CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes the potential consequences, or impacts, on the environment that could result from the construction, operation and maintenance, of the MSTI 500kV transmission line and associated facilities. Impacts are defined as modifications to the existing condition of the environment that would be brought about by No Action, the Preferred Route, and Alternatives.

Impacts can be beneficial (positive) or adverse (negative), and can result from the project activities directly or indirectly. Impacts can be permanent, long lasting (long-term) or temporary (short-term). Long-term impacts are defined as those that would substantially remain for the life of the project or beyond. Short-term impacts are defined as those changes to the environment during construction that generally would revert to a pre-construction condition at or within a few years of the end of construction. Impacts can vary in intensity from no change or only slightly discernible change, to a full modification of the environment.

As in Chapter 3, the resources addressed in this chapter can be assigned to three broad categories:

- **Natural Environment**
  - Biological Resources (Section 4.2)
  - Water Resources and Wetlands (Section 4.3)
  - Geology and Soils (Section 4.4)
  - Paleontological Resources (Section 4.5)
  - Climate and Air Quality (Section 4.13)
- **Human Environment**
  - Land Use and Transportation (Section 4.6)
  - Visual Resources (Section 4.7)
  - Socioeconomics (Section 4.8)
  - Environmental Justice (Section 4.9)
  - EMF, Audible Noise, Corona, and Radio/TV Interference (Section 4.11)
  - Noise (Construction) (Section 4.12)
- **Cultural Resources** (Section 4.10)

This chapter also includes sections on Cumulative Impacts (Section 4.14) and Irreversible and Irretrievable Commitment of Resources (Section 4.15). A summary of impacts for each alternative can be found in Table 2.5-1.

The resources addressed in Chapter 4 are generally the same as those addressed in Chapter 3. However, two of the sections in Chapter 4 -- Section 4.11- EMF, Audible Noise, Corona, and Radio/TV Interference; and Section 4.12 - Construction Noise, -- are not covered in Chapter 3.

As discussed in Section 2.6, environmental protection measures would be incorporated into the MSTI project design to eliminate or reduce the potential for some types of impacts. Any impacts that would

remain after implementation of the environmental protection measures are called "initial impacts". In each resource section of Chapter 4, specifically recommended mitigation measures are proposed to reduce moderate or high initial impacts. Impacts that would remain after implementation of specifically recommended mitigation measures are termed "residual impacts."

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 federal and state agencies 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 appropriate agencies.

For more detail on the methods for assessing impact and the results, the reader is referred to the Technical Reports for biological resources, water resources and wetlands, geology and soils, paleontological resources, land use, visual resources, socioeconomics, and cultural resources. These reports can be found in Volume II of the Environmental Report. To protect resources from vandalism, the cultural resource and paleontological resources technical reports are confidential and not available for public review.

Each resource section in Chapter 4 describes the environmental consequences of the alternatives in the following order

- No Action
- Townsend to Mill Creek to State Line Routes
    - Townsend to Mill Creek (Melrose) Segments
        - A1: Preferred Route
        - A2: Parallel Colstrip Lines Route
        - A3: Maximize Utility Corridors
    - Mill Creek to State Line Segments
        - B1: Preferred Route
        - B2: Sheep Creek Route
        - B3: I-15 Route
- Townsend to Pipestone/Mill Creek to State Line Route
    - AB1: I-15 Jefferson Valley Route
- State Line to Midpoint Route
    - C1: Preferred Route
    - C2: Eastern Route
    - C3: Western Route
    - C4: Sheep Creek INL /Brigham Point Route

Under the no-action alternative, no new transmission facilities would be constructed by NorthWestern between the new Townsend Substation and the Midpoint Substation in Idaho.

Each resource section also describes the environmental consequences of the construction of the new Townsend Substation, construction near the Mill Creek Substation, and modification of the Midpoint Substation. All 14 microwave site locations in the two states are either existing or designated communication sites, so potential impacts are discussed only briefly.

4.2 BIOLOGICAL RESOURCES

4.2.1 INTRODUCTION

Impacts to biological resources would result from actions that alter habitats. Three areas are the focus of this analysis: biological change, habitat fragmentation, and disturbance. Alteration may occur through direct habitat loss via surface disturbance, direct mortality from construction activities, or indirectly through the reduction in habitat quality such as increased noise levels or the presence of anthropogenic structures. Both the direct and indirect impacts of transmission line development are associated with ground disturbances caused by constructing road networks for access, installation of towers, conductors, substations, other infrastructure, and ongoing maintenance.

4.2.2 METHODS FOR ASSESSING IMPACTS

Initial and residual impact levels from each alternative route were compiled through the summation of impacts associated with links. Potential effects on biological resources were initially evaluated in the regional study and associated sensitivity analysis completed in November 2006. Many sensitive features were avoided through the regional study but it was not possible to avoid all of them, including biological resources. Consequently, it was necessary to map all known biological resources where data was available within the study area and prepare an impact assessment and mitigation planning procedure.

Impacts to biological resources inventoried in Section 3.2 were evaluated considering the following factors:

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

4.2.2.1 Impact Level

Resource sensitivity levels (Table 4.2-1) were the main factors used in estimating potential impact levels for biological 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 biological resources that have a high sensitivity.

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 biological resources that have moderate sensitivity.

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 biological resources that have low sensitivity.

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

The criteria for assessing the impacts to biological resources are summarized in Tables 4.2-1 and 4.2-2.

Table 4.2-1 Resource Sensitivity

Biological Resource	Sensitivity	Potential Impact from MSTI
Sage Grouse Lek - 0 to 2 Miles	High	Disturb breeding grouse, lek abandonment, and reduction in breeding habitat.
Big Game Winter Habitat	High	Disturb sensitive habitat during a stressful period to big game species
Big Game Summer Breeding Areas	High	Disturb sensitive habitat during a stressful period to big game species
Riparian Perennial Streams / Marsh	High	Reduction in sensitive habitat that is fragile and slow to recover from disturbance
Special Status Species Occurrences	High	Disturb fragile populations of species, reduction in species habitat
Big and Low Sagebrush, not in Grazing Allotment	High	Reduction in quality habitat that houses sensitive obligate species
Cottonwood Galleries	High	Reduction in quality habitat that houses sensitive obligate species and is slow to recovery from disturbance
Vegetated Lava	High	Reduction in sensitive habitat that is fragile and slow to recover from disturbance
Migration Corridor-High Priority	High	Disturb sensitive habitat (abundance and quality)during a stressful period to several species
Sage Grouse Lek - 2 to 4 Miles	Moderate	Disturb breeding grouse, lek abandonment, and reduction in breeding habitat.
Sage Grouse Habitat	Moderate	Reduction in quality habitat (abundance and quality)that houses sensitive obligate species
Migration Corridor-moderate-Low Priority	Moderate	Disturb sensitive habitat during a stressful period to several species
Sage Steppe Habitat	Moderate	Reduction in quality habitat (abundance and quality)that houses sensitive obligate species
Class I Fishery	Moderate	Reduce quality of a fragile habitat
Riparian Intermittent Stream	Moderate	Reduction in habitat (abundance and quality)that is slow to recover to pre-disturbance state
Bitterbrush	Moderate	Reduction in habitat (abundance and quality)that is slow to recover to pre-disturbance state
Big and Low Sagebrush, in Grazing Allotment	Moderate	Reduction in quality habitat (abundance and quality)that houses sensitive obligate species
Juniper	Moderate	Reduction in habitat (abundance and quality)that is slow to recover to pre-disturbance state
Mixed Conifer / Mixed Conifer Deciduous	Moderate	Reduction in habitat (abundance and quality)that is slow to recover to pre-disturbance state
Mixed Shrub	Moderate	Reduction in habitat (abundance and quality)that is slow to recover to pre-disturbance state
Ag Lands	Low	Reduce habitat (abundance and quality)
Mixed / Barren	Low	Reduce habitat (abundance and quality)
Urban / Developed	Low	Reduce habitat (abundance and quality)

Table 4.2-2 Impact Summary to Biological Resources

Impact Type	MSTI Project Attribute	Potential Impact and Biological Resource effects	Impact type and longevity
Direct flora Injury and/or mortality	Vehicle and human trampling during construction and maintenance	Destruction, mortality, and injury to vegetation, reduction in habitat quantity and quality	Biological disturbance, change, and fragmentation Long-term within the MSTI footprint from construction, access roads, and structures Short-term in areas adjacent to the MSTI ROW
Direct fauna Injury and/or mortality	Vehicle and human trampling during construction and maintenance	Destruction, mortality, and injury to wildlife species. Fasorial species and species with limited mobility are most susceptible, nest destruction	Biological change Short-term within the MSTI footprint from construction, structures, and in areas adjacent to the MSTI ROW Long-term for access roads
Ground disturbance	Construction, tower foundations, access roads	Habitat quantity and quality reduction, habitat fragmentation	Biological disturbance, change, and fragmentation Short-term within the MSTI footprint from construction Long-term from access roads and structures
Fugitive dust generation	Construction, maintenance, and repair activities	Reduce photosynthesis, impair species respiration, reduction in habitat quality	Biological disturbance and change Short-term within the MSTI footprint from construction Long-term from access roads
Exposure to pollutants	Chemical spills from construction and maintenance	Reduce survival, population, growth	Biological disturbance Short-term, localized to construction and maintenance sites.
Noise, Human presence	Construction, maintenance, and repair activities	Displace wildlife, disrupt breeding, migration, foraging	Biological disturbance Short-term within the MSTI footprint from construction Long-term from access roads
Fire	Construction and maintenance equipment, human access	Habitat loss and reduction in habitat quality through the potential post-fire establishment of noxious weeds	Biological disturbance, change, fragmentation Short-term in the construction footprint for the transmission line Long-term for access roads

Table 4.2-2 Impact Summary to Biological Resources

Impact Type	MSTI Project Attribute	Potential Impact and Biological Resource effects	Impact type and longevity
Avian Collisions	Conductors, shield wires, and guy-wires	Reduction in avian populations, waterfowl and upland game birds would be most susceptible	Biological disturbance Long-term for the MSTI project ROW
Increased predator habitat	Transmission towers	Raptors and corvids exploit perching opportunities, resulting in increased predation on small mammal and avian species	Biological disturbance Long-term for the MSTI project ROW

4.2.2.2 Impact Type

Impacts to biological resources were measured on multiple scales. Impact intensity was binned into three categories and is described above. In addition to intensity there is duration. Duration was evaluated in terms of short-term or temporary impacts and long-term or permanent impacts. Collectively intensity and duration were considered to evaluate three categories of impacts to biological resources: change, fragmentation, and disturbance.

TEMPORARY IMPACTS

Temporary impacts to biological resources are short term. These types of impacts are often associated with construction activities and include the generation of noise, dust, human presence, etc. Temporary impacts will usually diminish upon completion of construction activities. However intermittent temporary impacts may occur during maintenance and repair activities. Mitigation measures such as best management practices associated with construction will often reduce the magnitude of temporary impacts.

PERMANENT IMPACTS

Permanent impacts to biological resources for the Project reside in three categories: habitat change, habitat fragmentation, and habitat disturbance. These types of impacts are often long term and may exist for the life of the project in some situations (i.e. collision risk, perching habitat). A detailed discussion about the three permanent impacts follows.

Change

Impacts resulting in change include change in habitat, species composition, species behavior, etc. Biological change was evaluated through geographic information system (GIS) data analysis of vegetation communities within the study area and equated to habitat. Habitat change for our analysis is generally associated with (1) habitat removal and/or destruction (permanent usually) and (2) habitat conversion (i.e. removal of shrubland and reclamation with grassland), and introduced habitat features (perching habitat associated with towers). Based on the impact model habitat loss was calculated

within each habitat type by disturbance level and classified as permanent or temporary based on the reclamation potential and biological resource benefit.

Fragmentation

Habitat and populations can become fragmented through the construction of linear projects such as transmission lines. Habitat fragmentation is comprised of four components according to Franklin *et al*. (2002), these include: 1) What is being fragmented? (wildlife habitat (terrestrial and aerial); 2) What scale is being used? (the MSTI project area in this case); 3) What is the mechanism causing fragmentation? (the primary mechanism in this case is the transmission line and associated infrastructure); and 4) What is the extent and pattern of fragmentation? (this depends on the organism being evaluated, see the analysis below). The analysis below focuses on: fragmentation from linear feature associated with the transmission line (access roads, towers, and conductor) and a review of associated literature for the western U.S., and the impacts to wildlife (chiefly big game and avian species).

Habitat loss from roads has broader effects than just the conversion of a small area of land to road surfaces. Roads fragment by changing landscape structure and by directly and indirectly affecting species. Habitat effects of roads on the landscape include dissecting vegetation patches, increasing the edge-affected area, decreasing interior area, and increasing the uniformity of patch characteristics, such as shape and size (Reed *et al.* 1966). Road-avoidance behavior is characteristic of large mammals such as elk, bighorn sheep, grizzly, caribou, and wolf. Avoidance distances of 100 to 200 meters are common for these species (Lyon 1983).

Road density is a useful index of the effect of roads on wildlife populations (Forman *et al.* 1997). Some studies have shown that a few large areas of low road density, even in a landscape of high average road density, may be the best indicator of suitable habitat for large vertebrates (Rudis 1995).

The evidence is strong that forest roads displace some large mammals and certain birds (such as spotted owls and marbled murrelets) and that displaced animals may suffer habitat loss as a result. Effects of roads on small mammals and songbirds are generally described as less severe, with changes expressed as modifications of habitat that cannot readily be classified as detrimental or beneficial. This interpretation is also probably true for amphibians and reptiles.

Roads also create habitat edge (Mader 1984, Reed *et al.* 1996); increased edge changes habitat in favor of species that use edges, and to the detriment of species that avoid edges or experience increased mortality near or along edges (Marcot *et al.* 1994). The continuity of the road system also creates a corridor by which edge-dwelling species of birds and animals can penetrate the previously closed environment of continuous forest cover. Species diversity can increase, and increased habitat for edge-dwelling species can be created.

Roads and their adjacent environment qualify as a distinct habitat and have various species, population, and landscape-scale effects (Baker and Knight 2000, Dawson 1991, van der Zande *et al.* 1980). Some research has attempted to describe habitat modifications caused specifically by roads, but most of this work is species and site-specific (Lyon 1983).

In general, road building fragments habitat, and creates habitat edge, modifying the habitat in favor of species that use edges. Edge-dwelling species are generally not threatened, however, because the

human-dominated environment has provided ample habitat for them. Any habitat modifications attributed to the road may be insignificant compared to the effects of the activity, such as gas development activities, for which the road was built.

Concern for habitat fragmentation is increasing in wildlife management (Baker 2000, Knight *et al.* 2000) and is considered a global concern for biological diversity (Knight *et al.* 2000). Species declines, and shifts of animal distributions have led to a more modern focus on the causes of habitat fragmentation and the effect this may have on wildlife. Avian responses to habitat fragmentation included life cycle alterations, increased parasitism, and habitat affinity associations (Weller *et al.* 2002; Knight *et al.* 2000). Attempts have been made at extrapolating these data to the western U.S.; however, landscapes in the eastern and western U.S. are quite dissimilar, raising the question of the validity of this approach.

Habitat fragmentation affects wildlife regardless of the location, but the degree to which wildlife is affected, and the species-specific effects, is in need of more research before definitive conclusions can be made. Habitat fragmentation occurs along the MSTI study area, but the degree of effects to wildlife cannot be drawn with the current available data. The discussion below focuses on generalized results of habitat fragmentation analysis along the MSTI study area.

The primary cause of habitat fragmentation in the southern Rocky Mountains is roads (Knight *et al.* 2000). Existing roads, projected roads, and the remaining core areas left over from the effect zones were considered for fragmentation-related impacts that are likely to affect wildlife. The road effect zone (effect zone) is defined by Forman (Weller *et al.* 2002) as "the area of influence on edge environments parallel to roads". The core area is a component of natural habitat composed of "contiguous blocks of uniform habitat types away from natural breaks or habitat edges" (Weller *et al.* 2002).

Fragmentation results in many impacts to wildlife habitat. As the number of fragments increases in a given area, the core area size decreases, reducing the patches uninterrupted by human disturbance. The amount of edge area increases with the increase of fragments, and habitat connectivity decreases with increased fragmentation. Decreased connectivity may favor the habitat generalist wildlife species over the forest-adapted species, threatening species richness or diversity at regional scales (Knight *et al.* 2002). Habitat generalists, such as coyotes and brown-headed cowbirds, use road corridors to easily access the interior forest. These predators and nest parasites can have direct impacts on forest-adapted species populations. Opening up forest and to a lesser degree shrubland habitat also increases solar exposure during winter months creating earlier forage exposure for several species.

In general, species abundance declines with habitat reduction as a result of fragmentation. In some cases species-specific responses to the size of effect zones that may occur from project actions are summarized below.

- Bird species (Brewer's and sage sparrows, and sagebrush obligates) were documented to have a 50 percent decline in guilds within 100 meters (328 feet) of roadways in the Upper Green River Basin (Weller *et al.* 2002).
- Roads that are approximately 10 meters wide (33 feet) may create a thermal road effect zone more than 100 meters (328 feet) into the adjacent habitat (Knight *et al.* 2000).
- Elk and mule deer require contiguous habitat areas at least 250 acres in size and at least 0.5 mile from a road (BLM 2003).

- Large ungulates (such as mule deer and elk) in Colorado were documented to be more numerous 200 meters (656 feet) away from road edges (Rost and Bailey 1979).
- Block and Lindzey found that elk in western Wyoming avoided relatively high-density oil and gas fields (Weller *et al.* 2002).
- Perry and Overly suggest than more that 640 acres of elk habitat can be affected by one mile of road (Weller *et al.* 2002).
- Hayden and Wing (1991) are not able to report significant impacts to elk greater than 0.25 mile from a secondary road. Further more they report no increase in elk heart rates 330 feet from a major interstate highway.
- Hutto documented songbird affinities to road edges for edge-associated species (chipping sparrow, American robin) and interior forest associations (away from roads) for forest-interior species (western-tanager, golden crowned kinglets) in conifer forests in Montana (Hutto 1995).
- Knight *et al.* reported increased nest predation and nest parasitism along edge habitat compared to forest interior habitat in the Southern Rocky Mountains (Knight *et al.* 2000).
- Roads and other corridors, a primary cause of fragmentation in this region, allow species to expand their ranges (Beauvais reported coyotes, red foxes, and bobcats expanding their winter range), increase competition with forest-adapted species (non-generalists), and increase predator-prey interactions with increased access (Beauvais 2000).

While the above studies attempt to document the impacts of roads, conclusive results that are site specific to the Project are not available. In order to document if impacts to wildlife are significant, one must collect enough information to determine changes in species populations, birth rates, growth, and/or survival (Hayden-Wing 1991). This information is not available for wildlife occupying the MSTI study area.

Disturbance

Many species are sensitive to harassment or human presence, which are often facilitated by construction activities and road access; potential reductions in productivity, increases in energy expenditures, or displacements in population distribution or habitat use can occur (Bennett 1991, Mader 1984). However, the magnitude of impact to the species often depends on the experience associated with the disturbance (Geist *et al.* 1978). Examples include transmission line presence creating: collision risk, avoidance behavior, and perching habitat. Access road effects include: human disturbance of leks (e.g., sage grouse and sharp-tailed grouse), nests (e.g., ferruginous hawk), and dens (e.g., kit fox). Another example of road disturbance is elk avoidance of large areas near roads open to traffic (Lyon 1983, Rowland *et al.* 2000), with elk avoidance increasing with increasing rate of traffic (Wisdom *et al.* 2000; Johnson *et al.* 2000). A final example comes from Hayden-Wing (1991). They report significant declines in mule deer populations in Wyoming due to increased hunting access associated with access roads from development.

Wildlife disturbance along the MSTI alternative routes includes any activities, either temporary or ongoing, that would disrupt wildlife, temporarily or permanently displacing animals from where they would typically exist. The wildlife species that occur in different vegetation communities are described in Section 3.0. Disruption along the MSTI alternative route links is most likely to come from: (1) increased noise levels (i.e. construction); (2) increased vehicle traffic (i.e. construction, maintenance); and (3) structure presence (i.e. towers and conductor). Our analysis focuses on these sources of disruption to wildlife along the MSTI alternative route links. Through the use of current

literature, current governing policies, and GIS we have analyzed wildlife resources on a per link basis and compiled impacts into Alternative level analysis. Below is also a brief list of studies involving disturbance impacts related to wildlife.

- Pre- and post-development big game numbers are similar in numerous instances following construction activities involved in road and well development (Hayden-Wing 1991, Reeve 1996, and Geist *et al.* 1978, Easterly *et al.* 1981).
- Fewer elk occur around drill sites after CO_2 well development (Brekke 1998).
- Disruption of watering activities and migration routes increase stress to wildlife species due to change induced from development associated with oil and gas production (Campbell and Remington 1981).
- Avoidance behavior has been observed from numerous studies involving development (Johnson and Lockman 1990, Campbell and Remington 1981, Rost and Bailey 1978, and Hayden-Wing 1991) with the highest avoidance behavior observed during hunting and calving periods (Hayden-Wing 1991).

4.2.2.3 Specific Mitigation Measures

Species Preliminary Environmental Protection measures would be incorporated in the Plan of Development (POD) that would directly and indirectly benefit biological resources and reduce impacts. In addition to project design measures specifically recommended mitigation measures are proposed to reduce impacts to biological resources. A summary of Preliminary Environmental Protection and mitigation measures can be found in Table 4.2-3.

4.2.3 EFFECTS OF EACH ALTERNATIVE – MONTANA

A summary of residual impacts, or impacts resulting after preliminary environmental protection and preliminary mitigations measures are applied, to biological resources is discussed below for each route alternative. The Environmental Protection Measures described in this document are preliminary measures part of the project description, but are not finalized or committed until further discussions with the MDEQ and other agencies are conducted. Likewise, the Specifically Recommended Mitigation Measures are preliminary, and not committed by to NorthWestern, until discussions are held on this subject with the MDEQ and other agencies. Residual impacts to biological resources are quantified by linear mile for each alternative route. Discrepancies may exist between the sum of residual impacts for each alternative route and linear mileage of route alignments. The discrepancies arise from numerical rounding and resource overlap based on the 0.1 mile scale used for impact analysis in GIS.

4.2.3.1 No Action

Under the No Action Alternative, the MSTI project would not be constructed and no biological resource impacts would occur.

Table 4.2-3 Preliminary Environmental Protection and Mitigation Measures Pertaining to Biological Resources

Environmental Protection (EPM) and Mitigation Measure (MM) No.	Abbreviated Description (details can be found in Section 2.6)	Biological Benefit
ENVIRONMENTAL PROTECTION MEASURE		
1.1, 8.1	Restrict vehicle use outside ROW	Reduce potential mortality, injury, habitat loss and degradation
1.3	Preserve vegetation in areas where recontouring is not required	Reduce potential habitat loss and degradation
1.4	Revegetate areas of substantial ground disturbance	Reduce potential habitat loss and degradation
1.5	Develop a POD in coordination with agencies	Reduce potential habitat loss and degradation
1.6	Construction monitoring	Reduce potential mortality, injury, habitat loss and degradation
1.7	Brief supervisory construction personnel on site specific ecological issues	Reduce potential mortality, injury, habitat loss and degradation
2.8	Install fences and gates	Reduce human disturbance, access
2.13	Timing construction to avoid high impact scenarios (i.e. rainy season)	Reduce potential habitat loss and degradation
5.1	See 1.7	See 1.7
5.2	Develop species specific mitigation measures for special status species	Protect special status species
5.3	Pre-construction sensitive plant surveys	Protect sensitive plants
5.4	Noxious weed plan	Reduce potential habitat loss and degradation
5.5	Limited ground disturbance	Reduce potential habitat loss and degradation
5.6	Avian electrocutions	Reduce avian mortality
5.7	Ground disturbance reclamation	Reduce potential habitat loss and degradation
5.9	See 5.2	See 5.2
6.1	Environmentally sound road construction	Reduce potential habitat loss and degradation
6.2	Rehabilitate disturbance	Reduce potential habitat loss and degradation
6.4	Controlled river crossings	Protect aquatic resources
7.1	Control dust from road construction	Reduce habitat degradation and reduce potential species injury

Table 4.2-3 Preliminary Environmental Protection and Mitigation Measures Pertaining to Biological Resources

Environmental Protection (EPM) and Mitigation Measure (MM) No.	Abbreviated Description (details can be found in Section 2.6)	Biological Benefit
MITIGATION MEASURE		
1, 2, 3, 4	Limit road construction	Reduce potential mortality, injury, habitat loss and degradation
9	Timing limitations for construction and maintenance	Reduce potential mortality, injury, and disturbance
10	Span riparian areas	Reduce potential habitat loss and degradation
11	Limited tree trimming/removal	Reduce potential mortality, injury, habitat loss and degradation
12	Install marking devices	Reduce potential mortality and injury
13	See 9	See 9
14	Preconstruction surveys for ESA species	Reduce potential mortality, injury, habitat loss and degradation

4.2.3.2 Townsend to Mill Creek (Melrose) Segment

The Townsend to Melrose route portion of the MSTI project includes the northern Montana portion of project. The route alternatives are collectively dominated by grassland communities and secondarily shrubland and conifer forest. Species that reside in grassland, shrubland, and conifer habitats would be dominant along the Townsend to Melrose Alternatives and therefore be most likely impacted. Impacts to biological resources from the proposed Alternatives are discussed below in the individual Alternative sections.

A1: PREFERRED ROUTE

The A1: Preferred Route alignment is approximately 112.9 miles long. Residual impacts to biological resources along the preferred route include: 1.0 miles of high impact, 86.4 miles of moderate impact, and 25.1 miles of low impact. A1 would disturb approximately 50 acres from clearing and grading for structures, work areas, and access roads. The A1: Preferred Route is dominated by grassland and secondarily low sagebrush. Riparian tree and shrub habitat is associated with the Beaverhead River. Impacts to biological resources include habitat change, habitat disturbance, and fragmentation. Construction noise, dust, and human presence would be localized and temporary. Access roads would create long term impacts such as fragmentation and human access. Long term impacts would be associated with towers, conductors, shield wires, and guy-wires. These structures would create perching habitat, cause disturbance to certain breeding species (i.e. sage grouse), and fragment migration corridors (terrestrial and aerial).

Impacts to class 1 fisheries (0.1 miles of the Beaverhead River) would mainly be associated potential water quality reduction. This issue would be minimized through construction BMP's and preliminary environmental protection measure 6.4 and specifically recommended mitigation measure 10. Waterfowl production area impacts would potentially occur near Clark Canyon Reservoir from MP 25-30 along Link 16-1 and along the Missouri River corridor. Marking devices would be placed on

shield wires (specifically recommended mitigation measure 12) to reduce avian collisions. Further study and monitoring of the Missouri River corridor for avian use and transmission line impacts would aid in developing further mitigation to reduce impacts to avian species. Impact to wintering game would potential be highest under the preferred route for mule deer and pronghorn. Summering elk impacts would potentially be the second highest under the preferred route. Disturbance to big game would be mitigated through timing limitations (preliminary environmental protection measure 2.13 and specifically recommended mitigation measure 9) and access control (preliminary environmental protection measures 2.2 and 2.8).

Impacts to critical winter habitat for elk, winter habitat for moose and elk, or critical elk calving habitat would be minimal due to lack of quality habitat. Impacts to high quality sage grouse habitat would potentially be the second highest. Direct mortality from collisions and reduced breeding are potential long term impact to sage grouse. During construction timing limitations would potentially reduce impacts to breeding sage grouse and other avian species. The highest amount of wildlife movement corridor is in the vicinity of the preferred route. Little is known about how a large transmission line would impact wildlife movement corridors. Wildlife movement would not be directly impaired from the transmission line right-of-way or experience the magnitude of mortality risk that is associated with transportation corridors. However, the transmission line right-of-way would likely cause some behavioral responses in some species (such as avoidance or alter migration route) that may cause added stress during an ecologically stressful period (migration).

There are eight special status wildlife species and three special status plants known to occur along A1. Impacts to these species would be minimized through preliminary environmental protection measure 2.13, 5.2 and specifically recommended mitigation measures 9, 14. Potential impacts to avian special status species (bald eagle nests, prairie falcon, heron rockeries, Brewer's sparrow, McCowen's longspur, sage thrasher would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to northern leopard frog, western toad, fringed myotis, and Canada lynx would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (perennial summer Cyprus, Rail Canyon wild buckwheat, and Scallop-leaf lousewart) would be further mitigated through preliminary environmental protection measure 5.3. Several preliminary environmental protection measures and specifically recommended mitigation measures listed in Table 4.2-3 would be applicable for reducing impacts to these species.

A2: Parallel Colstrip Lines Route

A2 is approximately 121.7 miles long. Residual impacts to biological resources along A2 includes: 2.7 miles of high impact, 102.8 miles of moderate impact, and 12.8 miles of low impact. A2 has the highest amount of residual impacts among the alternative between Townsend and Mill Creek. A2 would disturb approximately 54 acres from clearing and grading for structures, work areas, and access roads. Impact type, preliminary environmental protection measures, and specifically recommended mitigation measures applicable to flora and fauna along A2 would be similar to those described above for A1. Impact specific to A2 are described below.

A2 is dominated by grassland and secondarily low sagebrush and mixed conifer habitats. A2 crosses approximately twice as much mixed conifer habitat and half as much grassland habitat compared to the preferred route. Riparian tree and shrub habitat is associated with stream and river crossings (see Section 3.3 Water Resources). Impacts to wildlife associated with these communities (see Section

3.2.3) would be prominent along A2. Impacts to class 1 fisheries would occur along the Big Hole River (0.1 miles). A2 crosses the same amount of waterfowl production area and high quality sage grouse habitat as the preferred route, therefore impacts to waterfowl and sage grouse would be similar to the preferred route. Impacts to would potentially be the highest (among the three alternatives) for bighorn sheep mule deer, and moose winter habitat and potentially the second highest for elk critical winter habitat. Potential impact would also be the highest (among the three alternatives) for elk summer habitat. The lowest amount of wildlife movement corridors and pygmy rabbit habitat occurs along A2. There are nine special status wildlife species and two special status plants known to occur along the preferred route. Impacts to these species would be minimized through preliminary environmental protection measures 2.13, 5.2 and specifically recommended mitigation measures 9, 14. Potential impacts to avian special status species (bald eagle nests, prairie falcon, heron rockeries, and Brewer's sparrow) would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to northern leopard frog, western toad, fringed myotis, North American wolverine, and Canada lynx would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (muskroot and peculiar moonwart) would be further mitigated through preliminary environmental protection measure 5.3. Several preliminary environmental protection measures and specifically recommended mitigation measures listed in Table 4.2-3 would be applicable for reducing impacts to these species.

A3: MAXIMIZE UTILITY CORRIDORS

A3 is approximately 128.8 miles long. There would be a total of 0.7 miles of high, 73.8 miles of moderate, and 51.1 miles of low residual impacts. A3 has lowest amount of high and moderate residual impacts to biological resources. A3 would disturb approximately 57 acres from clearing and grading for structures, work areas, and access road construction. Impact type, preliminary environmental protection measures, and specifically recommended mitigation measures applicable to flora and fauna along A3 would be similar to those described above for A1. Impact specific to A3 are described below.

A3 is dominated by grassland and secondarily low sagebrush and mixed shrubland habitats. Riparian tree and shrub habitat is associated with stream and river crossings (see Section 3.3 Water Resources). Wildlife associated with these communities (see Section 3.2.3 above) are most likely to be impacted by the proposed transmission line. The highest amount of potential impact to critical elk winter habitat, and bighorn sheep and elk winter habitat would occur along A3. The second highest amount of potential impact to elk calving habitat would occur along A3. The third highest amount of potential impact to mule deer winter habitat would occur along A3. Impacts to waterfowl production areas would be lowest under A3. The second highest amount of impact to wildlife movement corridors is likely under A3. There are 12 special status wildlife species known to occur along A3. Impacts to these species would be minimized through preliminary environmental protection measure 2.13, 5.2 and specifically recommended mitigation measures 9 and 14. Potential impacts to avian special status species (bald eagle nests, prairie falcon, heron rockeries, long-billed curlew, sage thrasher, and Brewer's sparrow) would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to northern leopard frog, western toad, fringed myotis, Townsend big-eared bat, western spotted skunk, and Canada lynx would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Several preliminary environmental protection measures and specifically recommended mitigation measures listed in Table 4.2-3 would

be applicable for reducing impacts to these species. Impacts to class 1 fisheries, winter habitat for pronghorn, or moose, and special status plants would not likely occur under A3 due to lack of quality habitat.

4.2.3.3 Mill Creek to State Line Segment

B1: PREFERRED ROUTE

The B1 alignment is approximately 87.1 miles long. B1 contains 6.6 miles of high, 48.7 miles of moderate, and 23.7 miles of low residual impacts to biological resources. Residual impacts to biological resources would be the second highest under B1. B1 would disturb approximately 38.5 acres from clearing and grading for structures, work areas, and access roads. Impact type, preliminary environmental protection measures, and specifically recommended mitigation measures applicable to flora and fauna along B1 would be similar to those described above for Townsend to Mill Creek (Melrose) Segment. Impact specific to B1 are described below.

Impacts to grassland and low sagebrush habitats and wildlife associated with these communities are at greatest risk of impact from the MSTI project. Riparian tree and shrub habitat and wildlife associated with stream and river crossings (see Section 3.3 Water Resources) would also be subjected to impacts from the MSTI project. Potential impacts to class 1 fisheries would occur along Beaverhead River under B1. Potential impacts to waterfowl production area are most likely near Clark Canyon Reservoir. The highest amount of potential impact to mule deer and pronghorn winter habitat would occur along B1. The second highest amount of potential impact to elk calving habitat, elk calving habitat within 0.5 miles of a road, and high quality sage grouse habitat would occur along B1. The second highest amount of potential impact to wildlife movement corridors would occur along B1. Impact to critical winter habitat for elk, winter habitat for moose and elk, or critical elk calving habitat would not likely occur along B1 due to lack of habitat.

There are eight special status wildlife species and three special status plants known to occur along B1. Impacts to these species would be minimized through preliminary environmental protection measure 2.13, 5.2 and specifically recommended mitigation measures 9, 14. Potential impacts to avian special status species (bald eagle nests, prairie falcon, heron rockeries, Brewer's sparrow, McCowen's longspur, sage thrasher) would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to northern leopard frog, western toad, fringed myotis, and Canada lynx would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (perennial summer Cyprus, Rail Canyon wild buckwheat, and Scallop-leaf lousewart) would be further mitigated through preliminary environmental protection measure 5.3. Several preliminary environmental protection measure and specifically recommended mitigation measures listed in Table 4.2-3 would be applicable for reducing impacts to these species.

B2: SHEEP CREEK ROUTE

B2 is approximately 86.9 miles long. There would be a total of 2.7 miles of high, 73.5 mile of moderate, and 10.5 miles of low residual impacts to biological resources. B2 has the least residual impacts of the three alternatives from Mill Creek to the State Line. B2 ground disturbance would be similar to B1.

The highest amount of impacts to biological resources along B2 would occur in grassland and sagebrush habitats. Additional impacts in riparian tree and shrub habitat associated with stream and river crossings may also occur under B2. Wildlife associated with these communities (see Section 3.2.3 above) would most likely be impacted from the MSTI project under B2. The lowest amount of impact to waterfowl production area would be anticipated under B2. The highest amount of potential impact to elk winter habitat, elk calving habitat within 0.5 mile of a road, high quality sage grouse habitat and sage grouse leks within 2- and 4-miles, pygmy rabbit habitat, and wildlife movement corridors would occur along B2. The second highest amount of potential impacts to mule deer winter habitat would occur along B2. Impacts to class 1 fisheries, winter habitat for pronghorn, moose, and critical winter habitat for elk are not likely under B2 due to lack of habitat.

There are five special status wildlife species and 12 special status plants known to occur along the preferred route. Impacts to these species would be minimized through preliminary environmental protection measures 2.13, 5.2 and specifically recommended mitigation measures 9, 14. Potential impacts to avian special status species (sage sparrow, Brewer's sparrow, McCowen's longspur, and sage thrasher would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to the plains spadefoot toad would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (perennial summer Cyprus, head milkvetch, lemhi beardtongue, bitteroot milkvetch, chicken sage, small flower pennycress, Idaho sedge, alkali primrose, alpine meadowrue, mealy primrose, low braya, and marsh fleabane) would be further mitigated through preliminary environmental protection measure 5.3. Several preliminary environmental protection measures and specifically recommended mitigation measures listed in Table 4.2-3 would be applicable for reducing impacts to these species.

B3: I-15 ROUTE

B3 is approximately 88.4 miles long. There would be a total of 3.4 miles of high, 57.6 miles of moderate, and 21.9 miles of low residual impacts to biological resources. B3 has the highest residual impacts of the three alternatives from Mill Creek to the State Line. B3 disturbance would be similar to B1.

Impacts to grassland, low sagebrush, and mixed shrubland habitats would be most likely under B3. Additional impacts to riparian tree and shrub habitat is also likely under B3. Wildlife associated with these communities (see Section 3.2.3 above) would be subjected to the highest amount of impacts from the MSTI project. Impacts to class 1 fisheries would be similar to the Preferred Route and occur along the Beaverhead River for B3. The highest amount of potential impact to waterfowl production areas and elk calving would occur along B3. The second highest amount of potential impacts to pronghorn winter habitat, pygmy rabbit habitat, and elk calving habitat within 0.5 miles of a road would occur along B3. The lowest amount of potential impact to high quality sage grouse habitat, and wildlife movement corridors would occur along B3. Impacts to winter habitat for elk or moose are not likely due to lack of quality habitat along B3.

There are eight special status wildlife species and one special status plants known to occur along the preferred route. Impacts to these species would be minimized through preliminary environmental protection measures 2.13, 5.2 and specifically recommended mitigation measures 9, 14. Potential impacts to avian special status species (bald eagle nests, Brewer's sparrow, McCowen's longspur, sage thrasher) would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to plains spadefoot

toad, western toad, and western spotted skunk would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (perennial summer Cyprus) would be further mitigated through preliminary environmental protection measure 5.3. Several preliminary environmental protection measures and specifically recommended mitigation measures listed in Table 4.2-3 would be applicable for reducing impacts to these species.

4.2.3.4 AB1: I-15 Jefferson Valley Route

The AB1: I-15 Jefferson Valley Route most closely resembles A1 and B1 in terms of flora and fauna present with a couple exceptions. AB1 includes Link 8 which is not part of any of the previously described alternative routes above. Aside from Link 8, impacts to biological resources for A1 and B1 would also apply to AB1. A description of Link 8 biological impacts is included below. Link 8, A1 and B1 should be considered collectively for comprehensive impacts to biological resources for AB1.

AB1 alignment is approximately 200 miles long. Residual impacts to biological resources along AB1 include: 5.6 miles of high impact, 178 miles of moderate impact, and 49.4 miles of low impact. AB1 ground disturbance from clearing and grading for structures, work areas, and access roads would disturb approximately 92 acres.

Impacts to grassland, low sagebrush, and mixed shrub habitat would mostly likely occur along the I-15 Jefferson Valley Route. Impacts to riparian tree and shrub habitat would potential occur near the Big Hole River crossing. Wildlife associated with these communities (see Section 3.2-1 above) would be most likely to experience impacts from the MSTI project. Impacts to elk, pronghorn, and mule deer winter range would be similar to A1 and B1. Impacts similar those described above would occur to 3.8 miles of summer elk habitat and 7.5 miles of summer elk habitat that is less than 0.5 miles from a road occurring along Link 8. Impacts to sage grouse habitat and wildlife movement corridors would occur along Link 8 but would be slightly less due to less miles of habitat crossed by this link.

There are eight special status wildlife species and two special status plants known to occur along the preferred route. Impacts to these species would be minimized through preliminary environmental protection measures 2.13, 5.2 and specifically recommended mitigation measures 9, 14. Potential impacts to avian special status species (bald eagle nests, Brewer's sparrow, McCowen's longspur, sage thrasher, and long-billed curlew) would be mitigated further through preliminary environmental protection measure 5.4 and specifically recommended mitigation measures 5 and 6. Potential impacts to plains spadefoot toad and Townsend's big-eared bat would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (silverstar and Parry's fleabane) would be further mitigated through preliminary environmental protection measure 5.3. Several preliminary environmental protection measures and specifically recommended mitigation measures listed in Table 4.2-3 would be applicable for reducing impacts to these species.

4.2.4 Effects of Each Alternative - Idaho

A summary of residual impacts, or impacts resulting after preliminary environmental protection (PEPM) and preliminary mitigations measures (PMM) are applied, to biological resources is discussed below for each route alternative. The Environmental Protection Measures described in this document are preliminary measures part of the project description, but are not finalized or committed

until further discussions with state and federal agencies are conducted. Likewise, the Specifically Recommended Mitigation Measures are preliminary, and not committed by NorthWestern, until discussions are held on this subject with state and federal agencies. Residual impacts to biological resources are quantified by linear mile for each alternative route. Discrepancies may exist between the sum of residual impacts for each alternative route and linear mileage of route alignments. The discrepancies arise from numerical rounding and resource overlap based on the 0.1 mile scale used for impact analysis in GIS.

4.2.4.1 No Action

Under the No Action Alternative, the MSTI project would not be constructed and no biological resource impacts would occur.

4.2.4.2 C1: Preferred Route

The Preferred Route (C1) alignment is approximately 232.6 miles long. Residual impacts to biological resources along the preferred route include: 36.1 miles of high impact, 162.1 miles of moderate impact, and 34.7 miles of low impact. C1 would disturb approximately 102 acres from clearing and grading for structures, work areas, and access roads. The preferred route is dominated by sagebrush and secondarily grassland habitats. Riparian tree and shrub habitat is associated with the Beaverhead River. Impacts to biological resources include habitat change, habitat disturbance, and fragmentation. Construction noise, dust, and human presence would be localized and temporary. Access roads would create long term impacts such as fragmentation and human access. Long term impacts would be associated with towers, conductors, shield wires, and guy-wires. These structures would create perching habitat, cause disturbance to certain breeding species (i.e. sage grouse), and fragment migration corridors (terrestrial and aerial). Impacts to fisheries would mainly be associated potential water quality reduction. This issue would be minimized through construction BMP's and PEPM 6.4 and PMM 10. Waterfowl production area impacts would potentially occur near Minidoka NWR and American Fall Reservoir along link 26-2 and 26-3. Marking devices would be placed on shield wires (PMM 12) to reduce avian collisions.

Further study and monitoring of the Missouri River corridor for avian use and transmission line impacts would aid in developing further mitigation to reduce impacts to avian species. Impact to wintering game would potential be highest under the preferred route for mule deer and pronghorn. Winter elk habitat and summering elk impacts would potentially be the second highest under the preferred route. Disturbance to big game would be mitigated through timing limitations (PEPM 2.13 and PMM 9) and access control (PEMP 2.2 and 2.8). Impacts to critical winter habitat for elk or critical elk calving habitat would be minimal due to lack of quality habitat. Impacts to high quality sage grouse habitat would potentially be the second lowest and second highest in terms of proximity to leks. Direct mortality from collisions and reduced breeding are potential long term impact to sage grouse. During construction timing limitations would potentially reduce impacts to breeding sage grouse and other avian species. The highest amount of wildlife movement corridor is in the vicinity of the preferred route. Little is known about how a large transmission line would impact wildlife movement corridors. Wildlife movement would not be directly impaired from the transmission line ROW or experience the magnitude of mortality risk that is associated with transportation corridors. However, the transmission line ROW would likely cause some behavioral responses in some species (such as avoidance or alter migration route) that may cause added stress during an ecologically stressful period (migration).

There are 9 special status wildlife species and 3 special status plants known to occur along A1. Impacts to these species would be minimized through PEPM 2.13, 5.2 and PMM 9, 14. Potential impacts to avian special status species (northern goshawk, great gray owl, ferruginous hawk, loggerhead shrike, long-billed curlew, bald eagle, and mountain plover) would be mitigated further through PEPM 5.4 and PMM 5 and 6. Potential impacts to wolverine and Townsend's big-ear bat would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (Idaho sedge, three-lead milkvetch, lehmi milkvetch, and spreading gilia) would be further mitigated through PEPM 5.3. Several PEPM and PMM listed in Table 4.2-3 would be applicable for reducing impacts to these species.

4.2.4.3 C2: Eastern Route

C2 is approximately 239.3 miles long. Residual impacts to biological resources along C2 includes: 28.1 miles of high impact, 176.2 miles of moderate impact, and 35.3 miles of low impact. C2 has the second lowest amount of high residual impacts among the alternatives. C2 would disturb approximately 105 acres from clearing and grading for structures, work areas, and access roads. Impact type, PEPMs, and PMMs applicable to flora and fauna along C2 would be similar to those described above for A1. Impact specific to C2 are described below.

C2 is dominated by sagebrush and secondarily grassland habitats. Riparian tree and shrub habitat is associated with stream and river crossings (see Section 3.3 Water Resources). Impacts to wildlife associated with these communities (see Section 3.2.3) would be prominent along C2. Impacts to fisheries, WPA and high quality sage grouse habitat as the preferred route, therefore impacts to waterfowl and sage grouse habitat would be similar to C2. Impacts to would potentially be the highest (among the four alternatives) for elk and mule deer winter habitat and potentially the highest for elk critical winter habitat. Potential impact would also be the highest (among the four alternatives) for elk calving habitat. There are 19 special status wildlife species and 2 special status plants known to occur along the preferred route. Impacts to these species would be minimized through PEPM 2.13, 5.2 and PMM 9, 14. Potential impacts to avian special status species (ferruginous hawk, northern goshawk, great gray owl, golden eagle, loggerhead shrike, long-billed curlew, American white pelican, black tern, Franklin's gull, marbled godwit, mountain plover, trumpeter swan, white-face ibis, Wilson's phalarope, willet, yellow rail, and yellow-billed cuckoo) would be mitigated further through PEPM 5.4 and PMM 5 and 6. Potential impacts to North American wolverine and Idaho dunes tiger beetle would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (Idaho sedge and blue grama) would be further mitigated through PEPM 5.3. Several PEPM and PMM listed in Table 4.2-3 would be applicable for reducing impacts to these species.

4.2.4.4 C3: Western Route

A3 is approximately 177.6 miles long. There would be a total of 29.6 miles of high, 136.9 miles of moderate, and 11.6 miles of low residual impacts. C3 has second lowest amount of high residual impacts to biological resources. C3 would disturb approximately 78 acres from clearing and grading for structures, work areas, and access road construction. Impact type, PEPMs, and PMMs applicable to flora and fauna along C3 would be similar to those described above for C1. Impact specific to C3 are described below.

C3 is dominated by sagebrush and secondarily grassland habitats. Riparian tree and shrub habitat is associated with stream and river crossings (see Section 3.3 Water Resources). Wildlife associated with these communities (see Section 3.2.3 above) is most likely to be impacted by the proposed transmission line. The lowest amount of potential impact to elk and mule deer winter habitat would occur along C3. The highest amount of potential impact high quality sage grouse habitat would occur along C3. The second highest amount of potential impact to elk calving habitat would occur along C3. There are 11 special status wildlife and 6 special status plant species known to occur along C3. Impacts to these species would be minimized through PEPM 2.13, 5.2 and PMM 9, 14. Potential impacts to avian special status species (golden eagle, great gray owl, ferruginous hawk, bald eagle, mountain plover, loggerhead shrike, Brewer's sparrow, long-billed curlew, and northern goshawk) would be mitigated further through PEPM 5.4 and PMM 5 and 6. Potential impacts to, Canada lynx, and wolverine would primarily include short term mortality, injury, and disturbance. Potential impacts to special status plants species (bugleg goldenweed, mourning milkvetch, winged-seed evening primerose, three-leaf milkvetch, lehmi milkvetch; and spreading gilia) would be further mitigated through PEPM 5.3. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Several PEPM and PMM listed in Table 4.2-3 would be applicable for reducing impacts to these species. Impacts to fisheries, WPA, and winter habitat for pronghorn would not likely occur under C3 due to lack of quality habitat.

4.2.4.5 C4: Sheep Creek INL/Bringham Point

The C4 alignment is approximately 214.3 miles long. C4 contains 11.7 miles of high, 172.1 miles of moderate, and 30.8 miles of low residual impacts to biological resources. Residual impacts to biological resources would be the third highest under C4. C4 would disturb approximately 94.4 acres from clearing and grading for structures, work areas, and access roads. Impact type, PEPMs, and PMMs applicable to flora and fauna along C4 would be similar to those described above for C1. Impact specific to C4 are described below.

Impacts to agricultural and sagebrush habitats and wildlife associated with these communities are at greatest risk of impact from the MSTI project. Riparian tree and shrub habitat and wildlife associated with stream and river crossings (see Section 3.3 Water Resources) would also be subjected to impacts from the MSTI project. Potential impacts to fisheries would occur along Big Lost River, Sand and Sid Lakes under C4. Potential impacts to WPA are most likely near Sand and Sid Lakes. The highest amount of potential impact to mule deer winter habitat would occur along C4. The second highest amount of potential impact to critical elk winter and elk winter habitat would occur along C4. The lowest amount of calving habitat and the second highest amount of elk calving habitat within 0.5 miles of a road would occur along C4. The highest amount of high quality sage grouse habitat would occur along C4.

There are 16 special status wildlife species and 4 special status plants known to occur along C4. Impacts to these species would be minimized through PEPM 2.13, 5.2 and PMM 9, 14. Potential impacts to avian special status species (Brewer's sparrow, sage thrasher, sage sparrow, long-billed curlew, loggerhead shrike, sage thrasher, mountain plover, golden eagle, great gray owl, ferruginous hawk, and northern goshawk) would be mitigated further through PEPM 5.4 and PMM 5 and 6. Potential impacts to Idaho dune tiger beetle, northern leopard frog, Townsend's big-ear bat, wolverine, and Canada lynx would primarily include short term mortality, injury, and disturbance. Long term impacts include habitat loss, fragmentation, and human access (disturbance). Potential impacts to special status plants species (three-leaf milkvetch, Picabo milkvetch, lehmi milkvetch, and

spreading gilia) would be further mitigated through PEPM 5.3. Several PEPM and PMM listed in Table 4.2-3 would be applicable for reducing impacts to these species.

4.2.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.2.5.1 New Townsend Substation

The new substation south of Townsend would disturb of approximately 80-100 acres of land dominated by agriculture. Riparian tree and shrub habitat is associated with the Missouri River which is nearby and may indirectly impact wildlife occupying those habitats. Impacts to biological resources includes habitat change and habitat disturbance. Construction noise, dust, and human presence would be localized and temporary. Minimal human presence would occur intermittently over the long term for maintenance activities. Construction BMP's would minimize potential impacts to the Missouri River Class 1 fishery and aquatic biota associated with the Missouri River. Impacts to waterfowl would similar to those described above for the Preferred Alternative. Impacts to: big game summer and winter habitat; grouse habitat and leks; wildlife movement corridors, and special status plants are not likely from the new substation due to lack of quality habitat. There are three special status wildlife species known to occur in the vicinity of the new substation. These three species include: bald eagle, heron rockeries, and northern leopard frog. Impacts to these three species are not likely from the new substation. Habitat for these species is associated with the Missouri River. While this habitat is in the general vicinity of the substation site it is not in the immediate area of the substation site.

4.2.5.2 Mill Creek Substation Addition

Mill Creek Substation would disturb approximately 42 acres land dominated by grassland habitat. Impacts to biological resources includes habitat change and habitat disturbance. Construction noise, dust, and human presence would be localized and temporary. Minimal human presence would occur intermittently over the long term for maintenance activities. The Mill Creek substation is in the vicinity of elk and mule deer winter range (lower elevation grass and shrub habitat). Impacts to wintering game would be minimized through timing limitations. Further more construction would impose short-term, localized impacts to winter game species. Impacts to: summer elk habitat and winter range for bighorn sheep, moose, and pronghorn, sage grouse habitat and leks, wildlife movement corridors, special status species (plants and wildlife), and waterfowl production areas are not likely due to the lack of quality habitat present.

4.2.5.3 Midpoint Substation Addition

The Midpoint substation would disturb land already impacted from the existing substation. Land in the vicinity of the substation is dominated by agriculture and sagebrush habitat. Impacts to biological resources includes habitat change and habitat disturbance. Construction noise, dust, and human presence would be localized and temporary. Minimal human presence would occur intermittently over the long term for maintenance activities. Construction BMP's would minimize potential impacts to biota associated with adjacent habitats. Impacts to waterfowl would similar to those described above for the C1. Impacts to: big game summer and winter habitat, grouse habitat and leks, wildlife movement corridors, and special status plants are not likely from the new substation due to lack of quality habitat. There are 4 special status wildlife species known to occur in the vicinity of the new substation. These four species include: loggerhead shrike, Brewer's sparrow, sage sparrow, and long-billed curlew. Impacts to these four species are not likely from the substation. Habitat for these

species is associated with adjacent lands. While this habitat is in the general vicinity of the substation site it is not in the immediate area of the substation site.

4.2.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to biology from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to biology from construction, operation, or maintenance of the communication system are anticipated.

4.3 WATER AND WETLAND RESOURCES

4.3.1 INTRODUCTION

This section describes the potential water resource impacts that could result from the construction, operation, and maintenance of the MSTI Transmission Line Project.

4.3.2 METHODS FOR ASSESSING IMPACTS

A primary 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 Volume IV). Many sensitive features were avoided through the regional study; however, 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 alternative route link study corridors and prepare an impact assessment and mitigation planning procedure.

Impacts to water resources were evaluated considering the following factors:

- Construction, operation, and maintenance related impacts after implementation of environmental protection measures.
- Occurrence of affected water resource areas.
- Water resource sensitivity levels.
- Access level category (level of impact expected from ground disturbance).
- Specifically recommended mitigation measures to reduce initial impact levels.

4.3.2.1 Impact Level

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.

The criteria for assessing the initial ground disturbance impacts to water resources are summarized in Table 5.2-5 in the Water and Wetland Resources Technical Report in Volume II.

4.3.2.2 Impact Type

The types of impacts which may occur to water and wetland resources as a result of the MSTI Project include the following:

- Contamination of surface water from erosion, storm water runoff, or air emissions that could create or contribute to a violation of waste discharge requirements.
- Surface water quality degradation which causes a long-term loss of human use or use by aquatic wildlife and plants.
- Surface water quality degradation that exceeds state-established standards for designated uses.
- Alteration of existing drainage pattern of the site or area that would result in off-site erosion or siltation.
- Surface water impacts that would violate Section 404 of the Clean Water Act or other applicable surface water regulations.
- Groundwater quality degradation that causes groundwater quality to exceed state or Federal standards.
- Groundwater depletion or interference with groundwater recharge that adversely affects existing or proposed uses of the groundwater aquifer.
- Degradation or loss of any Federal or state protected wetlands(s), as defined by Section 404 of the Clean Water Act or other applicable regulations. Mitigation for losses of wetlands may be required as part of a Section 404 permit.

- Indirect loss of wetlands or riparian areas, caused by degradation of water quality, diversion of water sources, or erosion and sedimentation resulting from altered drainage patterns.
- Structures within a 100-year flood hazard area as mapped by the Federal Emergency Management Agency (FEMA), which would impede or redirect flood flows.

4.3.2.3 Specific Mitigation Measures

Specifically recommended mitigation measures would be used on a site-specific basis to minimize impacts to water resources. The specific mitigation measures are listed in Volume I-C, Appendix C.

The specific mitigation measures used to comply with water quality standards and reduce impacts from water quality degradation, alteration of existing drainage patterns, and groundwater quality degradation include:

- 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.
- To minimize ground disturbance and/or reduce scarring of the landscape, the alignment of any new access roads or cross-county route will follow the landform contours in designated areas when practicable, providing that such alignment does not impact resource values additionally.
- 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.
- To minimize ground disturbance, the tower design will be modified or an alternative tower type will be used.

The specific mitigation measures used to reduce impacts to federally protected wetlands include:

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

The specific mitigation measures used to reduce impacts within the 100-year FEMA flood zones include:

- 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.
- To minimize sensitive feature disturbance and/or reduce visual contrast, 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.

4.3.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

4.3.3.1 No Action

Under the No Action Alternative, the MSTI project would not be constructed and no water and wetland resource impacts would occur.

4.3.3.2 Townsend to Mill Creek (Melrose) Segments

A1: PREFERRED ROUTE

The A1: Preferred Route alignment is approximately 112.9 miles long. There would be a total of 18.3 miles of low and 1.7 miles of moderate residual impacts. The main impacts include:

- crossing the Missouri River, a class I fisheries resource river and navigable waterway, and the associated riparian wetlands and designated floodplain;
- crossing the Boulder River;
- crossing the Big Hole River, a class I fisheries resource river;
- crossing 27 segments with perennial streams;
- crossing 201 segments with intermittent streams;
- crossing 8.7 miles of wetlands (interpreted); and
- crossing Homestake Lake located in the Homestake Recreation Area.

The A1: Preferred Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 49.9 acres. Estimated ground disturbance would be: 51.9 miles of low access levels, 38.7 miles of moderate access levels, and 22.6 miles of high access levels.

