	0	0.5
31	24.4	0	0	0	0

6.2.2 WATER QUALITY

The summary of water quality impairments by link are shown in Tables A-1 and A-2 in Appendix A.

6.2.2.1 Montana

The following rivers are 303(d) listed: the Missouri River (Links 1, 2-1), Boulder River (Links 2-2, 2-3, 3-1, 4-3), Big Hole River (Links 8, 11-22), Beaverhead River (Link 16-1) and Red Rock River (Links 16-1, 16-3). Many perennial streams throughout the project have impairments.

The Missouri, Boulder, and Red Rock rivers and numerous perennial streams are 303(d) listed as sediment impaired water bodies. Additional discharges of sediment from construction of the 500kV transmission line would contribute to the exceedance of the water quality standard for sediment.

TOWNSEND SUBSTATION. The proposed Townsend Substation would cause approximately 52 acres of ground disturbance. The site currently is being used as pasture land. 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 fromthe proposed site and could receive storm water runoff from the site during construction. NWE

would obtain a NPDES construction general permit for storm water runoff associated with construction activities disturbing one or more acres of soil. The permit requires the development and implementation of a SWPPP to protect receiving waters from storm water runoff during and after construction. NWE would implement BMPs including stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment.

Substation operation and maintenance may adversely impact surface waters from accidental spills from oil-filled electrical equipment. Oil will 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, NWE would prepare a Spill Prevention, Countermeasure and Control (SPCC) plan for the substation to comply with EPA's Oil Pollution Prevention regulation (40CFR Part 112). A 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 will minimize the potential for accidental oil spills and contamination of receiving waters.

MILL CREEK SUBSTATION. Since the existing Mill Creek Substation site is located in an arid landscape with no water resources associated with this site, the same permitting for the new facility would apply as described for the Townsend Substation.

6.2.2.2 Idaho

The following rivers are 303(d) listed: the Big Lost River (Links 24, 25-11, 25-12, 29) and the Little Wood River (Links 25-2, 25-4). Many perennial streams throughout the project have impairments.

The Big Lost and Little Wood Rivers and numerous perennial streams are 303(d) listed as sediment impaired water bodies. Additional discharges of sediment from construction of the 500kV transmission line would contribute to the exceedance of the water quality standard for sediment.

MIDPOINT SUBSTATION. The proposed modifications to the substation cannot be completed in the existing fenced area; expansion of the substation yard 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. The same permitting would apply as described for the Townsend substation.

6.3 RESIDUAL IMPACTS

Compliance with federal, state, and local regulations and implementation of environmental protection measures and site specific mitigation measures described in Chapter 2 would reduce initial impacts to no impact, low, and moderate levels as shown below in Table 6.4-8 for Montana and Table 6.4-9 for Idaho.

6.3.1 MONTANA

As shown in the following table, the link with the greatest impact in miles is 4-2 at 15.1 total miles, with 9.3 miles of moderate impacts and 5.8 of low impacts. The link with the next greatest impact in

miles is 16-2 at 8.1 miles, followed by Links 16-3 (6.8 miles), 8 (6.2 miles), 4-3 (6.0 miles), and 3-1 (5.2 miles). All other links have total miles of impacts of 4.9 miles or less.

Table 6.3-1 Summary of Residual Impacts by Link for Montana

	RESIDUAL IMPACTS (Miles)				
Link	No Impact	Low	Moderate	High	Total Impacts
1	4.3	2.8	0	0	2.8
2-1	21.7	4.1	0	0	4.1
2-2	18.4	2.0	0.2	0	2.2
2-3	18.8	1.6	0.1	0	1.7
3-1	27.1	5.2	0	0	5.2
3-2	0.2	0	0	0	0
4-1	11.5	2.0	0	0	2.0
4-2	48.9	5.8	9.3	0	15.1
4-3	24.9	5.4	0.6	0	6.0
4-4	0.1	0	0	0	0
7-1	10.8	1.3	0	0	1.3
7-2	10.8	1.4	0	0	1.4
7-3	8.9	0.4	0.4	0	0.8
7-41	8.0	0.2	0.2	0	0.4
7-42	2.3	0.2	0.5	0	0.7
7-43	2.3	0.4	0	0	0.4
7-5	1.6	0.2	0	0	0.2
7-61	14.9	0.8	0.3	0	1.1
7-62	0.5	0	0	0	0
7-63	4.1	2.5	0	0	2.5
7-71	2.0	0.1	0.1	0	0.2
7-72	3.3	0.3	0.2	0	0.5
7-8	8.5	2.3	0.3	0	2.6
7-9	2.2	0.9	0.1	0	1.0
8	44.1	5.6	0.6	0	6.2
11-21	3.2	0.1	0	0	0.1
11-22	8.3	0.4	0.3	0	0.7
11-23	17.0	4.6	0.3	0	4.9
11-3	15.9	3.0	0.3	0	3.3
11-4	22.3	0.3	0.2	0	0.5
13	4.7	0.2	0	0	0.2
16-1	25.5	4.0	0.6	0	4.6
16-2	21.2	7.8	0.3	0	8.1
16-3	23.8	6.8	0	0	6.8
16-4	6.8	0.7	1.2	0	1.9
18-1	60.6	3.1	0.5	0	3.6

6.3.2 IDAHO

As shown in the following table, the link with the greatest impact in miles is Link 25-2 at 7.1 total miles, with 0.3 miles of moderate impacts and 6.8 miles of low impacts. The link with the next greatest impact in miles is Link 26-4 at 6.6 miles, followed by Links 25-12 (2.6 miles), 21 (2.5 miles), and 25-3 (2.3 miles). All other links have total miles of impacts of 1.8 miles or less.

