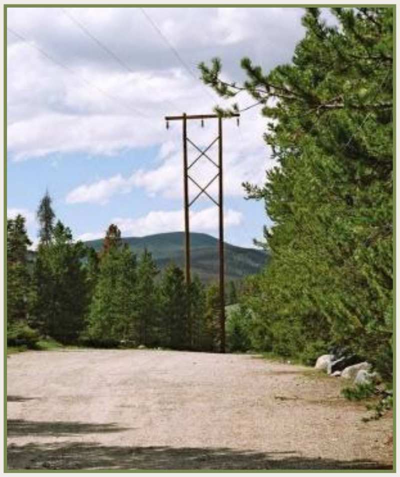
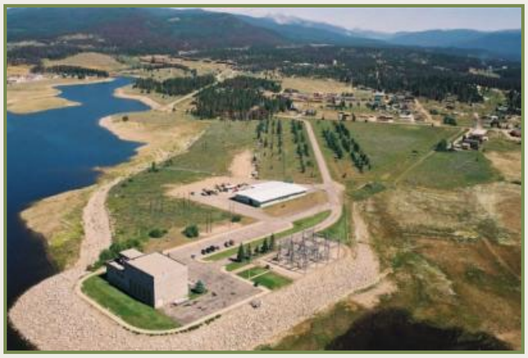
GRANBY PUMPING PLANT SWITCHYARD – WINDY GAP SUBSTATION TRANSMISSION LINE REBUILD, GRAND COUNTY, COLORADO

DOE/EIS-0400

Final Environmental Impact Statement





Western Area Power Administration

Grand County, Colorado
June 2013

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GRANBY PUMPING PLANT SWITCHYARD – WINDY GAP SUBSTATION TRANSMISSION LINE REBUILD, GRAND COUNTY, COLORADO

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Responsible Agencies

Lead Federal Agency:
U.S. Department of Energy, Western Area Power Administration

Cooperating Federal Agencies:
U.S. Bureau of Land Management
U.S. Forest Service

Local Cooperating Agencies:
Grand County, Colorado

Abstract

The Western Area Power Administration (Western) owns and operates a 13.6-mile, 69-kilovolt (kV) electric transmission line in Grand County, Colorado, that originates at Windy Gap Substation, located immediately northwest of the intersection of U.S. Highway 40 and State Highway 125. The proposed project involves rebuilding this single-circuit line as a double-circuit transmission line and adding a second power transformer. One circuit would replace the existing 69-kV line; the other circuit would be a new 138-kV line. The Granby Pumping Plant Switchyard would be expanded to accommodate the second line and power transformer. Windy Gap Substation would be modified to accommodate the second line. The purpose of this project is to enhance system reliability by providing a second source of power (or looped service) to the area between Grand Lake and Granby before failure of the 69-kV cable located in the Alva B. Adams water tunnel (also known as the Adams Tunnel Cable).

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ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
°F	degree Fahrenheit
µg/m^3	Micrograms per Cubic Meter
µT	micro Tesla
µV/m	microvolts per meter
AC	Alternating Current
AECOM	AECOM Technical Services, Inc.
amp or amps	Amperes
ANRA	Arapaho National Recreation Area
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
ARNF	Arapaho and Roosevelt National Forests and Pawnee National Grassland
ATV	All Terrain Vehicle
AWG	American Wire Gauge
BBS	Breeding Bird Survey
BGEPA	Bald and Golden Eagle Protection Act
BLM	U.S. Bureau of Land Management
BPA	Bonneville Power Administration
BR	Biological Report
CAA	Clean Air Act
CAAQS	Colorado Ambient Air Quality Standards
C-BT	Colorado-Big Thompson project
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CO	Carbon monoxide
CO_2	Carbon dioxide
CPW	Colorado Parks and Wildlife
CR	County Road
CWA	Clean Water Act
CWD	Chronic Wasting Disease
dB	Decibel
dBA	Decibel (A-weighted)
DC	Direct Current
DEIS	Draft Environmental Impact Statement
DOE	U.S. Department of Energy
DTV	Digital Television
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMF	Electric and magnetic fields
E.O.	Executive Order
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
FCC	Federal Communications Commission
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act
Forest Plan	Arapaho-Roosevelt National Forest *1997 Revision of the Land Resource Management Plan*
Forest Service	U.S. Forest Service

FPD	Fire Protection District
FSM	Forest Service Manual
FSS	Forest Service Sensitive
ft^2	square foot
G	Gauss
GIS	Geographic Information System
GMU	Game Management Unit
GPS	Global Positioning Systems
Grand County	Grand County, Colorado
GSGCP	Greater Sage Grouse Conservation Plan
HAP	Hazardous Air Pollutant
Hz	Hertz
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
IITRI	Illinois Institute of Technology Research
kCM	Kilo Circular Mil
km	Kilometers
km^2	Square Kilometers
KOP	Key Observation Point
kV	Kilovolt
kV/m	Thousands of volts per meter
LAU	Lynx Analysis Unit
Ld	daytime Leq
Ldn	Equivalent Day-Night Sound Level
Leq	Equivalent Sound Level
Ln	nighttime Leq
mA	Milliampere
MBTA	Migratory Bird Treaty Act
mG	Milligauss
mg/m^3	Milligrams Per Cubic Meter
MHz	megahertz
MIC	Forest Service Management Indicator Community
MIS	Forest Service Management Indicator Species
MLS	Multiple Listing Service
MPEI	Mountain Parks Electric, Inc.
MS-NCWCD	Municipal Subdistrict-Northern Colorado Water Conservancy District
MVA	Megavolt-ampere
NAAQS	National Ambient Air Quality Standards
NCWCD	Northern Colorado Water Conservancy District
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NO_2	Nitrogen Dioxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
O_3	Ozone
P.L.	Public Law
Pb	Lead
PFYC	Potential Fossil Yield Classification
PM_{10}	10 micrometers or less
$PM_{2.5}$	2.5 micrometers or less

ppb	part per billion
ppm	Parts Per Million
PFYC	Potential Fossil Yield Classification
Reclamation	U.S. Bureau of Reclamation
RMNP	Rocky Mountain National Park
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	Right-of-Way
RV	Recreational Vehicle
Scenic byway	Colorado River Headwaters National Scenic and Historic Byway
SCORP	Colorado State Comprehensive Outdoor Recreation Plan
SCP	Standard Construction and Mitigation Practices
SHPO	State Historic Preservation Officer
SIO	Scenic Integrity Objective
SIP	State Implementation Plan (Clean Air Act)
SLB	Colorado State Land Board
SNR	Signal-to-Noise Ratio
SO_2	Sulfur Dioxide
SSURGO	Soil Survey Geographic
SWA	State Wildlife Area
T	Tesla
TCP	Traditional Cultural Property
Tri-State	Tri-State Generation and Transmission, Inc.
TV	Television
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
UCM	University of Colorado Museum
UGA	Urban Growth Area
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
V/m	Volts per meter
VAC	Visual Absorption Capacity
VOC	Volatile Organic Compounds
VRM	Visual Resource Management
WCRM	Western Cultural Resource Management, Inc.
Western	Western Area Power Administration
WRCC	Western Regional Climate Center

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EXECUTIVE SUMMARY

Introduction

Western Area Power Administration (Western), a power marketing administration within the U.S. Department of Energy (DOE), is proposing to rebuild and upgrade the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line in Grand County, Colorado (Grand County). This Environmental Impact Statement (EIS) analyzes the impacts associated with the proposal to remove approximately 13.6 miles of 69-kilovolt (kV) transmission line, construct approximately 12 miles of new 138-kV double-circuit transmission line (operated at 69-kV and 138-kV), and add a second power transformer.

This EIS has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] Section 4321 et seq.), the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations (CFR) Parts 1500-1508), and the DOE's NEPA Implementing Procedures (10 CFR Part 1021).

The project Cooperating Agencies and partners include the following:

- Western (Lead Federal Agency)
- U.S. Forest Service (Forest Service), Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARNF) (Federal Cooperating Agency)
- Bureau of Land Management (BLM), Kremmling Field Office (Federal Cooperating Agency)
- Grand County, Colorado (Local Cooperating Agency)
- Tri-State Generation and Transmission Association (Tri-State)
- Mountain Parks Electric, Inc. (MPEI)
- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict-Northern Colorado Water Conservancy District (MS-NCWCD)

Project Background

Western owns and operates a 13.6-mile, 69-kV electric transmission line in Grand County, Colorado. The line originates at Windy Gap Substation, located immediately northwest of the intersection of U.S. Highway 40 and Colorado State Highway 125. The single circuit, wood pole, H-frame transmission line was authorized in 1938 and constructed in 1939 by the U.S. Bureau of Reclamation (Reclamation) as part of the Colorado-Big Thompson (C-BT) project. The existing transmission line runs northeast along U.S. Highway 34 and terminates at the Granby Pumping Plant Switchyard at the end of Grand County Road (CR) 64 on the north shore of Lake Granby. Portions of the existing transmission line are adjacent to the western shoreline of Lake Granby and are within the Arapaho National Recreation Area (ANRA), managed by the Forest Service. The Project Area includes tracts of land managed by the Bureau of Land Management (BLM) Kremmling Field Office and the ARNF, including portions of the ANRA, as well as Colorado State Land Board (SLB), NCWCD, MS-NCWCD, and private lands (Map ES-1).

The local transmission system has been reliably served by Reclamation's Adams Tunnel 69-kV cable for the past 65 years. The tunnel carries a 69-kV transmission line in the form of an electric cable owned by Reclamation and operated by Western. This cable currently provides the only secondary source of electrical power to the Grand Lake-Granby area by allowing looped transmission service (explanation provided below) between the Marys Lake and Windy Gap substations. The Adams Tunnel cable has exceeded its predicted useful life (40 years) and, upon failure, will not be replaced (USBR 1994).

The Adams Tunnel cable currently provides Tri-State with the only second source of power for MPEI loads (e.g., local residential and commercial electrical needs).

To ensure electrical service reliability, Tri-State must maintain a second source of power to serve MPEI loads. The result of systems studies by both Western and Tri-State demonstrated electrical system reliability improvements when a new 138-kV transmission line was added between the Windy Gap and Granby Tap substations (Western 2003).

The failure of the Adams Tunnel cable will leave large parts of Western's and Tri-State's Granby-Grand Lake service area with only a one-way or radial transmission supply. The portion of the system affected by this transmission system includes approximately 7,000 customers in the area extending from the west side of Rocky Mountain National Park on the north, to the YMCA Snow Mountain Ranch on the south, and from Byers Canyon on the west, to the ANRA and Continental Divide on the east. The towns of Hot Sulphur Springs, Granby, and Grand Lake, as well as hundreds of customers in rural areas, particularly along the U.S. Highway 34 corridor, are included in the service area. Without a rebuild and upgrade of the existing facilities, Tri-State/MPEI and Western customers risk extended power outages, especially during adverse winter weather and prolonged line maintenance due to the lack of an alternate transmission circuit to supply the area.

Purpose and Need

The Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project is intended to address the electrical deficiencies anticipated due to the eventual failure of the Adams Tunnel cable and the antiquated line configuration in the Project Area. The combination of the eventual failure of the Adams Tunnel cable, increasing residential and commercial load demands in the study area, and antiquated structures, creates a high-risk scenario, potentially jeopardizing power supply for all electric customers in the service area.

The proposed project is needed to:

- Upgrade voltage to ensure that the electrical system in the area will continue to operate within acceptable voltage criteria while accommodating future load growth in the area.
- Ensure that the electrical system in the area would continue to operate within established electrical criteria during motor starting operations at Farr (Granby) and Willow Creek pumping plants after the eventual failure of the Adams Tunnel power line cable. Engineering studies indicate that once the Adams Tunnel cable is out of service, the voltage drop upon starting the motors at the Willow Creek Pumping Plant would exceed acceptable system limits if load growth in the area continues at the current rate (Western 2003).
- Ensure that Western, Tri-State, and Tri-State's cooperative member (MPEI) are able to serve their customers with reliable service by providing a redundant transmission feed

("looped" transmission service) in the Grand Lake and Granby service areas, in advance of the loss of the Adams Tunnel cable.

- Maintain reliable power supply for existing operations at the Colorado-Big Thompson Project (C-BT) facilities, regardless of future load growth demand in the valley.
- Improve transmission safety by updating antiquated facilities and rebuilding a 70-year-old transmission line to be compliant with current National Electric Safety Code (NESC) standards.
- Minimize long-term transmission line maintenance costs for Western and NCWCD.

Proposed Project

The proposed project involves rebuilding and upgrading the existing single-circuit line, currently on a 30-foot right-of-way (ROW), as a double-circuit transmission line, and adding a second power transformer. The existing 69-kV, H-frame wood pole line would be removed. One circuit would replace the existing 69-kV line; the other circuit would be a new 138-kV line on a 100-foot ROW. The 138-kV double-circuit line would be operated at 69/138-kV. The Granby Pumping Plant Switchyard would be expanded to accommodate the second circuit and power transformer. Windy Gap Substation would also be modified to accommodate the second circuit. This would be a joint participation project between Western, Tri-State, MPEI, and NCWCD.

The Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project would minimize impacts by rebuilding and upgrading the existing 69-kV transmission line as a 138-kV double-circuit, looped transmission system on one set of structures in a single ROW. Western acknowledges that looped transmission service on a single set of structures presents an increased risk of system failure compared to two circuits on separate structures and ROWs. However, given existing land use and environmental constraints throughout the Project Area, two sets of structures on separate ROWs are not reasonable or practical. As discussed in Chapter 2.0, the use of single-pole steel structures with concrete bases would help alleviate some of the single-structure and single-ROW vulnerabilities. Additionally, Tri-State's need to provide a second source of power exists regardless of Western's agreement to participate in the project. By combining the new second circuit (138-kV) with Western's existing 69-kV circuit, electric transmission providers in the valley would consolidate existing facilities to meet growing service area needs, while minimizing impacts.

Decisions to be Made

Decisions to be made by the lead and federal cooperating agencies are described below:

- Western Area Power Administration (Lead Federal Agency)

  Western is the lead agency for this project, and has the primary responsibility for conducting the environmental review and preparing the NEPA document. The decision to be made by Western is whether to rebuild and upgrade the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line in Grand County, Colorado as a double-circuit transmission line on a 100-foot ROW.

- U.S. Forest Service, Arapaho and Roosevelt National Forests (Federal Cooperating Agency)

  The Forest Service is a federal land management agency that manages the ANRA and surrounding ARNF lands, through which transmission line ROW is proposed. The

Forest Service must ensure that actions proposed to occur within the ANRA or surrounding National Forest lands are consistent with its Forest Plan (Forest Service 1997a). The Forest Service is a federal Cooperating Agency on this EIS and worked with Western to identify mitigation measures that would be implemented on the portion of the project that is under its jurisdiction.

- Bureau of Land Management, Kremmling Field Office (Federal Cooperating Agency)

  The BLM Kremmling Field Office is a cooperating agency on this project because of its legal jurisdiction and expertise with respect to permitting and environmental impacts on BLM lands. The existing transmission line and each of the alternatives proposed would use ROW on BLM land. The BLM Kremmling Field Office must decide whether to approve the new or expanded ROWs proposed by the action alternatives on BLM lands.

Public Participation

Notice of Intent

A Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on August 10, 2007 (Appendix A).

Public Scoping

Public scoping for the EIS was initiated August 10, 2007, and ended September 17, 2007. Scoping activities included the publication of the NOI in the *Federal Register*; notification of stakeholders by U.S. mail and phone; a public scoping meeting held August 30, 2007, at the MPEI office in Granby, Colorado; and correspondence with potentially affected federal, state and local agencies and Tribes (Appendix A). Public meeting notices and requests for public input were published in a local newspaper, *Ski-Hi* News, prior to the August 30, 2007, public meeting. Scoping materials were also posted on the project website maintained by Western.

Approximately 200 comment forms, letters, e-mails, and faxes were received during the public scoping period. All letters were reviewed by the project team to help define the scope of analysis for the EIS and to inform the refinement of project alternatives.

Key Issues Identified During Scoping

The following issues were identified during public scoping. This list is not intended to be a comprehensive listing of issues, but instead represents key public concerns:

- Potential effects to visual resources and rural aesthetics.
- Potential effects to sage grouse populations and habitats.
- Project costs.
- Potential effects to land uses, including agricultural practices and conservation easements.
- Restoration efforts proposed for the abandoned ROW.
- Human health effects.
- Interference with radio and cellular communications.
- Electromagnetic field effects.

- Effects on riparian, wetlands, or other aquatic habitats as a result of construction.
- Construction effects on winter range habitat for mule deer and elk.
- Avian collisions with conductors and structures, including migratory species and raptor species.
- Effects on special status or sensitive species and habitat as a result of construction activities and presence of above-ground structures.
- Alternatives to above-ground structures, including undergrounding, reusing the Adams Tunnel cable, and/or laying the transmission line on the bed of Lake Granby.
- Socioeconomic impacts in Grand County.
- Cumulative effects of mountain pine beetle epidemic.
- Cumulative impacts to wildlife habitats from various types of development in the Project Area.
- Effects to cultural and historic resources, including Traditional Cultural Properties.
- Effects to special designation areas, such as the ANRA or Colorado Headwaters Scenic Byway.
- Consistency with local and Grand County Zoning Regulations and management overlays.

Public Review of the Draft EIS

The Notice of Availability (NOA) for the Draft EIS (DEIS) was published in the *Federal Register* on March 30, 2012. The NOA established a 60-day public comment period that ended May 29, 2012. Public meetings on the DEIS were held in Granby, Colorado on April 24, 2012, which consisted of an open house from 4:00-6:00 p.m. with exhibits displaying project information, followed by a formal public hearing from 6:00-8:00 p.m. Notice of the meeting was provided through an advertisement in the Sky-Hi News and direct mailing. The mailed notice was sent to all property owners within 0.5 mile of a project alternative and to other individuals and agencies with an interest in the project, including tribal representatives and individuals and agencies that had provided scoping comments.

Six individuals provided oral comments during the public meeting and one individual provided an oral comment at the public hearing. An additional 43 comment letters, emails or telephone comments were received on the DEIS during the 60-day comment period.

In total, considering all comment sources, 135 unique comments were received. Comments on the DEIS and the responses to those comments are presented in Appendix L. Most comments fell into one or more of the themes identified below:

- The transmission line should be installed underground in its entirety or for specific segments.
- Impacts to residential properties along County Road 64, including a request by property owners and residents to relocate the alignment proposed along CR 64 to the west side of the road.
- Grand County is adequately served by the existing transmission system and the need for additional power has not been demonstrated.

- Lake Granby, Colorado River, and the Arapaho National Recreation Area of Grand County are highly valued for their scenery and the project's visual impacts would potentially affect the recreational activities and amenities that contribute to Grand County's recreational and tourist destination appeal.
- Property values could potentially be affected by the transmission line, whether located directly on the property, within line of sight of their property, or in the general vicinity.
- The existing transmission conduit through the Adams Tunnel should be replaced to continue providing looped service between Estes Park and the Windy Gap substations rather than any of the action alternatives.

Responses to theme comments are provided in Appendix L.

Changes to the Draft EIS

Comments received on the DEIS were carefully considered. Western conducted a field visit with Forest Service personnel on August 10, 2012 to discuss public comments requesting that the preferred alternative be moved to the west side of County Road 64, rather than remaining on the east side of the road, as was presented in the DEIS. After this meeting, the alignment of the preferred alternative was adjusted to move it further west of the residences and to cross County Road 64 on the west side of the road on Forest Service lands. Based on the field review and discussions with the Forest Service the route was modified to meet other objectives and local constraints. These included 1) reduce the angles and length of line along Highway 34 by crossing a section of privately-owned land after discussions with the landowner; 2) remove a tall structure and move a segment of line away from encroaching buildings; 3) avoid a residence on the west side of CR 64 and north of the campground; 4) try to minimize use of private land; and 5) minimize the number of structures within the campground. A minor adjustment to the alignment was made on the private parcel to the north, at the property owners request. The adjusted alignment for the preferred alternative is described in Section 2.2.5 of the FEIS and is shown on Map 2-3. The environmental impacts of the modified preferred alternative on land use, visual resources, socioeconomics, and recreation were updated in Table 2-7 and in Sections 4.7.3.6 , 4.8.3.7, 4.9.3.5, and 4.10.3.5 of the FEIS to reflect the change.

A request that the preferred alternative follow the alignment of Alternative C1 through the 1,500-acre planned development north of the Colorado River (on the south end of the project) was not added as the preferred alternative. Additional consultation with Colorado Parks and Wildlife confirmed conclusions made in the DEIS regarding impacts of the proposed alternatives to sage grouse. Careful consideration of the environmental consequences of the proposed alternatives confirmed that the preferred alternative (Alternative D - Option 1) balanced impacts to planned development and wildlife resources located just north of the property boundary. Responses to comments I-13-1 through I-13-8 in Appendix L further document the rationale for selection of Alternative D - Option 1 as the preferred alternative on the south end of the project.

Other changes to the DEIS included updates to Section 1.6 to describe the public review period for the DEIS, and other minor technical edits to text or maps for clarity.

Unresolved Issues

The specific locations of structures and the need for additional access roads cannot be determined until final design and engineering of the preferred alternative. Access is not required along the entire length of the transmission line for construction and maintenance.

However, for purposes of the EIS, it has been assumed that disturbances from access roads may occur anywhere within the proposed and alternative ROWs. This provides for a worst-case analysis of impacts in the EIS, in terms of calculated areas of disturbance. Site-specific access requirements would be addressed as the design phase proceeds. Western's standard construction practices and project-specific environmental protection measures would be incorporated into the design of any new access roads required for the project. If the proposed alignments for new access roads are outside the ROWs considered in this EIS, additional surveys and/or consultation for natural and cultural resources would be conducted prior to project implementation. All access roads on National Forest System (NFS) lands must be authorized by the Forest Service and will be designed by qualified engineers to the appropriate Forest Service standards. Road siting, designs, construction practices, operations and maintenance protocols, and closures of temporary roads on NFS lands will meet Forest Service standards and be approved by the Forest Service Authorized Officer prior to commencement of any surface-disturbing activity.

Areas of Controversy

Correspondence between Western and the Grand County Department of Planning and Zoning has identified several areas of non-concurrence regarding permit requirements, consistency with land use plans and policies, and the scope of the EIS impact analysis. Specific areas of non-concurrence between Western and Grand County include:

- The degree to which the project has achieved substantive compliance with Grand County permit requirements and land use policies
- Viability of alternatives that would rebuild and upgrade the Adams Tunnel cable, or construct the transmission line as an underwater power cable below Lake Granby
- Whether to include within the scope of the EIS an analysis of effects of the proposed project on the operations and pumping capacity of the CB-T project, and other West Slope water diversion projects (i.e., the Windy Gap Firming Project)
- Whether to include within the scope of the EIS an analysis of cumulative effects to aquatic and scenic resources resulting from reservoir water level fluctuations and water development projects
- Whether to include within the scope of the EIS an analysis of effects of the proposed project on continued hydroelectric power generation for pumping plant power

Correspondence between Western and Grand County is provided in Appendix B.

Alternatives Carried Forward for Analysis

A range of reasonable alternatives for the proposed project was identified by evaluating routing opportunities and constraints, engineering design standards, public comments, and environmental resources. The overall objective was to identify alternatives that address public, environmental, and social concerns, and meet the project purpose and need and engineering criteria for the transmission line rebuild.

Relevant issues identified during both the EA and EIS public scoping processes were used to refine the alternatives. The Arapaho-Roosevelt National Forest *1997 Revision of the Land Resource Management Plan* (Forest Plan) goals and objectives, and Grand County zoning and land use policies applicable to the Project Area, were also considered in the development of alternatives.

The five alternatives carried forward for analysis in this EIS are described below and presented on Map ES-2:

- **Alternative A** – Keep the existing transmission line (no action)
- **Alternative B1** – Rebuild and upgrade the transmission line primarily on the existing transmission line ROW
- **Alternative C1** – Reroute and upgrade the transmission line
- **Alternative C2** – Reroute and upgrade the transmission line, with options to use existing utility ROWs
- **Alternative D-Options 1 and 2** – Rebuild and upgrade the transmission line primarily on existing utility ROWs (preferred alternative)

Alternative A (No Action)

Under Alternative A, Western would continue to operate and maintain the existing transmission line. This would include replacing hardware, replacing deteriorated structures, managing vegetation, maintaining access, and other maintenance activities to ensure the safety and reliability of the transmission line. Alternative A would keep the existing 69-kV transmission line for approximately 13.6 miles between the Windy Gap Substation and the Granby Pumping Plant. From the Windy Gap Substation to the Stillwater Tap, the existing transmission line is located on a 30-foot right-of-way (ROW). At Stillwater Tap, the Granby Pumping Plant-Windy Gap 69-kV line and the Marys Lake-Granby Pumping Plant 69-kV line (which goes through the Adams Tunnel) meet and begin paralleling each other, with some minor deviations, from Stillwater Tap into the Granby Pumping Plant Switchyard. Each 69-kV transmission line has a 100-foot ROW. Both lines are constructed on wood pole H-frame structures.

Alternative B1-Rebuild and Upgrade Primarily on Existing Transmisssion Line ROW

Alternative B1 was derived from the original Alternative B presented during the EA scoping and alternative development processes. Alternative B1 is identical to the original Alternative B, with one exception: the transmission line alignment on the east side of Table Mountain.

Alternative B would have expanded the existing 30-foot ROW to 100 feet and would have potentially impacted several homes. Alternative B1 uses a new 1.3-mile alignment on the east side of Table Mountain by routing the line just inside the ANRA boundary, therefore avoiding possible home relocations.

Alternative B1 would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant. The rebuild would include constructing approximately 11.8 miles of 138-kV double-circuit line on the existing alignment. However, the existing 30-foot ROW is considered inadequate for the new transmission line and would be expanded to a width of 100 feet to accommodate requirements for construction, operation, and maintenance per the National Electric Safety Code (NESC). The existing single circuit 69-kV H-frame wood pole transmission line would be removed. At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three terminal line. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby

Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard and a new 138-kV/138-kV double-circuit line (operated at 69-kV/138-kV) would be constructed.

Alternative C1-Reroute and Upgrade the Transmission Line

Alternative C1 was derived from the original Alternative C presented during the EA scoping and alternative development processes. Alternative C was originally Western's Proposed Action for the project. Alternative C1 is identical to the original Alternative C, with one exception. The primary difference between Alternative C and Alternative C1 is the transmission line routing in the vicinity of the Willow Creek crossing. Alternative C was originally routed north of the Windy Gap Pipeline and behind a topographic rise in this area to avoid visual impacts to Scenic Byway users. Due to wildlife disturbance concerns as a result of creating a new ROW in this area, the Alternative C1 transmission line would be routed back onto the Windy Gap Pipeline at the Willow Creek crossing.

Alternative C1 would reroute and upgrade the transmission line between the Windy Gap Substation and the Granby Pumping Plant. The reroute would include constructing approximately 12.2 miles of 138-kV double-circuit transmission line using single-column steel poles designed for 138-kV operation on a primarily new length of ROW. The existing single circuit 69-kV H-frame wood pole transmission line would be removed. At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three terminal line with. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard and a new 138-kV/138-kV double-circuit line (operated at 69-kV/138-kV) would be constructed.

Alternative C2-Reroute and Upgrade with Options Using Existing Utility ROWs

Alternative C2 was derived from the original Alternative C presented during the EA scoping and alternative development processes. Alternative C was originally Western's Proposed Action for the project. Alternative C2 is identical to the original Alternative C, with two exceptions. The primary differences between Alternative C and Alternative C2 are the transmission line routing in the vicinity of the Willow Creek crossing and the use of either the existing transmission line alignment or the Windy Gap Pipeline ROW between Windy Gap substation and Willow Creek.

At the Willow Creek crossing, Alternative C was originally routed north of the Windy Gap Pipeline and behind a topographic rise in this area to avoid visual impacts to Scenic Byway users. Due to wildlife disturbance concerns as a result of creating a new ROW in this area, the Alternative C2 transmission line would be routed back onto the Windy Gap Pipeline at the Willow Creek crossing. At the west end of the Project Area, Alternative C (and Alternative C1) was routed, at the request of a private property owner, to follow the boundary of the private parcel. However, due to wildlife disturbance concerns as a result of creating a new ROW in this area, primarily sage-grouse habitat disturbances and the potential for avian-line collisions, Western developed Alternative C2, which would use either the Windy Gap pipeline ROW or the existing transmission line ROW on the west end.

Alternative C2 would reroute and upgrade the transmission line between the Windy Gap Substation and the Granby Pumping Plant. The reroute would include constructing approximately 12 miles of 138-kV double-circuit transmission line using single-pole steel structures designed for 138-kV operation. The existing single circuit 69-kV H-frame wood pole transmission line would be removed. At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three terminal line. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard and a new 138-kV/138-kV double-circuit line (operated at 69-kV/138-kV) would be constructed.

Alternative D-Options 1 and 2 – Preferred Alternative (Option 1)

This alternative was derived from the original Alternative B presented during the EA scoping and alternative development processes and has two options. Of the two options, Option 1 is the preferred alternative. The only difference between the two options occurs east of the Windy Gap Substation. Immediately east of Windy Gap Substation, Alternative D-Option 1 would follow the Windy Gap Pipeline for the initial 2.5 mile segment while Option 2 would remain on the existing transmission line ROW. The two options converge at a point approximately 3 miles east of Windy Gap Substation and follow the same alignment over the remaining distance to the Granby Pumping Plant. In response to public comments on the DEIS, an adjustment was made to the alignment of Alternative D in the vicinity of Cutthroat Bay Campground, which moved a portion of the alignment to the west side of CR 64 (Map 2-3).

Alternative D, both options, would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant. The rebuild would include constructing approximately 11.7 miles of 138-kV double-circuit line on the existing alignment or the Windy Gap Pipeline ROW. However, the existing 30-foot transmission line ROW is inadequate for the new transmission line and would be expanded to a width of 100 feet to accommodate safety requirements for construction, operation, and maintenance. The existing single circuit 69-kV H-frame wood pole transmission line would be removed. At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three terminal line. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard and a new 138-kV/138-kV double-circuit line (operated at 69-kV/138-kV) would be constructed.

Western has adopted standard construction, operation, and maintenance practices (SCP) that would avoid or minimize impacts to the environment to the greatest extent practicable. Design criteria are actions or measures integrated into the project design to avoid, minimize, reduce, or eliminate adverse effects as a result of implementing the “action” alternatives. For the Granby Pumping Plant-Windy Gap transmission line rebuild, Western’s Standard Construction and Mitigation Practices and Special Measures would be implemented for the construction of any action alternative. These measures are part of Western’s proposed project and are considered in this EIS.

Additionally, resource-specific environmental protection measures were developed to minimize or avoid resource impacts.

Key Differences between Alternatives

The key differences between the alternatives are route location (east or west of Table Mountain), ROW type (existing or new), and voltage (69-kV single circuit or 138-kV double-circuit [operated at 69-kV and 138-kV]).

The existing alignment (Alternative A) is routed to the east of Table Mountain on an existing 30-foot ROW. Alternatives B1 and D, both options, would generally follow this same alignment to the east of Table Mountain, but on an expanded 100-foot ROW. These alternatives also include slight alignment variations from the existing ROW due to site-specific concerns. Alternatives C1 and C2 would follow a primarily new alignment on the west side of Table Mountain on a new 100-foot ROW. Alternatives C1, C2, and D, both options, parallel the Windy Gap Pipeline ROW to some extent.

Alternative A consists of a single-circuit 69-kV line whereas Alternatives B1, C1, C2, and D, both options, would use a 138-kV double-circuit line (operated at 69-kV and 138-kV).

Alternatives Considered but Eliminated

Western considered 11 alternatives that were ultimately eliminated from further analysis. In summary, Western investigated, but eliminated full or partial underground line construction, a rebuild of the Adams Tunnel Cable, construction of an underwater transmission line, and partial above-ground rebuilds. Brief descriptions of all alternatives considered but eliminated are provided below:

Eliminated Alternative #1-Rebuild and Upgrade to Granby Substation

This alternative would rebuild 6 miles of existing line with double-circuit 138-kV line; enlarge Western's existing Granby Substation to accommodate a second power transformer and expanded switchyard; and leave the existing transmission line between Granby Substation and Granby Pumping Plant Switchyard intact. This alternative was eliminated because of environmental concerns related to seepage at the Granby Substation enlargement site, visual intrusiveness, and not meeting Western's purpose and need to ensure looped transmission service to its customers, since the Granby Pumping Plant Switchyard would become a radially fed load after loss of the Adams Tunnel 69-kV cable. This alternative would only defer the rebuild of the remaining 6 miles from Granby Substation to Granby Pumping Plant Switchyard. At 70 years old, Western would still need to rebuild this line at some future time to ensure system reliability and safety criteria are met.

Eliminated Alternative #2-Rebuild and Upgrade to Stillwater Tap

This alternative would rebuild 10 miles of the existing 69-kV line with double-circuit 138-kV line, construct a new substation at Stillwater Tap to house a power transformer and switchyard, and would leave the existing line between Stillwater Tap and Granby Pumping Plant Switchyard intact. This alternative was eliminated because of seepage concerns and unstable soils identified during a preliminary site investigation that would preclude constructing a substation and installing a second power transformer at Stillwater Tap. This alternative would also leave 2 miles of the existing line in service in an antiquated line configuration.

Eliminated Alternative #3-Rebuild and Upgrade, Expand two Substations

This alternative would rebuild 12 miles of the existing 69-kV line with double-circuit 138-kV line, enlarge Western's existing Granby Substation to accommodate a second power transformer and expanded switchyard, and expand the Granby Pumping Plant Switchyard to accommodate a third power transformer and additional switchyard equipment. This alternative was eliminated because of general ineffectiveness. Although this alternative would expand two existing substation facilities, doing so would not provide any additional system benefits over the proposed alternative, which expands only the Granby Pumping Plant Switchyard. As such, this alternative does not offer any unique advantages over the action alternatives carried forward for further analysis.