A2: PARALLEL COLSTRIP LINES ROUTE

The A2 route alignment is approximately 121.7 miles long. There would be a total of 16.6 miles of low and 10.0 miles of moderate residual impacts. This alternative has the highest impacts of the three routes between Townsend and Mill Creek, with 1.7 fewer miles of low residual impacts and 8.3 more miles of moderate residual impacts than the Preferred Route. The main impacts include:

- crossing the Missouri River, a class I fisheries resource river and navigable waterway, and the associated riparian wetlands and designated floodplain;
- crossing 50 segments with perennial streams;
- crossing 143 segments with intermittent streams;
- crossing the Big Hole River, a class I fisheries resource river; and
- crossing 10.6 miles of wetlands (interpreted).

A2 ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 53.7 acres, 3.8 acres more than the A1: Preferred Route. Estimated ground disturbance for A2 would have the same low access levels, 13.7 fewer miles of moderate access levels, and 22.4 more miles of high access levels than the A1: Preferred Route. This alternative would have the greatest miles of high access levels at 45 miles.

A3: MAXIMIZE UTILITY CORRIDORS

The A3 route alignment is approximately 128.8 miles long. There would be a total of 14.8 miles of low and 2.0 miles of moderate residual impacts. A3 has fewer low residual impacts (3.5 miles) than the A1: Preferred Route, but slightly more moderate residual impacts (0.3 miles) than the A1: Preferred Route. The main impacts include:

- crossing the Missouri, Boulder, and Big Hole Rivers, and Homestake Lake as described under the Preferred Route in this section (4.3.3.2);
- crossing 32 segments with perennial streams;
- crossing 197 segments with intermittent; and
- crossing 11.0 miles of wetlands (interpreted).

A3 ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 56.9 acres, 7 acres more than the A1: Preferred Route. Estimated ground disturbance for A3 would have 19.3 more miles of low access levels, 7.5 fewer miles of moderate access levels, and 4.4 more miles of high access levels than the Preferred Route.

4.3.3.3 Mill Creek to State Line Segments

B1: PREFERRED ROUTE

The B1: Preferred Route alignment is approximately 87.1 miles long. There would be a total of 15.5 miles of low and 2.4 miles of moderate residual impacts. The main impacts include:

- crossing the Beaverhead River, a class I fisheries resource river;
- crossing the Red Rock River;
- crossing 13 segments with perennial streams;
- crossing 197 segments with intermittent streams; and
- crossing 13.9 miles of wetlands (5.7 interpreted, 8.2 NWI).

The B1: Preferred Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 38.5 acres. Estimated ground disturbance would be: 28.2 miles of low access levels, 35.3 miles of moderate access levels, and 23.8 miles of high access levels.

This alternative has the highest moderate and high access levels of the Mill Creek to State Line Segments.

B2: SHEEP CREEK ROUTE

The B2 route is approximately 86.9 miles long. There would be a total of 3.4 miles of low and 0.7 miles of moderate residual impacts. This alternative has the least residual impacts of the three alternatives from Mill Creek to the state line, 12.1 fewer miles of low residual impacts and 1.7 fewer miles of moderate residual impacts than the B1: Preferred Route. The main impacts include:

- crossing 28 segments with perennial streams;
- crossing 110 segments with intermittent streams;
- crossing 5.9 miles of wetlands (interpreted);

B2 ground disturbance from clearing and grading for structures, work areas, and access roads would disturb the same estimated acres as the B1: Preferred Route. Estimated ground disturbance would be 51 more miles of low access levels, 29.7 fewer miles of moderate access levels, and 21.6 fewer miles of high access levels than the B1: Preferred Route. This alternative has the fewest moderate and high access levels of the Mill Creek to State Line Segments.

B3: I-15 ROUTE

The B3 route alignment is approximately 88.4 miles long. There would be a total of 14.5 miles of low and 2.1 miles of moderate residual impacts. B3 is comparable to the B1: Preferred Route described in this section (4.3.3.3). The main impacts include:

- crossing the Beaverhead River, a class I fisheries resource river;
- crossing the Red Rock River;
- crossing 13 segments with perennial streams;
- crossing 161 segments with intermittent streams; and
- crossing 15 miles of interpreted wetlands (5.7 interpreted, 9.3 NWI);

B3 ground disturbance would be similar to the Preferred Route. Alternative B3 would disturb an estimated one acre more than the B1 Preferred Route. Estimated ground disturbance would be 4.1 fewer miles of low access levels, 2.5 fewer miles of moderate access levels, and 2.1 fewer miles of high access levels. The access levels for this alternative are comparable to the B1: Preferred Route.

4.3.3.4 Townsend to Pipestone/Mill Creek to State Line Route

AB1: I-15 JEFFERSON VALLEY ROUTE

The AB1: I-15 Jefferson Valley Route is approximately 200 miles long. There would be a total of 32.5 miles of low and 3.3 miles of moderate residual impacts. The main impacts include:

- crossing the Missouri, Boulder, and Big Hole Rivers, and Homestake Lake;
- crossing the Beaverhead and Red Rock Rivers;
- crossing 18.9 miles of wetlands (10.7 interpreted, 8.2 NWI);

- crossing 40 segments with perennial streams; and
- crossing 384 segments with intermittent streams.

The ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 92 acres. Estimated ground disturbance would be: 78.3 miles of low access levels, 80.5 miles of moderate access levels, and 51 miles of high access levels.

4.3.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.3.4.1 No Action

Under the No Action Alternative, the Idaho portion of the MSTI project would not be constructed and no water and wetland resource impacts would occur.

4.3.4.2 Stateline to Midpoint Routes

C1: PREFERRED ROUTE

The C1: Preferred Route alignment is 232.6 miles long. There would be 9.7 miles of low and 0.8 miles of moderate residual impacts for a total of 10.5 miles of impacts. The main impacts include:

- crossing the Big Lost River;
- crossing 12 segments with perennial streams;
- crossing 139 segments with intermittent streams;
- crossing 4.2 miles of wetlands (NWI); and
- crossing Sid Lake and Sand Lake (intermittent).

The C1: Preferred Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 102 acres. Estimated ground disturbance would be: 151.1 miles of low access levels, 74.0 miles of moderate access levels, and 7.8 miles of high access levels.

C2: EASTERN ROUTE

The C2: Eastern Route alignment is 239.3 miles long. There would be a total of 11.2 miles of low and 0.6 miles of moderate residual impacts. This alternative has the highest total impacts of the four routes at 11.8 miles, but the second lowest in moderate residual impacts at 0.6 miles. C2 has 1.5 more miles of low residual impacts and 0.2 fewer miles of moderate residual impacts than the C1: Preferred Route. The main impacts include:

- crossing 13 segments with perennial streams;
- crossing 131 segments with intermittent streams;
- crossing 3.4 miles of wetlands (NWI);
- crossing Sid Lake and Sand Lake (intermittent); and
- crossing 20 segments of FEMA designated flood zones.

The C2: Eastern Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 105 acres, 3 acres more than the C1: Preferred Route. Estimated ground disturbance would have 5.31 fewer miles of low access levels, 14.2 more miles of moderate access levels, and 2.2 fewer miles of high access levels than the Preferred Route. This alternative has the highest moderate access levels of the Stateline to Midpoint Routes at 88.2 miles.

C3: WESTERN ROUTE

The C3: Western Route alignment is 177.6 miles long. There would be a total of 6.1 miles of low and 1.6 miles of moderate residual impacts. The C3: Western Route would have the least total residual impacts of the four alternatives at 7.7 miles, but the most moderate impacts of the four alternatives at 1.6 miles. C3 has 3.6 fewer miles of low residual impacts than the C1: Preferred Route, but 0.8 more miles of moderate residual impacts than the C1: Preferred Route. The main impacts include:

- crossing the Big Lost River and Big Lost River sinks (intermittent);
- crossing Nichols Reservoir (intermittent);
- crossing the Little Wood River six times and Silver Creek once;
- crossing 15 segments with perennial streams;
- crossing 134 segments with intermittent streams;
- crossing 5.0 miles of wetlands (3.7 NWI, 1.3 interpreted); and
- crossing 3 segments with FEMA designated flood zones.

The C3: Western Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 78 acres, 24 acres less than the C1: Preferred Route. Estimated ground disturbance for Alternative 2 would have 27.8 fewer miles of low access levels, 45.9 fewer miles of moderate access levels, and 18.9 more miles of high access levels than the C1: Preferred Route. This alternative has the greatest miles of high access levels of the four alternatives at 26.7 miles.

C4: SHEEP CREEK INL/BRIGHAM POINT ROUTE

The C4: Sheep Creek INL/Brigham Point Route alignment is 214.3 miles long. There would be a total of 8.3 miles of low and 0.1 miles of moderate residual impacts. This alternative has the least amount of moderate residual impacts of the four alternatives at 0.1 miles and the second lowest total impacts at 8.4 miles. This alternative has 1.4 fewer miles of low residual impacts than the C1: Preferred Route and 0.7 fewer miles of moderate residual impacts. The main impacts include:

- crossing the Big Lost River (intermittent);
- crossing 7 segments with perennial streams;
- crossing 118 segments with intermittent streams;
- crossing Sid Lake and Sand Lake (intermittent); and
- crossing 2.6 miles of wetlands (NWI).

The C4: Sheep Creek INL/Brigham Point Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 94.4 acres, 7.6 fewer acres than the C1: Preferred Route. Estimated ground disturbance for C4 would have 5.31 fewer miles of low access levels, 14.2 more miles of moderate access levels, and 2.2 fewer miles of high access levels

than the C1: Preferred Route. This alternative has the lowest miles of high access levels of the four route alternatives at 2.6 miles.

4.3.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.3.5.1 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.

No water resources occur on this site or directly adjacent to this site, therefore there is no potential for impacts. Runoff from this site during storm events would be controlled through the required permits and storm water management plans.

4.3.5.2 Mill Creek Substation Addition

The Project includes modification to the Mill Creek Substation. The modification would include approximately 42 acres of new ground disturbance. No water resources occur on this site, therefore there is no potential for impacts. Runoff from this site during storm events would be controlled through the required permits and storm water management plans.

4.3.5.3 Midpoint Substation Addition

No water resources occur on this site or directly adjacent to this site, therefore there is no potential for impacts. Runoff from this site during storm events would be controlled through the required permits and storm water management plans.

4.3.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to water resources and wetlands from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to water resources and wetlands from construction, operation, or maintenance of the communication system are anticipated.

4.4 GEOLOGY AND SOILS

4.4.1 INTRODUCTION

This section addresses the potential impacts that could occur along the Preferred Route and alternatives that would be related to geology and soils. For geological resources, the key issues are active faults, landslides, and liquefaction-prone areas (see Section 3.4 and the Geology and Soils Technical Report (Volume II)). Soil attributes addressed in this section include erosion by wind and water, and reclamation and revegetation potential.

4.4.2 METHODS FOR ASSESSING IMPACTS

4.4.2.1 Impact Level

GEOLOGY

Potential impact levels were determined by recording the presence/absence of mapped landslides, active faults or areas with high potential for liquefaction. Geology-related impacts due to Cretaceous shales, lacustrine sediments and intrusive rocks were dependant on slope and access levels.

Impact levels relating to geologic features are defined as follows:

- High impact – a high level of impact would result if ground movement could occur due to the presence of landslides or active faults. High impacts would include the destabilization or toppling of towers and infrastructure failure of substations and roads. These impacts are not related to slope or access levels. Conditions that were classified as high impact included:
    - Location of project infrastructure on mapped landslides or active faults.
    - Ground disturbance on steeply sloping terrain underlain by Cretaceous shales. An example would be new road construction on terrain with Access Level 5 or 6 underlain by Cretaceous shales
    - Location of construction activities in areas with high potential for landslides and reclamation constraints on terrain with Access Level 5 or 6 underlain by Cretaceous shales.

- Moderate impact –Conditions classified as moderate impact included:
    - Ground disturbance on moderately sloping terrain underlain by Cretaceous shales, intrusive or lacustrine sediments. An example would be new road construction on moderately sloping terrain with Access Level 4 on terrain underlain by Cretaceous shales or with Access Level 5 underlain by intrusive rocks.
    - Locations with moderate soil erosion or productivity loss potential on terrain with Access Level 4 underlain by Cretaceous shales or on terrain with Access Level 5 underlain by intrusive rocks.

Moderate impact levels were not assigned to areas with landslides, liquefaction or active faults.

- Low impact – a low level of impact was determined by the presence of liquefiable sediments. Conditions classified as low impact included:

    - Ground disturbance on gently sloping terrain underlain by Cretaceous shales, intrusive rocks, or lacustrine sediments. An example would be new road construction on gently sloping terrain with Access Level 2 or 3.
    - Location on areas of low soil erosion or productivity loss potential on terrain underlain by Cretaceous shales, intrusive rocks, or lacustrine sediments.

- No Identifiable Impact – No identifiable impact to the MSTI infrastructure would occur in the absence of the underlying causal geologic features.

SOILS

The primary concerns in connection with soil resources are to avoid or minimize potential impacts related to wind and water erosion during and after construction. Factors considered in conducting the impacts analysis include the erosion of certain soil types; the intensity, duration and frequency of impacts; and the ability to reduce the potential impact by pre-construction investigation.

Ground disturbance levels were estimated by considering the slope and amount of disturbance related to building pads, set-up sites, upgrade of existing roads, construction of new access roads, turn-around areas, material lay-down, storage and yarding, and the new substation site at Townsend. Disturbance to soil resources from construction activities could be either temporary or permanent.

Potential impact levels were estimated by combining projected ground disturbance levels, soil characteristics (T, Kw and WEG), and project protocols. Impact levels relating to soils are defined as follows:

- High impact – a high level of impact to soil resources would result if the construction, operation, maintenance or abandonment of the MSTI would potentially cause a substantial erosion hazard or loss of soil productivity potential. Conditions classified as high impact included:

    - Construction activities in steep terrain. An example would be new road construction in sloping terrain with Access Level 5 or 6.
    - Construction in areas of high soil erosion or productivity loss potential.

- Moderate impact – a moderate level of impact to soil resources would result if the construction, operation, maintenance or abandonment of the MSTI would potentially cause some erosion hazard or loss of soil productivity potential. Conditions classified as moderate impact included:

    - Construction activities in flat to moderately sloping terrain. An example would be new road construction on gently sloping terrain with Access Level 3 or 4.
    - Construction in areas of moderate soil erosion or productivity loss potential.

- Low impact – a low level of impact to soil resources would result if the construction, operation, maintenance or abandonment of MSTI would potentially cause a small erosion hazard or loss of soil productivity potential. Conditions classified as low impact included:

    - Ancillary activities related to construction. An example would be using unimproved existing roads or overland travel in agricultural areas.
    - Construction activities in areas of low soil erosion or productivity loss potential.

- No Identifiable Impact – No identifiable impact to soil resources would be identified where no loss of soil or loss of productive potential would occur.

All soil units affected by MSTI would be subject to some level and type of disturbance. Soil surface disturbance, compaction and erosion would occur to varying degrees. These disturbances would likely result in some increase to wind and water erosion rates and loss of productivity levels, and lead to a loss of soil resources.

4.4.2.2 Impact Type

GEOLOGY AND SOILS

The proposed MSTI alternatives could be impacted *by* geology and soils or could cause impacts *to* the environment. Impacts include:

- Ground movement associated with landslides and ground rupture associated with active faults could cause impacts to the project infrastructure.
- Site grading and excavation that expose soil to potential erosion are impacts that the proposed project could cause to the environment.

Disturbance areas were calculated based on the disturbance area assumptions using GIS. Data were first entered into the impact matrix. Once the matrix was constructed, the data was entered into GIS which allowed a systematic link-by-link analysis. Output from the GIS took the form of numeric impact tables and maps that illustrate the spatial distribution of impacts on each link before and after mitigation measures were applied to each impact.

Resource Sensitivity

In constructing the models, relevant features were identified within a one-mile impact zone on either side of the assumed centerline for each route link. This included a description of geologic and erosion impacts which could potentially occur due to encountering:

- Landslides
- Liquefiable geologic units
- Active faults
- Cretaceous shales
- Intrusive rocks
- Lake-bed (lacustrine) sediments

- Highly erodible soils
- Soils with severe reclamation constraints (defined as those developing on Cretaceous shales, intrusive rocks and lacustrine sediments)

These occurrences were mapped and assigned a sensitivity level of high, moderate or low. Sensitivity levels were assigned based on the following considerations:

- Known occurrences of mapped landslides, potentially liquefiable units or active faults were assumed to have high sensitivity to the project.

- Sensitivity due to the presence of Cretaceous shales, intrusive rocks and lacustrine sediments was based on access levels. Ground disturbance occurring on sloping ground was considered more sensitive than ground disturbance on level ground.4.4.2.3 Specific Mitigation Measures

Volume I-C, Appendix B, includes a list of proposed Environmental Protection Measures that are incorporated in the Project Description pending further discussions between NorthWestern, MDEQ and other agencies. Many of these measures would contribute to reducing potential impacts related to geological and soil resources.

No specific mitigation measures directly related to geology and soils are included in Appendix B (Volume I-C). To minimize potential structural failure of the transmission towers due to ground rupture or landslides, a reconnaissance–level field mapping effort is recommended as part of project planning and construction. The geologic mapping would identify the location of active faults and landslides shown on the source maps used for the Technical Report (Volume II). Appropriate set-backs from all mapped faults would be established for all project related structures. The landslide maps would include figures showing the aerial extent of the landslides, and a description of the landslide geology, surface features, and hydrogeology. Where possible, structures and roads would avoid landslide areas. Where not possible to avoid disturbance on landslide areas, all roads and structures would be designed with appropriate measures to minimize engineering risk.

Lands administered by the BLM within the Craters of the Moon National Monument and the Great Rift National Natural Landmark are subject to the four management actions specified in Section 2.0 Regulatory Framework of the Geology and Soils Technical Report (see Volume II). Management action implementation will require coordination with U.S. Department of Interior Resource Specialists to conduct field reconnaissance studies to identify sensitive geologic features and biological soil crusts prior to the start of construction. The results of the field studies will indicate the presence of sensitive unique features, if present, that may be avoided or mitigated in the construction planning process.

With the performance of pre-construction geological investigations, it is anticipated there would be no alternate route links with moderate or high potential impacts. Where initial impacts are low, no additional mitigation is necessary.

4.4.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

Impacts associated with geologic resources and soils are summarized in Tables 4.4-1 and 4.4-2. They are addressed in more detail in the Geology and Resources Technical Report in Volume II.

4.4.3.1 No Action

Geology

No impacts to the MSTI project directly related to geologic hazards would occur under the No Action Alternative.

Soils

No impacts to soil resources directly related to the MSTI project activities would occur under the No Action Alternative.

4.4.3.2 Townsend to Mill Creek (Melrose) Segment

Table 4.4-1 Geology Impacts

	Geologic Feature			
Alternative	Intrusives (miles)	Cretaceous Shales (miles)	Landslides (miles)	Active Faults (number)
A1	4.9	0.6	0.1	2
A2	16.9	0.3	0.0	0
A3	2.7	0.0	0.0	2
B1	0.0	1.1	0.0	1*
B2	0.0	0.1	3.4	1
B3	0.0	0.0	0.0	5
AB1	2.5	2.3	0.0	4*

*Parallel to corridor for 2.3 miles but not crossing corridor

Table 4.4-2 Potentially High Soil Impacts

Alternative	High Potential Impacts (Miles)
1	11.3
A2	12.4
A3	17.9
B1	4.2
B2	0.0
B3	4.8
AB1	13.0

A1: PREFERRED ROUTE

Geology

Alternative A1 has 5.8 miles of moderate to high potential impacts due to the presence of active faults and intrusive rocks and Cretaceous shales on steep slopes. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

Alternative A1 has 11.3 miles of high potential impacts due to water erosion and soil productivity characteristics. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

A2: PARALLEL COLSTRIP LINES ROUTE

Geology

A2 has 17.6 miles of moderate to high potential impacts due to the presence of intrusive rocks and Cretaceous shales on steep slopes. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

A2 has 12.4 miles of high potential impacts due to water erosion and soil productivity characteristics. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

A3: MAXIMIZE UTILITY CORRIDORS

Geology

A3 has 2.9 miles of moderate to high potential impacts due to the presence of active faults and intrusive rocks on steep slopes. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

A3 has 17.9 miles of high potential impacts due water erosion and soil productivity characteristics. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

4.4.3.3 Mill Creek to State Line Segment

B1: PREFERRED ROUTE

Geology

B1 has 3.4 miles of moderate to high potential impacts due to the presence of active faults and Cretaceous shales on steep slopes. Note that in link 16-2, the high impact rating is driven by the presence of a mapped fault trace immediately adjacent but not crossing the transmission line corridor for a distance of 2.3 miles. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

B1 has 4.2 miles of high potential impacts due to susceptibility to water erosion. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

B2: SHEEP CREEK ROUTE

Geology

B2 has 3.6 miles of moderate to high potential impacts due to the presence of Cretaceous shales on steep slopes, landslides and an active fault. Note that link 18-1 includes five landslide zones that in aggregate total 3.4 miles, of which the longest single zone is 1.6 miles long. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

B2 has no high potential impact to soil resources.

B3: I-15 ROUTE

Geology

B3 has 0.5 mile of high potential impacts due to the presence of five active faults in link 16-3. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

B3 has 4.8 miles of high potential impacts due to susceptibility to water erosion. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

4.4.3.4 Townsend to Pipestone/Mill Creek to State Line Route

AB1: I-15 JEFFERSON VALLEY ROUTE

Geology

AB1 has 10.2 miles of moderate to high potential impacts due to the presence of active faults and intrusives and Cretaceous shales on steep slopes. Note that in Link 16-2, the high impact rating is driven by the presence of a mapped fault trace immediately adjacent but not crossing the transmission line footprint for a distance of 2.3 miles. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

Soils

The AB1: Jefferson Valley Route has 13.0 miles of high potential impacts due to water erosion and soil productivity characteristics. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

4.4.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

Impacts associated with geologic resources and soils are summarized in Tables 4.4-3 and 4.4-4. They are addressed in more detail in the Geology and Resources Technical Report in Volume II.

Table 4.4-3 Miles of Geologic Features by Alternative

	Geologic Feature				
Alternative	Landslides	Active Faults	Lacustrine	Special Management Area	Total
Preferred Route	0.0	0.4	3.3	5.5	9.2
Alternative 1 - Eastern Route	0.0	0.2	3.4	5.5	9.1
Alternative 2 - I-15, Craters	0.0	1.0	3.3	21.8	26.1
Alternative 3 - Western Route	5.2	0.7	8.2	0.0	14.1
Alternative 4 - INL, Craters	5.2	1.2	3.3	21.8	31.5
Alternative 5 - INL, Brigham Point	5.2	0.5	3.3	5.5	14.5

Table 4.4-4 Miles of High Soil Impact by Alternative

Alternative	High Initial Impacts (Miles)
Preferred Route	0.0
Alternative 1 - Eastern Route	0.0
Alternative 2 - I-15, Craters	0.0
Alternative 3 - Western Route	11.7
Alternative 4 - INL, Craters	0.0
Alternative 5 - INL, Brigham Point	0.0

4.4.4.1 No Action

Geology

No impacts to the MSTI project directly related to geologic hazards would occur under the No Action Alternative.

Soils

No impacts to soil resources directly related to the MSTI project activities would occur under the No Action Alternative.

4.4.4.2 Stateline to Midpoint Routes

C1: Preferred Alternative

Geology

The C1: Preferred Alternative has 9.2 miles of moderate to high potential impacts due to the presence of active faults, lacustrine deposits and lands administered by the BLM. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.2) would result in low or no impact.

Soils

The C1: Preferred Alternative has no high potential impacts due soil attributes. Implementing the Environmental Protection Measures in Volume I-C, Appendix B, would result in moderate, low or no impact.

C2: Eastern Route

Geology

The C2: Eastern Route has 9.1 miles of moderate to high potential impacts due to the presence of active faults, lacustrine deposits and lands administered by the BLM. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.2) would result in low or no impact.

Soils

C2 has no high potential impacts due soil attributes. Implementing the Environmental Protection Measures in Volume I-C, Appendix B, would result in moderate, low or no impact.

C3: Western Route

Geology

The C3: Western Route has 14.1 miles of moderate to high potential impacts due to the presence of landslides, active faults, lacustrine deposits and lands administered by the BLM. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.2) would result in low or no impact.

Soils

C3 has 11.7 miles of high potential impacts due disturbance of soils with the least resilient T-Factor on slopes greater than 15%. Implementing the Environmental Protection Measures in Volume I-C, Appendix B, would result in reduction of high impacts to moderate.

C4: Sheep Creek INL/Brigham Point

Geology

The C4: Sheep Creek INL/Brigham Point route has 14.5 miles of moderate to high potential impacts due to the presence of landslides, active faults, lacustrine deposits and lands administered by the BLM. Implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.2) would result in low or no impact.

Soils

C4 has no high potential impacts due soil attributes. Implementing the Environmental Protection Measures in Volume I-C, Appendix B, would result in moderate, low or no impact

4.4.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.4.5.1 New Townsend Substation

The construction of the new Townsend Substation would have no moderate or high potential impacts to either geology or soils.

4.4.5.2 Mill Creek Substation Addition

The exact location of the proposed addition at the Mill Creek Substation is not yet known. However, implementation of recommendations following pre-construction geologic investigations (Section 4.4.2.3) would result in low or no impact.

4.4.5.3 Midpoint Substation Addition

Modification of the existing Midpoint Substation has no initial high impacts.

4.4.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to geology and soils from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to geology and soils from construction, operation, or maintenance of the communication system are anticipated.

4.5 PALEONTOLOGICAL RESOURCES

4.5.1 INTRODUCTION

The loss of any identifiable fossil that could yield information important to science, or that embodies the distinctive characteristics of a type of organism, environment, period of time, or geographic region, would constitute a significant environmental consequence. Direct impacts on paleontological resources primarily concern the potential destruction of non-renewable paleontological resources and the loss of information associated with these resources. This includes the non-professional collection of fossil remains.

4.5.2 METHODS FOR ASSESSING IMPACTS

If geologic units potentially containing scientifically significant fossils are disturbed, the disturbance could result in the destruction of those resources and subsequent loss of information. At the project-specific level, direct initial impacts can be mitigated to below a significant level through the implementation of paleontological mitigation. Surface disturbance may result in the exposure of fossils that may never have been unearthed via natural processes. If mitigation measures are implemented, these newly exposed fossils become available for salvage, data recovery, scientific analysis, and preservation into perpetuity at a public museum. The need for implementing any measures at any particular location along the transmission line would be determined by the land-holding state or federal agency based on relevant regulations, plans, and policies.

Paleontological resource sensitivity is defined as the potential for a geologic unit to produce scientifically significant fossils. Due to the nature of the fossil record, paleontologists cannot know either the quality or the quantity of fossils present in a given geologic unit prior to natural erosion or human-induced exposure. Therefore, in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce scientifically significant fossils elsewhere within the same geologic unit (both within and outside of the project area).

The paleontological sensitivity of the geologic units underlying the MSTI project area was evaluated using the Potential Fossil Yield Classification (PFYC) system as outlined above in Chapter 3, Section 3.5.

The MSTI project would create a significant impact if it would:

- Directly or indirectly disturb or destroy a significant paleontological resource, or
- If it would be inconsistent with any management plan regarding paleontological resources on public lands.

Examples of activities that could directly disturb or destroy paleontological resources include excavation, trenching, boring, tunneling or any other activity that disturbs the subsurface geologic unit. Indirect disturbances or destruction refers to activities where the disturbance or destruction of paleontological resources is reasonably foreseeable, such as where the project would lead to increased erosion or non-professional surface collection or subsurface excavation (e.g., workers onsite collecting fossils).

A paleontological resource or site can be considered "significant" when it meets any of the following criteria:

- It is the best example of its kind locally or regionally
- Illustrates a geologic principle
- Provides a critical piece of paleobiological data
- Encompasses any part of a "type locality" of a fossil or formation
- Contains a unique or particularly unusual assemblage of fossils
- Occupies a unique position stratigraphically
- Occupies a unique position, proximally, distally or laterally within a formation's extent or distribution

4.5.2.1 Impact Level

Construction and ongoing operations associated with the MSTI project have the potential to impact significant paleontological resources. The criteria used to define significant paleontological resources are outlined above. Four classes of potential impact levels are recognized:

Class A – High

Impacts caused by project construction or operation that can only be mitigated to a level that is less than significant through mitigation measures, such as extensive field surveys, planning, training, testing, monitoring, or data recovery.

Class B – Moderate

Impacts caused by project construction or operation that can be mitigated to a level that is less than significant through limited mitigation measures, such as limited field surveys to determine if additional mitigation efforts are warranted, as well as training.

Class C – Low

Impacts caused by project construction or operation that would not cause substantial harm to paleontological resources or that can be avoided through mitigation.

Class D – None Identifiable

Impacts caused by project operations that have no bearing on paleontological resources. This would include operations in areas where no paleontologically sensitive geologic units have been identified.

4.5.2.2 Impact Type

In general, for project areas that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance, the higher the potential for impacts to paleontological resources. For project areas that are directly underlain by geologic units with no paleontological sensitivity, there is no potential for impacts on paleontological resources.

Direct impacts result from activities related to construction and occur at the same time and place as the surface disturbing action. The potential for direct impacts on scientifically significant surface and subsurface fossils in fossiliferous sedimentary deposits is controlled by two factors. These include: 1) the depth and lateral extent of disturbance of fossiliferous bedrock and/or surficial sediments; and 2) the depth and lateral extent of occurrence of fossiliferous bedrock and/or surficial sediments beneath the surface. Ground disturbance has the potential to adversely impact an unknown quantity of fossils which may occur on or underneath the surface in areas containing paleontologically sensitive geologic units. Without mitigation, these fossils, as well as the paleontological data they could provide if properly salvaged and documented, could be adversely impacted (destroyed), rendering them permanently unavailable for future scientific research.

Indirect impacts occur later in time or further away in distance than direct impacts, but are still reasonably foreseeable. They typically include those impacts which result from the normal ongoing operations of facilities constructed within the project area. An example of an indirect adverse impact on paleontological resources would be the construction of a new road that increases public access to a previously inaccessible area and results in non-professional fossil collecting and vandalism.

4.5.2.3 Specific Mitigation Measures

The following preliminary specifically recommended mitigation measures have been developed to ensure that potential direct and indirect initial impacts associated with the proposed project operations do not create Class A or Class B impacts as defined above in the Section 4.5.2.1. The need for implementing any one or more of these measures at any particular location along the transmission line would be determined by the land-holding state or federal agency (e.g., BLM, USFS, MDNRC) based on relevant regulations, plans, and policies.

- **PAL-1.** Inventory and evaluate paleontological resources in the Final Area of Potential Effects (APE).
- **PAL-2.** Develop a Paleontological Monitoring and Treatment Plan.
- **PAL-3.** Monitor construction for paleontological resources in locations with paleontological sensitivity.
- **PAL-4.** Conduct paleontological data recovery if avoidance of a significant paleontological resource is not feasible.
- **PAL-5.** Train construction personnel to recognize and protect paleontological resources during construction.

4.5.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

The Paleontological Resources Technical Report (see Volume II) addresses the potential effects of alternative route links, milepost by milepost, on paleontological resources.

All routes discussed below would cross a variety of geologic units with varying degrees of paleontological sensitivity, ranging from Class 1 (very low) to Class 5 (very high) based on the PFYC system. Based on this paleontological sensitivity ranking system, geologic units classified as Class 3 or higher may require the implementation of mitigation measures to reduce potential impacts to less than significant. Geologic units with a sensitivity ranking of Class 1 or Class 2 would not require mitigation measures. The need for implementing any one or more of the measures described in

Section 4.5.2.3 at any particular location along the transmission line would be determined by the land-holding state or federal agency (e.g., BLM, USFS, MDNRC) based on relevant regulations, plans, and policies.

4.5.3.1 No Action

The No Action alternative would have no impact on paleontological resources.

4.5.3.2 Townsend to Mill Creek (Melrose) Segment

A1: PREFERRED ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within 1 mile of the centerline along approximately 81.6 miles of A1. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

A2: PARALLEL COLSTRIP LINES ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within 1 mile of the centerline along approximately 50.6 miles of the A2 route. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

A3: MAXIMIZE UTILITY CORRIDOR ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within 1 mile of the centerline along approximately 88.2 miles of the Alternative A3 route. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

4.5.3.3 Mill Creek to State Line Segment

B1: PREFERRED ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within one mile of the centerline along approximately 64.8 miles of B1. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

B2: SHEEP CREEK ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within one mile of the centerline along approximately 61.5 miles of the B2 route. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

B3: I-15 ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within one mile of the centerline along approximately 39.1 miles of the B3 route. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

4.5.3.4 Townsend to Pipestone/Mill Creek to State Line Route

AB1: I-15 JEFFERSON VALLEY ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within one mile of the centerline along approximately 147.2 miles of the AB1 route. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

4.5.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

The Paleontological Resources Technical Report (see Volume II) addresses the potential effects of alternative route links, milepost by milepost, on paleontological resources.

All routes discussed below would cross a variety of geologic units with varying degrees of paleontological sensitivity, ranging from Class 1 (very low) to Class 5 (very high) based on the PFYC system. Based on this paleontological sensitivity ranking system, geologic units classified as Class 3 or higher may require the implementation of mitigation measures to reduce potential impacts to less than significant. Geologic units with a sensitivity ranking of Class 1 or Class 2 would not require mitigation measures. The need for implementing any one or more of the measures described in

Section 4.5.2.3 at any particular location along the transmission line would be determined by the land-holding state or federal agency (e.g., BLM, USFS, MDNRC) based on relevant regulations, plans, and policies.

4.5.4.1 No Action

The No Action alternative would have no impact on paleontological resources.

4.5.4.2 Stateline to Midpoint

C1: PREFERRED ROUTE

No Class 3 or higher paleontologically sensitive geologic units were identified within 1 mile of the centerline of C1. Therefore, the probability of impacting paleontological resources during ground disturbing operations for this route is low and mitigation measures would not be required.

C2: EASTERN ROUTE

No Class 3 or higher paleontologically sensitive geologic units were identified within 1 mile of the centerline of C2. Therefore, the probability of impacting paleontological resources during ground disturbing operations for this route is low and mitigation measures would not be required.

C3: WESTERN ROUTE

Class 3 or higher paleontologically sensitive geologic units were identified within one mile of the centerline along approximately 8.2 miles of C3. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

C4: SHEEP CREEK INL/BRIGHAM POINT

Class 3 or higher paleontologically sensitive geologic units were identified within one mile of the centerline along approximately 8.2 miles of C4. There is a potential for moderate or high initial impacts to paleontological resources in these locations. By implementing one or more of the specific mitigation measures outlined in Section 4.5.2.3 as required by land-holding agencies, the residual impact level to paleontological resources can be reduced to low.

4.5.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.5.5.1 New Townsend Substation

The new Townsend Substation would be located over Quaternary alluvium, which has a low paleontological sensitivity ranking (Class 2). Therefore, the probability of impacting paleontological resources during ground disturbing operations at this proposed facility is low and mitigation measures would not be required.

4.5.5.2 Mill Creek Substation Addition

The exact location of the proposed addition at the Mill Creek Substation is not yet known. The general vicinity is located over Quaternary sediments that have a low paleontological sensitivity ranking (Class 2). Therefore, the probability of impacting paleontological resources during ground disturbing operations in the immediate area is low and mitigation measures would not be required.

4.5.5.3 Midpoint Substation Addition

The Midpoint Substation would be located over Pleistocene basalt, which has a very low paleontological sensitivity ranking (Class 1). Therefore, the probability of impacting paleontological resources during ground disturbing operations at this proposed facility is very low and mitigation measures would not be required.

4.5.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to paleontological resources from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to paleontological resources from construction, operation, or maintenance of the communication system are anticipated.

4.6 LAND USE

This section examines the project's potential effects on land use resources. The primary land use issues associated with the project are related to potential physical conflicts with land uses or restriction of access (e.g., conflicts with agricultural operations, grazing areas, mining operations, urban/developed lands, or transportation routes). The specific locations for the transmission towers, materials yards and spur roads have not yet been determined. Therefore, this assessment addresses potential impacts, some of which are likely to be avoided by discretionary site selection decisions by the project engineers and construction contractor. However, for purposes of a conservative analysis in this study, no assumptions are made about specific siting to avoid hazards or impacts.

4.6.1 INTRODUCTION

The impact assessment/mitigation planning process involves assessing impacts by comparing the project alternative routes with the pre-project environment, determining mitigation that would reduce or eliminate impacts, and identifying impacts remaining after application of Specifically Recommended Mitigation measures (residual impacts). The results section reports the residual impacts. Residual impacts to land use resources are quantified by linear mile for the alternative routes. Discrepancies may exist between the sum of residual impacts for each alternative route and

linear mileage of route alignments. The discrepancies arise from numerical rounding and resource overlap based on the 0.1 mile scale used for impact analysis in GIS.

4.6.2 METHODS FOR ASSESSING IMPACTS

A land use impact assessment model was utilized to assess impacts. The model combined resource sensitivity, resource quantity, and resource quality to predict potential impacts. A description of the three impact assessment variables discussed above, is found in Volume II, Land Use Technical Report. The combination of the three assessment variables determined the level of impact (high, moderate, low, or not identifiable impact) assigned to each land use category. Once initial impact levels were established along the alternative routes, specific measures for mitigating or reducing predicted high or moderate impact levels were applied. The "residual" impact represents the impacts remaining after applying the mitigation measures.

The results of the impact assessment and mitigation planning process are presented, in detail, on the Impact Data Table CD. The Impact Data Tables show, by link, the milepost location of potential impacts, access and ground disturbance level, the land use feature, initial impact levels, environmental protection measures, selectively recommended mitigation measures, and residual impact levels.

4.6.2.1 Impact Level

Resource sensitivity was the primary element used to determine initial impact levels for land uses. The presence or absence of existing parallel transmission lines modified the sensitivity level, while access and ground disturbance levels quantified the area of impact. In addition, site specific circumstances were considered, and in some cases modified the impact level. Agency, utility, or public concerns helped determine site-specific factors.

The impact levels are defined as follows:

High Impact - Assigned to those land use categories where the officially stated or approved land use restriction, plan, or policy would be violated, or where land use sensitivity was moderate but has been modified by the lack of access or no existing linear features.

Moderate Impact – Assigned to those land use categories whose sensitivity is moderate and where there is adequate access and/or an existing transmission line is present, or where sensitivity is minimum, new access would be required, and there is no existing transmission line.

Low Impact – assigned to those categories where sensitivity is minimum (excluding the above).

No-Identifiable Impact – Assigned to those land use categories where no measurable impact would occur.

For purposes of this analysis, a construction-related (temporary) land use impact would occur if access to a land use would temporarily be disrupted or if the nature, condition, or operation of a land use would temporarily be altered during construction of the alternative route. An operational (permanent) land use impact would occur if access to a use would permanently be disrupted or if the

nature, condition, or operation of a use would permanently be altered as a result of the Project operation.

4.6.2.2 Impact Type

Physical impacts to land uses were assessed along the centerline of each of the alternative routes for the inventoried land use categories. The impact types identified for land uses along the centerlines of alternative routes are characteristically direct and long-term, and include any impact that:

- Displaces, alters, or otherwise physically affects any existing, developing or planned residential, commercial, industrial, governmental, or institutional use or activity.
- Displaces, alters, or otherwise physically affects any existing agricultural use or activity.
- Displaces, alters, or otherwise physically affects any existing or planned air facility or air travel-related activity.
- Displaces, alters, or otherwise physically affects any area designated as suitable for timber production.
- Alters or otherwise physically affects any established, designated or planned park, recreation, preservation, or educational use area or activity.
- Affects applicable comprehensive and regional plans and/or approved, adopted, or officially stated policies, goals, or operations of communities or governmental agencies.

The effects of the Project to land jurisdiction involve primarily land policies, land management plans, and permitting requirements of federal, state, and local agencies. The land jurisdictions mapped in the inventory were used to identify the potentially affected land agencies and to quantify the land area potentially affected by the study area. In addition, these data were used to assess the socioeconomic impacts (refer to Volume II, Socioeconomic Technical Report).

The crossing or paralleling of existing utilities is a matter of technical coordination and realty agreements with the affected utilities. Impacts were not assessed for these situations.

4.6.2.3 Mitigation Measures

Environmental protection and specifically recommended mitigation measures were applied, where appropriate, to minimize the potential initial high and moderate impact levels identified through the impact assessment model (also refer to Environmental Protection Measures Volume I-C, Appendix B and Specifically Recommended Mitigation Measures described in Volume I-C, Appendix C). 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 and other agencies 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 and other agencies.

Impact assessment assumes that all Environmental Protection Measures would be implemented as a part of the project. Specific mitigation measures are recommended when it is determined that Environmental Protection Measures do not fully mitigate an impact. Measures from the list of Specifically Recommended Mitigation Measures (2, 3, 4, 5, 6, 7, and 8) were applied to land use, on a case-by-case basis, where appropriate (Table 4.6-1).

Table 4.6-1 Specifically Recommended Mitigation Measures – Land Use

Specifically Recommended Mitigation Measure No.	Description
2	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.
3	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.
4	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.
5	To minimize ground disturbance, operational conflicts and/or visual contrast, the tower design will be modified or an alternative tower type will be used.
6	To minimize sensitive feature disturbance and/or reduce visual contrast 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.
7	To reduce visual contrast and/or potential operational conflicts, standard tower design will be modified to correspond with spacing of existing transmission line structures where feasible and within limits of standard tower design. The normal span will be modified to correspond with existing towers, but not necessarily at every location.
8	To reduce visual impacts, potential impacts on recreation values and safety, at highway, canyon and trail crossings, towers are to be placed at the maximum feasible distance from the crossing within limits of standard tower design.

4.6.3 EFFECTS OF EACH ALTERNATIVE

Because many of the alternative routes share links, the analysis first addresses impacts that are common to all of the route alternatives. It then examines impacts that are specific to each of the route alternatives. This serves to reduce redundancy in discussion of the impacts and to present a clearer comparison of the alternatives. A discussion of the No Action alternative is also included.

4.6.3.1 No Action

Under the No Action Alternative, none of the facilities associated with the alternatives evaluated in this ER would be constructed by NorthWestern and, therefore, none of the impacts in this section would occur. However, under the No Action Alternative, NorthWestern could be forced to upgrade other existing facilities or add new transmission capacity elsewhere to compensate for existing system limitations and anticipated future loads. Other transmission options would need to be pursued by NorthWestern if its growth projections are realized, resulting in construction and operational impacts. These impacts would be expected to be similar to those described in 4.6.3.1 for new transmission, but could vary depending on length of transmission line and location pursued.

4.6.3.2 Impacts Common to all Alternative Routes

The following presents the impacts and associated measures (Environmental Protection Measures and Specifically Recommended Mitigation Measures) that are common to all route alternatives. The transmission line would traverse a wide variety of land uses, which pose site-specific constraints and potential for impact. While the constraints and impacts would be specific to given sections of a link, there is a commonality of constraint types and potential impacts, which are described below.

Construction Impacts

Construction would temporarily disturb/disrupt land uses at or near the alignment

Land uses in the area at or near the alternative route alignment would be temporarily disrupted by construction activities such as noise, dust, and traffic. Construction of the Project would temporarily disturb these areas as a result of heavy construction equipment on temporary and permanent access roads, moving building materials to sites and returning to construction staging areas.

Construction of the route would involve installation of new transmission structures. Installation of the new transmission structures would temporarily disturb land use/cover at each structure location. Established land uses at the proposed structure locations would be temporarily displaced during construction.

Short-term land disturbances would result in an initial moderate impact in areas where developed land uses occur within or adjacent to the proposed right-of-way (includes residences within 1,000 feet of an alternative route). Mitigation measures to reduce noise and air quality impacts are presented in Sections 4.12-Noise, and 4.13-Air Quality. Incorporation of Environmental Protection Measures 1.1, 1.2, 1.8 and 2.11 would help minimize land use impacts relating to construction activities by ensuring that: (1) limits of construction determined prior to the start of construction activities would be adhered to; (2) landowners and residents of properties potentially obstructed by construction activities would be notified and access facilitated by providing alternative access where feasible. With incorporation of Environmental Protection Measures 1.1, 1.2, 1.8, and 2.11, construction-related residual land use impacts would be low.

Construction activities would temporarily interfere with active agricultural operations

Active agricultural operations would be temporarily impacted by construction activities associated with the construction and/or expansion of access roads, both temporary and permanent; pulling sites

and construction equipment/vehicle staging areas; and the installation of structures and wires. These construction activities could temporarily interfere with active agricultural operations by damaging or removing crops, impeding access to certain fields or plots of land, obstructing farm vehicles and equipment, disrupting drainage and irrigation systems (including self-propelled irrigation rigs), and disrupting grazing activities, all of which could result in the temporary reduction of agricultural productivity.

The Project would incorporate Environmental Protection Measures to minimize direct impacts to active agricultural operations. Environmental Protection Measure 2.10 would require that construction activities would avoid agricultural areas during certain seasons. Environmental Protection Measure 2.11 requires that notification be provided to all properties that would be obstructed by construction activities. In addition, Environmental Protection Measures 1.1 and 1.2 require that construction activities remain within predetermined limits, which would serve to minimize disruption to agricultural lands and operations outside of the limits of construction to the greatest extent feasible.

Incorporation of these Environmental Protection Measures would reduce impacts relating to the damage and loss of crops and obstruction of access to properties to moderate and low residual levels. Impacts relating to the disruption of grazing activities would also exist. Implementation of Environmental protection measure 2.6 (coordinate with grazing operators) would reduce impacts to a low residual level.

Agricultural Soils. Depending upon the extent of construction required for certain aspects of the Project, soils, including those designated as Important Farmland, would be compacted as a result of construction activities, (i.e. the use of heavy construction equipment). This would create a temporary disturbance to agricultural soils that would impact active agricultural operations, such as the planting of crops. Environmental Protection Measure 2.12 (restore compacted soil) would require that compacted soils within agricultural land would be restored after construction activities are complete. Implementation of Environmental Protection Measure 2.12 would reduce impacts to soils, as a result of compacted soils due to construction activities, to a low residual level.

Construction activities would temporarily reduce access and visitation to Special Management Areas

Project construction activities would create a number of temporary impacts that would diminish the value of Special Management Areas. Noise, dust and heavy equipment traffic generated during construction activities could negatively affect a visitor's enjoyment of these areas. Visitors may be less likely to visit these resources during project construction. Mitigation measures to reduce noise and air quality impacts are presented in Sections 4.12-Noise, and 4.13-Air Quality. The location of construction equipment may also temporarily preclude access to Special Management Areas. Temporary closure of some facilities may occur in order to ensure the safety of visitors during construction. Such closure would cause a temporary reduction of access and visitation.

Construction-related impacts to Special Management Areas would be mitigated to a moderate to low residual level through implementation of Environmental Protection Measures 1.5 (POD including specific plans addressing mitigation requirements in consultation with Agencies), 2.10 (timing to avoid peak use periods/scheduled activities in coordination with relevant agencies), and 2.11 (advanced notice of construction and access provisions).

Construction would cause temporary road and lane closures that would temporarily disrupt traffic flow

Construction of the Project would result in roadway closures at locations where the construction activities, especially transmission line stringing, would be located within right-of-ways of public streets and highways. These transportation impacts, characterized as moderate, could be reduced by implementation of Environmental Protection Measure 2.13 (Obtain an encroachment permit or similar authorization). Encroachment permit requirements would be specified by the agency having jurisdiction. The encroachment permit issued by local jurisdictions may include the following:

- Identify all roadway locations where special construction techniques (e.g., night construction) would be used to minimize impacts to traffic flow.
- Develop circulation and detour plans to minimize impacts to local street circulation. This may include the use of signing and flagging to guide vehicles through and/or around the construction zone.
- Schedule truck trips outside of peak morning and evening commute hours.
- Limit lane closures during peak hours to the extent possible.
- Use haul routes minimizing truck traffic on local roadways to the extent possible.
- Include detours for bicycles and pedestrians in areas potentially affected by project construction.
- Install traffic control devices if specified by agencies.
- Store construction materials only in designated areas.
- Coordinate with local transit agencies for temporary relocation of routes or bus stops in works zones, if necessary.

Enforcement of the terms of an encroachment permit would reduce impacts associated with short-term road closures. Upon implementation of this mitigation measure, residual impacts would be classified as low.

Construction would temporarily disrupt the operation of emergency service providers

Overhead construction activities could interfere with emergency response by ambulance, fire, paramedic, and police vehicles. Potential roadway segments that would be most impacted would be two-lane roadways, which provide one lane of travel per direction. On roadways with multiple lanes, the loss of a lane and the resulting increase in congestion could lengthen the response time for emergency vehicles to pass through the construction zone. Additionally, there is a possibility that emergency services would be needed at a location where access is temporarily blocked by the construction zone.

These impacts, associated with temporary disruption of the operation of emergency service providers, are characterized as moderate and would be reduced by implementation of Environmental Protection Measure 2.14. Upon implementation of this mitigation measure, residual impacts would be classified as low because emergency service providers would be aware of any potential delays, lane closures, and/or roadway closures and would identify alternative routes as necessary to maintain emergency service coverage and response times.

Construction vehicles and equipment would cause physical damage to roads

There is potential for unexpected damage to roads by vehicles and equipment (overhead line trucks, crew trucks, concrete trucks, etc.) that would be entering and leaving roads within the Project area. Environmental Protection Measure 2.3 would ensure that damaged roadways in the Project area are restored to previous conditions and/or improved conditions. Roads disturbed by construction activities or construction vehicles shall be properly restored to ensure long-term protection of road surfaces.

Construction activities could cause a temporary disruption to rail traffic or operations

Overhead construction activities could interfere with rail traffic because construction of overhead transmission lines could require temporary use or closure of a railroad right-of-way. It would be necessary to halt through-rail traffic during stringing operations over railroads. In addition, delivery of large equipment and materials via truck would also require temporary closures. Temporary closures, although likely to occur only for up to a few minutes at a time, could cause back ups with freight trains and constrain circulation in the area. These transportation impacts, characterized as moderate, would be reduced by implementation of Environmental Protection Measure 2.16. Upon implementation of this mitigation measure, residual impacts would be classified as low.

Construction could conflict with planned transportation projects

Construction of the proposed transmission line would cross the right-of-way of numerous roadways/transportation corridors. The construction activities could potentially impact planned widening and pathway projects. The public agencies that have jurisdiction over the roadways would be notified of the project, and an encroachment permit or other such agreement obtained for each location where the project would interface with a roadway or other transportation facility. Complying with permits and agreements would ensure appropriate coordination between NorthWestern and the affected agencies so that conflicts would be avoided or minimized. No mitigation measures would be required because coordination with appropriate agencies would require plans and schedules to be submitted for approval prior to construction, thereby reducing any potential impacts.

Construction would generate additional traffic on the regional and local roadways

Construction of the Project would temporarily increase traffic (Project trip generation) on the regional and local roadways through construction worker commute trips, Project equipment deliveries, and hauling materials such as support structures and poles, concrete, fill, and excavation spoils. Depending on location, construction personnel would likely access worksites using primary and secondary roadways in the Project area. From these roadways, construction traffic would use either existing roads or overland access for construction areas. Impacts associated with the transmission lines would be short-term and related to the movement of personnel and equipment during construction. Because of the limited traffic volumes on all roadways and the low number of construction-related trips that would be necessary each day, traffic associated with construction would not be substantial. Personnel trips and equipment movement necessary for operation of the transmission line would be minimal and transmission line monitoring would be limited to one or two vehicles at any one time. It should be noted that specific roadways used and the number of construction vehicle trips would likely vary for the Project. These transportation impacts, characterized as moderate, would be reduced by implementation of Environmental Protection Measure 2.13 (Obtain an encroachment permit or similar authorization). Encroachment permit

requirements would be specified by the agency having jurisdiction. The encroachment permit issued by local jurisdictions may include the following:

- Identify all roadway locations where special construction techniques (e.g., night construction) would be used to minimize impacts to traffic flow.
- Develop circulation and detour plans to minimize impacts to local street circulation. This may include the use of signing and flagging to guide vehicles through and/or around the construction zone.
- Schedule truck trips outside of peak morning and evening commute hours.
- Limit lane closures during peak hours to the extent possible.
- Use haul routes minimizing truck traffic on local roadways to the extent possible.
- Include detours for bicycles and pedestrians in areas potentially affected by project construction.
- Install traffic control devices if specified by agencies.
- Store construction materials only in designated areas.
- Coordinate with local transit agencies for temporary relocation of routes or bus stops in works zones, if necessary.

Enforcement of the terms of an encroachment permit would reduce impacts associated with short-term road closures. Upon implementation of this measure, residual impacts would be classified as low.

Operational Impacts

Presence of a Project component would disrupt land uses at or near the alignment

Direct or high impacts on existing residences could result from the incompatibility with or removal of occupied dwellings and related structures from the Project right-of-way. The location of the Project right-of-way within platted subdivisions, mineral extractive areas, and Superfund remediation sites could result in initial high to moderate impacts where operation and maintenance would preclude or impair future development/remediation activities. Environmental Protection Measure 2.4 would reduce these initial impacts (with the exception of the removal of occupied dwellings) to moderate/low through a reduction or avoidance of land use conflicts.

Potential impacts to mining claims were not assessed because the BLM has the authority to grant rights-of-way across mineral claims. Mining claim crossings have been quantified, but were not assigned impact levels. Further, impacts to mining claims would not likely contribute significantly to the route selection process. Claimants along the selected route would be identified and contacted during the project engineering and permitting process.

Operation would permanently convert agricultural land to non-agricultural use

Impacts to agricultural land (cropland and rangeland) would occur where the location of Project facilities, such as access roads and structure structures, would permanently convert the land upon which they are situated to non-agricultural use. This also includes soils designated as Important Farmland.

Loss of agricultural land would result in initial high and moderate impacts while grazing impacts would be low. Areas disturbed by construction would be minimal. Following rehabilitation, areas removed from use for the life of the Project would include the small areas at the tower footings and/or guy anchors, as well as specific new access roads.

Once construction is complete and the structures are in place, agricultural uses (i.e., crops, grazing) may be re-established/continued within the transmission line right-of-way. The loss of productive farmland will result in financial impacts to farmers. The amount of financial loss will depend on the type of crop since crop values fluctuate from year to year.

CRP lands crossed by the approved transmission line would need a FSA assessment of the adverse effects on the participants CRP acreage. If the FSA determines that the use will have an adverse effect on CRP acreage, the affected acreage may be terminated and refunds assessed.

Operation would permanently interfere with active agricultural operations

In addition to the permanent loss of land under active agricultural operations, the Project could result in other adverse agricultural impacts in the vicinity of the Project. These include (1) disrupting farming facilities or operations; (2) disrupting or altering aerial spraying practices; and (3) introducing electric field effects on apiaries and precision farming equipment.

Disruption of Farming Facilities or Operations. The presence of new Project components would permanently disrupt active farming operations in nearby areas, by dividing or fragmenting agricultural fields, obstructing access, impeding the delivery and use of water for livestock and irrigation, reducing the efficacy of windbreaks, and/or disrupting the operation of farm equipment.

Effects from transmission line structure components range from land leveling and preparation to crop harvesting. Maneuvering harvesting equipment around structures may be difficult. The level of difficulty would depend on the type of crop. Row crops that are perpendicular or diagonal to the transmission lines, rather than parallel, would be more difficult for equipment maneuvering. Potential secondary effects include damage to farm equipment as a result of collisions with structures, restrictions on nighttime operations (due to the potential for accidents), restrictions on normal crop rotations because of operational considerations, and increased difficulty in leasing fields with transmission line structures. Structures would also increase the need for weed and pest control activities around structure foundations. Agricultural lands that utilize certain types of irrigation systems may also be impacted by the placement of structures on cropland.

Incorporation of Environmental Protection Measure 2.4 requires that facilities are installed along the edges of private property (where feasible and appropriate). If facilities cannot be located along property or field boundaries, Environmental Protection Measure 2.4 would ensure that NorthWestern would consult with affected property owners to identify facility locations that would create the least potential for impact. Incorporation of this Environmental Protection Measure would minimize impacts to farming operations through avoidance of areas to the greatest extent feasible. Implementation of Selectively Recommended Mitigation Measures 5 (modify tower design or use of alternative tower type), 6 (minimize disturbance), and 7 (modification of structure design to correspond with spacing of existing transmission structures, where feasible) would further reduce impacts relating to the disruption of active agricultural operations.

Aerial Spraying Applications. Aerial spraying (i.e., crop dusting) is used to control insects, weeds, and diseases that may affect crops in the Project area. Aerial spraying occurs in those areas actively cultivated with field crops. Transmission lines and structures present a substantial obstacle to be avoided, and require additional attention from the pilots. Transmission lines can be hazardous when:

- Lines are oriented diagonally relative to field boundaries.
- Multiple lines exist side-by-side.
- Lines change direction (especially at a 90-degree angle) along the corridor.
- New transmission lines and towers are installed.
- Towers and lines are not clearly visible.

Thus, the presence of transmission lines and towers would result in interference with active agricultural operations. Implementation of Environmental Protection Measure 2.15 requires that aerial applicators be notified of the project location and components in order to educate pilots to significant dangers that would exist as a result of development of the proposed Project (i.e., Association of Montana Aerial Applicators). However, even with implementation of Environmental Protection Measure 2.15, the presence of transmission lines and structures would continue to pose safety hazards to aerial applicators, or could preclude spraying activities in certain areas.