Table 6.3-2 Summary of Residual Impacts by Link for Idaho

	RESIDUAL IMPACTS (Miles)				
Link	No Impact	Low	Moderate	High	Total Impacts
18-2	26.2	0.7	0.1	0	0.8
20	18.2	1.2	0.6	0	1.8
21	86.9	2.5	0	0	2.5
22	24.2	0.9	0.2	0	1.1
23	28.9	0.1	0	0	0.1
24	28.4	0	0	0	0
25-11	24.9	1.0	0	0	1.0
25-12	37.2	2.2	0.4	0	2.6
25-2	13.4	6.8	0.3	0	7.1
25-3	20.0	1.2	1.1	0	2.3
25-4	32.8	0.9	0	0	0.9
26-1	16.7	0	0	0	0
26-2	27.3	0.5	0	0	0.5
26-3	37.8	0.4	0	0	0.4
26-4	40.5	6.6	0	0	6.6
27	0.4	0	0	0	0
28	1.9	0.1	0	0	0.1
29	33.3	1.1	0	0	1.1
30	15.8	0.5	0	0	0.5
31	24.4	0	0	0	0

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APPENDIX A

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
1 2-1	Missouri River (Totson Dam to Canyon Ferry Reservoir)	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Industrial	▪ Cadmium ▪ Copper ▪ Lead ▪ Alteration in streamside or littoral vegetative covers ▪ Siltation ▪ Low flow alterations	▪ Abandoned mining ▪ Agriculture ▪ Crop production
2-1	Broadwater Missouri Canal	NA	NA	NA
2-1	Dry Creek	NA	NA	NA
2-1	Sixmile Creek	NA	NA	NA
2-1	Big Springs Ditch	NA	NA	NA
2-1	Toston Canal	NA	NA	NA
2-3	Mud Spring Gulch	NA	NA	NA
2-3	Milligan Creek	NA	NA	NA
2-3 3-1	Boulder River (Cottonwood Creek to mouth – Jefferson River)	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Alteration in streamside or littoral vegetative covers ▪ Arsenic ▪ Cadmium ▪ Copper ▪ Lead ▪ Low flow alterations ▪ Siltation ▪ Water temperature ▪ Zinc	▪ Forest roads ▪ Grazing in riparian zone ▪ New construction ▪ Abandoned mines ▪ Mill tailings ▪ Acid mine drainage ▪ Regulation/modification ▪ Irrigated crop production
3-1 4-1	Crow Creek	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Industrial ▪ Primary contact recreation	▪ Flow alteration ▪ Nutrients ▪ Other habitat alterations ▪ Siltation	▪ Agriculture ▪ Crop-related sources ▪ Grazing-related sources ▪ Habitat modification (other than hydromodification)
3-1	Swamp Creek	NA	NA	NA

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
4-2	Elkhorn Creek	NA	NA	NA
4-2	McCarty Creek	NA	NA	NA
4-2	Sloan Gulch	NA	NA	NA
4-2	Muskrat Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water	▪ Alteration in stream side or littoral vegetative covers ▪ Copper ▪ Lead	▪ Abandoned mines ▪ Rangeland grazing
4-2	Wood Creek	NA	NA	NA
4-2	High Ore Creek	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Industrial	▪ Alteration in stream side or littoral vegetative covers ▪ Arsenic ▪ Cadmium ▪ Copper ▪ Lead ▪ Mercury ▪ Sedimentation/ siltation ▪ Water temperature ▪ Total suspended solids ▪ Zinc	▪ Channel-ization ▪ Forest roads ▪ Highway, roads, bridges ▪ Abandoned mines ▪ Loss of riparian habitat ▪ Silviculture activies ▪ Acid mine drainage ▪ Contaminate d sediments ▪ Mine tailings ▪ Rangeland grazing
4-2	Bishop Creek	NA	NA	NA
4-2	Big Limber Gulch	▪ Drinking water	▪ Lead ▪ Mercury	▪ Acid mine drainage ▪ Abandoned mine lands
4-2	Cataract Creek	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Drinking water	▪ Arsenic ▪ Cadmium ▪ Copper ▪ Lead ▪ Mercury ▪ Nitrogen/nitrate ▪ Sedimentation/ Siltation	▪ Acid mine drainage ▪ Forest roads ▪ Contaminate d sediments ▪ Abandoned mines ▪ Mine tailings