Eliminated Alternative #4-Underground Entire Length

This alternative would underground all of the approximately 12.2 miles of 69-kV and 138-kV double-circuit transmission line on a combination of new and existing ROW along the alternative alignments. By eliminating the need for above-ground transmission structures and conductors, underground construction would reduce the project's visibility and impacts on visual resources. The primary disadvantages of underground transmission line construction include cost, the time and expense required to locate and repair problems if outages occur, and the recurring environmental impacts associated with maintenance activities, such as searching for and repairing problems.

The large volume of earthwork required to underground the proposed transmission line would result in increased impacts to soil, surface geology, water quality, and biological resources (including sensitive habitats that support threatened and endangered species), which could be avoided by spanning with overhead construction. Removal of vegetation to native soil could create an avenue for the spread of invasive species and weeds, and may have a long-term visual impact if ground disturbance causes a change in the vegetation assemblage occurring in the ROW.

Western does not currently operate or maintain underground high voltage cable circuits. If these two transmission lines are installed underground, Western does not have the expertise or equipment to maintain and service them. It is not practical or cost effective for Western to acquire the specialized personnel or equipment necessary to install, maintain, and operate 12.2 miles out of Western's 17,000 miles of transmission lines. Western would likely contract maintenance to a company with specialized personnel and equipment. This would substantially increase maintenance and operation costs, which ultimately conflicts with the project need to reduce maintenance and operation costs for Western, Tri-State, and NCWCD (see Section 1.2). Furthermore, relying on a third-party company for specialized personnel or equipment to mobilize and respond to repair situations could result in extended outage time for customers. In addition to these maintenance and ownership issues, the EIS discusses additional effects of undergrounding, including relative cost, reduced project life, and environmental disturbance and impacts that make the alternative impractical.

Eliminated Alternative #5-Underground Betweeen Stillwater Tap and Granby Pumping Plant

This alternative would underground approximately 1.7 miles between Granby Pumping Plant Switchyard and Stillwater Tap of the 12.2-mile 138-kV double-circuit transmission line. The remainder of this alignment would be modeled on the original Alternative C (see Eliminated Alternative #10). This alternative would have removed the existing 11.8 miles of single-circuit 69-kV H-frame wood pole transmission line, installed one new 69-kV three-way switch at the Stillwater Tap, and constructed additions at Granby Pumping Plant Switchyard and Windy Gap Substation.

This alternative was ultimately eliminated because of long-term operational and maintenance difficulties and cost issues. This alternative would rebuild 100 percent of the length of line identified in the action alternatives carried forward for further analysis, but for 155 percent of the cost. Operational, maintenance, and environmental issues, as described for Eliminated Alternative #4, would also apply to underground sections of the transmission line in Eliminated Alternative #5.

Eliminated Alternative #6-Rebuild and Upgrade Adams Tunnel Cable

This alternative would rebuild and upgrade the 13.2-mile Adams Tunnel cable from 69-kV to 138-kV. This alternative was eliminated because of cost, construction constraints, maintenance access constraints, health and safety concerns for construction and maintenance workers (due to air quality, confined spaces, and access for emergency rescue), and the fact that the alternative did not fulfill Western's stated purpose and need to update the antiquated line configuration on the ground from the Granby Pumping Plant Switchyard to the Windy Gap Substation.

The primary use of the Adams Tunnel is for transporting drinking and irrigation water to communities along the Colorado Front Range. The tunnel transports water 11 months out of the year. Tunnel inspections and repairs, as well as physical inspections and tests on the existing 69-kV circuit, are all completed within a 4-week window each year when the tunnel is drained. Water delivery could be interrupted for up to 8 weeks with prior coordination with the Bureau of Reclamation, allowing a maximum construction duration of 5 weeks per year with mobilization and demobilization to/from the construction site (Black & Veatch 2006). Scheduling construction and maintenance activities within the tunnel are, therefore, extraordinarily constrained. It would take numerous years to replace the existing cable or a failed cable installed in the Adams Tunnel. This scenario could leave the transmission system serving the Project Area in a radial configuration for an unacceptable period of time while a cable is repaired or replaced. The possibility that the transmission system may be in a radial configuration for extended periods of time does not meet the purpose and need for looped transmission service. This alternative is also cost-prohibitive, costing 1,150 percent more than the action alternatives carried forward for further analysis.

Eliminated Alternative #7-Install Part of Project Inside Windy Gap Water Pipeline

This alternative would install approximately 6 miles of the 12.2 miles of 138-kV double-circuit transmission line as cable inside the Windy Gap Water Pipeline, from near the Windy Gap Substation to Lake Granby. The remaining 6.2 miles of 138-kV double-circuit transmission line would be similar to the original Alternative C (see Eliminated Alternative #10). This alternative was ultimately eliminated because it was determined to be technically infeasible. Unlike the Adams Tunnel, the Windy Gap Water Pipeline was not designed to accommodate electrical power cables. The primary use of the Windy Gap Pipeline is for transporting drinking and irrigation water. It is technically infeasible to construct and maintain a transmission line within the pipeline.

Eliminated Alternative #8-Install 3 miles of Underwater Cable Across Lake Granby

This alternative would install 3 miles of the 9 miles of double-circuit transmission line as an underwater power cable below Lake Granby. The remaining 6 miles of 138-kV double-circuit transmission line, from where the line would enter Lake Granby to the Windy Gap Substation, would be constructed similar to Alternative C.

Western engineers conducted a preliminary review of the concept. Some of the construction and engineering issues were related to getting underwater cable-laying equipment (which is usually seagoing) to an inland lake; trenching in very shallow water; cable weight and the logistics of cable delivery and transfer to the cable-laying equipment; long-term maintenance, including keeping a barge on the lake that could raise and lower the replacement cables for repairs, and repairing/replacing cable lengths during the winter while the lake is iced over; and the potential for extended outages if the cable failed. Public safety concerns include the potential for the cable to be exposed when water levels are low.

Western does not currently own or operate any underwater high-voltage-cable circuits. It is not practical or feasible for Western to acquire the specialized personnel or equipment necessary to install, maintain, and operate 3 miles of underwater cable out of Western's more than 17,000 miles of transmission lines. This would increase maintenance and operation costs, which ultimately conflicts with the project need to reduce maintenance and operation costs for Western, Tri-State, and NCWCD.

Preliminary estimates of the cost of materials indicate that underwater cable is prohibitively expensive for small projects like the proposed action. Since power system reliability is a key component of Western's purpose and need and the costs of this alternative were not economically feasible, this alternative was determined to be not viable and was eliminated from further consideration.

Eliminated Alternative #9 – Original Alternative B

The original Alternative B, as presented during the EA process and during the EIS scoping period, has been eliminated. Alternative B would have rebuilt and upgraded the line through the Scanloch Subdivision (east side of Table Mountain). This alternative was eliminated due to the high potential for unacceptable impacts to homes and homeowners (e.g., relocations or condemnations). Additionally, this alternative is similar to Alternative B1 and would not have substantially contributed to the range of reasonable alternatives.

Eliminated Alternative #10 – Original Alternative C

The original Alternative C, as presented during the EA process and during the EIS scoping period, has been eliminated. Variations of this alternative are being carried forward for analysis; however, the Alternative C segment at the Willow Creek Crossing (formerly called the “knoll” reroute) has been eliminated due to high potential for unacceptable impacts to sage grouse habitat that could be easily avoided by relocating a minor line segment. Additionally, this alternative is similar to Alternatives C1 and C2 and would not have substantially contributed to the range of reasonable alternatives.

Eliminated Alternative #11 – Outside the Project Area

Early in the planning process, prior to preparation of the initial EA, Western and Tri-State investigated whether other routing options existed outside of the Project Area. No other feeds from outside the service area were identified as sources to provide the secondary transmission feed needed to establish a looped transmission system. As such, this alternative could not satisfy the reliability aspects of the project purpose and need. Additionally, the large distances and topographic constraints requisite with a regional-scale construction project would have resulted in unacceptable resource impacts that could be avoided.

Impact Comparison

Table ES-1 provides a general summary comparison of effects by alternative. Impacts are similar between the action alternatives for accidents and intentional acts of destruction, air quality, aquatic resources, cultural resources, electric and magnetic fields (EMF), paleontological resources, soils, and terrestrial and avian wildlife.

All the action alternatives have lower EMF at the ROW edge, and a reduced risk of damage from accidents and intentional acts of destruction, compared to the no-action alternative (Alternative A).

Construction and/or maintenance activities proposed for all alternatives would result in negligible to moderate impacts to air quality, aquatic resources, paleontological resources, and soils due to ground disturbance and the use of heavy equipment in the ROW.

Acreage of impacts to vegetation is similar for each alternative, but the type of vegetative cover impacted varies slightly between the action alternatives. Alternatives B1and D would have a slightly greater impact on vegetative communities, because more forested cover would be impacted by construction and vegetation management activities. Both these alternatives would cross more acres of aspen and lodgepole pine communities. Alternatives C1 and C2 would cross fewer acres of forested communities and more sagebrush communities. Sagebrush would be allowed to return to the project ROW following construction, and therefore these alternatives would have short-term impacts.

Construction and maintenance activities proposed for all alternatives could also adversely affect cultural resources, if historic properties cannot be avoided. Impacts to cultural resources could range in severity from negligible to significant, depending on the final treatment of sites identified in the alternative ROWs. The treatment of historic properties in the alternative ROWs, and mitigation for adverse effects, will be determined in consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Results of this consultation are included in the Final EIS.

Key differences between alternatives with regard to land use, socioeconomics, recreation, special status plant and wildlife species, terrestrial and avian wildlife resources, visual resources, and wetlands are described below:

Land Use

Alternative A would maintain the existing transmission line and ROW that passes through the Scanloch Subdivision for 1 mile, as well as the Stillwater Estates Subdivision, the Lakeridge Mountain Valley Subdivision, and other smaller neighborhoods along the north end of the Project Area. Sixty improved residential lots, two residential lots with mobile homes, and 55 vacant residential lots are located within 100 feet of the current alignment. An additional 60 improved residential lots, six condominiums, and 48 vacant residential lots are located at a distance between 100 and 300 feet.

Alternative B1 follows the existing transmission line, except at two locations. Alternative B1 does not cross through the Scanloch Subdivision; instead, it borders the subdivision’s western boundary for approximately 1 mile. The alignment also diverges from the existing corridor on the north end of the Project Area. Forty-three improved residential lots, two residential lots with mobile homes, and 18 vacant residential lots are located within 100 feet of the alignment of

Alternative B1. An additional 51 improved residential lots, six condominiums, and 55 vacant residential lots are located at a distance between 100 and 300 feet.

The alignment for Alternative C1 is located on NCWCD land west of Table Mountain, and does not directly pass through either the Stillwater Estates or the Scanloch subdivisions. It also does not require new ROW easement on the ANRA, east of Table Mountain. This alternative crosses the C Lazy U Preserves for 0.5 mile along its northeastern edge, including approximately 0.1 mile of the property that has a conservation easement on it. Thirty-five improved residential lots and 10 vacant residential lots are located within 100 feet of the current alignment. An additional 30 improved residential lots, two residential lots with mobile homes, six condominiums, and nine vacant residential lots are located at a distance between 100 and 300 feet.

Alternative C2, which has two options, differs from Alternative C1 only in the approximately 2-mile segment immediately east of the Windy Gap Substation. Therefore, the description of land use along Alternative C2 is similar to that provided for Alternative C1.

Alternative D-Option 1 follows the ROW of the Windy Gap pipeline for several miles between the Windy Gap Substation and the Granby Substation, and then follows the alignment of Alternative B1 to the project terminus on the north end of the Project Area. The alignment for Alternative D-Option 2, is located south of Alternative D-Option 1 east of the Windy Gap Substation. Alternative D-Options 1 and 2 each have fewer residences located within 100 feet of the centerline, a total of 4 compared to 13 for Alternative B1.

Socioeconomic and Environmental Justice

All action alternatives would be expected to have beneficial effects on the local economy from construction phase employment and expenditures, and increased reliability of the transmission system, whereas the no-action alternative (Alternative A) could have indirect adverse effects on the local economy if the reliability of the transmission system is diminished over time. None of the alternatives would have adverse impacts with regard to environmental justice.

Recreation

The adjusted alignment for Alternative D-Options 1 and 2 would move the alignment for Alternative D further to the west along County Road 64 nearer to the Forest Service Cutthroat Bay Campgroud. The adjusted alignment for Alternative D would be located to minimize conflicts with recreational uses in the campground while addressing requests from local landowners to move the line further from their residences. The existing transmission line located between the use areas and the lakeshore, would still be removed. Visual impacts from the modification are discussed in Section 4.8, Visual Resources.

Special Status Plant Species

Field surveys documented the presence of five Forest Service species of local concern within or at the edge of the ROW of Alternatives A, B1, and D, both options: *Botrychium hesperium* (western moonwort), *Botrychium minganense* (mingan moonwort), *Pediocactus simpsonii* (Simpson's hedgehog cactus), *Dermatocarpon reticulatum* "vagrant form" (reticulate earth lichen), and *Penstemon cyathophorus* (cupped penstemon). Suitable habitat for other special status species was also confirmed. Cupped penstemon and suitable habitat for other Forest Service Sensitive species was documented in the ROW for Alternatives C1 and C2. Construction and/or maintenance activities proposed under all alternatives would result in minor to moderate adverse effects on special status plant species and habitat occurring within the alternative ROWs. None of the alternatives would result in a species being listed or proposed for listing as threatened or endangered.

Special Status Terrestrial, Avian, and Aquatic Wildlife Species

Federally listed species are not affected by any of the project alternatives.

The greater sage grouse is a Forest Service Sensitive (FSS) species that inhabits sagebrush. Colorado Parks and Wildlife (CPW) currently monitors two sage-grouse leks, or breeding grounds, near the project alternatives: the Horn West lek and the Horn lek (inactive). The Horn West lek is located on private property on the western end of the project area and is approximately 0.8 mile north of Alternatives A, B1, and D-Option 2. The Horn lek is 0.3 mile north of Alternative C1, 0.5 mile north of Alternative C2–Option 1, and 0.8 mile north of Alternative C2-Option 2.

Operation of the proposed transmission line could result in increased mortality from an increase in raptor perches in the ROW. Increased perching opportunities for raptors leads to increased predation rates on breeding sage grouse. Sage grouse are also at risk for collision with transmission lines. Alternatives C1, C2-Options 1 and 2, and D-Option 1 would result in moderate to significant long-term impacts to the greater sage grouse and associated sagebrush habitats. However, Alternative C2-Option 2 would result in fewer impacts than Option 1 because it would rebuild the line in the existing transmission ROW, which is located further south of the Horn lek site. Alternatives A, B, and D-Option 2 are located slightly further from the active lek and within existing ROW; therefore, these alternatives would be expected to result in fewer impacts to the greater sage grouse.

An active golden eagle nest is located on Table Mountain. Alternatives C1 and C2 would have adverse impacts to golden eagles because they would construct new ROWs and alter habitat on the west side of Table Mountain, in the vicinity of an active nest.

Visual Resources

Under Alternative A, the existing adverse effects from the existing 69-kV transmission line would continue. Since its construction approximately 70 years ago, viewers have become accustomed to the adverse effects of the existing transmission line, lessening its visual impact. However, views from existing commercial and residential buildings and Cutthroat Bay Campground facilities, located directly under the existing transmission line or immediately adjacent to the ROW, would continue to be significantly affected. Foreground views from existing commercial and residential buildings, the scenic byway, Lake Granby, and use areas within the ANRA would continue to be adversely affected, though to a lesser degree than what would occur under the action alternatives. All action alternatives would achieve BLM Visual Resource Management (VRM) Class II and III objectives. Views of multiple power lines (both Western and MPEI) from Key Observation Points (KOPs) 1, 2, 3, and 5 (from the Stillwater Tap to the Granby Pumping Plant Substation), and KOP 12 (Granby Substation near the intersection of the scenic byway and Willow Creek Road) do not currently achieve the Forest Service Predominant Scenic Integrity Objectives (SIO) of High for the scenic byway and Moderate for the remaining lands within the ANRA. The Secondary SIO of Low would be met. Therefore, the no action alternative currently complies with Forest Plan Standards and Guidelines.

Under Alternative A, Tri-State would still need to expand their transmission system in the valley with a new transmission line to improve reliability and plan for increasing load demands without the participation of Western. Due to topographic and environmental constraints, their expansion would likely occur in the same general vicinity of Western's line and would require a new ROW. Short and long-term visual effects from the Tri-State expansion would be similar to those of the action alternatives, some of which would be significantly adverse.

All action alternatives would have short and long-term direct impacts to visual resources from the following components: construction activities (clearing, grading, new or expanded ROWs, and construction staging areas), new facilities (access roads, upgraded existing tap and substation facilities, and steel monopoles would replace existing wood H-frames), and operations and maintenance activities. All action alternatives would be visible from the Colorado River Valley (at varying degrees) and from the intersection of the scenic byway and CR 64. Within the ANRA managed by the Forest Service, the Predominant SIOs of High for the scenic byway and Moderate for the remaining lands would not be met. Secondary SIOs are meant to be transitory and subordinate with the Predominant SIOs prevailing in the management area. While the transitory nature of the Secondary SIOs is not defined in the Plan, the useful life of all action Alternatives is many decades and would not meet the Desired Future Visual Condition as listed in the Forest Plan EIS in some areas. While not requiring an amendment to the Plan, all action Alternatives are considered to be in contrast with the intent of the Forest Plan where they cross U.S. Forest Service lands (between 1.5 and 3.8 miles). In the long term, all action alternatives would achieve BLM VRM Class II and III objectives.

Alternative B1 would remove the existing transmission line from the Scanloch Subdivision and place it higher on Table Mountain, decreasing impacts to the residential areas but potentially skyline new structures above the Table Mountain ridgeline as seen from the scenic byway.

Alternatives C1 and C2-Options 1 and 2 would cross more of the Grand County Three Lakes Design Review Area, yet would be least visible from the scenic byway overall and in the ANRA, and have the fewest conflicts with Forest Service SIOs relative to the other action alternatives.

Impacts from Alternative D-Options 1 and 2 would be similar to Alternative B1, except in the Colorado River Valley where it would be less visible than Alternative B1.

Wetland Resources

All action alternatives would remove an existing H-frame structure in a fen wetland. The structure would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. No impacts are anticipated to occur to the fen wetland. Alternatives B1 and D, both options, are not anticipated to require placement of new structures in wetland areas. Alternatives C1 and C2 would place a corner pole in a wetland area, where the alignment turns to the northeast. The span from the corner pole would need to be increased to approximately 1,500 ft to avoid a second pole placement in a wetland. Alternative A (no-action) would have no measurable long-term direct effects on wetlands as a result of maintenance.

Table ES-1. Comparison of Alternative Effects (Resources are listed in alphabetical order.)

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Accidents and Intentional Acts of Destruction	Existing transmission line presents vulnerabilities in the event of a wildfire due to wooden H-frame structures and ROW vegetation. Wooden H-frame structures and single ROW configuration present vulnerabilities in the event of intentional acts of destruction. However, there is a low risk that the existing transmission line would be targeted for destruction. Short-term minor adverse effects on risk to workers in the event of intentional acts of destruction.	Risk of outages and long-term damage to steel structures from wildfire, as well as the duration of outages, would be significantly reduced compared to Alternative A. Minor long-term vulnerabilities in the event of intentional acts of destruction. However, low risk that any of the action alternatives would be targeted. Short-term minor adverse effects on risk to workers in the event of intentional acts of destruction.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Air Quality, Climate, and Global Climate Change	Long-term negligible adverse effects on air quality due to maintenance needs. No measurable effect on global climate change. No potential for cumulative effects to air quality, climate, or global climate change.	Short-term minor adverse effects on air quality as a result of construction activities. Long-term negligible adverse air quality effects as a result of long-term maintenance and operations. No exceedances of National Ambient Air Quality Standards (NAAQS). No measurable cumulative effects to air quality, climate, or global climate change.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1
Aquatic Resources	The existing transmission line crosses three perennial streams, four intermittent streams, and ten canals or ditches. Short-term negligible impacts at surface water crossings.	Similar to Alternative A and crosses the same water bodies. Short-term negligible impacts at surface water crossings.	Crosses three perennial streams, eight unnamed intermittent streams, and two canals. Short-term negligible impacts at water crossings	Similar to Alternatives A and B1, crossing the same surface waters. Short-term negligible impacts at water crossings.	Similar to Alternatives A, B1, and C2 crossing the same surface waters. Short-term negligible impacts at water crossings.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Cultural Resources	Site-specific long-term adverse effects on historic properties, varying in severity. Treatment of sites and mitigation for adverse effects to be determined in consultation with the SHPO under Section 106 of the NHPA. No potential for cumulative effects to cultural resources.	Similar to Alternative A, with one additional site potentially affected. Cumulative effects on cultural resources are expected to be negligible.	Similar to Alternative A, with two additional sites potentially affected. Cumulative effects on cultural resources are expected to be negligible.	Similar to Alternative A, with two additional sites potentially affected. Cumulative effects on cultural resources are expected to be negligible.	Similar to Alternative A. Cumulative effects on cultural resources are expected to be negligible.
Electric and Magnetic Fields (EMF)	Long-term minor adverse effects on power-frequency magnetic fields. Long-term minor adverse effects on audible noise. Cumulative effects on EMF are expected to be negligible.	Lower EMF at ROW edge than existing alternatives (higher EMF within ROW). Minor adverse effects to audible noise (increase) at ROW edge. No effect on FM radio. At ROW edge, induced current values are below the threshold of perception. No effect on Global Positioning Systems (GPS) signal. Cumulative effects on EMF are expected negligible to non-existent (less than existing conditions).	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Land Use	60 improved residential lots, two residential lots with mobile homes, and 55 vacant residential lots are located within 100 feet of the current alignment. No impacts related to ROW expansion. Short-term minor adverse effects on land uses in localized areas as a result of increasing maintenance and repairs to existing line. No potential for long-term cumulative effects.	Short-term minor to moderate adverse construction effects on land uses within and adjacent to the ROW. Forty-three improved residential lots, two residential lots with mobile homes, and 18 vacant residential lots are located within 100 feet of the current alignment. Long-term minor adverse effects on 13 residences located within 100 feet of the centerline due to expanded ROW and associated land use restrictions. Minor to moderate long-term effect on future development of vacant lots within 100 feet of the centerline. Short-term moderate adverse construction effects on agricultural land; negligible long-term impact. Cumulative effects would be negligible to non-existent.	Short-term minor to moderate adverse construction effects on land uses within and adjacent to the ROW. Thirty-five improved residential lots and 10 vacant residential lots are located within 100 feet of the current alignment. Long-term minor adverse effects on 13 residences located within 100 feet of the centerline due to expanded ROW and associated land use restrictions. Minor to moderate long-term effect on future development of vacant lots within 100 feet of the centerline. Short-term moderate adverse construction effects on agricultural land; negligible long-term impact; 0.1 mile of new ROW would cross private land with a conservation easement. If development north and east of the Windy Gap substation resumes, Alternative C1 would result in minor adverse cumulative effects on future land uses in this area. Otherwise, cumulative effects would be negligible to non-existent.	Similar to Alternative C1.	Similar to Alternative B1, except that Alternative D-Options 1 and 2 each have fewer residences located within 100 feet of the centerline, a total of 4 residences compared to 13 for Alternative B1.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Paleontological Resources	No further direct or indirect impacts, unless new excavations are needed for more intensive maintenance activities. No potential for cumulative effects to paleontological resources.	Minor to moderate potential for adverse impacts from structure excavation; sensitive locations to be monitored during construction. Cumulative effects associated with the proposed transmission line rebuild are anticipated to be negligible.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1
Recreation and Wilderness	Negligible, unless maintenance activities occur at recreation sites during the prime use seasons. No potential for cumulative effects to recreation or wilderness resources.	Short-term negligible to minor effects to ANRA from removal/construction activities, depending on timing of construction. Long-term negligible adverse effects on recreation use areas from ROW expansion and clearing. Short-term moderate adverse effect on Cutthroat Bay campground as a result of construction/removal activities. Long-term moderate beneficial effect at Cutthroat Bay campground due to removal of existing line(s). No measurable cumulative effects to recreation or wilderness resources.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1; however, the adjusted alignment for Alternative D-Options 1 and 2 would move the alignment for Alternative D from the east side of County Road 64 to the west side, on Forest Service managed lands at Cutthroat Bay Campground.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Socioeconomics and Environmental Justice	Increased potential for indirect adverse effects on local economy from diminished reliability of the transmission system. No disproportionate effects to minority populations. No cumulative effects on socioeconomics or environmental justice.	Long-term beneficial effects on local economy due to increased reliability of the transmission system. Short-term negligible beneficial effects on local economy from construction phase employment and expenditures. Long-term negligible to minor adverse effects on property values adjacent to the ROW. No disproportionate effects to minority populations. No measurable cumulative effects on socioeconomics or environmental justice.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1
Soils	Short-term negligible adverse effects on soils in localized areas as a result of maintenance and repairs to existing line. No potential for cumulative effects to soil resources.	Short-term, minor to moderate adverse effects from construction disturbance. Long-term minor adverse effects from soil loss and displacement. Approximately 18 acres of soil within the proposed ROW is highly erodible. Little or no cumulative effects to soil resources are expected.	Similar to Alternative B1. Approximately 8 acres of soil within the proposed ROW is highly erodible.	Similar to Alternative B1. Approximately 8 acres of soil within the proposed ROW is highly erodible.	Similar to Alternative B1. Approximately 20 acres of soil within the proposed ROW is highly erodible.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Special Status Plant Species	Short-term, direct minor to moderate adverse effects on special status plant species as a result of maintenance. Short- and long-term, indirect minor to moderate adverse effects on special status plant species and habitat as a result of maintenance. Maintenance activities may impact *Botrychium hesperium, Botrychium minganense, Pediocactus simpsonii*, *Dermatocarpon reticulatum* "vagrant form," and *Penstemon cyathophorus,* which were identified within or at the edge of the ROW for Alternative A.	Similar to Alternative A: Same five species identified during field surveys. Alternative B1 transects the most suitable habitat for special status plants. Impacts to special status plants and habitat would be minor in the short-term and negligible in the long-term.	One species, *Penstemon cyathophorus,* identified during surveys. Impacts to special status plants would be minor in the short-term and negligible in the long-term.	Similar to Alternative C1: One species, *Penstemon cyathophorus,* identified during surveys. Impacts to special status plants would be minor in the short-term and negligible in the long-term	Similar to Alternative A: Same five species identified during field surveys. Alternative D transects the second most suitable habitat for special status plants. Impacts to special status plants and habitat would be minor in the short-term and negligible in the long-term.
Special Status Terrestrial, Avian, and Aquatic Wildlife Species	Short- and long-term minor direct effects to some special status species and habitats. No change in disturbance related to ongoing maintenance activities. Replacement of aged equipment will also impact wildlife. Continued potential for collision with migratory and juvenile birds. Minor potential for cumulative effects.	Short-and long-term impacts to some special status species including risk of avian collision. Alternative B1 is located in proximity to several raptor nests. Less impacts likely to the greater sage grouse and golden eagle nest.	The two special status species of concern for Alternative C1 are greater sage grouse and the golden eagle. Long-term moderate to significant impacts to greater sage grouse and habitat. Increased risk of golden eagle collision with transmission line on west side of Table Mountain.	Similar to Alternative C1; however, Option 2 would result in fewer impacts to greater sage grouse because it would rebuild the line in the existing transmission ROW, which is located further south of the Horn lek site.	Short-and long-term impacts to some special status species including risk of avian collision. Alternative D is located in proximity to several raptor nests. Option 2 would result in fewer impacts to greater sage grouse because it would rebuild the line in the existing transmission ROW, which is located further south of the Horn lek site.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Terrestrial and Avian Wildlife Resources	Existing impacts to birds include potential for collision and electrocution and increased perching opportunities for foraging raptors, resulting in increased predation.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.
Vegetation Resources	Short-term, negligible to minor direct adverse effects on vegetation, increasing with the age of the transmission line, as a result of routine maintenance operations. Long-term, negligible to minor direct adverse effects on vegetation as a result of plant removal.	Short-term direct moderate impacts on individual plants as a result of construction. Alternative B1 would have a slightly greater impact on vegetative communities, because more forested cover would be impacted.	Direct short-term minor impacts on individual plants as a result of construction. Alternative C1 would cross less acreage of forested communities and more sagebrush communities. Sagebrush would be allowed to return to the project ROW following construction, and therefore these alternatives would have short- term impacts.	Direct short-term minor impacts on individual plants as a result of construction. Alternative C2 would cross less acreage of forested communities and more sagebrush communities. Sagebrush would be allowed to return to the project ROW following construction, and therefore these alternatives would have short- term impacts.	Short-term direct moderate adverse effects on individual plants as a result of construction Alternative D would have a slightly greater impact on vegetative communities, because more forested cover would be impacted.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Visual Resources	No or negligible adverse effects from ongoing maintenance activities. Crosses BLM Visual Resource Management (VRM) Class II lands and Forest Service lands with High Scenic Integrity Objectives (SIO). Ongoing adverse effects as Forest Service High SIO objectives continue to not be met. Limited or no potential for cumulative effects to visual resources.	Taller structures and associated disturbance result in moderate to significant long-term visual effects along Highway 34 and areas with Forest Service Retention objectives. Crosses BLM VRM Class II lands and Forest Service lands with High SIO. Alternative B1 would result in long-term, minor adverse cumulative effects to visual resources.	Similar to Alternative B1. However, long-term effects would range from minor to moderate with localized areas of significant effects. Less long-term adverse effects to ANRA, views from Lake Granby, and Highway 34. Crosses BLM VRM Class II lands and Forest Service lands with High SIO. Cumulative effects would be the same as described for Alternative B1.	Similar to Alternative C1. Option 2 crosses BLM VRM Class II lands. Cumulative effects would be the same as described for Alternative B1.	Similar to Alternative B1. Option 2 crosses BLM VRM Class II lands. Cumulative effects would be the same as described for Alternative B1.
Wetland Resources	No measurable long-term direct adverse effects on wetlands and riparian areas as a result of maintenance. Long-term, indirect negligible to minor adverse effects on wetlands and riparian areas. The potential for cumulative effects to wetland resources is limited.	Short-term, direct minor to moderate adverse effects on wetland vegetation, soils, and surface and groundwater flow regimes as a result of construction. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. Alternative B1 crosses the greatest acreage of wetland communities.	Short-term, direct minor to moderate impacts to wetlands during construction for one to two structures in wetland areas. Long-term minor impacts to wetlands include a corner pole in a wetland area, where the alignment turns to the northeast.	Similar to Alternative C1: Short-term, direct minor to moderate impacts to wetlands during construction for one to two structures in wetland areas. Long-term minor impacts to wetlands include a corner pole in a wetland area, where the alignment turns to the northeast.	Similar to Alternative B1: Short-term, direct minor to moderate adverse effects on wetland vegetation, soils, and surface and groundwater flow regimes as a result of construction. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. Alternative D crosses the second greatest acreage of wetland communities.