Electric Field Effects on Apiaries and Precision Farming Equipment. Electrical fields from transmission lines may affect apiaries and the operation of electronic monitoring machinery used in farm fields, including irrigation controls. Transmission line electric fields have been shown to cause bees to leave their hives. Environmental Protection Measure 2.7 would require NorthWestern to identify apiaries within 1,000 feet of the approved transmission line and notify owners prior to construction and energizing of the transmission line so the apiaries, which are mobile, could be relocated as necessary.

GPS systems are a recent technology. It is a space-based triangulation system that uses satellites and computers to identify locations anywhere on earth. The use of GPS systems by farmers is currently limited. However, it is likely to become more widely used as its cost declines. Potential interference could occur to certain types of GPS systems installed in farm equipment. The effect of transmission lines on this technology, however, needs further study. If problems occur in GPS systems because of the transmission line, NorthWestern would work with farmers to resolve these issues similar to when transmission lines interfere with radio and television reception (Environmental Protection Measure 8.10).

Presence of a transmission line would permanently preclude or degrade Special Management Areas

If transmission support structures were sited on or immediately adjacent to Special Management Areas, visitors would be precluded from these locations. Exact locations of transmission support structures have not been determined. Although preliminary locations have been proposed, these may be modified based on site-specific environmental conditions (i.e., slope stability, presence of sensitive biological or cultural resources). Impacts to existing Special Management Areas that resulted from locating new structures on or immediately adjacent to these areas would be high. Preclusion of the use of recreational resources would be mitigated to moderate/low through implementation of Environmental Protection Measure 2.4 and Selectively Recommended Mitigation Measure 8.

The Project could also result in the potential degradation of the aesthetic value of the Special Management Area. The physical presence of the transmission line may prevent the user from experiencing a completely natural environment that is unaltered by man-made structures. Mitigation measures to reduce visual impacts are presented in the Visual Resources Technical ReportVolume II. Environmental Protection Measure 2.8 and Selectively Recommended Mitigation Measures 2 and 3 would also be implemented to limit new or improved accessibility into an area by OHVs and other motorized vehicles. Road access would be controlled in accordance with management directives of the agencies.

In addition, increased vehicle access could increase with new roads and indirectly result in increased littering, illegal hunting, and other unauthorized activities on areas not classified as Special Management Areas (other private and public lands). Specifically Recommended Mitigation Measure 4 would be applied to close road access and minimize the potential impacts of increased access.

The Project could require the granting of a right-of-way across a Special Management Area which has received LWCF grant funding. This conversion of land would constitute a conflict with the LWCF. Implementation of providing replacement property, under-grounding or avoidance would prevent the transmission line route's non-compliance with the LWCF, resulting in a low impact.

Operation could interfere with aviation safety

The transmission line could affect aviation activities by modifying aircraft operations and air navigation. With regard to aviation safety, Subpart B, Section 77.13 of the guidelines of the FAA indicate that construction of a project could potentially have a significant impact on aviation activities if a structure or any equipment is positioned such that it would be more than 200 feet above the ground or if an object would penetrate the imaginary surface extending outward and upward at a ratio of 100 to 1 from a public or military airport runway out to a horizontal distance of 20,000 feet (approximately 3.78 miles). If either of these conditions is met, an applicant is required to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area for review and approval of the project.

The Project will comply with all appropriate regulations of the FAA, and Form 7460-1 would be required of NorthWestern pursuant to FAA Regulations, Part 77. Final locations, structures, and structure heights, including transmission lines, and construction related equipment or facilities that might impact air navigation, would be submitted to the FAA for the Project. The Montana Department of Transportation, Aeronautics Division, and the chief pilot for Montana Fish, Wildlife & Parks, Aeronautics Helicopter Operations, would also be contacted.

The transmission line could intersect or occur near MTRs where low-altitude military aircraft flights may regularly occur. Two MTRs IR 301 and IR 307 are approximately eight miles west from the western edge of the Clark Canyon Reservoir. They run along the same pattern and cannot be flown at the same time. IR 301 has a north heading flight pattern and has a route width ranging from 8 nautical miles to 5 nautical miles (approximately 9 to 6 miles wide from centerline). IR 307 has a south heading flight pattern and has a route width ranging from 5 nautical miles to 8 nautical miles (approximately 6 to 9 miles wide from centerline). Coordination/consultation with the Department of Defense will be conducted regarding the location and potential effects/conflicts of the Project upon operations or training activities in military airspace.

Maintenance Impacts

Transmission

Operation or maintenance personnel would require access to the right-of-way for routine maintenance and inspection activities or during emergency situations. Safe and reliable operation of the new transmission line will be maintained through regular inspection of the structures, conductors, insulators, access areas, and vegetation in the right-of-way. The inspections will consist of foot patrols and aerial patrols. Special patrols will be conducted following storm conditions. Transmission lines normally require minimal maintenance; however, NorthWestern will inspect the line on a regular basis to look for problems caused by weather, vandalism, vegetation re-growth, etc. NorthWestern will manage vegetation on the right-of-way by a variety of methods, including trimming, mowing, and the use of approved herbicides, targeting species that are incompatible with the safe operation, maintenance, and access to the transmission system. Use of herbicides for vegetation control will be selective.

Other efforts to reduce the effects of these activities include the following:

- Application of herbicides will meet federal, state, and local regulations. Due to the selective nature of vegetation cutting, the limited use of herbicides, and the infrequent occurrence of maintenance activities, the potential effects on wildlife and water quality will be minimal.
- Required access for maintenance would have a temporary impact on those farmlands that are crossed by the transmission line. Effects to farmlands from temporary inspection and maintenance of the transmission line would be less than significant. NorthWestern will coordinate construction schedules with landowners to ensure that maintenance does not interfere with farming operations.
- During maintenance, potential noise sources include the use of vegetation clearing equipment (aerial lift and chainsaws), erosion management equipment, and/or aircraft. Minor intermittent noise may be generated by vegetation and erosion management activities, and any associated minor earthworks. With the exception of emergency maintenance, the potential for noise nuisance will be minimized by restricting the hours of maintenance activities where possible, to those defined by work management practices.

4.6.4 ALTERNATIVE ROUTE SPECIFIC ISSUES - MONTANA

Primary issues related to specific existing land uses along the alternative routes in Montana are the potential for removal of structures (residences and farm support structures) and modifications of existing and planned land uses. Land uses of particular concern are those with high sensitivity due to their social or economic value. These include residences (1), airports (2), conservation easements (3), platted subdivisions (4), LWCF sites (5), and center-pivot irrigation systems (6) – see below for discussion.

(1) would require removal of residences or localized re-routing of the proposed transmission line route to avoid (Link 7-5 from milepost 0.9 to milepost 1.0, Link 7-61 from milepost 12.8 to milepost 13.0, and Link 8 from milepost 36.9 to milepost 37.0).

(2) could cause an obstruction for future non-precision instrument approaches to Butte Bert Mooney Airport Runway 33. In addition, a missed approach path for the instrument landing system would result in passes over a taller transmission line (Link 7-42, 7-5, Link 7-61, and Link 7-8). Link 16-3 could also potentially cause operational conflicts with the Dell Flight Strip Airport. The Project would comply with appropriate regulations of the FAA, and Form 7460-1 would be required of NorthWestern pursuant to FAA Regulations, Part 77. Final locations, structures, and structure heights, including transmission lines, and construction related equipment or facilities that might impact air navigation, would be submitted to the FAA for the Project. Adherence to FAA guidelines would ensure that operation of the alternative would not cause a significant impact to aviation activities.

(3) could conflict with easement stipulations (WH Ranch CE - Link 7-72 from milepost 3.4 to milepost 3.7, Link 7-9 from milepost 1.0 to milepost 1.8 and from milepost 2.7 to milepost 3.2, and Link 11-21 from milepost 0.0 to milepost 0.2); (Lowell Hildreth CE - Link 16-1 from milepost 22.4 to milepost 24.3); (Dragging Y Ranch CE – Link 18-1 from milepost 20.1 to milepost 22.9); and (Arrigoni CE – Link 8 from milepost 9.6 to milepost 11.3). NorthWestern would comply with CE easement stipulations.

(4) would preclude approved development use of platted subdivision (Link 11-3 – Dutchman Springs Mountain Estates from milepost 15.4 to milepost 17.0). The alternative routes would also cross the Homestate Meadows Place II Subdivision along Link 7-42 from milepost 2.2 to 3.0, and Link 7-5 from milepost 0.0 to 0.3. Mitigation would require localized re-routing of the proposed transmission line route.

(5) would cross a LWCF site (MFWP's Maidenrock FAS - Link 11-23 from milepost 18.0 to milepost 18.4). The granting of a right-of-way across the FAS would be considered a land conversion because it has received LWCF grant funding. This conversion of land would constitute a conflict with the LWCF grant. Mitigation implementing either property replacement or localized avoidance (re-routing) would prevent the proposed transmission line route's non-compliance with the site.

(6) would cross irrigated cropland utilizing center-pivot irrigation methods (Link 16-3 from milepost 20.7 to milepost 21.7 and from milepost 21.8 to milepost 22.5). Because of the route's specific location in this area (parallels an existing transmission line), an obstruction/interference impact would occur resulting in an unavoidable impediment to this irrigation method's use. Mitigation would require localized re-routing of the proposed transmission line route to avoid.

Table 4.6-2 provides a summary comparison of land use residual impacts by alternative route. A brief discussion of the land use associated with these impacts follows.

Table 4.6-2 Summary Comparison of Land Use Residual Impacts by Alternative Route (miles) in Montana

	Townsend – Mill Creek			Mill Creek – State Line		
Residual Impact Level	**A1: Preferred Route**	**A2: Parallel Colstrip Lines**	**A3: Maximize Utility Corridors**	**B1: Preferred Route**	**B2: Sheep Creek**	**B3: I-15**
High	2.0	1.9	2.6	1.9	2.9	3.6
Moderate	19.4	29.0	21.7	5.2	5.4	10.8
Low	43.8	32.5	43.5	50.5	74.3	43.3
No Identifiable	48.1	58.6	61.6	29.7	3.5	30.9
AB1 I-15 Jefferson Valley Route						
High	5.3					
Moderate	22.1					
Low	116.6					
No Identifiable	65.8					

4.6.4.1 Townsend to Mill Creek (Melrose) Segment

A1: Preferred Route

High residual impacts (2.0 miles) occur from the route crossing one residence along Link 7-5, WH Ranch CE along Link 11-21, and Maidenrock FAS along Link 11-23.

Moderate residual impacts (19.4 miles) occur from the route crossing irrigated cropland along Link 1; permitted hard rock mines, platted subdivision, and proposed ACEC along Link 3-1; irrigated cropland, permitted hard rock mine, platted subdivisions, and proposed ACEC along Link 7-2; permitted hard rock mine and proposed ACEC along Link 7-41; platted subdivisions along Link 7-5; platted subdivision along Link 7-8; a wildlife management area along Links 11-21 and 11-22; and irrigated cropland and platted subdivision along Link 11-23.

A2: Parallel Colstrip Lines

High residual impacts (1.9 miles) occur from the route crossing the WH Ranch CE along Links 7-9 and 11-21, and Maidenrock FAS along Link 11-23.

Moderate residual impacts (29.0 miles) occur from the route crossing irrigated cropland along Link 1; irrigated cropland, permitted hard rock mines, and proposed ACEC along Link 4-1; permitted hard rock mines, platted subdivisions, and proposed ACEC along Link 4-2; a wildlife management area along Links 11-21 and 11-22; and irrigated cropland and platted subdivision along Link 11-23.

A3: Maximize Utility Corridors

High residual impacts (2.6 miles) occur from the route crossing one residence along Link 7-5; one residence along Link 7-61; the WH Ranch CE along Links 7-72, 7-9, 11-21; and Maidenrock FAS along Link 11-23.

Moderate residual impacts (21.7 miles) occur from the route crossing irrigated cropland along Link 2-1; irrigated cropland, permitted hard rock mines, and platted subdivisions along Link 2-3; irrigated cropland, permitted hard rock mine, platted subdivisions, and proposed ACEC along Link 7-2; permitted hard rock mine and proposed ACEC along Link 7-41; platted subdivisions along Link 7-5; platted subdivisions along Link 7-61; irrigated cropland, platted subdivision, and wildlife management area along Link 7-72; a wildlife management area along Links 11-21 and 11-22; and irrigated cropland and platted subdivision along Link 11-23.

4.6.4.2 Mill Creek to State Line Segment

B1: Preferred Route

High residual impacts (1.9 miles) occur from the route crossing the Lowell Hildreth CE along Link 16-1.

Moderate residual impacts (5.2 miles) occur from the route crossing irrigated cropland, permitted hard rock mine and platted subdivision along Link 11-3; irrigated cropland along Links 16-1 and 16-2; and farm support structure along Link 16-4.

B2: Sheep Creek

High residual impacts (2.9 miles) occur from the route crossing the Dragging Y Ranch CE along Link 18-1.

Moderate residual impacts (5.4 miles) occur from the route crossing irrigated cropland and permitted hard rock mines along Links 11-4 and 18-1.

B3: 1-15 Route

High residual impacts (3.6 miles) occur from the route crossing the Lowell Hildreth CE along Link 16-1 and irrigated cropland along Link 16-3. Impacts to this cropland would remain high because a portion of the link would cause in unavoidable obstruction/interference with the irrigation method (center-pivot system) resulting in an impediment to its use.

Moderate residual impacts (10.8 miles) occur from the route crossing irrigated cropland, permitted hard rock mine and platted subdivision along Link 11-3; irrigated cropland along Links 16-1; irrigated cropland and platted subdivisions along 16-3; and a farm support structure along Link 16-4.

4.6.4.3 AB1 I-15: Jefferson Valley Route

High residual impacts (5.3 miles) occur from the route crossing one residence along Link 7-5, WH Ranch CE along Link 7-9 and Link 11-21; one residence and Arrigoni Conservation Easement along Link 8; and Lowell Hildreth CE along Link 16-1.

Moderate residual impacts (22.1 miles) occur from the route crossing irrigated cropland along Link 1; permitted hard rock mines, platted subdivision, and proposed ACEC along Link 3-1; irrigated cropland, permitted hard rock mine, platted subdivisions, and proposed ACEC along Link 7-2; permitted hard rock mine and proposed ACEC along Link 7-41; platted subdivisions along Link 7-5; platted subdivision along Link 7-8; a wildlife management area along Links 11-21 and 11-22; irrigated cropland, permitted hard rock mines, and platted subdivisions along Link 8; irrigated cropland along Links 16-1 and 16-2; and a farm support structure along Link 16-4.

4.6.5 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.6.5.1 Stateline to Midpoint

Primary issues related to specific existing land uses along the alternative routes in Idaho are the potential for removal of structures (residences and farm support structures) and modifications of existing and planned land uses. Land uses of particular concern are those with high sensitivity due to their social or economic value. Table 4.6-3 provides a summary comparison of land use residual impacts by alternative route. A brief discussion of the land use associated with these impacts follows.

Table 4.6-3 Summary Comparison of Land Use Residual Impacts by Alternative Route (miles) in Idaho

	Stateline To Midpoint			
Residual Impact Level	**C1: Preferred Route**	**C2: Eastern Route**	**C3: Western Route**	**C4: Sheep Creek INL Brigham Point**
High	0.1	0.1	---	---
Moderate	21.0	26.6	2.7	21.1
Low	169.1	173.4	168.9	169.3
No Identifiable	42.7	39.5	6.5	24.2

C1: Preferred Route

High residual impacts (0.1 mile) occur from the route crossing one residence along Link 20.

Moderate residual impacts (21.0 miles) occur from the route crossing irrigated cropland along Link 26-2 and Link 26-4; BLM mineral material site along Link 23; and national natural landmark along Link 26-3.

C2: Eastern Route

High residual impacts (0.1 mile) occur from the route crossing one residence along Link 20.

Moderate residual impacts (26.6 miles) occur from the route crossing irrigated cropland along Link 21, Link 26-2, and Link 26-4; wildlife management area along Link 21; and national natural landmark along Link 26-3.

C3: Western Route

No high residual impacts occur along the route.

Moderate residual impacts (2.7 miles) occur from the route crossing irrigated cropland along Link 25-3 and Link 25-4; inventoried roadless area along Link 18-2; BLM mineral material site along Link 23; and platted subdivision along Link 25-3.

C4: Sheep Creek INL/ Brigham Point

No high residual impacts occur along the route.

Moderate residual impacts (21.1 miles) occur from the route crossing irrigated cropland along Link 26-2 and Link 26-4; BLM mineral material site along Link 23; and national natural landmark along Link 26-3.

4.6.6 EFFECTS OF SUBSTATION CONSTRUCTION

4.6.6.1 New Townsend Substation

Construction of a facility within the siting area could result in potentially high initial impacts to cropland irrigated with center-pivot methods. Impacts could also occur to adjacent residents. Impacts to the cropland irrigated with center-pivot methods would be unavoidable. Mitigation to reduce these impacts would involve siting the facility to avoid sensitive land uses, or to compensate, restore or replace those land uses that are affected.

4.6.6.2 Mill Creek Substation Addition

The proposed additions to the substation cannot be completed in the existing fenced area; expansion of the substation yard would be required. Engineering studies will be completed to determine the ultimate modifications required at the Mill Creek Substation.

Possible mitigation includes: (1) selective placement of facilities to avoid sensitive environmental features; (2) preconstruction geotechnical and biological field review; and (3) land acquisition (buffer zone).

4.6.6.3 Midpoint Substation Addition

Construction activities associated with substation modifications could result in noise and air quality impacts to the single-family residence located within 1,000 feet of the Midpoint Substation. These impacts are discussed in Volume I, Sections 4.12 Noise, and 4.13 Air Quality.

4.6.7 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to land use from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to land use from construction, operation, or maintenance of the communication system are anticipated.

4.7 VISUAL RESOURCES

4.7.1 INTRODUCTION

Visual resource impacts would result from the construction, operation and maintenance of the Project, specifically, the 500kV transmission line and associated substations and communication system. Visual resource impacts would be caused by the line being seen from sensitive viewpoints and from the effects to the aesthetic values of the landscape. Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change.

The impact assessment is based on the elements of the BLM Contrast Rating Process found in the BLM's 8400 Series Visual Resources Manual (BLM 1986a) and the USFS Visual Absorption Capability found in the USFS *Landscape Aesthetics: A Handbook for Scenery Management* (USFS 1995), adapted to address specific issues relating to transmission projects.

4.7.2 METHODS FOR ASSESSING IMPACTS

The visual resources inventory consisted of the following sequence of tasks (refer to Chapter 3):

- Identification of agency management objectives (VRM classes and SIOs/VQOs) and scenic quality classifications if available;
- Inventory of existing regional landform, vegetation and water features (physiography), including a review of existing mapping and aerial photography and a review of landscape setting and character evaluation;
- Development of landscape rating units;

- Inventory of scenic quality and visual integrity within landscape rating units (where not established by agency);
- Identification and mapping of sensitive viewpoints;
- Sensitivity analysis of identified sensitive viewpoints (where not established by agency, i.e. USFS concern levels); and
- Visibility and distance zone mapping.

The existing visual condition of the landscape that would be affected by the alternative routes is described by these components. The visual impacts that would result from the construction and operation of a 500kV transmission line are usually direct, adverse, and long-term.

The visual impact analysis was conducted using Environmental Systems Research Institute (ESRI) ArcInfo GIS software to model the seen area, to derive maps and data tables of initial visual impacts and document the effect of the Project (refer to Volume II, Visual Resources Technical Report). Inventory maps were derived through computer models that used the ground disturbance model (refer to Volume II, Visual Resources Technical Report), vegetation communities and land use. For example, to determine project visibility from sensitive viewpoints, view shed mapping was derived using a GIS model that "looked out" from selected viewpoints over a digital elevation model (DEM) created from USGS digital elevation mapping to establish what portion of the landscape would be visible from that particular viewpoint. Likewise, vegetation mapping and soils data also contributed to the contrast models.

Photo-Simulations

Representative viewpoints were evaluated using photographic simulation techniques. The simulations were used to evaluate the accuracy of the predicted visual impacts, to determine the effectiveness of recommended mitigation and to illustrate the expected impacts to the concerned agencies and public.

In coordination with MDEQ personnel, a total of four viewpoints for photo-simulations were identified in the study area. Because the simulations were completed to fulfill a requirement for the MFSA application in Montana, no simulations were completed for the Idaho portion of the Project. See Figures 4.7-1 through 4.7-5 for photo-simulations and mapping of photo-simulation viewpoint locations. The viewpoints are briefly described below:

- Photo-Simulation 1 – Residential area located south of Butte, looking west from Spur Lane down the existing transmission corridor. The view is of Link 7-5. Viewer Sensitivity: High; Scenic Quality: Class C.
- Photo-Simulation 2 – Community of Silver Star in the Jefferson Valley, looking southeast from Cemetery Lane, just west of Hwy 41/287. The view is of Link 8. Viewer Sensitivity: High; Scenic Quality: Class C.
- Photo-Simulation 3 – Dalys Siding located along the Beaverhead River Class II Fishery and Lewis and Clark National Historic Trail, off of Interstate 15, looking north. The view is of Link 16-1. Viewer Sensitivity: Moderate; Scenic Quality: Class A.
- Photo-Simulation 4 – Litening Road off of Dry Creek Road, just east of Hwy 287, looking north toward the proposed Townsend Substation site. Viewer Sensitivity: High (nearby residences); Scenic Quality: Class C.

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Figures 4.7-1 through 4.7-5

Simulations were used to evaluate the accuracy of the predicted visual impacts, to determine the effectiveness of recommended mitigation, and to illustrate the expected impacts to the concerned agencies and the public.

The process of photo-simulation began with taking field photographs, documenting viewpoint locations (coordinates) and weather conditions, and matching those photographs with project terrain models developed using Microstation. Computer models of the transmission lines and substation were introduced into the terrain model based on preliminary facility layouts developed in ArcView. The final image is a composite of the 3-dimentional structure modeling and the original photograph. The process ensured that spatial relationships, perspective, proportions and similar visual attributes were accurate and matched existing landscape conditions.

The proposed structure types were modeled based on engineering input from POWER. Final engineering on the transmission line had not been completed during the environmental analysis phase of the project, and actual pole locations and configurations may deviate from the simulation if constructed.

4.7.2.1 Impact Level

Initial impact levels were determined for the following impact types identified in the inventory:

- Residential
- High sensitivity recreation and preservation viewpoints
- Moderate sensitivity recreation and preservation viewpoints
- High sensitivity travel routes and linear recreation and preservation features
- Moderate sensitivity travel routes and linear recreation and preservation features
- Scenic resources

Visual Contrast

To determine potential visual impacts, contrast levels were first assessed. Visual contrast is defined here as the degree of physical alteration of the landscape which would be perceived without regard to specific viewpoints or viewing conditions. How the visual changes are seen from sensitive viewpoints determines the viewer impacts. Contrast is determined by the difference in form, line, color, texture, scale, and landscape position between the proposed action and its setting. Contrast levels are characterized as strong, moderate, or weak.

Visual contrast levels were assigned to the landscapes inventoried within the study area through the combination of landform, vegetation, and structure contrast (see Volume II, Visual Resources Technical Report, Table 5.1-4). Three levels (weak, moderate, and strong) are used to describe the potential visual contrasts that would result from the construction and operation of the proposed transmission lines and substations. Each of the contrast components are described below.

> **Landform contrast** is created by alteration of landform patterns, exposure of soil, erosion scars, slumping, and other disturbances due to the Project that are uncharacteristic of the natural landscape. Landform contrast was determined through a GIS model that used the

access/ground disturbance level and soil contrast (based upon soil erosion potential). Refer to Chapter 2 for access/ground disturbance levels.

Vegetation contrast is the change in vegetation cover and patterns that would result from clearing required for road construction and improvements. Vegetation contrast was determined through a GIS model that evaluated the diversity and complexity of vegetation types and patterns in the area long alternative corridors. Diversity is a major criterion in determining the inherent capability of the landscape to absorb visual change. Vegetation types, identified and mapped by the biological resource team (see Volume II, Biological Resources Technical Report), were grouped into categories that are representative of each vegetation type's basic form. These criteria are combined with the vegetation clearing required for road construction and improvements to determine vegetation contrasts (see Volume II, Visual Resources Technical Report, Table 5.1-2).

Structure contrast examines the compatibility of transmission facilities with the existing landscape. Structure contrast would be greatest where there are no other structures (e.g., buildings, existing utilities) in the landscape. For the most part, structure contrast in the study area is determined by the presence or absence of existing parallel transmission lines. Structure contrast would be considerably weaker where the Project would parallel other transmission lines, especially lines of similar structure types. The structure contrasts of the MSTI proposed tower types with the existing transmission lines are illustrated in Volume II, Visual Resources Technical Report, Table 5.1-3.

Visual Impact Levels

To determine potential visual impacts, the contrast levels were overlaid with the visibility and distance zones from sensitive viewpoints (i.e., residences, recreation areas and travel routes) and with the scenic values (i.e., scenic quality and visual integrity). The impact levels were recorded in one-tenth (0.1) mile increments along each link. Impact maps were then derived. Potential impacts were recorded into a data table for each impact level change along the length of each link. Each potential impact was described and assigned specifically recommended mitigation to reduce impacts and to obtain a residual impact level. The highest potential impact out of the categories became the representative potential visual impact for that area. Refer to Volume II, Visual Resources Technical Report, Appendix C for documentation of each individual impact. Refer to Figure 5.2-1 in Volume II, Visual Resources Technical Report for an illustration of the impact assessment process. Tables 5.2-1, 5.2-2, and 5.2-3 in Volume II, Visual Resources Technical Report document the methods used to determine potential impacts to scenic values (i.e., scenic quality and visual integrity) and sensitive viewers.

Residual impacts to visual resources are quantified by linear mile for each alternative route. Discrepancies may exist between the sum of residual impacts for each alternative route and linear mileage of route alignments. The discrepancies arise from numerical rounding and resource overlap based on the 0.1 mile scale used for impact analysis in GIS.

Wherever a potential impact was identified within the immediate foreground distance zone of 0 to 1,000 feet, it was assessed as a non-mitigatable impact. This potential impact was not considered lower because of the dominance of the proposed 500kV transmission structures.

Generally, strong visual contrasts in the landscape viewed form high sensitivity viewpoints within the immediate foreground and foreground distance zones would result in high impacts. Visual impact levels generally get lower as visual contrasts become weaker or as the distance from the viewpoint increases. These contrasts are defined as follows:

High – High potential visual impact levels for high sensitivity viewpoints would result from all levels of visual contrast associated with the presence of the transmission line and vegetation removal and/or exposure of contrasting soil/rock color from ground disturbing activities that are visible within the immediate foreground distance zone and from strong visual contrast in the foreground distance zone. High potential visual impact levels for moderate sensitivity viewpoints would result from strong and moderate visual contrast that is visible within the immediate foreground distance zone and strong contrast that is visible within the foreground distance zone. Also, high potential visual impact levels for scenic quality would result from strong or moderate visual contrast in areas of Class A scenic quality.

Moderate – Moderate potential visual impacts for high sensitivity viewpoints would result from moderate and weak levels of visual contrast in the immediate foreground distance zone and strong visual contrast in the middleground distance zone. Moderate potential visual impacts for moderate sensitivity viewpoints would result from weak visual contrast in the immediate foreground distance zone and moderate or weak contrast in the foreground distance. Moderate potential visual impact levels for scenic quality would result from weak visual contrast in areas of Class A scenic quality, strong or moderate contrast in areas of Class B scenic quality, and strong contrast is areas of Class C scenic quality.

Low – Low potential visual impacts for high sensitivity viewpoints would result from moderate or weak levels of visual contrast in the middleground distance zone and all levels of visual contrast in the background distance zone. Low potential visual impacts for moderate sensitivity viewpoints would result from all levels of visual contrast in the middleground and background distance zones. Low potential visual impact levels for scenic quality would result from weak visual contrast in areas of Class B scenic quality and from moderate or weak visual contrast in areas of Class C scenic quality.

4.7.2.2 Impact Type

A variety of factors were taken into account when determining potential impact significance, including the extent of project visibility from residential areas and designated scenic routes, the degree to which the various project elements would contrast with or be integrated into the existing landscape, the extent of changes in the landscape's composition and character, and the number and sensitivity of the viewers. Project conformance with BLM and USFS policies regarding visual quality management objectives was also taken into account.

Scenic Quality Impacts

Potential impacts to scenic quality are based on the changes in quality and quantity of the visual resources inherent in the natural landscape, without regard to how it is seen from viewpoints. Strong or moderate visual contrast in combination with Class A scenic quality usually resulted in potentially high initial visual impact levels, while weak visual contrast in combination with Class A scenic quality and strong or moderate visual contrast in combination with Class B scenic quality usually

resulted in potentially moderate initial visual impact levels. Strong visual contrast levels in combination with Class C scenery also resulted in potential moderate initial impact levels. Volume II, Visual Resources Technical Report, Table 5.2-1 illustrates the model matrix used to determine initial impact levels.

Sensitive Viewpoint Impacts

High impacts to high sensitivity viewpoints (residences and high sensitivity recreation and transportation viewpoints) are the result of all levels of visual contrast in the 0-1,000 feet immediate foreground distance zone and high visual contrasts in the 1,000 feet – 0.75 mile foreground distance zone. Impacts to high sensitivity viewpoints in the immediate foreground distance zone are assessed as a nonmitigatable impact. Potential high impacts to views from moderate sensitivity recreation and transportation viewpoints are found where high and moderate levels of visual contrast occur in the 0-1,000 feet immediate foreground distance zone and high visual contrasts occur in the1,000 feet-0.75 mile foreground distance zone.

The number of high impacts to sensitive viewpoints was initially minimized during the regional study, where the alternative route links were sited to avoid residential areas.

Impacts to National Historic Landmarks, National Register historic districts and sites, and sites nominated to or designated by the State Historic Preservation Office (SHPO), also required by MFSA Circular-2, are addressed in Volume II, Cultural Resources Technical Report.

VRM/VQO/SIO Impacts

VRM/SIO/VQO designations were examined to determine whether or not the level of visual change from construction and operation of the Project would meet the adopted visual management objectives on BLM and USFS lands. Visual changes are not permitted by the BLM in VRM Class I or by the USFS in SIO Very High and VQO Preservation designations. Moderate or strong visual contrasts in areas of VRM Class II, SIO High, and VQOs Retention would not comply with agency visual management objectives. Volume II, Visual Resources Technical Report Table 5.2-4 documents the method used to determine whether initial impacts would comply with agency visual management designations

4.7.2.3 Specific Mitigation Measures

Mitigation for the proposed project includes two types of programs: environmental protection measures and selective mitigation. 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 and other agencies 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 and other agencies.

Mitigation measures were developed to address and, as feasible, reduce the potential for impacts by construction of the Project. Mitigation measures can be applied individually to impacts or can be combined with other mitigation measures to reduce or eliminate impacts. The impacts remaining after applying mitigation measures are termed residual impacts.

When assessing the mitigation necessary for reducing impact levels, those factors which have contributed to the degree of impact must be identified. These project-related factors are landform contrast, vegetation contrast, and structure contrast. It is assumed that the only effective mitigation measures are those that reduce the visibility or weaken the contrast of the project. Further, in assessing the impact of the proposed activity, it was determined that all alternative route links would have at least a "low" impact since there will always be some level of identifiable impact to viewers as long as the transmission line is visible. No mitigation measures were recommended for low impacts. For moderate or high impacts, one or more of the relevant mitigation measures were recommended, where effective, depending upon the particular situation.

Application of mitigation may be effective in reducing initial impacts a full impact level; however, in other instances, residual impacts may be the same level as initial impacts. In this case, mitigation is still effective, although only in reducing impacts to a lower level within that interval.

Environmental protection measures were considered when assessing initial impacts. A complete list of environmental protection measures can be found in Chapter 2. After initial impacts were determined, specifically recommended mitigation measures were applied as appropriate to determine residual impact levels. Refer to Volume II, Impact Data Tables CD for a complete list of initial impacts, specifically recommended mitigation measures, and residual impacts by link and milepost.

The specifically recommended mitigation that were assigned to reduce potential visual impacts include the following:

3. 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.

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

6. Where feasible, to minimize sensitive feature disturbance and/or reduce visual contrast, 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.

7. To reduce visual contrast and/or potential operational conflicts, standard tower design will be modified to correspond with spacing of existing transmission line structures where feasible and within limits of standard tower design. The normal span will be modified to correspond with existing towers, but not necessarily at every location.

8. To reduce visual impacts, potential impacts on recreation values and safety, at highway, canyon and trail crossings, towers are to be placed at the maximum feasible distance from the crossing within limits of standard tower design.

11. To reduce visual contrast in areas where overstory vegetation is removed for access, structure pads, or conductor clearance, the clearing edges will be feathered to give a natural appearance.

4.7.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

The results of the visual impact assessment of each of the alternative routes in Montana are described in the following sections. Table 4.7-1 is a summary of these visual resource impacts by alterative. Refer to Volume III, 100K Map Series, Scenic Quality and Sensitive Views for a graphic representation of the resource impacts. For detailed descriptions of the potential impacts, refer to Volume II, Visual Resources Technical Report.

Residual visual impacts in areas of BLM VRM Class III and Class IV and USFS SIO Moderate and Low are expected to meet the guidelines of these management classes following the application of environmental protection measures and specifically recommended mitigation to reduce visual contrasts. Residual visual impacts may not be compatible with agency management objective in areas where BLM VRM Class II and USFS SIO High occur.

All high impacts to residential viewpoints and high sensitivity recreation, preservation, and transportation viewpoints result from all contrast levels in the immediate foreground distance zone or foreground views of strong contrast areas of the routes. High impacts to moderate sensitivity recreation, preservation, and transportation viewpoints result from strong and moderate contrast levels in the immediate foreground distance zone or foreground views of strong contrast areas of the routes. All moderate impacts to residential viewpoints and high sensitivity recreation, preservation, and transportation viewpoints result from moderate or weak contrast levels in the foreground distance zone or middleground views of strong contrast areas of the routes. Moderate impacts to moderate sensitivity recreation, preservation, and transportation viewpoints result from weak contrast levels in the immediate foreground distance zone and moderate or weak contrast levels in the foreground distance zone. High impacts to sensitive viewpoints are identified and discussed in these sections. Moderate impacts to sensitive viewpoints are summarized.

High impacts to scenic quality occur only in areas of Class A scenery where strong or moderate contrast levels occur. Moderate impacts to scenic quality occur in areas of Class B and Class C scenery. Moderate impacts to Class B scenery occur in areas of strong or moderate visual contrast. Moderate impacts to Class C scenery occur only in areas of strong visual contrast. Specific areas of impacts to Class C scenery are not discussed in this section, but are identified in Volume III, 100K Map Series, Scenic Quality.

Selective Mitigation Measures 3 and/or 11 would be effective in reducing the visual contrast and visual impacts from high to moderate or from moderate to low in some locations. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

4.7.3.1 No Action

The no action alternative would result in no adverse affects to visual resources in the project area.

Table 4.7-1 Visual Resource Impact Summary - Montana

		Townsend to Mill Creek (Melrose) Segments			Mill Creek to State Line Segments			AB1: I-15 Jefferson Valley Route
		A1: Preferred Route	A2: Parallel Colstrip Lines Route	A3: Maximize Utility Corridors Route	B1: Preferred Route	B2: Sheep Creek Route	B3: I-15 Route	
Total Length of Alternative (Miles)		112.9	121.8	128.8	87.1	86.9	88.4	209.2
Number of Residences within Immediate Foreground (1000 feet)		90	32	132	9	8	11	99
Visual Contrast Level	**Strong**	31.8	64.6	22.3	36.4	1.7	20.8	82.9
	Moderate	80.3	56.8	105.1	50.9	85.3	67.8	125.7
	Weak	1.2	0.6	2	0	0	0	1.2
Visual Contrast Compliance with Agency Management Objectives	**Yes**	24.5	46.9	28.6	22.5	48.5	15.9	58.2
	No	8.5	18.1	8.7	0	1.5	0	5.5
Scenic Quality Impacts	**High**	6.1	2.6	6.1	4.2	0.9	4.2	6.9
	Moderate	43.2	74.9	38.3	34.7	14.9	19.1	94.4
Impacts to High Sensitivity Viewpoints – **Residences**	**High**	17.8	19	23.9	9.2	2.9	9.2	25.1
	Moderate	47	58.1	62.3	39.2	19.3	39.2	80.4
Impacts to High Sensitivity Viewpoints – **Recreation, Preservation, and Transportation Viewpoints and Linear Features**	**High**	8.1	7.6	5.2	0	11.7	0.5	6
	Moderate	11.9	15.6	12	6	16.9	5.7	10.9
Impacts to Moderate Sensitivity Viewpoints	**High**	2.7	4.7	4.4	6.5	0.4	6.5	9.8
	Moderate	10.4	9	9.4	2.5	3.1	2.5	6.9
Overall Residual Impacts	**High**	26.9	27.6	31.5	13.2	14.6	12.7	37.4
	Moderate	63.2	77.1	70.7	35.6	32.2	35	110.1

4.7.3.2 Townsend to Mill Creek (Melrose) Segments

A1: PREFERRED ROUTE

The A1: Preferred Route is composed of Links 1, 3-1, 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21, 7-9, and 11-23. The preferred route would have the shortest distance of potential overall residual high impacts (26.9 miles) and the shortest distance of potential overall residual moderate impacts (63.2 miles).

Two of the most densely populated areas occurring in the immediate foreground and foreground distance zones for any alternative are found along the A1: Preferred Route north and west of Whitehall (Links 7-2 and 7-41) and south of Butte (Links 7-42 and 7-5). Link 7-5 has the greatest number of residences (69 residences) with immediate foreground views of the route of any link on any alternative. High and moderate impacts to residences are scattered throughout the route corridor

due to the large number of dispersed residences present. A total of 90 residences would have immediate foreground views of the A1: Preferred Route.

The A1: Preferred Route would cross several visually sensitive recreation, preservation, and transportation features, including the Missouri River Class II Fishery, the Big Hole River Class I Fishery, the Lewis and Clark National Historic Trail, the Continental Divide National Scenic Trail, a BDNF Concern Level One Route (I-90), and a BDNF Concern Level Two Route. A cluster of these high and moderate sensitivity recreation and transportation features are located in the immediate foreground and foreground distance zones of Links 7-41 and 7-42 and would be crossed multiple times by the route in this area. The route would also follow the east edge of the Black Sage WSA (Link 3-1) and the west edge of the Humbug Spires WSA (Link 11-23), resulting in immediate foreground and foreground views and high impacts for these areas.

Areas of potential high impacts to Class A scenery are located in an area of the Boulder Mountains in the Boulder Batholith southeast of Butte (Links 7-41 and 7-42) and at the crossing of the Big Hole River (Link 11-23).

Strong visual contrast levels would occur along 2.3 miles of Link 1, while moderate visual contrast levels would occur along 4.7 miles of the link. Strong visual contrast levels would occur along 20.4 miles of Link 3-1, while moderate visual contrast levels would occur along 11.9 miles. The remainder of the route (Links 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21, 7-9, and 11-23) would generally have moderate visual contrast levels, with occasional areas of strong visual contrast.

Selective Mitigation Measures 3 and/or 11 would reduce impact levels from high to moderate for 1.3 miles (Links 3-1, 7-8, and 11-21) and from moderate to low for 1.5 miles (Links 3-1, 7-9, 11-21, 11-22, and 11-23) of the Preferred Route. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

Visual contrasts along the A1: Preferred Route would not comply with the BLM VRM Class II designation for approximately 0.6 mile of Link 7-2, 0.9 mile of Link 7-41, and 3.0 miles of Link 11-23. Areas of BDNF where visual contrasts along the A1: Preferred Route would not comply with the USFS SIO High would occur along Link 7-41 for 1.2 miles and along Link 7-42 for 2.8 miles.

From the Townsend Substation to the Hwy 69 crossing (Links 1 and 3-1), 7.8 miles of overall residual potential high impacts and 25.0 miles of overall residual potential moderate impacts would occur. Near the Townsend Substation Site, views from rural residences in the immediate foreground in addition to views from the Missouri River Class II Fishery and the Lewis and Clark National Historic Trail would result in 1.8 miles of high impacts (Link 1). Link 1 would cross both the river and the trail. Views from residences would result in an additional 0.9 mile of potential high impacts south of Radersburg (Link 3-1). Further south, the route crosses through the immediate foreground and foreground distance zones of the Black Sage WSA, resulting in 2.4 miles of potential high impacts. An additional 2.7 miles of potential high impacts to residential viewers would occur at the end of Link 3-1, where the route wraps around the west side of Doherty Mountain and crosses the Boulder River. Several areas of potential moderate impacts to Class B scenery are found along Link 3-1, including 2.9 miles where the link skirts the base of Doherty Mountain at the edge of the Boulder River valley and then crosses the Boulder River and 4.7 miles of uplifted bedrock ridges in the foothills of the Elkhorn Mountains. Additional potential moderate impacts occur due to strong visual

contrast levels in areas of Class C scenery and due to views from residences, the Black Sage WSA, the Missouri River Class II Fishery, and the Lewis and Clark National Historic Trail.

Between the Hwy 69 crossing and the end of Link 7-5 southeast of Butte (Links 7-2, 7-41, 7-42, and 7-5), a total of 8.1miles of overall residual potential high impacts and 12.9 miles of overall residual moderate impacts would occur. An area of potential high impacts to Class A scenery is located in an area of the Boulder Mountains in the Boulder Batholith southeast of Butte. Potential high impacts are located at the end of Link 7-41 (0.7 mile) and along almost all of Link 7-42 (2.8 miles). These areas are presently impacted by existing transmission lines. Views from residences would result in 2.6 miles of potential high impacts north and northwest of Whitehall (Links 7-2 and 7-41). Views from the Continental Divide National Scenic Trail, a BDNF Concern Level Two roadway, and a BDNF Concern Level One Roadway (I-90), would result in 3.2 miles of potential high impacts in the mountains southeast of Butte (Links 7-41 and 7-42). The Continental Divide National Scenic Trail is crossed three times by the route; I-90 (where it is within the BDNF and identified as a BDNF Concern Level One Roadway) is crossed once by the route; and the BDNF Concern Level Two Roadway is crossed twice by the route. Views from a concentrated area of residences southeast of Butte would result in an additional 2.0 miles of potential high impacts (Link 7-5). Link 5 has 69 residences located within 1,000-feet of the centerline, the greatest number for any link on any route. Moderate impacts to Class B scenery would occur in the foothills east of Pipestone, where 0.6 mile of potential moderate impacts would occur (Link 7-2). Additional potential moderate impacts occur due to strong visual contrast levels in areas of Class C scenery and due to views from dispersed residences, the BDNF Concern Level One Roadway (I-90), and the BDNF Concern Level Two Roadway.

Along Link 7-8, 3.1 miles of potential high impacts would occur due to views from dispersed residences. Potential moderate impacts occur due to views from a BDNF Concern Level Two roadway and from a section of I-90/15 that is within an area of the BDNF where it is designated a BDNF Concern Level One roadway.

From the Mill Creek Substation to the end of the route (Links 7-9, 11-21, 11-22, and 11-23), a total of 8.1 miles of potential overall residual high impacts and a total of 17.3 miles of potential overall residual moderate impacts would occur. An area of potential high impacts to Class A scenery would occur at the crossing of the Big Hole River on Link 11-23, where 2.6 miles of potential high residual impacts would occur. This area is presently impacted by existing transmission lines. The Big Hole River Class I Fishery crossing is located near MP 18.2. A total of 2.7 miles of potential high impacts to residences would occur. Residences are typically dispersed, however, two notable areas of potential high impacts to residences occur where a small but relatively dense cluster of residences with foreground views is located near the Fairmont Hot Springs resort (Links 11-21 and 11-22) and where a small cluster of residences is located in and around the rural community of Divide (Link 11-23). Along Link 11-23, the Continental Divide National Scenic Trail would be crossed near MP 3.7, resulting in 0.4 miles of potential high impacts, and immediate foreground and foreground views from the west edge of Humbug Spires WSA would result in 1.7 miles of potential high impacts. Potential moderate impacts occur due to views from dispersed residences along all links and due to views from the Big Hole River Class I Fishery, Humbug Spires WSA, two MDT rest areas, and a BDNF Concern Level Two Roadway, all located along Link 11-23.

A2: PARALLEL COLSTRIP LINES ROUTE

The A2: Parallel Colstrip Lines Route is composed of Links 1, 4-1, 4-2, 7-9, 11-21, 11-22, and 11-23. The A2 route would have 27.6 miles of potential overall residual impacts, which is less than the A3: Maximize Utility Corridors but greater than the A1: Preferred Route, and the longest distance of potential overall moderate impacts, totaling 77.1 miles.

See the A1: Preferred Route effects section for discussion of impacts that occur along Link 1 and between the Mill Creek Substation and the end of the route (Links 7-9, 11-21, 11-22, and 11-23). Potential impacts that would occur between the end of Link 1 and the Mill Creek Substation (Links 4-1 and 4-2) are discussed below.

The A2: Parallel Colstrip Lines Route would have the smallest number of residences (32 residences) with immediate foreground views of any of the alternatives. The most densely populated area occurring in the foreground distance zone is located in the community of Opportunity (Link 4-2). The community of Radersburg would also have immediate foreground and foreground views of the route (Link 4-1). An additional relatively dense concentration of residences is located in the foothills of the Elkhorn Mountains and the Boulder Mountains north of Boulder. High and moderate impacts to residences are scattered throughout the route corridor due to the large number of dispersed residences present.

The A2: Parallel Colstrip Lines Route would cross several visually sensitive recreation, preservation, and transportation features, including the Missouri River Class II Fishery, the Lewis and Clark National Historic Trail, the Continental Divide National Scenic Trail, and a BDNF Concern Level Two Roadway. The route would also pass near the Radersburg ORV trailhead (Link 4-1) and roughly parallel a BDNF Concern Level Roadway for several miles within the foreground distance zone (Link 4-2), resulting in high impacts. Refer to the A1: Preferred Route effects section for a description of notable areas of impacts to visually sensitive recreation, preservation, and transportation features.

The A2: Parallel Colstrip Lines Route would cross the greatest distance of Class B scenery and the shortest distance of Class A scenery of all the Townsend to Mill Creek alternative routes, resulting in no high impacts and extensive moderate impacts to scenic quality.

Strong visual contrast levels would occur along most of the route from the end of Link 1 to the Mill Creek Substation, with several miles of moderate visual contrast occurring at the beginning of Link 4-1 around Radersburg and at the end of Link 4-2 around Opportunity. The remainder of the route generally has high levels of visual contrast with occasional pockets of moderate visual contrast. Strong visual contrast levels would occur along 7.8 miles of Link 4-1, while moderate visual contrast levels would occur along 5.7 miles of the link. Strong visual contrast levels would occur along 50.4 miles of Link 4-2, while moderate visual contrast levels would occur along 13.6 miles of the link. Refer to the A1: Preferred Route effects section for a description of visual contrast levels for the remainder of the route.

Selective Mitigation Measure 11 would reduce impact levels from high to moderate for 1.5 miles (Link 4-2) and from moderate to low for 1.2 miles (Links 4-1 and 4-2). All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low). Refer to the A1: Preferred Route effects section for a description of reductions in impact levels for the remainder of the route

Visual contrasts along the A2 route would not comply with the BLM VRM Class II designation for approximately 1.6 miles of Link 4-1 and 2.5 miles of Link 4-2. Areas of BDNF where visual contrasts along the A2 route would not comply with the USFS SIO High would occur along Link 4-2 for 11.0 miles.

From the end of Link 1 to the Mill Creek Substation (Links 4-1 and 4-2), 17.7 miles of overall residual potential high impacts and 54.7 miles of overall residual potential moderate impacts would occur. Potential high impacts due to views from sensitive viewpoints occur in several areas along Links 4-1 and 4-2. Along Link 4-1 near Radersburg, views from residences in the immediate foreground and views from the Radersburg ORV trailhead would result in 0.7 mile of potential high impacts (Link 4-1). Along Link 4-2, the relatively dense area of residences located in the foothills of the Elkhorn Mountains and Boulder Mountains north of Boulder would have immediate foreground and foreground views of the route, resulting in an additional 4.6 miles of potential high impacts, while views from a small cluster of residences northeast of Basin would result in 2.6 miles of potential high impacts (Link 4-2). Further west on Link 4-2, somewhat extensive views from a BDNF Concern Level One Roadway, a BDNF Concern Level Two Roadway, and dispersed residences would result in 4.5 miles of potential high impacts. Where Link 4-2 crosses the Continental Divide National Scenic Trail and a BDNF Concern Level Two Roadway, 2.4 miles of potential high impacts due to immediate foreground and foreground views would occur. An additional 3.6 miles of potential high impacts would occur along Link 4-2 due to immediate foreground and foreground views from dispersed residences and residences in Opportunity. Between the end of Link 1 and the Mill Creek Substation, 34.3 miles of potential moderate impacts to Class B scenery are found along Links 4-1 and 4-2 in the Elkhorn Mountains and the Boulder Mountains. The longest continuous area of Class B scenery (31.5 miles) for all the alternatives is crossed by this route (Link 4-2) through the Boulder Mountains. Additional potential moderate impacts would occur along Links 4-1 and 4-2 due to strong visual contrast levels in Class C scenery areas and due to views from dispersed residences, the Radersburg ORV Trailhead, the Elkhorn WSA, BDNF Concern Level One Roadway, and the Continental Divide National Scenic Trail.

A3: MAXIMIZE UTILITY CORRIDORS

The A3: Maximize Utility Corridors is composed of Links 2-1, 2-3, 7-2, 7-41, 7-42, 7-5, 7-61, 7-62, 7-72, 7-9, 11-21, 11-22, and 11-23. The A3 route would have the longest distance of potential overall residual high impacts, totaling 31.5 miles, and 70.7 miles of potential overall residual moderate impacts.

See the A1: Preferred Route effects section for discussion of impacts that occur between the Hwy 69 crossing and the end of Link 7-5 and between the Mill Creek Substation and the end of the route (Links 7-2, 7-41, 7-42, 7-5, 7-9, 11-21, 11-22, and 11-23). Potential impacts that would occur between the Townsend Substation and the Hwy 69 crossing (Links 2-1and 2-3) and from the end of Link 7-5 to the Mill Creek Substation (Links 7-61, 7-62, and 7-72) are discussed below.

The A3: Maximize Utility Corridors would have the greatest number of residences (132 residences) with immediate foreground views of any of the alternatives. Link 7-61 has the second greatest number of residences (63 residences) with foreground views of the route of any link on any alternative. In addition to the relatively dense residential areas located along Links 7-2, 7-41, 7-42, and 7-5 noted in the A1: Preferred Route effects section, notable clusters of residences located southwest of Ramsay and southwest of Butte are located along Link 7-61. High and moderate

impacts to residences are scattered throughout the route corridor due to the large number of dispersed residences present.

The A3: Maximize Utility Corridors would cross the same visually sensitive recreation, preservation, and transportation features and the same areas of Class A scenery that would be crossed by the Preferred Route.

Strong visual contrast levels would occur along 15.7 miles of Link 2-1, while moderate visual contrast levels would occur along 9.2 miles of the link. Links 2-3, 7-61, and 7-72 would generally have moderate visual contrast levels, with a few small isolated pockets of strong visual contrast where strong landform and vegetation contrast levels occur. Moderate visual contrast levels would occur for all of Link 7-62. Refer to the A1: Preferred Route effects section for a description of visual contrast levels for the remainder of the route.

Selective Mitigation Measure 3 would reduce impact levels from moderate to low for 0.7 mile (Links 2-1, 2-3, 7-61, 7-72). All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low). Refer to the A1: Preferred Route effects section for a description of reductions in impact levels for the remainder of the route.

Visual contrasts along the A3 route would not comply with the BLM VRM Class II designation for approximately 0.2 mile of Link 3-1. Refer to the A1: Preferred Route effects section for a description of areas where visual contrast would not comply with agency management objectives for the remainder of the route.

From the Townsend Substation to the Hwy 69 crossing, 9.0 miles of overall residual potential high impacts and 28.0 miles of overall residual potential moderate impacts would occur (Links 2-1 and 2-3). A total of 8.2 miles of potential high impacts to residences would occur along the route between the Townsend Substation and the Hwy 69 crossing. Residences are typically dispersed, however, notable areas of potential high impacts to residences occur where a cluster of rural residences with immediate foreground and foreground views of the route is found north of Three Forks (Link 2-1 and 2-3) and where clusters of residences are located southwest of Ramsay and southwest of Butte (Link 7-61). Along Link 3-1, views from the Missouri River Class II Fishery and the Lewis and Clark National Historic Trail, both crossed by Link 3-1, would result in 2.8 miles of potential high impacts. Potential moderate impacts along Links 2-1 and 2-3 occur due to views from dispersed residences and due to views from the Missouri River Class II Fishery, the Lewis and Clark National Historic Trail, the Fairweather Campground/Sportsman’s Access, and Missouri Headwaters State Park, all located along Link 2-3.

From the end of Link 7-5 to the south end of Link 7-9 (Links 7-61, 7-62, and 7-72), 6.3 miles of overall residual potential high impacts and 10.8 miles of overall residual potential moderate impacts would occur. All high impacts are due to views from residences. Residences are dispersed along the route, with notable clusters of residences located southwest of Ramsay and southwest of Butte (Link 7-61). Potential moderate impacts would result from views from residences and from strong contrast levels in areas of Class C scenery.

4.7.3.3 Mill Creek to State Line Segments

B1: PREFERRED ROUTE

The B1: Preferred Route is composed of Links 11-3, 16-1, 16-2, and 16-4. The preferred route would have 13.2 miles of potential overall residual high impacts. The B1: Preferred Route would have the greatest distance of potential overall residual moderate impacts (35.6 miles).

High and moderate impacts to residences are scattered throughout the route corridor due to the large number of dispersed residences present. A total of nine residences would have immediate foreground views of the B1: Preferred Route.

The B1: Preferred Route would cross two visually sensitive recreation and preservation features, the Beaverhead River Class I Fishery and the Lewis and Clark National Historic Trail. High impacts occur for these features and for several other features with foreground views of the route.

Areas of potential high impacts to Class A scenery are located at the Coyote Creek crossing on Link 11-3 and where the route crosses the Beaverhead River and then follows the edge of the mountains on the east side of the Beaverhead River valley on Link 16-1.

Link 11-3 and the north half of Link 16-1 would generally have moderate visual contrast levels, with occasional areas of strong visual contrast. Strong visual contrast levels would occur for 10.3 miles along Link 16-1 where the route crosses the Beaverhead River and follows the edge of the mountains on the east side of the river. Moderate visual contrast levels would occur for the remainder of the link. Strong visual contrast levels are widespread and evenly distributed along Link 16-2, with 18.7 miles of strong visual contrast levels and 10.6 miles of moderate visual contrast levels. Areas of strong visual contrast are scattered along Link 16-4, with 3.5 miles of strong visual contrast levels and 5.2 miles of moderate visual contrast levels.

Selective Mitigation Measure 3 would reduce impact levels from moderate to low for 6.1 miles of the Preferred Route. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

Where BLM lands are crossed, visual contrasts along the Preferred Route would comply with the BLM VRM Class designations.

From the beginning of the route southwest of Mill Creek to the end of Link 11-3, 3.3 miles of overall residual potential high impacts and 6.4 miles of overall residual potential moderate impacts would occur. Along Link 11-3, a total of 3.0 miles of potential high impacts to residences would occur. Residences are typically dispersed, however, a small cluster of residences located around Interstate 90 Exit 85, in the vicinity of the Kalsta Bridge fishing access site would have immediate foreground or foreground views of the route. Along the link, a total of 0.2 mile of potential high impacts would occur due to foreground views of the link from the Beaverhead River Class I Fishery and the Lewis and Clark National Historic Trail. An area totaling 1.3 miles of potential high impacts to Class A scenery is found at the Coyote Creek crossing, just upstream from where it flows into the Big Hole River, west of McCartney Mountain. Potential moderate impacts occur due to views from dispersed residences and due to views from the Beaverhead River Class I Fishery, the Lewis and Clark National Historic Trail, and the Kalsta Bridge sportsman's access

Along Link 16-1, a total of 2.9 miles of potential high impacts to dispersed residences would occur. The route would cross the Lewis and Clark National Historic Trail and the Beaverhead River Class I Fishery and continue to the south within the foreground distance zone of the river and the trail, resulting in 6.3 miles of potential high impacts. The High Bridge sportsman's access would also have foreground views and potential high residual impacts in the same area.

An area of Class A scenery is located where the route crosses the Beaverhead River and then roughly follows the edge of Jim Brown Mountain and Gallagher Mountain above the narrow Beaverhead River valley to Clark Canyon, resulting in 1.7 miles of high impacts to scenic quality in the crossing area and an additional 1.2 miles of high impacts to scenic quality further south where the route is near the river. Moderate impacts to Class B scenery would occur where the route crosses the Beaverhead River and then roughly follows the edge of Jim Brown Mountain and Gallagher Mountain above the narrow Beaverhead River valley to Clark Canyon. Additional potential moderate impacts would occur due to strong visual contrast levels in areas of Class C scenery and due to views from dispersed residences and due to views from the Beaverhead River Class I Fishery and the Lewis and Clark National Historic Trail.