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
4-2	Cataract Creek *(cont.)*		▪ Zinc	▪ Rangeland grazing ▪ Silviculture activities and harvesting ▪ Loss of rip. habitat
4-2	Deer Creek	NA	NA	NA
4-2	Basin Creek	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Drinking water	▪ Alteration in stream side or littoral vegetative covers ▪ Arsenic ▪ Copper ▪ Lead ▪ Mercury ▪ Sedimentation/ Siltation ▪ Zinc	▪ Forest roads ▪ Abandoned mines ▪ Loss of riparian habitat ▪ Rangeland grazing ▪ Silviculture activities and harvesting ▪ Acid mine drainage ▪ Contaminate d sediments ▪ Mine tailings
4-2	East Fork Red Rock Creek	NA	NA	NA
4-2	Red Rock Creek	▪ Aquatic life ▪ Cold water fishery	▪ Alteration in stream side or littoral vegetative covers ▪ Turbidity	▪ Agriculture ▪ Grazing in riparian zones ▪ Loss of riparian habitat
4-2	Torpy Gulch	NA	NA	NA
4-2	Alta Gulch	NA	NA	NA
4-2	Finn Gulch	NA	NA	NA
4-2	Boyle Gulch	NA	NA	NA
4-2	Thunderbolt Creek	NA	NA	NA
4-2	Trapper Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Alteration in stream side or littoral vegetative covers ▪ Copper ▪ Lead ▪ Low flow alterations	▪ Channel-ization ▪ Highway, road, bridges ▪ Mine tailings ▪ Unspecified

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
4-2	Trapper Creek (*cont.*)		▪ Physical substrate habitat alterations ▪ Sedimentation/ Siltation ▪ Zinc	unpaved road or trail ▪ Acid mine drainage ▪ Abandoned mines ▪ Impacts from hydro-Structure ▪ Irrigated crop production
4-2	Little Cottonwood Creek	NA	NA	NA
4-2	Rock Creek	NA	NA	NA
4-2	Indian Creek	NA	NA	NA
4-2	Dieders Fork	NA	NA	NA
4-2	Orfino Creek	NA	NA	NA
4-2	North Fork Cottonwood Creek	NA	NA	NA
4-2	South Fork Cottonwood Creek	NA	NA	NA
4-2	Perkins Gulch	NA	NA	NA
4-2	Girard Creek	NA	NA	NA
4-2	Whitcraft Gulch	NA	NA	NA
4-2 7-6 7-72	Silver Bow Creek	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Industrial ▪ Primary contact recreation ▪ Warm water fishery	▪ Aluminum ▪ Arsenic ▪ Copper ▪ Iron ▪ Lead ▪ Manganese ▪ Nitrates ▪ Physical substrate ▪ Alterations ▪ Sedimentation/ siltation ▪ Zinc ▪ Silver	▪ Abandoned mine lands ▪ Site clearance ▪ Loss of riparian habitat
4-2	Mill Creek	▪ Aquatic life ▪ Cold water fishery	▪ Alteration in stream-side or littoral	▪ Abandoned Mine Lands

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
7-61 7-9		▪ Primary contact recreation	vegetative covers ▪ Low flow alterations ▪ Phosphorus (Total) ▪ Sedimentation/ siltation ▪ Temperature, water ▪ Total Kjehldahl Nitrogen (TKN)	▪ Grazing in Riparian or Shoreline Zones ▪ Irrigated Crop Production ▪ Unspecified Unpaved Road or Trail
4-2	Mill-Willow Bypass canal	NA	NA	NA
7-2	Whitetail Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Dewatering ▪ Flow alteration ▪ Other habitat alterations ▪ Riparian degradation ▪ Siltation	▪ Agriculture ▪ Crop-related sources ▪ Flow regulation/modification ▪ Grazing-related sources ▪ Hydromodification
7-41	Homestake Creek	NA	NA	NA
7-41 8	Big Pipestone Creek	▪ Aquatic life ▪ Cold water fishery ▪ Industrial ▪ Primary contact recreation	▪ Alteration in stream-side littoral vegetative covers ▪ Phosphorus (total) ▪ Nitrogen ▪ Physical substrate habitat ▪ Total suspended solids ▪ Water temperature	▪ Loss of riparian habitat ▪ Agricultural use ▪ Dam or impoundment ▪ Irrigated crop production ▪ Grazing in riparian zones ▪ Highway/road/ bridge construction ▪ Streambank modifications ▪ Municipal point source discharges ▪ Sediment resuspension ▪ Channelization

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
7-5	Blacktail Creek	NA	NA	NA
7-61 7-8	Basin Creek	NA	NA	NA
7-61	Sand Creek	NA	NA	NA
7-61	Grove Gulch	NA	NA	NA
7-72 11-21	Gregson Creek	NA	NA	NA
7-8	Left Fork Basin Creek	NA	NA	NA
7-8	Muddy Creek	NA	NA	NA
7-9	Willow Creek	▪ Aquatic life ▪ Primary contact recreation	▪ Flow alteration ▪ Metals ▪ Thermal modifications ▪ Zinc	▪ Abandoned mining ▪ Acid mine drainage ▪ Agriculture ▪ Crop-related sources ▪ Hydromodification ▪ Resource extraction
8	Pipestone Ditch	NA	NA	NA
8	Little Pipestone Creek	▪ Aquatic life ▪ Cold water fishery	▪ Bank erosion ▪ Other habitat alterations ▪ Riparian degradation ▪ Siltation	▪ Agriculture ▪ Channelization ▪ Grazing-related Sources ▪ Hydromodification
8	Fish Creek	▪ Drinking water	▪ Cadmium ▪ Metals	▪ Abandoned mining ▪ Acid mine drainage ▪ Resource extraction