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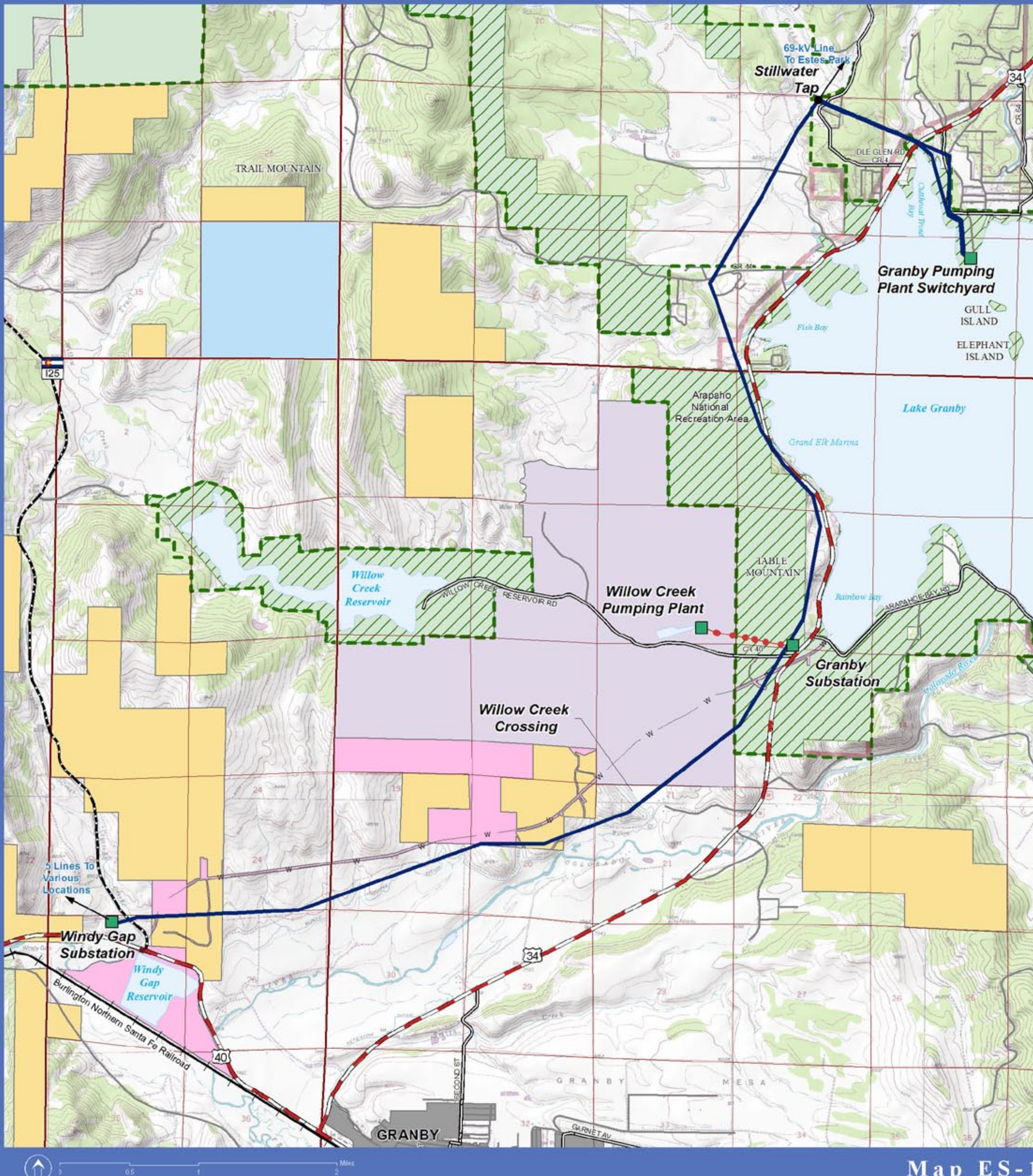


Map ES-1

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)
- Existing 69-kV Transmission Line (Alt. A)

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership

U.S. Forest Service Boundary

Project Area

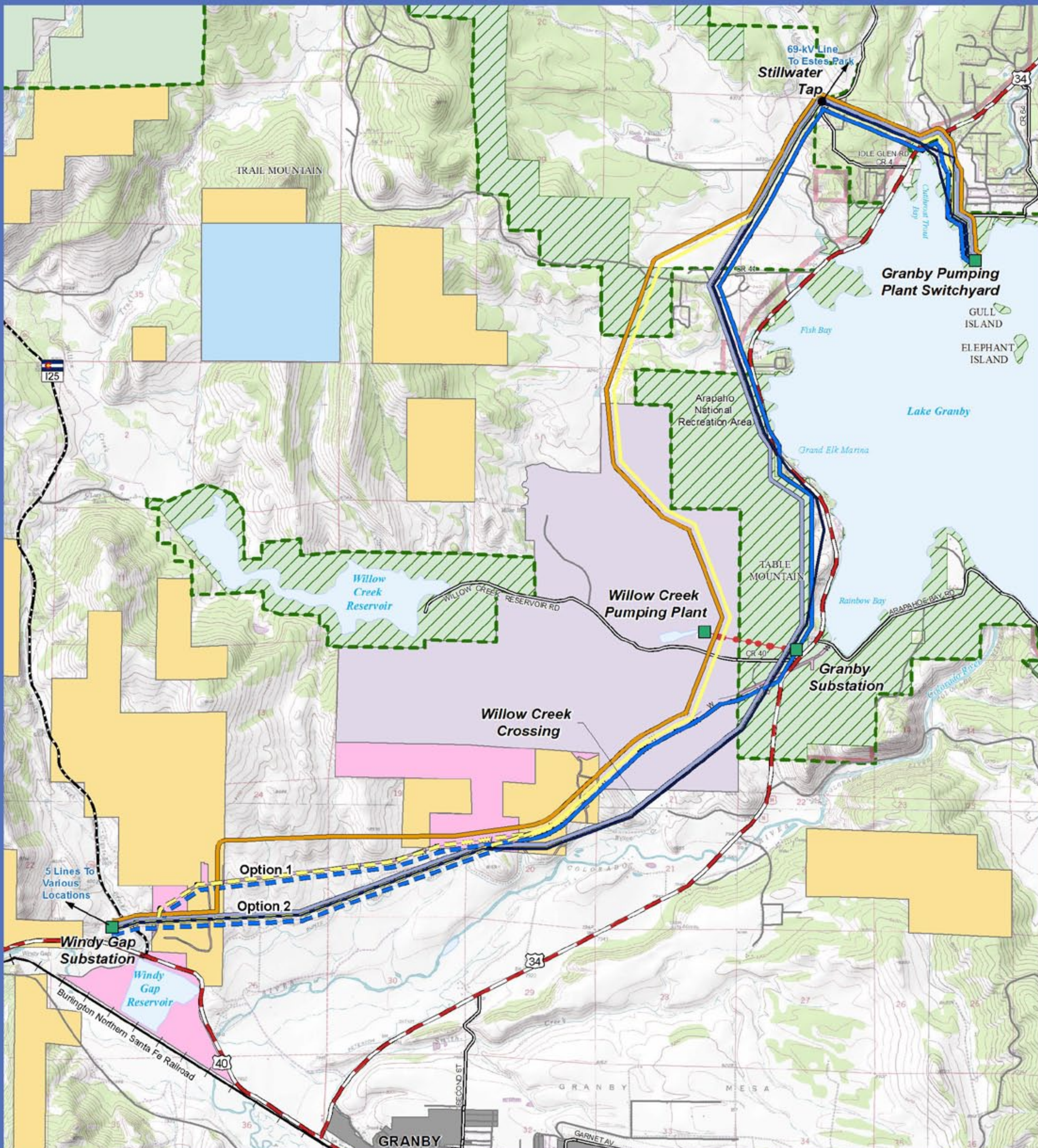
April 2, 2013

Western

AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map ES-2

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

All Alternatives

April 2, 2013

Western AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

1.0 INTRODUCTION

Western Area Power Administration (Western), a power marketing administration within the United States (U.S.) Department of Energy (DOE), is proposing to rebuild and upgrade the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line in Grand County, Colorado (Grand County). This Environmental Impact Statement (EIS) analyzes the impacts associated with the proposal to remove approximately 13.6 miles of 69-kilovolt (kV) transmission line, construct approximately 12 miles of new 138-kV double-circuit transmission line (operated at 69-kV and 138-kV), and add a second power transformer. Alternatives, including a no action alternative, are also analyzed.

Western is the lead federal agency for preparing the EIS, as defined in 40 Code of Federal Regulations (CFR) 1501.5. The U.S. Forest Service (Forest Service), U.S. Bureau of Land Management (BLM), and Grand County are cooperating agencies. Other project participants include Tri-State Generation and Transmission, Inc. (Tri-State), Mountain Parks Electric, Inc. (MPEI), Northern Colorado Water Conservancy District (NCWCD), and Municipal Subdistrict (MS-NCWCD).

Western's EIS process complies with the Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR parts 1500–1508) and DOE NEPA implementing procedures (10 CFR part 1021). Because the proposed project may involve actions in floodplains, the EIS includes a floodplain assessment and floodplain statement of findings following DOE regulations for compliance with floodplain and wetlands environmental review requirements (10 CFR part 1022).

This chapter provides background information on the proposed project, including Western's purpose and need for the project and a description of the analysis area. It also summarizes public involvement activities and describes the key issues, identified through scoping, and comments received on the DEIS. Finally, it describes the organization of the remainder of the EIS document.

1.1 Project Location

The transmission line is located in Grand County. It originates at Windy Gap Substation, located immediately northwest of the intersection of U.S. Highway 40 and State Highway 125, and runs northeast along U.S. Highway 34 and terminates at the Granby Pumping Plant Switchyard at the end of Grand County Road (CR) 64 on the north shore of Lake Granby (Map 1-1). The Project Area includes tracts of land managed by the BLM Kremmling Field Office and Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARNF), including portions of the Arapaho National Recreation Area (ANRA), as well as Colorado State Land Board (SLB), NCWCD, MS-NCWCD, and private lands (Map 1-1).

1.2 Purpose and Need

The Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project is intended to address the electrical deficiencies anticipated due to the eventual failure of the Adams Tunnel cable and the antiquated line configuration in the Project Area. The combination of the eventual failure of the Adams Tunnel cable, the need to provide more reliable service; plan for increasing residential and commercial load demands in the Project Area, and antiquated structures creates a high-risk scenario, potentially jeopardizing power supply for all electric customers in the service area.

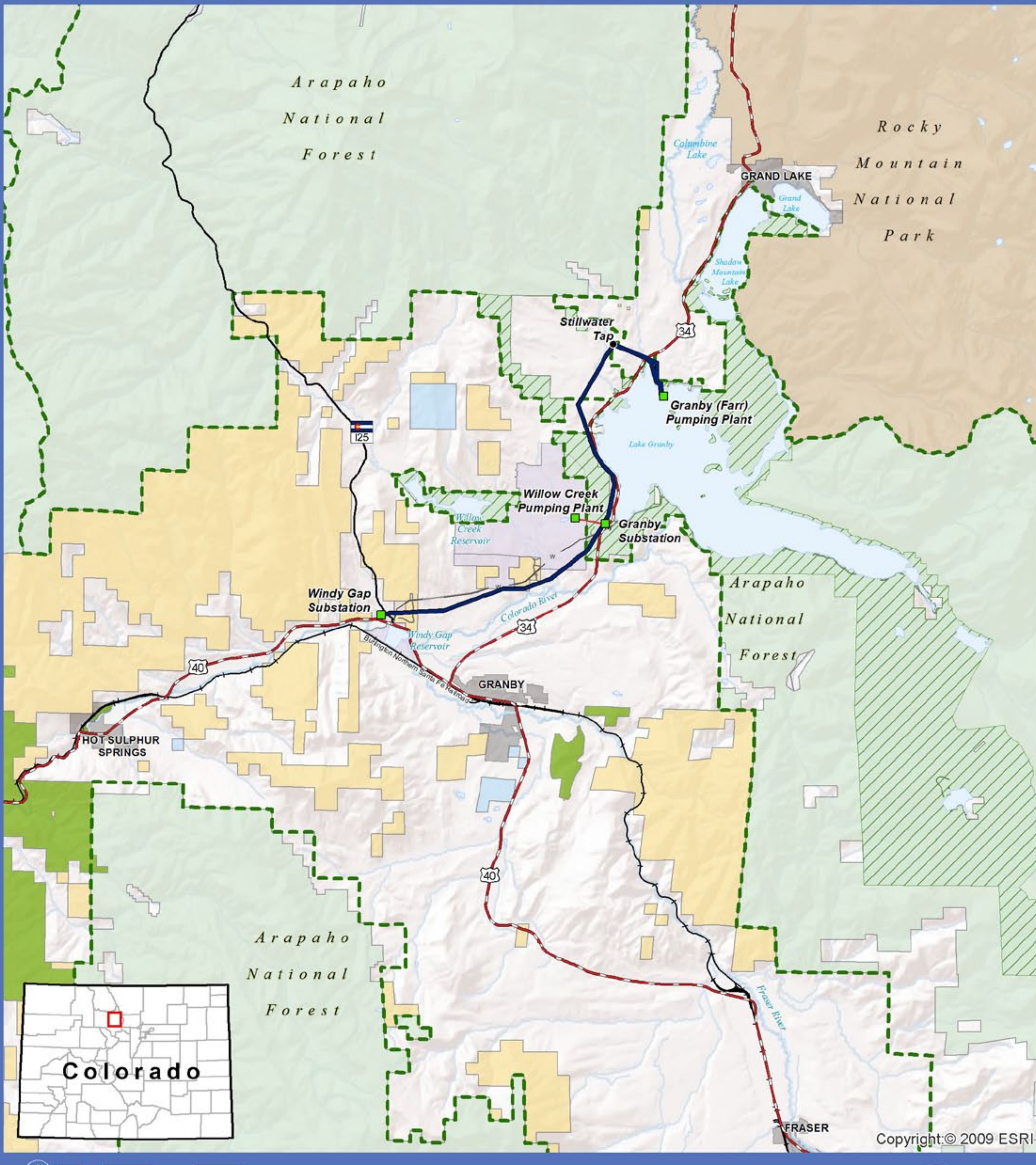
The proposed project is needed to:

- Upgrade voltage to ensure that the electrical system in the area will continue to operate within acceptable voltage criteria while accommodating future load growth in the area.
- Ensure that the electrical system in the area would continue to operate within established electrical criteria during motor starting operations at Farr (Granby) and Willow Creek pumping plants after the eventual failure of the Adams Tunnel power line cable. Engineering studies indicate that once the Adams Tunnel cable is out of service, the voltage drop upon starting the motors at the Willow Creek Pumping Plant would exceed acceptable system limits if load growth in the area continues at the current rate (Western 2003).
- Ensure that Western, Tri-State, and Tri-State's cooperative member (MPEI) are able to serve their customers with reliable service by providing a redundant transmission feed ("looped" transmission service) in the Grand Lake and Granby service areas, in advance of the loss of the Adams Tunnel cable.
- Maintain reliable power supply for existing operations at the Colorado-Big Thompson Project (C-BT) facilities, regardless of future load growth demand in the valley.
- Improve transmission safety by updating antiquated facilities and rebuilding a 70-year-old transmission line to be compliant with current National Electric Safety Code (NESC) standards.
- Minimize long-term transmission line maintenance costs for Western and NCWCD.

1.3 Proposed Project

The proposed project involves rebuilding and upgrading the existing single-circuit line, currently on a 30-foot right-of-way (ROW), as a double-circuit transmission line and adding a second power transformer. The existing 69-kV, H-frame wood pole line would be removed. One circuit would replace the existing 69-kV line; the other circuit would be a new 138-kV line on a 100-foot ROW. The 138-kV double-circuit line would be operated at 69/138-kV. The Granby Pumping Plant Switchyard would be expanded to accommodate the second circuit and power transformer. Windy Gap Substation would also be modified to accommodate the second circuit. This would be a joint participation project between Western, Tri-State, MPEI, and NCWCD.

The Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project would minimize impacts by rebuilding and upgrading the existing 69-kV transmission line as a 138-kV double-circuit, looped transmission system on one set of structures in a single ROW. Western acknowledges that looped transmission service on a single set of structures presents an increased risk of system failure compared to two circuits on separate structures and ROWs. However, given existing land use and environmental constraints throughout the Project Area, two sets of structures on separate ROWs are not reasonable or practical. As discussed in Chapter 2.0, the use of single-pole steel structures with concrete bases would help alleviate some of the single-structure and single-ROW vulnerabilities. Additionally, Tri-State's need to provide a second source of power exists regardless of Western's agreement to participate in the project. By combining the new second circuit (138-kV) with Western's existing 69-kV circuit, electric transmission providers in the valley would consolidate existing facilities to meet growing service area needs, while minimizing impacts.



Map 1-1

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)
- Existing 69-kV Transmission Line

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado Divison of Wildlife (CDOW)
- National Park Service (NPS)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

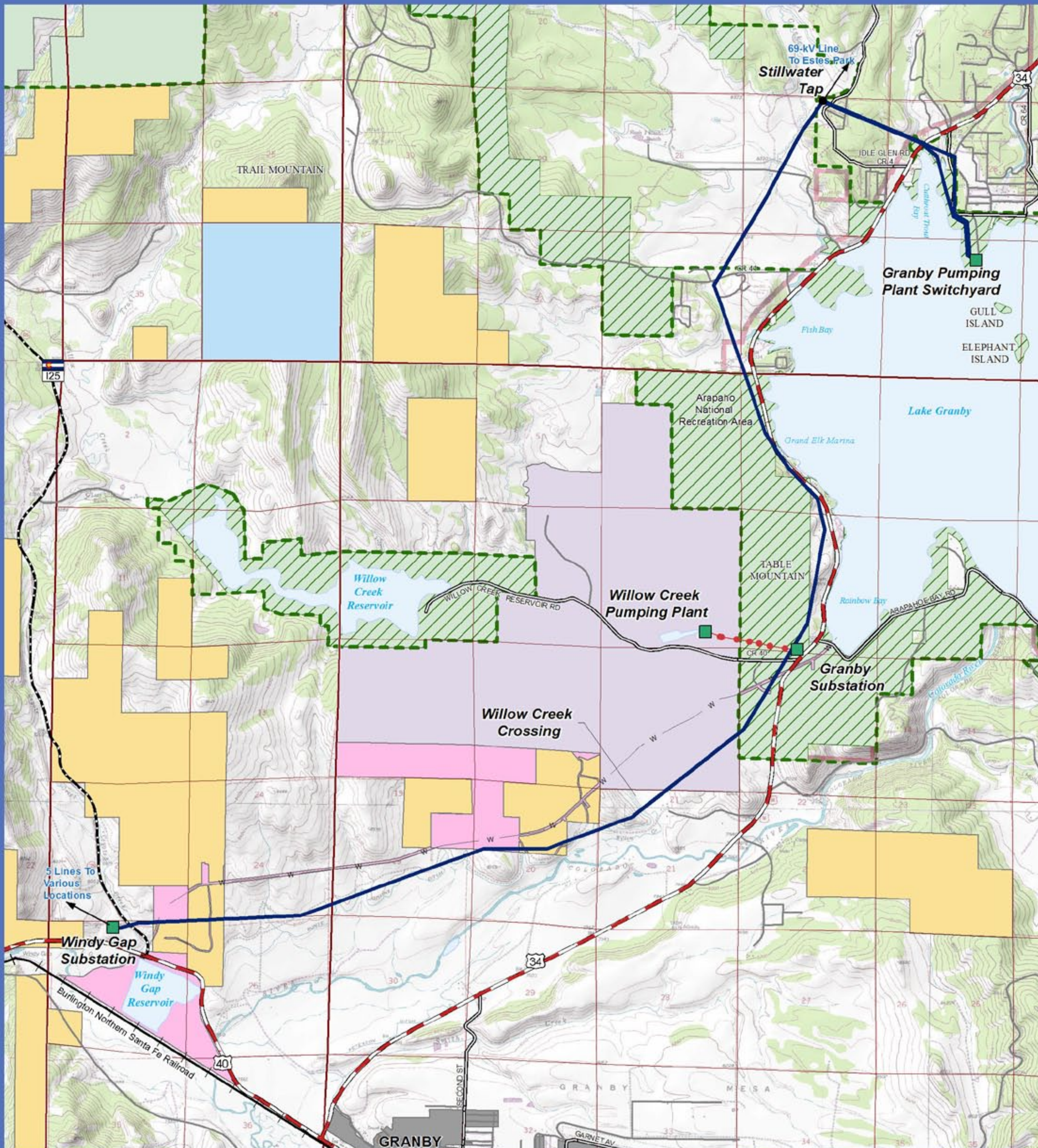
Locator Map

April 2, 2013

Western AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



0 0.5 1 2 Miles

Map 1-2

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)
- Existing 69-kV Transmission Line (Alt. A)

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership

U.S. Forest Service Boundary

Project Area

April 2, 2013

Western Area Power Administration

AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

1.4 Background

1.4.1 Cooperating Agencies and Project Partners

The Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project relies on the creation of partnerships to solve systemwide shortages related to power supply and reliability throughout the service area. The project would rely on combining existing system infrastructure, existing ROWs, and maximizing the use of partnership lands to achieve reliable, redundant electrical feeds in the area, despite the eventual failure of the Adams Tunnel cable.

1.4.1.1 Lead Agency

Western Area Power Administration

Western delivers reliable, cost-based hydroelectric power and related services within the central and western United States. Western is one of four power marketing administrations within the DOE, whose role is to market and transmit electricity from multi-use federal water projects. Western markets energy from power plants operated by the U.S. Bureau of Reclamation (Reclamation), U.S. Army Corps of Engineers (USACE), and the International Boundary and Water Commission.

Western's service area covers 1.3 million square miles, and its wholesale power customers provide service to millions of consumers in 15 western states. Western operates and maintains approximately 17,000 miles of transmission lines from its four regional offices. The Project Area is located entirely within Western's Rocky Mountain Region.

Reclamation authorized the single-circuit, wood pole, H-frame transmission line in 1938 and constructed it in 1939 as part of the C-BT Project. Western now owns the existing 69-kV transmission line between Granby Pumping Plant Switchyard and Windy Gap Substation. Western is the lead agency for this project, and has the primary responsibility for conducting the environmental review and preparing the NEPA document.

1.4.1.2 Cooperating Agencies

Forest Service, Arapaho-Roosevelt National Forest

The Forest Service is a federal land management agency that manages the ANRA and surrounding ARNF lands, which would be affected by this proposed project. The Forest Service must ensure that actions proposed to occur within the ANRA or surrounding National Forest lands are consistent with its Forest Plan (Forest Service 1997a). The Forest Service is a federal Cooperating Agency in preparing this EIS and worked with Western to identify mitigation measures that would be implemented on the portion of the project that is under its jurisdiction.

Bureau of Land Management, Kremmling Field Office

The BLM Kremmling Field Office is a cooperating agency on this project because of its legal jurisdiction and expertise with respect to permitting and environmental impacts on BLM lands. The existing transmission line and each of the alternatives proposed (Chapter 2.0) would use ROW on BLM land. The BLM has interest in minimizing potential conflicts on Traditional Cultural Properties (TCPs) located on BLM lands in the Project Area.

Grand County, Colorado

Grand County is a cooperating agency on this project because of its interest in potential impacts and outcomes for employment and residential growth, development, and tourism within the county related to the proposed project.

1.4.1.3 Project Partners

Tri-State Generation and Transmission Association

Tri-State is a wholesale electric power supplier owned by the 44 electric cooperatives that it serves. Tri-State generates and transports electricity to its member systems throughout a 250,000 square-mile service territory across Colorado, Nebraska, New Mexico, and Wyoming (TSGT 2008). Tri-State owns the Windy Gap Substation and serves the local electrical cooperative, MPEI.

Tri-State and Western's electrical transmission systems are interconnected at numerous locations, including Windy Gap Substation. Tri-State and Western often plan and construct joint transmission projects for the mutual benefit of both entities.

In 2003, to fulfill long-term transmission needs for MPEI's growing demand, Tri-State proposed to Western a joint project to rebuild and upgrade Western's existing 69-kV transmission line between the Windy Gap and Granby substations, and to install a new power transformer at an enlarged Granby Substation. Tri-state's proposed project would have used Western's existing transmission line to establish a new transmission path instead of building a new transmission line on entirely new ROW. Tri-State proposed a double-circuit 138-kV transmission line to achieve their project needs – one circuit would have replaced Western's existing 69-kV line, the other line circuit would have fulfilled Tri-State/MPEI's needs; both circuits would have been constructed on Western's structures and ROW.

Mountain Parks Electric, Inc.

MPEI is one of 44 not-for-profit electrical distribution cooperatives-owners of Tri-State Generation and Transmission. All residential, commercial, and other electrical users are served by MPEI (with the exception of Reclamation's Farr [Granby] and Willow Creek pumping plants, which are served directly by Western). MPEI's load is fed from both the Granby and McKenzie substations.

MPEI desires to continue serving its existing customers with reliable electric service and also meet all future demands and requests for electricity in its service territory.

Northern Colorado Water Conservancy District

NCWCD was established as the local public agency to contract with Reclamation to share 50/50 in the cost to build the C-BT Project, and to share in the operation and maintenance of certain features of the project.

Reclamation built all C-BT Project facilities, including all water conveyance and storage facilities and the existing 69-kV transmission line (now owned and operated by Western). Reclamation still retains ownership of the pumping and storage facilities in the area; however, Western owns the Granby Pumping Plant Switchyard located at the Farr (Granby) Pumping Plant.

In 1977-78, Reclamation transferred ownership, operations, and maintenance of the 69-kV transmission line to Western. Similarly, NCWCD's prior cost-sharing responsibilities with Reclamation for current multipurpose transmission line operations and maintenance costs were transferred to Western. NCWCD is, therefore, contractually obligated to cost share 50/50 with Western for operations and maintenance, including system improvements and upgrades of the transmission lines between Granby Substation and Granby Pumping Plant Switchyard.

For the purposes of this project, NCWCD's jurisdiction and financial cost-sharing responsibilities apply to the transmission line rebuild between Granby Substation and the Granby Pumping Plant Switchyard.

Reclamation has no decision to make related to the proposal and is not financially affected by the proposed transmission line rebuild, nor would Reclamation operations be dramatically affected by this project, either adversely or beneficially. Reclamation is not a project participant or stakeholder, and is mentioned only for the purposes of providing historical or operational context.

NCWCD has an interest in extending the 138-kV transmission line directly to C–BT Project facilities at Granby Pumping Plant Switchyard to allow operational flexibility for motor starting at Farr (Granby) and Willow Creek pumping plants. The pumps and pump motors at the Farr (Granby) and Willow Creek pumping plants were installed in 1950 and 1951, respectively, in conjunction with the C-BT Project. The pumps and pump motors currently have the same electrical demand as when they were first installed; however, because of growth in electrical loads on the system, motor starting operations are increasingly constrained to remain within the allowed power system operating criteria to which Western must adhere.

Municipal Subdistrict-Northern Colorado Water Conservancy District

MS-NCWCD is a separate entity from NCWCD. MS-NCWCD is funded by a smaller, different group of municipalities than NCWCD. MS-NCWCD is not a financial participant on the proposed transmission line rebuild project.

For the purposes of this project, MS-NCWCD has been identified as a project participant because several of the alternative options proposed (described in Chapter 2.0) would require shared use of the Windy Gap Pipeline ROW owned by MS-NCWCD. The MS-NCWCD Board would need to decide whether to grant shared use of the ROW to Western for the proposed transmission line rebuild.

MS-NCWCD was developed nearly 40 years after the C-BT Project to operate and maintain Windy Gap Project facilities, including the Windy Gap Pipeline. MS-NCWCD owns the pipeline and its ROW between the Windy Gap Substation and Lake Granby (Granby Reservoir). The proposed project would not have any power related effects on operations, either beneficial or adverse, at the Windy Gap Pumping Plant or on the Windy Gap Project overall. Electrical service to the Windy Gap Pumping Plant is provided by Tri-State, independent of the existing or proposed project transmission line.

1.4.2 Current Electrical System

Western's Granby Pumping Plant Switchyard-Windy Gap Substation 69-kV transmission line has been in operation for approximately 70 years. Reclamation designed and built the line to supply electrical power to the C-BT facilities in the Granby and Grand Lake service area. The electrical substations associated with the transmission line are operated by MPEI, Tri-State, and Western.

Residential and commercial load demands on the transmission line came after the C-BT load demands.

The local transmission system has been reliably served by Reclamation's Adams Tunnel 69-kV cable for over 50 years. The Adams Tunnel is a water diversion tunnel, owned by Reclamation and part of the C-BT Project, which is routed under the Continental Divide between the towns of Estes Park and Grand Lake, Colorado. The tunnel carries a 69-kV transmission line in the form of an electric cable owned by Reclamation and operated by Western (installed in 1951).

This cable currently provides the only secondary source of electrical power to the Grand Lake-Granby area by establishing a looped transmission service (explanation provided below) between the Marys Lake and Windy Gap substations. The Adams Tunnel cable has exceeded its predicted useful life (40 years) and, upon failure, would not be replaced (Reclamation 1994), thus, reducing the electrical system in the Grand Lake-Granby area to a radial transmission system.

Substations receiving electricity from more than one source create looped transmission service (two-way feed), which is more reliable than if fed "radially" from a single source (one-way feed). Substations fed by a looped system can remain in service as long as at least one of the lines feeding the substation remains in service, whereas radial, or one-way feed substations, are out of service whenever the single line feeding them is out of service.

The Marys Lake Substation in Estes Park and Windy Gap Substation in Granby are each fed by multiple transmission lines, creating a looped transmission system for the 69-kV line connected between them. This arrangement allows the four substations (Granby Substation, Granby Pumping Plant Switchyard, Willow Creek Pumping Plant Switchyard, and McKenzie Substation) connected along the 69-kV transmission line to be fed from either Windy Gap Substation, Marys Lake Substation, or both (Figure 1-1).

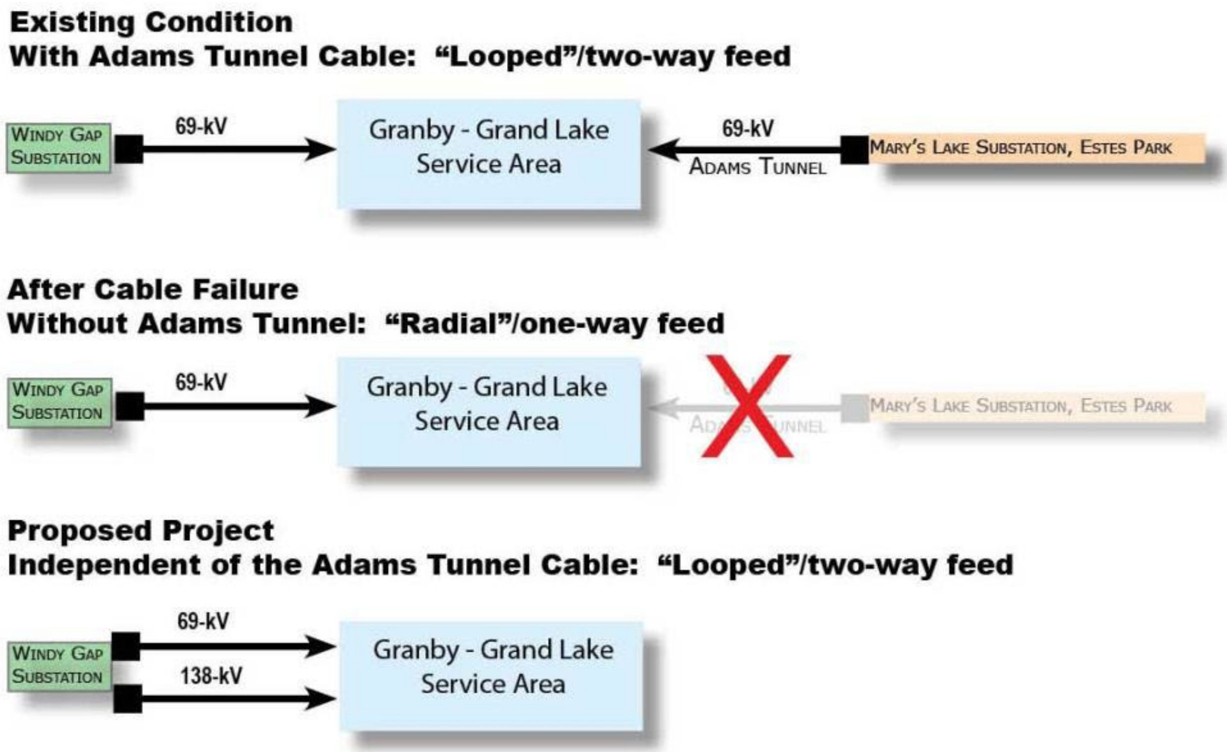


Figure 1-1. Conceptual Diagram of Radial and Looped Electric Feeds

In 1994, Western, Reclamation, the town of Estes Park, Tri-State, Platte River Power Authority, and NCWCD studied costs, engineering requirements, and electrical system constraints for replacing the Adams Tunnel cable in anticipation of its eventual failure. Because of requisite power interruptions, water delivery interruptions, costs, labor constraints, safety concerns, and future maintenance requirements, these entities collectively decided not to replace the cable when it fails (Windy Gap-Estes Park Area Planning Study, Vols. 1 and 2, July 1994).

In 2006, in response to public and agency scoping comments, Western re-evaluated the opportunities and constraints of replacing the Adams Tunnel cable. Because of electrical system constraints, water delivery interruptions, safety concerns, and costs, Western decided to uphold the 1994 decision and not replace the Adams Tunnel cable upon failure (Black & Veatch 2006).

1.4.3 Load Supply / Demand

There are two electrical load demands in the Project Area: residential and commercial electrical demands served by MPEI, and Reclamation's pumping plant electrical demands served directly by Western.

In the late 1990s, MPEI recognized the area's growth potential and increased load requirements, and requested that Tri-State construct additional transmission service to meet the projected future growth of their service area.

Grand County is one of the fastest growing counties in Colorado. From 1990-2010, Grand County grew by 86 percent, from 7,966 to 14,843 (U.S. Census Bureau 2011). The two main communities within the Project Area are Grand Lake and Granby, both of which also experienced significant population growth in the period 1990-2010: population increased nearly 82 percent in Grand Lake from 259 to 471 people, and nearly 93 percent in Granby from 966 to 1,864 people (U.S. Census Bureau 2011). From 2010 to 2030, forecasted population increases for Grand County are 66.8 percent. Electrical load demand is expected to increase, commensurate with county population growth projections. The current 69-kV Granby Pumping Plant Switchyard-Windy Gap Substation transmission line will begin experiencing operational constraints if the load growth rate seen since 1990 continues.

There are no plans to increase the electrical power demand for Reclamation's facilities as a result of the proposed project. Instead, a benefit of the project is the upgraded system voltage, which improves reliability and increases operational flexibility during pump motor starting at the pumping plants.

1.4.4 System Reliability

To ensure electrical service reliability, Western and Tri-State intend to maintain a second source of power to serve Reclamation and MPEI loads after the loss of the Adams Tunnel 69-kV cable. Due to topographic constraints and distances, there are no other secondary feed options originating from outside the Granby-Grand Lake service area. Additionally, there is no power generation in Grand County. All power comes from the following sources:

- Hydroelectric generation at Green Mountain Reservoir or the interconnected transmission system through the Gore Pass Substation to the west; or
- Hydroelectric generation at Marys Lake and Estes Park or the interconnected transmission system through the Marys Lake Substation to the east through the Adams Tunnel.

In 2003, Western and Tri-State performed system studies to determine system needs for maintaining a looped transmission system in the Granby-Grand Lake area and meet current and future loading requirements. The studies demonstrated that long-term electrical system reliability is achieved when a new 138-kV transmission line is added in the Granby-Grand Lake area (Western 2003).

Originally, Tri-State proposed to rebuild and upgrade Western's 69-kV line between the Windy Gap and Granby substations as a double-circuit 138-kV line to replace Western's existing line, and add a second transformer at an expanded Granby Substation. The proposal would have created a second transmission path utilizing Western's existing ROW and fulfilled MPEI's growing power demands.