Along Link 16-2, a total of 2.7 miles of potential high impacts to dispersed residences would occur. Moderate impacts would occur due to views from dispersed residences and from the community of Lima. Moderate impacts would also occur due to views from the Big Sheep Creek Back Country Byway and the Red Rocks day use area.

Along Link 16-4, a total of 0.6 miles of potential high impacts to dispersed residences would occur. Moderate impacts would occur where an area of Class B scenery is crossed by the route at the edge of Lima Peaks in the Bitterroot Range and due to strong contrast levels in areas of Class C scenery, due to views from dispersed residences, and where strong visual contrast levels would occur in areas of Class C scenery.

B2: SHEEP CREEK ROUTE

The B2: Sheep Creek Route is composed of Links 11-4 and 18-1. The B2: Sheep Creek Route would have the greatest distance of potential overall residual high impacts (14.6 miles) and the shortest distance of potential overall residual moderate impacts (32.2 miles).

High and moderate impacts to residences are scattered throughout the route corridor due to the large number of dispersed residences present. A total of eight residences would have immediate foreground views of the B2 route.

The B2 route would cross the Lewis and Clark National Historic Trail and the Continental Divide National Scenic Trail once each. The route would also cross the Big Sheep Creek Back Country Byway a number of times, where both the route and the byway roughly follow Medicine Lodge Creek in the Bitterroot Range.

One area of potential high impacts to Class A scenery is located where the route crosses Coyote Creek, just upstream from the Big Hole River.

Moderate contrast levels occur along almost the entire route, with 85.3 miles of moderate visual contrast levels. Only 1.3 miles of high visual contrast levels occur due to strong land form and vegetation contrasts.

Selective Mitigation Measure 3 would reduce impact levels from moderate to low for 0.6 mile of the B2 route. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

Visual contrasts along the B2 route would not comply in areas of the BDNF where USFS SIO High occurs along Link 18-1 for 1.5 miles.

A total of 2.9 miles of potential high impacts to residences would occur. Residences are typically dispersed, however, along Link 11-4, a small cluster of residences located on Argenta Flats west of Dillon would have immediate foreground or foreground views of the route resulting in potential high impacts.

Along Link 18-1, the route would follow the east edge of the Henneberry Ridge WSA, resulting in 3.1 miles of potential high impacts due to immediate foreground views of the route. The Lewis and Clark National Historic Trail would be crossed by B2 at the beginning of the Big Sheep Creek Back Country Byway, resulting in 1.0 mile of potential high impacts due to immediate foreground views from the trail and the byway. An additional 7.3 miles of potential high impacts for the byway would occur where the byway is crossed by the route in several locations and in other areas where the route is within the immediate foreground distance zone. A total of 0.3 mile of potential high residual impacts would occur where the Continental Divide National Scenic Trail would be crossed by the route at the Montana-Idaho border and would have immediate foreground and foreground views of the route.

Potential moderate impacts occur due to views from dispersed residences and due to views from the Henneberry Ridge WSA, the Lewis and Clark National Historic Trail, the Big Sheep Creek Back Country Byway, and the Continental Divide National Scenic Trail.

B3: I-15 ROUTE

The B3: I-15 Route is composed of Links 11-3, 16-1, 16-3, and 16-4. The B3: I-15 Route would have the shortest distance of potential overall residual high impacts (12.7 miles) and an additional 35.0 miles of potential overall residual moderate impacts.

See the B1: Preferred Route effects section for discussion of potential impacts that would occur along Links 11-3, 16-1, and 16-4. Potential impacts that would occur along Link 16-3 are discussed below.

The B3: I-15 Route would have the greatest number of residences (11 residences) with immediate foreground views of any of the alternatives. High and moderate impacts to residences are scattered throughout the route corridor due to the large number of dispersed residences present. The community of Lima would have foreground views of the route and a notable cluster of residences located to the south of Clark Canyon would have foreground views of the route (Link 16-3).

The B3: I-15 Route would cross the Big Sheep Creek Back Country Byway (Link 16-3) in addition to crossing the same visually sensitive recreation, preservation, and transportation features that would be crossed by the Preferred Route, and would cross the same areas of Class A scenery that would be crossed by the Preferred Route.

Moderate contrast levels occur along almost all of Link 16-3, with 27.5 miles of moderate visual contrast levels and 3.1 miles of high visual contrast levels. Refer to the B1: Preferred Route effects section for a description of visual contrast levels for the remainder of the route (Links 11-3, 16-1, and 16-4).

Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low), for potential impacts along Link 16-3. Refer to the B1: Preferred Route effects section for a description of reductions in impact levels for the remainder of the route.

Where BLM lands are crossed by the B3 route, visual contrasts would comply with the BLM VRM Class designations.

Along Link 16-3, 2.2 miles of overall residual potential high impacts and 16.8 miles of overall residual potential moderate impacts would occur. A total of 1.7 miles of potential high impacts to residences would occur for Link 16-3. High potential impacts would occur where the community of Lima would have foreground views of the route, where a cluster of residences south of the Clark Canyon Reservoir would have immediate foreground and foreground views of the route, and where two additional dispersed residences would have foreground views of the route. The link would cross the Big Sheep Creek Back Country Byway, resulting in 0.5 mile of potential high impacts. Potential moderate impacts along Link 16-3 would occur due to views from the community of Lima, from dispersed residences, from the Red Rocks day use area, and from the Big Sheep Creek Back Country Byway.

4.7.3.4 AB1: I-15 Jefferson Valley Route

The AB1: I-15 Jefferson Valley Route is composed of Links 1, 3-1, 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21, 7-9, 8, 16-1, 16-2, and 16-4. The route would have 27.5 miles of potential overall residual high impacts and 76.4 miles of potential overall residual moderate impacts. A total of 6.5 miles of potential high impacts and 23.1 miles of potential moderate impacts would occur along Link 8. Refer to the A1: Preferred Route effects section for discussion of potential impacts that would occur along Links 1, 3-1, and 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21, and 7-9. Refer to the B1: Preferred Route effects section for discussion of potential impacts that would occur along Links 16-1, 16-2, and 16-4. Potential impacts that would occur along Link 8 are discussed below.

A total of 99 residences would have immediate foreground views of the AB1: I-15 Jefferson Valley Route. High and moderate impacts to residences are scattered throughout the AB1 route corridor due to the large number of dispersed residences present. A total of 6.0 miles of potential high impacts to dispersed residences would occur along Link 8. Refer to the A1: Preferred Route and B1: Preferred Route sections for a description of clusters of residences with immediate foreground and foreground views of the route that are located along Links 1, 3-1, 7-2, 16-1, 16-2, and 16-4.

Refer to the A1: Preferred Route and B1: Preferred Route effects sections for a description of impacts to sensitive recreation, preservation, and transportation viewpoints along Links 1, 3-1, 7-2, 16-1, 16-2, and 16-4. Along Link 8, the Big Hole River Class I Fishery would be crossed by the route, resulting in 1.5 miles of potential high impacts due to immediate foreground and foreground views.

Refer to the A1:Preferred Route and B1: Preferred Route effects sections for discussion of potential impacts to Class A and Class B scenery crossed by Links 1, 3-1, 7-2, 16-1, and 16-4. Along Link 8, 0.5 mile of potential high impacts to Class A scenery occur where the Big Hole River is crossed.

Strong visual contrast levels would occur along 20.4 miles of Link 8, and are generally concentrated in the middle portion of the link, while moderate visual contrast levels would occur along 29.7 miles of the route, with concentrations occurring and the north and south ends and smaller, scattered areas occurring in the middle section of the link. Refer to the A1: Preferred Route and B1: Preferred Route effects sections for a description of visual contrast levels for the remainder of the route.

Selective Mitigation measures 3 and 6 would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low), for potential impacts along Link 8. Refer to the A1: Preferred Route and B1: Preferred Route effects sections for a description of reductions in impact levels for the remainder of the route.

Where BLM lands are crossed by Link 8, visual contrasts would comply with the BLM VRM Class designations. Refer to the A1: Preferred Route and B1: Preferred Route effects sections for a description of areas where visual contrasts would not comply with agency objectives for the remainder of the route.

Potential moderate impacts occur along Link 8 where Class B scenery is crossed by the route where it crosses Hell Canyon and where it traverses the east side of McCartney Mountain, above the Big Hole River. Additional potential moderate impacts occur along Link 8 due to strong visual contrast levels in areas of Class C scenery and due to views from dispersed residences and views from the Big Hole River Class I Fishery. Refer to the A1: Preferred Route and B1: Preferred Route effects sections for a description of areas of potential moderate impacts for the remainder of the route.

4.7.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

The results of the visual impact assessment of each of the alternative routes in Idaho are described in the following sections. Table 4.7-2 is a summary of these visual resource impacts by alterative. Refer to Volume III, 100K Map Series, Scenic Quality and Sensitive Views for a graphic representation of the resource impacts. For detailed descriptions of the potential impacts, refer to Volume II, Visual Resources Technical Report.

Residual visual impacts in areas of BLM VRM Class III and Class IV and USFS SIO Moderate and Low are expected to meet the guidelines of these management classes following the application of environmental protection measures and specifically recommended mitigation to reduce visual contrasts. Residual visual impacts may not be compatible with agency management objective in areas where BLM VRM Class II and USFS SIO High occur.

Table 4.7-2 Visual Resource Impact Summary - Idaho

			State Line to Midpoint Segments			
			C1: Preferred Route	C2: Eastern Route	C3: Western Route	C4: Sheep Creek INL Brigham Point
Total Length of Alternative (Miles)			232.5	239.2	177.6	214.2
Number of Residences within Immediate Foreground (1000 feet)			6	5	3	4
Visual Contrast Level		**Strong**	35.3	23.5	38.2	21.3
		Moderate	185.5	202.5	139.2	181.2
		Weak	12.1	11.8	0.7	12.1
Visual Contrast Compliance with Agency Management Objectives		**Yes**	131.7	126	107	136.3
		No	33.6	21.3	32.1	31.6
Scenic Quality Impacts		**High**	0	0	0	0
		Moderate	40.9	32.2	47.8	34.7
Impacts to High Sensitivity Viewpoints	**Residences**	**High**	3.2	2.7	1.9	2.2
		Moderate	35.3	30.8	32.7	26.6
	Recreation, Preservation, and Transportation Viewpoints and Linear Features	**High**	7.6	7.2	2.2	4.6
		Moderate	21.2	21.5	16.1	14.5
Impacts to Moderate Sensitivity Viewpoints		**High**	9.7	7.8	11.7	7.9
		Moderate	16.6	9.2	11.1	13.6
Overall Residual Impacts		**High**	18	16.2	13.1	14.3
		Moderate	64.8	54.3	60	58.3

All high impacts to residential viewpoints and high sensitivity recreation, preservation, and transportation viewpoints result from all contrast levels in the immediate foreground distance zone or foreground views of strong contrast areas of the routes. High impacts to moderate sensitivity recreation, preservation, and transportation viewpoints result from strong and moderate contrast levels in the immediate foreground distance zone or foreground views of strong contrast areas of the routes. All moderate impacts to residential viewpoints and high sensitivity recreation, preservation, and transportation viewpoints result from moderate or weak contrast levels in the foreground distance zone or middleground views of strong contrast areas of the routes. Moderate impacts to moderate sensitivity recreation, preservation, and transportation viewpoints result from weak contrast levels in the immediate foreground distance zone and moderate or weak contrast levels in the foreground distance zone. High impacts to sensitive viewpoints are identified and discussed in these sections. Moderate impacts to sensitive viewpoints are summarized.

High impacts to scenic quality occur only in areas of Class A scenery where strong or moderate contrast levels occur. Moderate impacts to scenic quality occur in areas of Class B and Class C scenery. Moderate impacts to Class B scenery occur in areas of strong or moderate visual contrast. Moderate impacts to Class C scenery occur only in areas of strong visual contrast. Specific areas of impacts to Class C scenery are not discussed in this section, but are identified in Volume III, 100K Map Series, Scenic Quality.

Selective Mitigation Measures 3 and/or 11 would be effective in reducing the visual contrast and visual impacts from high to moderate or from moderate to low in some locations. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

4.7.4.1 State Line to Midpoint Segments

C1: PREFERRED ROUTE

The C1: Preferred Route is composed of Links 20, 22, 23, 24, 26-1, 26-2, 26-3, 26-4, and 27. The C1: Preferred Route would have the greatest distance of potential overall residual high impacts (18.0 miles) and potential overall residual moderate impacts (64.8 miles) of any State Line to Midpoint alternative.

A total of 6 residences would have immediate foreground views of the C1: Preferred Route. High and moderate impacts to residences are scattered throughout the route corridor due to presence of dispersed residences. The community of Spencer would have immediate foreground and foreground views of the route, resulting in potential residual high and moderate impacts (Link 20).

The C1: Preferred Route would cross a number of visually sensitive features, including the Continental Divide National Scenic Trail, the Lost Gold Trails Loop Scenic Byway, the Nez Perce National Historic Trail, the Sacajawea Historic Byway, Goodale's Cutoff Historic Trail, and Great Rift NNL, resulting in immediate foreground and foreground views of the route and potential residual high impacts. Immediate foreground or foreground views of the route would occur for Great Rift WSA and Shale Butte WSA, resulting in potential residual high impacts.

The C1 route would generally have moderate visual contrast levels, with occasional areas of strong visual contrast. Areas of strong visual contrast levels are concentrated along Links 20, 22, and 26-3.

Selective Mitigation Measures 3 and 11 would reduce impact levels from moderate to low for 4.2 miles of Link 20. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

Visual contrasts along the C1: Preferred Route would not be compatible with the BLM VRM Class I designation for approximately 0.7 mile of Link 24; and would not be compatible with the BLM VRM Class II designation for approximately 6.2 miles of Link 22, 11.3 miles of Link 23, 9.1 miles of Link 24, and 0.2 mile of Link 26-4. Areas of Caribou-Targhee National Forest where visual contrasts would not be compatible with the USFS VQO Retention would occur along Link 20 for 6.1 miles.

From the beginning of the route at the Montana-Idaho border to the end of Link 20, 3.3 miles of overall residual potential high impacts and 4.5 miles of overall residual potential moderate impacts would occur. Along Link 20, a total of 1.6 miles of potential high impacts to residences would occur. Residences are typically dispersed, however, the majority of the community of Spencer would have either immediate foreground or foreground views of the route. Along Link 20, a total of 2.2 miles of potential high impacts would result due to crossings of the Continental Divide National Scenic Trail, the Lost Gold Trails Loop Scenic Byway, and the Nez Perce National Historic Trail; and due to foreground views from the Garfield Mountain roadless area. Potential moderate impacts would occur due to strong visual contrast levels in areas of Class C scenery and due to views from dispersed

residences, the Continental Divide National Scenic Trail, the Lost Gold Trails Loop Scenic Byway, the Nez Perce National Historic Trail, and the Garfield Mountain roadless area.

Along Link 22, a total of 1.6 miles of overall potential high impacts would occur. A total of 0.4 mile of potential residual high impacts to dispersed residences would occur. The route would cross the Lost Gold Trails Loop Scenic Byway and the Nez Perce National Historic Trail, resulting in 1.2 miles of potential high impacts. Potential moderate impacts would occur due to strong visual contrast levels in areas of Class C scenery and due to views from dispersed residences, the Lost Gold Trails Loop Scenic Byway, and the Nez Perce National Historic Trail.

Along Link 23, a total of 3.3 miles of overall potential high impacts would occur. A total of 0.4 mile of potential residual high impacts to two dispersed residences would occur. The route would cross the Nez Perce National Historic Trail and the Sacajawea Historic Byway, resulting in 2.8 miles of potential high impacts. Potential moderate impacts would occur due to views from two dispersed residences, the Nez Perce National Historic Trail, and the Sacajawea Historic Byway.

Along Link 24, a total of 0.4 mile of overall potential high impacts would occur. The route would cross Goodale's Cutoff, resulting in 0.4 mile of potential high impacts. Moderate impacts to Class B scenery would occur at the south end of the link, where the route crosses through an area dominated by lava fields and several buttes. Additional potential moderate impacts would occur due to views from Goodale's Cutoff.

From the origin of Link 26-1 west of Cedar Butte WSA to the route's termination at Link 27 and the Midpoint substation (Links 26-1, 26-2, 26-3, 26-4, and 27), a total of 9.4 miles of overall potential high impacts would occur. A total of 0.8 mile of potential residual high impacts to dispersed residences would occur. A total of 8.6 miles of high impacts would occur due to the route crossing Goodale's Cutoff (Link 26-1), crossing through Great Rift NNL (Link 26-3), foreground views of the route from Great Rift WSA (Link 26-3), and immediate foreground and foreground views from Shale Butte WSA (Link 26-4). Moderate impacts to Class B scenery would occur at the north end of Link 26-1, where the route crosses through an area dominated by lava fields and several buttes. Additional potential moderate impacts would occur due to views from dispersed residences, concentrated northwest and west of American Falls and east and north of Minidoka, views from Goodale's Cutoff, Great Rift WSA, Great Rift NNL, and Shale Butte WSA.

C2: EASTERN ROUTE

The C2: Eastern Route is composed of Links 20, 21, 26-1, 26-2, 26-3, 26-4, and 27. The C2: Eastern Route would have the 16.2 miles of potential overall residual high impacts and 54.3 miles of potential overall residual moderate impacts.

See the C1: Preferred Route effects section for discussion of impacts that occur along Link 20 and from the origin of Link 26-1 east of Cedar Butte WSA to the route's termination at Link 27 and the Midpoint substation (Links 26-1, 26-2, 26-3, 26-4, and 27). Potential impacts that would occur along Link 21 are discussed below.

A total of 5 residences would have immediate foreground views of the C2: Eastern Route. High and moderate impacts to residences are scattered throughout the route corridor due to the presence of dispersed residences. Refer to the C1: Preferred Route effects section for a description of any notable

area of impacts to clusters of residences and communities for Links 20, 26-1, 26-2, 26-3, 26-4, and 27.

The C2: Eastern Route would cross several visually sensitive recreation, preservation, and transportation features, including the Continental Divide National Scenic Trail, the Lost Gold Trails Loop Scenic Byway, the Nez Perce National Historic Trail, and Goodale's Cutoff Historic Trail. The Great Rift NNL is also crossed by the route. Immediate foreground or foreground views of the route would occur for Hell's Half Acre WSA, Cedar Butte WSA, Great Rift WSA, and Shale Butte WSA, resulting in potential residual high impacts. Refer to the C1: Preferred Route effects section for a description of notable areas of impacts to visually sensitive recreation, preservation, and transportation features along Links 20, 26-1, 26-2, 26-3, 26-4, and 27.

The C2: Eastern Route would have the least impacts to scenic quality of all the Stateline to Midpoint alternatives.

Link 21 would generally have moderate visual contrast levels, with a few small areas of strong visual contrast. Refer to the C1: Preferred Route effects section for a description of visual contrast levels for the remainder of the route.

Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low) for impacts along Link 21. Refer to the C1: Preferred Route effects section for a description of reductions in impact levels for the remainder of the route

Visual contrast levels would not be compatible with the BLM VRM Class I designation for approximately 1.6 miles of Link 21 and would not be compatible with BLM VRM Class II designation for approximately 13.4 miles of Link 21. Refer to the C1: Preferred Route effects section for a description of visual contrast level compatibility with agency management objectives for the remainder of the route.

Along Link 21, 3.5 miles of overall residual potential high impacts and 10.8 miles of overall residual potential moderate impacts would occur. A total of 0.3 mile of potential high impacts to one residence northeast of Hamer would occur. A total of 3.2 miles of potential high impacts due to crossings of the Lost Gold Trails Loop Scenic Byway and Goodale's Cutoff (crossed twice); and due to foreground views from Cedar Butte WSA would occur. Moderate impacts to Class B scenery would occur where the route passes northwest of Market Lake and also at the south end of the link, where the route crosses through an area dominated by lava fields and several buttes. Additional potential moderate impacts would occur due to strong visual contrast levels in Class C scenery areas; views from dispersed residences; and views from the Lost Gold Trails Loop Scenic Byway, Hell's Half Acre WSA, Goodale's Cutoff, and Cedar Butte WSA.

C3: WESTERN ROUTE

The C3: Western Route is composed of Links 18-2, 23, 25-11, 25-12, 25-3, 25-4, and 27. The C3: Western Route would have 13.1 miles of potential overall residual high impacts and 60.0 miles of potential overall residual moderate impacts. The C3 route would have the shortest distance of potential overall residual high impacts of all the Stateline to Midpoint alternatives.

See the C1: Preferred Route effects section for discussion of impacts that occur along Links 23 and 27. Potential impacts that would occur along the remainder of the C3 route (Links 18-2, 25-11, 25-12, 25-3, and 25-4 are discussed below.

The C3: Western Route would have the smallest number of residences (3) with immediate foreground views of the route of all the Stateline to Midpoint alternatives. High and moderate impacts to residences are scattered throughout the route corridor due to presence of dispersed residences. A portion of the community of Richfield would have foreground views of the route. Refer to the C1: Preferred Route effects section for a description of any notable areas of impacts to clusters of residences and communities for Links 23 and 27.

Potential residual high impacts would occur along the C3 route where immediate foreground and foreground views would result from crossings of several visually sensitive recreation, preservation, and transportation features, including the Continental Divide National Scenic Trail, the Nez Perce National Historic Trail, the Sacajawea Historic Byway, Goodale's Cutoff Historic Trail, a segment of US Hwy 20 designated by Blaine County as a scenic corridor; and where foreground views of the route would occur for Great Rift WSA. Refer to the C1: Preferred Route effects section for a description of notable areas of impacts to visually sensitive recreation, preservation, and transportation features along Links 23 and 27.

The C3: Eastern Route would have the most impacts to scenic quality of all the Stateline to Midpoint alternatives.

The C3 route would generally have moderate visual contrast levels. High visual contrast levels are concentrated along Links 25-12 and 25-3, where 33.1 miles of high visual contrast levels and 29.0 miles of moderate visual contrast levels would occur. Small areas of high visual contrast levels are scattered elsewhere along the route.

Selective Mitigation Measure 3 would reduce impact levels from moderate to low for 1.6 miles of Link 18-2. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

Visual contrasts along the C3: Western Route would not be compatible with the BLM VRM Class II designation for approximately 6.8 miles of Link 18-2 and 10.5 miles of Link 25-11. Areas of Caribou-Targhee National Forest where visual contrasts along the C3: Western Route would not be compatible with the USFS VQO Retention would occur along Link 18-2 for 3.6 miles. Refer to the C3: Western Route effects section for a description of visual contrast level compatibility with agency management objectives for Link 23.

Along Link 18-2, 1.2 miles of overall residual potential high impacts and 10.1 miles of overall potential moderate impacts would occur. A total of 1.0 mile of potential high impacts to dispersed residences would occur. A total of 0.2 mile of potential high impacts due to immediate foreground views of the route at the Continental Divide National Scenic Trail crossing would occur. Moderate impacts to Class B scenery would occur where the route crossed through the Beaverhead Mountains. Additional potential moderate impacts would occur due to strong visual contrast levels in Class C scenery areas; views from dispersed residences; and views from the Continental Divide National Scenic Trail and the Italian Peak roadless area/proposed wilderness.

From the beginning of Link 25-11 to the end of the route at Link 27 and the Midpoint substation (Links 25-11, 25-12, 25-3, and 25-4), 8.6 miles of overall residual potential high impacts and 42.6 miles of overall residual potential moderate impacts would occur. A total of 0.5 mile of potential high impacts to residences would occur west of Carey (Link 25-3) and between Shoshone and Dietrich (Link 25-4). A total of 8.4 miles of potential high impacts would occur due to views from crossings of Goodale's Cutoff (one by Link 25-3, three crossings by Link 25-12) and US Hwy 20 where it is designated by Blaine County as a scenic corridor (Link 25-3); and due to foreground views from Great Rift WSA (Link 25-12). Moderate impacts to Class B scenery would occur where the route crosses the Big Lost River Sinks (Link 25-11) and south of Fish Creek Reservoir (Link 25-12). Additional potential moderate impacts would occur due to strong visual contrast levels in Class C scenery areas; views from dispersed residences; and views from the US Hwy 20, US Hwy 26/93, and US Hwy 20/26/93 where they are designated by Blaine County as scenic corridors, Goodale's Cutoff, and Great Rift WSA.

C4: Sheep Creek INL/Brigham Point Route

The C4: Sheep Creek INL/ Brigham Point Route is composed of Links 18-2, 23, 24, 26-1, 26-2, 26-3, 26-4, and 27. The C4 route would have 14.3 miles of potential overall residual high impacts and 58.3 miles of potential overall residual moderate impacts.

Refer to the C3: Western Route effects section for discussion of impacts that occur along Link18-2. Refer to the C1: Preferred Route for discussion of impacts that occur along Links 23, 24, 26-1, 26-2, 26-3, and 27.

A total of 4 residences would have immediate foreground views of the C4 route. High and moderate impacts to residences are scattered throughout the route corridor due to presence of dispersed residences. Refer to the C3: Western Route and C1: Preferred Route effects sections for a description of any notable area of impacts to clusters of residences and communities.

The C4 route would cross a number of visually sensitive features, including the Continental Divide National Scenic Trail, the Nez Perce National Historic Trail, the Sacajawea Historic Byway, Goodale's Cutoff Historic Trail, and Great Rift NNL, resulting in immediate foreground and foreground views of the route and potential residual high impacts. Immediate foreground or foreground views of the route would occur for Great Rift WSA and Shale Butte WSA, resulting in potential residual high impacts.

The C4 route would generally have moderate visual contrast levels, with occasional areas of strong visual contrast. Areas of strong visual contrast levels are concentrated along Link 26-3.

Selective Mitigation Measure 3 would reduce impact levels from moderate to low for 1.6 miles of Link 18-2. All other Selective Mitigation Measures would be effective in reducing impacts, but would not reduce the visual impacts a full level (i.e., high to moderate or moderate to low).

Refer to the C3: Western Route and C1: Preferred Route effects section for a description of visual contrast level compatibility with agency management objectives.

4.7.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.7.5.1 New Townsend Substation

Visual contrast levels would be weak for the new Townsend Substation site. Potential moderate impacts would be expected for the eight residences in the foreground distance zone.

4.7.5.2 Mill Creek Substation Addition

Visual contrast levels would be weak for the Mill Creek Substation Addition. Potential moderate impacts would be expected for the two residences in the foreground distance zone.

4.7.5.3 Midpoint Substation Addition

Visual contrast levels would be weak for the Midpoint Substation Addition. No sensitive viewpoints would be present in the immediate foreground or foreground distance zones.

4.7.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to visual resources from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to visual resources from construction, operation, or maintenance of the communication system are anticipated.

4.8 SOCIOECONOMICS

4.8.1 INTRODUCTION

Potential socioeconomic impacts of construction and operation of each project alternative are examined in this chapter and are discussed in more detail in the Socioeconomics Technical Report (Volume II). The primary socioeconomic effects associated with transmission line projects are: 1) construction-period impacts within area communities, 2) social and economic impacts along the selected route, and 3) fiscal effects within surrounding jurisdictions. These effects can be adverse or beneficial, and short-term or long-term. They may be experienced by property owners along the transmission line route, residents of nearby communities, and taxpayers in jurisdictions crossed by the route.

The influx of the construction labor force can have both adverse and beneficial impacts on area communities. Potential adverse effects could include overburdening existing retail facilities, such as

motels and restaurants. At the same time, the project could benefit local communities by increasing retail sales and by generating employment. These impacts are short-term, lasting only for the duration of construction in a particular area.

Economic impacts may also occur where existing or planned land uses are displaced by the right-of-way or where the transmission line affects nearby properties. The effects of the alternative routes on agriculture, recreation, and other land uses are addressed in the Land Use sections of this document (Sections 3.6 and 4.6).

Revenues from property taxes assessed on the project provide a long-term benefit to local taxpayers. This can be particularly important to small rural communities with declining tax bases. Additional revenues may be generated through local sales taxes on purchases by construction contractors and workers, but these revenues are generally small and transitory. In addition to payments to private property owners for fee purchases or for right-of-way leases, the USFS and BLM will receive right-of-way payments on federal lands crossed by the transmission line.

Socioeconomic impacts arise mostly from proposed project's requirements for mobilizing and deploying labor, capital and material resources. Application of these factors of production in the study area would potentially result in changes in employment, housing, and commercial activities. Whether these changes are significant -- either beneficial or adverse -- largely depends on: 1) the degree, or intensity, magnitude, duration, and reversibility of changes in the baseline levels of utilization, and 2) the capacity of the study area's resources to accommodate changes in demand. The study area is addressed at four geographic levels:

1. The counties that comprise the study area;
2. Each county through which a project alternative would pass;
3. Affected cities; and
4. An area within 6 miles of each project alternative (for Environmental Justice considerations, see Section 4.9).

4.8.2 METHODS FOR ASSESSING IMPACTS

The basic method for assessing socioeconomic impacts is to compare the pre-project environment with the estimated condition of the socioeconomic parameters of interest following implementation of the project.

In general, the effects of transmission lines on existing economic activities are relatively small. Economic issues include potential effects from the influx of construction workers, disruption of land-based economic activities (e.g., ranching, irrigation), and compensation for right-of-way.

The assessment of construction impacts involves evaluating whether the influx of construction workers would require additional community services or facilities, including accommodations. Potential economic benefits from the influx of workers are also considered. The assessment involves an analysis of data on the proposed construction schedule, size of the workforce, population distribution, and available accommodations.

Potential impacts from construction are typically minimal due to the small size and short-term workforce characteristics of transmission line construction. Some conflicts may exist if the

construction workforce competes with tourists for space in motels and campgrounds. Increased traffic associated with transporting both workers and equipment to and from the worksite may also result in potential conflict with tourist activities.

To estimate the increases in jobs and income, the IMPLAN model was employed. IMPLAN, commonly used for impact analysis across the country, is an input-output model developed by IMG, Inc. to enable users to simulate the indirect and induced impacts of any specified project, using the project's direct spending on labor and materials as inputs. In order to run IMPLAN, an input-output model of the MSTI study area was assembled, and local purchases were added to the region's existing structure.

Fiscal impacts are assessed by estimating potential property tax revenues from the project by county. Estimates for assessed value for the project are derived by multiplying the distance of the transmission line for each alternative route by the assessment ratio for the state and by the average cost per mile for the project. To calculate the project's average cost per mile, the value of substations and other facilities are added to the transmission line costs and the total is divided by the length of the project. Property tax revenues by county are estimated by multiplying the assessed value by the average property tax rate in each county.

For the socioeconomic impact assessment, several assumptions were necessary.

1. It was assumed that construction, rather than operation, impacts are of primary consideration because the main drivers of socioeconomic impacts are the demand for labor and the purchase of local goods and services, which would be far greater during construction.
2. It was assumed that annual operation and maintenance costs would be only 3% of the total costs of construction. Few workers, on average, will be needed. The number could fluctuate somewhat if there are major emergency repairs to be made, but these would be rare unanticipated occurrences. The primary impacts of concern for operation are positive impacts on local property tax bases and therefore property tax revenues.
3. It was assumed that regardless of the transmission line alternative chosen, construction activities for the combined Idaho and Montana portions of the lines would begin July 1, 2010, and last for 136 weeks, or 32 months, and conclude in early February, 2013.
4. It was assumed that the peak construction workforce, combining line and substation workers, would be 298 workers, working 6-day weeks and an assumed 50-hour average workweek.
5. It was assumed the entire workforce would be union workers, members of the International Brotherhood of Electrical Workers (IBEW) and would require payment of union wages and benefits by employees of the prime contractors.

The approach to the socioeconomic assessment is first to describe an end-to-end Preferred Route (A1, B1, C1) including both the Idaho and Montana portions for the MSTI project. Similar information is provided for Alternative AB1 in Montana. Impacts of other alternatives in Montana, including a Montana combined Preferred Route (A1, B1), are subsequently assessed either qualitatively (as in the case for employment, income, population, and housing) or quantitatively where adequate data exist (such as property tax payments).

This section therefore describes an end-to-end Preferred Route (A1, B1, C1) to show how the project in sum would occur as the source of impacts to socioeconomics. The Socioeconomics Technical Report (Volume II) provides additional background information.

4.8.2.1 Impact Type

There are several aspects of the economy that could potentially be impacted by the MSTI project. These include employment and income, population, housing, and fiscal conditions. Each is discussed below. In addition, there is a discussion about the possible effects of transmission lines on property values.

EMPLOYMENT AND INCOME

The types of impacts to employment and income potentially caused by the MSTI project include:

1. **Site construction:** These are on-site construction jobs and would occur almost entirely within the site right-of-way and substation sites. These jobs would be comprised of 75% non-local hires who would largely seek transient accommodations (with a very few rental apartments) near their place of work.

2. **Direct impacts – contemporaneous:** These are workers at the locations where site workers would spend their incomes (with non-local workers patronizing hotels, restaurants, and miscellaneous retail establishments nearby). Thus, they would be likely to work in communities along the right-of-way and near the substations.

3. **Direct impacts – 4-week delay:** These are primarily workers at firms supplying aggregate, office supplies, equipment rental, and fuel for the project. Their jobs could be located anywhere in the MSTI study area.

4. **Indirect Impacts – re-spending (half 4-week delay, half 8-week delay):** These are workers who work at businesses in the supply chains of firms supplying project materials. Workers could reside anywhere in the region, but would be most likely to occur in the regional centers of Bozeman, Helena, and perhaps Butte in Montana and Pocatello and Idaho Falls in Idaho.

5. **Induced Impacts – re-spending (half 8-week delay, half 16-week delay):** These jobs would be created through the general, extended recycling of all project payments throughout the region. The jobs could be located anywhere in the region, but would be most likely to occur in the regional centers of Bozeman, Helena, and perhaps Butte in Montana and Pocatello and Idaho Falls in Idaho.

Jobs classified above as categories 1 and 2 would be strongly tied to the communities near the transmission route and substations. Construction workers (category 1) would clearly be temporary and would bring no dependents. In category 2, the jobs would likely be temporary since they would be so closely tied to project purchases, and workers taking these positions would most likely be residents of communities close to the route. These workers would likely be residents of the region, and therefore would not significantly affect regional or sub-regional populations. In fact, many of

these jobs could be filled by extending hours of existing workers, rather than by hiring new employees, since the jobs would be short-term.

The remainder of the jobs would likely be viewed as increases in the number of workers in the broader region—as part of normal economic growth. These jobs could ultimately cause workers to migrate to the MSTI study area, many bringing dependents. These jobs would likely cause both increases in population, and demand for housing, both rental and owner-occupied. .

Operation employment, wage payments, and purchases of materials would be extremely minimal, and therefore are not addressed in this analysis.

POPULATION

Increases in employment in an area generally lead to increases in population, as some of those who take jobs associated with a project move to the area, some with dependents. The direct project construction workforce is likely to be drawn from both within and outside the study area; those who relocate to the study area for construction are unlikely to bring dependents. Furthermore, workers in category 2 above are likely to be local residents known to be working only temporarily.

Population increases would occur primarily due to jobs created in categories 3 through 5 above. With a historically very tight labor market in the study area, ultimately in-migration would be a primary vehicle for meeting increased labor demand.

Based on historical data on the region's employment and population, the ratio of population to employment has declined over the past 40 years, largely due to increasing labor force participation rates. Since 2001 the ratio has been approximately 1.5 (U.S. Bureau of Economic Analysis 2008).

Operational employment may also indirectly cause some of these indirect population increases. However, the level of employment and expenditures for operations would be so small that population increases would be minimal, if they occur at all.

HOUSING

Workers on the MSTI project who relocate to the study area would most likely choose transient accommodations such as hotel/motel rooms or RV parks, rather than rent or buy homes. This might be regarded as a cost in the sense that they might overload available space or displace customary users of motels and RV parks nearest the project work sites.

Non-local workers are expected to move to hotels, motels, and RV parks that are nearest available to their project work locations; a small proportion, whose work extends past a few months, would likely seek rental housing.

For work locations within a reasonable commuting distance of regional centers in Idaho and Montana, substantial hotel/motel space is available. Very limited space may be available in other locations.

After completion of construction, personnel requirements would be negligible, and would place no extra burden on the housing market.

FISCAL CONDITIONS

Impacts on local fiscal conditions would take the form of increased property tax payments to taxing jurisdictions in which project facilities are located. The amount of these payments would depend on the extent to which project facilities are located on private lands, and the rate at which each jurisdiction taxes improvements to that land.

PROPERTY VALUE

Proposed transmission line projects often raise concerns about their potential effects on property values. In general, there are two types of property value impacts that may be experienced by property owners affected by a new transmission line. The first is a potential economic impact associated with the amount paid by a utility for a right-of-way easement. The second is the potential economic impact involving the future marketability of the property. Although somewhat interrelated, these two effects are discussed below.

Just compensation for a transmission line easement has been typically interpreted as the difference between the fair market price of the land with and without the encumbrance of the line. Economic impacts to landowners may occur if they are not compensated for the "highest and best use" of the affected parcel or if the effective "taking" is larger than the actual easement.

Potential impacts related to the marketability of a property include factors such as sale price, the amount of time required to sell, and the debt carried over this time.

A transmission line may either increase or decrease an individual's perception of a property's worth. This perception is indicative of how much one is willing to pay for the property (the fair market value).

The perceived value of a piece of property may increase if:

- A cleared right-of-way provides better access to interior lands or water.
- A cleared right-of-way creates an opening that enhances the area for certain wildlife.
- A cleared right-of-way provides open space that is used for gardening or recreation.
- Increased local electrical reliability enhances opportunities for development of commercial or industrial interests.
- In rural areas, especially in the vicinity of large wooded parcels, utility right-of-way may provide improved access for hunting, snowmobiling, or other recreational activities.
- Some animals use forest openings for foraging and travel. In urban or suburban residential areas, lots on or adjacent to transmission line corridors are often sized larger than neighboring lots but similarly priced, allowing residents to benefit from the added buffer and space the right-of-way provides. Integrating the open space of the utility corridor into a neighborhood and developing it as usable space can also diminish or avoid adverse effects on property values.

Conversely, the perceived value of property may decrease in value because of:

- Concern or fear of possible health effects from electric or magnetic fields (see Section 4.11).
- The potential noise and visual unattractiveness of the transmission line (see Sections 4.7 and 4.11).
- Potential interference with farming operations or foreclosure of present or future land uses (see Section 4.6).

Lastly, the presence of a transmission line may not affect some individuals' perceptions of a property's value at all. These people tend to view transmission lines as necessary infrastructure on the landscape, similar to roads, water towers, or antennae. They generally do not notice the transmission lines nor do they have strong feelings about them.

Appraisers, utility consultants, and university researchers have studied this issue since the 1950s. Studies have either been based on appraisal comparisons of like property proximate or not proximate to transmission lines, attitudinal studies of qualitative perceptions, or statistical analyses on data derived from appraisals and other field study methodologies (Kroll and Priestley 1992). While the data from many of the studies are often inconclusive, some general points of agreement between the studies are:

- Overhead transmission lines have the potential to reduce the sale price of residential and agricultural property.
- The estimated reduction in sale price for single-family homes has ranged generally from 0 to 15 %.
- Agricultural values are likely to decrease if the transmission line structures are in a location that inhibits farm operations.
- Other factors, including size of lot, square footage of a house, and neighborhood characteristics, have a much greater effect on sale prices than the presence of a transmission line.
- Positive impacts may also occur, where the right-of-way is attractively landscaped and/or developed for recreational use.
- Effects are most likely to occur to property crossed by or immediately next to the line, but some impacts have been measured at longer distances.
- Impacts may be greater for small properties than for larger properties.
- Impacts may be greatest immediately following construction of a new line (or a major increase in size in an older right-of-way), diminishing over time.

Transmission Lines and Property Values: State of the Science (Electric Power Research Institute (EPRI) 2003) indicated the following regarding their review of studies of the effects of transmission

line on property values: cases of small decreases in property values associated with proximity to a transmission line, no changes in property values, and even increases in property values.

In summary, it is very difficult to make predictions about how a specific transmission line would affect the value of specific properties. Some short-term adverse impacts on property value and saleability may occur on an individual basis. However, these impacts are highly variable, individualized, and unpredictable. The MSTI project is not expected to cause overall long-term adverse effects on property values along existing transmission right-of-way. Project impacts along with numerous general market factors should already be reflected in the market value of properties along existing transmission right-of-way in the study area. Land needed for easements associated with the new transmission line or access roads would be appraised and landowners would be offered fair market value for these land rights.

4.8.3 COST ESTIMATES

To assess potential economic impacts of the preferred and alternative transmission line routes and other facilities, it is first necessary to estimate the costs of the project. With the exception of Alternative AB1, which entails different substation activities and transmission routing, the differences among the project alternatives consist solely of differences in the transmission routes. Each of these alternative routes has differences in length traversed and the cost of construction.

4.8.3.1 Transmission Line

For each of the alternative routes, the general phasing of construction would begin near the Idaho/Montana state line, with two separate construction contractors proceeding, largely concurrently, to the north into Montana, and to the south into Idaho. The alternatives in Montana are identified as A1 though A3, B1 through B3, and AB1. The alternatives in Idaho are identified as C1 through C4.

Table 4.8-1 shows the estimated costs for construction of each alternative transmission line (separate from costs for substation construction, project management, environmental permitting, permitting, right-of-way, and construction management).

4.8.3.2 Substations

Tables 4.8-2 and 4.8-3 include substation costs.

TOWNSEND SUBSTATION

The total cost of the Townsend Substation would be $127 million (2008 dollars). Site preparation would begin about July 2010 and conclude approximately February 2013.

MILL CREEK SUBSTATION

The total cost of the Mill Creek Substation addition would be $119 million (2008 dollars). Site preparation would begin about July 2010 and conclude approximately February 2013.

Table 4.8-1 Cost Summary, Transmission Construction, All Alternatives (2008 dollars)

			2010	2011	2012
A1: Preferred Route	**Miles**	113.1			
	Cost	$157,481,577	$ 26,771,868	$ 74,016,341	$ 56,693,368
A2: Parallel Colstrip Lines	**Miles**	121.8			
	Cost	$135,646,032	$ 23,059,825	$ 63,753,635	$ 48,832,572
	Cost % Preferred	86.1%			
A3: Maximize Utility Corridors	**Miles**	128.8			
	Cost	$144,251,002	$ 24,522,670	$ 67,797,971	$ 51,930,361
	Cost % Preferred	91.6%			

			2010	2011	2012
B1: Preferred Route	**Miles**	87.2			
	Cost	$103,859,450	$ 16,617,512	$ 51,929,725	$ 35,312,213
B2: Sheep Creek	**Miles**	86.7			
	Cost	$103,256,199	$ 14,455,868	$ 51,628,100	$ 37,172,232
	Cost % Preferred	99.4%			
B3: I-15 Dell Valley	**Miles**	88.5			
	Cost	$105,354,643	$ 16,856,743	$ 52,677,322	$ 35,820,579
	Cost % Preferred	101.4%			

			2010	2011	2012
C1: Preferred Route	**Miles**	232.6			
	Cost	$223,047,908	$ 44,609,582	$ 98,141,080	$ 80,297,247
C2: Eastern Route	**Miles**	239.3			
	Cost	$228,916,572	$ 45,783,314	$ 100,723,292	$ 82,409,966
	Cost % Preferred	102.6%			
C3: Western Route	**Miles**	177.6			
	Cost	$193,097,508	$ 38,795,016	$ 84,962,903	$ 69,515,102
	Cost % Preferred	86.6%			
C4: Sheep Creek INL Brigham Point	**Miles**	188.8			
	Cost	$212,459,719	$ 42,491,438	$ 98,481,164	$ 76,484,589
	Cost % Preferred	95.3%			

			2010	2011	2012
AB1: Townsend to Pipestone/Mill Creek to Stateline Route	**Miles**	209.2			
	Cost	$155,000,000	$ 21,700,000	$ 77,500,000	$ 55,800,000
(Note: cost comparison for this alternative are compared to Preferred Routes A1 and B1 combined)	Cost % Preferred	59.31%			

Table 4.8-2 Total Cost Summary by Alternative (2008 dollars)

Alternative	Miles	Transmisson Costs ($mill.)	Substation and Shunt Costs ($mill.) Townsend	Mill Creek	Dubois(3)	Midpoint	Total Costs Constructed (1)	Total Cost (2)
A1: Preferred Route	112.9	$ 157.5	$ 126.7	$ 118.7			$ 402.9	$ 438.0
A2: Parallel Colstrip Lines	121.8	$ 135.6	$ 126.7	$ 118.7			$ 381.0	$ 414.1
A3: Maximize Utility Corridors	128.8	$ 144.3	$ 126.7	$ 118.7			$ 389.7	$ 423.6
B1: Preferred Route	87.1	$ 103.9					$ 103.9	$ 112.9
B2: Sheep Creek	86.9	$ 103.3					$ 103.3	$ 112.3
B3: I-15 Dell Valley	88.4	$ 105.4					$ 105.4	$ 114.6
C1: Preferred Route	232.6	$ 223.0			$ 14.7	$ 22.7	$ 260.4	$ 283.1
C2: Eastern Route	239.3	$ 228.9			$ 14.7	$ 22.7	$ 266.3	$ 289.5
C3: Western Route	177.6	$ 193.1			$ 14.7	$ 22.7	$ 230.5	$ 250.6
C4: Sheep Creek INL Brigham Point	214.2	$ 212.5			$ 14.7	$ 22.7	$ 249.9	$ 271.6
AB1: Townsend to Pipestone/Mill Creek to Stateline Route	209.2	$ 155.0	$ 202.9				$ 357.9	$ 389.0

Note: Cost of constructed facilities does not include communications/microwave facilities costing $3.9 million for entire project.

(1) "Total Costs Constructed" means costs directly associated with on-site activities during the construction period 7/1/10 to 2/1/13. Costs for ROW purchase, engineering, environmental permitting, project management, and construction management are not included. For example, the total cost of the Preferred Routes A1, B1, and C1 are estimated at $869.7 million not included. For example, the total cost of the Preferred Routes A1, B1, and C1 are estimated at $869.7 million compared to $767.2 million as their sum as shown here.

(2) "Total Costs" means all costs except ROW. Non-site costs include environmental permitting, engineering, procurement, project management, and construction management.

3) The need for a series compensation station at Dubois in Clark County, Idaho will be evaluated during engineering design.

MIDPOINT SUBSTATION

The total cost of the Midpoint Creek modification would be $23 million (2008 dollars). Site preparation would begin about July 2010 and conclude approximately February 2013.

4.8.3.3 Communication System

Construction costs for the network of microwave sites in both Idaho and Montana would be an estimated $3.9 million (Table 4.8-3). Communication facility construction has not been firmly scheduled but would likely take place intermittently in 2011 and 2012.

4.8.3.4 Total Cost

Table 4.8-2 summarizes the costs for the transmission line alternatives combined with the substations. Table 4.8-3 summarizes costs for the end-to-end Preferred Route (A1, B1, C1). In Table 4.8-3, the total cost of construction, including planning expense beforehand but excluding right-of-way acquisition, is $833.7 million, plus right-of-way costs of $36.0 million, in 2008 dollars for a project total of $869.7 million. These detailed costs can be used as proxies for the ultimate valuation of the end-to-end Preferred Route for ad valorem tax purposes.

The costs shown in Table 4.8-2 do not include right-of-way acquisition costs, which are shown in Table 4.8-3. These are estimated at $36.0 million for the end-to-end Preferred Route (A1, B1, C1), including acquisitions of right-of-way from Federal, State, and private landowners. Payments to public entities such as the BLM and USFS would be used for ongoing maintenance of federal lands and therefore are not considered in this analysis. Costs of right-of-way acquisition will be built into the rate base for NorthWestern. Rights-of-way are purchased at prevailing market rates; thus, there would be no change in its valuation for ad valorem property tax levies, and hence no impact.

Table 4.8-3 Total Cost and Details, End-to-End Preferred Route (A1, B1, C1) (2008 dollars)

			Total Cost (2008 Dollars)					
Description	**Miles**	**Project Total**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
ROW		**$36,000,000**	$1,800,000	$10,440,000	$18,000,000	$3,600,000	$1,800,000	$360,000
Environmental / Permitting		**$14,061,000**	$3,234,030	$3,515,250	$3,515,250	$1,406,100	$1,406,100	$984,270
Internal Labor and Supervision		**$13,500,000**	$1,000,000	$2,000,000	$2,500,000	$3,000,000	$3,000,000	$2,000,000
Transmission Lines - Construction								
Townsend to Mill Creek Alternative A1	112.9	$157,481,577			$26,771,868	$74,016,341	$56,693,368	
Mill Creek to State Line Alternative B1	87.1	$103,859,450			$16,617,512	$51,929,725	$35,312,213	
State Line to Midpoint Alternative C1	232.6	$223,047,908			$44,609,582	$98,141,080	$80,297,247	
Sub Total		**$484,388,935**	**$0**	**$0**	**$87,998,962**	**$224,087,146**	**$172,302,828**	**$0**
Substations - Construction								
Townsend Substation		$126,917,968			$15,230,156	$67,266,523	$38,075,390	$6,345,898
Mill Creek Substation		$118,664,910			$15,426,438	$61,705,753	$35,599,473	$5,933,246
Midpoint Substation		$22,757,859			$2,275,786	$12,516,822	$6,827,358	$1,137,893
Dubois Compensation Station (1)		$14,749,368			$1,474,937	$8,112,152	$4,424,810	$737,468
Sub Total		**$283,090,105**	**$0**	**$0**	**$34,407,317**	**$149,601,251**	**$84,927,032**	**$14,154,505**
Communication - Construction								
Microwaves Facilities		$3,919,674			$476,405	$2,071,383	$1,175,902	$195,984
Sub Total		**$3,919,674**	**$0**	**$0**	**$476,405**	**$2,071,383**	**$1,175,902**	**$195,984**
Engineering								
Transmission Line		$7,758,000	$620,640	$3,956,580	$2,792,880	$387,900		
Substation		$7,751,322	$697,619	$2,790,476	$3,565,608	$697,619		
Dubois Compensation Station (1)		$301,987	$27,179	$108,715	$138,914	$27,179		
Communication		$150,000	$27,000	$54,000	$69,000			
Sub Total		**$15,961,309**	**$1,372,438**	**$6,909,771**	**$6,566,402**	**$1,112,698**	**$0**	**$0**
Procurement								
Transmission Line		$330,739			$198,444	$66,148	$66,148	
Substation		$892,520			$535,512	$178,504	$178,504	
Communication		$58,795			$35,277	$11,759	$11,759	
Sub Total		**$1,282,055**	**$0**	**$0**	**$769,233**	**$256,411**	**$256,411**	**$0**
Project Management								
Transmission Line		$1,500,000	$165,000	$375,000	$375,000	$345,000	$210,000	$30,000
Substation		$593,577	$59,358	$118,715	$118,715	$118,715	$118,715	$59,358
Dubois Compensation Station (1)		$60,397	$6,040	$12,079	$12,079	$12,079	$12,079	$6,040
Communications		$50,956	$5,096	$10,191	$10,191	$10,191	$10,191	$5,096
Sub Total		**$2,204,930**	**$235,493**	**$515,986**	**$515,986**	**$485,986**	**$350,986**	**$100,493**
Construction Management								
Transmission Line		$12,884,746		$644,237	$3,865,424	$3,865,424	$3,865,424	$644,237
Substation		$2,187,153		$174,972	$546,788	$546,788	$546,788	$371,816
Dubois Compensation Station (1)		$120,795		$9,664	$30,199	$30,199	$30,199	$20,535
Communications		$107,791			$13,101	$56,963	$32,337	$5,390
Sub Total		**$15,300,485**	**$0**	**$828,873**	**$4,455,512**	**$4,499,374**	**$4,474,748**	**$1,041,978**
PROJECT TOTALS		$869,708,492	$7,641,961	$24,209,880	$159,205,066	$390,120,349	$269,694,006	$18,837,230

(1) The need for a series compensation station at Dubois in Clark County, Idaho will be evaluated during engineering design

General overhead costs of project management, procurement, construction management, environmental permitting, and engineering are not readily allocated to particular alterative route links, let alone individual counties. However, for local property tax purposes, some allocations were made in Table 4.8-3 to derive taxable value.

The evaluation of key project impacts on property tax valuations, on the other hand, is judged to be suitably based on an allocation of non-construction costs to each alternative. By using distances of land traveled by alternative and transmission average costs per mile and the location and cost of substations, and then by increasing the total by 8.7% to reflect permitting, engineering, procurement and construction and project management costs to derive total costs from constructed cost estimates, the approximate change in the value of local property tax bases can be estimated with a reasonable expectation of meaningful values.

There will also be differences in the construction workforce requirements, depending on which alternative route is selected. Construction work schedules have been created only for the end-to-end Preferred Route (A1, B1, C1) (see the Socioeconomics Technical Report in Volume II). No similar schedules for other combinations of alternatives were assembled, in large part due to the error inherent in workforce planning for projects similar to MSTI.

Chapter 2 in this document and the Socioeconomics Technical Report in Volume II show the estimated labor schedule for the end-to-end Preferred Route (A1, B1, C1) using combined transmission and substation staffing estimates. Construction will begin with access road and staging area clearing and construction. After about 10 weeks from the project start (assumed to be July 1, 2010), the project workforce will grow rapidly as the sequential construction of tower pads, erection of towers, and stringing of lines begin. In March and April, 2012, the total workforce in both Idaho and Montana will peak at an estimated 298 workers in and around the route and substations. As the major remaining tasks will be line stringing and site cleanup from that point to completion, the construction workforce will drop rapidly over the last 10 months of construction, concluding in February 2013.

Based on prevailing union wages and the schedule of construction manpower by skill type, total wages are estimated at $59.0 million for the end-to-end Preferred Route (A1, B1, C1).[1] Adding in the value of monetizable benefits, and assuming combined 30% state and federal income tax rates and social security, the take-home pay for construction project workers is estimated at $49.6 million.

Wage estimates are important to the socioeconomic impact analysis because the workers imported into the area will spend a portion of their wages on temporary housing, increasing local housing demand somewhat. They will also purchase food and miscellaneous personal goods and services locally. The bulk of their wages, however, are expected to be spent in their own home areas. By contrast, workers hired from the MSTI study area will not require significant new housing (most

[1] The average hourly wage paid is segregated into relatively unskilled labor, which is likely to be subject to local hiring (within the respective MSTI counties), and skilled labor, which is likely to be imported into the MSTI study area from other areas of the U.S. Average wage rates for local-hire labor are assumed to be $35 per hour, and imported labor to be $42 per hour. Time and a half overtime is assumed for 10 hours of the 6-day work week.

would be expected to commute), but much more of their wages would be spent in the region than for non-local workers.

Wage payment breakdown (see the Socioeconomics Technical Report in Volume II) shows the total of $49.6 million in after-tax earnings would be divided into $31.8 million to workers in the Montana project component and $17.7 million in its Idaho component. Only $6.9 million would be paid to workers hired from the Montana MSTI study area and $3.9 million to its Idaho residents over the course of construction; by far the bulk of project wage payments would be to higher-paid nonresidents.

State income taxes paid by project workers are not considered in this analysis since they primarily are re-spent on statewide projects and programs. After-tax incomes are important to the analysis since they represent increases to final demand by MSTI study area residents, and thereby result in further re-spending of incomes, creating "indirect and induced" income and employment.

Per Diem payments to non-local construction workers for food and lodging are assumed to be paid by the project contractors. Regardless of the level of such payments (assumed at $60 per day for project costing), visiting non-local workers will have to find accommodations and purchase food and miscellaneous personal goods and services, thereby benefiting local merchants. It is assumed these expenditures will average $120 per worker per day ($50 per day for lodging $50 per day for food, and $20 per day for miscellaneous purposes). Local spending by visiting workers will total $10.8 million in Montana and $6.8 million in Idaho. Thus, in terms of local spending of income, the visiting non-local workers will provide a greater total benefit to the local economy than the workers hired from the local market area.

Local purchases and rentals of materials, supplies and larger-ticket project components are important in this analysis to the extent that they are bought from local companies and residents, benefiting local economies. For the MSTI project, however, such purchases are likely to represent a very small proportion of the total purchases because of a lack of local suppliers for specialty components such as towers, cables, conductors, and electrical machinery. The primary local purchases are expected to be consumable supplies, small mechanical rentals, and aggregate materials and concrete for access roads, substation sites, and tower foundations.

Based on project cost estimates, approximately $4.6 million are expected to be purchases of foundation materials. Rentals of locally-supplied small construction equipment and machinery would also be minimal, as would purchases of materials and supplies, over the 32 months of project construction. A final small but noticeable component of local purchases would be fuel. Total project local purchases would be an estimated $20 million (2008 dollars).

4.8.3.5 Cost Allocation to Counties

Costs of construction will not be spread evenly among the counties in the MSTI study area due to lengths of transmission line differences, per-mile cost differences (largely due to different difficulties of terrain for construction), and locations of substations. These issues are important to the evaluation of property tax benefits accruing to counties in which the project would be built.