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
8 11-3 11-4	Cherry Creek	NA	NA	NA
8	Little Cherry Creek	NA	NA	NA
8	Hells Canyon Creek	▪ Agriculture ▪ Aquatic life ▪ Cold water fishery ▪ Primary contact recreation	▪ Dewatering ▪ Fish habitat degradation ▪ Flow alteration ▪ Other habitat alterations ▪ Riparian degradation ▪ Siltation	▪ Agriculture ▪ Crop-related sources ▪ Grazing-related sources ▪ Highway/road/ bridge Construction ▪ Hydromodification ▪ Silviculture
8	Cottonwood Creek	▪ Aquatic life support ▪ Cold water fishery	▪ Dewatering ▪ Flow alteration ▪ Other habitat alterations ▪ Riparian degradation ▪ Siltation	▪ Agriculture ▪ Crop-related sources ▪ Grazing-related sources ▪ Highway maintenance and runoff ▪ Unpaved road runoff
8	Rochester Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water	▪ Arsenic ▪ Copper ▪ Lead ▪ Mercury ▪ Physical substrate habitat ▪ Sedimentation/ siltation	▪ Abandoned Mine Lands ▪ Grazing in riparian or shoreline zones
8	Nez Perce Creek	NA	NA	NA
8	Larson-Narangich Ditch	NA	NA	NA

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
8 11-23	Big Hole River	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Cadmium ▪ Copper ▪ Lead ▪ Low flow alterations ▪ Physical substrate habitat ▪ Temperature, water ▪ Zinc	▪ Acid mine drainage ▪ Abandoned mine lands ▪ Dam construction ▪ Grazing in riparian or shoreline zones ▪ Habitat modification ▪ Hydromodification ▪ Highway, roads, bridges, infrastructure ▪ Irrigated crop production ▪ Streambank modifications/ destabilization
8	Cocanough-er Ditch	NA	NA	NA
8	Black Slough	NA	NA	NA
11-22	German Gulch	▪ Aquatic life ▪ Cold water fishery	▪ Selenium	▪ Abandoned mines ▪ Placer mining
11-22	Sunday Gulch	NA	NA	NA
11-23	Rose Gulch	NA	NA	NA
11-23	North Fork Divide Creek	NA	NA	NA
11-23	Divide Creek	▪ Aquatic life ▪ Cold water fishery ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Low flow alterations ▪ Phosphorus (total) ▪ Sedimentation/ Siltation ▪ Temperature Total Kjehldahl Nitrogen (TKN)	▪ Agriculture ▪ Flow alterations from water diversions

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
11-23	Moose Creek	▪ Primary contact recreation	▪ Low flow alterations	▪ Irrigated crop production
11-23	Trapper Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Copper ▪ Lead ▪ Low flow alterations ▪ Physical substrate habitat alterations	▪ Channelization ▪ Highway, roads, bridges, infrastructure ▪ Mine tailings ▪ Unspecified unpaved road or trail ▪ Acid mine drainage ▪ Abandoned mine lands ▪ Hydrostructure flow ▪ Regulation/modification ▪ Irrigated crop production
11-3 11-4	Rock Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water	▪ Alteration in stream-side or littoral vegetative covers ▪ Low flow alterations ▪ Sedimentation/ siltation	▪ Grazing in riparian or shoreline zones ▪ Irrigated crop production ▪ Rangeland grazing ▪ Silviculture harvesting
11-3 11-4	Birch Creek	▪ Aquatic life ▪ Cold water fishery ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Low flow alterations ▪ Other anthropogenic substrate alterations ▪ Physical substrate habitat alterations	▪ Channelization ▪ Dam or impoundment ▪ Hydrostructure flow ▪ Regulation/modification ▪ Irrigated crop production
11-3	South Channel Ditch	NA	NA	NA

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
11-3	Willow Creek Ditch	NA	NA	NA
11-4	Lost Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Arsenic ▪ Iron ▪ Low flow alterations ▪ Manganese ▪ Nitrate/Nitrite ▪ Physical substrate habitat alterations ▪ Sulfates	▪ Agriculture ▪ Contaminated sediments ▪ Grazing in riparian or shoreline zones ▪ Irrigated crop production
11-4 16-1	Beaverhead Water Co. Ditch	NA	NA	NA
16-1 18-1	Rattlesnake Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water	▪ Alteration in stream-side or littoral vegetative covers ▪ Cadmium ▪ Copper ▪ Lead ▪ Nitrogen (total) ▪ Phosphorus (total) ▪ Sedimentation/ siltation	▪ Grazing in riparian or shoreline zones ▪ Irrigated crop production ▪ Subsurface (hardrock) mining
16-1	Beaverhead River (Clark Canyon Dam to Grasshopper Creek)	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Lead ▪ Low flow alterations	▪ Agricultural use ▪ Dam or impoundment ▪ Abandoned mines ▪ Irrigated crop production
16-1	Clark Canyon Creek	▪ Aquatic life ▪ Cold water fishery	▪ Alteration in stream-side or littoral vegetative covers ▪ Phosphorus (total) ▪ Sedimentation/ siltation	▪ Grazing in riparian zones
16-2	Sage Creek	NA	NA	NA