Western determined that Tri-State's proposed transmission line rebuild would provide tangible benefits to Western's customers and enhance the federal transmission system. Western also determined that the need to rebuild all of the 1939 vintage 69-kV transmission line was imminent and could be best accomplished by one overall project. Tri-State's proposed project was therefore modified by extending the double-circuit line and by adding a second power transformer at the Granby Pumping Plant Switchyard. The expanded project would benefit both Western's customers (MPEI and Reclamation) and result in improved reliability, power supply, and safety by replacing antiquated facilities throughout the entire local system.

The proposed 138-kV double-circuit transmission line project is intended to address all load demand issues on the system with one solution, including ensuring adequate supply for increasing local area load demands as well as ensuring reliable supply for Reclamation's pumping plants. Further, Western and Tri-State desire to accomplish the project while the Adams Tunnel 69-kV cable is still available as a secondary source. Without the Adams Tunnel 69-kV cable, the rebuild of the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line can only be accomplished by building on new ROW adjacent to the existing line before the existing line can be removed. This increases the ROW needs and, subsequently, the potential impacts of the project.

The eventual failure of the Adams Tunnel cable will leave large parts of Western and Tri-State's Granby-Grand Lake service area with only a one-way or radial transmission supply. The portion of the system affected by this transmission system includes approximately 7,000 customers in the area, extending from the west side of Rocky Mountain National Park (RMNP) on the north to the YMCA Snow Mountain Ranch on the south, and from Byers Canyon on the west to the ANRA and Continental Divide on the east. The towns of Hot Sulphur Springs, Granby, and Grand Lake, as well as hundreds of customers in rural areas, particularly along the U.S. Highway 34 corridor, are included in the service area. Without a rebuild and upgrade of existing facilities, Tri-State/MPEI and Western customers risk extended power outages, especially during adverse winter weather and prolonged line maintenance due to the lack of an alternate transmission circuit to supply the area.

1.4.5 Acceptable Voltage Criteria

One of the system needs that led to the recommendation of a 138-kV line in the Granby-Grand Lake area is meeting acceptable voltage criteria for the operation of the transmission system. Both Western and Tri-State adhere to Rural Electric Association Bulletin 160-3 voltage flicker standard, which allows voltage dips of up to 6 percent of the nominal voltage. Voltage dips, or sags, are short-term system conditions. Typically, transmission lines operate within 5 percent of their nominal voltage (e.g., a 138-kV line is usually operated between 131.1-kV and 144.9-kV). Voltage sags greater than 6 percent, or voltage sags occurring more than one or two times per 24-hour period, exceed the acceptable criteria range. Large motor starting operations, such as Reclamation's pump motors, draw a large starting current (measured in amperes [amps]), often in multiples of the running current (e.g., operating/running current may be 500 amps, whereas starting current may exceed 2,500 amps), which can cause voltage sags.

As system loading increases and should the existing 69-kV system become a radial system with the loss of the Adams Tunnel 69-kV cable, system studies show the 69-kV system may not be able to sufficiently support the loads without exceeding the acceptable voltage operating criteria. A 138-kV system provides a stronger voltage source, which would not violate the voltage flicker standard.

Farr (Granby) Pumping Plant currently uses reduced voltage starting protocols to minimize system impact (voltage sags) during motor starting. Willow Creek Pumping Plant does not have the capability to use reduced voltage starting methods. Willow Creek Pumping Plant, with full voltage motor starting, impacts the power system much more than Farr (Granby) Pumping Plant does with its reduced voltage motor starting. If future electrical load demands were not forecasted to increase in the service area, NCWCD could continue low-voltage motor starting operations after the failure of the Adams Tunnel cable without exceeding the 6 percent sag criteria. However, as previously stated, load demands are forecasted to increase and the 6 percent sag criteria would be exceeded with increasing frequency. Upgraded voltage support would not increase power demand at the pumping plants, but would instead enhance operational flexibility for motor starting activities, both on a daily and seasonal basis.

1.5 Decision to Prepare an EIS

In 2005, Western began preparation of an Environmental Assessment (EA) for the proposed Granby Pumping Plant Switchyard-Windy Gap Substation transmission line rebuild. Two public meetings were held in July 2005 and November 2006 to inform the public of the project, the environmental analysis process, and to invite public comment. The results of EA scoping and public meeting summaries are included in Appendix A. Based on a review of public comments and the public's concerns regarding potential significant impacts, Western determined that an EIS would be appropriate for this project.

A Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on August 10, 2007 (Appendix A).

This EIS has been prepared consistent with the procedural provisions of NEPA and CEQ regulations.

1.6 Public Involvement

1.6.1 Scoping

Scoping for the EA was initiated with notification in local newspapers and a mailing to over 250 landowners within 500 feet of the proposed transmission line alternatives, government officials, and persons known to be interested in similar projects or who had asked to be informed of such projects. Flyers were also distributed to notify the public.

The first public scoping meeting was held Thursday, July 28, 2005, at the Grand Lake Fire Protection District, and was attended by 35 people. The meeting format, with exhibits and opportunities to make written and oral comments, was intended to promote informal interaction between interested members of the public and Western. Attendees were asked to visit four information stations to learn about the project background, existing conditions, preliminary issues and preliminary alternatives, and to provide their input to Western, Forest Service representatives, and the consulting team. Attendees provided their input directly on the presentation boards, comment sheets, and to project team representatives. Based on public input, the preliminary alternatives were reevaluated, including minor adjustments to the alignments, and additional resource surveys were scheduled.

A second public meeting was held Wednesday, November 15, 2006, at the MPEI Community Room in Granby, and was attended by approximately 45 people. More than 250 newsletters announcing the second public meeting were mailed to landowners and interested persons approximately 1 month in advance. The attendees were asked to visit various information stations to learn about project updates since the July 2005 meeting; give feedback on alternatives (including alternatives considered but eliminated) and preliminary findings of the affected resource analyses; and to review requested survey results. Attendees provided their input directly on the presentation boards, comment sheets, and to project team representatives.

Once a decision was made to prepare an EIS, an NOI was published. The NOI invited public participation in the EIS scoping process and solicited public comments on the scope and content of the EIS. Formal public scoping for the EIS was initiated with the publication of the NOI and ended on September 17, 2007. One public scoping meeting was held on August 30, 2007. The EIS scoping summary report is included in Appendix A.

Approximately 30 local residents attended the August 30, 2007, scoping meeting in Granby. The attendees were asked to visit various information stations to learn about the project updates since the November 2006 meeting, including the decision to prepare an EIS and alternatives considered but eliminated, and to provide their input to Western and the consulting team on issues and concerns. Attendees provided their input directly on the presentation boards, comment sheets, and to project team representatives.

Approximately 200 comment letters were received during the scoping period. All letters were reviewed by the project team to help define the scope of analysis for the EIS and to inform the refinement of project alternatives.

1.6.1.1 Issue Identification

Issues are defined as concerns about the potential effects of the proposed project. The range of issues was determined through agency, stakeholder, and public scoping, as well as from project Interdisciplinary Team collaboration. Each potential issue was evaluated to determine its relevance to the decision, or whether the issue could be eliminated from further study because of minimal or no known or anticipated effects. If the issue was determined to be a substantial concern, Western evaluated whether it should be considered during the alternative development process. Ultimately, all issues identified were classified as either "Selected for Detailed Analysis" or "Dismissed from Detailed Analysis."

Issues Selected for Detailed Analysis are addressed in the Affected Environment and Environmental Consequences chapters (Chapters 3.0, 4.0, and 5.0). Issues Dismissed from Detailed Analysis will not be addressed further in this EIS.

1.6.1.2 Issues Selected for Detailed Analysis

The following issues were identified by the public, cooperating agencies, and the Interdisciplinary Team as being particularly important to the development of alternatives and the assessment of potential impacts. These issues establish a framework for the analysis in Chapters 3.0-5.0 of this EIS. They were selected for detailed analysis because 1) they are potential factors in deciding which alternative will be selected for implementation; 2) they are topics of public interest; or 3) a law, regulation, or policy requires their analysis. Issues that ultimately framed or affected the development of alternatives are considered to be “Key Issues.” Key Issues are indicated in **bold** text.

- **Potential effects to visual resources and rural aesthetics**
- **Potential effects to sage grouse populations and habitats**
- Project costs
- Potential effects to land uses, including agricultural practices and conservation easements
- Restoration efforts proposed for the abandoned ROW
- Human health effects
- Interference with radio and cellular communications

- Electromagnetic field effects
- Effects on riparian, wetlands, or other aquatic habitats as a result of construction
- Construction effects on winter range habitat for mule deer and elk
- Bird collisions with conductors and structures, including migratory species and raptor species
- Effects on special status or sensitive species and habitat as a result of construction activities and presence of above-ground structures
- Alternatives to above-ground structures, including undergrounding, reusing the Adams Tunnel cable, or laying the transmission line on the bed of Lake Granby
- Socioeconomic impacts in Grand County
- Cumulative effects of mountain pine beetle epidemic
- Cumulative impacts to wildlife habitats from various types of development in the Project Area
- Effects to cultural and historic resources, including TCPs
- Effects to special designation areas, such as the ANRA or scenic byway
- Consistency with local and Grand County Zoning Regulations and management overlays

1.6.1.3 Issues Dismissed from Detailed Analysis

The following issues, identified during public and agency scoping, are not carried forward into the analysis for the reasons described below:

- Front Range water use – The purpose of the project is to maintain and improve electrical power reliability for this portion of Grand County. It would not affect nor be affected by existing or proposed water collection and delivery projects that serve the Front Range. The pumping plants that are part of the water collection and delivery systems would continue to operate, relative to electrical power demand, as they always have. Strengthening the power grid in this area would minimize or eliminate impacts to all current electrical power users caused by increased growth in this area of Grand County and the potential failure of the Adams Tunnel power cable.
- Per capita energy consumption – The purpose of the project is to maintain and improve electrical power reliability for this portion of Grand County. Neither restrictions on nor modifications to per capita energy consumption would affect system reliability. As such, per capita energy consumption is irrelevant to this analysis.
- Energy conservation measures – The purpose of the project is to maintain and improve electrical power reliability for this portion of Grand County. Implementation of new or stricter energy conservation measures would ultimately have no bearing on the electrical system reliability. As such, changes to energy conservation measures are irrelevant to this analysis.

1.6.2 Public Review of the Draft EIS

The Notice of Availability (NOA) for the Draft EIS (DEIS) was published in the *Federal Register* on March 30, 2012. The NOA established a 60-day public comment period that ended May 29, 2012. Public meetings on the DEIS were held in Granby, Colorado on April 24, 2012, which consisted of an open house from 4:00-6:00 p.m. with exhibits displaying project information, followed by a formal public hearing from 6:00-8:00 p.m. Notice of the meeting was provided through an advertisement in the Sky-Hi News and direct mailing. The mailed notice was sent to all property owners within 0.5 mile of a project alternative and to other individuals and agencies with an interest in the project, including tribal representatives and individuals and agencies that had provided scoping comments.

Six individuals provided oral comments during the public meeting and one individual provided an oral comment at the public hearing. An additional 43 comment letters, emails or telephone comments were received on the DEIS during the 60-day comment period.

In total, considering all comment sources, 135 unique comments were received. Comments on the DEIS and the responses to those comments are presented in Appendix L. Most comments fell into one or more of the themes identified below:

- The transmission line should be installed underground in its entirety or for specific segments.
- Impacts to residential properties along County Road 64, including a request by property owners and residents to relocate the alignment proposed along CR 64 to the west side of the road.
- Grand County is adequately served by the existing transmission system and the need for additional power has not been demonstrated.
- Lake Granby, Colorado River, and the Arapaho National Recreation Area of Grand County are highly valued for their scenery and the project's visual impacts would potentially affect the recreational activities and amenities that contribute to Grand County's recreational and tourist destination appeal.
- Property values could potentially be affected by the transmission line, whether located directly on the property, within line of sight of their property, or in the general vicinity.
- The existing transmission conduit through the Adams Tunnel should be replaced to continue providing looped service between Estes Park and the Windy Gap substations rather than any of the action alternatives.

Responses to theme comments are provided in Appendix L.

1.6.3 Changes to the Draft EIS

Comments received on the DEIS were carefully considered. Western conducted a field visit with Forest Service personnel on August 10, 2012 to discuss public comments requesting that the preferred alternative be moved to the west side of County Road 64, rather than remaining on the east side of the road, as was presented in the DEIS. After this meeting, the alignment of the preferred alternative was adjusted to move it further west of the residences and to cross County Road 64 to the west side of the road on Forest Service lands. Based on the field review and discussions with the Forest Service the route was modified to meet other objectives and local constraints. These included 1) reduce the angles and length of line along Highway 34 by crossing a section of privately-owned land after discussions with the landowner; 2) remove a tall structure and move a segment of line away from encroaching buildings; 3) avoid a residence on the west side of CR 64 and north of the campground; 4) try to minimize use of private land; and 5) minimize the number of structures within the campground. A minor adjustment to the alignment was made on the private parcel to the north, at the property owner's request. The adjusted alignment for the preferred alternative is described in Section 2.2.5 of the FEIS and is shown on Map 2-3. The environmental impacts of the modified preferred alternative on land use, visual resources, socioeconomics, and recreation were updated in Table 2-7 and in Sections 4.7.3.6 , 4.8.3.7, 4.9.3.5, and 4.10.3.5 of the FEIS to reflect the change.

A request that the preferred alternative follow the alignment of Alternative C1 through the 1,500-acre planned development north of the Colorado River (on the south end of the project) was not added as the preferred alternative. Additional consultation with Colorado Parks and Wildlife confirmed conclusions made in the DEIS regarding impacts of the proposed alternatives to sage grouse. Careful consideration of the environmental consequences of the proposed alternatives confirmed that the preferred alternative (Alternative D - Option 1) was balanced impacts to planned development and wildlife resources located just north of the property boundary. Responses to comments I-13-1 through I-13-8 in Appendix L further document the rationale for selection of Alternative D - Option 1 as the preferred alternative on the south end of the project.

Other changes to the DEIS included updates to Section 1.6 to describe the public review period for the DEIS, and other minor technical edits to text or maps for clarity.

1.7 Areas of Controversy

Correspondence between Western and the Grand County Department of Planning and Zoning has identified several areas of non-concurrence regarding permit requirements, consistency with land use plans and policies, and the scope of the EIS impact analysis. Specific areas of non-concurrence between Western and Grand County include:

- The degree to which the project has achieved substantive compliance with Grand County permit requirements and land use policies
- Viability of alternatives that would rebuild and upgrade the Adams Tunnel cable, or construct the transmission line as an underwater power cable below Lake Granby
- Whether to include within the scope of the EIS an analysis of effects of the proposed project on the operations and pumping capacity of the CB-T project, and other West Slope water diversion projects (i.e., the Windy Gap Firming Project
- Whether to include within the scope of the EIS an analysis of cumulative effects to aquatic and scenic resources resulting from reservoir water level fluctuations and water development projects
- Whether to include within the scope of the EIS an analysis of effects of the proposed project on continued hydroelectric power generation for pumping plant power

Correspondence between Western and Grand County is provided in Appendix B.

1.8 Decisions Framework

Western is the lead agency and prepared the EIS. The EIS was prepared in accordance with DOE, Western, and Forest Service procedures and guidelines requisite to NEPA compliance. Western selected a NEPA contractor to support environmental review for the proposed project. The results of the analysis are presented in this EIS and will form the basis for decisions regarding the project.

Western has considered comments on the DEIS submitted by the public, interested organizations, and government agencies, and has responded to all substantive comments. As required by CEQ NEPA regulations (40 CFR 1506.10), Western will announce its decision on the proposed action in a Record of Decision (ROD) in the *Federal Register* no sooner than 30 days after the U.S. Environmental Protection Agency publishes the Notice of Availability of the Final EIS.

Each cooperating agency will prepare their own decision documents in accordance with their respective policies and guidelines.

As an affected federal land management agency, the Forest Service is required to comply with all laws (National Forest Management Act [NFMA], NEPA, Section 7 of the Endangered Species Act [ESA], National Historic Preservation Act [NHPA], etc.), regulations, and policies for the portion of the project on lands under its jurisdiction. The Forest Service is meeting these responsibilities by participating as a Cooperating Agency in the preparation of this EIS.

1.9 Statutes, Regulations, and Permitting

The rebuild and upgrade of the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line would occur entirely within Grand County. The project would comply with applicable requirements, including the statutes, regulations, and permit requirements listed below.

1.9.1 Statutes

- Antiquities Act of 1906 (Public Law [P.L.] 59-209; 34 Stat. 225; 16 United States Code [U.S.C.] 432, 433)
- Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712; Chapter 128; July 13, 1918; 40 Stat. 755), as amended
- Historic Sites Act of 1935 (P.L. 74-292; 49 Stat. 666; 16 U.S.C. 461)
- Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250), as amended
- Archeological and Historic Preservation Act of 1960 (P.L. 86-523, 16 U.S.C. 469-469c-2), as amended
- NHPA of 1966 (P.L. 89-665; 16 U.S.C. 470 et seq.)
- NEPA of 1969 (42 U.S.C. 4321 et seq.)
- Clean Air Act (CAA) of 1970 (42 U.S.C. 7401 et seq.), as amended
- Federal Water Pollution Control Act (Clean Water Act [CWA]) of 1972 (33 U.S.C. §1251 et seq.), as amended
- ESA of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended
- The Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2814)
- NFMA of 1976: Forest Service, 1997 Revision of the Land and Resource Management Plan for the Arapaho and Roosevelt National Forests and Pawnee National Grassland
- Archaeological Resources Protection Act of 1979 (P.L. 96-95; 16 U.S.C. 470aa-mm), as amended

- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001)
- Senate Document No. 80, 75th Congress 1st Session, authorizing the C-BT Project
- Water Conservancy Act, Article 45 Colorado Revised Statutes, which enabled the establishment of the NCWCD
- Repayment Contract and all Supplements, a contract made on July 5, 1938 between the Reclamation and NCWCD, a Corporation of the State of Colorado, providing for the constructions of the C-BT Project
- C-BT Project, Letter of Understanding in reference to Contract No. 9-07-70-W0020 (Formerly Ilr-1051), as amended by Supplement No. 2, dated May 1, 1996, between DOE, Western, and NCWCD
- C-BT Project, Letter of Understanding in reference to Contract No. 9-07-70-W0020 (Formerly Ilr-1051), as amended by Supplement No. 2, dated March 26, 1980, between DOE, Western, and Water and Power Resources Services (Reclamation), Department of the Interior

1.9.2 Regulations

- CEQ Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR § 1500-1508)
- U.S. DOE NEPA Implementing Procedures (10 CFR § 1021)
- U.S. DOE Compliance with Floodplain/Wetlands Environmental Review Requirements (10 CFR § 1022)
- Interagency Cooperation, ESA of 1973, as amended (50 CFR Part 402)
- Protection of Historic Properties (36 CFR Part 800)
- General [CAA] Conformity Regulations (40 CFR Part 93, Subpart B)
- National Pollutant Discharge Elimination System (NPDES) permitting requirements
- Institute of Electrical and Electronics Engineers (IEEE), NESC
- Guidance Regarding Consideration of Global Climatic Change in Environmental Documents Prepared Pursuant to the NEPA, CEQ, 1997

1.9.3 Executive Orders

- Executive Order (E.O.) 11988, Floodplain Management, May 24, 1977
- E.O.11990, Protection of Wetlands, May 24, 1977
- E.O.12875, Enhancing the Intergovernmental Partnership, October 26, 1983
- E.O.12898, Environmental Justice: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994
- E.O.13084, Consultation and Coordination with Indian Tribal Governments, May 14, 1998
- E.O.13112, Invasive Species, February 3, 1999
- E.O.13186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001

1.9.4 DOE Orders and Guidance

- DOE O 450.1B, NEPA Compliance Program
- Office of NEPA Policy and Compliance Interim Guidance on *Need to Consider Intentional Destructive Acts in NEPA Documents*, December 1, 2006

1.9.5 Permits

- Forest Service, ROD; Construction, Operation and Maintenance Plan; Special Use Permit
- BLM, ROD; Plan of Development; Amended Grant Reservation
- NPDES Stormwater Program Permits

1.9.6 State and Local Requirements

As a federal agency, Western is not required to comply with state or local land use regulations. Nevertheless, Western would comply with substantive requirements of state and local requirements whenever practicable.

1.10 Document Organization

The contents of each chapter of the EIS are as follows:

- Chapter 1.0 provides background information on the proposed project, describes the analysis area, states the purpose and need for the project, and summarizes public involvement activities.
- Chapter 2.0 describes all alternatives considered in the EIS. It describes common features of transmission line design, construction, operation, and maintenance; includes a summary comparison of the environmental effects of the alternatives; and discusses measures to prevent or mitigate potential effects.
- Chapter 3.0 describes the affected environment and other resources that the proposed action and alternatives could affect. Resources discussed include air quality, climate, and global climate change; soils; paleontological resources; cultural resources; electric and magnetic fields; land use (including transportation); visual resources; socioeconomics and environmental justice; recreation and wilderness; aquatic resources; vegetation resources; special status plant species; wetland resources; terrestrial and avian wildlife resources; and special status terrestrial, avian, and aquatic wildlife species.
- Chapter 4.0 describes the potential environmental effects of the proposed action and alternatives. The chapter identifies the direct and indirect, short-term and long-term, and beneficial and adverse effects to each potentially affected resource identified in Chapter 3.0, as well as unavoidable adverse effects. A discussion on the short-term use of the environment and long-term productivity and irreversible and irretrievable commitments of resources as a result of the proposed action or alternatives is included at the end of the chapter.
- Chapter 5.0 identifies the potential cumulative effects of the alternatives to each of the potentially affected resources in Chapter 3.0. Cumulative impact is the impact on the environment that results from the incremental impact of the proposal when added to other

past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes the other actions.

- Chapter 6.0 provides a list of permits and approvals that may be required prior to implementation of the proposed action or alternatives.
- Chapter 7.0 provides a list of persons who helped to prepare this EIS, including their role on the project and years of experience in that capacity.

2.0 ALTERNATIVES

2.1 Introduction

This chapter describes the no action, proposed action, and all other action alternatives, including descriptions of the proposed facilities, construction activities, maintenance activities, schedule, environmental protection measures, and other information relevant to the project. The chapter also describes other alternatives that Western considered but eliminated from detailed study.

2.2 Alternatives Considered in Detail

The development of a reasonable range of alternatives is important to the environmental review. NEPA requires that a no action alternative be evaluated, in addition to the action alternatives, to establish a baseline for analysis and to analyze the consequences of not implementing the project.

A range of reasonable alternatives for the proposed project was identified by evaluating routing opportunities and constraints, engineering design standards, public comments, and environmental resources. The objective was to identify alternatives that address public, environmental, and social concerns, and meet the project purpose and need and engineering criteria for the transmission line rebuild.

Relevant issues identified during both the EA and EIS public scoping processes were used to refine the alternatives. The ARNF Forest Plan (Forest Service 1997) goals and objectives, and Grand County zoning and land use policies applicable to the Project Area, were also considered in the development of alternatives. Chapter 3.0 of the EIS describes the affected environment and Chapter 4.0 analyzes the environmental consequences of the no action and action alternatives.

Development of the transmission line rebuild project occurred in several phases, beginning with identification of the electrical system reliability and voltage needs associated with the potential effects of failure of the Adams Tunnel 69-kV cable. Western and Tri-State conducted several stability and power flow studies to develop an electrical system configuration that would provide redundant transmission service to the area and support voltage requirements. In developing the alternative transmission routes, Western relied on additional studies and public comments to assess and refine preliminary transmission line alignments, and to identify the proposed and alternative transmission line routes to carry forward into the EIS. Ultimately, five alternatives were identified:

(1) **Alternative A** – Keep the existing transmission line (no action)

(2) **Alternative B1** – Rebuild and upgrade the transmission line primarily on the existing transmission line ROW

(3) **Alternative C1** – Reroute and upgrade the transmission line

(4) **Alternative C2** – Reroute and upgrade the transmission line, with options to use existing utility ROWs

(5) **Alternative D-Options 1 and 2** – Rebuild and upgrade the transmission line primarily on existing utility ROWs (preferred alternative). Option 1 was selected as a component of the preferred alternative. The alignment for Alternative D, both options, was adjusted along County Road 64. See the discussion in Section 2.2.5.

All alternatives are shown on Map 2-1, as well as individual alternative maps, and are discussed in the following sections. In total, Western evaluated approximately 10 alternatives, line configurations, or alternative components during the process. Alternatives and components that were considered but eliminated during the EIS process are discussed in Section 2.5.

2.2.1 Alternative A – Keep the Existing Transmission Line (No Action)

Alternative A would not upgrade or rebuild the existing transmission line system between the Granby Pumping Plant Switchyard and the Windy Gap Substation. Alternative A would continue use of the existing 69-kV transmission line for approximately 13.6 miles between the Windy Gap Substation and the Granby Pumping Plant Switchyard (Map 2-2). The existing line consists of wooden H-frame pole structures (Figure 2-1, Figure 2-2, and Figure 2-3).

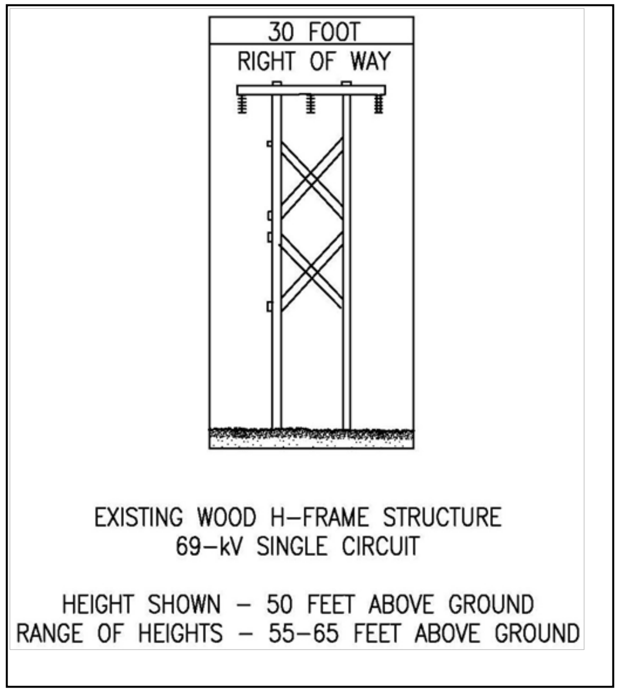


Figure 2-1. Existing H-Frame Wood Structure Profile.

From the Windy Gap Substation, the current alignment crosses State Highway 125 and travels northeast, generally parallel to U.S. Highway 34, to the Granby Substation (Map 2-2). On the east side of Table Mountain, private development in the Scanloch Subdivision has encroached on the existing transmission line. Private buildings, including residences and unoccupied outbuildings, are located immediately adjacent to or directly under the existing transmission line (Figure 2-2).

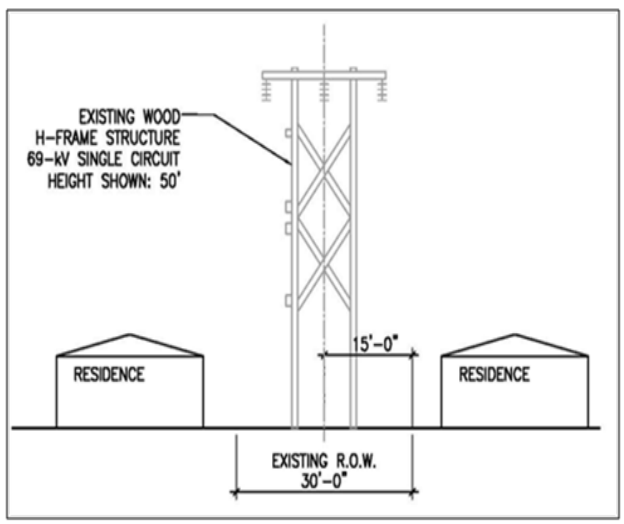


Figure 2-2. Typical Profile of Alternative A ROW through Residential Developments.

At Stillwater Tap, the Granby Pumping Plant-Windy Gap 69-kV line and the Marys Lake-Granby Pumping Plant 69-kV line (which goes through the Adams Tunnel) meet and begin paralleling each other, with some minor deviations from Stillwater Tap into the Granby Pumping Plant Switchyard. Each 69-kV transmission line has a 100-foot ROW. Both lines are constructed on wood pole H-frame structures (Map 2-3).

Structures and hardware would be maintained, repaired, or replaced (as required) during routine maintenance activities or in the event of emergency outages. Repairs and other maintenance activities would be necessary, likely with increasing frequency as the transmission line ages. Vegetation management activities would be required. When the Adams Tunnel cable fails, the existing transmission line would be the only source of power for the Grand Lake-Granby area and the Farr (Granby) and Willow Creek pumping plants.

Figure 2-3. Existing 69-kV Granby Pumping Plant Switchyard – Windy Gap Substation Transmission Line, Grand County, Colorado.

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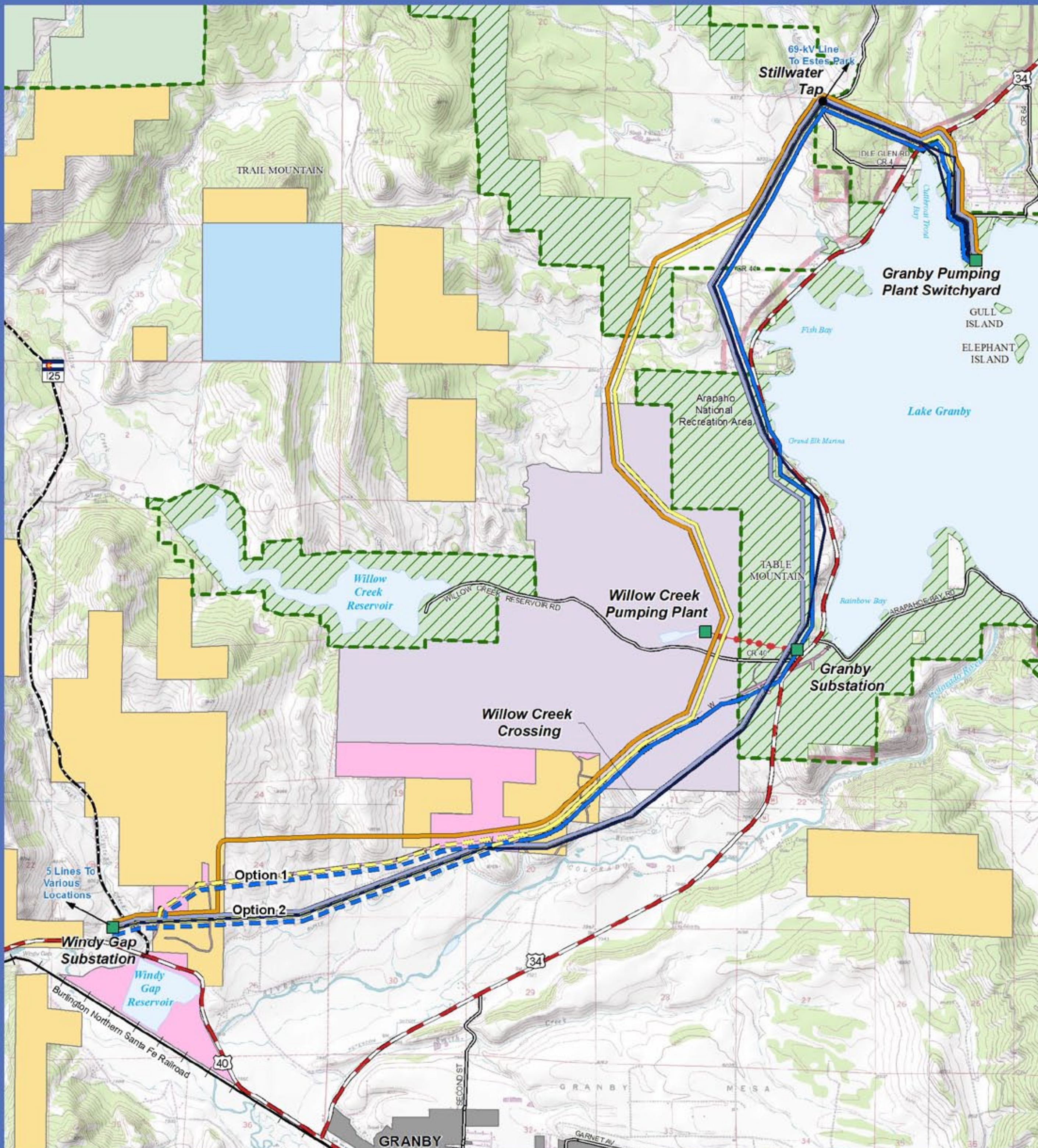
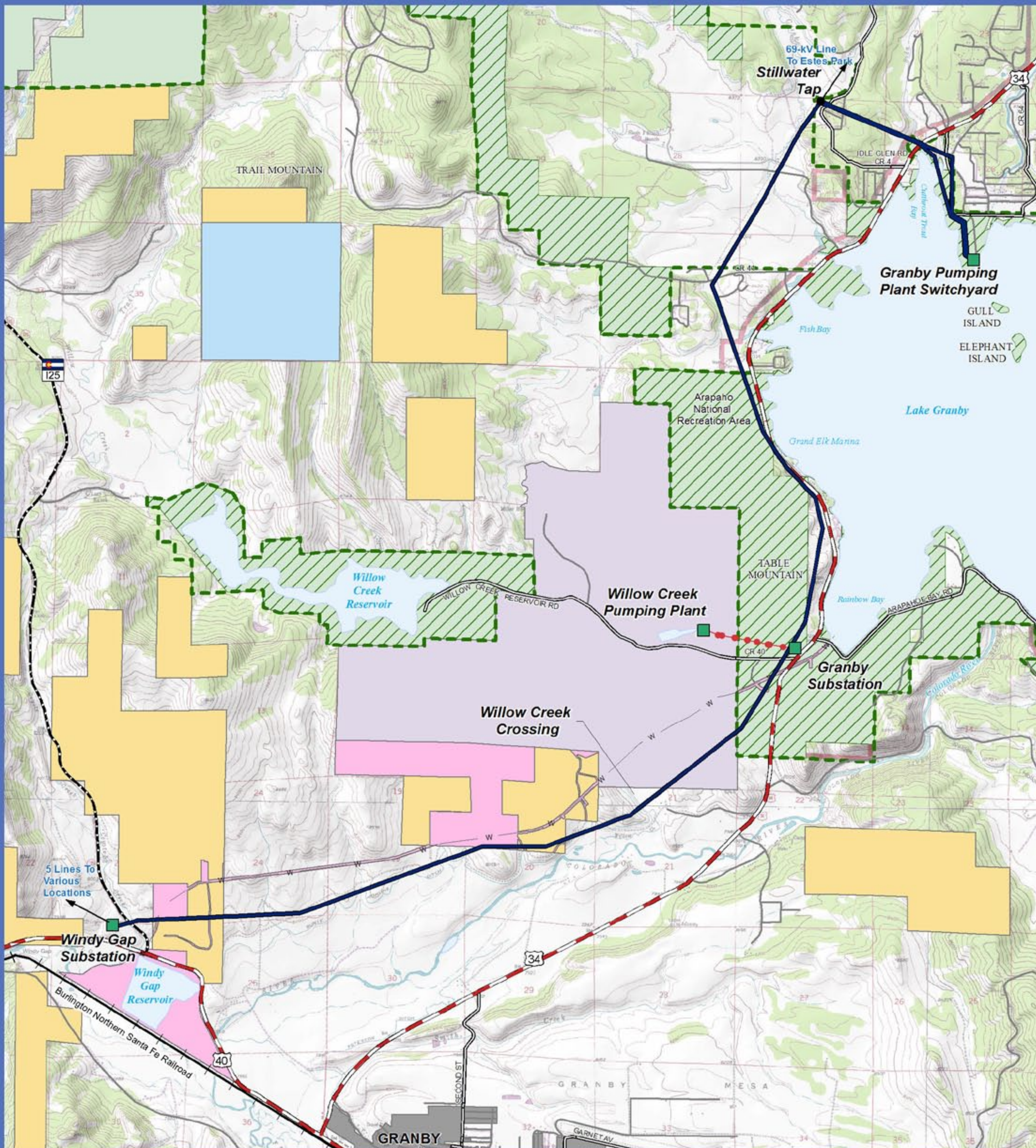


Map 2-1

All Alternatives

April 2, 2013

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 2-2

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

No Action Alternative

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Alternative A

April 2, 2013

Western AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

Map 2-3

North End Routes
Alternatives A and D

March 6, 2013

Legend

Land Status

- Forest Service Land within Arapaho National Recreation Area
- U.S. Forest Service Boundary
- Private or Other Land Ownership

Transmission Line Alternatives

- Alternative A - Existing
- Alternative D
- Approximate proposed location of structure. Actual location will be determined during final design.