Table 4.8-4 also shows the total cost of project construction as allocated to the counties in which it would be built. These estimates were made by calculating average total per-mile transmission costs,

increasing those by 8.7 % to reflect permitting, engineering, procurement, and construction and project management costs, and adding in the cost of the substations.

For completeness, the figures in Table 4.8-4 show not only private lands, but publicly-managed lands. In terms of the increases in county built values on private lands, the end-to-end Preferred Route (A1, B1, C1) would most benefit the counties in which the substations are located, including Broadwater (Townsend Substation) and Deer Lodge (Mill Creek Substation) counties in Montana and Clark (possible Dubois compensation station) and Jerome (Midpoint Substation) counties in Idaho. Of counties in which no substations would be built, substantial increases in built values would accrue to Beaverhead, Jefferson and Silver Bow Counties in Montana and Bingham, Blaine, Butte, Jefferson, Lincoln, Minidoka and Power counties in Idaho.

The estimated local and non-local, and total transmission line workforce schedule for the end-to-end Preferred Route (A1, B1, C1) workforce is illustrated in Chapter 2, Figure 2-11 of this document. For Alternative AB1, the workforce is illustrated in Chapter 2, Figure 2-12. Detailed construction workforce schedules have not been developed for each alternative, however, because the costs are sufficiently close that the differences are well within the estimation error inherent in workforce planning. Rather than address uncertain and likely very small differences in construction labor force requirements, this assessment will address differing construction manpower requirements qualitatively. It should be emphasized that all alternatives have statistically insignificant estimable differences in worker requirements.

For the Montana combined Preferred Route (A1, B1), levels of staffing would occur from approximately the winter in 2010-11 until the spring of 2012, with a sustained peak of 203 workers on-site along the transmission line segments for much of that period, including 51 Montana local hires and 154 Montana non-local hires.

For the Preferred Route in Idaho (Alternative C1), the work force would peak at an estimated 98 workers. Only 24 of the workers would be hired from the study area, and 74 would relocate temporarily to the study area.

By its nature, major electrical transmission line construction is specialized, and companies able to do such work operate in the national (and even international) markets. Skilled personnel are expected to all be IBEW members but who reside anywhere in the U.S., and some even overseas; they will relocate to the study area only to work on the project, and departing once their work is completed. Such workers are expected to comprise about 75% of the project construction workforce. Lesser-specialized workers, who are likely to be hired from the MSTI labor pool, are expected to comprise about 25% of the project labor demand.

This analysis assumes a skilled/unskilled split of 75% and 25%. Furthermore, the labor forces are allocated between the projects Idaho component and its Montana component according to the ratio of total construction costs of transmission line, and adding in substation costs. The Montana workforce is projected to be slightly larger than the Idaho workforce, at an at-peak total of 203 workers, with the at-peak Idaho construction workforce at 98.

Table 4.8-4 Miles of Transmission Line by County and Land Jurisdiction, and Built Values, End-to-End Preferred Route (A1, B1, C1)

Alternative A1: Preferred (all Montana Counties)					
County	**Land Jurisdiction**	**Miles**	**Constructed Cost ($1,392,410/mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**	**With Substation Costs (8.7% Additional)**
Beaverhead	BLM	0.91	$ 1,271,404	$ 1,381,622	
	Private	2.61	$ 3,629,980	$ 3,944,662	
	State of Montana - FWP	0.16	$ 228,063	$ 247,834	
Broadwater	BLM	1.58	$ 2,193,301	$ 2,383,438	
	Private	17.39	$ 24,217,985	$ 26,317,440	$ 164,237,914
	State of Montana - ST	3.29	$ 4,580,039	$ 4,977,083	
	Water	0.12	$ 172,315	$ 187,252	
Deer Lodge	**Private**	3.78	$ 5,260,117	$ 5,716,116	$ 134,668,075
	State of Montana - FWP	0.88	$ 1,226,090	$ 1,332,379	
Jefferson	BLM	5.39	$ 7,500,544	$ 8,150,766	
	Private	25.88	$ 36,039,822	$ 39,164,111	
	State of Montana - ST	3.75	$ 5,219,042	$ 5,671,481	
	USDA FS	3.91	$ 5,449,020	$ 5,921,395	
Silver Bow	BLM	2.60	$ 3,621,844	$ 3,935,821	
	Private	34.84	$ 48,510,468	$ 52,715,835	
	State of Montana - ST	2.86	$ 3,975,490	$ 4,320,125	
	State of Montana - FWP	0.38	$ 529,337	$ 575,225	
	USDA FS	2.55	$ 3,550,082	$ 3,857,838	
	Total	112.88	$ 157,174,942	$ 170,800,423	$ 437,672,849
	Total Private	**84.50**	**$ 117,658,371**	**$ 127,858,164**	**$ 394,730,592**

B1: Preferred (all Montana Counties)				
County	**Land Jurisdiction**	**Miles**	**Cost ($1,392,410/mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**
Beaverhead	BLM	20.60	$ 24,540,032	$ 26,667,405
	Private	36.83	$ 43,861,521	$ 47,663,872
	State of Montana - ST	29.63	$ 35,296,406	$ 38,356,248
	Total	87.06	$ 103,697,959	$ 112,687,525
	Total Private Land	**36.83**	**$ 43,861,521**	$ 47,663,872

C1: Preferred (all Idaho Counties)					
County	**Land Jurisdiction**	**Miles**	**Cost ($958,503/mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**	**With Substation Costs (8.7% Additional)**
Bingham	BLM	25.57	$ 24,510,217	$ 26,635,005	
	DOE	0.00	$ 271	$ 295	
	Private	15.12	$ 14,491,406	$ 15,747,665	
Blaine	BLM	17.77	$ 17,031,532	$ 18,507,994	
	Private	0.86	$ 824,314	$ 895,774	
	State of Idaho - DL	1.16	$ 1,110,218	$ 1,206,463	
Butte	DOE	35.29	$ 33,826,563	$ 36,758,984	
	Private	2.62	$ 2,513,135	$ 2,730,999	
Clark	BLM	16.70	$ 16,008,328	$ 17,396,088	
	DOE	3.21	$ 3,074,691	$ 3,341,236	
	Private	24.32	$ 23,307,557	$ 25,328,087	$ 41,356,076
	State of Idaho - DL	3.74	$ 3,586,137	$ 3,897,019	
	USDA - Sheep	6.06	$ 5,808,467	$ 6,312,002	
	USFS	5.53	$ 5,295,807	$ 5,754,900	
Jefferson	BLM	2.50	$ 2,395,202	$ 2,602,842	
Jerome	BLM	3.06	$ 2,935,623	$ 3,190,112	
	Private	0.37	$ 356,168	$ 387,044	
Lincoln	BLM	32.60	$ 31,247,499	$ 33,956,342	
	BOR	0.25	$ 244,066	$ 265,224	
	Private	1.20	$ 1,153,264	$ 1,253,240	
	State of Idaho - DL	2.02	$ 1,931,468	$ 2,098,907	
Minidoka	BLM	12.72	$ 12,195,631	$ 13,252,869	
	State of Idaho - DL	1.00	$ 959,487	$ 1,042,665	
Power	BLM	6.92	$ 6,637,567	$ 7,212,977	
	Private	12.01	$ 11,509,118	$ 12,506,842	$ 37,237,578
	State of Idaho - DL	0.03	$ 29,893	$ 32,484	
	Total	232.64	$ 222,983,630	$ 242,314,059	$ 320,907,712
	Total Private Land	**53.88**	**$ 51,641,827**	**$ 56,118,652**	**$ 134,712,306**
GRAND TOTALS	Total	432.58	$ 414,630,729	$ 450,575,026	$ 758,580,561
	Total Private Land	**175.20**	**$ 167,931,995**	**$ 182,490,003**	**$ 529,442,898**

Based on prevailing union wages and the schedule of construction manpower by skill type, total wages are estimated at $59.0 million for the end-to-end Preferred Route (A1, B1, C1).[2] Adding in the value of monetizable benefits, and assuming combined 30% state and federal income tax rates and social security, the take-home pay for construction project workers are estimated at $49.6 million.

4.8.4 EFFECTS OF EACH ALTERNATIVE - MONTANA

Impacts of each alternative on local fiscal conditions would take the form of increased property tax payments to taxing jurisdictions in which project facilities are located. The amount of these payments depends on the extent to which project facilities are located on public and private lands, and the rate at which each jurisdiction taxes improvements to that land.

Table 4.8-5 Mil Levy Rates and Property Tax Collections, Counties in Which Project Facilities Would be Located

	Mill Levy (Dollars per Thousand Value)	2006/07 Total Property Tax Collections
Montana		
Beaverhead	148.67	$ 2,421,145
Broadwater	153.38	$ 1,666,998
Deer Lodge	263.55	$ 277,924
Jefferson	139.26	$ 2,988,454
Madison	115.16	$ 6,061.415
Silver Bow	260.55	$15,399,898
	Average County Property Tax Rate	**2007 Approved Property Taxes**
Idaho		
Bingham	122.30	$ 7,196,283
Blaine	42.50	$ 7.555.508
Bonneville	144.90	$19,456,609
Butte	138.00	$ 766,778
Clark	138.00	$ 469,615
Jefferson	89.90	$ 3,726,445
Jerome	109.30	$ 4,419,178
Lincoln	97.00	$ 889,185
Minidoka	91.70	$ 3,665,838
Power	146.00	$ 2,779,647

Source: Montana county budgets; Idaho State Tax Commission

[2] The average hourly wage paid is segregated into relatively unskilled labor, which is likely to be subject to local hiring (within the respective MSTI counties), and skilled labor, which is likely to be imported into the MSTI study area from other areas of the U.S.. Average wage rates for local-hire labor are assumed to be $35 per hour, and imported labor to be $42 per hour. Time and a half overtime is assumed for 10 hours of the 6-day work week.

Table 4.8-5 displays the mil levy rates for each county in which any of the facilities would be built. In Montana, county rates vary from a low of 115.16 mils (dollars per $1,000 of assessed value) in Madison County to 263.55 mils in Deer Lodge County. In Idaho, average rates ranges from a low of 42.50 mils in Blaine County to 146.00 mils in Power County.

Based on the FY 2006/07 mil levies shown in Table 4.8-5, and the value of improvements on all land within the counties, private as well as public property tax payments were calculated by county for different alternatives (Tables 4.8-6 and 4.8-7). Due to depreciation of the project (typically straight-line depreciation over the project life of about 40 years), this benefit would decline gradually each year.

Table 4.8-6 Projected Property Tax Payments by County, All Alternatives - Montana

County	A1: Preferred Route	A2: Parallel Colstrip Lines	A3: Maximize Utility Corridors	B1: Preffered Route	B2: Sheep Creek	B3: I-15 Dell Valley	AB1: Townsend to Pipestone/Mill Creek to Stateline Route	Mil Levy	Total FY 2006/07 Property Tax Revenue
TOTAL CONSTRUCTION VALUE									
Beaverhead	$ 5,574,118	$ 4,458,295	$ 4,483,447	$112,687,525	$112,416,006	$101,145,484	$ 80,453,185	148.67	$ 2,421,145
Broadwater	$ 198,103,123	$ 151,459,959	$ 175,183,458	$ -	$ -	$ -	$ 225,106,256	153.38	$ 1,666,998
Deer Lodge	$ 136,000,454	$ 154,853,437	$ 137,437,567	$ -	$ -	$ -	$ 4,618,145	263.55	$ 277,924
Jefferson	$ 58,907,750	$ 53,593,945	$ 29,606,490	$ -	$ -	$ -	$ 42,350,480	139.26	$ 2,988,454
Madison	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,391,490	115.16	$ 6,061,415
Silver Bow	$ 65,404,843	$ 40,851,306	$ 60,841,036	$ -	$ -	$ -	$ 5,717,387	260.55	$ 15,399,898
Total Montana	$ 463,990,288	$ 405,216,942	$ 407,551,999	$112,687,525	$112,416,006	$101,145,484	$ 383,636,944		$ 28,815,834
PROPERTY TAX PAYMENTS									
Beaverhead	$ 99,444	$ 79,538	$ 79,986	$ 2,010,391	$ 2,005,547	$ 1,804,476	$ 1,435,317		
Broadwater	$ 3,646,207	$ 2,787,711	$ 3,224,357	$ -	$ -	$ -	$ 4,143,216		
Deer Lodge	$ 4,301,150	$ 4,897,395	$ 4,346,601	$ -	$ -	$ -	$ 146,053		
Jefferson	$ 984,419	$ 895,619	$ 494,760	$ -	$ -	$ -	$ 707,727		
Madison	$ -	$ -	$ -	$ -	$ -	$ -	$ 350,890		
Silver Bow	$ 2,044,948	$ 1,277,257	$ 1,902,256	$ -	$ -	$ -	$ 178,760		
Total Montana	$ 11,076,169	$ 9,937,520	$ 10,047,959	$ 2,010,391	$ 2,005,547	$ 1,804,476	$ 6,961,963		
PROPERTY TAX PAYMENTS AS PERCENT OF TOTAL COUNTY (county-wide only) PROPERTY TAX REVENUE									
Beaverhead	4.1%	3.3%	3.3%	83.0%	82.8%	74.5%	59.3%		
Broadwater	218.7%	167.2%	193.4%	-	-	-	248.5%		
Deer Lodge	1547.6%	1762.1%	1564.0%	-	-	-	52.6%		
Jefferson	32.9%	30.0%	16.6%	-	-	-	23.7%		
Madison	-	-	-	-	-	-	5.8%		
Silver Bow	13.3%	8.3%	12.4%	-	-	-	1.2%		
Total Montana	38.4%	34.5%	34.9%	7.0%	7.0%	6.3%	24.2%		

The estimated Montana property tax payments shown in Table 4.8-6 were calculated based on the assumption that the MSTI transmission line would be Class 9 property as defined by Montana Code (MCA 15-6-141). Class 9 property includes, ". . . centrally assessed allocations of an electric power company that owns or operates transmission or distribution facilities or both . . ." Class 9 property is taxed at 12% of market value. For example, it is estimated that for Alternative A1, the portion of the transmission line in Beaverhead County would have a market value of $5,574,118. This property would be taxed at 12% of the estimated market value, or $668,894. The mil levy rate for the county is $148.67 per $1000) (see Table 4.8-5). Therefore, the property tax in Beaverhead County would be the levy rate multiplied by $668,894, or $99,444.

The Montana legislature recently enacted tax breaks for "clean and green" transmission lines (Class 14) (MCA 15-6-157), which are taxed at 3% of market value. No analysis or comparison was

performed with an assumption that the transmission line would be Class 14 property because it is not known at this time whether the MSTI project would qualify for this tax break.

It is particularly noteworthy that while the benefits to each Montana county are non-trivial, for Deer Lodge County the benefits are extremely large. This is because Deer Lodge County has a very low total taxable base, and the Mill Creek Substation addition, in particular, would be a very large increase in that base. Such an increase could allow Deer Lodge County to substantially lower its ad valorem rate, which is currently relatively high.

Table 4.8-7 Projected Property Tax Payments by County, All Alternatives – Idaho

	C1: Preferred Route	C2: Eastern Route	C3: Western Route	C4: Sheep Creek INL Brigham Point	Mill Levy	Total 2007 Approved Property Taxes
TOTAL CONSTRUCTION VALUE						
Bingham	$ 42,382,964	$ 66,001,139		$ 46,056,229	122.30	$ 7,196,283
Blaine	$ 20,610,230	$ 20,569,508	$ 43,350,148	$ 24,197,130	42.50	$ 7.555.508
Bonneville		$ 9,740,449			144.90	$ 19,456,609
Butte	$ 39,489,983	$ 144,777	$ 74,441,277	$ 46,362,619	138.00	$ 766,778
Clark	$ 78,057,321	$ 54,481,303	$ 64,678,425	$ 66,381,229	138.00	$ 469,615
Jefferson	$ 2,602,842	$ 38,832,312	$ 2,952,488	$ 3,055,828	89.90	$ 3,726,445
Jerome	$ 3,577,157	$ 28,300,824	$ 26,223,296	$ 28,930,442	109.30	$ 4,419,178
Lincoln	$ 37,573,713	$ 37,499,474	$ 38,958,194	$ 44,112,851	97.00	$ 889,185
Minidoka	$ 14,295,534	$ 14,267,288		$ 16,783,456	91.70	$ 3,665,838
Power	$ 19,742,304	$ 19,713,277		$ 23,189,895	146.00	$ 2,779,647
Total Idaho	$248,342,048	$289,550,351	$250,603,828	$299,069,679		$ 50,925,086
PROPERTY TAX PAYMENTS						
Bingham	$ 518,344	$ 807,194		$ 563,268		
Blaine	$ 87,593	$ 87,420	$ 184,238	$ 102,838		
Bonneville		$ 141,139				
Butte	$ 544,962	$ 1,998	$ 1,027,290	$ 639,804		
Clark	$ 1,077,191	$ 751,842	$ 892,562	$ 916,061		
Jefferson	$ 23,400	$ 349,102	$ 26,543	$ 27,472		
Jerome	$ 39,098	$ 309,328	$ 286,621	$ 316,210		
Lincoln	$ 364,465	$ 363,745	$ 377,894	$ 427,895		
Minidoka	$ 131,090	$ 130,831		$ 153,904		
Power	$ 288,384	$ 287,814		$ 338,572		
Total Idaho	$ 3,074,526	$ 3,230,414	$ 2,795,148	$ 3,486,024		
PROPERTY TAX PAYMENTS AS PERCENT OF TOTAL COUNTY (county-wide) PROPERTY TAX REVENUE						
Bingham	7.2%	11.2%		7.8%		
Blaine	1.2%	1.2%	2.4%	1.4%		
Bonneville		0.7%				
Butte	71.1%	0.3%	134.0%	83.4%		
Clark	229.4%	160.1%	190.1%	195.1%		
Jefferson	0.6%	9.4%	0.7%	0.7%		
Jerome	0.9%	7.0%	6.5%	7.2%		
Lincoln	41.0%	40.9%	42.5%	48.1%		
Minidoka	3.6%	3.6%		4.2%		
Power	10.4%	10.4%		12.2%		
Total Idaho	6.0%	6.3%	5.5%	6.8%		

For Idaho, average county property tax rates were estimated by the Idaho State Tax Commission (2008) for both rural and urban areas, incorporating all types of taxing districts in each county. These include but are not limited to school districts, fire districts, auditorium districts, and county governments. Calculation of property tax benefits for every taxing district in each county was not attempted in this analysis. Rather, the key indicators of impact were the increase in total county

assessed values caused by an alternative route, and the hypothetical property taxes paid to all taxing jurisdictions.

Again, while the benefits to most Idaho counties are non-trivial, for Clark County the benefits are large compared to current property tax revenues.

After completion of construction, project operations and maintenance activities would have essentially no socioeconomic effects on the project area.

4.8.4.1 No Action

Without the construction of the MSTI 500kV transmission line and substations, socioeconomic impacts – adverse and beneficial -- would not take place. The economic benefits and costs to the counties in southwestern Montana and southeastern Idaho would not occur, because there would be no MSTI-related increases in temporary and permanent jobs, sales to local businesses, and tax revenues.

4.8.4.2 Townsend to Mill Creek (Melrose) Segment

A1: PREFERRED ROUTE

The total construction cost for Alternative A1 facilities is an estimated $437.7 million. Of the total cost, $164.2 million is estimated for the Townsend substation, $134.7 million for the Mill Creek Substation, and $138.8 for transmission lines. These costs are shown in Table 4.8-8.

Impacts on Employment and Income

In the Socioeconomics Technical Report (Volume II), the impacts associated with Alternative A1 were subsumed under impacts addressed for the Montana combined Preferred Route (a1, B1). For the Montana combined Preferred Route (A1, B1), levels of staffing would occur from approximately the winter in 2010-11 until the spring of 2012, with a sustained peak of 205 workers on-site along the transmission line segments for much of that period, including 51 Montana local hires and 154 Montana non-local hires. Alternative A1 makes up the northern portion of the combined route in Montana.

Wage and benefit payments to locally-hired and imported construction workers would constitute benefits to the receiving households, and to the businesses and governments on which they spend their disposable after-tax incomes. Although the imported workers would earn substantial salaries (about $45 per hour before overtime, plus union benefits), they are expected to spend money almost solely on local hotel/motels/RV facilities, restaurants, food stores, and miscellaneous retail goods near the routes and substations. The smaller portion (25%) of the construction work force will earn both lower wages (about $35 an hour before overtime and union benefits), and will live more diffusely around the MSTI study area. Therefore, their spending--and the employment and earnings of businesses supported by their spending—will tend to be less visible at any particular locations. The total wage bill for the Montana combined Preferred Route (A1, B1) would be $37.9 million in wages and benefits, and $31.8 million in disposable income increases. Non-local workers are expected to spend (assuming $120 per day per worker) about $10.8 million locally, while the local workers would reap approximately $6.9 million in added household income. Thus, spending by imported workers

would have the greater impact on the local economy, although in light of total activity, the increase would be small and short-term.

Table 4.8-8 Land Ownership and Value Built, Alternative A1 (Preferred Route)

Alternative A1: Preferred						
County	**Land Jurisdiction**	**Miles**	**Cost ($1,392,410/ mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**	**With Substation Costs (8.7% Additional)**	
Beaverhead	BLM	0.91	$ 1,271,404	$ 1,381,622		
	Private	2.61	$ 3,629,980	$ 3,944,662		
	State of Montana - FWP	0.16	$ 228,063	$ 247,834		
Broadwater	BLM	1.58	$ 2,193,301	$ 2,383,438		
	Private	17.39	$ 24,217,985	$ 26,317,440	$	164,237,914
	State of Montana - ST	3.29	$ 4,580,039	$ 4,977,083		
	Water	0.12	$ 172,315	$ 187,252		
Deer Lodge	**Private**	3.78	$ 5,260,117	$ 5,716,116	$	134,668,075
	State of Montana - FWP	0.88	$ 1,226,090	$ 1,332,379		
Jefferson	BLM	5.39	$ 7,500,544	$ 8,150,766		
	Private	25.88	$ 36,039,822	$ 39,164,111		
	State of Montana - ST	3.75	$ 5,219,042	$ 5,671,481		
	USDA FS	3.91	$ 5,449,020	$ 5,921,395		
Silver Bow	BLM	2.60	$ 3,621,844	$ 3,935,821		
	Private	34.84	$ 48,510,468	$ 52,715,835		
	State of Montana - ST	2.86	$ 3,975,490	$ 4,320,125		
	State of Montana - FWP	0.38	$ 529,337	$ 575,225		
	USDA FS	2.55	$ 3,550,082	$ 3,857,838		
	Total	112.88	$ 157,174,942	$ 170,800,423	$	437,672,849
	Total Private	**84.50**	**$ 117,658,371**	$ 127,858,164	**$**	**394,730,592**

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by Alternative A1 are estimated to total $11 million or 38.4% of FY 2006/07 collections for the combined Montana counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative A1 among counties would be: Beaverhead County, $99,444 (4.1% of FY 2006/07 collections); Broadwater County, $3,646,207 (218.7% of FY 2006/07 collections); Deer Lodge County, $4,301,150 (1,547% of FY 2006/07 collections); Jefferson County, $984,419 (32.9% of FY 2006/07 collections); and Silver Bow County, $2,044,948 (13.3% of FY 2006/07 collections).

A2: PARALLEL COLSTRIP LINES ROUTE

The total construction cost for A2 facilities is an estimated $414.2 million. Of the total cost, $154.7 million is estimated for the Townsend Substation, $139.8 million for the Mill Creek Substation, and $119.7 million for transmission lines. These costs are shown in Table 4.8-9.

Impacts on Employment and Income

Impacts of A2 on socioeconomic conditions would in generally likely be somewhat less than those of the Preferred Route (A1), because the cost of construction for Alternative A2 is slightly less. Although detailed construction worker schedule has not been prepared for Alternative A2, its slightly lower cost likely means a slightly lower workforce, and hence increases on income, population, and housing demand would be somewhat less.

Table 4.8-9 Land Ownership and Value Built, Alternative A2 (Parallel Colstrip Lines)

A2: Parallel Colstrip lines								
County	**Land Jurisdiction**	**Miles**		**Cost ($1,113,678/ mile)**		**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**		**With Substation Costs (8.7% Additional)**
Beaverhead	BLM	0.91	$	1,016,895	$	1,105,050		
	Private	2.61	$	2,903,333	$	3,155,023		
	State of Montana - FWP	0.16	$	182,410	$	198,223		
Broadwater	BLM	4.63	$	5,157,487	$	5,604,590		
	Private	13.84	$	15,417,132	$	16,753,642	$	154,674,116
	Water	0.12	$	137,821	$	149,768		
Deer Lodge	**Private**	8.94	$	9,950,959	$	10,813,607	$	139,765,566
	State of Montana - FWP	0.88	$	980,652	$	1,065,664		
	USDA FS	11.59	$	12,903,595	$	14,022,206		
Jefferson	BLM	11.95	$	13,313,506	$	14,467,653		
	Private	13.71	$	15,270,255	$	16,594,032		
	State of Montana - ST	0.20	$	222,432	$	241,715		
	USDA FS	18.42	$	20,512,333	$	22,290,546		
Silver Bow	BLM	2.60	$	2,896,826	$	3,147,951		
	Private	26.99	$	30,056,571	$	32,662,173		
	State of Montana - ST	1.64	$	1,825,480	$	1,983,730		
	State of Montana - FWP	0.38	$	423,374	$	460,077		
	USDA FS	2.15	$	2,390,171	$	2,597,375		
	Total	121.72	$	135,561,234	$	147,313,023	$	414,185,457
	Private Land	**66.09**	**$**	**73,598,251**	**$**	**79,978,476**	**$**	**346,850,909**

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by Alternative A2 in its first year are estimated to total $9.9 million or 34.5% of FY 2006/07 collections for the combined counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative A2 among counties would be: Beaverhead County, $79,538 (3.3% of FY 2006/07 collections); Broadwater County, $2,787,711 (167.2% of FY 2006/07 collections); Deer Lodge County, $4,897,395 (1,762.1% of FY 2006/07 collections); Jefferson County, $895,619 (30% of FY 2006/07 collections); and Silver Bow County, $1,277,256 (8.3% of FY 2006/07 collections).

A3: MAXIMIZE EXISTING UTILITY CORRIDOR ROUTE

The total construction cost for A3 facilities is an estimated $423.6 million. Of the total cost, $169.4 million is estimated for the Townsend substation, $136.2 million for the Mill Creek Substation, and $118.0 million for transmission lines. These costs are detailed in Table 4.8-10.

Table 4.8-10 Land Ownership and Value Built, Alternative A3 (Maximize Utility Corridors)

A3: Maximize Utility Corridors								
County	**Land Jurisdiction**	**Miles**		**Cost ($1,119,961/ mile)**		**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**		**With Substation Costs (8.7% Additional)**
Beaverhead	BLM	0.91	$	1,022,632	$	1,111,284		
	Private	2.61	$	2,919,712	$	3,172,822		
	State of Montana - FWP	0.16	$	183,439	$	199,341		
Broadwater	BLM	1.38	$	1,539,952	$	1,673,450		
	BOR	1.14	$	1,271,191	$	1,381,390		
	Private	25.83	$	28,926,548	$	31,434,187	$	169,354,661
	State of Montana - ST	2.21	$	2,477,959	$	2,692,773		
	Water	0.07	$	74,707	$	81,183		
Deer Lodge	**Private**	5.97	$	6,685,284	$	7,264,831	$	136,216,790
	State of Montana - FWP	1.00	$	1,123,391	$	1,220,777		
Jefferson	BLM	5.08	$	5,685,080	$	6,177,920		
	Private	24.33	$	27,244,654	$	29,606,490		
	State of Montana - ST	4.19	$	4,696,204	$	5,103,318		
	USDA FS	3.91	$	4,382,826	$	4,762,773		
Silver Bow	BLM	2.60	$	2,913,168	$	3,165,710		
	Private	42.82	$	47,957,329	$	52,114,746		
	State of Montana - ST	1.64	$	1,835,778	$	1,994,922		
	State of Montana - FWP	0.38	$	425,763	$	462,672		
	USDA FS	2.55	$	2,855,448	$	3,102,986		
	Total	128.77	$	144,221,066	$	156,723,576	$	423,596,009
	Private land	**101.55**	**$**	**113,733,527**	**$**	**123,593,075**	**$**	**390,465,509**

Impacts on Employment and Income

Impacts of A3 on socioeconomic conditions would in generally likely be somewhat less than those of the Preferred Route (A1), because the cost of construction for A3 is slightly less. Although a detailed construction worker schedule has not been prepared for Alternative A3, its slightly lower cost likely means a slightly lower workforce, and hence increases on income, population, and housing demand would be somewhat less.

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by A3 are estimated to total $10.0 million or 34.9% of FY 2006/07 collections for the combined Montana counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative A3 among counties would be: Beaverhead County, $79,986 (3.3% of FY 2006/07 collections); Broadwater County, $3,224,357 (193.4% of FY 2006/07 collections); Deer Lodge County, $4,346,601 (1,564% of FY 2006/07 collections); Jefferson County, $494,760 (16.6% of FY 2006/07 collections); and Silver Bow County, $1,902,256 (12.4% of FY 2006/07 collections).

4.8.4.3 Mill Creek to State Line Segment

B1: PREFERRED ROUTE

The total cost for B1 facilities is an estimated $112.7 million. There are no substation or shunt facilities planned for any of the "B" alternatives. These costs are detailed in Table 4.8-11.

Table 4.8-11 Land Ownership and Value Built, Alternative B1 (Preferred Route)

B1: Preferred						
County	**Land Jurisdiction**	**Miles**		**Cost ($1,191,049/ mile)**		**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**
Beaverhead	BLM	20.60	$	24,540,032	$	26,667,405
	Private	36.83	$	43,861,521	$	47,663,872
	State of Montana - ST	29.63	$	35,296,406	$	38,356,248
	Total	87.06	$	103,697,959	$	112,687,525
	Total Private Land	**36.83**	**$**	**43,861,521**	**$**	**47,663,872**

Impacts on Employment and Income

Alterantive B1 was addressed in the Socioeconomics Technical Report (Volume II) as apart of the Montana combined Preferred Route (A1, B1). Levels of staffing would occur from approximately the winter in 2010-11 until the spring of 2012, with a sustained peak of 205 workers on-site along the transmission line segments for much of that period, including 51 Montana local hires and 154 Montana non-local hires.

Wage payment breakdown are discussed under Alternative A1 in Section 4.8.4.2.

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by Alternative B1 are estimated to total $2,010,391 or 7% of FY 2006/07 collections. All would be paid to Beaverhead County.

B2: SHEEP CREEK ROUTE

The total cost for Alternative B1 facilities is an estimated $112.4 million. There are no substation or shunt facilities planned for any of the "B" alternatives. These costs are detailed in Table 4.8-12.

Table 4.8-12 Land Ownership and Built Values, Alternative B2 (Sheep Creek)

B2: Sheep Creek				
County	Land Jurisdiction	Miles	Cost ($1,190,960/ mile)	Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)
	BLM	44.84	$ 53,396,778	$ 58,025,740
	Private	33.70	$ 40,138,089	$ 43,617,656
Beaverhead	State of Montana - ST	6.01	$ 7,153,074	$ 7,773,173
	USDA FS	2.32	$ 2,758,224	$ 2,997,334
	USFS	0.00	$ 1,935	$ 2,103
	Total	86.86	$ 103,448,100	$ 112,416,006
	Total Private Land	**33.70**	**$ 40,138,089**	**$ 43,617,656**

Impacts on Employment and Income

Impacts of Alternative B2 on socioeconomic conditions would in generally likely be very slightly less than those of the Preferred Route (Alternative B1), because the cost of construction for Alternative B2 is slightly less. However, the constructed cost estimate differences are so small as to be unnoticeable. Although a detailed construction worker schedule has not been prepared for Alternative B2, its slightly lower cost could mean a slightly lower workforce, and hence increases on income, population, and housing demand would be somewhat less.

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by Alternative B2 are estimated to total $2,005,547 or 7% of FY 2006/07 collections. All would be paid to Beaverhead County.

B3: I-15 ROUTE

The total cost for Alternative B3 facilities is an estimated $101.1 million. There are no substation or shunt facilities planned for any of the "B" alternatives. These costs are detailed in Table 4.8-13.

Impacts on Employment and Income

Impacts of Alternative B3 on socioeconomic conditions would in generally likely be very slightly greater than those of the Preferred Route (Alternative B1), because the cost of construction for Alternative B3 is slightly greater ($105.4 million, versus $103.9 million). However, the constructed cost estimate differences are so small as to be unnoticeable. Although a detailed construction worker schedule has not been prepared for Alternative B3, its slightly greater cost could mean a slightly

higher workforce, and hence increases on income, population, and housing demand could be somewhat greater.

Table 4.8-13 Land Ownership and Built Value, Alternative B3 (I-15 Route)

B3: I-15 Route				
County	Land Jurisdiction	Miles	Cost ($1,190,448/ mile)	Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)
Beaverhead	BLM	14.42	$ 17,164,065	$ 18,652,016
	Private	45.44	$ 54,093,636	$ 58,783,008
	State of Montana - ST	28.49	$ 33,913,689	$ 36,853,664
	Total	88.35	$ 105,171,390	$ 114,288,688
	Total Private Land	**45.44**	**$ 54,093,636**	**$ 58,783,008**

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by Alternative B3 are estimated to total $1,804,476 or 6.3% of FY 2006/07 collections. All would be paid to Beaverhead County.

4.8.4.3 Townsend to Pipestone/Mill Creek to State Line Route

AB1: I-15 JEFFERSON VALLEY ROUTE

Impacts on Employment and Income

The total construction cost for Alternative AB1 facilities is an estimated $400.8 million. Of the total cost, $220.2 million is estimated for the Townsend Substation, and $180.6 million for transmission lines.

Because Alternative AB1 has noticeable substation construction differences, it is useful to examine their likely implications on demand for construction workers. There would be no workers at the Mill Creek Substation site, and an increase in the workforce for the Townsend Substation. The implication of this shift in workers is small—16 workers less than the Moontana combined Preferred Route (A1, B1) workforce. The differences in work force requirements are also very small.

The smaller workforce requirements of Alternative AB1 will also mean slightly lower total wage and benefit payments to its construction workers. Because employment figures vary little from Montana combined Preferred Route (A1, B1), there would be similarly small reductions in wage, benefit, and take-home pay provided.

Impacts on Fiscal Conditions

As shown in Table 4.8-6, property taxes generated by Alternative AB1 in its first year are estimated to total $6.9 million or 24.2% of FY 2006/07 collections for the combined counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative AB1 among counties would be: Beaverhead County, $1,435,317 (59% of FY 2006/07 collections); Broadwater County, $4,143,216 (248.5% of FY 2006/07 collections); Deer Lodge County, $146,053 (52.6% of FY 2006/07 collections); Jefferson County, $707,727 (23.7% of FY 2006/07 collections); Madison County, $350,890 (5.8% of FY 2006/07 collections); and Silver Bow County, $178,760 (1.2% of FY 2006/07 collections).

4.8.5 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.8.5.1 State Line to Midpoint

C1: PREFERRED ROUTE

Impacts on Employment and Income

The total construction cost for Alternative C1 facilities is an estimated $283.1 million. Of the total cost, $25.7 million is estimated for the Midpoint Substation, $16.0 million for the Dubois Shunt facility, and $274.9 million for transmission lines. These costs are detailed in Table 4.8-14.

The total wage bill for the Preferred Route (C1) is $21.2 million in wages, and $17.8 million in disposable income increases, over the entire course of construction. The nonlocal workers are expected to spend (assuming $120 per day per worker) about $6.0 million locally, while the local workers will reap approximately $3.9 million in added after-tax household income (some of which will be spent out of the Idaho portion of the MSTI study area). Thus, spending by imported workers would have the greater impact on the local economy, although in light of total activity, the increase would be small and short-term.

For the Preferred Route in Idaho (Alternative C1), the work force would peak at an estimated 98 workers. Only 24 of the workers would be hired from the study area, and 74 would relocate temporarily to the study area.

Table 4.8-14 Land Ownership and Value Built, Alternative C1 (Preferred Route)

C1: Preferred						
County	**Land Jurisdiction**	**Miles**	**Cost ($958,503/mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**	**With Substation Costs (8.7% Additional)**
Bingham	BLM	25.57	$ 24,510,217	$ 26,635,005	
	DOE	0.00	$ 271	$ 295	
	Private	15.12	$ 14,491,406	$ 15,747,664	
Blaine	BLM	17.77	$ 17,031,532	$ 18,507,994	
	Private	0.86	$ 824,314	$ 895,774	
	State of Idaho Dept of Lands	1.16	$ 1,110,218	$ 1,206,462	
Butte	DOE	35.29	$ 33,826,563	$ 36,758,984	
	Private	2.62	$ 2,513,135	$ 2,730,999	
Clark	BLM	16.70	$ 16,008,328	$ 17,396,088	
	DOE	3.21	$ 3,074,691	$ 3,341,236	
	Private	24.32	$ 23,307,557	$ 25,328,087	$ 41,356,076
	State of Idaho Dept of Lands	3.74	$ 3,586,137	$ 3,897,019	
	USDA - Sheep	6.06	$ 5,808,467	$ 6,312,002	
	USFS	5.53	$ 5,295,807	$ 5,754,900	
Jefferson	BLM	2.50	$ 2,395,202	$ 2,602,842	
Jerome	BLM	3.06	$ 2,935,623	$ 3,190,112	
	Private	0.37	$ 356,168	$ 387,044	$ 37,237,578
Lincoln	BLM	32.60	$ 31,247,499	$ 33,956,342	
	BOR	0.25	$ 244,066	$ 265,224	
	Private	1.20	$ 1,153,264	$ 1,253,241	
	State of Idaho Dept of Lands	2.02	$ 1,931,468	$ 2,098,907	
Minidoka	BLM	12.72	$ 12,195,631	$ 13,252,869	
	State of Idaho Dept of Lands	1.00	$ 959,487	$ 1,042,664	
Power	BLM	6.92	$ 6,637,567	$ 7,212,977	
	Private	12.01	$ 11,509,118	$ 12,506,843	
	State of Idaho Dept of Lands	0.03	$ 29,893	$ 32,485	
	Total	232.64	222,983,630	242,314,059	320,907,713
	Total Private Land	**56.50**	**$ 54,154,963**	**$ 58,849,651**	**$ 137,443,306**

Impacts on Fiscal Conditions

As shown in Table 4.8-7, property taxes generated by Alternative C1 in its first year are estimated to total $3.1 million or 6.0% of FY 2006/07 collections for the combined counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative C1 among counties would be: Bingham County, $518,344 (7.2% of FY 2006/07 collections); Blaine County, $87,593 (1.2% of FY 2006/07 collections); Butte County, $544,962 (71.1% of FY 2006/07 collections); Clark County, $1,077,191 (229.4% of FY 2006/07 collections); Jefferson County, $23,400 (0.6% of FY 2006/07 collections); Jerome County, $39,098 (0.9% of FY 2006/07 collections); Lincoln County, $364,465 (41.0% of FY 2006/07 collections); Mindoka County, $131,090 (3.6% of FY 2006/07 collections); and Power County, $288,384 (10.4% of FY 2006/07 collections).

C2: EASTERN ROUTE

Impacts on Employment and Income

The total construction cost for Alternative C2 facilities is an estimated $289.5 million. Of the total cost, $25.7 million is estimated for the Midpoint substation, $16.0 million for the Dubois Shunt facility, and $248.8 million for transmission lines.

As shown in Table 4.8-7, the cost of construction of Alternative C2 would be very slightly above those estimated for Preferred Route C1. No detailed construction workforce schedules have been developed for Alternative C2, but since the cost difference is quite small, it is expected that the employment schedule, as well as wage bill, would be for analytical purposes the same as for the Preferred Route. Thus, the impacts on employment and income detailed in Alternative C1 can be considered as also applying to Alternative C2:

Total impacts on regional employment from re-spending of worker incomes and incomes derived from Project purchases are also predicted to be approximately equal for Alternative C2 as for Preferred Route C1.

Impacts on Fiscal Conditions

Although the total value of Alternative C-2 facilities, and the total property taxes paid, would be greater than those of the Preferred Route, the percentage changes would be lower due to different areas traversed.

As shown in Table 4.8-7, property taxes generated by Alternative C2 in its first year are estimated to total $3.2 million or 6.3% of FY 2006/07 collections for the combined counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative C2 among counties would be: Bingham County, $807,194 (11.2% of FY 2006/07 collections); Blaine County, $87,420 (1.2% of FY 2006/07 collections); Bonneville County, $141,139 (0.7% of FY 2006/07 collections); Butte County, $1,998 (0.3% of FY 2006/07 collections); Clark County, $751,842 (160.1% of FY 2006/07 collections); Jefferson County, $349,102 (9.4% of FY 2006/07 collections); Jerome County, $309,328 (7.0% of FY 2006/07 collections); Lincoln County, $363,745 (40.9% of FY 2006/07 collections); Minidoka County, $130,831 (3.6% of FY 2006/07 collections); and Power County, $287,814 (10.4% of FY 2006/07 collections).

Table 4.8-15 Land Ownership and Built Value, Alternative C2 (Eastern Route)

C2: Eastern Route					
County	**Land Jurisdiction**	**Miles**	**Cost ($956,609/mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**	**With Substation Costs (8.7% Additional)**
Bingham	BLM	35.34	$ 33,807,672	$ 36,738,456	
	Private	16.86	$ 16,128,032	$ 17,526,169	
	State of Idaho Dept of Lands	11.29	$ 10,800,248	$ 11,736,520	
Blaine	BLM	17.77	$ 16,997,881	$ 18,471,425	
	Private	0.86	$ 822,686	$ 894,004	
	State of Idaho Dept of Lands	1.16	$ 1,108,024	$ 1,204,079	
Bonneville	BLM	4.87	$ 4,663,408	$ 5,067,678	
	Private	3.86	$ 3,688,989	$ 4,008,787	
	State of Idaho Dept of Lands	0.64	$ 611,014	$ 663,983	
Butte	**Private**	0.14	$ 133,227	$ 144,777	
Clark	BLM	3.42	$ 3,270,088	$ 3,553,572	
	Private	17.09	$ 16,346,401	$ 17,763,469	$ 33,791,458
	State of Idaho Dept of Lands	3.00	$ 2,873,029	$ 3,122,091	
	USDA - Sheep	7.96	$ 7,610,866	$ 8,270,652	
	USFS	5.53	$ 5,285,344	$ 5,743,530	
Jefferson	BLM	20.88	$ 19,973,096	$ 21,704,561	
	Private	15.84	$ 15,149,433	$ 16,462,736	
	State of Idaho Dept of Lands	0.52	$ 496,514	$ 539,557	
	State of Idaho Fish and Game	0.12	$ 115,449	$ 125,458	
Jerome	BLM	3.06	$ 2,929,823	$ 3,183,809	
	Private	0.37	$ 355,465	$ 386,280	
Lincoln	BLM	32.60	$ 31,185,759	$ 33,889,250	
	BOR	0.25	$ 243,583	$ 264,700	
	Private	1.20	$ 1,150,986	$ 1,250,765	
	State of Idaho Dept of Lands	2.02	$ 1,927,652	$ 2,094,760	
Minidoka	BLM	12.72	$ 12,171,535	$ 13,226,684	
	State of Idaho Dept of Lands	1.00	$ 957,591	$ 1,040,604	
Power	BLM	6.92	$ 6,624,452	$ 7,198,726	
	Private	12.01	$ 11,486,378	$ 12,482,131	$ 37,212,867
	State of Idaho Dept of Lands	0.03	$ 29,834	$ 32,420	
	Total	239.33	$ 228,944,460	$ 248,791,632	$ 319,795,957
	Total Private Land	**68.22**	**$ 65,261,597**	$ 70,919,118	**$ 141,923,443**

ALTERNATIVE C3: WESTERN ROUTE

Impacts on Employment and Income, population, and housing

The total construction cost for Alternative C3 facilities is an estimated $250.6 million. Of the total cost, $25.7 million is estimated for the Midpoint substation, $16.0 million for the Dubois Shunt facility, and $209.9 million for transmission lines.

As shown in Table 4.8-7, the cost of construction of Alternative C3 would be very slightly above those estimated for Preferred Route C1. No detailed construction workforce schedules have been developed for Alternative C3, but since the cost difference is quite small, it is expected that the employment schedule, as well as wage bill, would be for analytical purposes the same as for the Preferred Route. Thus, the impacts on employment and income detailed for Alternative C1 can be considered as also applying to Alternative C2:

Total impacts on regional employment from re-spending of worker incomes and incomes derived from Project purchases are also predicted to be approximately equal for Alternative C3 as for Preferred Route C1.

Impacts on Fiscal Conditions

The results of this analysis are shown in Table 4.8-16. In total, the increase to overall county property assessments would be about the same as for Preferred Route C1. However, the distribution among counties would be different from the Preferred Route.

Table 4.8-16 Land Ownership and Value Built, Alternative C3 (Western Route)

C3: Western Route						
County	**Land Jurisdiction**	**Miles**	**Cost ($1,087,261/mile)**	**Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)**	**With Substation Costs (8.7% Additional)**
Blaine	BLM	28.50	$ 30,992,218	$ 33,678,930	
	Private	5.41	$ 5,880,250	$ 6,390,008	
	State of Idaho Dept of Lands	2.78	$ 3,019,453	$ 3,281,209	
Butte	DOE	25.59	$ 27,827,628	$ 30,240,002	
	BLM	23.06	$ 25,076,592	$ 27,250,480	
	State of Idaho Dept of Lands	1.57	$ 1,703,546	$ 1,851,227	
	Private	12.78	$ 13,895,011	$ 15,099,569	
Clark	BLM	20.21	$ 21,968,296	$ 23,872,726	
	DOE	3.21	$ 3,487,722	$ 3,790,072	
	Private	11.70	$ 12,725,336	$ 13,828,494	$ 29,856,483
	State of Idaho Dept of Lands	1.01	$ 1,099,850	$ 1,195,196	
	USFS	5.05	$ 5,488,179	$ 5,963,949	
Jefferson	BLM	2.50	$ 2,716,956	$ 2,952,488	
Jerome	BLM	0.90	$ 980,324	$ 1,065,308	
	Private	0.36	$ 393,169	$ 427,252	$ 24,730,736
Lincoln	BLM	26.23	$ 28,516,485	$ 30,988,576	
	BOR	0.25	$ 271,509	$ 295,046	
	Private	2.91	$ 3,162,396	$ 3,436,544	
	State of Idaho Dept of Lands	3.59	$ 3,899,943	$ 4,238,029	
	Total	177.61	$ 193,104,863	$ 209,845,105	$ 264,432,323
	Total Private Lands	**33.16**	**$ 36,056,161**	**$ 39,181,867**	**$ 93,769,085**

As shown in Table 4.8-7, property taxes generated by Alternative C3 in its first year are estimated to total $2.8 million or 5.5% of FY 2006/07 collections for the combined counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative C3 among counties would be: Blaine County, $184,238 (2.4% of FY 2006/07 collections); Butte County, $1,027,290 (134.0% of FY 2006/07 collections); Clark County, $892,562 (190.1% of FY 2006/07 collections); Jefferson County, $26,543 (0.7% of FY 2006/07 collections); Jerome County, $286,621 (6.5% of FY 2006/07 collections); and Lincoln County, $377,894 (42.5% of FY 2006/07 collections).

C4: SHEEP CREEK INL BRIGHAM POINT ROUTE

Impacts on Employment and Income, population, and housing

The total construction cost for Alternative C4 facilities is an estimated $271.6 million. Of the total cost, $25.7 million is estimated for the Midpoint substation, $16.0 million for the Dubois Shunt facility, and $231.0 million for transmission lines.

There is little difference between Alternative C4 and the Preferred Route, that being in the area north of the Amps Substation. North of the Amps Substation, at which both routes converge and remain the same to their termini at the Midpoint Substation, the route vicinities are quite different: Alternative C4 traverses essentially uninhabited areas, while the Preferred Route traverses near Spencer and Dubois along the I-15 corridor. Aside from longer commute distances, there would not be noticeable differences in the locations chosen by in-migrating construction workers for Alternative C4, and therefore localized impacts of their spending on goods and services would remain the same as for Preferred Route C1.

Therefore, impacts of Alternative C4 on employment, population, and housing would be essentially the same as those described for the Preferred Route (C1).

Impacts on Fiscal Conditions

The results of this analysis are shown in Table 4.8-17. In total, the increase to overall county property assessments would be slightly higher than for Preferred Route C-1. However, the distribution among counties would be different from the Preferred Route.

As shown in Table 4.8-7, property taxes generated by Alternative C4 in its first year are estimated to total $3.5 million or 6.8% of FY 2006/07 collections for the combined counties in which property taxes would be paid.

The breakdown of property taxes paid by Alternative C4 among counties would be: Bingham County, $563,268 (7.8% of FY 2006/07 collections); Blaine County, $102,838 (1.4% of FY 2006/07 collections); Butte County, $639,804 (83.4% of FY 2006/07 collections); Clark County, 916,061 (195.1% of FY 2006/07 collections); Jefferson County, $27,742 (0.7% of FY 2006/07 collections); Jerome County, $316,210 (7.2% of FY 2006/07 collections); Lincoln County, $427,895 (48.1% of FY 2006/07 collections); Minidoka County, $153,904 (4.2% of FY 2006/07 collections); and Power County, $338.572 (12.2% of FY 2006/07 collections).

Table 4.8-17 Land Ownership and Built Values, Alternative C4 (Sheep Creek INL Brigham Point)

C4: Sheep Creek INL Brigham Point		Miles	Cost ($992,063/mile)	Cost With Engineering, Permitting, Procurement, Management (8.7% Additional)	With Substation Costs (8.7% Additional)
Bingham	BLM	25.57	$ 25,368,391	$ 27,567,575	
	DOE	0.00	$ 281	$ 305	
	Private	15.12	$ 14,998,792	$ 16,299,036	
Blaine	BLM	17.77	$ 17,627,856	$ 19,156,013	
	Private	0.86	$ 853,176	$ 927,138	
	State of Idaho Dept of Lands	1.16	$ 1,149,090	$ 1,248,704	
Butte	DOE	35.29	$ 35,010,930	$ 38,046,024	
	Private	2.62	$ 2,601,127	$ 2,826,619	
Clark	BLM	20.21	$ 20,044,804	$ 21,782,486	
	DOE	3.21	$ 3,182,345	$ 3,458,222	
	Private	11.70	$ 11,611,135	$ 12,617,704	$ 28,645,693
	State of Idaho Dept of Lands	1.01	$ 1,003,550	$ 1,090,547	
	USFS	5.05	$ 5,007,647	$ 5,441,760	
Jefferson	BLM	2.50	$ 2,479,065	$ 2,693,975	
Jerome	BLM	3.06	$ 3,038,408	$ 3,301,807	
	Private	0.37	$ 368,639	$ 400,596	$ 37,675,479
Lincoln	BLM	32.60	$ 32,341,566	$ 35,145,253	
	BOR	0.25	$ 252,611	$ 274,510	
	Private	1.20	$ 1,193,644	$ 1,297,120	
	State of Idaho Dept of Lands	2.02	$ 1,999,095	$ 2,172,396	
Minidoka	BLM	12.72	$ 12,622,636	$ 13,716,891	
	State of Idaho Dept of Lands	1.00	$ 993,081	$ 1,079,171	
Power	BLM	6.92	$ 6,869,968	$ 7,465,525	
	Private	12.01	$ 11,912,086	$ 12,944,744	
	State of Idaho Dept of Lands	0.03	$ 30,940	$ 33,622	
	Total	214.26	$ 212,560,863	$ 230,987,743	$ 297,308,915
	Total Private Lands	**43.89**	**$ 43,538,600**	**$ 47,312,957**	**$ 113,634,129**

4.9 ENVIRONMENTAL JUSTICE

4.9.1 INTRODUCTION

This section addresses Environmental Justice considerations associated with construction and operation of the MSTI 500kV transmission project.

4.9.2 METHODS FOR ASSESSING IMPACTS

4.9.2.1 Impact Level

Criteria for evaluating impacts under Environmental Justice are based on the distribution of minority and low income populations in relation to project elements across alternatives. Disproportionate levels of impact to low income and minority populations relative to higher income and non-minority populations are considered significant. The BLM has been at the forefront of including consideration of minority and low income communities that may be affected by actions on administered public lands. The BLM's criteria (BLM 2004) are similar to EPA guidelines (1996) and are appropriately applied for this analysis:

- A minority population exists where the percentage of minority persons for a given geographic unit is more than 20 percentage points higher than the percentage of minority persons for the referenced geographic unit, or where a minority population exists in any geographic unit where the number of minority persons exceeds 50% of the total population.
- A low-income population exists where the percentage of low-income persons for any given geographic unit is more than 20 percentage points higher than the percentage of low income persons for the referenced geographic unit, or where the number of low income persons in the geographic unit exceeds 50% of the total population.

4.9.2.2 Impact Type

To assess impact types it is necessary to compare the distribution of these effects across the project area to the distribution of minority or low income populations within geographically meaningful units (e.g. Census Block Groups). Data from Census Block Groups is compared to similar data for the portions of the MSTI analysis area in Idaho and Montana using the BLM and EPA guidelines.

As discussed in Section 3.9, for Montana minorities comprise 8% of the statewide population and only 3% of the population within the 9-county analysis area. Low-income individuals comprise 14.6% of the statewide population and 11.5% of the population within the Montana portion of the analysis area. Therefore, a significant minority population exists in Census Blocks in Montana where minorities make up more than 23% of the population and a significant low-income population exists where low-income persons comprise more than 31.5% of the population.

For Idaho, minorities comprise 9% of the statewide population and 10% of the population within the 16-county analysis area. Low-income individuals comprise 11.8% of the statewide population and 12.8% of the population within the Idaho portion of the analysis area. Therefore, a significant minority population exists in Census Blocks in Idaho where minorities make up more than 30% of the population and a significant low-income population exists where low-income persons comprise more than 32.8% of the population.

Environmental protection measures and specifically recommended mitigation measures (Volume I-C, Appendices B and C) as applied to all resources would confer benefit evenly to all socioeconomic entities across the project area.

4.9.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

Census Block Group data were developed for areas within 6 miles of each alternative. The data are derived from the 2000 census, as specified by EPA (1996) guidelines. The Socioeconomics Technical Report (Vol. II) contains more detailed information on the minority and low-income populations in the MSTI project area.

4.9.3.1 No Action

Under the No Action Alternative, the MSTI project would not be constructed and no disproportionate effects to minority or low income populations would occur.

4.9.3.2 Townsend to Mill Creek (Melrose) Segment

ALTERNATIVE A1: PREFERRED ROUTE

Census Block Groups within 6 miles of Alternative A1 average 96.0% persons of White race only. No Block Group in the 6-mile radius has less than 84.1% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averages 2.3% of the population within 6 miles. The highest concentration in any Census Block is 16.0%.

For Alternative A1, on average 14.0% of the population had incomes below the poverty level. The Block Group with the highest proportion of persons in poverty, 60.5%, was Block Group 5, Census Tract 1, in Silver Bow County (in the City of Butte). Three other Block Groups had over 30% of their residents with earnings below the poverty threshold.

ALTERNATIVE A2: PARALLEL COLSTRIP ROUTE

Census Block Groups within 6 miles of Alternative A2 average 96.0% persons of White race only. No Block Group in the 6-mile radius has less than 89.5% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averages 1.7% of the population within six miles. The highest concentration in any Census Block is 5.2%.

For Alternative A2, on average 12.9% of the population had incomes below the poverty level (lower than the 14.0% for Alternative A1). The Block Group with the highest proportion of persons in poverty had 32.8%, and was the only Block Group with over 30% of its residents having 1999 earnings below the poverty threshold.

ALTERNATIVE A3: MAXIMIZE UTILITY CORRIDORS

Census Block Groups within 6 miles of Alternative A3 average 96.0% persons of White race only, the same as for Alternative A1. No Block Group in the 6-mile radius has less than 84.1% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averages 2.6% of the population within 6 miles,

compared to 2.3% for the Alternative A1. Two Block Groups had Hispanic/Latino concentration over 15%.

For Alternative A3, on average 14.0% of the population had incomes below the poverty level (the same as the Alternative A1). The Block Group with the highest proportion of persons in poverty, 60.5%, was Block Group 5, Census Tract 1, in Silver Bow County (in the City of Butte). Six other Block had over 30% of their residents with 1999 earnings below the poverty threshold.

4.9.3.3 Mill Creek to State Line Segment

ALTERNATIVE B1: PREFERRED ROUTE

Census Block Groups within 6 miles of Alternative B1 average 93.6% persons of White race only. No Block Group in the 6-mile radius has less than 92.2% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averages 4.9% of the population within 6 miles. Block Group 1 in Census Tract 9305 in adjacent Clark County, Idaho, (within the 6-mile radius for this alternative) had a Hispanic/Latino concentration of 38.5%.

For Alternative B1, on average, 16.1% of the population had incomes below the poverty level. Three Block Groups had proportions of persons in poverty over 25%.