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
16-2 16-3	Red Rock River	▪ Aquatic life ▪ Cold water fishery	▪ Alteration in stream-side or littoral vegetative covers ▪ Phosphorus (total) ▪ Sedimentation/ Siltation ▪ Temperature ▪ Total Kjehldahl Nitrogen (TKN)	▪ Grazing in riparian or shoreline zones
16-3	Big Sheep Creek	NA	NA	NA
16-2 16-4	Junction Creek	NA	NA	NA
16-4	Shineberger Creek	NA	NA	NA
16-4	Middle Creek	NA	NA	NA
16-4	Poison Creek	▪ Aquatic life ▪ Cold water fishery	▪ Alteration in stream-side or littoral vegetation covers ▪ Cadmium ▪ Lead ▪ Phosphorus (total ▪ Nitrogen ▪ Sedimentation/ siltation	▪ Rangeland grazing ▪ Natural sources ▪ Placer mining
16-4	Big Beaver Creek	NA	NA	NA
16-4	West Fork Big Beaver Creek	NA	NA	NA
18-1	Grasshopper Creek	▪ Aquatic life ▪ Cold water fishery ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Cadmium ▪ Copper ▪ Low flow alterations ▪ Zinc	▪ Agriculture ▪ Grazing in riparian or shoreline zones ▪ Streambank modifications/ destabilization ▪ Mine tailings ▪ Irrigated crop production

Table A-1 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed By Link in Montana

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
18-1	Horse Prairie Creek	▪ Aquatic life ▪ Cold water fishery ▪ Drinking water ▪ Primary contact recreation	▪ Arsenic ▪ Cadmium ▪ Copper ▪ Lead ▪ Low flow alterations ▪ Mercury ▪ Zinc	▪ Abandoned mine lands
18-1	Medicine Lodge Creek	▪ Aquatic life ▪ Cold water fishery ▪ Primary contact recreation	▪ Alteration in stream-side or littoral vegetative covers ▪ Low flow alterations ▪ Phosphorus (total) ▪ Sedimentation/ Siltation ▪ Temperature	▪ Grazing in riparian or shoreline zones ▪ Irrigated crop production
18-1	Schwartz Creek	NA	NA	NA
18-1	Pass Creek	NA	NA	NA
18-1	Hildreth Creek	NA	NA	NA
18-1	Morrison Creek	NA	NA	NA
18-1	Erickson Creek	NA	NA	NA
18-1	Craver Creek	NA	NA	NA
18-1	Cabin Creek	NA	NA	NA
18-1	Simpson Creek	NA	NA	NA
18-1	Tex Creek	NA	NA	NA
18-1	Meadow Creek	NA	NA	NA
18-1	Rock Creek	NA	NA	NA
18-1	Nicholia Creek	NA	NA	NA
18-1	Deadman Creek	NA	NA	NA

NA – Not assessed, Source: MDEQ 2006

Table A-2 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed by Link in Idaho

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
18-2	Divide Creek	▪ Aquatic life use - Cold ▪ Secondary contact recreation	▪ Pathogens	NA
18-2	Horse Creek	▪ Aquatic life use – cold ▪ Aquatic life use – SS	▪ Cause Unknown ▪ Siltation	NA
18-2	Fritz Creek	▪ Aquatic life use – cold ▪ Aquatic life use – SS	▪ Thermal modifications	NA
18-2	Cold Creek	NA	NA	NA
18-2	Webber Creek	NA	NA	NA
18-2	Lake Hollow Creek	NA	NA	NA
18-2	Deep Creek	▪ Aquatic life use – cold	▪ Cause Unknown	NA
18-2	Blue Creek	NA	NA	NA
20 22	Beaver Creek	▪ Aquatic life use – cold ▪ Aquatic life use – SS ▪ Primary contact recreation	▪ Pathogens	NA
20	Modoc Creek	▪ Aquatic life use – cold ▪ Aquatic life use – SS ▪ Primary Contact (Recr)	▪ Pathogens	NA
20	Berry Creek	▪ Aquatic life use – cold ▪ Aquatic life use – SS ▪ Primary contact recreation	▪ Pathogens	NA
20	Idaho Creek	NA	NA	NA
20	Flat Creek	NA	NA	NA
20	Sheep Creek	NA	NA	NA
20	Miners Creek	▪ Aquatic life use – cold	▪ Cause Unknown	NA
20	Dairy Creek (cont.)	▪ Aquatic life use – cold ▪ Aquatic life use – SS ▪ Primary contact recreation	▪ Flow alteration ▪ Other habitat alterations ▪ Nutrients ▪ Siltation ▪ Thermal modifications	NA

Table A-2 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed by Link in Idaho