Western AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

Under the no action alternative, Western would maintain the current level of service within the Project Area. However, Tri-State would still need to expand their transmission system in the valley to serve increasing electrical load demands. Due to topographic and environmental constraints and the need to interconnect the same substations, Tri-State's expansion would likely occur in the same general vicinity of Western's line and would require new ROW.

The existing structures would be replaced when they fail to meet set criteria during wood pole testing, which is normally conducted in 10-year cycles. Rejected poles would be identified and marked for replacement. The frequency of pole replacements is dependent on local climatic and soil conditions and type of wood pole used for construction (i.e., cedar, pine, etc.).

The existing line is 70 years old. Maintenance activity to repair and replace components of the line would continue to increase in frequency and scope. Also, once the system is operated radially without the Adams Tunnel cable providing looped transmission service, interruptions to electrical service in the Granby-Grand Lake area would be more frequent and longer in duration when caused by forced outages from weather, failed line components, or scheduled outages for Western to perform certain maintenance activities.

2.2.2 Alternative B1 – Rebuild and Upgrade Primarily on Existing Transmission Line ROW

Alternative B1 was derived from the original Alternative B presented during the scoping process and is identical to the original Alternative B, with one exception: Alternative B1 uses a new 1.3-mile alignment on the east side of Table Mountain, routing the line just inside the ANRA boundary thereby avoiding possible home relocations in Scanloch Subdivision. (See Section 2.5, Alternatives Considered but Eliminated from Further Analysis, for more information.)

Alternative B1 would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant Switchyard (Map 2-4). Alternative B1 would remove the existing single-circuit 69-kV line and construct approximately 11.8 miles of 138-kV double-circuit line using single-pole steel structures on the existing alignment (Figure 2-4, Figure 2-5, and Figure 2-6). However, the existing 30-foot ROW is inadequate for the new transmission line, and would be expanded to a width of 100 feet to accommodate requirements for construction, operation, and maintenance.

As shown in Map 2-4, from the Windy Gap Substation, Alternative B1 would follow the existing transmission line alignment to the Granby Substation. At the Granby Substation, Alternative B1 would deviate from the existing alignment onto a new ROW located just inside the ANRA boundary (Figure 2-7). The eastern boundary of the ROW would be along the ANRA boundary (the ROW centerline would be located approximately 50 feet inside the ANRA boundary).

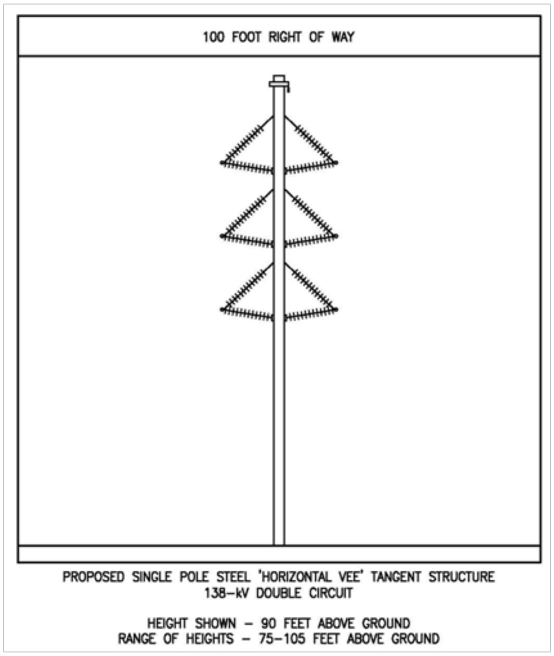


Figure 2-4. Typical Single-Pole Steel Structure Profile.

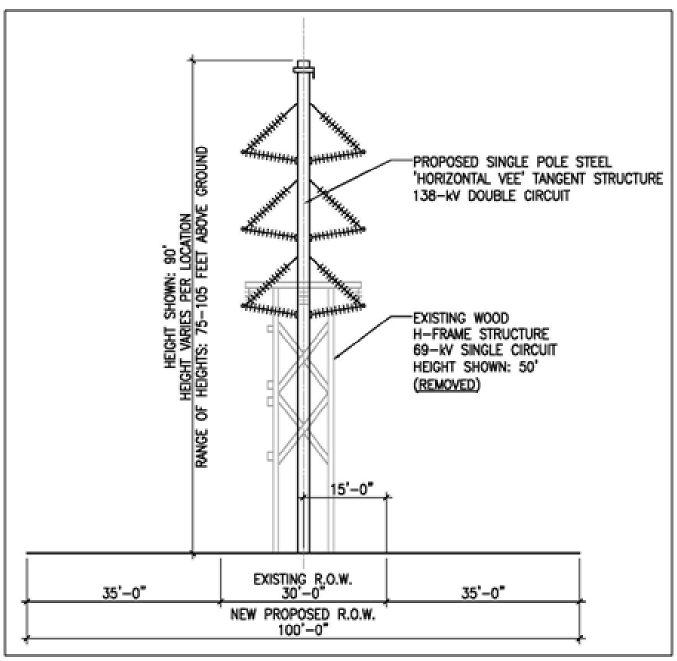


Figure 2-5. Typical Profile of New Single Steel Structures on Existing but Expanded ROW.

Figure 2-6. Example of Double-Circuit Single-Pole Steel Structures with COR-TEN Finish.

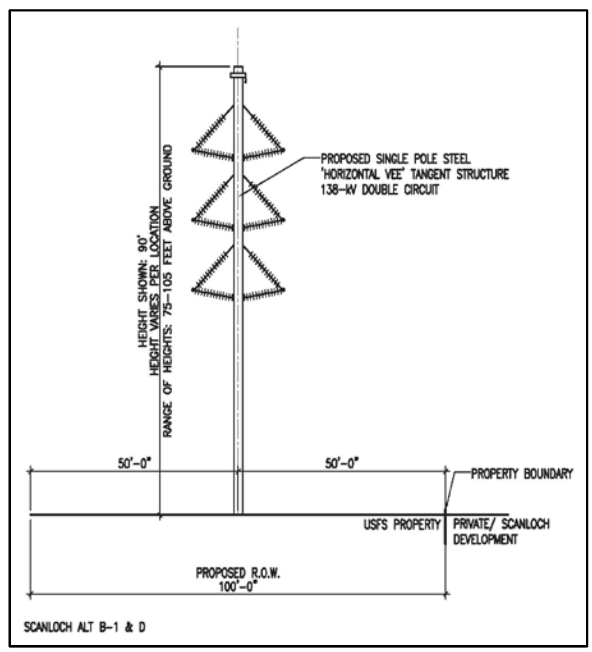
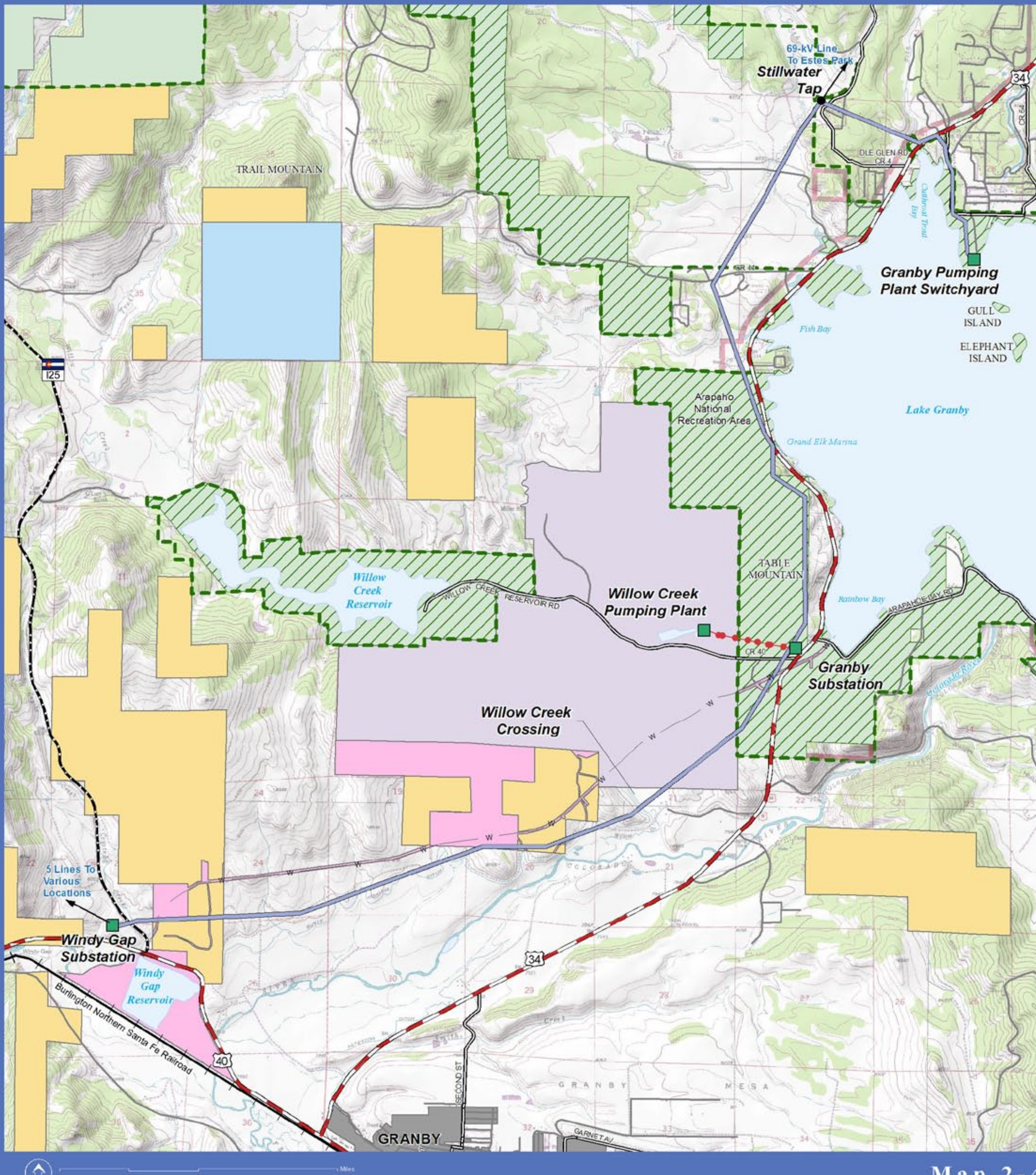


Figure 2-7. Typical Profile of New ROW on East Side of Table Mountain.



Map 2-4

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives
- Alternative B1

Land Status
- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Alternative B1

April 2, 2013

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

Alternative B1 rejoins the existing transmission line alignment south of the Grand Elk (Norton) Marina and follows the existing alignment into Stillwater Tap, with one minor exception (Map 2-4). Immediately west of the marina, Alternative B1 would deviate from the existing alignment for approximately 0.5 mile and would be located approximately 500-750 feet west of the existing alignment and U.S. Highway 34. The ROW would be located on private and ANRA lands.

At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three-terminal line. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would also be removed between Stillwater Tap and Granby Pumping Plant Switchyard. A new 138-kV/138-kV double-circuit line (operated at 69-kV/138-kV) would be constructed and replace the two existing lines on a single set of structures. (Map 2-3, Figure 2-8).

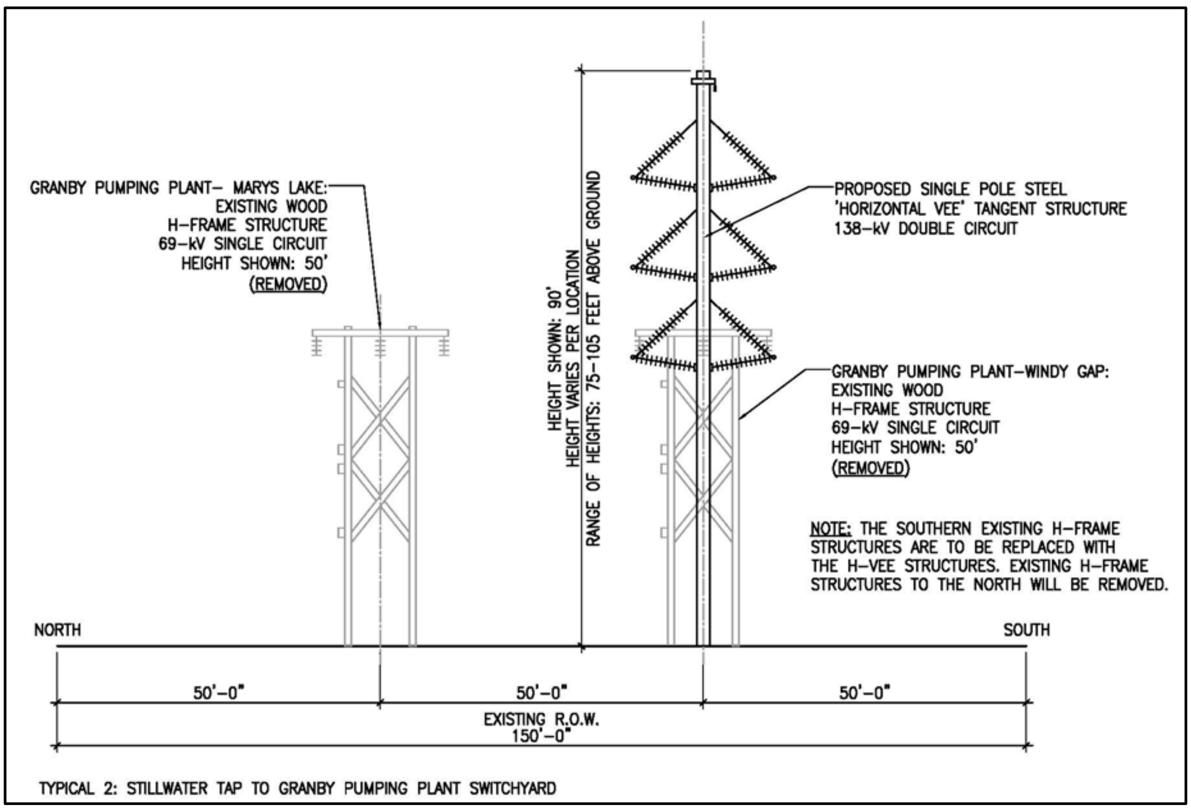


Figure 2-8. Typical Profile of Existing Parallel ROW Versus New Single ROW Leaving Stillwater Tap towards Granby Pumping Plant Switchyard.

Between Stillwater Tap and the Granby Pumping Plant Switchyard, Alternative B1 would generally follow the existing transmission line (Figure 2-9), with a minor alignment deviation to avoid impacting several homes that are located close to the existing transmission line.

In addition to the rebuild and upgrade of the transmission line, Alternative B1 would upgrade the existing tap and substation facilities to include:

- One new 69-kV three-way line termination at the Stillwater Tap.
- Additions at Granby Pumping Plant Switchyard consisting of one or two 138-kV circuit breakers, one 69-kV breaker, and a 50 megavolt-ampere (MVA) 138/69-kV power transformer.
- Additions at Windy Gap Substation consisting of one 138-kV breaker.

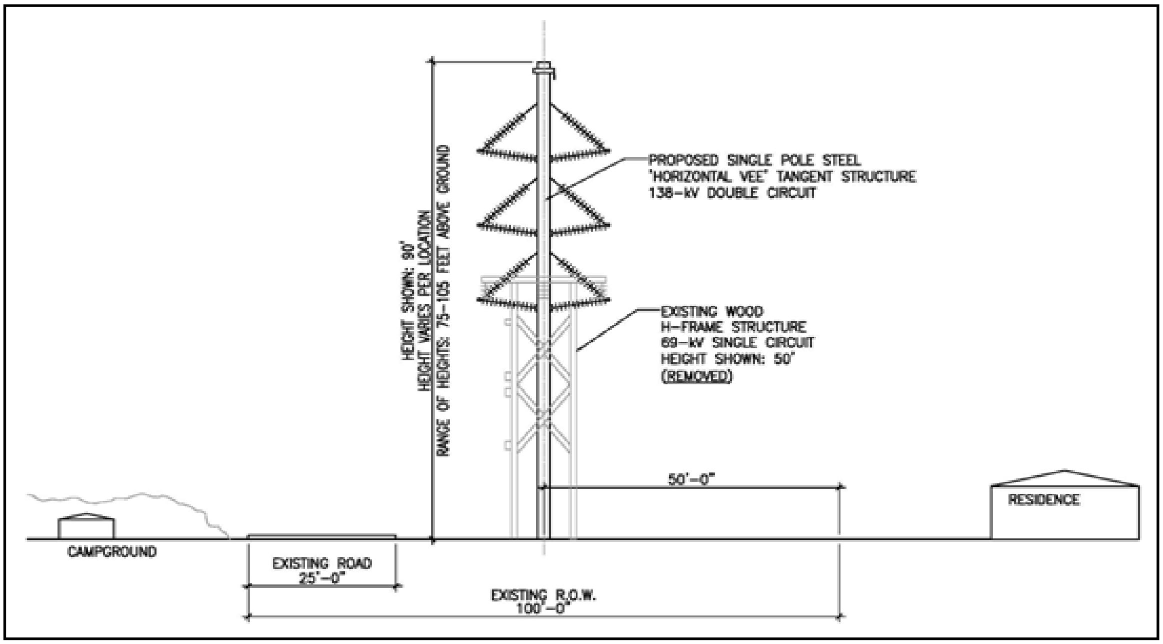


Figure 2-9. Typical Profile of Existing ROW with New Single-Pole Steel Structure East of CR64 and Cutthroat Bay Campground.

2.2.3 Alternative C1 – Reroute and Upgrade the Transmission Line

Alternative C1 is identical to the original Alternative C presented during the scoping process, with one exception. The primary difference between Alternative C and Alternative C1 occurs in the vicinity of the Willow Creek crossing. Alternative C was originally routed north of the Windy Gap Pipeline and behind a topographic rise in this area to avoid visual impacts to scenic byway users. Due to wildlife disturbance concerns as a result of creating a new ROW in this area, the Alternative C1 transmission line would be routed back onto the Windy Gap Pipeline at the Willow Creek crossing. (See also Alternatives Considered but Eliminated from Further Analysis, Section 2.5 for more information.)

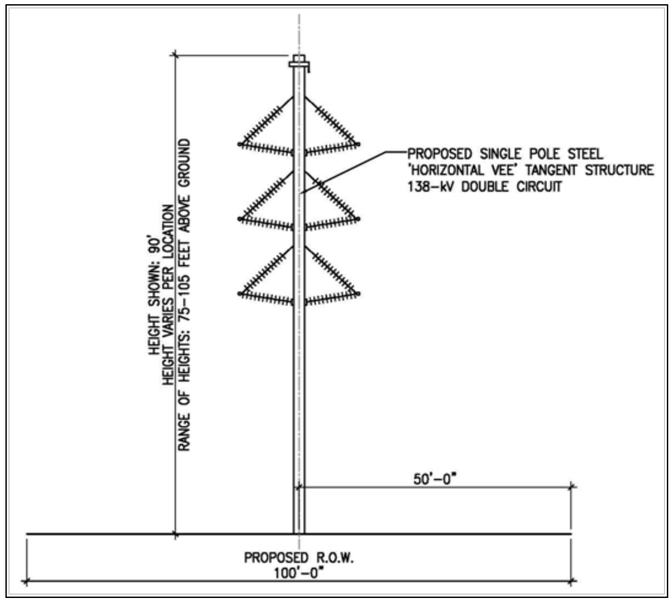


Figure 2-10. Typical Profile of Single-Pole Steel Structure on All New ROW.

Alternative C1 would reroute and upgrade the transmission line between the Windy Gap Substation and Granby Pumping Plant Switchyard (Map 2-5). Alternative C1 would remove the existing single-circuit 69-kV line and construct approximately 12.2 miles of 138-kV double-circuit line using single-pole steel structures on a primarily new ROW (Figure 2-4, Figure 2-6, and Figure 2-10). Approximately 3 miles would be rebuilt along the existing transmission line ROW. The existing 30-foot ROW is inadequate for the new transmission line, and would be increased to a width of 100 feet to accommodate requirements for construction, operation, and maintenance. Where the transmission line would parallel the Windy Gap Pipeline, structures would be located off the edge of the pipeline ROW. As such, Western would need to acquire additional transmission line ROW for lands that fall outside the existing pipeline easement (Figure 2-11).

From the Windy Gap Substation, Alternative C1 would travel east for approximately 0.75 mile following the existing transmission line alignment (Map 2-5). Just east of the boundary between BLM and private land, Alternative C1 would depart from the alignment of the existing line and turn north, paralleling the private parcel boundary. The transmission line would cross the Windy Gap Pipeline and then turn east, just inside the private property boundary until it joins with the Windy Gap Pipeline. Alternative C1 would overlap the Windy Gap Pipeline ROW for approximately 2 miles. The pipeline has a 100-foot permanent and exclusive easement for the pipeline that is 50 feet on either side of the pipeline centerline. There is also a permanent 200-foot easement for construction, repair, or replacement of the pipeline that is 100 feet on either side of the pipeline centerline. MS-NCWCD would need to agree to share ROW with Western if Alternative C1 is selected for implementation. The structures and conductors would not be located within the 100-foot permanent and exclusive easement for the pipeline; however, the ROWs would overlap. The transmission line structures would be offset from the pipeline centerline by approximately 50 to 100 feet.

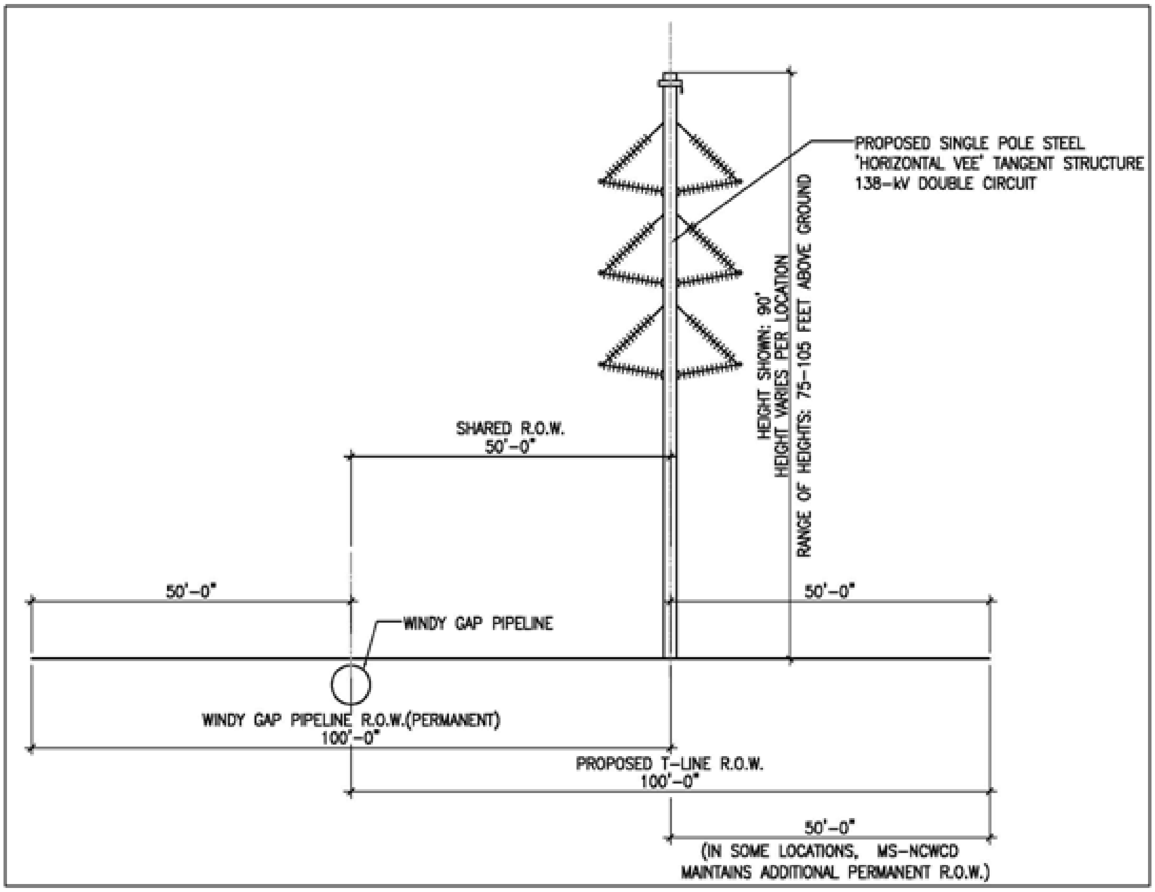
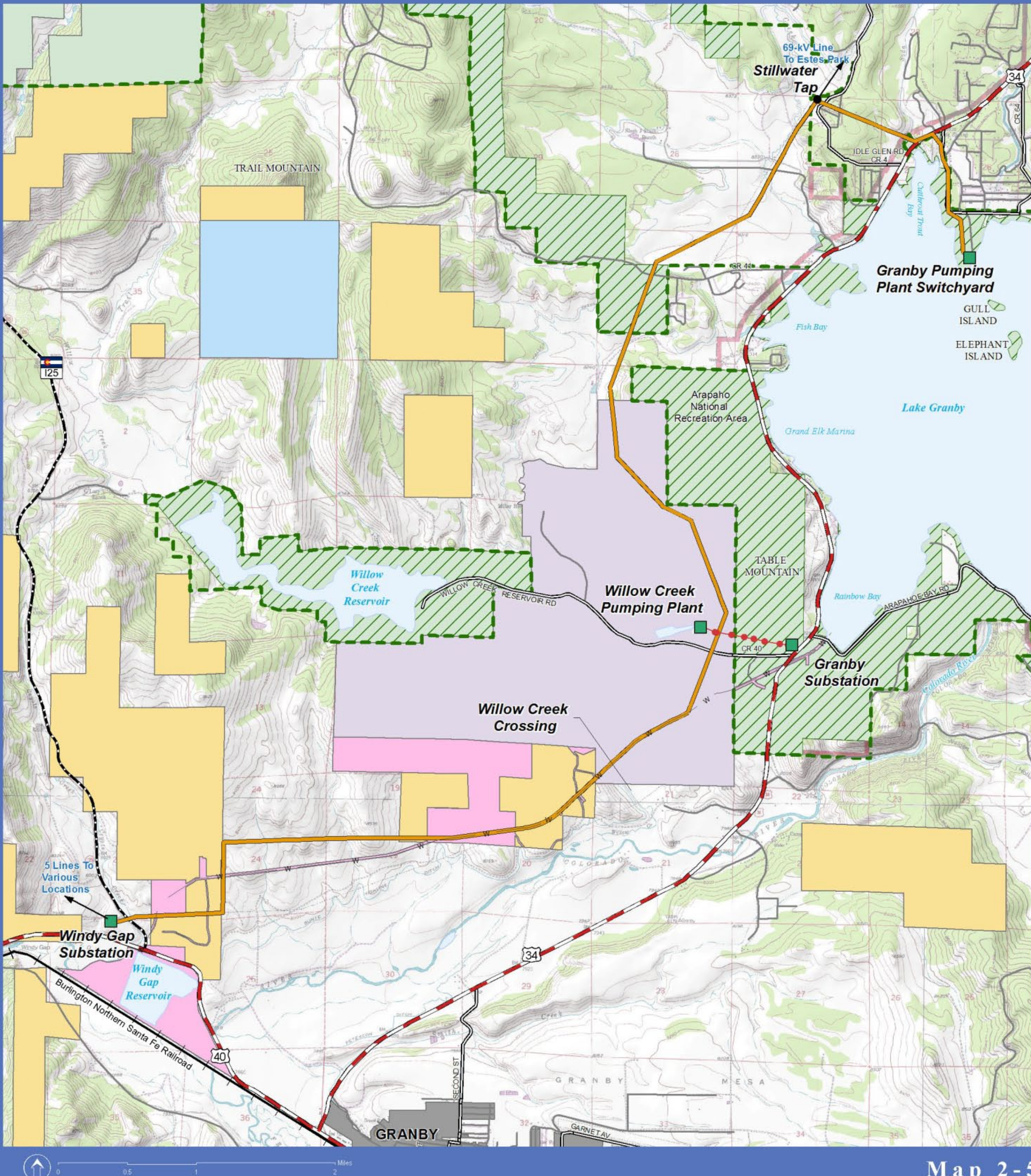


Figure 2-11. Typical Profile of New Single-Pole Steel Structure on Shared Windy Gap Pipeline ROW. The actual offset from the pipeline centerline for the transmission line structures would be approximately 50 to 100 feet.

South of CR 40, Alternative C1 would deviate from the Windy Gap Pipeline and generally follow the contours of the western toe of Table Mountain. At the north end of Table Mountain, Alternative C1 would cross private land for approximately 0.5 mile prior to entering ANRA lands due west of Fish Bay. After crossing CR 41, the alignment would cross private land on a new alignment until joining the existing transmission line alignment at the section boundary (Sections 27 and 28). From this point to the Stillwater Tap, Alternative C1 would be located on the existing but expanded ROW. At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three-terminal line. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard, and a new 138-kV/138-kV double-circuit line (operated at 69-kV/138-kV) would be constructed (Map 2-3).



Map 2-5

Alternative C1

April 2, 2013

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative C1

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Western Area Power Administration AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

In addition to the rebuild and upgrade of the transmission line, Alternative C1 would upgrade existing tap and substation facilities in the same manner as described for Alternative B1.

Activities common to all action alternatives are discussed in Section 2.3.

2.2.4 Alternative C2 – Reroute and Upgrade the Transmission Line, with Options Using Existing Utility ROWs

Alternative C2 is identical to Alternative C1, except for an approximately 2-mile segment east of the Windy Gap Substation. From the Windy Gap Substation, Alternative C2 would either parallel the Windy Gap Pipeline ROW or use the existing transmission line ROW to the vicinity of the Willow Creek crossing. At the Willow Creek crossing, Alternative C2 would follow the same alignment as described for Alternative C1.

Alternative C2 would reroute and upgrade the transmission line between the Windy Gap Substation and Granby Pumping Plant Switchyard (Map 2-6). Alternative C2 would remove the existing single-circuit 69-kV line and construct approximately 12 miles of 138-kV double-circuit line using single-pole steel structures on a combination of new and existing ROW (Figure 2-4 and Figure 2-6). Where Alternative C2 would be located on the existing alignment, the 30-foot ROW would be increased to a width of 100 feet to accommodate requirements for construction, operation, and maintenance.