ALTERNATIVE B2: SHEEP CREEK ROUTE

Census Block Groups within 6 miles of Alternative B2 average 93.5% persons of White race only, nearly the same as for Alternative B1. No Block Group in the 6-mile radius has less than 94.7% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averages 7.4% of the population within 6 miles (for Alternative B1, the proportion was 4.9%). Block Group 1 in Census Tract 9305 in adjacent Clark County, Idaho, also within the 6-mile radius of Alternative B1, had a Hispanic/Latino concentration of 38.5%.

For Alternative B2, on average, 15.3% of the population had incomes below the poverty level (lower than that of the Alternative B1 of 16.1%). One Block Group had a proportion of persons in poverty over 25%.

ALTERNATIVE B3: I-15 ROUTE

Census Block Groups within 6 miles of Alternative B3 average 93.2% persons of White race only, nearly the same as for Alternative B1. No Block Group in the 6-mile radius has less than 94.7% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averaged 7.5% of the population within 6 miles (for Alternative B1, the proportion was 4.9%). Block Group 1 in Census Tract 9305 in adjacent Clark County, Idaho, also within the 6-mile radius of Alternative Route B-1, had a Hispanic/Latino concentration of 38.5%.

For Alternative B3, on average, 16.1% of the population had incomes below the poverty level. Three Block Groups had proportions of persons in poverty over 25%, as did the Alternative B1 route.

4.9.3.4 Alternative AB1: I-15 Jefferson Valley Route

Census Block Groups within 6 miles of Alternative AB1 average less than 6.4% minority population. No Block Group in the 6-mile radius has less than 84.1% of the population as White only. Thus, there are no significant numbers of minorities in this area. Regarding ethnicity, the Hispanic or Latino population averages 2.3% of the population within 6 miles. The highest concentration in any Census Block in Montana is 16.0%. Across the state border in Clark County Idaho, Block Group 1 in Census Tract 9305 (also within the 6-mile radius Alternative AB1) has a Hispanic/Latino concentration of 38.5%.

For Alternative AB1, on average 14.5% of the population had incomes below the poverty level (slightly higher than the 14.0% for Alternative A1). The Block Group with the highest proportion of persons in poverty, 60.5%, was Block Group 5, Census Tract 1, in Silver Bow County (in the City of Butte). Three other Block Groups had over 30% of their residents with earnings below the poverty threshold.

4.9.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.9.4.1 State Line to Midpoint

Alternative C1: Preferred Route

For Census Block Groups within 6 miles of Alternative C1, 83.5% of the population was White only. American Indians or Alaskan Natives represented only 0.7% of the total population. Hispanic or Latino population represented a far higher proportion of the population at 25.8%.

In all Census Block Groups within 6 miles of Alternative C1, the population included 12.1% classified as low-income. Among Block Groups within 6 miles of Alternative C1, only two had over 25% of their populations under the poverty threshold: Block Group 4, Census Tract 9701, in Butte County (28.3%), and Block Group 2, Census Tract 9501, in Clark County (27.3%).

Alternative C2: Eastern Route

For Census Block Groups within 6 miles of Alternative C2, 84.7% of the population was White only. American Indians or Alaskan Natives represented only 0.7% of the total population, the same as in Alternative C1. Hispanic or Latino population at 22.1% represented a lower proportion than in Alternative C1.

In all Census Block Groups within 6 miles of Alternative C2, the population included 13.5% classified as low-income. Among Block Groups within 6 miles of Alternative C2, only two had over 25% of their populations under the poverty threshold: Block Group 4, Census Tract 9701, in Butte County (28.3%), and Block Group 2, Census Tract 9501, in Clark County (27.3%). These Block Groups are also within 6 miles of Alternative C1.

Alternative C3: Western Route

For Census Block Groups within 6 miles of Alternative C3, 87.3% of the population was White only. American Indians or Alaskan Natives represented only 0.7% of the total population, the same as in Alternative C1. Hispanic or Latino population at 14.5% represented a lower proportion than in Alternative C1.

In all Census Block Groups within 6 miles of Alternative C3, the population included 15.4% classified as low-income, noticeably higher than for the entire MSTI analysis area in Idaho. Among Block Groups within 6 miles of Alternative C3, two Block Groups had poverty rates above 20% but under 25%: Block Group 3, Census Tract 9601, in Jefferson County, Idaho (23.3%), and Block Group 3, Census Tract 9701, Butte County, Idaho (20.0%). Thus, concentrations of persons in poverty within 6 miles of Alternative C3 were less noticeable than for Alternative C1.

Alternative C4: Sheep Creek INL Brigham Point Route

For Census Block Groups within 6 miles of Alternative C4, 83.5% of the population was White only. American Indians or Alaskan Natives represented only 0.7% of the total population, the same as in Alternative C1. Hispanic or Latino population was 25.6% of the population.

In all Census Block Groups within 6 miles of Alternative C4, the population included 12.4% classified as low-income. Among Block Groups within 6 miles of Alternative C4, two had over 25% of their populations under the poverty threshold: Block Group 4, Census Tract 9701, in Butte County (28.3%), and Block Group 2, Census Tract 9501, in Clark County (27.3%). Three other Block Groups had poverty rates above 20% but under 25%: Block Group 3, Census Tract 9601, in Jefferson County (23.3%), Block Group 4, Census Tract 9803, in Minidoka County (22.9%), and Block Group 4, Census Tract 9503, in Bingham County (21.1%). Thus, concentrations of persons in poverty within 6 miles of Alternative C4 were slightly more noticeable than for Alternative C1.

4.9.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.9.5.1 New Townsend Substation

The Project includes building a new 500kV Townsend Substation located in southwestern Montana, five miles south of Townsend, Montana. The total ground disturbance for the substation would be approximately 52 acres.

The proposed site for the new Townsend Substation is in a rural area zoned for agricultural land use. No disproportionate effects to minority or low income populations would occur.

4.9.5.2 Mill Creek Substation Addition

A new 500kV Mill Creek Substation would be built adjacent to NorthWestern's existing Mill Creek Substation approximately 3 miles south on Anaconda, Montana. The modification would result in approximately 28 acres of new ground disturbance in an area that already supports a substation. No disproportionate effects to minority or low income populations would occur.

4.9.5.2 Midpoint Substation Addition

IPCO's existing Midpoint Substation located 10 miles north of 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. No disproportionate effects to minority or low income populations are anticipated.

4.9.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to environmental justice from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to environmental justice from construction, operation, or maintenance of the communication system are anticipated.

4.9.7 CONCLUSIONS

Most of the MSTI Project area in Montana is sparsely inhabited, with the exception of the area around Butte. Project environmental effects would affect the area's population equally without regard to ethnicity or income. No minority or low-income populations would be disproportionately affected by construction and operation of the MSTI 500kV transmission line, substations and communication facilities.

4.10 CULTURAL RESOURCES

4.10.1 INTRODUCTION

Cultural resources within the project area are subject to both direct and indirect impacts. Direct impacts would result from ground disturbing activities associated with the construction of the transmission line such as clearing vegetation, grading of new access roads, improving existing access roads, installing tower foundations, assembling and erecting towers, stringing and tensioning conductors, and any restoration and re-vegetation measures.

Visual impacts result when highly visible modern structures such as transmission lines are introduced into a historical setting thereby affecting the quality of archaeological sites that are significant because they retain their visual historic context.

Cultural resources could also be subject to indirect impacts. This analysis evaluated one type of indirect impacts: access-related. Access related impacts occur to cultural resources when public accessibility is increased to a previously remote area via new roads. Uncontrolled recreational use,

overland vehicle travel, and looting and vandalism of archaeological sites degrade the quality of these resources and can affect their eligibility to the National Register.

4.10.2 METHODS FOR ASSESSING IMPACTS

A significant step in the process of selecting an environmentally Preferred Route for MSTI is determining initial and residual impact levels from the various alternative route links. While some known cultural resources were avoided through the regional study and associated sensitivity analysis (Volume IV) (POWER 2006), the locations of most cultural resources along the alternative route links are not known because so little of the affected land has been surveyed by professional archaeologists. Consequently, it was necessary to complete a background records review to identify these resources, map their locations, and carry out and impact assessment and mitigation planning procedure. The following section describes the methods for impact assessment and mitigation planning for cultural resources known or expected to occur within the various MSTI study corridors.

The methodology for identifying, evaluating, and mitigating impacts to cultural resources has been established through federal laws and regulations, primarily the NHPA, and similar methods can be used for cultural resources affected by non-federal undertakings. This process requires identifying significant cultural resources potentially affected by an action, determining the effect of that action, and implementing measures to avoid, reduce, or otherwise mitigate those effects.

A project affects a significant (i.e., National Register-eligible) cultural resource (e.g., a historic property) when it alters the property's characteristics, including relevant features of its environment or use, which qualify it as significant according to National Register criteria. These criteria include:

- **a.** That are associated with events that have made a significant contribution to the broad patterns of our history; or
- **b.** That are associated with the lives of persons significant in our past; or
- **c.** That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- **d.** That have yielded, or may be likely to yield, information important in prehistory or history.

The resulting impacts can be either direct or indirect and can only be determined on a project-specific basis for which the anticipated parameters of an undertaking are known.

Impacts to cultural resources related to operations and maintenance of transmission lines are generally indirect and result from increased public access to previously remote areas.

4.10.3 IMPACT LEVEL

The impact levels for the cultural resource impact assessment are defined as follows:

High – A high level of impact to cultural resources would result if the construction, operation, or maintenance of the transmission line has the potential to cause a significant or substantial adverse change to a National Register-listed or eligible archaeological or architectural resource. In addition to known cultural resources, it is also considered a high impact if the project may affect yet to be

identified sites in areas identified by agency archaeologists as having a high potential for undocumented cultural resources.

Moderate – A moderate impact to cultural resources would result if the construction, operation, or maintenance of the proposed project would potentially cause some adverse change to the condition of recorded archaeological or architectural sites that have not yet been evaluated for National Register eligibility or if the affected area is more that 1,000 meters from a permanent water source (i.e., site densities would likely be lower than in areas closer to a water source).

Low –A low impact to cultural resources would result if the construction, operation, or maintenance of the proposed project would potentially cause a change to resources that have been determined not eligible to the National Register, archaeological sites with fewer than five artifacts, and areas expected to have a low probability of containing undisturbed cultural resources (e.g., urban areas without listed or eligible resources, interstate rights-of-way, bodies of water, cultivated fields, and terrain with greater than 30 degrees of slope).

No Identifiable Impact - No identifiable impact would be indicated where no measurable or suspected adverse impact would occur to any cultural resources. These include areas that have been previously surveyed for cultural resources, and in which no cultural resources were identified.

4.10.4 IMPACT TYPE

Certain activities associated with the development of transmission line projects have a high potential to impact cultural resources in a variety of ways depending on the particular type of resource involved. Earth-moving activities which cause both on and below ground surface disturbance have the highest potential to directly impact archaeological resources and can occur during project area preparation, construction of new transmission lines, and continuing operation and maintenance of the lines. Of these activities, preparation of the project area has the greatest potential to directly impact cultural resources because these activities tend to disturb larger areas of the ground surface than actual construction due to the grading of access roads. Ground clearing can compact soils, crush artifacts, and alter prehistoric and historic features. Although site preparation is considered a temporary action, damage to cultural resources resulting from these activities is permanent.

Construction of a new transmission line has the potential to affect cultural resources both on and below the ground surface. As with project preparation, ground disturbance associated with road grading, platform leveling, and guy wire installation can directly impact cultural resources. For the expected permanent ground disturbance see Chapter 2, Section 2.5.

Access-related impacts can have an indirect impact on cultural resources caused by improving existing roads or creating new roads into a previously remote area thereby increasing pedestrian and vehicle traffic. The likelihood of unauthorized collection of artifacts and intentional, as well as inadvertent, destruction of structures or landscape features increase with ease of access.

Physical impacts to cultural resources as a result of ground disturbing activities or increased public access to sites are expected within 250 feet of the proposed alternative centerlines.

Visual impacts may occur to some significant cultural resources such as Native American sacred sites, historic trails, and the settings of certain classes of historic buildings when modern structures

such as large transmission towers are introduced into the viewshed of these resources. These visual impacts remain as long as the transmission structures are in place. For this project, potential visual impacts were considered for National Register listed or eligible resources that were located within 0.5 mile to either side of the proposed alternative centerline.

4.10.5 SPECIFIC MITIGATION MEASURES

Mitigation measures would be implemented on a case-by-case basis following the identification of cultural resources along the Preferred Route. These mitigation measures can be applied individually to impacts or combined with other mitigation measures to reduce or eliminate impacts. The impacts remaining after application of mitigation measures are termed residual impacts. Any high residual impacts determined for cultural resources for this project are based on the presence of cultural resources within 250 feet of the route centerlines (see Volume II Cultural Resources Technical Report, Appendix A, Table 4). These impacts can be reduced to low-level impacts by implementing the mitigation measures for cultural resources outlined in Volume I-C, Appendix B, Section 4.

Additionally, as part of the Section 106 process a Programmatic Agreement (PA) may be prepared setting forth the criteria for identifying, evaluating, and managing cultural resources along the selected alternative. The parties to the agreement may include Northwestern, BLM, USFS, MDNRC, MDEQ, Idaho SHPO, Montana SHPO, and interested Native American Tribes. Among other things, this PA would include: 1) the Area of Potential Effect (APE); procedures for completing cultural resource survey within the APE; 3) procedures for evaluating the National Register eligibility of identified cultural resources; 4) steps in assessing effects; 5) appropriate measures for mitigating adverse effects on cultural resources that cannot be avoided; 6) Tribal consultation procedures; 7) when, how, and where, and by whom monitoring would be carried out; 8) appropriate responses to the discovery of unanticipated cultural resources during construction; 9) the contents and schedule for technical reports resulting from surveys, test excavations, data recovery excavations, documentation of historic structures, and other studies; and 10) procedures for ensuring timely review by appropriate agencies throughout the process. This PA is a recommended SRMM for cultural resources presented in Volume I-C, Appendix C, No. 15.

4.10.6 EFFECTS OF EACH ALTERNATIVE - MONTANA

4.10.6.1 No Action

The No Action Alternative would result in no project-related effects on cultural resources within the Montana study corridors.

4.10.6.2 Townsend to Mill Creek (Melrose) Segment

A1: Preferred Route

The A1: Preferred Route is approximately 112.9 miles long. Approximately 2.1 miles are anticipated to have high impacts, and 97.1 miles to have low impacts to cultural resources. No identifiable impacts are projected for 14.1 miles of the route.

High impacts are projected because there are nine sites that have been determined eligible to the National Register within 250 feet of the centerline of this route including two mining sites, three homesteads, one bridge, and segments of the Burlington Northern Railroad Depending on the resource, these impacts may be reduced to low level impacts by implementing mitigation measures outlined in Appendix B, Section 4 and Appendix C, No. 15. Additionally, Links 7-61, 7-62, 7-72, and 7-9 of the route parallel the Butte, Anaconda and Pacific Railway Historic District which is listed on the National Register and the Butte to Anaconda Historic Landmark District. However, these districts are highly developed and therefore access-related and visual impacts are not expected. Although the Pipestone Historic Mining District located north of Link 7-2 does not have an official state or national register district status, it is considered to have a high sensitivity for both prehistoric and historic artifacts. Sites in this area could be impacted by both ground disturbing activities and increased public access, but impacts could be mitigated using the above mitigation measures. Transmission lines already cross this area so increased visual impacts are not expected.

A2: Parallel Colstrip Lines

A2 is approximately 121.7 miles long. High impacts are expected along 2.8 miles and low impacts along 104.9 miles of the route. No identifiable impacts are anticipated along 14.3 miles of the alternative.

High impacts are expected because the greatest number of sites determined eligible for listing on the National Register are located within 250 feet of the centerline of Link 4-2 of the alternative. The greatest number of overall sites within 250 feet of any of the project links is also located along Link 4-2. Depending on the resource, these impacts may be mitigated to low-level impacts by implementing mitigation measures outlined in Volume I-C, Appendix B, Section 4 and Appendix C, No. 15. Additionally, visual and access-related impacts are anticipated to be low because a similar transmission line currently traverses the route.

A3: Maximize Utility Corridors

A3 is approximately 128.8 miles long. High impacts are anticipated along three miles, low impacts along 111.3 miles, and no identifiable impacts along 15.1 miles of the route.

High impacts are attributed to the nine sites that have been determined eligible to the National Register within 250 feet of A3 including three homesteads, one placer mine, one bridge, the Burlington Northern Railroad, two lithic scatters, and one tipi ring site. Ground disturbing activities have the greatest potential to impact cultural resources within 250 feet of the route centerline. Any high impacts can be reduced to low-level impacts using mitigation measures in Volume I-C, Appendix B, Section 4 and Appendix C, No. 15. Visual and access-related impacts would primarily impact the homestead sites which may have standing structures, but are anticipated to be low because there are existing power lines along Links 7-2 and 2-3 of the route where the homesteads are located.

4.10.6.3 Mill Creek to State Line

B1: Preferred Route

B1 is approximately 87.1 miles long. High impacts are anticipated along 0.6 mile, and low impacts are expected along 80.2 miles of the route. No identifiable impacts are projected for 6.5 miles of the alternative.

There is one site that is eligible to the National Register located within 250 feet of the centerline along Link 16-1. It is a rock alignment that could be impacted by ground disturbing activities. The site also has the potential to be visually impacted. Impacts to this resource will be low if the mitigation measures for cultural resources are implemented (Volume I-C, Appendices B and C).

B2: Sheep Creek Route

The Sheep Creek alternative is approximately 86.9 miles long. High impacts are expected along 0.5 mile of the route, and low impacts for 81.5 miles. No identifiable impacts are anticipated along 5.0 miles of the alternative.

Three National Register-eligible sites are located within 250 feet of Link 18-1 of Alternative B2. These sites include a lithic scatter, a lithic scatter and tipi ring, and a homestead. High impacts from ground disturbing activities can be mitigated to low-level impacts using those measures established for cultural resources in Volume I-C, Appendices B and C. Additional access-related and visual impacts are expected to be low because there are existing power lines along Link 18-1 of this alternative.

B3: I-15 Route

B3 is approximately 88.4 miles long. High impacts are expected along 0.6 miles, and low impacts are anticipated along 78.9 miles of the route. No identifiable impacts are anticipated along 9.1 miles of the route.

One National Register-eligible site is located within 250 feet of the centerline of this alternative along Link 16-1. It is a rock alignment that could be impacted by ground disturbing activities. The site also has the potential to be visually impacted. High impacts can be mitigated to a low level using the mitigation measures for cultural resources outlined in Volume I-C, Appendices B and C.

4.10.6.4 AB1: I-15 Jefferson Valley Route

The AB1: Jefferson Valley Route is approximately 200 miles long. High impacts are expected along 3.5 miles, low impacts along 206.4 miles, and no identifiable impacts along 19.2 miles of the route.

There are eleven sites that have been determined eligible to the National Register within 250 feet of the I-15 Jefferson Valley Route including two mining sites, three homesteads, two railroads, two bridges, one irrigation system, and one rock alignment. All of the sites are susceptible to ground disturbing impacts, but these high level impacts can be reduced to low following the specific mitigation measures for cultural resources. Sites with buildings have the most potential to be visually impacted and include the three homestead and two mining sites. Two of the homestead sites are

located along Link 7-2 which is highly developed therefore additional visual impacts can be expected to be low. This is also the case with one placer mine which is located on Link 11-22. One homestead and the hard rock mine are located in somewhat more rural locations along Link 3-1. However, there are existing powerlines along this link so impacts are also expected to be reduced to a low level.

4.10.7 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.10.7.1 Stateline to Midpoint

C1: PREFERRED ROUTE

The preferred route is 232.6 miles long. High impacts are anticipated along 7.5 miles of the route, low impacts along 203.4 miles, and no identifiable impacts along 22 miles of the route.

High impacts are expected because there are 41 archaeological and architectural sites that have been previously documented within 250 feet of the centerline. One of these sites, visible ruts of Goodale's Cutoff trail, is listed on the National Register where it passes by Arco. Thirty-one sites are prehistoric lithic scatters, cairns, or rock alignments. These high-level impacts may be reduced to low level by implementing the mitigation measures outlined in Volume I-C, Appendix B, Section 4 and Appendix C, No. 15. High impacts can be reduced for the seven linear sites within 250 feet of the centerlines if the resources are crossed at right angles by the transmission line. No architectural resources have been previously documented within 250 feet of the centerline. Fifteen architectural sites have been documented within 0.5 mile. Visual impacts are expected to be low for these resources as they are located in areas where a there are existing powerlines

C2: EASTERN ROUTE

Alternative C2 is 239.3 miles long. High impacts are expected along 4.3 miles, low impacts along 223.4 miles, and no identifiable impacts along 1109 miles of the route.

High impacts are anticipated because 18 sites have been previously documented within 250 feet of the centerline. Impacts to the prehistoric lithic scatters and rock features may be reduced using the recommended mitigation measures for cultural resources outlined in Volume I-C, Appendix B, Section 4 and Appendix C, No. 15. All of the historic sites are linear features including segments of canals, railroads, and a historic trail. Impacts to these resources may be reduced to a low level if crossed a right angles to the transmission lines. No architectural resources have been documented within 250 feet of the centerline. Five architectural resources have been recorded within 0.5 mile. Visual impacts are expected to be low for all of these resources because they located in areas where powerlines already exist.

C3: WESTERN ROUTE

Alternative C3 is 177.6 miles long. High impacts are expected along 10.3 miles of the route, low impacts along 146 miles, and no identifiable impacts along 21.8 miles.

High impacts are anticipated because 30 cultural resources have been previously documented within 250 feet of the centerline of the route. Just over half of these resources are prehistoric lithic scatters

and the impacts to these resources can be reduced to a low level by implementing the mitigation measures outlined in Volume I-C, Appendix B, Section 4 and Appendix C, No. 15. Nine of the historic archaeological sites are linear features and the impacts to these resources can be mitigated to a low level by crossing them perpendicularly. No architectural resources have been documented within 250 feet of the route centerline. Thirteen architectural sites have be documented within 0.5 mile of the centerline. Visual impacts to these resources are expected to be low because there are in areas where powerlines currently exist.

C4: SHEEP CREEK INL/BRIGHAM POINT ROUTE

Alternative C4 is 214.2 miles long. High impacts are expected along 7.6 miles, low impacts along 186.1 miles, and no identifiable impacts along 20.9 miles of the route.

High impacts are anticipated because 40 cultural resources have been documented within 250 feet of the centerline of the route. Most of these resources are prehistoric lithic scatters and the high impacts along segments of the route where they occur may be reduced to low impacts if mitigation measures outlined in Volume I-C, Appendix B, Section 4 and Appendix C, No. 15 are implemented. Historic resources include segments of the Oregon Shortline and Union Pacific Railroads, the Milner-Gooding Canal, and visible ruts of Goodale's Cutoff trail which is listed on the National Register. Impacts to these linear resources can be reduced to a low level if the resources are crossed perpendicularly by the transmission line. No architectural resources have been documented within 250 feet of the route. Fifteen architectural sites are in within 0.5 mile of the centerline. Visual impacts to these resources are expected to be low because they are located in areas where powerlines currently exist.

4.10.8 EFFECTS OF SUBSTATION CONSTRUCTION

4.10.8.1 New Townsend Substation

Low impacts to noted buildings are anticipated at the new Townsend Substation. One house and some agricultural outbuildings are within 0.5 mile of the new substation. These buildings have not been documented and consequently have not been evaluated for eligibility to the National Register. Regardless, the specific mitigation measures for cultural resources can reduce the potential impacts to a low level.

4.10.8.2 Mill Creek Substation Addition

No identifiable impacts to cultural resources are expected at the Mill Creek Substation because the site is developed. Only two cultural resources have bee identified within 0.5 mile of the substation. One site is a homestead and the other is a residence. Neither is within 250 feet of the facility which could have subjected the properties to ground disturbing impacts and no additional visual impacts are expected because of the presence of the substation and existing power lines.

4.10.8.3 Midpoint Substation Addition

One architectural resource has been previously documented.25 mile south of the Midpoint Substation. It is the A.J. and Lela Newman water tank, well house, and chicken house. No additional

visual impacts to this resource are expected because of its proximity to existing powerlines and the substation.

4.10.9 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to cultural resources from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to cultural resources from construction, operation, or maintenance of the communication system are anticipated.

4.11 EMF, AUDIBLE NOISE, CORONA, RADIO/TV INTERFERENCE

4.11.1 ELECTRIC AND MAGNETIC FIELDS

4.11.1.1 Introduction

This section discusses background information regarding impacts from electric and magnetic fields (EMF) on human health and electrical effects issues. This section also analyzes electrical effects in close proximity of electric transmission lines of the preferred and alternative routes.

Electric and magnetic fields are present wherever electricity flows: around appliances and power lines, in offices, schools, and homes. These fields are low energy, extremely low frequency fields, and should not be confused with high energy or ionizing radiation such as X-rays and gamma rays. The current (a flow of electric charge, measured in amperes [A]), creates a magnetic field. The magnetic field is expressed in units of milliGauss (mG). The voltage (the force or pressure that causes the current to flow) measured in units of volts (V) or thousands of volts (kV), creates an electric field. Both fields occur together whenever electricity flows, hence the general practice of considering both as EMF exposure. Any device connected to an electrical outlet, even if the device is not turned on and current is not flowing, would have an associated electric field that is proportional to the voltage of the source to which it is connected. Magnetic fields occur only when current is flowing. Common materials such as wood and metal usually do not shield against magnetic fields.

4.11.1.2 Background

MAGNETIC FIELDS

Current and voltage are required to transmit electrical energy over a transmission line. A 60-Hertz (Hz; cycles per second) magnetic field is created in the space around transmission line conductors by

the electric current flowing in the conductors. This is the frequency of ordinary household current, usually referred to as 60 cycles. The strength of the magnetic field produced by an electric transmission line depends on the amount of current flowing through the conductor (the higher the electrical load, the higher the current), the configuration of the conductors (spacing and orientation), the height of the conductors, the distance from the line, and the proximity of other electrical lines. As the electric load (and the resulting current) on the transmission line varies continually on a daily and seasonal basis, the magnetic fields likewise vary throughout the day and year. Magnetic fields are highest closer to the line and diminish with distance. Physical structures, such as buildings, are transparent to magnetic fields in that they do not provide any shielding.

A majority of people in the U.S. are exposed to magnetic fields that average less than 2 mG. Table 4.11-1 depicts estimated average magnetic field exposure of the U.S. population for residential sources, according to a study commissioned by the U.S. government as part of the EMF Research and Public Information Dissemination (EMF RAPID) Program. The EMF RAPID study measured magnetic field exposure of a sample of people of all ages randomly selected among the U.S. population. Participants wore or carried with them a small personal exposure meter and kept a diary of their activities both at home and away from home. Magnetic field strength values were automatically recorded twice a second for 24 hours. The study reported that exposure to magnetic fields is similar in different regions of the country and similar for both men and women.

Table 4.11-1 Residential Sources of Magnetic Fields

Source	Magnetic Field Strength[1] (mG)
Kitchen	
Blenders	20
Coffee Makers	1
Dishwashers	30
Electric Ranges	30
Refrigerators	20
Bedroom	
Digital Clock	8
Analog Clock	30
Living/Family Room	
Color Televisions	20
Window Air Conditioners	20
Ceiling Fans	50
Laundry/Utility	
Electric Clothes Dryer	3
Washing Machines	30
Vacuum Cleaners	200
Portable Heaters	40
Workshop	
Drills	40
Power Saws	300

[1] The magnetic field strengths are measured at a distance of one (1) foot from the source.

Source: "EMF Questions & Answers", U.S. National Institute of Environmental Health Services, EMF RAPID Program, 2002

Possible Health Effects of Magnetic Fields

This section reviews the results of selected reports pertaining to possible links between magnetic fields (commonly referred to as EMF) and health effects.

A number of studies in the late 1980s and 1990s investigated a possible association between power lines and EMF and the incidence of childhood leukemia. The studies included:

- Four studies which used wire codes to assess exposure to EMF were considered to be of sufficient quality to evaluate an association between the incidence of childhood leukemia and exposure to magnetic fields (Wertheimer & Leeper, 1979, Savitz *et al.*, 1988, London *et al.*, 1991). (The wire code method includes a number of factors, such as the wiring in the home, and the distance of the home from the power line.)
- Four studies were considered to be of sufficient quality by the National Institute of Environmental Health Sciences (NIEHS) to be used in an evaluation of the association between the incidence of childhood brain tumors and classification of exposure based on wire codes (Savitz *et al.*, 1988; Wertheimer & Leeper, 1979, Gurney *et al.*, 1996; and Preston-Martin *et al.*, 1996b).
- Three studies of appliance use evaluated the association between the incidence of childhood leukemia and exposure to magnetic fields (Hatch *et al.*, 1998; London *et al.*, 1991; Savitz *et al.*, 1990).

In 1996, a National Research Council committee of the National Academy of Sciences (NAS) released its evaluation of research on potential associations between EMF exposure and cancer, reproduction, development, learning, and behavior. The report concluded:

> "Based on a comprehensive evaluation of published studies relating to the effects of power-frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."

The NAS focused primarily on the association of childhood leukemia with the proximity of the child's home to power lines. The NAS panel found that, although a link between EMF exposure and increased risk for childhood leukemia was observed in studies that had estimated EMF exposure using the wire code method, this link was not found in studies that had included actual measurements of magnetic fields at the time of the study.

In 1992, the U.S. Congress authorized the EMF-RAPID Program in the Energy Policy Act (PL 102-486, Section 2118). The Congress instructed the National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health, and the Department of Energy to direct and manage a program of research and analysis aimed at providing scientific evidence to clarify the potential for health risks from exposure to extremely low frequency (ELF) EMF.

Seven years later, the 1999 NIEHS report stated the following in its conclusion section:

> "The scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak. The strongest evidence for health effects comes from associations observed in human populations with two forms of cancer: childhood leukemia and chronic lymphocytic leukemia in occupationally exposed adults. While the support from individual studies is weak, the epidemiological studies demonstrate, for some methods of measuring exposure, a fairly consistent pattern of a small, increased risk with increasing exposure that is somewhat weaker for chronic lymphocytic leukemia than for childhood leukemia. In contrast, the mechanistic studies and the animal toxicology literature fail to demonstrate any consistent pattern across studies although sporadic findings of biological effects (including increased cancers in animals) have been reported. No indication of increased leukemia in experimental animals has been observed.
>
> The lack of connection between the human data and the experimental data (animal and mechanistic) severely complicates the interpretation of these results. The human data are in the "right" species, are tied to "real-life" exposures and show some consistency that is difficult to ignore. This assessment is tempered by the observation that given the weak magnitude of these increased risks, some other factor or common source of error could explain these findings. However, no consistent explanation other than exposure to ELF-EMF has been identified.
>
> Epidemiological studies have serious limitations in their ability to demonstrate a cause and effect relationship whereas laboratory studies, by design, can clearly show that cause and effect are possible. Virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to ELF-EMF at environmental levels and changes in biological function or disease status. The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to ELF-EMF, but it cannot completely discount the epidemiological findings.
>
> The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures."

More recently, childhood leukemia has been associated with exposure to magnetic fields in the highest exposure groups, in recent reviews and pooled studies (International Agency for Research on Cancer (IARC) 2001, Ahlbom *et al.* 2000, and Greenland *et a.l* 2000). The basis for these relationships remains unexplained (Brain *et a.l* 2003). Kavet and Zaffanella (2002) suggested that contact currents could explain the association between high residential magnetic fields and childhood leukemia. Contact currents flow through the body whenever a person touches two conductive surfaces that are at different voltages. Leukemia in childhood is rare. In the U.S., about 2-3 cases per 100,000 person years for children 0-20 years old have been reported, but the rate peaks at two to three times this rate in 0-4 year olds (Brain *et al* 2003).

In the first of the analyses of pooled data, Ahlbom *et al.* (2000) reported that if nine studies that included long-term measurements of magnetic fields were pooled, a statistically significant association could be found for childhood leukemia in the children with average exposures of 4 mG

(0.4 microTesla) or greater. For children with lower average exposures, no significant elevation of childhood leukemia was found in the pooled studies. In the second of the analyses of pooled data, Greenland et al (2000) reported that if the 15 studies for which magnetic fields were measured (or could be estimated) were pooled, a statistically significant association (relative risk = 1.7) could be found for childhood leukemia in the children with average exposures of 3 mG. For children with lower average exposures, no significant elevation of childhood leukemia was found in the pooled studies. According to the authors, this data indicates that exposure to power-frequency magnetic fields could account for 0-8% of childhood leukemia deaths in the United States.

The World Health Organization's International Agency for Research on Cancer (IARC) met in June 2001 to review the scientific evidence regarding the potential carcinogenicity of static and ELF-EMF. An international scientific panel was created consisting of 21 experts from 10 countries. The panel categorized its conclusions for carcinogenicity based on the IARC classification system that evaluates the strength of evidence from epidemiological, laboratory (human and cellular), and mechanistic studies (classifications are "carcinogenic to humans," "probably carcinogenic to humans," and "possibly carcinogenic to humans."). The IARC concluded that:

> "ELF magnetic fields are possibly carcinogenic to humans, based on consistent statistical associations of high level residential magnetic fields with a doubling of risk of childhood leukemia and power-frequency (50 or 60 Hz) residential ELF magnetic field strengths above 0.4 microTesla. In contrast, no consistent evidence was found that childhood exposures to ELF electric or magnetic fields are associated with brain tumors or any other kinds of solid tumors. No consistent evidence was found that residential or occupational exposures of adults to ELF magnetic fields increase risk for any kind of cancer."

Pacemakers. Electrical sources such as welding equipment, power lines at electric generating plants, and rail transportation equipment can produce lower frequency EMF strong enough to interfere with some models of pacemakers and defibrillators. The exposure guidelines developed by the American Conference of Governmental Industrial Hygienists (ACGIH), state that workers with cardiac pacemakers should not be exposed to a 60-Hz magnetic field greater than 1 Gauss (1,000 mG) or a 60-Hz electric field greater than 1kv/m (1,000 V/m).

Breast Cancer. The interest by researchers that the possibility EMF exposure might cause breast cancer was in part because breast cancer is such a common disease in adult women. The early studies identified a few electrical workers with male breast cancer, which is a very rare disease. A link between EMF exposure and alterations in the hormone melatonin was considered a possible hypothesis for breast cancer. This idea provided motivation to conduct research addressing a possible link between EMF exposure and breast cancer.

Miscarriage. According to a recent article in EPRI Journal online, "the question of whether exposure to power-frequency electric and magnetic fields (EMF) might be linked to the risk of miscarriage and other adverse reproductive health outcomes has been the subject of scientific investigation for more than two decades. In 2002, the question took on new importance when the results of two large epidemiologic studies were published. The studies, conducted by research teams led by Dr. Geraldine Lee at the California Department of Health Services (CDHS) and Dr. De-Kun Li at the Kaiser Foundation Research Institute, found "an increased risk of miscarriage among California women who were exposed to high peak magnetic fields (maximum exposure above 16 mG during the measurement day) in early pregnancy."

ELECTRIC FIELDS

Electric field considerations in the immediate vicinity of electric power lines include the potential for electric shock, the clearance of the power lines above ground, measures to prevent unauthorized climbing of the poles, and the proximity of the transmission lines to other utilities such as oil wells and pipelines.

The electric field created by a high-voltage transmission line extends from the energized conductors to other conducting objects such as the ground, towers, vegetation, buildings, vehicles, and persons. Potential field effects can include induced currents, steady-state current shocks, spark discharge shocks and, in some cases, field perception and neurobehavioral responses.

Steady-State Current Shock

Steady-state currents are those that flow continuously after a person contacts an object, such as a vehicle, and provides a path to ground for the induced current. The effects of these shocks range from involuntary movement in a person to direct physiological harm. Steady-state current shocks occur in instances of direct or indirect human contact with an energized transmission line. The emphasis of this report is directed towards EMF effects and not direct contact with transmission lines.

When a conducting object, such as a vehicle or person, is placed in an electric field, currents and voltages are induced. Some induced currents in undisturbed electric fields of 1kv/m and 3.5kv/m are provided in Table 4.11-2.

Table 4.11-2 Induced Currents for Various Objects in milli-amperes (mA)

	Electric Field	
Object	**1kv/m**	**3.5kv/m**
Person (5'8" tall)	0.016	0.06
Cow	0.024	0.08
Sedan	0.11	0.40
Camper Truck (28' long)	0.28	1.00
Large Trailer-Truck (65'x8.5'x13.5')	0.93	3.30
Large Hay Stacker and 4WD Tractor	0.89	3.10
3-Strand Fence (200' long)	0.3	1.10

Source: Conrad-Shelby Transmission Line EIS (DOE 1986)

Table 4.11-3 demonstrates the effects of a 60-cycle, hand-to-foot shock of one second's duration.

Features reducing the level of potential for induced current in objects near the transmission line also reduce the level of a possible induced current shock. The proposed lines would be constructed in accordance with industry and NorthWestern standards to minimize hazardous shocks from direct or indirect human contact with an overhead, energized line. The proposed line is expected to pose minimal hazards to humans.

Table 4.11-3 Electric Current Effects on the Human Body

Current Level (mA)	Probable Effect on Human Body
1	Perception level. Slight tingling sensation. Still dangerous under certain conditions.
5	Slight shock felt; not painful but disturbing. Average individual can let go. However, strong involuntary reactions to shocks in this range may lead to injuries.
6-30	Painful shock, muscular control is lost. This is called the freezing current or "let-go" range.
50-150	Extreme pain, respiratory arrest, severe muscular contractions. Individual cannot let go. Death is possible.
1,000-4,300	Ventricular fibrillation (the rhythmic pumping action of the heart ceases.) Muscular contraction and nerve damage occur. Death is most likely.
10,000	Cardiac arrest, severe burns and probable death.

Source: "How Electrical Current Affects the Human Body", U.S. Department of Labor OSHA, www.osha.gov

Spark-Discharge

Induced voltages appear on objects such as vehicles when there is an inadequate ground. If the voltage is sufficiently high, a spark-discharge shock would occur as contact is made with the ground. The potential for nuisance shocks would be minimized through standard grounding procedures. Carrying or handling conducting objects, such as irrigation pipe, under transmission lines can result in spark discharges that are a nuisance. The primary hazard with irrigation pipes or any other long objects is direct contact with the transmission line if the section of pipe is inadvertently tipped up near the conductors; electrical flashover onto the pipe from the conductors is also a hazard when the pipe is placed in close proximity to the line. In order to minimize these effects, the transmission line would be constructed using the NESC minimum ground clearance of 32 feet as stated in Chapter 2. The use of farm augers under power lines should be consistent with the guidelines presented by the Occupational Health and Safety Administration (OSHA).

In a high electric field, it is theoretically possible for a spark discharge from the induced voltage on a large vehicle to ignite gasoline vapor during refueling. However, the probability for the precise conditions to occur for ignition is extremely remote. According to the Conrad-Shelby EIS (DOE 1986), the ignition of fuel under a transmission line would require that an individual be standing on damp earth or vegetation and that the vehicle to be refueled will be exposed to the maximum intensity of the electric field. Also, the vehicle must not be grounded. Finally, the air-fuel mixture must approach optimal flash-point conditions. Therefore, the number of precise conditions to be met to achieve fuel ignition reduces the likelihood of the occurrence. In the event fueling is to be done under a power line, grounding is recommended.

Field Perception and Neurobehavioral Responses

When the electric field under a transmission line is sufficiently strong, it can be perceived by hair rising on an upraised hand. This is the effect of harmless levels of static electricity, similar to the effect of rubbing feet with socks on a carpet.

Perceptions of the field associated with the transmission lines would not be felt beyond the edge of the right-of-way. Persons working in the right-of-way might feel the field. Studies of short-term exposure to electric fields have shown that fields may be perceived (for example, felt as movement of arm hair) by some people at levels of about 2 to 10kv/m, but studies of controlled, short-term exposures to even higher levels in laboratory studies have shown no adverse effects on normal physiology, mood, or ability to perform tasks (DOE 2001a). The International Commission on Non-Ionizing Radiation Protection Guidelines recommends that short-term exposures be limited to 4.2kv/m for the general public (International Commission on Non-Ionizing Radiation Protection 2003).

Based on the length requirements set forth by the U.S. Department of Transportation, the longest permitted truck in Montana is 65 feet. This is also the longest anticipated vehicle under the proposed transmission line with a short-circuit current of 0.93 milli-ampere (mA)/kV/m. Large farm equipment, such as hay wagons, sprayers, and combines, would also have large short-circuit currents but would not exceed the NESC criterion of 5 mA. Under a worst-case scenario, the short-circuit current to the largest anticipated vehicle (a semi truck and trailer) is 3.3 mA, which is less than the NESC criterion of 5 mA. The transmission line will be designed to accommodate the maximum height of a vehicle or piece of equipment passing under the line. If a person provides the only conducting path from the object to the ground, then the currents listed in Table 4.11-2 flow through the person, when the person touches the object and the object is below the line.

4.11.1.3 Methods for Assessing Impacts

Electric and magnetic fields from the transmission lines of the preferred and alternative routes were calculated at the edge of right-of-way and within the right-of-way. EMF levels were calculated at a height of one meter above ground with phase conductors located at minimum conductor heights. The minimum ground clearances used for the 500kv, 230kv, and 161kv transmission lines were 32 feet, 25 feet, and 23.5 feet respectively. These ground clearances are based on maximum sag conditions under maximum operating temperatures of the conductors. A maximum operating voltage of 550kv with a peak line loading of 1800 amps (as designated by NorthWestern for this project) was used for the calculation of the EMF levels of the 500kv transmission line for the different case studies. Conductor types were assumed as 795 MCM ACSR for the 230kv lines and 556 MCM ACSR for the 161kv lines. Typical structure configurations with a transmission line electrical loading of 800 amps per phase were assumed for the 161kv and 230kv existing transmission lines (RUS Bulletin 1728F-811).

ANALYSIS AREA

Table 4.11-4 provides a cross-reference between the different case study scenarios (pertaining to the various transmission lines in the preferred and alternative routes) and the route segments pertaining to those scenarios.

Table 4.11-4 Case Study/Route Segment Cross Reference

Case Study	Segment(s)
Case 1	1, 2-1, 3-1, 4-1, 4-2, 4-4, 7-61, 7-8, 7-9, 8, 11-21, 11-22, 11-23, 11-3, 13, 16-1, 16-2, 16-3, 16-4
Case 2	7-9, 11-21, 11-22
Case 3	2-3, 7-2, 7-41, 7-5, 11-21, 11-22, 11-23
Case 4	7-61
Case 4a *(electric field mitigation case)*	7-5
Case 5	7-61
Case 6	7-61
Case 7	7-61, 7-62, 7-72
Case 8	11-3, 16-1, 16-3, 16-4
Case 9	7-61, 11-22, 11-23, 11-4, 18-1
Case 10	11-21, 11-22
Case 11	11-22

Case 1

Case 1 pertains to the primary structure used for the proposed line; a Guyed V tangent tower. For angled sections of the relevant segments, a Self-Supporting Lattice tower is used. In terms of electric and magnetic fields, the Guyed V and Self-Supporting structures are identical in configuration. Therefore the Guyed V structure was only considered in the analysis. The proposed structure would have a right-of-way width of 220 feet. Refer to Figure 4.11-1 for a drawing of this structure configuration.

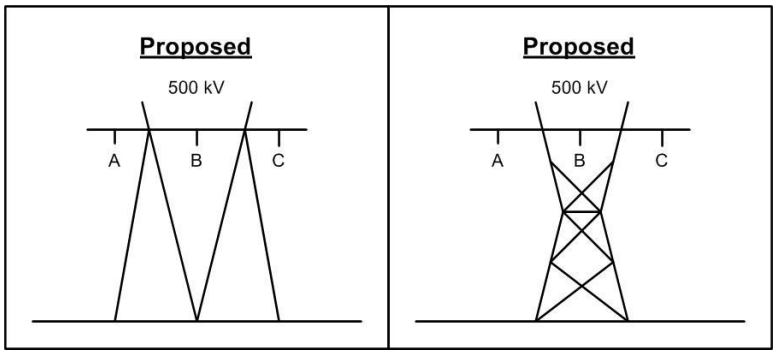

Figure 4.11-1 Case 1

Case 2

Case 2 consists of a double circuit 500kv Self-Supporting Lattice tower. This case represents a special configuration of the 7-9, 11-21, and 11-22 segments applicable to the preferred route only. The proposed structure would have a right-of-way width of 220 feet. Refer to Figure 4.11-2 for a drawing of this structure configuration.

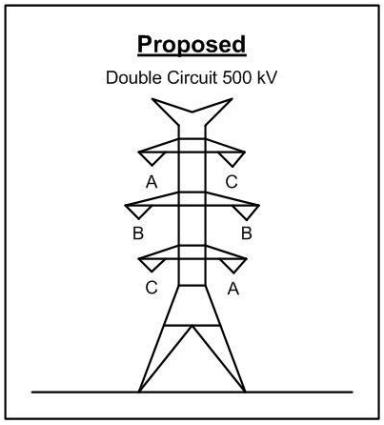

Figure 4.11-2 Case 2

Case 3

Case 3 consists of a 500kv Guyed V tangent tower in the corridor with the existing 230kv and 161kv H-frame structures. The proposed structure will have a right-of-way width of 220 feet plus the addition of the existing lines' right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 80 feet for the 161kv H-frame structure, a total right-of-way width of 385 feet was assumed. Refer to Figure 4.11-3 for a drawing of this structure configuration.

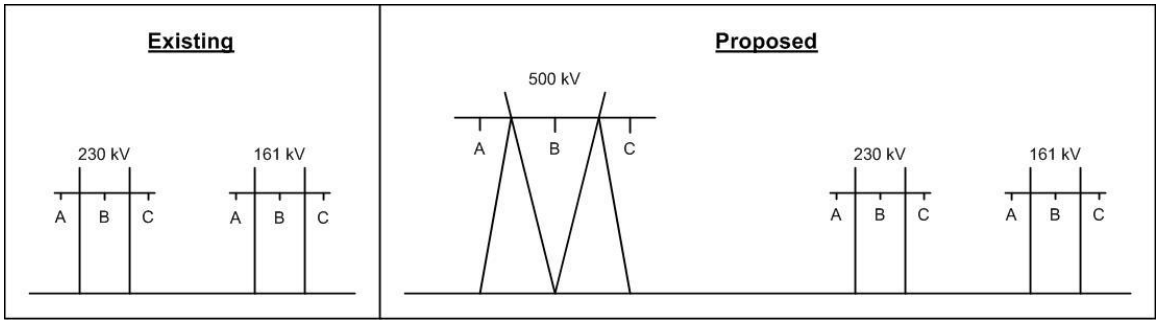

Figure 4.11-3 Case 3

Case 4

In Case 4, the proposed scenario consists of combining the two existing 161kv H-frame structures onto a new double-circuit 161kv pole located adjacent to the existing 230kv H-frame structure. A new 500kv Monopole structure would be constructed adjacent to the new double-circuit pole opposite the existing 230kv H-frame. The proposed 500kv structure will have a right-of-way width of 220 feet plus the addition of the existing 230kv line's right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 120 feet for the 230kv H-frame structure, a total right-of-way width of 310 feet was assumed. Refer to Figure 4.11-4 for a drawing of the structure configurations.

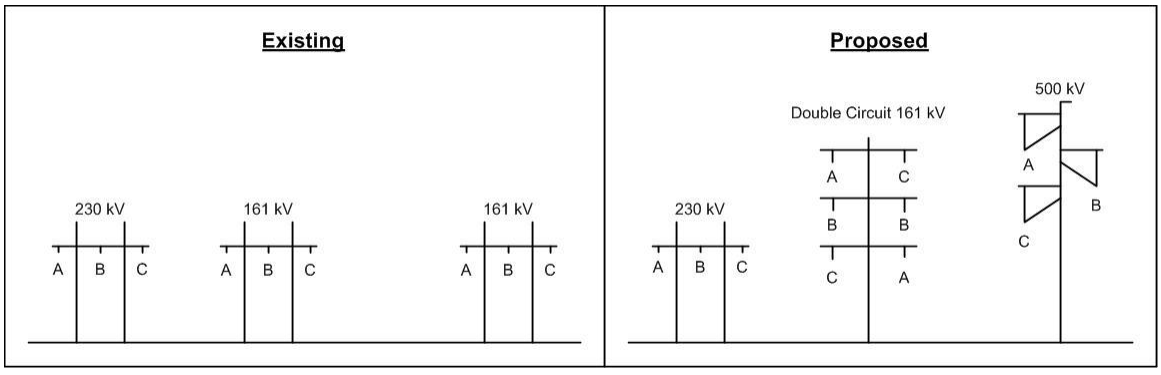

Figure 4.11-4 Case 4

Case 4A

For Case 4A, to reduce the electric fields on both sides of the right-of-way (in route segment 7-5), this case consists of combining the two existing 161kv H-frame structures onto a new double-circuit 161kv pole (located on the south side of the corridor) and a new double circuit structure consisting the 230kv and 500kv circuits. This was done to comply with MFSA's criterion not to exceed 1kv/m at the edge of right-of-way. The proposed right-of-way width of this corridor is 265 feet. Refer to Figure 4.11-5 for a drawing of the structure configurations.

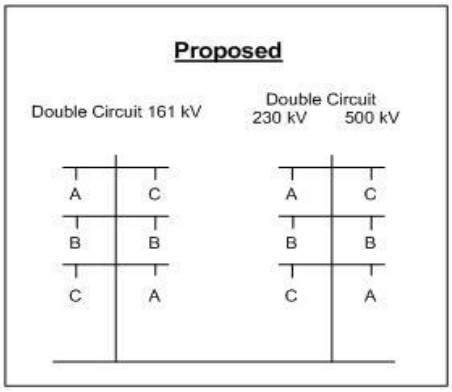

Figure 4.11-5 Case 4A

Case 5

Case 5 consists of a 500kv Monopole structure. The proposed 500kv structure will have a right-of-way width of 220 feet. Refer to Figure 4.11-6 for a drawing of this structure configuration.

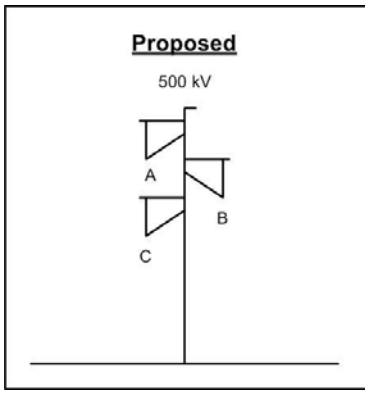

Figure 4.11-6 Case 5

Case 6

For Case 6, the proposed scenario consists of combining the two existing 161kv H-frame structures into a new double-circuit 161kv pole sharing the same corridor as the existing 230kv H-frame structure. A new 500kv Guyed V tangent tower will be constructed between the new double-circuit pole and the existing 230kv H-frame. The proposed 500kv structure will have a right-of-way width of 220 feet plus the addition of the existing 230kv line's right-of-way and the right-of-way of the 161kv double circuit, a total right-of-way width of 250 feet was assumed. Refer to Figure 4.11-7 for a drawing of the structure configurations.

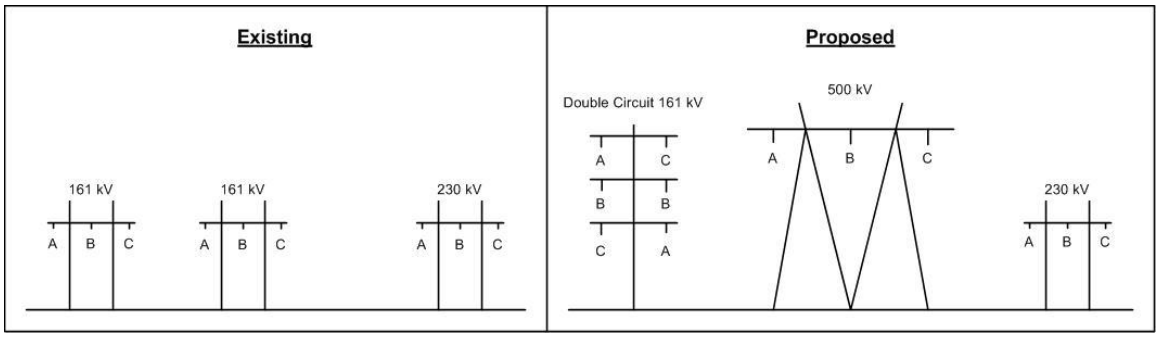

Figure 4.11-7 Case 6

Case 7

For Case 7, the proposed scenario consists of combining the two existing 161kv H-frame structures into a new double-circuit 161kv pole. A new 500kv Guyed V tangent tower will be constructed adjacent to the new double-circuit pole. The proposed 500kv structure would have a right-of-way width of 220 feet plus the addition of the 161kv double-circuit structure's right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 80 feet for the 161kv double circuit lattice tower, a total right-of-way width of 225 feet was assumed. Refer to Figure 4.11-8 for a drawing of the structure configurations.

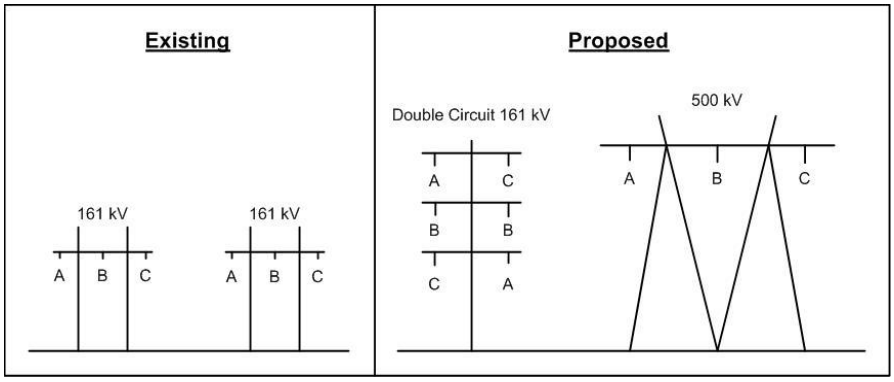

Figure 4.11-8 Case 7

Case 8

Case 8 consists of a new 500kv Guyed V tangent tower being constructed adjacent to the existing 161kv H-frame structure. The proposed 500kv structure will have a right-of-way width of 220 feet plus the addition of the existing 161kv H-frame structure's right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 80 feet for the 161kv H-frame structure, a total right-of-way width of 300 feet was assumed. Refer to Figure 4.11-9 for a drawing of the structure configurations.

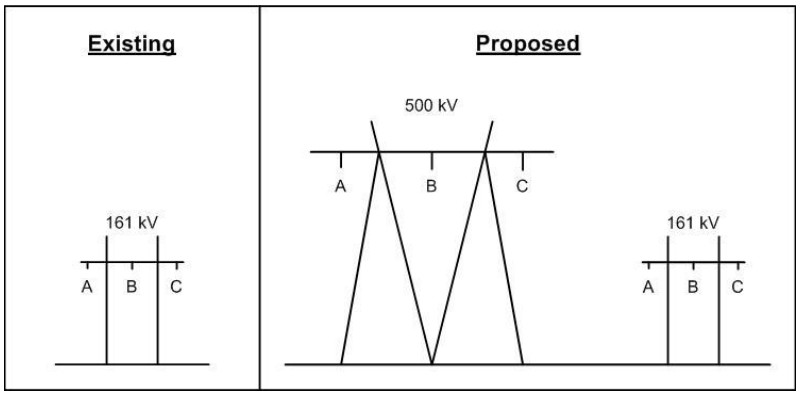

Figure 4.11-9 Case 8

Case 9

Case 9 consists of a new 500kv Guyed V tangent tower being constructed adjacent to the existing 230kv H-frame structure. The proposed 500kv structure will have a right-of-way width of 220 feet plus the addition of the existing 230kv H-frame structure's right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 120 feet for the 230kv H-frame structure, a total right-of-way width of 320 feet was assumed. Refer to Figure 4.11-10 for a drawing of the structure configurations.

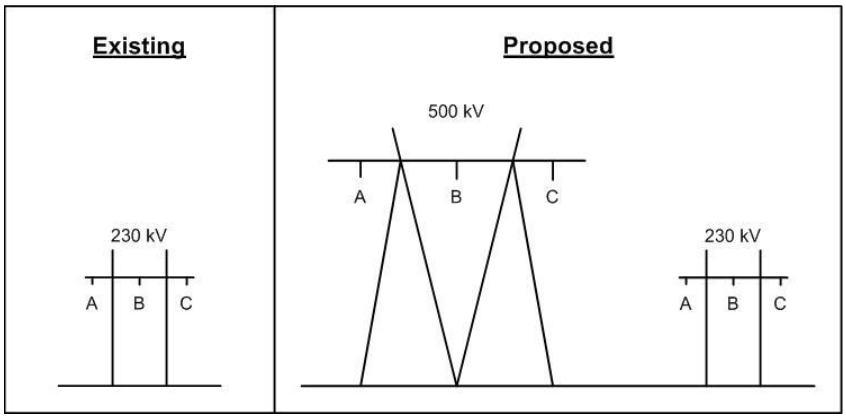

Figure 4.11-10 Case 9

Case 10

Case 10 consists of a double circuit 500kv lattice tower in the corridor with the existing 230kv and 161kv H-frame structures. This case represents a special configuration of the 11-21 and 11-22 segments applicable to the preferred route only. The proposed structure will have a right-of-way width of 220 feet plus the addition of the existing lines' right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 80 feet for the 161kv H-frame structure, a total right-of-way width of 385 feet was assumed. Refer to Figure 4.11-11 for a drawing of this structure configuration.