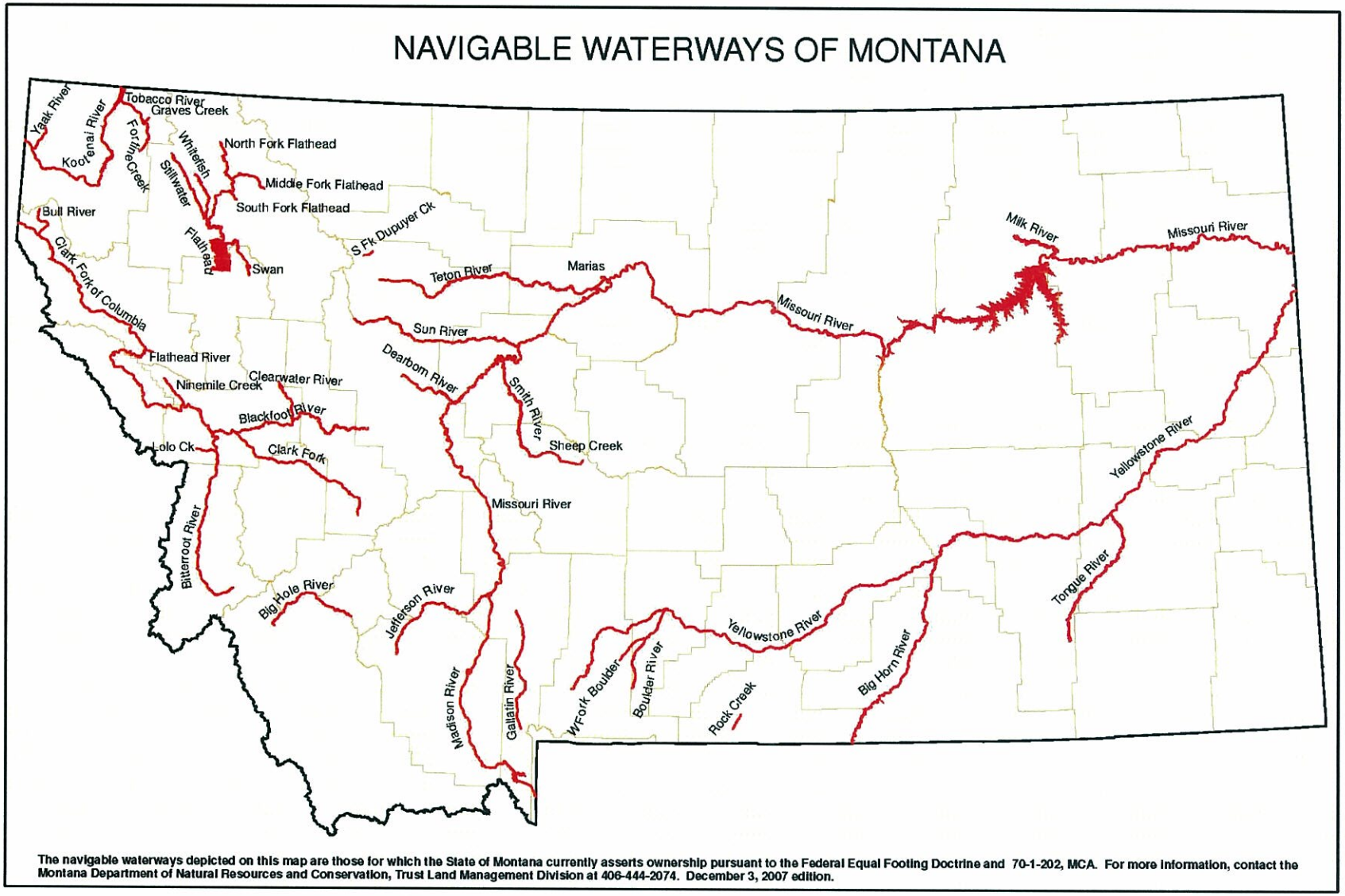
Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
21	Camas Creek	▪ Aquatic life use – cold	▪ Flow alteration ▪ Other habitat alterations ▪ Nutrients ▪ Siltation ▪ Thermal modifications	NA
21	Robinson Canal	NA	NA	NA
22	Medicine Lodge Creek	NA	NA	NA
22	Blue Creek	NA	NA	NA
23	Warm Springs Creek	NA	NA	NA
24 25-12 29	Big Lost River	▪ Aquatic life use – cold	▪ Organic enrichment/Low DO ▪ Flow alteration ▪ Nutrients ▪ Siltation ▪ Thermal modifications	NA
25-12	Champagne Creek	▪ Aquatic life use – cold	▪ Cause Unknown	NA
25-12	Lava Creek	▪ Aquatic life use – cold	▪ Cause Unknown	NA
25-12	Copper Creek	▪ Aquatic life use – cold	▪ Cause Unknown	NA
25-12	Huff Creek	NA	NA	NA
25-12	Fish Creek	▪ Aquatic life use – SS ▪ Primary contact recreation	▪ Bacteria ▪ Organic enrichment/Low DO ▪ Flow alteration ▪ Nutrients ▪ Siltation	NA
25-2 28	High Line Canal	▪ Aquatic life use – cold ▪ Aquatic life use – SS	▪ Bacteria ▪ Organic enrichment/Low DO ▪ Flow alteration ▪ Nutrients ▪ Siltation	NA