From Windy Gap Substation, Alternative C2 has two route options (Map 2-6 and Map 2-7):

- Alternative C2-**Option 1** – Follow the Windy Gap Pipeline for 4.5 miles and then divide onto a new ROW on the west side of Table Mountain, or
- Alternative C2-**Option 2** – Follow the existing transmission line alignment for 2.7 miles, join the Windy Gap Pipeline for 1.5 miles, and then divide onto a new ROW on the west side of Table Mountain.

Under Option 1, Alternative C2 would share a portion of the Windy Gap Pipeline ROW. The pipeline has a 100-foot permanent and exclusive easement for the pipeline that is 50 feet on either side of the pipeline centerline. There is also a permanent 200-foot easement for construction, repair, or replacement of the pipeline that is 100 feet on either side of the pipeline centerline. MS-NCWCD would need to agree to share ROW with Western if Alternative C2 is selected for implementation. The structures and conductors would not be located within the 100-foot permanent and exclusive easement for the pipeline; however, the ROWs would overlap. The transmission line structures would be offset from the pipeline centerline by approximately 50 to 100 feet.

Under Option 2, Alternative C2 would use the existing but expanded transmission line ROW for 2.7 miles, and then join the Windy Gap Pipeline for 1.5 miles before following the same alignment on the west side of Table Mountain, as described for Alternative C1.

Under both options, Alternative C2 would generally follow the contours of the western toe of Table Mountain after leaving the Windy Gap Pipeline ROW. At the north end of Table Mountain, Alternative C2 would cross private land for approximately 0.5 mile prior to entering ANRA lands due west of Fish Bay. After crossing CR 41, the alignment would cross private land on a new alignment until joining the existing transmission line alignment at the section boundary (Sections 27 and 28). From this point to the Stillwater Tap, Alternative C2 would be located on the existing but expanded ROW. At Stillwater Tap, the existing Marys Lake-Granby

Pumping Plant 69-kV line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three-terminal line. The new 138-kV circuit would bypass the three-way termination. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard, and a new 138-kV/138-kV double-circuit line (operated at 69kV/138-kV) would be constructed.

In addition to the rebuild and upgrade of the transmission line, Alternative C2 would upgrade the existing tap and substation facilities in the same manner as described for Alternative B1.

Activities common to all action alternatives are discussed in Section 2.3.

2.2.5 Alternative D-Options 1 and 2 – Preferred Alternative – Rebuild and Upgrade the Transmission Line on the Existing ROW, with Options to Use New ROWs

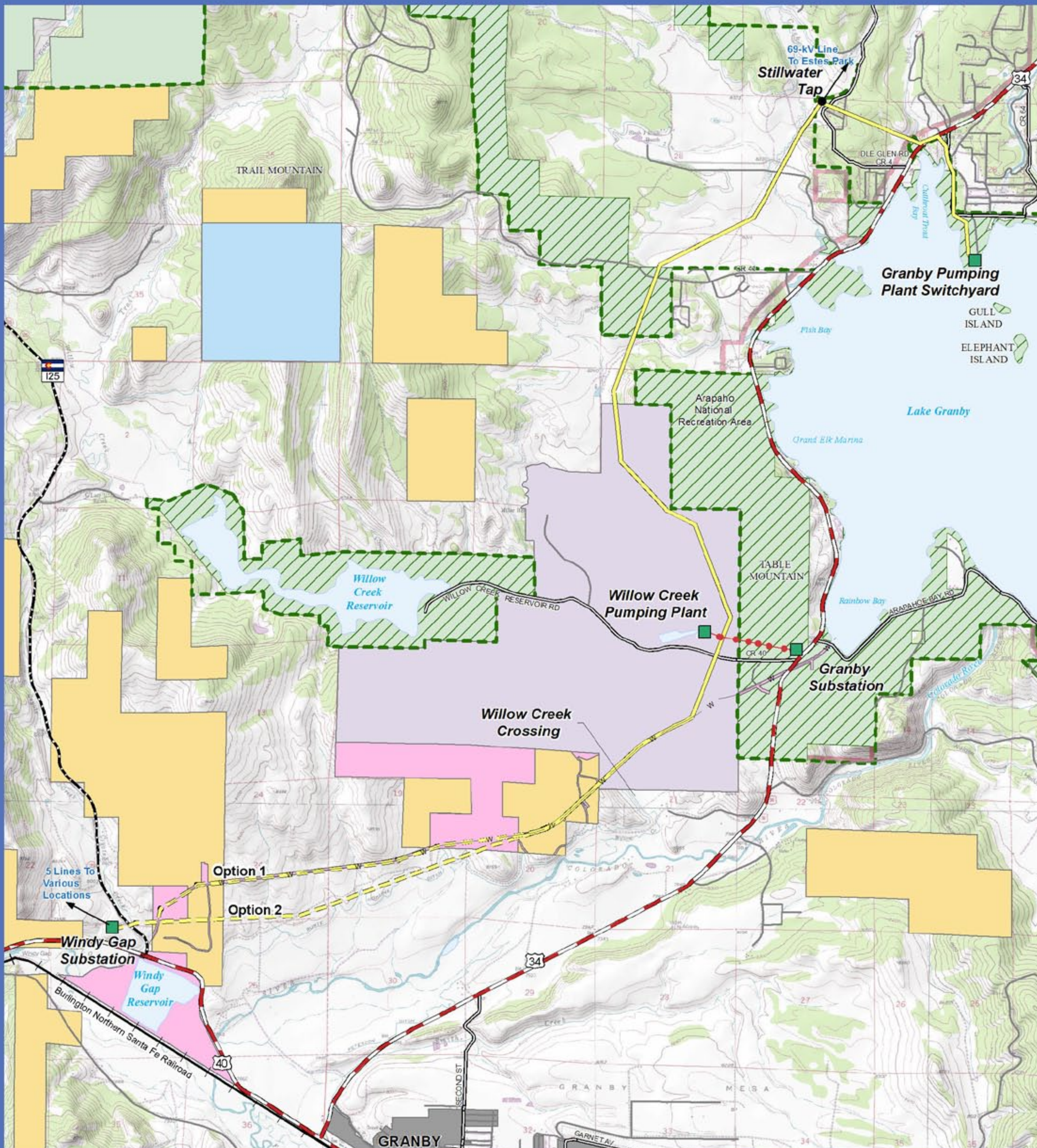
This alternative was derived from the original Alternative B presented during the scoping process. From Windy Gap Substation to the Granby Substation, Alternative D has two options, as discussed below. Option 1 is the preferred alternative. The only difference between the two options occurs east of the Windy Gap Substation. Immediately east of Windy Gap Substation Alternative D-Option 1 would follow the Windy Gap Pipeline for most of the appoximately 5 miles distance to the Granby Substation. Option 2 would remain on the existing transmission line ROW for the initial 2.5 miles east of Windy Gap Substation. The two options converge at a point approximately 3 miles east of Windy Gap Substation and follow the same alignment over the remaining distance to the Granby Pumping Plant Switchyard. See Maps 2-7 and 2-8.

Following public comments on the DEIS, an adjustment was made to the alignment of Alternative D in the vicinity of Cutthroat Bay Campground, which resulted in moving a portion of the alignment to the west side of County Road 64. See Map 2-3 for a detailed location.

Reasons for moving the alignment include the following:

- Reducing angles in the alignment and its proximity to U.S. Highway 34.
- Responding to landowner and resident concerns.
- Using an alignment that allows removal of the tall laminated structure and eliminates building encroachments on the existing ROW adjacent to County Road 64.

Alternative D would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant Switchyard (Map 2-8). This alternative would remove the existing single-circuit 69-kV line and construct approximately 11.7 miles of 138-kV double-circuit line using single-pole steel structures on the existing alignment or the Windy Gap Pipeline ROW (Figure 2-4 and Figure 2-6). Where Alternative D would be located on the existing alignment, the 30-foot ROW would be expanded to a width of 100 feet to accommodate requirements for construction, operation, and maintenance. From Stillwater Tap, this alternative would combine the two existing single-circuit 69-kV lines into one double-circuit line into Granby Pumping Plant Switchyard (Map 2-3).



Map 2-6

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative C2
- Alternative C2 - Route Options

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Alternative C2

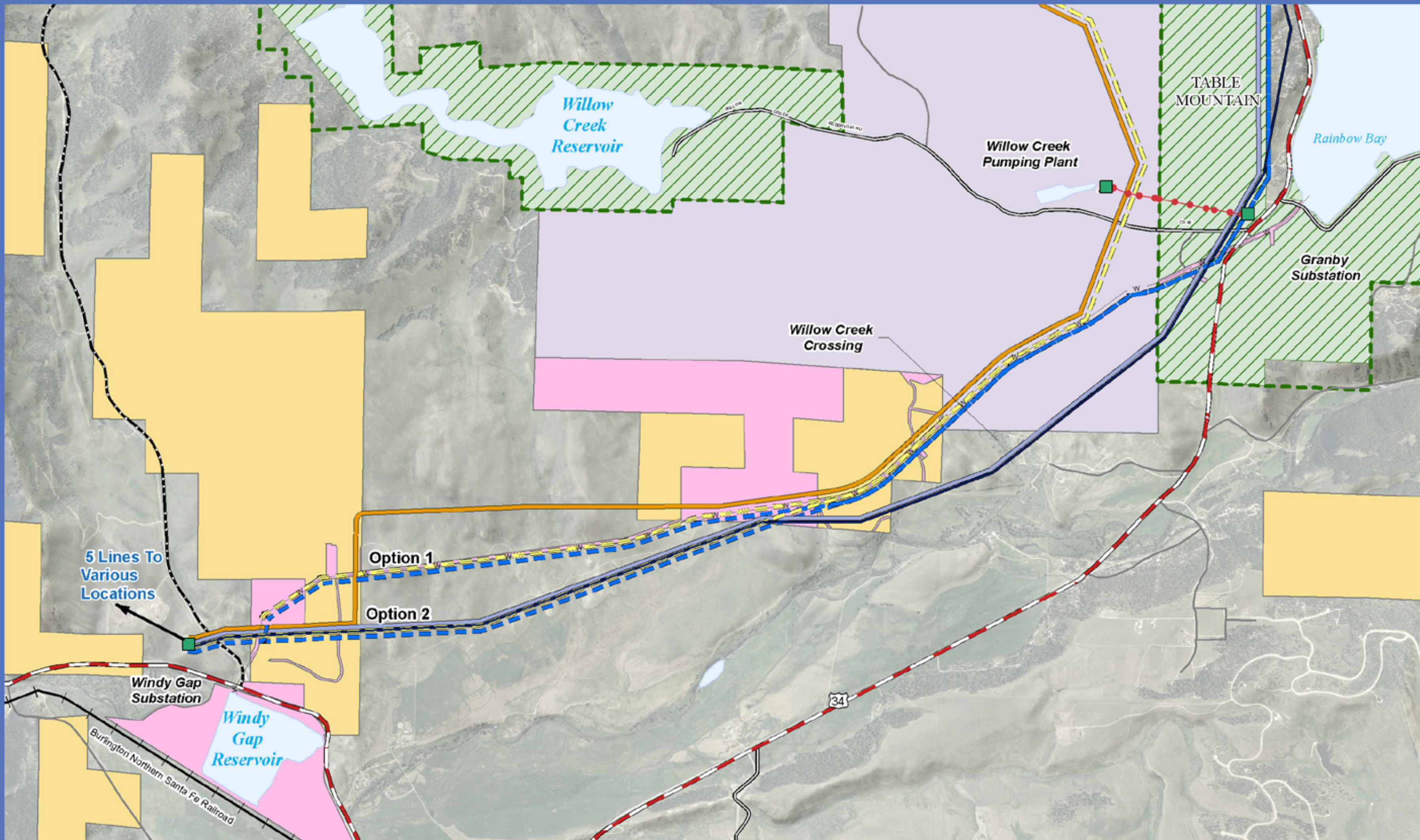
April 2, 2013

Western Area Power Administration

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



0 0.5 1 Miles

Map 2-7

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- W Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Options 1 and 2

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

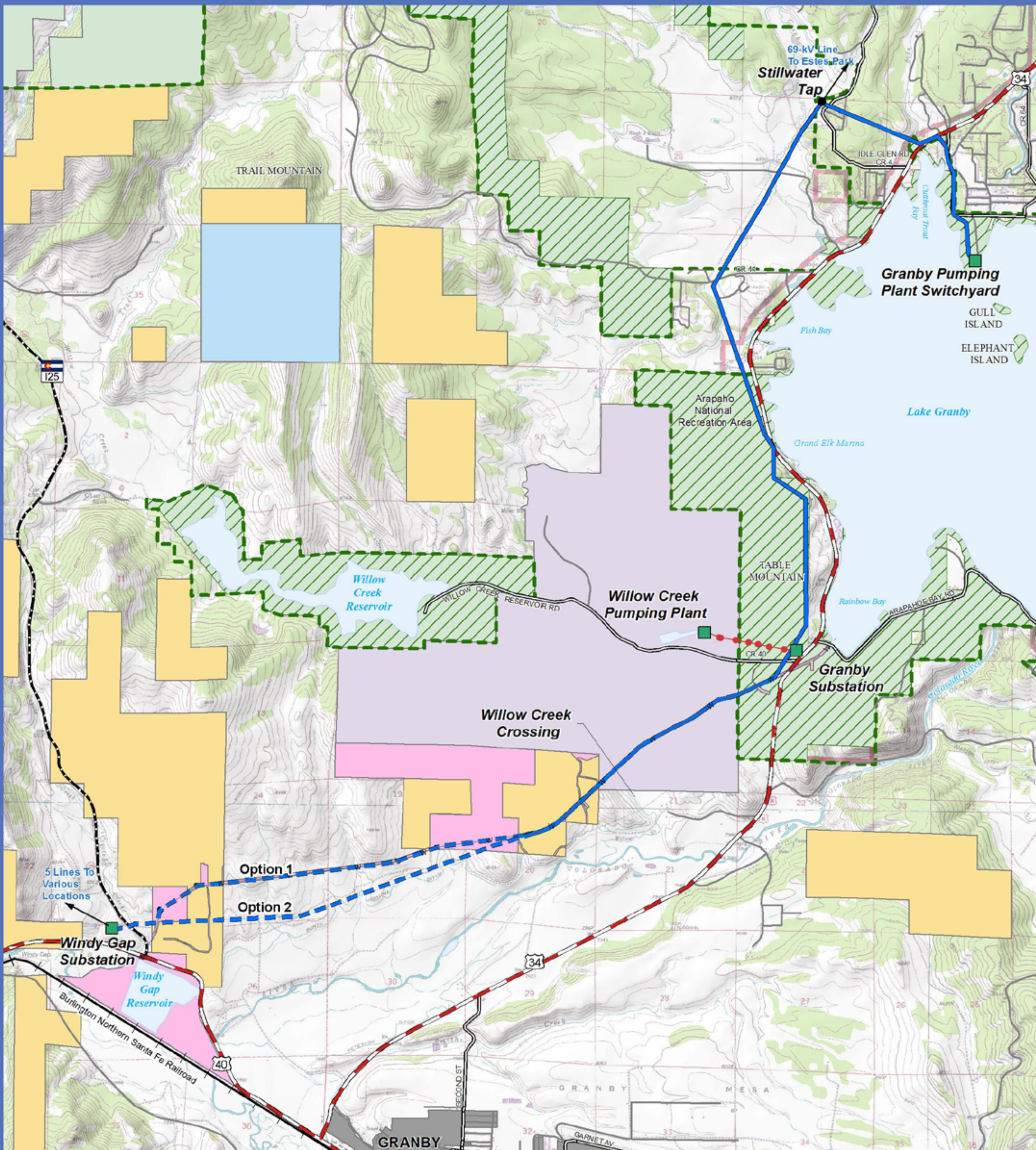
Southwest Route Options

February 8, 2013

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Miles
0 0.5 1 2

Map 2-8

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives
- Alternative D
- Alternative D - Route Options

Land Status
- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Alternative D

April 2, 2013

Western Area Power Administration

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, Colorado State University

Under Option 1, Alternative D would share a portion of the Windy Gap Pipeline ROW in the same manner as described for Alternative C2-Option 1.

Under Option 2, Alternative D would use the existing but expanded transmission line ROW for 3 miles, and would then join the Windy Gap Pipeline ROW for 2 miles to the area just south of the Granby Substation.

From the point of departure from the Windy Gap Pipeline ROW south of Granby Substation, Alternative D would follow the existing but expanded ROW north for 0.25 mile. At the Granby Substation, Alternative D would deviate from the existing alignment onto a new ROW located just inside the ANRA boundary, as described for Alternative B1 (Figure 2-7). The eastern boundary of the ROW would be the same as the ANRA boundary (structures/centerline would be located approximately 50 feet inside ANRA boundary).

Alternative D rejoins the existing transmission line alignment south of the Grand Elk (Norton) Marina and follows the existing alignment into Stillwater Tap, with one minor exception (same as described for Alternative B1). Immediately west of the marina, Alternative D would deviate from the existing alignment for approximately 0.5 mile, and would be located approximately 500-750 feet west of the existing alignment and U.S. Highway 34. The ROW would be located on private and ANRA lands.

At Stillwater Tap, Alternative D would consolidate the two existing single-circuit 69-kV lines onto one double-circuit line, and would remove the existing southwestern circuit currently routed through the Forest Service campground (Map 2-3, Figure 2-8). Between Stillwater Tap and the Granby Pumping Plant Switchyard, Alternative D would generally follow the existing transmission line, with a minor alignment deviation along County Road 64.

In addition to the rebuild and upgrade of the transmission line, Alternative D would upgrade the existing tap and substation facilities in the same manner as described for Alternative B1.

Activities common to all action alternatives are discussed in Section 2.3 below.

2.2.6 Comparison of Alternative Elements

Table 2-1 and Table 2-2 provide a comparison of alternative elements and alternative engineering specifications, respectively.

Table 2-1. Comparison of Alternative Elements.

Alternative	Total Length (miles)	Miles of Transmission Line within the Existing ROW	Miles of Transmission Line within a New ROW	Land Ownership Crossed (miles)	
Alternative A	13.6	13.6	0	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.8 0.7 0.4 3.3 8.5
Alternative B1	11.9	10.1	1.8	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.8 0.7 0.4 3.8 6.2
Alternative C1	12.3	3.3	9.0	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.7 3.4 1.4 1.5 5.3
Alternative C2-Option 1	11.9	2.8	9.1	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	<0.1 3.4 3.5 1.5 3.5
Alternative C2-Option 2	11.9	5.3	6.6	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.5 3.4 1.0 1.5 5.5
Alternative D-Option 1	11.8	5.1	6.7	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.0 1.2 3.8 3.2 3.6
Alternative D-Option 2	11.7	7.5	4.2	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.5 1.2 1.3 3.2 5.5

Table 2-2. Comparison of Alternative Engineering Specifications.

Engineering Specification	Alternative A no action	Alternatives B1, C1, C2, D
Pole structure type	Wood H-frame	Single-pole steel
Voltage	69-kV single-circuit	138-kV double-circuit (operated at 69-kV and 138-kV)
New construction and yard preparation necessary	No	Yes
Surveying	No	Yes
Structure demolition	No	Yes
Materials hauling	No	Yes
Foundation excavation	No	Yes
Structure assembly	No	Yes
Structure erection	No	Yes
Ground wire and conductor stringing	No	Yes
Cleanup	No	Yes
Seeding and reclamation	No	Yes
ROW width	~10 miles of 30-ft ROW ~2 miles of 100-ft ROW	100 ft max.
Average span	500 ft	600 ft
Maximum span	800 ft	800 ft
Average height range of poles	55- 65 ft	75- 105 ft
Pole diameter	2 poles set 8 ft apart, pole diameter: 1.5 ft	5 ft
Approximate area needed for construction staging	0 acres	2 staging areas, each 62,500 ft^2
Temporary land disturbed at each structure base (area)	None	900 ft^2 at each structure base; <2.25 acres of temporary disturbance for all action alternatives
Permanent land disturbed at each structure base (area)	n/a	<0.05 acre total for all action alternatives
Minimum ground clearance beneath conductor	21 ft	22 ft
Maximum height of any machine that can be operated safely under the line	14 ft	14 ft
Conductor size	4/0 AWG	397kCM

AWG = American Wire Gauge

ft = feet

ft^2 = square feet

kCM = kilo Circular Mil (1,000)

2.3 Activities Common to All Action Alternatives

This section describes the construction methods, permits, and approvals that would be used to implement the action alternatives. Conventional, above-ground construction methods would be used for the new structures built between the Windy Gap Substation and the Granby Pumping Plant Switchyard. Construction of Alternatives B1, C1, C2, or D would begin in spring 2012 and continue through winter 2013.

2.3.1 Construction Methods and Requirements

Western would take only one line segment out of service at a time to maintain electrical service during construction. The line segments are Windy Gap to Granby substations; Granby Substation to Stillwater Tap; and Stillwater Tap to Granby Pumping Plant Switchyard.

The transmission line ROW would be surveyed along its centerline. The survey data would be used during design to determine structure locations and heights needed to meet the transmission line design criteria for conductor clearances.

All segments of the existing 69-kV Granby Pumping Plant Switchyard-Windy Gap Substation transmission line constructed on H-frame wood poles would be removed, except a couple poles that may be left near Lake Granby for osprey nesting. Removed poles may be cut off at or below ground level or pulled completely out of the ground. The remaining holes would be backfilled and revegetated.

Direct embedded single-pole steel structures are proposed for the majority of the project. A truck-mounted auger would be used to excavate holes for the structures. The steel poles would be assembled at the pole sites, or portions of the poles may be assembled at the staging areas and then hauled to the sites. The structures would be lifted into place with cranes and held in place while concrete trucks backfill the excavation, filling the hole around the structure.

If site conditions or design requirements indicate a need, single-pole structures that bolt to a foundation would be used. The foundations are constructed by installing anchor bolt structures, rebar cages, and anchor bolt cages in the excavated holes. Concrete would then be poured into the formed foundation to secure these cages in place. Once the concrete has sufficiently hardened, the excavated holes would be backfilled. The steel poles would then be bolted to the foundation anchor bolts. Excess soil would be spread evenly around the base of the poles and revegetated or removed from the site.

The conductor pulling, sagging, and clipping operations would take place relatively quickly once the structures are in place. The conductor would not touch the ground during stringing or tensioning. Steel-pulling cables would be pulled through pulleys hanging from the insulator attached to each structure. Conductor pulling is limited by reel size; typically, a conductor of this diameter can be loaded onto reels in 10,000-15,000-foot segments.

Old wood poles and construction waste materials would be collected, hauled away, and recycled or disposed of at approved sites. All disturbed areas not returned to agricultural cultivation would be reseeded to minimize erosion and the invasion of noxious weeds. All disturbance areas would be restored to their original condition as feasible. Damaged gates, fences, or landscaping would be repaired.

The contractor would be required to prepare and implement a safety program in compliance with appropriate federal, state, and local safety standards and requirements, and as approved by Western.

Standard construction and mitigation practices (SCPs) would be employed to minimize potential adverse effects during construction activities (see Section 2.4, Design Criteria and Environmental Protection Measures).

2.3.2 Acquisition of Land Rights

To access, construct, and maintain the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line, Western would need to obtain easements for some segments of the transmission line or access roads. Western would acquire ROW with a width of 100 feet for the upgraded 138-kV transmission line.

Prior to construction on private property and as part of the preliminary design and EIS analyses, Western requested permission from landowners for worker and contractor access to property for the purpose of conducting necessary environmental and engineering surveys and studies of local conditions affecting construction, such as slope and soil stability. To select specific structure locations, a combination of aerial and land surveys, environmental and engineering field studies, and geologic investigations would be necessary, and Western would request landowner permission prior to entering private property. Western would select final sites to minimize effects to the properties crossed and to satisfy design criteria, such as maintaining adequate conductor-to-ground clearance. Western would compensate for or repair damage to crops, fences, or other property caused by the surveys and studies.

Western would negotiate and purchase necessary easements from landowners under federal property acquisition guidelines (the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and its regulations, located at 42 U.S.C. § 4601 et seq. and 49 CFR Part 24). A qualified real estate appraiser would appraise the easement at fair market value. The appraiser would determine the value of the easement using customary appraisal methods, including analysis of available market data and comparable sales, and by taking into consideration the rights being acquired from the landowner. The appraiser would invite the landowner(s) to accompany him/her during the property inspection. Landowners could then identify any property features and uses believed to be of importance in determining the value of the easement. Western would present landowners with a written offer and a contract to purchase the required easements. Western's land services agent would explain the contract and discuss the basis for payment. Once the conditions of the agreement are met, the transaction would be processed as efficiently as possible. Western would make full payment for easements to landowners, and would pay for any title insurance and all recording fees.

If Western and a landowner are unable to agree on purchase of an easement, federal and state laws enable public agencies to acquire property rights for facilities to be built in the public interest through eminent domain proceedings. During the proceedings, a court would determine the compensation that Western would pay to the landowner.

When construction on a particular ROW is ready to begin, Western would advise the landowner(s) of the construction schedule. Western would make reasonable attempts to take into account the use and condition of the land, such as planting, irrigation, and harvest schedules, to minimize any inconvenience. Western would compensate landowners for crop and property damage that occurs as a result of construction or maintenance of the transmission line. If a landowner believes that damage has occurred and has not been recognized, he or she could contact the Western land services agent.

The landowner would retain title to the land over which Western's easement crosses, and would be able to continue using that land for activities that do not interfere with Western's use of the ROW. These uses may include parking, cultivation, and livestock grazing, among others. Activities typically not permitted in transmission line ROWs are those that reduce ground-to-line clearance, interfere with access to the line for maintenance, or jeopardize the integrity of the support structures. Buildings and structures may not be erected in the ROW because they could impede the safe operation of the transmission line or interfere with access for maintenance. For safety reasons, equipment that can extend higher than 14 feet, such as dump trucks, cranes, derricks, bale wagons, and stack movers, should not be used around transmission towers and lines (per NESC guidelines). Likewise, pumps, wells, and flammables must not be placed in a ROW. Properly grounded and permitted fences are acceptable as long as adequate gates for access have been installed.

2.3.3 Access

Project crews would use existing access roads for construction and routine maintenance, to the extent possible, to minimize new disturbances. Where existing public roads are not available, Western would acquire a 30-foot access easement. Construction of new roads would be limited to locations requiring ongoing access to repair and maintain the transmission lines or structures. The roads would be surfaced with road base where necessary.

To minimize road building, Western would consider overland access where topography, soil, and vegetation conditions support overland travel with minimum disturbance and compaction. Such conditions generally consist of hay meadows or grass and shrub land habitats on relatively flat terrain. Western would expect vegetation to recover quickly because it would not be graded or cleared.

For much of the proposed transmission line rebuild project, Western has adequate existing access for construction. New, short spur roads to structure sites may be required in some locations to accommodate heavy equipment or unusual soil conditions. Whenever possible, overland travel (without grading) would occur, and existing trails and roads would be used wherever available.

The location and need for additional minor ROW access cannot be determined until final design and engineering, and, in some cases, not until the construction contractor has reviewed the access situation. For purposes of the EIS, it has been assumed that disturbances from access roads may occur anywhere within the proposed and alternative ROWs. Site-specific access requirements would be addressed as the design phase proceeds, and Western's SCPs and project-specific environmental protection measures would be implemented. If new roads are required, wetland, wildlife, botanical, and cultural surveys would be conducted if the proposed alignments have not already been surveyed. All access roads on National Forest System (NFS) lands must be authorized by the Forest Service and will be designed by qualified engineers to the appropriate Forest Service standards. Road siting, designs, construction practices, operations and maintenance protocols, and closures of temporary roads on NFS lands will meet Forest Service standards and be approved by the Forest Service Authorized Officer prior to commencement of any surface-disturbing activity.

Sites for pulling and tensioning conductors are assumed to occur approximately every 2-3 miles of the transmission line. This assumption allows reasonable estimates of impacts to be presented in the EIS.

Table 2-3 provides access type mileage estimates by alternative. For analysis purposes, it is assumed that a corridor width of 14 feet for all types of access roads shown in Table 2-3 would be temporarily disturbed by the movement of construction equipment.

Even though existing roads or two-tracks are located near the alternative alignments, it was assumed that disturbance during construction would occur along the entire length of each alternative. A width of 14 feet was used to calculate temporary disturbance acreages for each of the action alternatives; each alternative results in approximately 12 acres of temporary access road disturbance.

Table 2-3. Estimated Access Road Availability and Type by Alternative (miles shown indicate miles of transmission line where this type of access would be necessary/feasible).

Alternative	Existing Road or Track Available	Cross-Country Travel Feasible	New Temporary Road(s) Required	Grand Total
Alternative A - Existing	13.6	-	-	13.6
Alternative B1	10.5	-	1.4	11.9
Alternative C1	6.5	1.6	4.2	12.3
Alternative C2-Option 1	8.1	1.6	2.2	11.9
Alternative C2-Option 2	7.7	2.0	2.2	11.9
Alternative D-Option 1	10.4	-	1.4	11.8
Alternative D-Option 2	10.0	0.4	1.4	11.8

2.3.4 Construction Staging Areas

Existing substations and their immediate surroundings would be used to the extent possible for equipment staging, material laydown, and storage facilities. Additionally, Western anticipates that two 62,500–square foot (ft^2) temporary staging areas (approximately 3 acres, combined) would be necessary to support implementation of any action alternative. The location of staging areas would be determined by the construction contractor during the construction phase; staging areas would be sited in accordance with Western's SCPs and project-specific environmental protection measures. Existing or portable concrete batch plants would be used to supply poured concrete for foundations for transmission line structures and substation equipment.

2.3.5 Clearing and Grading

Western would implement the 2008 *Transmission Vegetation Management Program* and associated orders (Appendix C). The program consists of removing tree species that at mature height would be tall enough to either grow into contact with electrical conductors or fall into the conductors or structures, as well as removing danger trees. The vegetation management program is intended to actively manage the plant communities beneath transmission lines and within ROWs, as well as address fire-related impacts that affect the overall ability of transmission facilities to withstand a fire. The objective is to establish lower growing native vegetation in the

ROW. Design criteria would be implemented to protect sensitive resources (see Section 2.4, Design Criteria and Environmental Protection Measures).

Crews would remove trees and shrubs from the structure location and along the ROW, as necessary, using brush hogs, mowers, chain saws, skidders, and bulldozers to provide access for construction equipment and activities. Vegetation clearing activities would be conducted consistent with Western's 2008 Transmission Vegetation Management Program guidelines. Western would dispose of slash piles and woody debris in a manner acceptable to the county and landowner, but may dispose of the debris by hauling, burning, or windrowing at the edge of the ROW for stormwater control. In some instances, Western may need to remove trees outside the ROW if their growth could bring them within 10 feet of a transmission line or conductor during icing or wind events. Removal of trees outside of the ROW on Forest Service land would be addressed in Western's Operation and Maintenance Plan. Crews would preserve native vegetation to the extent possible, particularly outside structure sites and near riparian areas.

2.3.6 Structure and Conductor Installation

Assembly of transmission line structures would occur on site where insulators, braces, and other equipment would be attached to the structures while they are still on the ground. Boom trucks and cranes would be used to raise the structures into foundation bore holes for structures. Helicopters may be used at the discretion of the contractor to erect equipment on steep slopes or in rugged terrain.

The project would require level sites approximately every 2-3 miles along the transmission line to house reels of transmission cable and to serve as staging areas for wire-pulling. Western would try to avoid locations that require grading or removal of vegetation. Pulleys would be attached to the insulators to string the conductors, which then would be pulled to the appropriate tension. Contractors would use either a ground vehicle or helicopter to pull the pilot line. Where necessary, traffic would be stopped while activities are occurring that could affect public safety.

2.3.7 Site Cleanup and Restoration

Crews would remove debris and other materials from construction sites following construction and dispose of it in a certified private, public, or construction and demolition landfill, as appropriate. Crews would loosen and level disturbed soil areas with harrowing or disking to approximate preconstruction contours. Ruts and scars that would interfere with overland travel would be filled or recontoured. Disturbed areas would be reseeded and mulched, as needed, using a Natural Resource Conservation Service (NRCS) approved weed-free mix as soon as practical after construction activities are completed in any given area. On NFS lands, a Forest Service approved weed-free seed mix would be used for restoration. In some areas, mulching, netting, or turf reinforcement mats may be necessary to protect seeded areas from erosion. If used, mulching would consist of weed-free hay or other approved material. Periodically, crews would monitor revegetated areas to determine that coverage is adequate. Areas may be reseeded, as necessary, to establish cover.

Drainage structures and other improvements not needed for permanent maintenance of the transmission lines would be removed. Similarly, access roads or trails that are not needed for ongoing maintenance access would be blocked and reclaimed, if necessary, to prevent future unauthorized access by the public.

2.3.8 Workforce

The workforce would be a combination of local labor acquired by contractors, and a mobile labor workforce that specializes in transmission line construction and temporarily relocates to the area where the work necessitates. Construction would be accomplished by two crews of five to six persons each.

2.3.9 Construction Sequencing

The transmission line rebuild is expected to take 1-2 years to construct. The line would be rebuilt in three line segments. Total construction time at each transmission structure location would be approximately 1-2 weeks, spread over a period of 18 months.

Table 2-4 lists the typical sequence of construction activities for each transmission line segment and the equipment needed for each task.

Table 2-4. Construction Activities and Equipment.