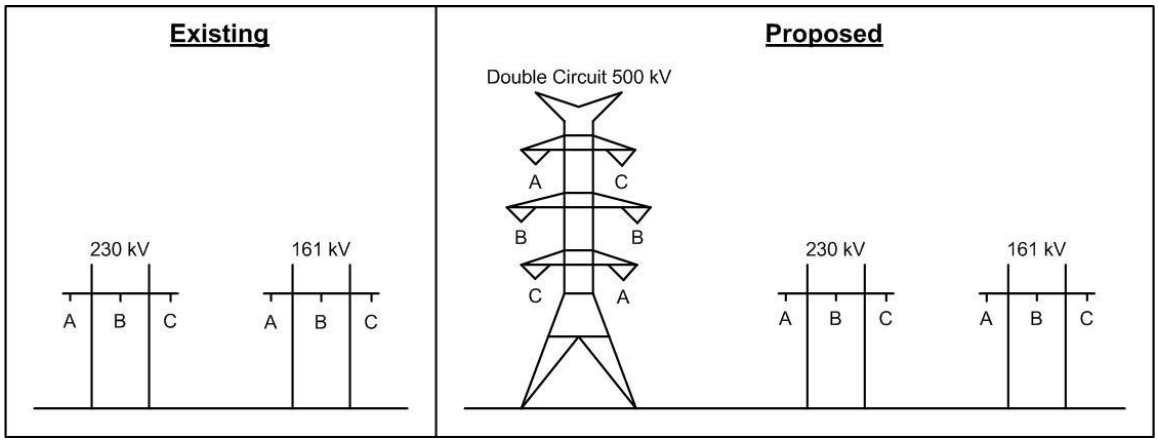

Figure 4.11-11 Case 10

Case 11

Case 11 consists of a new double circuit 500kv lattice tower being constructed adjacent to the existing 230kv H-frame structure. This case represents a special configuration of segment 11-22 applicable to the preferred route only. The proposed 500kv structure will have a right-of-way width of 220 feet plus the addition of the existing 230kv H-frame structure's right-of-way. Taking into account the spacing between the structures and an assumed right-of-way width of 120 feet for the 230kv H-frame structure, a total right-of-way width of 320 feet was assumed. Refer to Figure 4.11-12 for a drawing of the structure configurations.

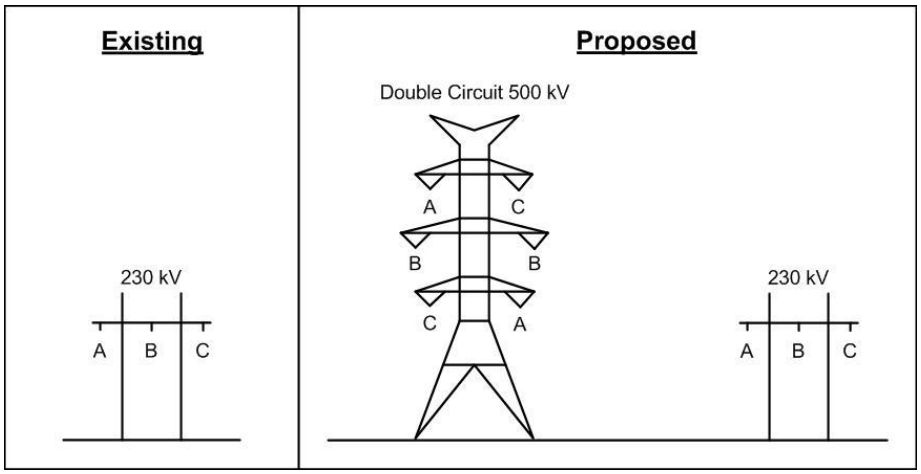

Figure 4.11-12 Case 11

Structure Alternative for Mitigation

The structure alternative would consist of a 500kv Guyed Delta tower. This structure could be used as a means of mitigation in areas of restricted right-of-way width where electric field levels exceed the MFSA criterion (1kv/m). Refer to Figure 4.11-13 for a drawing of the structure configuration.

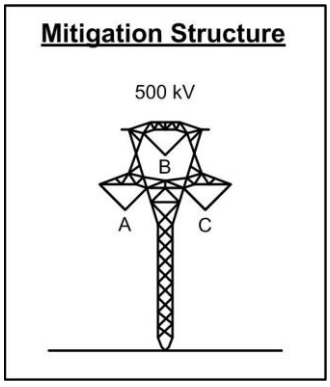

Figure 4.11-13 Structure Alternative

EMF STANDARDS AND REGULATIONS

Currently there are no federal or state regulations or industry guidelines pertaining to appropriate levels of magnetic field present around transmission lines. The MFSA requirement for electric transmission facilities is that the electric field at the edge of the right-of-way is not to exceed 1kv/m measured one meter above the ground in residential or subdivided areas unless the affected landowner waives this condition, and that the electric field at road crossings under the facility will not exceed 7kv/m measured one meter above the ground. (ARM 17.20.1607. Linear Facilities, Minimum Impact Standard.) For road crossings, the MFSA electric field compliance level of 7kv/m will be mitigated by design clearance requirements of the National Electrical Safety Code that will provide certain minimum conductor height to ground limits.

4.11.1.4 Effects of Proposed Transmission Line

This section presents the results of the analysis of electric and magnetic field on each of the case scenarios. Plots of the electric and magnetic field levels across the right-of-way are provided with descriptions of the results and solutions for mitigating excessive electric field levels in areas of non-compliance. Table 4.11-5 below summarizes the route segments with electric field levels in non-compliance with the 1kv/m criterion at the edge of right-of-way.

Table 4.11-5 Areas of Potential Concern

Case Study	Route Segment	Mile From	Mile To	Distance	Land Use
Case 1	3-1	29.7	31.0	1.3	Subdivision
	4-2	15.0	17.9	2.9	Subdivision
	4-2	59.8	64.0	4.2	Subdivision
	7-61	3.5	3.7	0.2	Subdivision
	7-61	3.9	4.0	0.1	Subdivision
	7-61	5.6	6.2	0.6	Subdivision
	7-61	7.3	7.7	0.4	Subdivision
	7-8	10.2	10.8	0.6	Subdivision
	8	3.7	4.1	0.4	Subdivision
	16-3	1.6	1.9	0.3	Subdivision
Case 3	2-3	0.1	0.7	0.6	Subdivision
	2-3	4.8	5.4	0.6	Subdivision
	2-3	8.4	9.0	0.6	Subdivision
	7-2	4.6	5.0	0.4	Subdivision
	7-2	10.7	11.3	0.6	Subdivision
	7-5	0.0	0.7	0.7	Subdivision
Case 4	7-5	0.7	0.8	0.1	Subdivision
	7-5	0.8	1.1	0.3	Residential Cluster / Subdivision
	7-5	1.3	1.4	0.1	Subdivision
	7-5	1.4	1.5	0.1	Residential Cluster
	7-61	1.1	1.4	0.3	Subdivision
Case 6	7-61	11.1	11.2	0.1	Subdivision
Case 7	7-72	1.0	1.4	0.4	Subdivision
Case 8	11-3	15.4	17.0	1.6	Subdivision
	16-3	25.7	26.3	0.6	Subdivision
Case 9	11-23	0.4	1.0	0.6	Subdivision
	11-4	1.4	2.3	0.9	Subdivision

CASE 1

Figure 4.11-14 is a horizontal profile plot of both magnetic and electric field levels for Case 1. The maximum electric field level at the edge of right-of-way is 1.544kv/m. Mitigation measures for reducing the electric field level at the edge of right-of-way include expansion of the right-of-way width and the use of alternative structure types. Increasing the right-of-way width by 17 feet on either side of the structure (a total right-of-way width of 254 feet) would reduce the electric field level below the 1kv/m criterion (0.992kv/m). For areas with right-of-way restrictions, an alternative for mitigating the electric field would be the use of the Guyed Delta alternative structure described in Section 4.11.1.3. Use of this structure would reduce the electric field to a level of 0.736kv/m at the edge of right-of-way. The maximum magnetic field at the edge of right-of-way is 67.17 mG.

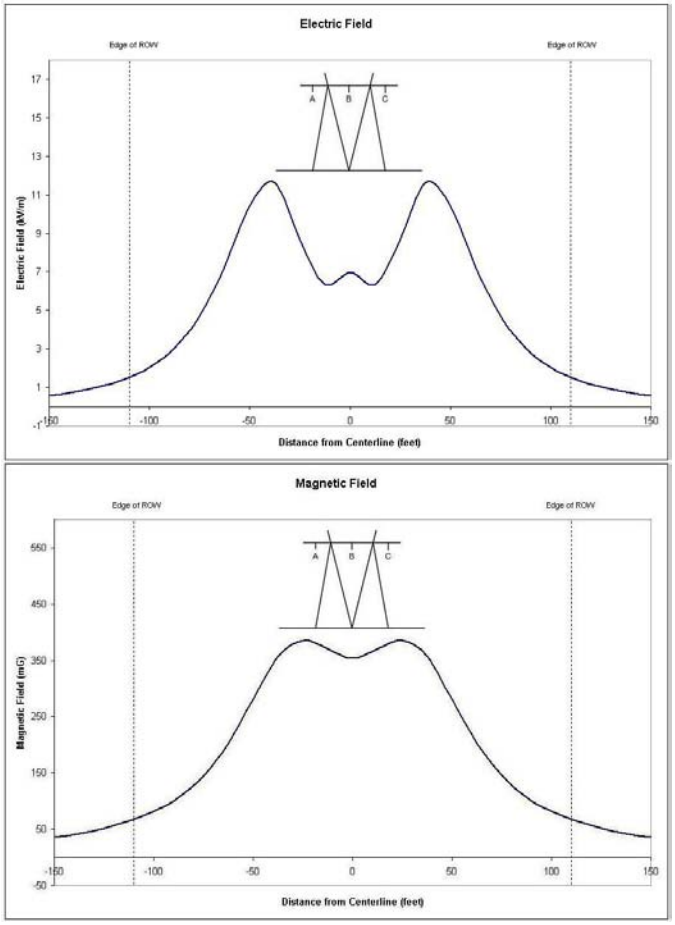

Figure 4.11-14 Case 1 EMF Plots

CASE 2

Figure 4.11-15 is a horizontal profile plot of both magnetic and electric field levels for Case 2. The maximum electric field level at the edge of right-of-way is 0.632kv/m. The maximum magnetic field at the edge of right-of-way is 92.57 mG.

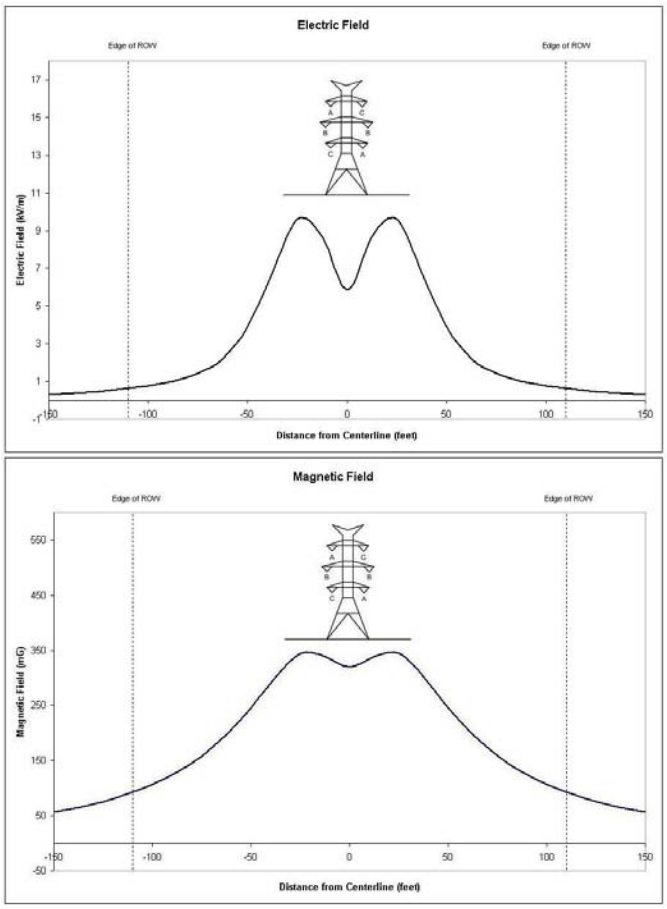

Figure 4.11-15 Case 2 EMF Plots

CASE 3

Figure 4.11-16 is a horizontal profile plot of both magnetic and electric field levels for Case 3. The electric field of the existing structures at the edge of right-of-way is 1.224kv/m on the 161kv side of right-of-way. The addition of the proposed structure to the corridor will result in an increase of 0.043kv/m on the 161kv side of the right-of-way. The maximum electric field level at the edge of right-of-way for the proposed project is 1.554kv/m on the 500kv side of right-of-way. Mitigation measures for reducing the electric field level at the edge of right-of-way include an expansion of the right-of-way width or the use of alternative structure types. Increasing the right-of-way width by 18 feet on the 500kv line edge of right-of-way and 6 feet on the 161kv edge of right-of-way (a total right-of-way width of 409 feet) would reduce the electric field level below the 1kv/m criterion (0.978kv/m on the 500kv line side and 0.968kv/m on the 161kv line side). For areas with right-of-way restrictions, an alternative for mitigating the electric field would be the use of the Guyed Delta alternative structure described in Section 4.11.1.3. Use of this structure would reduce the electric field to a level of 0.743kv/m at the 500kv side of right-of-way but a level of 1.232kv/m would still be present on the 161kv side. The maximum magnetic field at the edge of right-of-way is 94.92 mG.

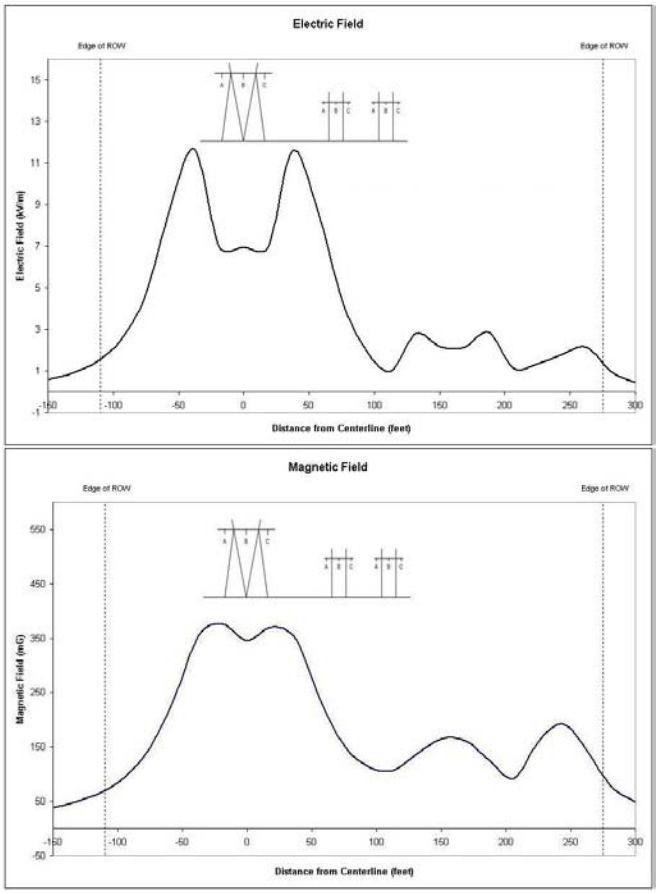

Figure 4.11-16 Case 3 EMF Plots

CASE 4

Figure 4.11-17 is a horizontal profile plot of both magnetic and electric field levels for Case 4. The maximum electric field level at the edge of right-of-way is 1.012kv/m. Moving the 500kv structure 2-3 feet further inside the corridor will ensure electric field levels at the edge of right-of-way are below the 1kv/m criterion. The maximum magnetic field at the edge of right-of-way is 51.46 mG.

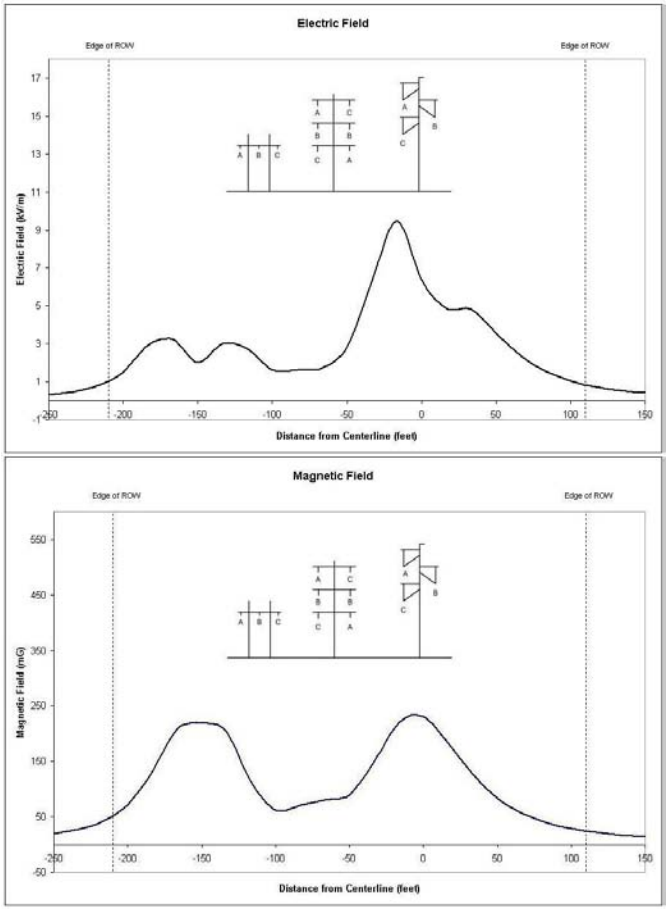

Figure 4.11-17 Case 4 EMF Plots

CASE 4A

Figure 4.11-18 is a horizontal profile plot of both magnetic and electric field levels for Case 4A (route segment 7-5). The maximum electric field level at the edge of right-of-way on the double circuit 161kv side of the corridor is 0.082kv/m. The maximum electric field level at the edge of right-of-way on the double circuit 230/500kv side of the corridor is 0.3kv/m. The maximum magnetic field at the edge of right-of-way is 29 mG.

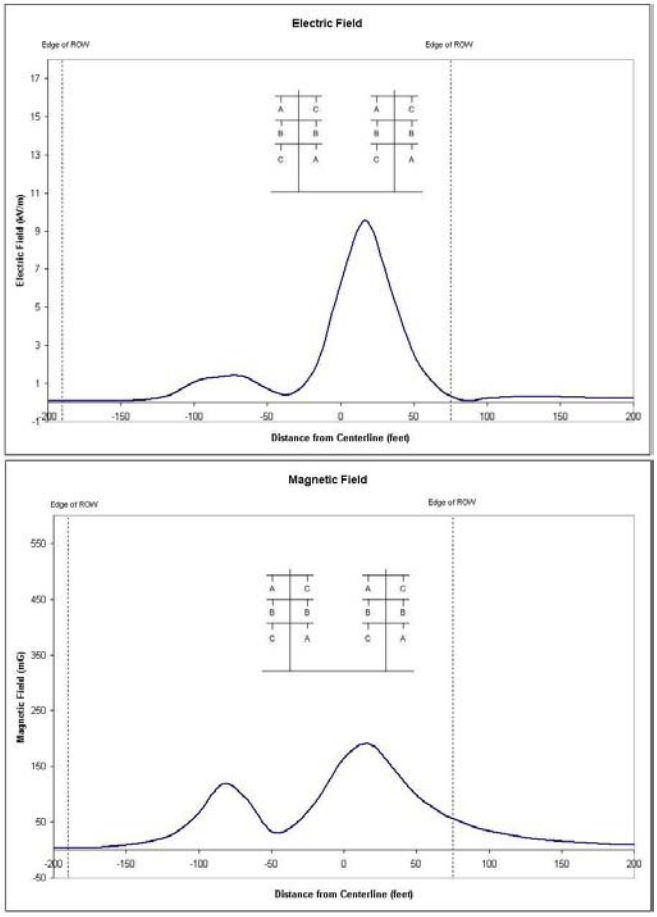

Figure 4.11-18: Case 4A EMF Plots

CASE 5

Figure 4.11-19 is a horizontal profile plot of both magnetic and electric field levels for Case 5. The maximum electric field level at the edge of right-of-way is 0.846kv/m. The maximum magnetic field at the edge of right-of-way is 24.85 mG.

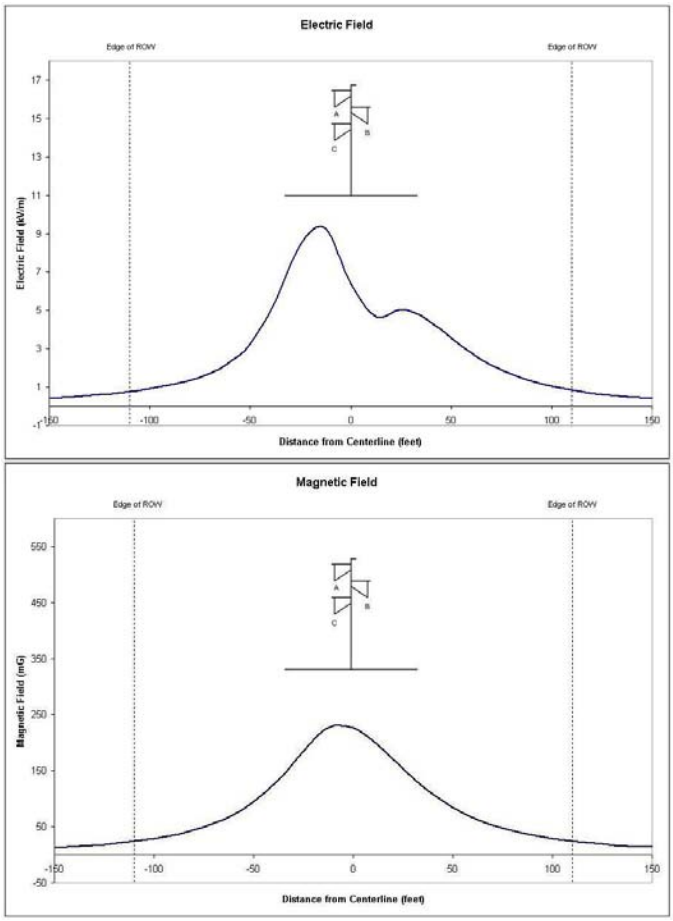

Figure 4.11-19 Case 5 EMF Plots

CASE 6

Figure 4.11-20 is a horizontal profile plot of both magnetic and electric field levels for Case 6. The maximum electric field level at the edge of right-of-way is 1.229kv/m. Mitigation measures for reducing the electric field level at the edge of right-of-way include expansion of the right-of-way width and the use of alternative structure types. Increasing the right-of-way width by 7 feet on the 230kv side of the corridor (a total right-of-way width of 257 feet) would reduce the electric field level below the 1kv/m criterion (0.973kv/m). For areas with right-of-way restrictions, an alternative for mitigating the electric field would be the use of the Guyed Delta alternative structure described in Section 4.11.1.3. Use of this structure would reduce the electric field to a level of 1.035kv/m at the edge of right-of-way. Moving the 500kv structure 2-3 feet closer to the 161kv double circuit pole structure will ensure electric field levels at the edge of right-of-way are below the 1kv/m criterion. The maximum magnetic field at the edge of right-of-way is 90.40 mG.

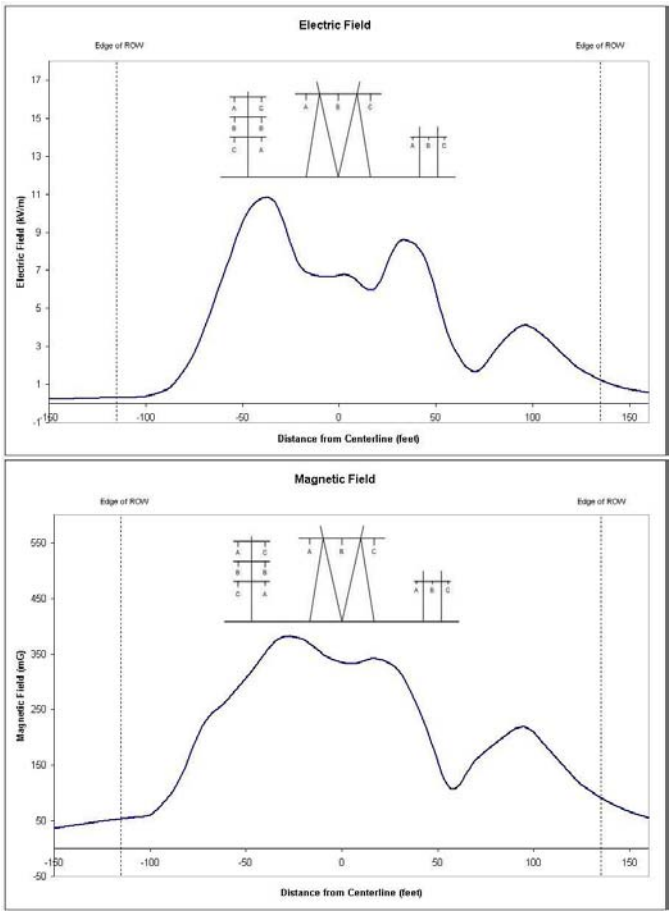

Figure 4.11-20 Case 6 EMF Plots

CASE 7

Figure 4.11-21 is a horizontal profile plot of both magnetic and electric field levels for Case 7. The maximum electric field level at the edge of right-of-way is 1.581kv/m. Mitigation measures for reducing the electric field level at the edge of right-of-way include expansion of the right-of-way width and the use of alternative structure types. Increasing the right-of-way width by 19 feet on the 500kv line edge of right-of-way (a total right-of-way width of 244 feet) would reduce the electric field level below the 1kv/m criterion (0.98kv/m). For areas with right-of-way restrictions, an alternative for mitigating the electric field would be the use of the Guyed Delta alternative structure described in Section 4.11.1.3. Use of this structure would reduce the electric field to a level of 0.755kv/m at the edge of right-of-way. The maximum magnetic field at the edge of right-of-way is 67.17 mG.

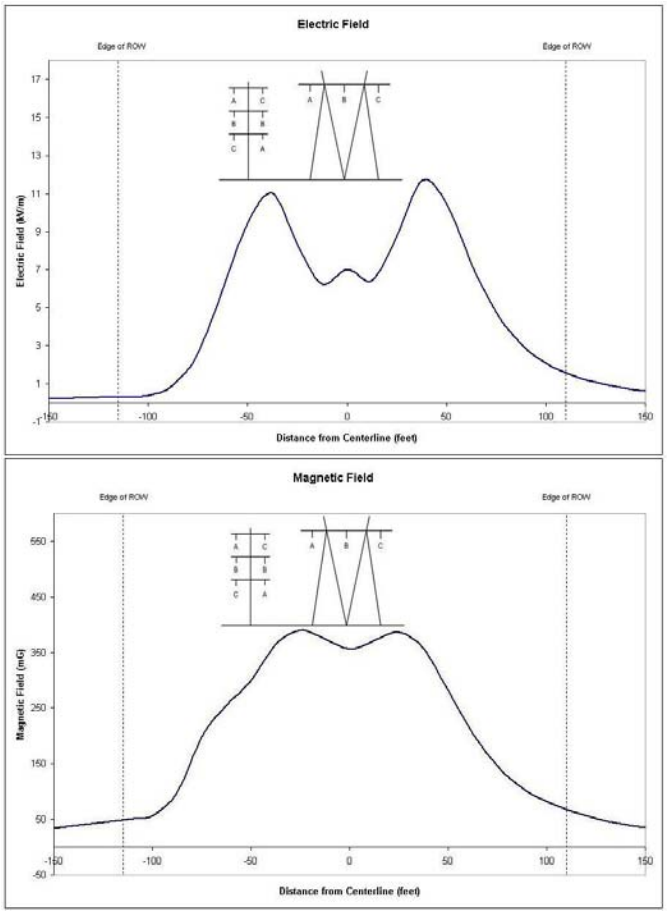

Figure 4.11-21 Case 7 EMF Plots

CASE 8

Figure 4.11-22 is a horizontal profile plot of both magnetic and electric field levels for Case 8. The electric field of the existing 161kv structure at the edge of right-of-way is 1.167kv/m. The addition of the proposed structure to the corridor will result in an increase of 0.146kv/m on the 161kv side of the right-of-way. The maximum electric field level at the edge of right-of-way for the proposed project is 1.550kv/m on the 500kv side of right-of-way. Mitigation measures for reducing the electric field level at the edge of right-of-way for non-compliance areas include an expansion of the right-of-way width or the use of alternative structure types. Increasing the right-of-way width by 17 feet on the 500kv line edge of right-of-way and 7 feet on the 161kv edge of right-of-way (a total right-of-way width of 324 feet) would reduce the electric field level below the 1kv/m criterion (0.998kv/m on the 500kv line side and 0.974kv/m on the 161kv line side). For areas with right-of-way restrictions, an alternative for mitigating the electric field would be the use of the Guyed Delta alternative structure described in Section 4.11.1.3. Use of this structure would reduce the electric field to a level of 0.739kv/m at the 500kv side of right-of-way but a level of 1.216kv/m would still be present on the 161kv side. The maximum magnetic field at the edge of right-of-way is 93.52 mG.

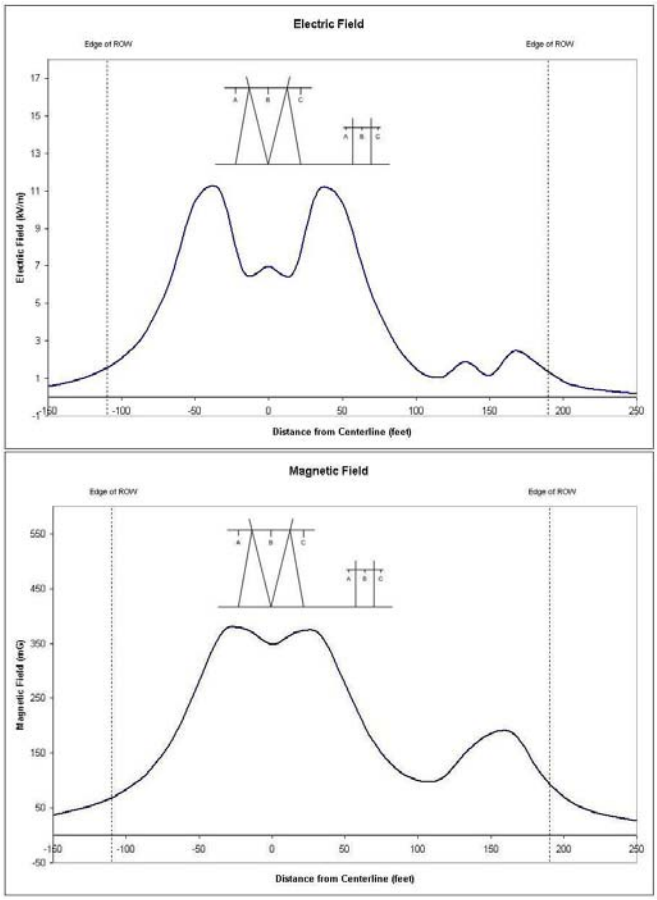

Figure 4.11-22 Case 8 EMF Plots

CASE 9

Figure 4.11-23 is a horizontal profile plot of both magnetic and electric field levels for Case 9. The maximum electric field level at the edge of right-of-way is 1.553kv/m. Mitigation measures for reducing the electric field level at the edge of right-of-way for non-compliance areas include expansion of the right-of-way width and the use of alternative structure types. Increasing the right-of-way width by 18 feet on the 500kv line edge or right-of-way and 1 foot on the 230kv edge of right-of-way (a total right-of-way width of 339 feet) would reduce the electric field level below the 1kv/m criterion (0.977kv/m on the 500kv line side and 0.973kv/m on the 230kv line side). For areas with right-of-way restrictions, an alternative for mitigating the electric field would be the use of the Guyed Delta alternative structure described in Section 4.11.1.3. Use of this structure would reduce the electric field to a level of 0.927kv/m at the edge of right-of-way. The maximum magnetic field at the edge of right-of-way is 69.57 mG.

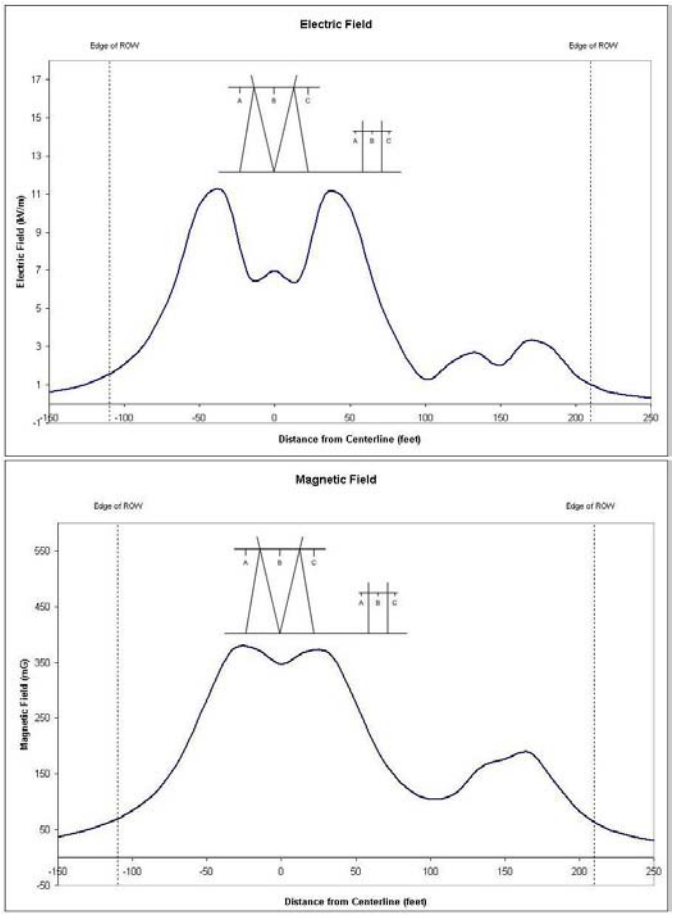

Figure 4.11-23 Case 9 EMF Plots

CASE 10

Figure 4.11-24 is a horizontal profile plot of both magnetic and electric field levels for Case 10. The maximum electric field level at the edge of right-of-way is 1.263kv/m. The maximum magnetic field at the edge of right-of-way is 89.85 mG.

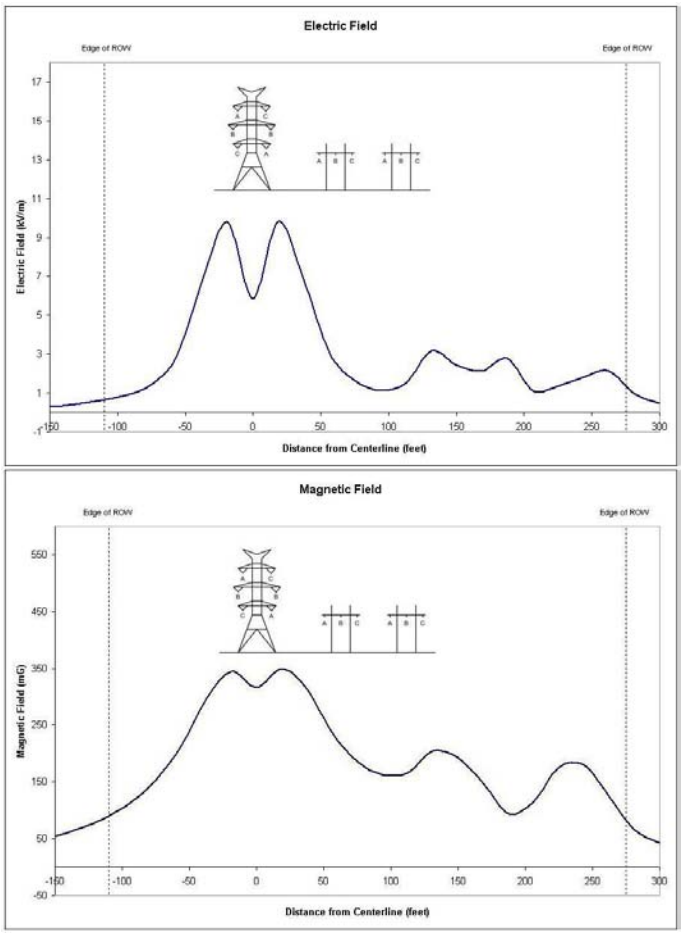

Figure 4.11-24 Case 10 EMF Plots

CASE 11

Figure 4.11-25 is a horizontal profile plot of both magnetic and electric field levels for Case 11. The maximum electric field level at the edge of right-of-way is 0.966kv/m. The maximum magnetic field at the edge of right-of-way is 90.63 mG.

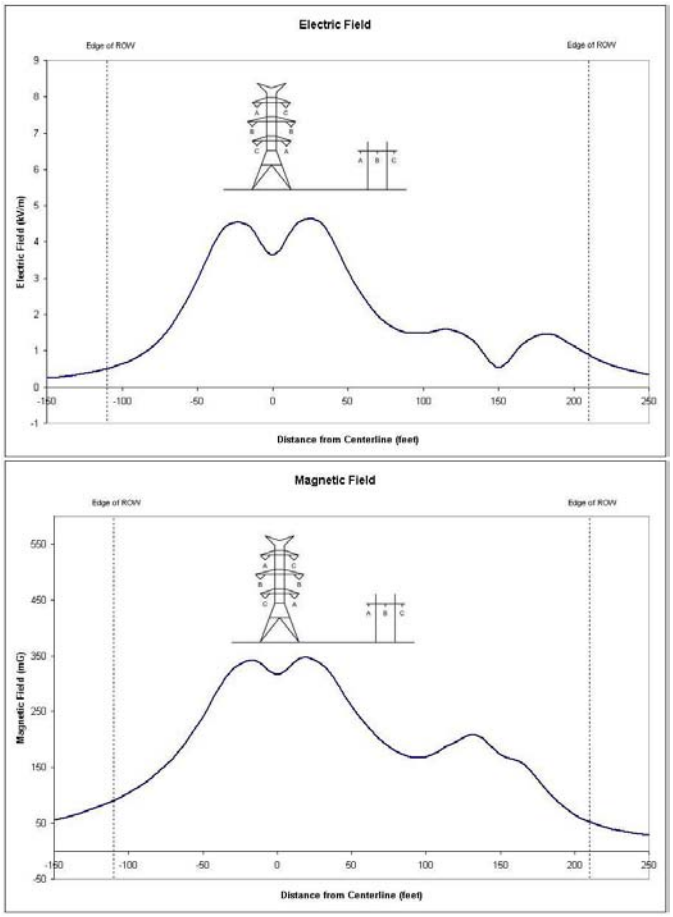

Figure 4.11-25 Case 11 EMF Plots

STRUCTURE ALTERNATIVE

Figure 4.11-26 shows a comparison of the horizontal profile plot of both magnetic and electric field levels for Guyed Delta structure alternative versus the Guyed V structure. As can be seen from the plots, the Guyed Delta structure produces lower levels of electric and magnetic field across the right-of-way.

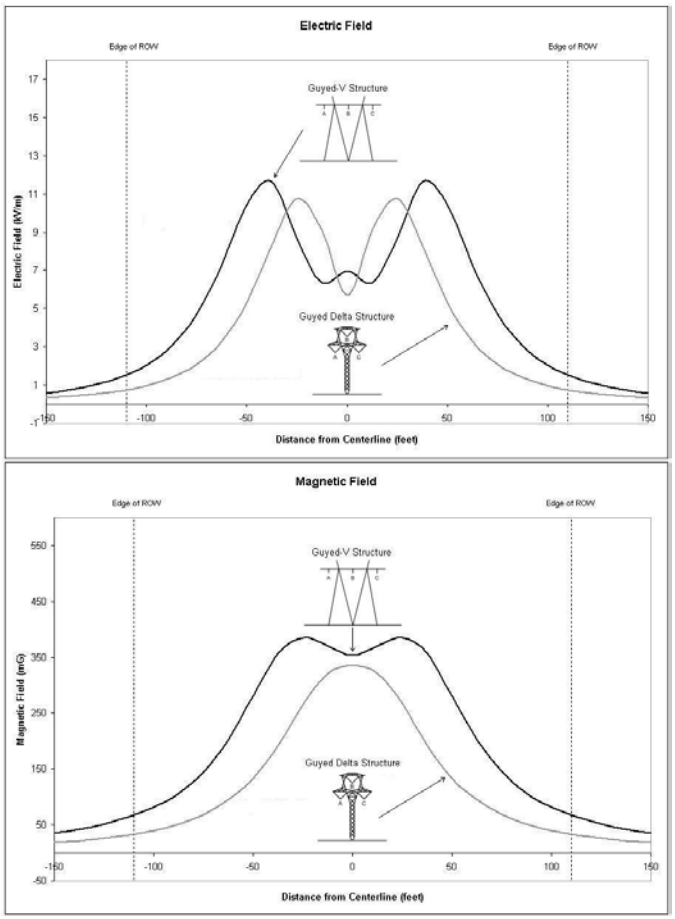

Figure 4.11-26 Structure Alternative vs. Guyed V EMF Plots

4.11.2 AUDIBLE NOISE

4.11.2.1 Introduction

Noise is defined as unwanted sound. It may be continuous (constant noise and decibel level), steady (constant noise with a fluctuating decibel level), impulsive (having a peak of short duration), stationary (occurring from a fixed source), intermittent (occurring at the same rate), or transient (occurring at a different rate). Noise levels are quantified using units of decibels. The A-weighted scale, reported in A-weighted decibels (dBA), most effectively approximates the human ear's response to sounds.

Audible noise from transmission lines is primarily due to point source corona (crackling and hissing with small amounts of light). It routinely occurs when air is ionized around a gap, burr, irregularity, or some non-insulated component during the conductance of electricity through the power lines. Periods of rain, fog, or heavy humidity amplify these corona effects due to the bridging capabilities of electricity and water. Additionally, corona is produced when transmission lines break down over time and their fastener components loosen, resulting in an air gap. All corona-based noise sources would be point source locations due to the inconsistencies found along the line.

In addition to audible noise due directly to the transmission line and to other environmental factors, noise can be generated as a result of wind blowing across power lines and power poles when airflow is non-laminar or turbulent.

4.11.2.2 Background

Concern about noise is related to negative impacts on humans and animals. Human response to noise is most commonly expressed as an annoyance and the level of annoyance may be affected by the intensity of the noise, its frequency (pitch), its duration of exposure and/or its recurrence. Ambient noise is the total noise in an environment and usually comprises sounds from many sources.

Typical ranges of audible sound levels for some common sources of noise are presented in Table 4.11-6.

Table 4.11-6 Typical Ranges of Audible Sound Levels for Common Sources

Source	Measured Sound Level
Loud Automobile Horn	110 to 120 dB(A)
Inside Motor Bus	80 to 90 dB(A)
Average Traffic on Street Corner	70 to 80 dB(A)
Conversational Speech	60 to 70 dB(A)
Typical Business Office	50 to 60 dB(A)
Living Room, Suburban Area	40 to 50 dB(A)
Library	30 to 40 dB(A)
Bedroom at Night	20 to 30 dB(A)

Source: U.S. EPA. 1974. Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety

Transmission lines can generate a small amount of sound energy. The audible noise from line sources is composed of two components:

1. A broadband (random) component characterized as having high frequency content (different from more common environmental noises).
2. Pure tone (hum) components, most noticeably second and fourth harmonics of the power frequency are superimposed on the broadband noise.

Audible noise decreases with distance from a transmission line. Each transmission line phase conductor may be considered as a separate line source. Beyond a distance of approximately 50 feet from the outer phase conductor, this conductor would dominate and completely obscure the contributions of the other phase conductors. Overall, the attenuation of noise from the transmission line is approximately 3 dB per doubling of the distance from the line.

One way that changes in audible noise levels are typically described is in statistical terms. For example, the L_{50} sound level is the noise level exceeded 50 percent of the time. It is also common to evaluate sound levels over time. The time variant noise levels take into account all types of noise sources including what is produced from foul weather. L_{eq} is the equivalent, average sound level of a varying sound over a period of time, typically a period of 24 hours.

4.11.2.3 Methods for Assessing Impacts

The audible noise effects of the transmission lines were calculated at the edge of right-of-way. L_{50} levels were calculated at a height of five feet above ground for a foul weather condition. A point of consideration is that audible noise levels will be higher in foul weather conditions due to an increase of moisture present on the line, but ambient noise levels themselves will be increased due to audible noise generated from the foul weather itself. In general, the audible noise level deceases at a rate of 3 decibels per doubling of distance from the transmission line.

The audible noise L_{50} foul weather level represents a conservative estimate of transmission line noise that would occur 100% of the time. The National Oceanic and Atmospheric Administration (NOAA) reports[3] that there is a rain rate of approximately 18% of the year in the Butte area. In order to equate the audible noise L_{50} level to a L_{DN} level for each case to compare to the MFSA L_{DN} criterion, an all weather L_{eq} probability distribution must be developed. The method for the development of the distribution and calculation of the L_{DN} noise level is from the Electric Power Research Institute (EPRI) AC Transmission Line Reference Book – 200kv and Above, Third Edition (Chapter 10). Three data points are required to develop the probability distribution curve, the L_{50} foul weather level, the L_{50} fair weather level, and the percentage of time foul weather occurs. Cases 2 and 7 were analyzed to determine the adjustment factor for conversion of L_{50} to L_{DN}. The result of this study was a negative adjustment of 2 dB from the L_{50} to the L_{DN} level. Therefore, the audible noise results (L_{DN}) in Section 4.11.2.4 are 2 dB less than the calculated L_{50} levels.

[3] CLIMATOGRAPHY OF THE UNITED STATES NO. 81 Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1971 - 2000

ANALYSIS AREA

Refer to Section 4.11.1.3 for a description of the different scenarios that were analyzed for audible noise.

Sensitive Receptors

Residences. Most of the residences in the project area are located in Butte, Whitehall, and Lima. The highest concentrations of residences are near route segments 7-5 and 7-61.

Recreation Areas. There are several parks and recreation areas in the project area.

Noise Sources

Transportation. Interstate highways 15 and 90 are travel corridors in the project area. I-15 crosses route segments 4-2, 7-8 and parallels route segments 11-23, 11-3, 16-1, 16-3, and 16-4 in Montana. I-90 crosses 7-5 and parallels 7-41, 7-72, 7-2, and 2-3. There are other state highways that cross route segments in the corridor.

There are four railroads (Burlington Northern and Santa Fe Railway, Union Pacific Railroad, Montana Rail Link, and Rarus Railway) that are located in the project area (described further in Section 4.11.4). The railroads cross or parallel, route segments 1, 2-1, 7-2, 7-8, 7-61, 7-72, 11-21, 11-22, 11-23, 11-3, 16-1, 16-2, 16-3, and 16-4.

The primary airport that is located in the project area relevant to the route segments is Smith Field (south of Butte) that is located adjacent to route segment 7-8.

NOISE STANDARDS AND REGULATIONS

The MFSA noise level guideline for electrical transmission facilities is 50 dBA average day/night noise level (L_{DN}) at edge of right-of-way in residential and subdivided areas unless the affected landowner waives the condition. The MFSA also requires an L_{DN} level of 55 dBA at the edge of the property boundaries of substations in residential and subdivided areas is not to be exceeded. (ARM 17.20.1607 Linear Facilities, Minimum Impact Standard.)

The DOE and BPA conducted research to determine the likelihood of receiving complaints related to transmission line audible noise. These noise values can be related to the level during rain that would be exceeded 50 percent of the time over 1 year (L_{50}). The foul weather L_{50} values are calculated at 100 feet from the centerline.

The following probabilities of receiving complaints are based on their expected audible noise level:

- High, Numerous Complaints: over 60 dBA
- Moderate, Some Complaints: 52 to 60 dBA
- Low, No Complaints: less than 52 dBA

BPA's Corona and Field Effects Program (Version 3.0) was used to determine the decibel levels at the edge of right-of-way for the previously described scenarios.

4.11.2.4 Effects of Proposed Transmission Line

Noise resulting from the proposed line would come from construction, corona effects, and wind.

Construction Noise is discussed in Section 4.12.

CORONA

Table 4.11-7 provides the audible noise values calculated when simulating the scenarios described in Section 4.11.1.3. Audible noise levels were calculated for an average conductor height. Table 4.11-7 depicts how audible noise levels increase with increases in elevation. In consideration of the MFSA audible noise criterion being expressed as an L_{DN} level, levels presented in Table 4.11-7 are expressed as an L_{DN} level.

Table 4.11-7 Audible Noise Results at Edge of Right-of-Way

Structure Type	Minimum Elevation (ft)	Audible Noise (dBA) (L_{DN})	Maximum Elevation (ft)	Audible Noise (dBA) (L_{DN})	Elevation Where Guideline is Exceeded[1] (ft)
Case 1	3,859	46.7	7,633	50.6	7,100
Case 2	5,109	52.9	6,116	53.9	See Note 2
Case 3	4,140	47.6	6,359	49.8	See Note 3
Case 4	5,538	53.3	5,647	53.4	See Note 2
Case 4A (see Note 4)	5,538	58.0	5,647	58.1	See Note 2
Case 5	5,283	53.2	6,132	54.0	See Note 2
Case 6	5,283	54.3	6,132	55.2	See Note 2
Case 7	5,084	50.9	5,354	51.1	See Note 2
Case 8	5,086	48.0	5,662	48.6	See Note 3
Case 9	5,244	48.7	7,913	51.4	6,500
Case 10	4,140	52.0	6,359	54.3	See Note 2
Case 11	5,244	53.2	7,913	55.9	See Note 2
Alternate Structure	3,859	48.7	7,913	52.8	5,100

1. Since audible noise levels increase with rise in elevation, these values state the elevation limit where audible noise produced from the line starts to exceed the 50 dBA criterion.
2. Level exceeds criterion for entire elevation range of case study.
3. Level is within criterion for entire elevation range of case study.
4. Levels are based on 265 foot right-of-way.

WIND

Noise can be generated as a result of wind blowing across power lines and power poles when airflow is non-laminar. Only limited research has been conducted to address wind-caused noise due to transmission line placement.

4.11.3 RADIO AND TELEVISION INTERFERENCE

4.11.3.1 Introduction

Radio Inference (RI) refers to interference primarily in the 535-1605 kilohertz (kHz) frequency range and television interference (TVI) refers to interference in the 54-88 megahertz (MHz) range. Both RI and TVI are components of what is referred to as Radio Noise (RN). Corona and gap discharges are two potential sources of interference from the 500kv line. Corona discharges induce trains of short-duration current pulses that propagate along the line conductors, away from the point of generation. Gap discharges result from electrical discharges between broken or poorly fitting hardware, such as insulators, clamps and brackets. Gap discharges are relevant to the distribution lines and not transmission lines, as discussed in this section.

RN is measured in decibels and is referenced to a signal input of 1 microvolt tuned to a certain measurement frequency (the unit is decibel microvolt per meter or dBμV/m). The RN level of the line at any particular location and measurement frequency varies based on many factors. The primary factors are weather conditions and time, but in the case of this 500kv line, altitude is also an important factor. RN is described in statistical terms and is typically denoted as the percentage of the total time that the RN level is less than a certain level. For example, a RN level often referred to is the "50 percent fair weather level" (L_{50}), meaning that the RN from the line can be expected to be less than this level for 50 percent of the total fair weather period. TVI is strictly a foul weather phenomenon and is characterized on the basis of a L_{50} foul weather level.

4.11.3.2 Background

The North American Regional Broadcasting Agreement (NARBA) regulates radio signals in the Amplitude Modulation (AM) broadcast band. The definitions of minimum signal levels and service areas of radio stations are the responsibility of the Federal Communications Commission's (FCC) Rules and Regulations.

According to FCC rules, power transmission falls into the category of "incidental radiation device" that is defined as "a device that radiates radio frequency energy during the course of its operation although the device is not intentionally designed to generate radio frequency energy." For purposes of these regulations, harmful interference is defined as "any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radio communication service operating in accordance with this chapter."

The FCC identifies radio noise field strength requirements on the basis of two service areas: 1) Primary service areas (city and rural) and 2) Secondary service areas (primarily rural areas with weaker signals). According to the FCC, primary limitations to types of radio service are from atmospheric and man-made noise. The types of service are further classified in six (6) grades of service: Grades A, B, C, D, E and F (Grade A would be the radio service with the strongest signals).

Television services are classified in two categories: Grades A and B. The quality of radio reception in the presence of man-made noise is primarily a function of the signal-to-noise ratio (SNR) at the receiver's antenna. Typically the SNR is determined based on measurements of the radio or television signal and the noise from the transmission line at a particular location.

Numerous tests conducted in the past in North America and other parts of the world have identified SNRs for different codes (that refer to quality of reception or degree of annoyance). For example, for a code A5 that is a strong radio signal, a SNR of approximately 30 signifies satisfactory service. The radio interference calculations for the 500kv line provide a basis for the measurement of the radio signals in order to evaluate the SNRs.

Interference generated at television frequencies from power lines and stations may be due to corona or gap type discharges. At the present time, there are no standards established for the measurement of TVI from power transmission systems. Early studies on the subjective evaluation of picture quality have been made using a random noise environment. The results of these studies have not been sufficient either to standard power line TVI measurements or to establish criteria for acceptable signal-to-noise ratios.

4.11.3.3 Methods for Assessing Impacts

The RI and TVI effects of the transmission lines were calculated at 100 feet from outermost phase. RI levels were calculated at a height of six feet above ground and TVI levels were calculated at a height of ten feet. RI and TVI levels are both calculated at average conductor height. In general, the farther removed a person is from the transmission line, the lower the RI and TVI level. The RN calculations are referenced to a measurement frequency of 1 Megahertz (MHz). The TVI calculations are referenced to a measurement frequency of 75 MHz.

ANALYSIS AREA

Refer to Section 4.11.1.3 for a description of the different scenarios that were analyzed for radio and television interference.

RADIO/TELEVISION INTERFERENCE STANDARDS AND REGULATION

The criteria for establishing limits of interference take into account 1) the definition of the quality of radio or TV service to be protected, 2) the zone in that a specified quality of service is to be protected, and 3) the fraction of time during a year that a specified quality of service is protected. The FCC governs the radio and television interference from power transmission systems.

In the U.S., there are no established standards for radio and television noise interference. For transmission lines with normal spacing and rights-of-way, a fair weather RI level of 40 dBμV/m (100μV/m) at a lateral distance of 100 feet from the outermost phase has been established as a guideline for identifying a design criterion for a RN limit (IEEE Standard 430-1991).

An FCC television service grade of Grade A signal level was assumed for evaluating TVI generated by the proposed line. Grade A levels are 68 dBμV/m for channels 2-6, 71 dBμV/m for channels 7-13, and 74 dBμV/m for channels 14-83. For the Grade A signal levels, a signal-to-noise ratio (SNR) of at least 30 is required if corona noise is not to cause objectionable interference. A SNR level from 20-30 will have somewhat-to-definitely objectionable interference levels.

4.11.3.4 Effects of Proposed Transmission Line

Refer to Table 4.11-8 and Table 4.11-9 for calculated values of RI and TVI for each of the scenarios described previously.

Table 4.11-8 Radio Interference at 100 ft. from Outermost Conductor

Structure Type	Minimum Elevation (ft)	RI (dBµV/m) (L_{50}-Fair)	Maximum Elevation (ft)	RI (dBµV/m) (L_{50}-Fair)	Elevation Where Guideline is Exceeded[1] (ft)
Case 1	3,859	37.8	7,633	41.6	6,000
Case 2	5,109	45.0	6,116	46.0	See Note 2
Case 3	4,140	38.1	6,359	40.4	6,000
Case 4	5,538	44.4	5,647	44.5	See Note 2
Case 4A (see Note 4)	5,538	53.9	5,647	54.0	See Note 2
Case 5	5,283	46.3	6,132	47.2	See Note 2
Case 6	5,283	43.3	6,132	44.1	See Note 2
Case 7	5,084	43.5	5,354	43.8	See Note 2
Case 8	5,086	39.1	5,662	39.6	See Note 3
Case 9	5,244	39.2	7,913	41.9	6,000
Case 10	4,140	43.4	6,359	45.7	See Note 2
Case 11	5,244	44.5	7,913	47.3	See Note 2
Alternate Structure	3,859	41.2	7,913	45.3	See Note 2

1. Since radio interference levels increase with rise in elevation, these values state the elevation limit where radio interference produced from the line starts to exceed the 40 dBµV/m guideline.
2. Level exceeds criterion for entire elevation range of case study.
3. Level is within criterion for entire elevation range of case study.
4. Levels are based on 265 foot right-of-way.

Table 4.11-9 shows TVI levels for the lowest and highest elevations of each of the case studies. As shown by the table, TVI increases with an increase in elevation. For the given signal level of 68 dBµV/m, the SNR in Table 4.11-9 show that the RI generated in the range of channels 2-6 will not cause objectionable interference to signal quality.