Table A-2 Designated Uses and Water Quality Impairments of Perennial Streams and Canals Crossed by Link in Idaho

Link	Stream Name	Designated Uses Partially or Not Supporting	Impairment Cause	Impairment Source
25-2 25-4	Little Wood River	▪ Aquatic life use – cold ▪ Primary contact recreation	▪ Bacteria ▪ Organic enrichment/Low DO ▪ Flow alteration ▪ Nutrients ▪ Siltation	NA
25-3	East Canal	NA	NA	NA
25-3	West Canal	NA	NA	NA
25-3	Dry Creek	▪ Aquatic life use – cold ▪ Primary Contact recreation	▪ Bacteria ▪ Organic enrichment/Low DO ▪ Flow alteration ▪ Nutrients ▪ Siltation	NA
25-2 25-3	Silver Creek	▪ Aquatic life use – cold	▪ Cause Unknown	NA
25-4	Dietrich Main Canal	▪ Aquatic life use – cold ▪ Primary contact recreation	▪ Nutrients ▪ Siltation ▪ Thermal modifications	NA
25-4 26-4	Milner Gooding Canal	NA	NA	NA

NA – Not assessed, Source: IDEQ 2006

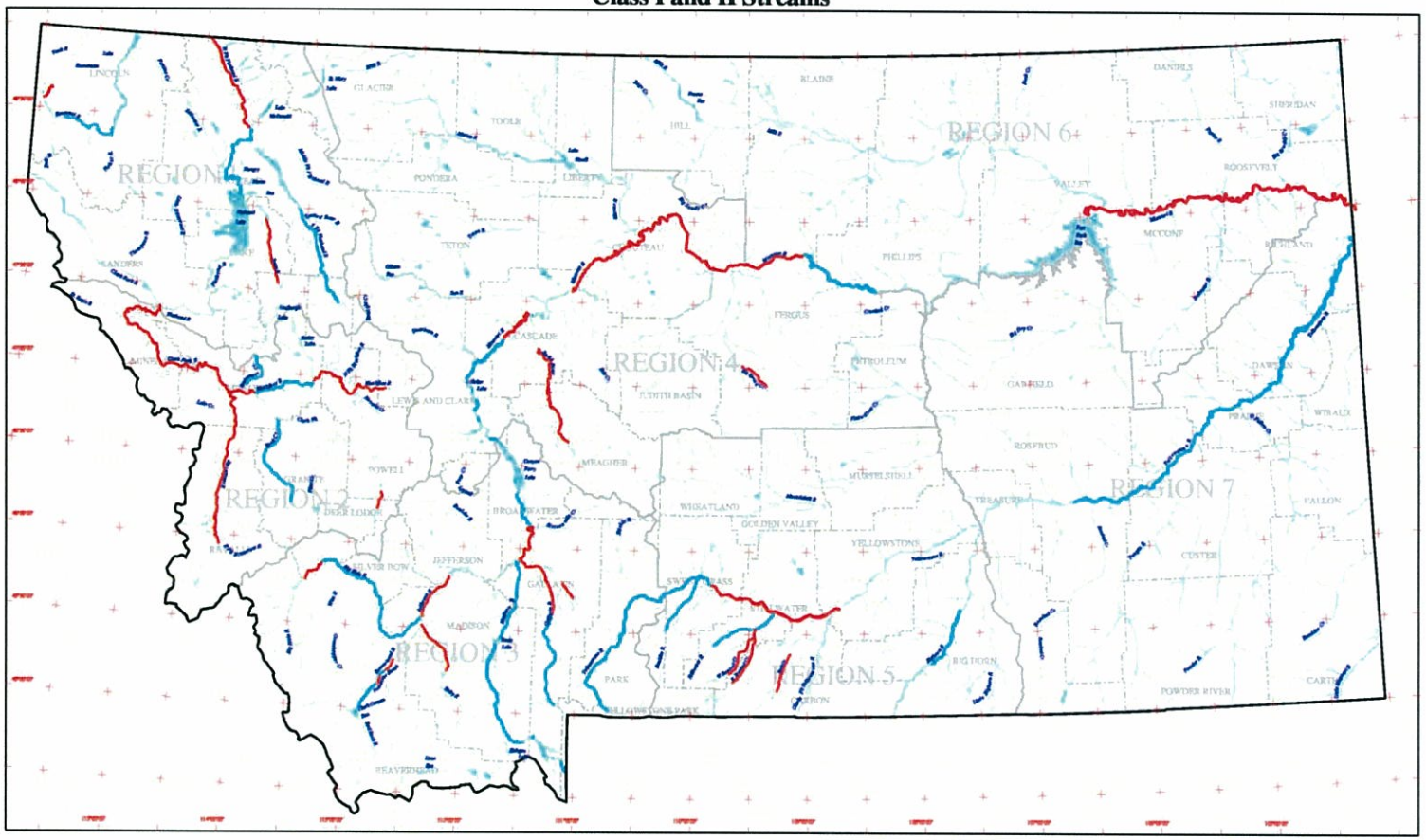
APPENDIX B



The navigable waterways depicted on this map are those for which the State of Montana currently asserts ownership pursuant to the Federal Equal Footing Doctrine and 70-1-202, MCA. For more information, contact the Montana Department of Natural Resources and Conservation, Trust Land Management Division at 406-444-2074. December 3, 2007 edition.