Task	Equipment
Surveying	Utility vehicles, pickups, All Terrain Vehicles (ATV)
Access	Graders, caterpillars, dump trucks, water trucks
ROW Clearing	Brush hogs, mowers, chain saws, skidders, bulldozers
Staging	Flatbeds with cranes, delivery trucks, pickups
Excavation	Backhoes, rotary drilling rigs, augers, cement mixers, pickups, ATVs, portable compressors
Structure Assembly	Cranes, material trucks, carryalls, pickups
Structure Placement	Cranes, boom trucks, pickups, helicopters
Cable Pulling	Boom trucks/manlifts, reel trailers, hydraulic tensioning equipment, pickups, helicopters
Cleanup	Flatbeds, dump trucks, pickups
Restoration	Seeding equipment, hand-seeding equipment, caterpillars, backhoes, flatbeds, pickups

2.3.10 Construction Monitoring

During construction, a construction inspector (Western employee or hired independent contractor) would be present in the field to ensure implementation of SCPs and project-specific environmental protection measures (Section 2.4).

2.3.11 Operation and Maintenance

Operation and maintenance of the line would be the responsibility of Western. Throughout the life of the project, Western would conduct the following operation and maintenance activities:

- Routine aerial inspections of the integrity and condition of the transmission lines, and after wind, ice, and lightning events that cause forced outages. Ground inspections once per year, and as needed after weather events, to identify any repair or routine maintenance needs. Maintenance activities would include repairing damaged conductors, insulators, or structure components.

- Maintenance of permanent access roads for Western's use, including surfacing and adequate drainage.
- Removal of trees and brush that create access, safety, or clearance problems for operation of the transmission lines and associated equipment. Vegetation clearing and maintenance activities would be conducted consistent with Western's 2008 *Transmission Vegetation Management Program* guidelines (Appendix C).
- Identification and control of noxious weeds around transmission structures and in ROWs using methods approved by the landowner and applicable land management agencies.

2.3.12 Other Permits and Approvals

Where the proposed transmission line and the Windy Gap Pipeline would share ROW and cross BLM managed lands, Western would need to acquire authorization from BLM. See Chapter 6.0 for further information.

2.4 Design Criteria and Environmental Protection Measures

Western has SCPs, including standard operation and maintenance practices that avoid or minimize impacts to the environment to the greatest extent practicable. Design criteria are actions or measures integrated into the project design to avoid, minimize, reduce, or eliminate adverse effects as a result of implementing the action alternatives. For the Granby Pumping Plant Switchyard-Windy Gap transmission line rebuild, Western's SCPs would be implemented for the construction of any action alternative. These measures are part of Western's proposed project and are considered in this EIS.

2.4.1 Western's Standard Construction and Mitigation Practices

Table 2-5. Western's Standard Construction and Mitigation Practices.

Ref. #	Standard Practices
SCP 1	The contractor shall limit the movement of its crews and equipment to the ROW, including access routes. The contractor shall limit movement on the ROW to minimize damage to grazing land, crops, or property, and shall avoid unnecessary land disturbance.
SCP 2	When weather and ground conditions permit, the contractor shall obliterate contractor-caused deep ruts that are hazardous to farming operations and to movement of equipment. Such ruts shall be leveled, filled, and graded, or otherwise eliminated in an approved manner. In hay meadows, alfalfa fields, pastures, and cultivated productive lands, ruts, scars, and compacted soils shall have the soil loosened and leveled by scarifying, harrowing, discing, or other approved methods. Damage to ditches, tile drains, terraces, roads, and other features of the land shall be corrected. Before final acceptance of the work in these agricultural areas, ruts shall be obliterated, and trails and areas that are hard-packed as a result of contractor operations shall be loosened, leveled, and reseeded. The land and facilities shall be restored as nearly as practicable to their original conditions.
SCP 3	Water bars or small terraces shall be constructed across ROW and access roads when needed to prevent water erosion and to facilitate natural revegetation.
SCP 4	The contractor shall comply with applicable federal, state, and local environmental laws, orders, and regulations. Prior to construction, supervisory construction personnel and heavy equipment operators will be instructed on the protection of cultural and ecological resources.

Ref. #	Standard Practices
SCP 5	The contractor shall exercise care to preserve the natural landscape, and shall conduct its construction operations to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for permanent works, construction roads, or excavation operations, trees, native shrubbery, and vegetation shall be preserved and shall be protected from damage by the contractor's construction operations and equipment. To the extent practicable considering the need to protect transmission lines form encroaching vegetation and vegetation hazards (especially trees) edges of clearings and cuts through tree, shrubbery, or other vegetation would be irregularly shaped to soften the visual impact of straight lines within the ROW.
SCP 6	On completion of the work, work areas shall be scarified or left in a condition that would facilitate natural revegetation, provide for proper drainage, and prevent erosion. The contractor would repair damages resulting from the contractor's operations. Newly created access roads will be left to revegetate to height that still allows vehicle passage.
SCP 7	Construction staging areas shall be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. Staging areas will not be placed within wetlands, including fen wetlands, riparian communities, or in proximity to surface waters. On abandonment, storage and construction buildings, including concrete footings and slabs, and construction materials and debris shall be removed from the site. The area shall be regraded as required so that surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.
SCP 8	Borrow pits shall be excavated so that water will not collect and stand. Before being abandoned, the sides of borrow pits shall be brought to stable slopes, with slope intersections shaped to carry the natural contour of adjacent undisturbed terrain into the pit or borrow area, giving a natural appearance. Waste piles shall be shaped to provide a natural appearance. No waste piles will occur on Forest Service Lands.
SCP 9	Construction activities shall be performed by methods that will prevent entrance, or accidental spillage, of solid matter contaminants, debris, other objectionable pollutants and wastes into streams, flowing or dry watercourses, lakes, and underground water sources. Pollutants and waste include, but are not restricted to refuse, garbage, cement, concrete, sanitary waste, industrial waste, oil and other petroleum products, aggregate processing tailing, mineral salts, and thermal pollution.
SCP 10	Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or watercourses, shall be conducted in a manner to prevent muddy water and eroded materials from entering the streams or watercourses by construction of intercepting ditches, bypass channels, barriers, settling ponds, or by other approved means. Dewatering shall comply with applicable state requirements.
SCP 11	Excavated material or other construction materials shall not be stockpiled or deposited near or on stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can encroach upon the actual watercourse itself.
SCP 12	Waste waters from construction operations shall not enter streams, watercourses, or other surface waters without the appropriate permits and proper implementation of applicable permit conditions, including but not limited to use of turbidity control methods as settling ponds, gravel-filter entrapment dikes, approved flocculating processes, or other approved methods. Waste waters discharged into surface waters shall be essentially free of settleable material. For the purpose of these practices, settleable material is defined as material that will settle from the water by gravity during a 1-hour quiescent detention period.
SCP 13	The contractor shall use practicable methods and devices that are reasonably available to control, prevent, and otherwise minimize discharges of air contaminants.
SCP 14	The emission of dust into the air will not be permitted during the handling and storage of concrete aggregate, and the contractor shall use methods and equipment as necessary for the collection and disposal, or prevention, of dust. The contractor's methods of storing and handling cement and pozzolans shall include means of controlling air discharges of dust.
SCP 15	Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or inefficient operating conditions, shall not be operated until repairs or adjustments are made.
SCP 16	The contractor shall prevent nuisance to persons or damage to crops, cultivated fields, and dwellings from dust originating from his operations. Oil and other petroleum derivatives shall not be used for dust control. Speed limits shall be enforced, based on road conditions, to reduce dust problems.

Ref. #	Standard Practices
SCP 17	To avoid nuisance conditions due to construction noise, internal combustion engines shall be fitted with an approved muffler and spark arrester.
SCP 18	Burning or burying waste materials on the ROW or at the construction site will be permitted if allowed by local regulations. The contractor shall remove all other waste materials from the construction area. All materials resulting from the contractor's clearing operations shall be removed from the ROW. No waste materials can be buried on NFS lands.
SCP 19	The contractor shall make necessary provisions in conformance with safety requirements for maintaining the flow of public traffic, and shall conduct its construction operations to offer the least possible obstruction and inconvenience to public traffic.
SCP 20	Western will apply necessary mitigation to eliminate problems of induced currents and voltages onto conductive objects sharing a ROW, to the mutual satisfaction of the parties involved.
SCP 21	Structures will be carefully located to avoid sensitive vegetative conditions, including wetlands, where practical. Wetlands will be crossed at a feasible location for the construction contractor and in an area where the least amount of damage would occur to the wetland community. If necessary, Western would obtain the appropriate permits from the USACE.
SCP 22	No disturbance of vegetation will occur within 100 feet of a stream, except for hazard trees. No fueling, staging or storage areas would be placed within 100 feet of wetlands, streams or riparian areas. Where possible, vehicles should avoid crossing hydric soils.
SCP 24*	Topsoil will be removed, stockpiled, and respread at heavily disturbed areas not needed for maintenance access.
SCP 25	Disturbed areas not needed for maintenance access will be reseeded using mixes approved by the landowner or land management agency.
SCP 26	Erosion control measures will be implemented on disturbed areas, including areas that must be used for maintenance operations (access ways and areas around structures).
SCP 27	The minimum area will be used for access ways (generally 12-16 feet wide, except where roadless construction is used).
SCP 28	Leveling and benching of structure sites will be the minimum necessary to allow structure assembly, erection, and maintenance.
SCP 29	ROW will be located to use the least steep terrain.
SCP 30	Careful structure location will ensure spanning of narrow flood prone areas.
SCP 31	Structures will not be sited on potentially active faults.
SCP 32	Structure sites and other disturbed areas will be located at least 100 feet, where practical, from rivers, streams (including ephemeral streams), ponds, lakes, and reservoirs.
SCP 33	New access ways will be located at least 100 feet, where practical, from rivers, ponds, lakes, and reservoirs.
SCP 34	At crossings of perennial streams by new access ways, culverts of adequate size to accommodate the estimated peak flow of the stream will be installed. Construction areas will minimize disturbance of the stream banks and beds during construction. The mitigation measures listed for soil/vegetation resources will be performed on areas disturbed during culvert construction.
SCP 35	If the banks of ephemeral stream crossings are sufficiently high and steep that breaking them down for a crossing would cause excessive disturbance, culverts will be installed using the same measures as for culverts on perennial streams, and the applicable USACE permits would be obtained.
SCP 36	Blasting will not be allowed.
SCP 37	Power line structures will be located, where practical, to span small occurrences of sensitive land uses, such as cultivated areas. Where practicable, construction access ways will be located to avoid sensitive conditions.
SCP 38	ROW will be purchased at fair market value and payment will be made of full value for crop damages or other property damage during construction or maintenance.
SCP 39	The power line will be designed to minimize noise and other effects from energized conductors.

Ref. #	Standard Practices
SCP 41*	Crossing of operating railroads by construction vehicles or equipment in a manner that would cause delays to railroad operations will be avoided. Construction will be coordinated with railroad operators. Conductors and overhead wire string operations would use guard structures to eliminate delays.
SCP 42	Before construction, Western will perform a Class III (pedestrian) cultural survey on areas to be disturbed, including structure sites and new access ways. These surveys will be coordinated with the appropriate landowner or land management agency, the State Historic Preservation Officer and Indian Tribe if on tribal lands. The survey reports and recommendations will be reviewed with the State Historic Preservation Offices and other appropriate agencies, and specific mitigation measures necessary for each site or resource will be determined. Mitigation may include careful relocation of access ways, structure sites, and other disturbed areas to avoid cultural sites that should not be disturbed, or data recovery.
SCP 43	The contractor will be informed of the need to cease work in the location if cultural resource items are discovered.
SCP 44	Construction activities will be monitored or sites flagged to prevent inadvertent destruction of cultural resource for which the agreed mitigation was avoidance.
SCP 45	Construction crews will be monitored to the extent possible to prevent vandalism or unauthorized removal or disturbance of cultural artifacts or materials from sites where the agreed mitigation was avoidance.
SCP 46	If cultural resources that were not discovered during the Class III survey are encountered during construction, ground disturbance activities at that location will be suspended until the provisions of the National Historic Preservation Act have been carried out.
SCP 47	Construction activities will be monitored or significant locations flagged to prevent inadvertent destruction of paleontological resource for which the agreed mitigation was avoidance.
SCP 48	Clearing for the access road will be limited to that necessary to permit the passage of equipment, and the safe construction, operation and maintenance of the line.
SCP 49	The access road will follow the lay of the land rather than a straight line along the ROW where steep topography would result in a higher disturbance.

*Western's SCPs 23 and 40 are not applicable to this project.

USACE = United States Army Corps of Engineers

2.4.2 Project-Specific Environmental Protection Measures

The following design criteria and environmental protection measures were developed specifically for this project to minimize or avoid resource impacts. The following project-specific design criteria apply to all action alternatives (unless otherwise noted).

Table 2-6. Project-Specific Design Criteria and Environmental Protection Measures by Resource.

	Wildlife Resources
DC 1	Construction will not occur within pronghorn, mule deer, or elk winter concentration areas or severe winter range between November 15 and April 30 on public and private lands, unless an exception is granted by the BLM or Colorado Parks and Wildlife (CPW).
DC 2	Western will design and construct the transmission line in conformance with Suggested Practices for Protection of Raptors on Powerlines (APLIC 2006) to minimize the potential for raptor electrocution.
DC 3	The siting of structure locations and/or timing of construction related activities will adhere to CDOW's (now CPW) 2008 *Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors* (Appendix D). When distance buffers are not possible because of project proximity, then seasonal restrictions will be implemented.
DC 4	Avian nesting surveys will be conducted prior to construction to ensure ground disturbing activities do not result in the "take" of an active nest or migratory bird protected under the MBTA.
DC 5	Perch deterrents will be placed on structures that span sagebrush habitats to mitigate raptor predation on avian and other wildlife species in the Project Area. In addition, flight diverters will be placed in areas that are determined to be "high risk" for avian collision. These locations may differ depending on species, and this will be assessed prior to construction of the transmission line and through coordination with U.S. Fish and Wildlife Service (USFWS) and Forest Service.
DC 6	During removal of the existing 69-kV transmission line, some structures will be left in place to provide osprey nesting opportunities. Locations of remaining structures will be identified by Western and the Forest Service and be in the vicinity of Lake Granby and Table Mountain.
	Special Status Wildlife
DC 7	Western will consult with CPW and the BLM to prepare a seed mix that will restore sagebrush habitats in the ROW. Guidance and further detail is provided in the *Colorado Greater Sage Grouse Conservation Plan* (2008).
DC 8	If it is not feasible to construct outside of the 4-mile sagegrouse lek buffer during the March through mid July breeding season, Western will consult with CPW and USFWS to develop methods that would minimize impacts to breeding sage grouse activities. In addition, Western will place perch deterrents within proximity to lek areas and those areas that cross greater sage grouse wintering, summer, spring, nesting, and brooding habitats.
DC 9	If construction occurs during the avian breeding season (roughly between March 15 and September 1), surveys will be conducted no earlier than 72 hours prior to any ground disturbing activities to ensure the project complies with the MBTA.
	Vegetation, including Noxious Weeds
DC 10	Low growing trees, shrubs, forbs, and grasses will not be intentionally removed but could be crushed by equipment moving up and down the ROW.
DC 11	It is expected that bare ground will be exposed by some construction activities. If erosion becomes a concern for either the Forest Service or for Western, construction of water bars, spreading mulch, brush piles, or seeding with a native or sterile cover crop will be undertaken. In areas with slopes greater than 20 percent that are identified to have erosion or all terrain vehicle (ATV) traffic concerns, 300 linear feet per acre of large logs (preferably 10-inch diameter at breast height) will be spread to deter erosion.
DC 12	All revegetation will be accomplished using native species or a sterile cover crop. All seed will be certified weed-free via the All-States exam. Species lists for revegetation will be developed in consultation with the Forest Service botanist or the botanist's representative.
DC 13	All seed used will be tested for noxious weed seed using an All States Exam by a federally approved facility. Results will be provided to the Forest Service prior to seeding. Presence of any seed that is either prohibited or restricted under the Colorado Weed Seed Act will result in the seed lot being rejected and replaced by the project proponent at proponent's cost. Replacement seed will be retested. If weed seeds are present based on exam results that are not prohibited or restricted in Colorado, seed will be rejected unless otherwise agreed upon by the Forest Service.
DC 14	All mulch will be certified weed-free.
DC 15	Western's contractor will follow a "clean vehicle policy". Equipment will be clean and clear of mud or vegetative debris when brought on site in an effort to minimize the spread of noxious weeds.

DC 16	Western will minimize the introduction or spread of weeds by washing all equipment at a commercial facility prior to the start of construction each year, by avoiding vehicle traffic in known weedy areas, and by rewashing equipment if weeds are encountered. Western will reclaim all disturbed areas as soon as practical after construction each year, and will implement a weed control program (in consultation with the BLM, Forest Service, and private landowners) if the project causes the spread of weeds.
DC 17	Western will implement a noxious weed management plan to minimize the spread of noxious weeds within the Project Area to mitigate potential impacts to wildlife forage and habitats. A weed-free native seed mix will be used in areas that are temporarily disturbed during project construction. Nonnative species and/or sterile crop seed may also be used to revegetate disturbed areas on Forest Service land, if approved by the Forest Service botanist.
	Special Status Plants
DC 18	Known rare plant sites will be avoided where possible. If hazard trees must be felled, they will be hand-cut and directionally felled away from rare plant individuals. Dropped trees may be skidded out of the site if an unoccupied corridor is available; otherwise, they will be left on site. No chips will be piled within an occurrence, and no machinery will be operated within an occurrence unless agreed upon in writing by the Forest Service and Western on a case-by-case basis.
DC 19	If threatened or endangered, sensitive, or local concern plant species are found on federally managed land prior to or during project implementation, a Forest Service or BLM botany representative will be contacted to identify conservation measures to avoid or minimize impacts to the plants. A biological site monitor, familiar with the sensitive species detected on site, will be present when work is initiated at documented sites for these species. Populations of special status plants will be marked and avoided to the extent necessary to be in compliance with the Endangered Species Act and to maintain viable populations of special status plants across the Planning area. Protection of the special status plant sites will be incorporated into contract specifications prior to project implementation.
DC 20	If new site information regarding threatened, endangered, proposed, sensitive, or rare species is located, the Forest Botanist or botanical representative will be notified immediately.
	Wetlands
DC 21	Construction and access in floodplains and wetlands would be avoided to the greatest extent feasible. However, if construction in floodplains and wetlands cannot be avoided and would cause soil compaction or ruts, long-term impacts to wetland vegetation could occur. To avoid this impact, Western will limit construction in floodplains and wetlands to periods when soils are dry or frozen, or use measures to support construction equipment (e.g., oversized treads on equipment, tracked equipment, matting) to avoid compacting soils and creating ruts.
DC 22	Fording streams will not be permitted unless permission is granted by Western and the Forest Service.
DC 23	Fen wetlands will be avoided altogether, with no vehicular access or pole placement in these systems. Removal of an existing pole in the fen would be accomplished by cutting the pole at the base using hand-held chainsaws. The pole would be supported by a crane, and lifted out of the fen wetland once the base is cut.
	Soil Resources
DC 24	Crews will decompact roads and other heavily disturbed areas (i.e., staging areas) by ripping or subsoiling to the depth of compaction to promote natural infiltration, reduce runoff and erosion, and to facilitate natural revegetation. Crews will then recontour to approximate pre-construction contours and will reseed with certified weed-free seed mix and mulch.
DC 25	Topsoil resources will be salvaged from the component footprints and any construction sites that are heavily disturbed (i.e., staging areas). The topsoil pile will be protected from wind and water erosion at all times. Berms, hay bales, or sediment fence will be placed around topsoil piles to prevent water erosion. Topsoil will be replaced, after decompaction is complete, on disturbed areas that are returned to their pre-existing state following construction.
DC 26	To the extent feasible, equipment will only be operated when soils are dry (below the plastic limit to a depth of 6-8 inches or more) or frozen. If rutting over 3 inches in depth occurs, soil is too wet to operate and detrimental soil mixing and a reduction in soil productivity may occur.
DC 27	Soil will be returned to excavated areas in the order it was removed. This will ensure the nutrient and biologically rich topsoil will stay at the surface. Excess subsoil/soft bedrock excavated for foundations beyond 14 inches in depth should be disposed of with construction debris.

Cultural & Historic Resources	
DC 28	Removal of the existing wooden transmission line structures on eligible cultural sites will be accomplished by cutting the structures at ground surface, thus requiring no additional excavation of the surrounding area. The structures will be accessed using rubber-tire vehicles to minimize other associated impacts to the site. All structure removals will be monitored by a permitted archaeologist.
DC 29	Impacts to eligible cultural sites caused by construction of new towers will be minimized by planning. Whenever possible, transmission structures will be planned outside of site boundaries. In cases where avoidance is not possible, a mitigation plan will be formulated. If new structures are planned within 150 feet of a site, an on-site archaeological monitor will be present to ensure that the site is not impacted during structure construction.
DC 30	Heavy trucks and other equipment will not cross eligible sites when unimproved access roads are wet. Upgrading or maintenance of access roads within the boundaries of eligible sites will be avoided wherever possible. Where avoidance is not possible, a mitigation plan will be prepared and implemented prior to any construction or roadwork. The plan will include mitigation of adverse effects. These guidelines apply not only to roads surveyed as project access roads, but also to roads beneath the transmission lines that were subsumed in the transmission line survey.
Paleontological Resources	
DC 31	Prior to construction, a qualified and permitted paleontologist should examine the construction design plans, and develop an appropriate mitigation monitoring program.
DC 32	The contractor will receive instructions from Western regarding the potential presence of fossils in pole excavations and in areas excavated or disturbed for roadwork. The contractor will be notified of his obligation to report any suspected paleontological finds to Western. Western will retain a paleontologist to assess the significance of the paleontological finds and make recommendations. The BLM maintains staff paleontologists to perform assessments of discoveries on lands managed by them.
Visual Resources	
DC 33	All steel structures will be a rust-colored COR-TEN© steel.
DC 34	Structures will be placed at the maximum feasible distance from highway and trail crossings, within the limits of the design of the structure, to reduce potential visual impacts at crossings.
DC 35	Access roads will follow the lay of the land rather than a straight line along the ROW where steep features will result in a higher disturbance.
DC 36	Western will coordinate closely with the Forest Service on the placement and design of both access roads and gates/closures.

2.5 Alternatives Eliminated from Further Analysis

CEQ NEPA regulations [40 CFR 1502.14(a)] direct federal agencies to “rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.” CEQ defined reasonable alternatives as those that are economically and technically feasible, and that show evidence of common sense. Alternatives that could not be implemented if they were chosen, or that do not resolve the need for action and fulfill the stated purpose for the proposed action, should be eliminated as unreasonable before impact analysis begins. Unreasonable alternatives may be those that are unreasonably expensive or that cannot be implemented for technical or logistic reasons. This is the primary reason for elimination of many of the alternatives. Feasibility is an initial measure of whether the alternative makes sense and is achievable.

Western assessed alternatives for their ability to achieve the purpose and need of the project reasonably, while reducing significant environmental impacts of the project. Additionally, Western evaluated their technical, legal, and regulatory feasibility. Based on these screening criteria, Western eliminated several alternatives from further consideration in this EIS. This section describes the alternatives that Western dismissed from further consideration and explains Western’s rationale for its dismissal of these alternatives.

2.5.1 Eliminated Alternative #1-Rebuild and Upgrade to Granby Substation

This alternative would rebuild 6 miles of existing line with double-circuit 138-kV line; enlarge Western's existing Granby Substation to accommodate a second power transformer and expanded switchyard; and leave the existing transmission line between Granby Substation and Granby Pumping Plant Switchyard intact. This alternative would establish an acceptable redundant transmission source for MPEI and Reclamation's Willow Creek Pumping Plant loads. Additionally, it would solve all forecasted voltage problems in the area transmission system. However, this alternative was ultimately eliminated because of environmental concerns at the Granby Substation enlargement site, visual intrusiveness, and not meeting all objectives of the project's purpose and need.

This alternative does not fulfill Western's purpose and need to ensure looped transmission service to its customers served since Reclamation's Granby Pumping Plant Switchyard would become a radially fed load after loss of the Adams Tunnel 69-kV cable. Also, it does not provide the voltage support needed at Farr (Granby) Pumping Plant to allow flexibility for full voltage motor start-up.

This alternative would only defer the rebuild of the remaining 6 miles from Granby Substation to Granby Pumping Plant Switchyard. At 70 years old, Western would still need to rebuild this line at some future time to ensure system reliability and safety criteria are met.

Preliminary site investigations at the Granby Substation indicated seepage problems and other environmental issues that would preclude enlarging the existing Granby Substation and installing a second power transformer at that location. Additionally, the alternative would expand a highly visible substation near U.S. Highway 34.

This alternative would leave 6 miles of the existing line in service, on inadequate ROWs, and in an antiquated line configuration. This alternative would rebuild only half (50 percent) of the length of total line identified for rebuild in the action alternatives carried forward for analysis, but for 90 percent of the cost.

2.5.2 Eliminated Alternative #2-Rebuild and Upgrade to Stillwater Tap

This alternative would rebuild 10 miles of the existing 69-kV line with double-circuit 138-kV line, construct a new substation at Stillwater Tap to house a power transformer and switchyard, and would leave the existing line between Stillwater Tap and Granby Pumping Plant Switchyard intact.

This alternative would establish a redundant transmission source for MPEI and Reclamation loads and solve voltage problems in the system. However, this alternative was ultimately eliminated because of visual intrusiveness, seepage concerns, and unstable soils.

Preliminary site investigations at the site for Stillwater Tap indicated seepage problems and other environmental issues that would preclude constructing a substation and installing a second power transformer at that location.

Additionally, this alternative would leave 2 miles of the existing line in service in an antiquated line configuration. This alternative would rebuild approximately 85 percent of the length of total line identified for rebuild in the action alternatives carried forward for analysis, but for 110 percent of the cost.

2.5.3 Eliminated Alternative #3-Rebuild and Upgrade, Expand two Substations

This alternative would rebuild 12 miles of the existing 69-kV line with double-circuit 138-kV line, enlarge Western's existing Granby Substation to accommodate a second power transformer and expanded switchyard, and expand the Granby Pumping Plant Switchyard to accommodate a third power transformer and additional switchyard equipment.

This alternative would establish a redundant transmission source for MPEI and Reclamation loads and solve voltage problems in the system. This alternative would rebuild the entire existing old line configuration on inadequate ROWs.

This alternative was ultimately eliminated because of general ineffectiveness. Although this alternative would expand two existing substation facilities, doing so would not provide any additional system benefits over the proposed alternative, which expands only the Granby Pumping Plant Switchyard. As such, this alternative does not offer any unique advantages over the action alternatives carried forward for further analysis.

2.5.4 Eliminated Alternative #4-Underground Entire Length

This alternative would underground all of the approximately 12.2 miles of 69-kV and 138-kV double-circuit transmission line (Windy Gap Substation to Granby Pumping Plant Switchyard). This alternative would be modeled on the original Alternative C (see Eliminated Alternative #10) by removing the existing 11.8 miles of single-circuit 69-kV H-frame wood pole transmission line, installing one 69-kV three-way switch at the Stillwater Tap, and constructing additions at Granby Pumping Plant Switchyard and Windy Gap Substation. Under this alternative, all of the rebuilt and upgraded transmission line would be constructed underground on a combination of new and existing ROW along the alternative alignments.

While underground construction is frequently used for lower voltage (less than 25 kV) distribution lines, such construction for high voltage transmission lines has been used only occasionally in densely populated urban areas where adequate ROW is not available for overhead construction. In such situations, the costs associated with underground construction are generally offset by the costs associated with acquiring the necessary land rights for conventional overhead construction.

The placement of lower voltage electric distribution lines underground is more feasible and less costly because there are no severe problems associated with insulating each phase conductor from the others and the surrounding environment. Lower voltage lines also do not have serious problems with dissipation of the heat the conductors generate. These same considerations become much more severe with high voltage transmission lines.

The primary disadvantages of underground transmission line construction include cost, the time and expense required to locate and repair problems if outages occur, and the recurring environmental impacts associated with maintenance activities, such as searching for and repairing problems.

Rather than limiting construction disturbances to relatively small areas around each structure for an overhead line, a continuous linear clear-cut disturbance would be necessary if trenching for underground construction is employed. Installing two circuits underground in a common concrete-encased, steel-reinforced duct bank entails deep excavation using sloped trenches or trench boxes. Duct banks would be approximately 39 inches wide by 30 inches tall, and would be buried under 60 inches of cover (total excavation depth of at least 90 inches).

Road and river crossings would be accomplished by directional boring with a 48-inch directional bore. To begin a directional bore, a large clearing is made at the boring site for drill setup. Drilling fluid is pressurized for jetting and the auger/jetting head is advanced hydraulically. Excavated material is flushed out of the bore with the drilling fluid. After the bore under the feature is made, the bore hole is lined with steel casing.

Splice or radius vaults would be constructed approximately every 2,300 feet. Construction of the proposed transmission line underground would require four radius vaults (with dimensions 15 feet by 30 feet by 7 feet) and approximately 26 splice vaults (with dimensions 10 feet by 20 feet by 7 feet). If large boulders or areas of quartz were encountered during construction of the duct bank or vaults, blasting could be required (Exponential Engineering Co. 2006).

The large volume of earthwork required to underground the proposed transmission line would result in increased impacts to soil, surface geology, water quality, and biological resources (including sensitive habitats that support threatened and endangered species), which could be avoided by spanning with overhead construction. Removal of vegetation to native soil could create an avenue for the spread of invasive species and weeds, and may have a long-term visual impact if ground disturbance causes a change in the vegetation assemblage occurring in the ROW.

Underground transmission lines typically have a shorter service life (40-45 years) than steel overhead transmission lines (80-90 years). The reliability of underground and overhead transmission lines is comparable. Overhead transmission lines that are subject to weather (particularly heavy, wet snow, and icing conditions) may experience relatively more frequent failures than underground. However, these failures can generally be repaired within a relatively short period of time (i.e., outages typically range from several hours to a couple of days for repair of failures). Failures of underground transmission lines from dig-ins or mechanical failure (usually associated with splices) may be less frequent, but can require several weeks to locate and repair.

This alternative was ultimately eliminated because of long-term operational and maintenance difficulties and unreasonable construction and replacement cost issues. This alternative would rebuild 100 percent of the length of line identified in the action alternatives carried forward for further analysis, but for 500 percent of the cost; while the life expectancy of the cables is half that expected from a steel overhead transmission line.

Western does not currently operate or maintain underground high voltage cable circuits. If these two transmission lines are installed underground, Western does not have the expertise or equipment to maintain and service them. It is not practical or cost effective for Western to acquire the specialized personnel or equipment necessary to install, maintain, and operate 12.2 miles out of Western's 17,000 miles of transmission lines. Western would likely contract maintenance to a company with specialized personnel and equipment. This would substantially increase maintenance and operation costs, which ultimately conflicts with the project need to reduce maintenance and operation costs for Western, Tri-State, and NCWCD (see Section 1.2). Furthermore, relying on a third-party company for specialized personnel or equipment to mobilize and respond to repair situations could result in extended outage time for customers. In addition to these maintenance and ownership issues, the EIS discusses additional effects of undergrounding, including relative cost, reduced project life, and environmental disturbance and impacts that make the alternative impractical.

Other factors considered were the direct ground disturbance from an underground line. Surface and subsurface cultural and natural features would be permanently impacted. Key features of concern are archeological, paleontological, wetlands, hydrology, and riparian resources. Blasting would also be necessary in key areas.

2.5.5 Eliminated Alternative #5-Underground Between Stillwater Tap and Granby Pumping Plant

This alternative would underground approximately 1.7 miles between Granby Pumping Plant Switchyard and Stillwater Tap of the 12.2-mile 138-kV double-circuit transmission line. The remainder of this alignment would be modeled on the original Alternative C (see Eliminated Alternative #10). This alternative would have removed the existing 11.8 miles of single-circuit 69-kV H-frame wood pole transmission line, installed one new 69-kV three-way switch at the Stillwater Tap, and constructed additions at Granby Pumping Plant Switchyard and Windy Gap Substation.

This alternative was ultimately eliminated because of long-term operational and maintenance difficulties and cost issues. This alternative would rebuild 100 percent of the length of line identified in the action alternatives carried forward for further analysis, but for 155 percent of the cost. Operational, maintenance, and environmental issues, as described for Eliminated Alternative #4, would also apply to underground sections of the transmission line in Eliminated Alternative #5.

2.5.6 Eliminated Alternative #6-Rebuild and Upgrade Adams Tunnel Cable

This alternative would rebuild and upgrade the 13.2-mile Adams Tunnel cable from 69-kV to 138-kV.

This alternative would establish a redundant transmission source for the Granby-Grand Lake area and solve voltage problems in the system. Although this alternative would establish a redundant transmission source, it would not address the existing antiquated line configuration on the ground from the Granby Pumping Plant Switchyard to the Windy Gap Substation.

This alternative was ultimately eliminated because of cost, construction constraints, maintenance access constraints, health and safety concerns for construction and maintenance workers (due to air quality, confined spaces, and access for emergency rescue), and the fact that the alternative did not fulfill Western's stated purpose and need to update antiquated facilities to be compliant with current standards.

The primary use of the Adams Tunnel is for transporting drinking and irrigation water to communities along the Colorado Front Range. The tunnel transports water 11 months out of the year. Tunnel inspections and repairs, as well as physical inspections and tests on the existing 69-kV circuit, are all completed within a 4-week window each year when the tunnel is drained. Water delivery could be interrupted for up to 8 weeks with prior coordination with the Bureau of Reclamation, allowing a maximum construction duration of 5 weeks per year with mobilization and demobilization to/from the construction site (Black & Veatch 2006). Scheduling construction and maintenance activities within the tunnel are therefore extraordinarily constrained. It would take numerous years to replace the existing cable or a failed cable installed in the Adams Tunnel. This scenario could leave the transmission system serving the Project Area in a radial configuration for an unacceptable period of time while a cable is repaired or replaced. The possibility that the transmission system may be in a radial configuration for extended periods of time does not meet the purpose and need for looped transmission service.