Table 4.11-9 Television Interference at 100 ft. from Outermost Conductor

Structure Type	Minimum Elevation (ft)	TVI (dBµV/m) (Rain)	Signal-to-Noise Ratio	Maximum Elevation (ft)	TVI (dBµV/m) (Rain)	Signal-to- Noise Ratio
Case 1	3,859	18.7	49.3	7,633	22.5	45.5
Case 2	5,109	23.0	45.0	6,116	24.0	44.0
Case 3	4,140	19.0	49.0	6,359	21.2	46.8
Case 4	5,538	25.1	42.9	5,647	25.2	42.8
Case 4 (see note 1)	5,538	31.1	36.9	5,647	31.1	42.8
Case 5	5,283	26.7	41.3	6,132	27.6	40.4
Case 6	5,283	26.7	41.3	6,132	27.6	40.4
Case 7	5,084	22.5	45.5	5,354	22.7	45.3
Case 8	5,086	19.9	48.1	5,662	20.5	47.5
Case 9	5,244	20.1	47.9	7,913	22.8	45.2
Case 10	4,140	21.4	46.6	6,359	23.6	44.4
Case 11	5,244	22.5	45.5	7,913	25.2	42.8
Alternate Structure	3,859	19.2	48.8	7,913	23.3	44.7

1. Levels are based on 265 foot right-of-way.

4.11.3.5 Mitigation

Transmission line related radio-frequency interference is one of the indirect effects of line operation produced by the physical interactions of transmission line electric fields. The level of such interference usually depends on the magnitude of the electric fields involved. The line would be constructed according to industry standards, which minimize the potential for surface irregularities (such as nicks and scrapes on the conductor surface), sharp edges on suspension hardware, and other irregularities around the conductor surface that would increase corona effects. Federal Communications Commission regulations require each project owner to ensure mitigation of stationary radio and television interference to the satisfaction of the affected individual. A study will be conducted along the preferred route prior to construction to determine specific areas of concern for interference along with a post construction survey. Typical mitigation measures include: cleaning insulators, tightening line hardware, inspecting conductor surface irregularities, relocating antennas, installing high-gain or directional antennas, connecting to a cable system or installing a translator station.

The U.S. electric power companies have been able to operate quite well under the present FCC rule because harmful interference can generally be eliminated. It has been estimated that more than 90 percent of power line sources, which cause interference, are due to spark discharges. These can be found and eliminated when required to prevent interference. Very few of the interference complaints that power companies in the U.S. receive are due to corona. In the few cases where there have been problems, power companies have paid for the installation of special equipment to improve the signal-to-noise ratio at the complainant's receiver. In some cases, problems are solved by hooking up the complainant's TV to cable or to satellite dishes. Therefore, according to the FCC, NorthWestern is obligated to record and investigate any complaints of radio and television interference reported and take corrective action when necessary.

4.11.4 INTERFERENCE WITH RAILROAD SIGNALS

Four railroads (Burlington Northern and Santa Fe Railway, Union Pacific Railroad, Montana Rail Link, and Rarus Railway) are located within the study area and vicinity. There are several railroad lines that pass through the Butte-Silver Bow area. The Burlington Northern and Santa Fe Railway (BNSF) serves as a freight carrier on track between the Union Pacific Railroad (UPRR) in Butte-Silver Bow and Burlington Northern in Garrison. Rarus Railway, a local railroad, operates a short line operation between Butte and Anaconda. This line is also capable of hauling freight and provides connections to the UPRR and BNSF.

The UPRR has a rail line that runs from the Port of Montana at Silver Bow (near Butte) to the Idaho Border (along I-15) and on to Salt Lake City via Idaho Falls and Pocatello. This is part of UPRR's Montana Subdivision. The Port of Montana at Silver Bow was formed to increase shipping competition and move more Montana products out of state. This is the only place in Montana served by two Class 1 Transcontinental Rail Carriers (UPRR and BNSF).

One of the BNSF Railway lines is out of service, or abandoned, between Butte and Spire Rock. Montana Rail Link, a regional Class II railroad, currently operates freight service on the old Northern Pacific Line near Whitehall. The Montana Rail Link also has a main railroad generally situated between Trident and Townsend. The Montana Rail Link leases railroad track from BNSF.

A study will be conducted along the preferred route prior to construction to determine specific areas of concern for interference along with a post construction survey. If the construction, operation, maintenance, or repair of the proposed project caused interference with the railroads operation, NorthWestern would immediately make such changes in the proposed project and furnish protective devices to the railroad company necessary to eliminate such interference. The cost of such protective devices and their installation would be covered by NorthWestern.

4.12 NOISE (CONSTRUCTION)

4.12.1 INTRODUCTION

This section addresses the potential noise impacts associated with construction activities. Audible noise caused by the operation of the 500kV transmission line is addressed in Section 4.11. Impacts addressed in this section include the effects of construction noise on the human environment (i.e., noise sensitive receptors) and the effects of construction noise on wildlife.

Section 3.11 briefly discusses some of the units of measurement for noise and Table 3.11-1 lists the noise levels associated with various noise sources.

4.12.2 METHODS FOR ASSESSING IMPACTS

The method for assessing the impacts of construction noise is to determine whether construction would result in a long-term or unmitigable short-term adverse effect to noise sensitive receptors.

4.12.2.1 Impact Level

A 3 dB increase in noise is considered barely noticeable to humans, a 5 dB increase would typically result in a noticeable community response, and a 10 dB increase is considered a doubling of the sound level. Noise levels above 45 dB(A) at night can result in the onset of sleep disturbance (EPA 1971), and at 70 dB(A) sleep interference becomes considerable (SDG&E 2001).

To protect public health and welfare, the EPA has developed guidelines on recommended maximum noise levels, and the Occupational Safety and Health Administration (OSHA) has established regulations to safeguard the hearing of workers. EPA guidelines recommend a day-night average sound level (L_{dn}) of 55 dB(A) in typically quiet outdoor and residential areas. For protection against hearing loss, the EPA guidelines recommend a sound pressure level less than 70 dB(A) over a 24-hour period. However, these levels are recommendations, not requirements.

Noise would result from various activities associated with construction of the transmission line and substations. Noise levels for typical construction equipment are shown in Table 4.12-1.

For on-road construction vehicles (e.g., heavy trucks operating at 50 miles per hour), the BLM (2005) estimates a peak noise level of 83 dB(A). However, noise levels for hourly traffic would generally be below the EPA guidelines of 55 dB(A) except in close proximity to a road or whenever there is heavy traffic volume.

Table 4.12-1 Noise Levels at Various Distances from Construction Noise Sources

Construction Equipment	Noise Level ($L_{eq(1-h)}$[a]) [dB(A)]					
	50 ft	250 ft	500 ft	1000 ft	2500 ft	5000 ft
Bulldozer	85	71	65	59	51	45
Crane, derrick	88	74	68	62	54	48
Front-end loader	85	71	65	59	51	45
Generator	81	67	61	55	47	41
Grader	85	71	65	59	51	45
Truck	88	74	68	62	54	48

[a] $L_{eq(1-h)}$ is the equivalent steady-state sound level that contains the same varying sound level during a one-hour period.

Source: HMMH(1995) in BLM (2005)

Table 2-4 in Chapter 2 lists the equipment needed for construction of the transmission line and substations. Construction noise is expected to be from 54 to 84 dB(A) (Table 4.12-1), at or below EPA guidelines of 55 dB(A), but construction noise would be temporary. It is estimated that the total construction time for the transmission line would be 32 months, beginning in July 2010 and being completed by January 2013. However, in any specific location, construction activities (e.g., building access roads, pouring foundations, assembling and erecting structures, stringing lines) would typically be short-term, with each activity requiring separate visits to each location over the course of the construction season. It is assumed that construction would occur during a 6 day work week.

4.12.2.2 Impact Type

CONSTRUCTION NOISE IMPACTS TO SENSITIVE NOISE RECEPTORS

Tables 3.12-3 and 3.12-5, and Section 3.12.3 identify noise sensitive resources (i.e., residences within 1,000 feet and recreation areas within 1 mile) along each of the alternative routes.

Noise levels during construction of the transmission line are expected to be from 54 to 84 dB(A), due to construction vehicles and machinery (Table 4.12-1). Construction activities would be intermittent; construction would occur during normal day-time working hours; and construction noise would be within acceptable OSHA standards. Also, based on the typical attenuation of sound over distance (6 dB(A) per doubling of distance from the noise source), construction noise would be reduced to acceptable levels between 1,000 and 2,500 feet from the construction equipment (Table 4.12-1). Therefore, construction-related noise would not have a long-term impact on humans in the study area.

Environmental Protection Measure 2.12, which will be incorporated into project design, states "Advanced notice of construction activities would be given to landowners and residents potentially affected by construction activities. . . . Nighttime construction near noise-sensitive land uses (e.g., residences and campers at recreation areas) would be avoided."

Given the localized, short-term and intermittent nature of construction activities, with implementation of this environmental protection measure, initial impacts would be low.

CONSTRUCTION NOISE IMPACTS TO WILDLIFE

Sections 3.2 and 4.2 and the Biological Resources Technical Report (Volume II) address the potential impacts of construction noise on wildlife, especially birds. Construction noise could temporarily disturb or displace individual birds, and potentially interfere with foraging, breeding, and nesting. Studies also suggest that noise from construction disturbs upland bird species, displacing birds from traditional habitats and causing nest abandonment.

As mentioned above, it is estimated that the total construction time for the transmission line would be 32 months, from July 2010 to January 2013. In any specific location, construction activities would typically be short-term, with different activities requiring separate visits to each location over the course of the construction season. Construction-related disturbance in any specific location would likely be limited to one or perhaps two breeding/nesting seasons.

Environmental protection measures, which will be incorporated into the project design, include several measures that could contribute to the protection or avoidance of noise-sensitive species:

1.5 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.

1.6 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 would conduct a training program to inform construction crews of all permit requirements and restrictions relevant to Proposed Project construction.

1.7 Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural, paleontological and ecological resources.

5.2 Mitigation measures developed during the consultation period under Section 7 of the Endangered Species Act (1973) as amended would be adhered to as specified by the FS and U.S. Fish and Wildlife Service (USFWS).

Given the localized, short-term and intermittent nature of construction activities, with implementation of these environmental protection measure, initial impacts would be low to moderate, depending on location.

4.12.2.3 Specifically Recommended Mitigation Measures

Specifically recommended mitigation measures for biological resources include:

13. Construction and maintenance will be subjected to timing limitations as proposed by land management agencies were feasible in areas known to be sensitive to wildlife species.

14. Preconstruction surveys for species protected under ESA will be conducted by qualified biologists to determine presence, absence, and habitat occupancy.

Implementation of these measures would result in low residual impacts to wildlife from construction noise.

4.12.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

Table 4.11-2 summarizes some of the residences found along the alternative routes.

4.12.3.1 No Action

There would be no project related changes in the noise environment under the No Action alternative.

4.12.3.2 Townsend to Mill Creek (Melrose) Segment

A1: PREFERRED ROUTE

Implementation of environmental protection measures and specifically recommended mitigation

measures along the A:1 Preferred Route from Townsend to Mill Creek would result in low residual impacts from construction noise.

A2: PARALLEL COLSTRIP LINES ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the A2: Parallel Colstrip Lines Route from Townsend to Mill Creek would result in low residual impacts from construction noise.

A3: MAXIMIZE UTILITY CORRIDORS

Implementation of environmental protection measures and specifically recommended mitigation measures along the A3: Maximize Utility Corridors from Townsend to Mill Creek would result in low residual impacts from construction noise.

4.12.3.3 Mill Creek to State Line Segment

B1: PREFERRED ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the B1: Preferred Route from Mill Creek to State Line would result in low residual impacts from construction noise.

B2: SHEEP CREEK ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the B2: Sheep Creek Route from Mill Creek to State Line would result in low residual impacts from construction noise.

B3: I-15 ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the B3: I-15 Route from Mill Creek to State Line would result in low residual impacts from construction noise.

4.12.3.4 AB1: Jefferson Valley Route

Implementation of environmental protection measures and specifically recommended mitigation measures along the AB1: Jefferson Valley Route would result in low residual impacts from construction noise.

4.12.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.12.4.1 State Line to Midpoint Route

C1: PREFERRED ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the C1: Preferred Route from State Line to Midpoint would result in low residual impacts from construction noise.

C2: EASTERN ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the C2: Eastern Route from State Line to Midpoint would result in low residual impacts from construction noise.

C3: WESTERN ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the C3: Western Route from State Line to Midpoint would result in low residual impacts from construction noise.

C4: SHEEP CREEK INL BRIGHAM POINT ROUTE

Implementation of environmental protection measures and specifically recommended mitigation measures along the C4: Sheep Creek INL Brigham Point Route from State Line to Midpoint would result in low residual impacts from construction noise.

4.12.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.2.5.1 New Townsend Substation

Implementation of environmental protection measures and specifically recommended mitigation measures during construction of the new Townsend Substation would result in low residual impacts from construction noise.

4.2.5.2 Mill Creek Substation Addition

Implementation of environmental protection measures and specifically recommended mitigation measures from the construction of the Mill Creek Substation addition would result in low residual impacts from construction noise.

4.2.5.3 Midpoint Substation Addition

Implementation of environmental protection measures and specifically recommended mitigation measures from the construction of the Midpoint Substation modification would result in low residual impacts from construction noise.

4.12.6 COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse noise effects from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse noise effects from construction, operation, or maintenance of the communication system are anticipated.

4.13 AIR QUALITY (CONSTRUCTION)

4.13.1 INTRODUCTION

This section describes the potential impacts to regional air quality that may result from the construction of the MSTI 500kV line project.

The impact assessment/mitigation planning process involves assessing impacts by comparing the Project alternative route links with the pre-Project environment, determining mitigation that would reduce or eliminate impacts, and identifying impacts remaining after application of specifically recommended mitigation measures (residual impacts).

4.13.2 METHODS FOR ASSESSING IMPACTS

4.13.2.1 Impact Level

Impacts to air quality were evaluated considering the following factors:

- Non-attainment pollutants under national and Montana air quality standards
- Presence and number of sensitive receptors in project area
- Emissions from heavy equipment and support vehicles during project construction
- Mitigation measures to reduce initial impacts

4.13.2.2 Impact Type

With the exception of ozone production, which would be expected for normal transmission line operations due to a photo-chemical reaction generated by corona activity, all potential impacts to air quality associated with the proposed action would be related to project construction. All construction related impacts would be short-term and temporary in nature.

Potential impacts considered include:

- Violation of any air quality standard or substantial contribution to an existing or projected air quality violation.
- A cumulatively considerable net increase of any criteria air pollutant for which an area is in non-attainment under an applicable federal or state ambient air quality standard.
- Exposure of sensitive receptors to substantial pollutant concentrations.
- Creation of objectionable odors affecting a substantial number of people.

4.13.2.3 Specific Mitigation Measures

Environmental protection measures and specifically recommended mitigation measures were applied, where appropriate, to minimize the potential impacts identified. 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, IDEQ and other agencies 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, IDEQ and other agencies.

Impact assessment assumes that all environmental protection measures would be implemented as a part of the Project. Specific mitigation measures are recommended when it is determined that environmental protection measures do not fully mitigate an impact. These specifically recommended mitigation measures were applied on a case-by-case basis where appropriate. A complete list of environmental protection measures are presented in Volume 1-C , Appendix B and specifically recommended mitigation measures are presented Volume 1-C , Appendix C.

Environmental protection measures that are relevant to air quality include the following:

7.1 Road construction would include dust-control measures, as required and identified in the approved POD.

7.2 All requirements of those entities having jurisdiction over air quality will be adhered to and any permits needed for construction activities will be obtained. Open burning of construction trash will not be allowed unless permitted by appropriate authorities.

The specifically recommended mitigation measures that were assigned to reduce air quality impacts and comply with air quality standards include the following:

1. In specific areas where soils and vegetation are particularly sensitive to disturbance, existing access roads will not be widened or otherwise upgraded for construction and maintenance, except in areas where repairs are necessary to make existing roads passable.

2. 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.

4.13.3 EFFECTS OF EACH ALTERNATIVE - MONTANA

4.13.3.1 No Action

Under the No Action Alternative, the MSTI project would not be constructed and no impacts to air quality would occur.

4.13.3.2 Townsend to Mill Creek (Melrose) Segment

A1: PREFERRED ROUTE

The overall air quality within the study area is generally very good and typically achieves ambient air quality standards. A primary source of air pollution near the study area is current mining activity on the north side of Butte, which was designated a nonattainment area for PM_{10} in 1990 (MDEQ). Due

to the largely rural setting of this route and the proposed construction methods, exceedance of Montana or National Air Quality Standards is not anticipated.

Construction

The A1: Preferred Route alignment is approximately 112.9 miles long. The A1: Preferred Route ground disturbance from clearing and grading for structures, work areas, and access roads would result in an estimated 407.26 acres of permanent land required and 509.62 acres of temporary disturbance. The A1 route would result in the least permanent and temporary disturbance of the Townsend to Mill Creek (Melrose) alternatives. Exact locations of these acres of disturbance are not known; however, it can be presumed that these acres of disturbance would be relatively evenly distributed along the entire length of the A1: Preferred Route. Effects on air quality associated with construction activities including fugitive dust and combustion of fuels would be limited, temporary in nature, and disbursed over a large area.

Potential sources of particulate (PM_{10}, $PM_{2.5}$) emissions for the A1: Preferred Route during construction include fugitive dust from vehicles and equipment traveling on non-paved roads and engine exhaust from construction equipment and vehicles. In locations where a concrete batch plant would be required, particulates would be created by the batch plant. In addition to on-site activities, emissions are possible because of material tracked from the site and deposited on adjacent paved roads. PM_{10} is the primary air pollutant from construction activities.

Potential sources of gaseous (NO_2, SO_2, and CO) emissions for the MSTI project are equipment used during construction of the transmission line and vehicular emissions from transporting workers, equipment and supplies to and from the project site. Possible emissions could be associated with engine exhaust from equipment traveling to the site and along paved and non-paved access roads and on-site diesel generators for the batch plant. These gaseous emissions from vehicles and equipment would include carbon dioxide (CO_2), which would be realized both directly from fuel combustion and indirectly as carbon monoxide (CO). Carbon monoxide is then converted to CO_2 after its release into the atmosphere, forming a greenhouse gas.

During construction and unpaved access road use, standard institutional controls and best management practices would be employed to minimize criteria particulate air pollution associated with fugitive dust and gaseous pollutants associated with equipment and vehicle operation. Implementation of environmental protection measures and specifically recommended mitigation measures along the A1: Preferred Route would result in low to negligible residual impacts to air quality from construction.

Operation

Normal transmission line operations would produce a small amount of ozone from a photo-chemical reaction generated by corona activity. During damp or rainy weather, the ozone produced would be less than 1.0 ppb which would be insignificant when compared to natural levels and their fluctuations. The corona activity generated can also vary in intensity with altitude changes (Environment, Fish and Wildlife, Bonneville Power Administration).

Vehicular emissions and fugitive dust from unpaved access road usage are the only additional sources of emissions associated with the long-term maintenance and repair of project components during the

operational phase. Potential impacts to air quality from the Project are considered less than significant and therefore, mitigation is not required for long-term operations.

A2: PARALLEL COLSTRIP ROUTE

The A2: Parallel Colstrip Route alignment is approximately 121.7 miles long. The A2: Parallel Colstrip Route ground disturbance from clearing and grading for structures, work areas, and access roads would result in an estimated 538.07 acres of permanent land required (130.81 acres more than the A1 route) and 536.80 acres of temporary disturbance (27.18 acres more than the A1 route).

Impacts to air quality would be similar to those associated with the A1: Preferred Route. Refer to the A1: Preferred Route effects section above for discussion of specific discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the A2 route would result in low to negligible residual impacts to air quality from construction.

A3: MAXIMIZE UTILITY CORRIDORS ROUTE

The A3: Maximize Utility Corridors Route alignment is approximately 128.8 miles long. The A3: Maximize Utility Corridors Route ground disturbance from clearing and grading for structures, work areas, and access roads would result in an estimated 460.38 acres of permanent land required (53.12 acres more than the A1 route) and 573.08 acres of temporary disturbance (63.46 acres more than the A1 route).

Impacts to air quality would be similar to those associated with the A1: Preferred Route. Refer to the A1: Preferred Route effects section above for discussion of specific discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the A3 route would result in low to negligible residual impacts to air quality from construction.

4.13.3.3 Mill Creek to State Line Segment

B1: PREFERRED ROUTE

The overall air quality within this portion of the study area is generally very good and typically achieves ambient air quality standards. There is no measured ambient air quality data for this portion of the Project area. Due to the largely rural setting of this route and the proposed construction methods, exceedance of Montana or National Air Quality Standards is not anticipated.

Construction

The B1: Preferred Route alignment is approximately 87.1 miles long. The B1: Preferred Route ground disturbance from clearing and grading for structures, work areas, and access roads would

result in an estimated 376.71 acres of permanent land required and 384.12 acres of temporary disturbance. The B1 route would result in the most acres of permanent disturbance and the second most acres of temporary disturbance for the Mill Creek to State Line Route. Exact locations of these acres of disturbance are not known; however, it can be assumed that these acres of disturbance would be relatively evenly distributed along the entire length of the B1: Preferred Route. Effects on air quality associated with construction activities including fugitive dust and combustion of fuels would be limited, temporary in nature, and disbursed over a large area.

Potential sources of particulate (PM_{10}, $PM_{2.5}$) emissions for the A1: Preferred Route during construction include fugitive dust from vehicles and equipment traveling on non-paved roads and engine exhaust from construction equipment and vehicles. In locations where a concrete batch plant would be required, particulates would be created by the batch plant. In addition to on-site activities, emissions are possible because of material tracked from the site and deposited on adjacent paved roads. PM_{10} is the primary air pollutant source from construction activities.

Potential sources of gaseous (NO_2, SO_2, and CO) emissions for the MSTI project are equipment used during construction of the transmission line and vehicular emissions from transporting workers, equipment and supplies. Possible emissions could be associated with engine exhaust from equipment traveling to the site and along paved and non-paved access roads and on-site diesel generators for the batch plant. These gaseous emissions from vehicles and equipment would include carbon dioxide (CO_2), which would be realized both directly from fuel combustion and indirectly as carbon monoxide (CO). Carbon monoxide is then converted to CO_2 after its release into the atmosphere, forming a greenhouse gas.

During construction and unpaved access road use, standard institutional controls and best management practices would be employed to minimize criteria particulate air pollution associated with fugitive dust and gaseous pollutants associated with equipment and vehicle operation. Implementation of environmental protection measures and specifically recommended mitigation measures along the B1: Preferred Route would result in low to negligible residual impacts to air quality from construction.

Operation

Normal transmission line operations would produce a small amount of ozone from a photo-chemical reaction generated by corona activity. During damp or rainy weather, the ozone produced would be less than 1.0 ppb which would be insignificant when compared to natural levels and their fluctuations. The corona activity generated can also vary in intensity with altitude changes (Environment, Fish and Wildlife, Bonneville Power Administration).

Vehicular emissions and fugitive dust from unpaved access road usage are the only additional sources of emissions associated with the long-term maintenance and repair of project components during the operational phase. Potential impacts to air quality from the Project are considered less than significant and therefore, mitigation is not required for long-term operations.

B2: SHEEP CREEK ROUTE

The B2: Sheep Creek Route alignment is approximately 86.9 miles long. The B2: Sheep Creek Route ground disturbance from clearing and grading for structures, work areas, and access roads would

result in an estimated 291.78 acres of permanent land required (84.93 acres less than the A1 route) and 382.80 acres of temporary disturbance (1.32 acres less than the A1 route).

Impacts to air quality would be similar to those associated with the B1: Preferred Route. Refer to the B1: Preferred Route effects section above for discussion of specific discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the B2 route would result in low to negligible residual impacts to air quality from construction.

B3: I-15 ROUTE

The B3: I-15 Route alignment is approximately 88.4 miles long. The B3: I-15 Route ground disturbance from clearing and grading for structures, work areas, and access roads would result in an estimated 358.96 acres of permanent land required (17.75 acres less than the A1 route) and 389.84 acres of temporary disturbance (5.72 acres more than the A1 route).

Impacts to air quality would be similar to those associated with the B1: Preferred Route. Refer to the B1: Preferred Route effects section above for discussion of specific discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the B3 route would result in low to negligible residual impacts to air quality from construction.

4.13.3.4 AB1: I-15 Jefferson Valley Route

The AB1: I-15 Jefferson Valley Route is 209.19 miles long. The AB1: I-15 Jefferson Valley Route ground disturbance from clearing and grading for structures, work areas, and access roads would result in an estimated 865.91 acres of permanent land required and 924.92 acres of temporary disturbance.

Impacts to air quality would be similar to those associated with the A1: Preferred Route and B1: Preferred Route. Refer to the A1: Preferred Route and B1: Preferred Route effects sections above for discussion of discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the AB1 route would result in low to negligible residual impacts to air quality from construction.

4.13.4 EFFECTS OF EACH ALTERNATIVE - IDAHO

4.13.4.1 No Action

Under the No Action Alternative, the MSTI project would not be constructed and no impacts to air quality would occur.

4.13.4.2 Stateline to Midpoint Routes

C1: PREFERRED ROUTE

The overall air quality within the study area is generally very good and typically achieves ambient air quality standards. Primary sources of pollution for the Portneuf Valley (NAA) are paved roads re-entrained dust, agricultural windblown dust, emissions from on-road mobile sources, and the J.R. Simplot Don Plant (IDEQ 2004). The primary identified source of PM_{10} pollution for Fort Hall (NAA) was from the Astaris facility which was closed in December 2001. Due to the largely rural setting of this route and the proposed construction methods, exceedance of Idaho or National Air Quality Standards is not anticipated.

Construction

The C1: Preferred Route alignment is approximately 232.64 miles long. The C1: Preferred Route ground disturbance from clearing and grading for structures, work areas, and access roads would 102 acres of temporary disturbance. The C1 route would result in the second highest temporary disturbance of the four alternatives. Exact locations of these acres of disturbance are not known; however, it can be presumed that these acres of disturbance would be relatively evenly distributed along the entire length of the C1: Preferred Route. Effects on air quality associated with construction activities including fugitive dust and combustion of fuels would be limited, temporary in nature, and disbursed over a large area.

Potential sources of particulate (PM_{10}, $PM_{2.5}$) emissions for the C1: Preferred Route during construction include: fugitive dust from vehicles and equipment traveling on non-paved roads and engine exhaust from construction equipment and vehicles. In locations where a concrete batch plant would be required, particulates would be created by the batch plant. In addition to on-site activities, emissions are possible because of material tracked from the site and deposited on adjacent paved roads. PM_{10} is the primary air pollutant from construction activities.

Potential sources of gaseous (NO_2, SO_2, and CO) emissions for the MSTI project are equipment used during construction of the transmission line and vehicular emissions from transporting workers, equipment and supplies to and from the project site. Possible emissions could be associated with engine exhaust from equipment traveling to the site and along paved and non-paved access roads and on-site diesel generators for the batch plant. These gaseous emissions from vehicles and equipment would include carbon dioxide (CO_2), which would be realized both directly from fuel combustion and indirectly as carbon monoxide (CO). Carbon monoxide is then converted to CO_2 after its release into the atmosphere, forming a greenhouse gas.

During construction and unpaved access road use, standard institutional controls and best management practices would be employed to minimize criteria particulate air pollution associated with fugitive dust and gaseous pollutants associated with equipment and vehicle operation. Implementation of environmental protection measures and specifically recommended mitigation measures along the C1: Preferred Route would result in low to negligible residual impacts to air quality from construction.

Operation

Normal transmission line operations would produce a small amount of ozone from a photo-chemical reaction generated by corona activity. During damp or rainy weather, the ozone produced would be less than 1.0 ppb which would be insignificant when compared to natural levels and their fluctuations. The corona activity generated can also vary in intensity with altitude changes (Environment, Fish and Wildlife, Bonneville Power Administration).

Vehicular emissions and fugitive dust from unpaved access road usage are the only additional sources of emissions associated with the long-term maintenance and repair of project components during the operational phase. Potential impacts to air quality from the Project are considered less than significant and therefore, mitigation is not required for long-term operations.

C2: EASTERN ROUTE

The C2: Eastern Route alignment is approximately 239.33 miles long. The C2: Eastern Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 105 acres (3 acres more than the C1 route), which is the highest of the four alternatives.

Impacts to air quality would be similar to those associated with the C1: Preferred Route. Refer to the C1: Preferred Route effects section above for discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the C2 route would result in low to negligible residual impacts to air quality from construction.

C3: WESTERN ROUTE

The C3: Western Route alignment is approximately 177.61 miles long. The C3: Western Route ground disturbance from clearing and grading for structures, work areas, and access roads would disturb an estimated 78 acres (24 acres less than the C1 route), which is the lowest amount of disturbance of the four alternatives.

Impacts to air quality would be similar to those associated with the C1: Preferred Route with the exception of the non-attainment areas (Portneuf Valley and Fort Hall), which would be far enough away that this would not be a factor. Portneuf Valley would be approximately 63 miles from the nearest section and Fort Hall would be approximately 53 miles from the nearest section. Refer to the C1: Preferred Route effects section above for discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the C3 route would result in low to negligible residual impacts to air quality from construction.

C4: SHEEP CREEK INL/BRIGHAM POINT ROUTE

The C4: Sheep Creek INL/Brigham Point Route alignment is approximately 214.26 miles long. The C4: Sheep Creek INL/Brigham Point Route ground disturbance from clearing and grading for

structures, work areas, and access roads would disturb an estimated 94.4 acres (7.6 acres less than the C1 route), which is the second lowest amount of disturbance of the four alternatives.

Impacts to air quality would be similar to those associated with the C1: Preferred Route. Refer to the C1: Preferred Route effects section above for discussion of specific pollutants and emission sources.

Implementation of environmental protection measures and specifically recommended mitigation measures along the C4 route would result in low to negligible residual impacts to air quality from construction.

4.13.5 EFFECTS OF SUBSTATION CONSTRUCTION

4.13.5.1 New Townsend Substation

The Project includes building a new 500kV Townsend Substation located in southwestern Montana, five miles south of Townsend, Montana. The total ground disturbance during construction would be approximately 52 acres.

Implementation of environmental protection measures and specifically recommended mitigation measures would result in low residual impacts to air quality from construction of the new Townsend Substation.

Impacts to air quality during construction and operation would be similar to those described above for the A1: Preferred Route.

Implementation of environmental protection measures and specifically recommended mitigation measures at the new Townsend Substation site would result in low to negligible residual impacts to air quality from construction.

4.13.5.2 Mill Creek Substation Addition

The Project includes modification to the Mill Creek Substation. The modification would result in approximately 28 acres of new ground disturbance.

Impacts to air quality during construction and operation would be similar to those described above for the A1: Preferred Route.

Implementation of environmental protection measures and specifically recommended mitigation measures would result in low residual impacts to air quality from construction associated with modification of Mill Creek Substation.

4.13.5.3 Midpoint Substation Addition

The Project includes expanding the Midpoint Substation located in southwestern Idaho, 12 miles northeast of Jerome, Idaho. Engineering studies with IPCO will be completed to determine the ultimate modifications required at the Midpoint substation.

Implementation of environmental protection measures and specifically recommended mitigation measures would result in low residual impacts to air quality from construction of the Midpoint Substation addition.

Impacts to air quality during construction and operation would be similar to those described above for the C1: Preferred Route.

Implementation of environmental protection measures and specifically recommended mitigation measures at the new Midpoint Substation site would result in low to negligible residual impacts to air quality from construction.

4.13.6 EFFECTS OF COMMUNICATION SYSTEM

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to air quality from construction, operation, or maintenance of the communication system are anticipated.

Of the seven proposed microwave site locations in Idaho, five – Humphrey Ridge, Big Grassy Substation, Howe Peak, American Falls SE, and Dietrich Butte – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects to air quality from construction, operation, or maintenance of the communication system are anticipated.

4.14 CUMULATIVE IMPACTS

The Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). The regulations further explain that "cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. MEPA defines cumulative impacts as "the collective impacts on the human environment of the proposed action when considered in conjunction with other past, present, and future actions related to the proposed action by location or generic type" (75-1-220(3),MCA). Related future actions may only be considered when these actions are under concurrent consideration by any agency through preimpact statement studies, separate impact statement evaluations, or permit processing procedures (75-1-208(11)MCA).

MDEQ considers cumulative impacts when making findings under MFSA (ARM 17.20.1604 (1) (b) and 1607 (1) (a) (vii)). Analysis of cumulative environmental impacts of a proposed Project and other actions helps to ensure that agency decisions consider the full range of consequences of the agencies' actions to the extent information is available.

4.14.1 CUMULATIVE IMPACTS REGION OF INFLUENCE

The geographical extent of the analysis area was selected for each resource based on the extent and duration of anticipated effects to a particular resource caused by an action. The cumulative impacts region of influence includes all areas in which planned or expected actions might occur. Cumulative impacts are identified only where there is a reasonable likelihood that the proposed MSTI Project would have a cumulative or incremental effect with other past, present, and reasonably foreseeable future actions. Resources that are likely to experience cumulative impacts in addition to any potential direct and indirect impacts from the action alternatives are: land use, water, wetlands, vegetation, wildlife, air quality, noise, socioeconomic resources, cultural resources, and visual resources. The effects of future actions can be difficult to predict. As a result, the cumulative impacts analysis is qualitative rather than quantitative.

4.14.2 PAST AND PRESENT ACTIONS POTENTIALLY CONTRIBUTING TO CUMULATIVE IMPACTS

The MSTI Project area and vicinity in Montana are transected by at least 3 pipelines and 15 transmission lines, most of which are owned by NorthWestern. Existing transmission lines located within the MSTI Project area in Montana are listed in Table 4.14-1.

Table 4.14-1 Transmission Lines Located in MSTI Project Area in Montana

Line Name	Voltage	Owner
Townsend-Garrison 500kV	500kV	BPA
Mill Creek-Billings 161kV (2 lines)	161kV	NorthWestern Energy
Butte-East Helena 100kV (2 lines)	100kV	NorthWestern Energy
White Hall-South Butte 100kV	100kV	NorthWestern Energy
Mill Creek-Dillon 161kV	161kV	NorthWestern Energy
South Butte-Three Rivers 161kV	161kV	NorthWestern Energy
South Butte to Mill Creek 161kV	161kV	NorthWestern Energy
Mill Creek-Peterson 230kV	230kV	NorthWestern Energy
Mill Creek-Wilsall 230kV	230kV	NorthWestern Energy
Broadview-Townsend 500kV	500kV	NorthWestern Energy
Dillon-Big Grassy	161kV	NorthWestern Energy
Dillon-Sheridan	161kV	NorthWestern Energy
Dillon-Tendoy	69kV	NorthWestern Energy
Peterson-AMPS	230kV	NorthWestern Energy

Other past and present actions in the vicinity of the MSTI Project in Montana include ongoing uses such as: residential areas, farms and ranches, commercial and industrial areas in and around incorporated and unincorporated communities, linear facilities including transmission lines and petroleum and gas pipelines and fiber optic cable, agriculture and rangeland including irrigated and non-irrigated farm land and livestock grazing, military facilities and installations, airports, Superfund sites, mines and mining claims, federal and state highways and county and other local roads, railroads and railroad rights-of-way, communication facilities, conservation easements, developed recreation facilities, national trails, off-highway vehicle use and preservation areas.

4.14.3 RELATED FUTURE ACTIONS POTENTIALLY CONTRIBUTING TO CUMULATIVE IMPACTS

Related future actions that could occur in the MSTI project area and vicinity in Montana relate to the purpose and need of the MSTI project, namely to 1) Respond to Customer Requests for Transmission Capacity and 2) Provide a Transmission Path for New Generation Development.

NorthWestern is an electricity exporting control area with approximately 3,300 MW of exiting generation and about 1,700 MW of load in Montana. Figure 1-5 in Chapter 1 shows NorthWestern's current internal and external WECC rated transmission paths.

NorthWestern has received new transmission service requests that far exceed the capacity of the existing transmission system. NorthWestern has over 3,900 MW of active potential generation projects in its generation interconnection queue, as of May 2008. Table 4.14-2 lists the projects by type of generation and size (MW). Approximately 2,100 MW of wind generation, 990 MW of coal-fired generation, 113 MW of hydroelectric generation and 770 MW of gas-fired turbine generation has been proposed in NorthWestern's interconnection queue.

For every MW of new generation that is added within NorthWestern's control area a MW must be exported to load elsewhere in the west. The proposals for new generation to be built in Montana and load growth outside of Montana provide a clear need for additional transmission capacity out of Montana. The existing transmission path between Montana and Idaho (Path 18) is fully subscribed today and into the future. The MSTI project would address the requests for additional transmission capacity and would allow for the export of power from proposed generation projects in Montana to load centers outside of Montana.

Many of the potential generation projects in the interconnection queue would likely be implemented if the MSTI project is constructed. Most of the potential generation projects are in the feasibility study stage.

Impacts from potential wind energy development projects on federal lands have been addressed in the Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States(BLM , June 2005). There are 26 wind energy projects in NorthWestern's interconnection queue and they represent the largest number of megawatts (2,100 MW) in the interconnection queue. Activities that could impact resources from increased wind energy development are generally discussed in this cumulative impact section.

Impacts from coal-fired generation are similar to those discussed in the *Draft Environmental Impact Statement for the 250 MW Highwood Generating Station MDEQ, June 2006).* There are 3 coal-fired generation projects in NorthWestern's interconnection queue and they represent the second largest number of megawatts (990 MW) in the interconnection queue. Activities that could impact resources from increased coal-fired generation development are generally discussed in this cumulative impact section.

Impacts from gas-fired turbine generation are similar to those discussed in the *Draft Environmental Impact Statement for the 500 MW Silver Bow Generation Project (MDEQ December 2001).* There are 3 gas-fired turbine generation projects in NorthWestern's interconnection queue and they represent the third largest number of megawatts (770 MW) in the interconnection queue. Activities that could

INSERT

TABLE 4.14-2

NorthWestern Energy Generation Interconnection Queue

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impact resources from increased gas-fired turbine generation development are generally discussed in this cumulative impact section.

4.14.4 CUMULATIVE IMPACT ANALYSIS BY ISSUE AREA

4.14.4.1 Biological Resources

Wildlife

Past activities that have impacted wildlife resources within the MSTI Project area in Montana include: loss of native grassland habitat due to agricultural development, loss of wetland habitat due to drainage for agriculture, and minor loss in habitat and disturbance related to mining activities. These activities have resulted in some displacement of wildlife due to habitat loss; however, many of the wildlife species have been able to adapt to habitat conversions and have not been negatively impacted. Species that have experienced the greatest impacts are those species dependent on native grassland habitats, such as grassland dependent birds that have experienced a loss of nesting habitat. Present activities within the MSTI Project area in Montana are very similar to activities of the past. Agriculture is a predominant use of land; however, grassland and wetland conversion to agricultural lands no longer occurs at a high rate. Land use within the region is relatively stable and land use practices do not generally negatively impact wildlife.

Wind energy developments could have an impact on avian species due to displacement from habitats and collisions though impacts may be reduced with sound siting practices.

Coal-fired, wind and gas-turbine generation facilities would impact wildlife and other biological resources by temporarily displacing wildlife due to removal of vegetation and disturbance from construction equipment at specific generation site locations. Coal-fired, gas-turbine and wind turbines would result in long-term increases in mortality of terrestrial mammals by railroad strikes and increased traffic on access roads. There is some potential for increased mortality to birds and bats from wind turbine blade strikes.

The MSTI transmission line would contribute to habitat loss and potentially increase avian mortality due to collisions. The cumulative impacts of the habitat loss would not likely reduce the viability of wildlife populations within the region, as structures would reduce habitat by a relatively small amount and would not likely consume critical habitats such as large expanses of grasslands or riparian areas.

Vegetation

Construction and operation of past and present buildings, roads and pipelines has disturbed or removed vegetation communities. It is highly likely that more vegetation communities would be disturbed or removed as wind farms, coal-fired, and gas-turbine generation facilities are developed in the region. Disturbance of vegetation may also contribute to the introduction or enlargement of noxious weed populations. Implementation of a Noxious Weed Control Plan would mitigate this potentially significant cumulative impact to a level of less than significant. Coal-fired and gas-turbine generation facilities would also likely lead to short-term duration impacts to aquatic biota from degraded water quality. In a cumulative context, this would be considered a minor incremental adverse impact on vegetation. Depending on reclamation practices, impacts to vegetation can be reduced.

Cumulative impacts to vegetation and wildlife special status species would not differ from those effects discussed within the wildlife and vegetation sections above.

4.14.4.2 Water Resources

Past and present actions potentially affecting water resources in the vicinity of the MSTI Project area in Montana are: ongoing weed management, fertilization, crop production, grazing, road use and maintenance, and waterway modifications for stock watering. These activities can result in surface water flow alterations, water diversions, and stream bank modification and destabilization. Weed control and fertilization can introduce pesticides and nitrates and total dissolved solids to water supplies. Irrigation and waterway modification for stock watering can result in increased salinity and flow reduction due to stream channel obstructions and diversions, and saline seep. Some grazing practices result in sedimentation to surface water due to soil destabilization from reduced vegetation. Road maintenance and use at river and stream crossings can destabilize banks and increase sedimentation to surface water. The effects of present and past actions in the MSTI Project area in Montana, would cumulatively present an increased risk of impairment of one or more beneficial uses. This would be a minor long-term adverse cumulative impact to water resources.

Related future actions include the construction and operation of future wind farms, coal-fired, and gas-turbine generation facilities in response to the availability of increased transmission capability within the MSTI Project area in Montana. Activities that could impact water resources from increased wind energy, coal-fired, and gas-turbine generation, primarily occur during construction, include:

- Potential reduction in existing water supply sources due to withdrawals
- Increased soil erosion due to ground disturbing activities such as heavy equipment traffic and extraction of geologic materials from borrow areas or quarries
- Wastewater discharges
- Pesticide application
- Diversion of surface water flows by access road systems, storm water control systems, or excavation activities
- Construction activity alteration of interaction between surface water bodies and local groundwater in systems where the two resources are hydrologically connected

New coal-fired power plants would also contribute incrementally to total national SO_2 emissions, and possibly, significant cumulative impacts on the water quality of the nation's bodies from acid deposition. However, the distance of new coal-fired-fired power plants in the region from areas of the country and continent where acidification is a serious problem, primarily poorly Canadian Shield parent rocks/soils of the Upper Midwest and Northeast, may mean that their SO_2 emissions have limited or negligible impacts on these vulnerable areas (*Coal-fired Highwood Generating Station Environmental Impact Statement*, June 2006).

These activities when combined with the MSTI Project may cumulatively increase the risk of introducing sediment and other pollutants to water resources in the study area and potentially affect the quantity and quality of available water supplies. Construction of these generation projects (wind, coal and gas), including MSTI, may also likely cause increased storm water runoff and potential soil erosion that may carry sediments to surface waters. The MSTI Project and generation facilities would include Best Management Practices (BMPs), Montana Pollutant Discharge Elimination System Permits, and other agency protection measures. Because of the implementation of these measures to

reduce risk of sedimentation, employ proper pesticide application procedures, and comply with waste water discharge requirements, adverse cumulative impacts are likely to be minor and of short-term duration.

4.14.4.3 Wetlands

Cumulative impacts on wetlands may result from the construction and operation of future wind energy, coal-fired, and gas-turbine generation facilities. Impacts to wetlands from potential wind farms have been addressed in a general sense in the *BLM Wind Energy Programmatic EIS* (BLM 2005). Activities that could impact wetlands would occur primarily during construction. The potential impacts would be:

- Habitat disturbance
- Direct injury or mortality
- Erosion and runoff
- Exposure to contaminants
- Facility construction activities

Because the action alternatives for the MSTI Project, future wind farms, coal-fired, and gas-turbine generation facilities would typically include BMPs and other environmental protection measures required by regulatory agencies to reduce disturbance to wetlands, these adverse cumulative impacts are likely to be minor, indirect, and of short-term duration.

4.14.4.4 Geology and Soils

Cumulative impacts on geology and soils may result from the construction and operation of future wind energy, coal-fired, and gas-turbine generation facilities, construction of new roads, and the increase and need for new or expanded sand, gravel, and concrete operations in the area. Extensive site grading and excavation activities would be associated with construction of the coal-fired and gas-turbine generation facilities. Soil resource impacts from construction activities would have a moderate magnitude, medium-term duration, and medium extent. Impacts from operation of waste monofills associated with coal-fired generation facilities would be of minor magnitude, long-term duration, and small extent. Such activities would also result in a need for new or expanded sand, gravel, and concrete operations in the area. Most of these projects include BMPs to mitigate impacts from blasting, excavation, earthmoving, and other construction activities. As a result, adverse cumulative impacts are most likely to be minor, indirect, and short term. Cumulative impacts that may occur would be minimal and largely limited to the areas actually disturbed.

4.14.4.5 Paleontological Resources

Disturbances from wind energy development and construction of coal-fired and gas-turbine generation facilities, combined with other surface disturbing activities (including MSTI) could uncover or destroy fossils. These projects could also increase access to areas where these resources may be located. This increased access could lead to damage from looting and vandalism. Because these projects typically include BMPs and other environmental protection measures required by regulatory agencies to limit potential impacts to paleontological resources, cumulative impacts would be negligible.

4.14.4.6 Land Use and Transportation

Existing transmission lines, pipelines, and roads have affected and would continue to affect land uses within the study area. Additional wind farms, coal-fired, and gas-turbine generation facilities, railroad spurs, roads and interconnecting power lines are anticipated due to MSTI and other proposed transmission lines. Depending on their location, these activities may affect farming operations, remove farmland from production, increase traffic on roads and highways, and pose additional hazards to aircraft. Construction related disruption of existing land uses would be of short to medium duration and result from construction of these energy generation facilities and associated infrastructure. Conversion of farmland to industrial land use would have impacts of minor magnitude, long-term duration (permanent), and medium extent. Impact on property values from the operation of energy generation facilities would be of moderate magnitude, long-term duration, and medium to large extent. Construction-related impacts on roadway traffic would be of minor magnitude, medium-term duration, and small extent. There would also be minor, temporary construction-related impacts on rail transport on the rail line to which a rail spur would connect. Maintenance activities using standard equipment would be an infrequent occurrence and not add greatly to the existing traffic loads on the roadway network. Each additional elevated structure or set of structures with wires within a given airspace would be a cumulative element for pilots to avoid and would result in a cumulative impact.

4.14.4.7 Visual Resources

Past and present actions (existing transmission lines) and actions reasonably expected to occur (wind energy, coal-fired, and gas-turbine generation) would increase the adverse impact to the aesthetic quality of the landscape for the long-term. Wind generation facilities would be expected to be highly visible because of the introduction of turbines into typically rural or natural landscapes, which have few other comparable structures. Operating wind turbines would generate a strobe effect and blade glint. Red tower lights at night would also adversely impact visual resources. In regions with variable terrain, wind developments along ridgelines would be most visible.

4.14.4.8 Socioeconomics

MSTI would be constructed in an area with wind generation potential. Implementation of the MSTI Project would provide the transmission capacity needed by wind, coal, and gas generation projects to access the energy market. At the time of this study, 34 wind energy projects, 3 coal-fired generation projects, and 3 gas-fired generation projects are in NorthWestern's interconnection queue. Details of these projects are not available, but would likely result in economic benefits to the region. Economic benefits may vary widely from project to project.

During the construction phase of wind energy, coal-fired, and gas-turbine generation facilities, there would be moderately beneficial effects on the socioeconomic environment of the local and regional area, including increases in employment opportunities, total purchases of goods and services, and increase in the tax base. During the long-term operational phase, beneficial socioeconomic impacts would be of minor magnitude, long-term duration and medium extent. Overall long-term cumulative impacts from the generation facilities in the area would be of minor magnitude and economically beneficial.

4.14.4.9 Cultural Resources

Disturbances from wind energy, coal-fired, and gas-turbine generation facilities, combined with other surface-disturbing development activities, could uncover or destroy cultural resources. These projects could also increase access to areas where these resources may be located. This increased access could lead to damage from looting and vandalism. However, project BMPs addressing cultural resources would limit potential impacts at a particular project site. Projects having a federal nexus (on federal land or with federal financing or permits) would also require consultation under Section 106 of the NHPA, which includes consultation with the Montana SHPO and with Native American governments as early in the planning process as appropriate to identify issues and concerns. For other projects, MFSA and additional state laws and regulations may require cultural resource investigations. Cumulative impacts to some cultural resources, predominately archaeological sites, would, therefore, be negligible. However, cumulative impacts to cultural resources with a visual component (i.e., sacred landscapes) could occur.

4.14.4.10 Electric and Magnetic Fields (EMF)

Past, present, and reasonably foreseeable future actions that could affect EMF levels near residences are considered in this cumulative impacts analysis. Residences within1/4 mile of the proposed MSTI transmission line may experience cumulative EMF impacts if additional energy-transmission projects are developed nearby. EMF levels could also cause interference with railroad operations (i.e., signals). If the construction, operation, maintenance, or repair of a project causes interference with railroad operations, protective devices would be provided to eliminate such interference.

Currently there are no federal or state regulations or industry guidelines pertaining to appropriate levels of magnetic field present around transmission lines. The MFSA requirement for electric transmission facilities is that the electric field at the edge of the right-of-way will not exceed 1kV/m measured one meter above the ground in residential or subdivided areas unless the affected landowner waives this condition, and that the electric field at road crossings under the facility will not exceed 7kV/m measured one meter above the ground. (ARM 17.20.1607, Linear Facilities, Minimum Impact Standard). For road crossings, the MFSA electric field compliance level of 7kV/m will be mitigated by design clearance requirements of the NESC that will provide certain minimum conductor height to ground limits.

Potential cumulative EMF impacts would be associated with transmission lines from wind, coal-fired and gas fired turbine generation facilities interconnecting to the existing transmission grid

Adherence to MFSA and NESC requirements would reduce cumulative impacts to a minimal level.

4.14.4.11 Noise (Audible and Radio)

Noise would be cumulatively affected by the MSTI Project and the development of wind generation, coal-fired, and gas-turbine generation facilities. Noise contributed by wind turbines could affect nearby residences if the turbines are operated at a wind speed less than about 23 miles per hour (BLM 2005). Cumulative impacts from wind turbine noise and the transmission line depends on proximity to residences.

Noise contributed by planned wind energy development would be generated by construction and maintenance activities and generator operations. Construction activities would be similar to those proposed under MSTI with the addition of potential blasting. During operation, major noise sources would be aerodynamic noise, transformer and switchgear noise from substations, corona noise from transmission lines, vehicular traffic noise, including commuter and visitor and material delivery, and noise from an operation and maintenance facility. Overall, noise levels of continuous wind energy site operation would be lower than the noise levels associated with short-term construction activities (BLM 2005).

At a wind speed of about 48 miles per hour, wind-generated noise is higher than aerodynamic noise. Noise from wind turbines would be more noticeable at lower wind speeds (BLM 2005).

Construction of other projects such as coal-fired and gas-turbine generation facilities could further exacerbate short-term noise impacts. Development of these facilities would cause minor to moderate, short-term duration adverse impacts from intermittent noise during construction, both from equipment at a particular site and transit of city and county roadways by workers and equipment. Coal-fired generation facilities would also entail minor long-term impacts from increased noise along routes of trains carrying coal to a power plant. The overall, long-term duration impact of noise from wind energy, coal-fired, and gas turbine facility operations on receptors, would be localized to the power plant locations and would be minor to moderate.

Electrical transmission lines from wind, coal-fired and gas fired turbine generation facilities interconnecting to the existing transmission grid would be subject to MFSA noise level guidelines. MFSA noise level guideline for electrical transmission facilities is 50 dBA average day/night noise level (L_{DN}) at edge of right-of-way in residential and subdivided areas unless the affected landowner waives the condition. MFSA also requires an L_{DN} level of 55 dBA at the edge of the property boundaries of substations in residential and subdivided areas is not to be exceeded (ARM 17.20.1607 Linear Facilities, Minimum Impact Standard.). In the U.S., there are no established standards for radio and television noise interference. For transmission lines with normal spacing and rights-of-way, a fair weather RI level of 40 dBμV/m (100μV/m) at a lateral distance of 100 feet from the outermost phase has been established as a guideline for identifying a design criterion for a RN limit (IEEE Standard 430-1991).

4.14.4.12 Air Quality

Past and present actions potentially affecting air resources in the vicinity of the MST Project area in Montana are: mining operations, cement manufacturing plants, crude oil and natural gas compressor stations, concrete mix plants, asphalt mix plants, gravel crushers and associated processing equipment, fugitive dust and smoke sources from farming, field and forest burning, and dust from gravel roads. These sources may affect air quality within the general area of the activity and possibly, the air shed, depending on the duration and nature of the emission. For emission sources such as construction activities, burning, and road dust, the effects are anticipated to be temporary in duration. For emission sources such as cement manufacturing plants and some mining operations, the impacts would be regulated through permits by MDEQ. In general these activities, when occurring at the same time as, and in the vicinity of, MSTI construction activities, are anticipated to have minor cumulative impacts.

Impacts to air resources from future wind energy developments are anticipated to be temporary, occurring only during construction. Fugitive gaseous and particulate emissions from construction would stop or decrease once these activities are completed. For emission sources such as future power coal-fired and gas-fired generating plants, the impacts would be regulated through permits by MDEQ. These energy generation activities would cumulatively increase the risk of affecting air quality in MSTI Project area in Montana.

Given that mitigation measures such as dust suppression for fugitive emissions would be implemented, and stationary sources would need to comply with emission standards set by MDEQ, cumulative impacts are anticipated to be minor and short term.

4.14.4.13 Hazardous Materials

Wind energy, coal-fired, and gas-turbine generation facility projects would require shipment, storage, use, and disposal of hazardous materials and generation of solid and hazardous wastes; however, BMPs addressing these activities would effectively mitigate potential impacts. Wastes generated by coal and gas fuel cycles are larger when compared to wastes associated with wind energy. Small waste quantities would be produced by operating wind energy projects mainly in the form of sanitary waste, and wastes produced from periodic servicing of wind turbines. Construction impacts on waste management for coal-fired and gas-turbine generation facilities would likely be of minor magnitude, medium-term duration, and small extent. Operation-related impacts on waste management would of moderate magnitude, long-term duration, and medium extent. Waste volumes would likely be limited compared with other wastes generated regionally, particularly, if wastes generated during decommissioning of turbines and ancillary structures were recycled for other uses. Wastes would be managed as required by state and federal law and there would be a low probability that any serious contamination would occur. As a result, cumulative impacts resulting from hazardous material use and waste generation would be negligible.

4.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Resources committed to the MSTI Project would be material and nonmaterial, including financial. Irreversible commitment of resources for the purposes of this section has been interpreted to mean that those resources once committed to the MSTI Project would continue to be committed throughout the useful life of the project. Irretrievable commitment of resources has been interpreted to mean those resources used, consumed, destroyed or degraded during construction, operation and maintenance of the MSTI Project could not be retrieved or replaced for the useful life of the project. Irreversible and irretrievable commitment of resources for the MSTI Project are summarized in Table 4.15-1.

Table 4.15-1 Irreversible and Irretrievable Commitment of Resources

Resource	Type of Commitment/Reason for Commitment	Irreversible	Irretrievable
Air	▪ Degradation of air quality ▪ Construction activities	No	Construction Phase
Soils	▪ Soil loss and erosion ▪ Construction activities	Yes	Yes
Water	▪ None *(see construction materials below)*	--	--
Geological	▪ None *(see construction materials below)*	--	--
Paleontological	▪ Disturbance or removal of fossils ▪ Construction activities	Yes	Yes
Biological	▪ Disturbance to and/or loss of vegetation, habitat, and wildlife species ▪ Construction and operation	Yes	Yes
Land Use	▪ Disturbance to agriculture and grazing ▪ Exclusion of residential, institutional and industrial uses ▪ Construction and operation	Yes	Project Life
Parks, Recreation and Preservation	▪ Increased recreation use of preservation areas and ORV areas ▪ Increased access for construction ▪ Construction / operation	Yes	Project Life
Visual	▪ Degradation of natural scenic quality, view shed intrusion ▪ Construction and operation	Yes	Project Life
Acoustical (Noise)	▪ Noise exceeding ambient levels ▪ Construction and operation	Yes	Project Life
Archaeological and Historical Sites	▪ Disturbance or removal of sites ▪ Construction, operation and maintenance	Yes	Yes
Special Status Cultural Sites	▪ Disturbance or removal of sites; interference with visual setting ▪ Construction, operation and maintenance	Yes	Yes
Traditional Cultural Places	▪ Disturbance or removal of sites; interference with visual setting; aural disturbance ▪ Construction, operation and maintenance	Yes	Project Life
Human Health	▪ Potential adverse electrical effects ▪ Operation	Unknown	Unknown
Socioeconomic	▪ Increased regional and local revenues and taxes ▪ Construction and operation	Yes	Project Life
Construction Materials and Fuels	Use of: ▪ Aggregate ▪ Water ▪ Steel ▪ Aluminum ▪ Concrete ▪ Wood ▪ Fossil Fuels	 Yes Yes Yes Yes Yes Yes Yes	 Yes Yes No No Yes No Yes