APPENDIX C

MFWP Stream Fishery Classification
1999 Final Sport Fisheries Value
Class I and II Streams



STREAM RATINGS

- Class I (Blue Ribbon Fisheries)
- Class II (Red Ribbon Fisheries)
- Other Streams

OTHER LAYERS

- MFWP Fishing Regions
- Water Bodies

The fisheries resource value was determined using data from the Montana Rivers Information System (MRIS) last updated in 1998 by MFWP and federal land management fisheries biologists. The sport fishery value was determined by an assessment of fish abundance, fishing pressure, esthetics and ingress. These values and their associated data were reviewed by MFWP fisheries biologists and regional managers prior to release of the final sport fishery value. All other data displayed on the maps are provided by the Natural Resource Information System (NRIS), Montana State Library, Helena, MT. All layers digitized at 1:100,000 scale. Only surveyed streams are displayed.

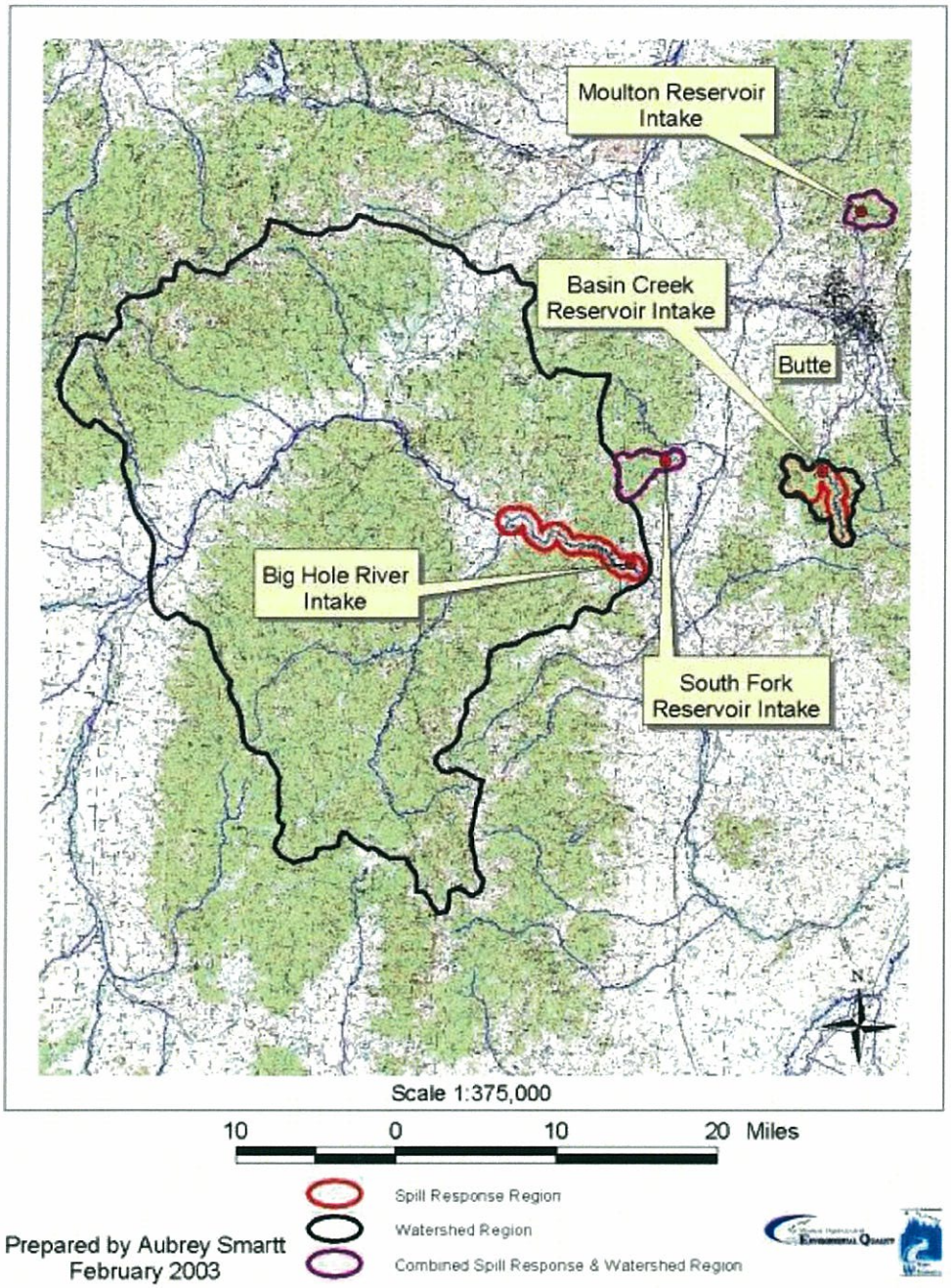
0 25 50 75 100

Scale in miles

Scale 1:1675863
Grid: Lat./Lon., NAD27

NRIS request# 00FWP20 - January 13, 2000

APPENDIX D



Butte Silverbow Water Department Spill Response and Watershed Regions