Rebuilding and upgrading the Adams Tunnel cable would cost 1,150 percent more than the action alternatives carried forward for further analysis, making this alternative cost-prohibitive. Furthermore, it does not address the antiquated transmission system between Granby Pumping Plant and Windy Gap indentified in the purpose and need statement.

2.5.7 Eliminated Alternative #7-Install Part of Project Inside Windy Gap Water Pipeline

This alternative would install approximately 6 miles of the 12.2 miles of 138-kV double-circuit transmission line as cable inside the Windy Gap Water Pipeline, from near the Windy Gap Substation to Lake Granby. The remaining 6.2 miles of 138-kV double-circuit transmission line would be similar to the original Alternative C (see Eliminated Alternative #10). This alternative would be modeled on Alternative C by removing the existing 11.8 miles of single-circuit 69-kV H-frame wood pole transmission line, installing one 69-kV three-way switch at the Stillwater Tap, and constructing additions at Granby Pumping Plant Switchyard and Windy Gap Substations.

This alternative was ultimately eliminated because it was determined to be technically infeasible. Unlike the Adams Tunnel, the Windy Gap Water Pipeline was not designed to accommodate electrical power cables. The primary use of the Windy Gap Pipeline is for transporting drinking and irrigation water. It is technically infeasible to construct and maintain a transmission line within the pipeline.

2.5.8 Eliminated Alternative #8-Install 3 miles of Underwater Cable Across Lake Granby

This alternative would install 3 miles of the 9 miles of double-circuit transmission line as an underwater power cable below Lake Granby. The remaining 6 miles of 138-kV double-circuit transmission line, from where the line would enter Lake Granby to the Windy Gap Substation, would be constructed similar to Alternative C. This alternative would be modeled on the original Alternative C (see Eliminated Alternative #10) by removing the existing 11.8 miles of single-circuit 69-kV H-frame wood pole transmission line, and constructing additions at Granby Pumping Plant Switchyard and Windy Gap Substation. Under this alternative, the line segment from where the line would enter Lake Granby near Rainbow Bay to the Granby Pumping Plant Switchyard would be laid along the lake bed of Lake Granby.

This alternative was ultimately eliminated because it is technically infeasible and poses possible public safety issues if low water levels ever expose part of the power cable, unless the cable is trenched in low water level areas.

Western engineers conducted a preliminary review of the concept. Some of the construction and engineering issues were related to getting underwater cable-laying equipment (which is usually seagoing) to an inland lake; trenching in very shallow water; cable weight and the logistics of cable delivery and transfer to the cable-laying equipment; long-term maintenance, including keeping a barge on the lake that could raise and lower the replacement cables for repairs, repairing/replacing cable lengths during the winter while the lake is iced over; and the potential for extended outages if the cable failed.

Repairing an underwater cable would be much more difficult and time-consuming than repairing an overhead line, although it is expected that the number of failures would be relatively fewer than for an overhead line. It is doubtful whether a cable that failed during winter months could be repaired/replaced until after ice off. Availability of an ice breaking vessel is unknown. Also, underground cables require a minimum installation temperature (usually above -10 degrees Celsius [°C]). It was assumed underwater cables also have a similar minimum installation temperature since the cable materials are similar.

The primary obstacle with this alternative is transportation and delivery of the necessary cable lengths from Rainbow Bay to Granby Pumping Plant. It is estimated the cable length required is approximately 3 miles (15,840 feet). Applications of the underwater cable installations researched showed the underwater cables were installed as continuous lengths of cable between end points. If splices were required, the cables were routed back to shore and spliced at a splice vault. Underground 138-kV cables are typically limited to reel sizes of 3,000 feet or less due to transportation restrictions. Underwater cable is heavier and larger in diameter due to armor protection around the cable; therefore, cable lengths per reel would be significantly less. It should be noted that most underwater cables are typically transported by the ship used for installation.

As witnessed during the most recent drought, low water levels in Granby Reservoir can expose significant amounts of shoreline as well as increase the amount of areas that have shallow water features. Due to public safety concerns and for the protection of the cable itself, an underwater cable cannot be laid directly upon the lake bed where it could have the possibility of exposure or damage during low water levels. In these areas, the underwater cable will need to be installed in a trench. The activity related to digging and filling an underwater trench would have a significant impact on water features and water quality due to sedimentation.

Western does not currently own or operate any underwater high-voltage-cable circuits. If an underwater cable was installed, Western does not have the expertise or equipment to maintain and service the installation. It is not practical or feasible for Western to acquire the specialized personnel or equipment necessary to install, maintain, and operate 3 miles of underwater cable out of Western's more than 17,000 miles of transmission lines. Western would likely contract cable maintenance to a company with specialized personnel or equipment. This would increase maintenance and operation costs, which ultimately conflicts with the project need to reduce maintenance and operation costs for Western, Tri-State, and NCWCD (see Section 1.2). Furthermore, relying on a third-party company with specialized personnel or equipment to mobilize and respond to repair situations could result in extended outage time for customers.

Preliminary estimates of the cost of materials indicate that underwater cable is prohibitively expensive for small projects like the proposed action, even before the additional costs of resolving the technical issues cited above are known. Since power system reliability is a key component of Western's purpose and need and the costs of this alternative were not economically feasible, this alternative was determined to be not viable and was eliminated from further consideration.

2.5.9 Eliminated Alternative #9 – Original Alternative B

The original Alternative B, as presented during the EA process and during the EIS scoping period, has been eliminated. Alternative B would have rebuilt and upgraded the line through the Scanloch Subdivision (east side of Table Mountain). This alternative was eliminated due to the high potential for unacceptable impacts to homes and homeowners (e.g., relocations or condemnations). Additionally, this alternative is similar to Alternative B1 and would not have substantially contributed to the range of reasonable alternatives.

2.5.10 Eliminated Alternative #10 – Original Alternative C

The original Alternative C, as presented during the EA process and during the EIS scoping period, has been eliminated. Variations of this alternative are being carried forward for analysis; however, the Alternative C segment at the Willow Creek Crossing (formerly called the "knoll" reroute) has been eliminated due to high potential for unacceptable impacts to sage grouse habitat that could be easily avoided by relocating a minor line segment. Additionally, this alternative is similar to Alternatives C1 and C2 and would not have substantially contributed to the range of reasonable alternatives.

2.5.11 Eliminated Alternative #11 – Outside the Project Area

Early in the planning process, prior to preparation of the EA, Western and Tri-State investigated whether other routing options existed outside of the Project Area. No other feeds from outside the service area were identified as sources to provide the secondary transmission feed needed to establish a looped transmission system. As such, this alternative could not satisfy the reliability aspects of the project purpose and need. Additionally, the large distances and topographic constraints requisite with a regional-scale construction project would have resulted in unacceptable resource impacts that could be avoided.

2.6 Comparison of Alternative Effects

Table 2-7 provides a general summary comparison of effects by alternatives. Additional information regarding the specific effects of each alternative can be found in Chapter 4.0.

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Table 2-7. Comparison of Alternative Effects (Resources are listed in alphabetical order.)

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Accidents and Intentional Acts of Destruction	Existing transmission line presents vulnerabilities in the event of a wildfire due to wooden H-frame structures and ROW vegetation. Wooden H-frame structures and single ROW configuration present vulnerabilities in the event of intentional acts of destruction. However, there is a low risk that the existing transmission line would be targeted for destruction. Short-term minor adverse effects on risk to workers in the event of intentional acts of destruction.	Risk of outages and long-term damage to steel structures from wildfire, as well as the duration of outages, would be significantly reduced compared to Alternative A. Minor long-term vulnerabilities in the event of intentional acts of destruction. However, low risk that any of the action alternatives would be targeted for destruction. Short-term minor adverse effects on risk to workers in the event of intentional acts of destruction.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Air Quality, Climate, and Global Climate Change	Long-term negligible adverse effects on air quality due to maintenance needs. No measurable effect on global climate change. No potential for cumulative effects to air quality, climate, or global climate change.	Short-term minor adverse effects on air quality as a result of construction activities. Long-term negligible adverse air quality effects as a result of long-term maintenance and operations. No exceedances of National Ambient Air Quality Standards (NAAQS). No measurable cumulative effects to air quality, climate, or global climate change.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1
Aquatic Resources	The existing transmission line crosses three perennial streams, four intermittent streams, and ten canals or ditches. Short-term negligible impacts at surface water crossings.	Similar to Alternative A and crosses the same water bodies. Short-term negligible impacts at surface water crossings.	Crosses three perennial streams, eight unnamed intermittent streams, and two canals. Short-term negligible impacts at water crossings.	Similar to Alternatives A and B1, crossing the same surface waters. Short-term negligible impacts at water crossings.	Similar to Alternatives A, B1, and C2 crossing the same surface waters. Short-term negligible impacts at water crossings.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Cultural Resources	Site-specific long-term adverse effects on historic properties, varying in severity. Treatment of sites and mitigation for adverse effects to be determined in consultation with the SHPO under Section 106 of the NHPA. No potential for cumulative effects to cultural resources.	Similar to Alternative A, with one additional site potentially affected. Cumulative effects on cultural resources are expected to be negligible.	Similar to Alternative A, with two additional sites potentially affected. Cumulative effects on cultural resources are expected to be negligible.	Similar to Alternative A, with two additional sites potentially affected. Cumulative effects on cultural resources are expected to be negligible.	Similar to Alternative A. Cumulative effects on cultural resources are expected to be negligible.
Electric and Magnetic Fields (EMF)	Long-term minor adverse effects on power-frequency magnetic fields. Long-term minor adverse effects on audible noise. Cumulative effects on EMF are expected to be negligible.	Lower EMF at ROW edge than existing alternatives (higher EMF within ROW). Minor adverse effects to audible noise (increase) at ROW edge. No effect on FM radio. At ROW edge, induced current values are below the threshold of perception. No effect on Global Positioning Systems (GPS) signal. Cumulative effects on EMF are expected negligible to non-existent (less than existing conditions).	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1 but fewer homes within 100 feet of the ROW.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Land Use	60 improved residential lots, two residential lots with mobile homes, and 55 vacant residential lots are located within 100 feet of the current alignment. No impacts related to ROW expansion. Short-term minor adverse effects on land uses in localized areas as a result of increasing maintenance and repairs to existing line. No potential for long-term cumulative effects.	Short-term minor to moderate adverse construction effects on land uses within and adjacent to the ROW. Forty-three improved residential lots, two residential lots with mobile homes, and 18 vacant residential lots are located within 100 feet of the current alignment. Long-term minor adverse effects on 13 residences located within 100 feet of the centerline due to expanded ROW and associated land use restrictions. Minor to moderate long-term effect on future development of vacant lots within 100 feet of the centerline. Short-term moderate adverse construction effects on agricultural land; negligible long-term impact. Cumulative effects would be negligible to non-existent.	Short-term minor to moderate adverse construction effects on land uses within and adjacent to the ROW. Thirty-five improved residential lots and 10 vacant residential lots are located within 100 feet of the current alignment. Long-term minor adverse effects on 13 residences located within 100 feet of the centerline due to expanded ROW and associated land use restrictions. Minor to moderate long-term effect on future development of vacant lots within 100 feet of the centerline. Short-term moderate adverse construction effects on agricultural land; negligible long-term impact; 0.1 mile of new ROW would cross private land with a conservation easement. If development north and east of the Windy Gap substation resumes, Alternative C1 would result in minor adverse cumulative effects on future land uses in this area. Otherwise, cumulative effects would be negligible to non-existent.	Similar to Alternative C1.	Similar to Alternative B1, except that Alternative D Options 1 and 2 each have fewer residences located within 100 feet of the centerline, a total of 4 compared to 13 for Alternative B1.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Paleontological Resources	No further direct or indirect impacts, unless new excavations are needed for more intensive maintenance activities. No potential for cumulative effects to paleontological resources.	Minor to moderate potential for adverse impacts from structure excavation; sensitive locations to be monitored during construction. Cumulative effects associated with the proposed transmission line rebuild are anticipated to be negligible.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1
Recreation and Wilderness	Negligible, unless maintenance activities occur at recreation sites during the prime use seasons. No potential for cumulative effects to recreation or wilderness resources.	Short-term negligible to minor effects to ANRA from removal/construction activities, depending on timing of construction. Long-term negligible adverse effects on recreation use areas from ROW expansion and clearing. Short-term moderate adverse effect on Cutthroat Bay campground as a result of construction/removal activities. Long-term moderate beneficial effect at Cutthroat Bay campground due to removal of existing line that crosses through the middle of the campground. No measurable cumulative effects to recreation or wilderness resources.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1; however, the adjusted alignment for Alternative D-Options 1 and 2 would move the alignment for Alternative D from the east side of County Road 64 to the west side, on Forest Service managed lands at Cutthroat Bay Campground.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Socioeconomics and Environmental Justice	Increased potential for indirect adverse effects on local economy from diminished reliability of the transmission system. No disproportionate effects to minority populations. No cumulative effects on socioeconomics or environmental justice.	Long-term beneficial effects on local economy due to increased reliability of the transmission system. Short-term negligible beneficial effects on local economy from construction phase employment and expenditures. Long-term negligible to minor adverse effects on property values adjacent to the ROW. No disproportionate effects to minority populations. No measurable cumulative effects on socioeconomics or environmental justice.	Similar to Alternative B1	Similar to Alternative B1	Similar to Alternative B1
Soils	Short-term negligible adverse effects on soils in localized areas as a result of maintenance and repairs to existing line. No potential for cumulative effects to soil resources.	Short-term, minor to moderate adverse effects from construction disturbance. Long-term minor adverse effects from soil loss and displacement. Approximately 18 acres of soil within the proposed ROW is highly erodible. Little or no cumulative effects to soil resources are expected.	Similar to Alternative B1. Approximately 8 acres of soil within the proposed ROW is highly erodible.	Similar to Alternative B1. Approximately 8 acres of soil within the proposed ROW is highly erodible.	Similar to Alternative B1. Approximately 20 acres of soil within the proposed ROW is highly erodible.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Special Status Plant Species	Short-term, direct minor to moderate adverse effects on special status plant species as a result of maintenance. Short- and long-term, indirect minor to moderate adverse effects on special status plant species and habitat as a result of maintenance. Maintenance activities may impact *Botrychium hesperium, Botrychium minganense, Pediocactus simpsonii*, *Dermatocarpon reticulatum* "vagrant form," and *Penstemon cyathophorus,* which were identified within or at the edge of the ROW for Alternative A.	Similar to Alternative A: Same five species identified during field surveys. Alternative B1 transects the most suitable habitat for special status plants. Impacts to special status plants and habitat would be minor in the short-term and negligible in the long-term.	One species, *Penstemon cyathophorus,* identified during surveys. Impacts to special status plants would be minor in the short-term and negligible in the long-term.	Similar to Alternative C1: One species, *Penstemon cyathophorus,* identified during surveys. Impacts to special status plants would be minor in the short-term and negligible in the long-term	Similar to Alternative A: Same five species identified during field surveys. Alternative D transects the second most suitable habitat for special status plants. Impacts to special status plants and habitat would be minor in the short-term and negligible in the long-term.
Special Status Terrestrial, Avian, and Aquatic Wildlife Species	Short- and long-term minor direct effects to some special status species and habitats. No change in disturbance related to ongoing maintenance activities. Replacement of aged equipment will also impact wildlife. Continued potential for collision with migratory and juvenile birds. Minor potential for cumulative effects.	Short-and long-term impacts to some special status species including risk of avian collision. Alternative B1 is located in proximity to several raptor nests. Less impacts likely to the greater sage grouse and golden eagle nest.	The two special status species of concern for Alternative C1 are greater sage grouse and the golden eagle. Long-term moderate to significant impacts to greater sage grouse and habitat. Increased risk of golden eagle collision with transmission line on west side of Table Mountain.	Similar to Alternative C1; however, Option 2 would result in fewer impacts to greater sage grouse because it would rebuild the line in the existing transmission ROW, which is located further south of the Horn lek site.	Short-and long-term impacts to some special status species including risk of avian collision. Alternative D is located in proximity to several raptor nests. Option 2 would result in fewer impacts to greater sage grouse because it would rebuild the line in the existing transmission ROW, which is located further south of the Horn lek site.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Terrestrial and Avian Wildlife Resources	Existing impacts to birds include potential for collision and electrocution and increased perching opportunities for foraging raptors, resulting in increased predation.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.	Short- and long-term minor adverse effects from widened ROW clearing. Long-term minor adverse effects due to increased potential for avian collisions and habitat fragmentation and alteration. Impacts similar for all action alternatives.
Vegetation Resources	Short-term, negligible to minor direct adverse effects on vegetation, increasing with the age of the transmission line, as a result of routine maintenance operations. Long-term, negligible to minor direct adverse effects on vegetation as a result of plant removal.	Short-term direct moderate impacts on individual plants as a result of construction. Alternative B1 would have a slightly greater impact on vegetative communities, because more forested cover would be impacted.	Direct short-term minor impacts on individual plants as a result of construction. Alternative C1 would cross less acreage of forested communities and more sagebrush communities. Sagebrush would be allowed to return to the project ROW following construction, and therefore these alternatives would have short- term impacts.	Direct short-term minor impacts on individual plants as a result of construction. Alternative C2 would cross less acreage of forested communities and more sagebrush communities. Sagebrush would be allowed to return to the project ROW following construction, and therefore these alternatives would have short- term impacts.	Short-term direct moderate adverse effects on individual plants as a result of construction Alternative D would have a slightly greater impact on vegetative communities, because more forested cover would be impacted.

Resource	Alternative A	Alternative B1	Alternative C1	Alternative C2-Options 1&2	Alternative D-Options 1&2
Visual Resources	No or negligible adverse effects from ongoing maintenance activities. Crosses BLM Visual Resource Management (VRM) Class II lands and Forest Service lands with High Scenic Integrity Objectives (SIO). Ongoing adverse effects as Forest Service High SIO objectives continue to not be met. Limited or no potential for cumulative effects to visual resources.	Taller structures and associated disturbance result in moderate to significant long-term visual effects along Highway 34 and areas with Forest Service Retention objectives. Crosses BLM VRM Class II lands and Forest Service lands with High SIO. Alternative B1 would result in long-term, minor adverse cumulative effects to visual resources.	Similar to Alternative B1. However, long-term effects would range from minor to moderate with localized areas of significant effects. Less long-term adverse effects to ANRA, views from Lake Granby, and Highway 34. Crosses BLM VRM Class II lands and Forest Service lands with High SIO. Cumulative effects would be the same as described for Alternative B1.	Similar to Alternative C1. Option 2 crosses BLM VRM Class II lands. Cumulative effects would be the same as described for Alternative B1.	Similar to Alternative B1. Option 2 crosses BLM VRM Class II lands. Cumulative effects would be the same as described for Alternative B1.
Wetland Resources	No measurable long-term direct adverse effects on wetlands and riparian areas as a result of maintenance. Long-term, indirect negligible to minor adverse effects on wetlands and riparian areas. The potential for cumulative effects to wetland resources is limited.	Short-term, direct minor to moderate adverse effects on wetland vegetation, soils, and surface and groundwater flow regimes as a result of construction. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. Alternative B1 crosses the greatest acreage of wetland communities.	Short-term, direct minor to moderate impacts to wetlands during construction for one to two structures in wetland areas. Long-term minor impacts to wetlands include a corner pole in a wetland area, where the alignment turns to the northeast.	Similar to Alternative C1: Short-term, direct minor to moderate impacts to wetlands during construction for one to two structures in wetland areas. Long-term minor impacts to wetlands include a corner pole in a wetland area, where the alignment turns to the northeast.	Similar to Alternative B1: Short-term, direct minor to moderate adverse effects on wetland vegetation, soils, and surface and groundwater flow regimes as a result of construction. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. Alternative D crosses the second greatest acreage of wetland communities.

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3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing conditions of the affected physical, natural, and human environments in the Project Area.

In accordance with NEPA regulations at 40 CFR 1502.15, this chapter provides a baseline from which to understand the potential effects of the Proposed Action and alternatives discussed in Chapter 4.0.

Each section of this chapter includes a description of the existing conditions and trends of the resource, relevant management considerations, and a summary of concerns identified during scoping. In preparing the sections, resource specialists collected data from existing reports, consulted with various agencies and individuals, and conducted field investigations, as appropriate.

The analysis area described for most of the resources is the existing or proposed transmission line ROW. In those cases where individual resources needed to narrow or redefine the analysis area to better describe the affected environment, those assumptions are discussed by resource section.

The analyzed resources are grouped and ordered as follows:

3.1.1.1 Physical Resources

- Air Quality, Climate, and Global Climate Change
- Soil Resources
- Paleontological Resources
- Cultural Resources
- Electric and Magnetic Fields

3.1.1.2 Human Resources

- Land Use
- Visual Resources
- Socioeconomics and Environmental Justice
- Recreation and Wilderness
- Biological Resources
- Aquatic Resources
- Vegetation Resources
- Special Status Plant Species
- Wetland Resources
- Terrestrial and Avian Wildlife Resources
- Special Status Terrestrial, Avian, and Aquatic Wildlife Species

3.2 Air Quality, Climate, and Global Climate Change

This section includes a description of existing air quality in the Project Area, including regional climate and ambient air quality, and a summary of applicable regulations.

3.2.1 Analysis Area

The project is located in Grand County. Portions of the existing transmission line are adjacent to the western shoreline of Lake Granby and are within the ANRA. The Project Area is located southwest of RMNP, which is designated as a Class I airshed by the U.S. Environmental Protection Agency (EPA). Class I airsheds are areas of special national or regional natural, scenic, recreational, or historic value and have special air quality protections associated with them.

The analysis area is the same for all alternatives since the alignments for all alternatives are located within Grand County.

3.2.2 Existing Conditions and Context

3.2.2.1 Climate

The climate of north-central Colorado is classified as continental-highland, characterized by highly variable local temperatures, abundant sunlight, and a moderate wind environment. The climate of local areas is profoundly affected by differences in elevation, and to a lesser degree, by the orientation of mountain ranges and valleys with respect to general air movements. Wide variations occur within short distances (WRCC 2009a). Elevation has a strong influence on local climate, with low valleys often being semi-arid and high elevations approaching sub-arctic conditions. Generally, average temperatures decrease and precipitation increases with increasing elevation. The Western Regional Climate Center (WRCC) maintains two weather stations at Grand Lake. Based on nearly 60 years of data collection, the average annual maximum temperature at Grand Lake is 51.0 degrees Fahrenheit (°F) and the average annual minimum temperature is 21.7°F. Based on historical data, lowest temperatures in the area are experienced in January and highest temperatures are observed in the month of July. The average maximum January and July temperatures at Grand Lake are 27.0°F and 75.0°F, respectively. Historically, August is the wettest month, with an average monthly precipitation of 1.68 inches. Snowfall is greatest in December, with an average monthly accumulation of 16.8 inches. Climate summary data from the WRCC Grand Lake station is provided in Table 3-1 for the period of record 1948-2008.

Table 3-1. Monthly Climate Summary 08/1948-12/31/2008, Grand Lake, Colorado[1].

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	*Annual*
Average Max. Temp. (°F)	27.0	31.1	38.3	48.0	59.3	69.5	75.0	73.0	66.3	55.4	39.6	29.4	*51.0*
Average Min. Temp. (°F)	0.5	2.1	10.2	20.3	29.4	36.0	41.8	40.8	33.5	24.9	15.6	5.6	*21.7*
Average Total Precipitation (in.)	1.02	0.81	0.95	1.16	1.42	1.25	1.54	1.68	1.33	0.93	0.88	1.00	*13.97*
Average Total Snowfall (in.)	15.6	12.2	12.3	7.9	2.1	0.4	0.0	0.0	1.1	1.9	8.5	16.8	*79.0*
Average Snow Depth (in.)	15	18	18	7	0	0	0	0	0	0	2	8	*6*

[1]Station identification: Grand Lake 6 SSW, Colorado 053500
Source: WRCC 2009b

3.2.2.2 Global Climate Change

The EPA defines global warming as "The progressive gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns," (EPA 2001). Certain man-made and natural gases absorb and reradiate infrared radiation, which prevents heat loss to space. These gases are known as greenhouse gases. Greenhouse gases include water vapor, carbon dioxide (CO_2), methane, chlorofluorocarbons, ozone (O_3), and nitrous oxides.

The greenhouse effect is a natural phenomenon that helps regulate the temperature of the Earth. Although global warming occurred in the distant past as the result of natural influences, the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases (EPA 2001). Human activities that contribute to global warming include burning coal, oil, and gas, and cutting down forests.

3.2.2.3 Regional Air Quality

Concentrations of the following air pollutants – ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), and fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$) – and lead (Pb) are used as indicators of ambient air quality conditions. These air pollutants are commonly referred to as "criteria air pollutants" because EPA regulates them by developing human health-based or environmentally-based criteria (science-based standards) for setting permissible levels. These standards are known as the National Ambient Air Quality Standards (NAAQS). These air pollutants are the most prevalent air pollutants known to be harmful to human health, and there is extensive documentation available on health effects of these pollutants. It should be noted that ozone is not emitted directly into the air, but is formed through complex chemical reactions between precursor emissions of volatile organic compounds and oxides of nitrogen in the presence of sunlight.

Overall, air quality in the Project Area is considered to be "good." The Air Pollution Control Division of the Colorado Department of Public Health and Environment (CDPHE) does not operate any air pollution monitoring stations in Grand County. However, no violations of

NAAQS or Colorado Ambient Air Quality Standards (CAAQS) for criteria air pollutants have been reported for Grand County (CDPHE 2009). EPA designates areas according to their attainment status for criteria air pollutants based on NAAQS violations. The purpose of these designations is to identify the areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. Unclassified is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. Grand County is designated as an attainment area for all criteria air pollutants (EPA 2009).

Major sources of air pollution in the area include fugitive dust emissions from unpaved roads and street sanding, and exhaust emissions from wood stoves. Private buildings, including residences, are located adjacent to or directly under the existing transmission line. The distance from homes, barns, and other structures varies by alternative. These buildings represent the sensitive receptors with respect to air quality.

3.2.3 Management Considerations

3.2.3.1 Federal Standards

Air Quality Standards

EPA's air quality mandates are drawn primarily from the CAA, which was enacted in 1970. The most recent major amendments to the CAA were made by Congress in 1990. The CAA required EPA to establish the NAAQS. As shown in Table 3-2, EPA has established primary and secondary NAAQS for ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and Pb. The primary standards protect the public health, while the secondary standards protect the public welfare. The CAA also requires each state to prepare an air quality control plan, referred to as a state implementation plan (SIP). The Federal CAA Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. EPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and to determine whether implementing the SIPs will achieve air quality goals.

Table 3-2. Federal and State Ambient Air Quality Standards.

		NAAQS		Colorado AAQS
Pollutant	Averaging Time	Primary[3]	Secondary[4]	Concentration[5]
Ozone (O_3)[6]	8-Hour	0.075 ppm (147 μg/m^3)	Same as Primary Standard	-
Carbon Monoxide (CO)	1-Hour	35 ppm (40 mg/m^3)	None	-
	8-Hour	9 ppm (10 mg/m^3)		-
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 μg/m^3)	Same as Primary Standard	-
	1-Hour	0.1 ppm	None	-
Sulfur Dioxide (SO_2)	Annual Average	0.030 ppm (80 μg/m^3)	-	-
	24-Hour	0.14 ppm (365 μg/m^3)	-	-
	3-Hour	-	0.5 ppm (1,300 μg/m^3)	700 μg/m^3[(7)]
	1-Hour	0.075 ppm	None	-

Pollutant	Averaging Time	NAAQS Primary[3]	NAAQS Secondary[4]	Colorado AAQS Concentration[5]
Respirable Particulate Matter (PM_{10})[8]	24-Hour	150 μg/m³	Same as Primary Standard	-
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	35 μg/m³	Same as Primary Standard	-
	Annual Arithmetic Mean	15 μg/m³		-
Lead (Pb)[10]	Rolling 3-Month Average[10]	0.15 μg/m³	Same as Primary Standard	-

[1] NAAQS (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.

[2] All measurements of air quality are corrected to a reference temperature of 25˚C and to a reference pressure of 760 millimeters of mercury (1,013.2 Millibars). Standards other than annual averages are not to be exceeded more than once per year.

[3] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[4] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[5] Concentration expressed first in units in which it was promulgated. Ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

[6] On June 15, 2005, the 1-hour ozone standard was revoked for all areas except the 8-hour ozone non-attainment Early Action Compact Areas (those areas do not yet have an effective date for their 8-hour designations). Additional information on federal ozone standards is available at http://www.epa.gov/oar/oaqps/greenbk/index.html.

[7] CDPHE has set the following standard for SO_2: The actual concentration of SO_2 at any given receptor site (no greater than five meters above ground level) in the State of Colorado shall not exceed a 3-hour maximum of 700 μg/m³ more than once in any 12-month period. CDPHE also has set ambient standards for SO_2, expressed as allowable amounts of increase in ambient concentration (increments) over an established baseline.

[8] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM_{10} standard on December 17, 2006.

[9] Effective December 17, 2006, EPA lowered the $PM_{2.5}$ 24-hour standard from 65 μg/m³ to 35 μg/m³.

[10] Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved

˚C = degrees Celsius; μg/m³ = micrograms per cubic meter; km = kilometer; mg/m³ = milligrams per cubic meter; ppm = parts per million

Source: EPA 2011, CDPHE 2011

The CAA also provides special protection for visibility and other air quality related values in specially designated Class I areas. The nearest Class I area to the Proposed Action is RMNP, with the closest point being an estimated 2 miles northeast of the Granby Pumping Plant.

Hazardous Air Pollutants

Air quality regulations also focus on hazardous air pollutants (HAPs). EPA has identified 188 air toxics as HAPs. In general, for those HAPs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants for which acceptable levels of exposure can be determined and for which ambient standards have been established (Table 3-2). Instead, EPA regulates HAPs through statutes and regulations that generally require the use of the maximum achievable control technology for stationary sources of HAPs to limit emissions. Primary HAPs of concern include diesel particulate matter.

3.2.3.2 State Standards

In addition to the NAAQS, EPA allows states to set air quality standards based on the state's air quality. The Air Quality Control Commission of the CDPHE has established ambient air quality standards for (SO_2). These standards are also shown in Table 3-2.

3.2.3.3 Regional Standards

The Grand County Natural Resources Department, under the authority of the CDPHE Air Pollution Control Division, regulates the open burning of any material in Grand County. The Grand County Burning Management Plan follows from the *Colorado Air Quality Control Commission Regulation No. 1.II.C.1*, which states in part as follows:

> Except as provided below, no person shall burn or allow the burning of rubbish, wastepaper, wood, or any flammable material on any open premises, or any public street, alley, or other land adjacent to such premises, or any public street, alley, or other land adjacent to such premises, unless an open burning permit is first obtained from the Colorado Department of Public Health and Environment or its authorized agents (Grand County Natural Resources Department).

3.2.4 Scoping Issues

No issues related to air quality were raised during scoping.

3.3 Soil Resources

The soil assessment for the proposed project is based on Soil Survey Geographic (SSURGO) database review and analyses. Field mapping methods using national standards are used to construct the soil maps in the SSURGO database. SSURGO is the most detailed level of soil mapping done by the NRCS. SSURGO digitizing duplicates the original soil survey maps. The map extent for a SSURGO dataset is a soil survey area, which may consist of a county, multiple counties, or parts of multiple counties (NRCS 2009).

3.3.1 Analysis Area

The Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project is within the Southern Rocky Mountain Parks Major Land Resource Area (NRCS 2006).

The Southern Rocky Mountain Parks consist of nearly level to rolling mountain parks and valleys and a few narrow mountain ridges. The topography ranges from rolling to steep, and slopes commonly are strongly dissected. Deep, loamy soils dominate the landscape; these typically have thick, dark, organically enriched topsoil layers. On steep or rocky slopes, shoulders, and ridges, shallow erodible soils are common. Mollisols are the dominant soil order in this Major Land Resource Area. Alfisols are of lesser extent.

Soils in the Project Area are used for grazing and irrigated hay production. Vegetative communities found in the Project Area include grass and shrub, sagebrush, lodgepole pine forest and woodland, aspen, riparian herbaceous, riparian willow shrubland, riparian cottonwood, rock outcrops, talus slopes, and irrigated hay meadow.

3.3.2 Existing Conditions and Context

This section provides context for the evaluation of potential project-induced environmental consequences to soil associations occurring within the analysis area in Grand County. Each alternative was examined by reviewing the soils within each ROW. Appendix E indicates the soils crossed by each alternative in the Project Area.

No soils in the Project Area are classified as Prime Farmlands; however, Farmland of Statewide Importance is present. Slopes in the Project Area are variable, ranging from nearly flat to 65 percent. Much of the area is erosion-prone when disturbed due to steep slopes and fine textured soils. No soils in the Project Area are prone to erosion by wind.

Map 3-1, Map 3-2, Map 3-3, and Map 3-4 show various soil and bedrock characteristics within the Project Area.

Soil series that occur in the Project Area include:

- The Gateway series consists of moderately deep, well drained soils that formed in loamy slope alluvium over clayey residuum derived from mudstone or shale. Gateway soils occur on mountain slopes of 15-50 percent. These soils are fine textured, compaction-prone, and erodible when disturbed.
- The Leavitt series consists of very deep, well drained soils that formed in alluvium derived from crystalline and sedimentary rock. Leavitt soils are on relict fan aprons, coalescing fans, terraces, hills, mountain slopes, and valley filling side slopes with slopes of 6-55 percent. Leavitt soils that are on slopes less than 15 percent are considered Farmland of Statewide Importance.
- The Frisco series consists of very deep, well drained soils formed in till, colluvium, or slope alluvium. They are on mountain slopes, till plains, mesas, and toe slopes with slopes of 25-65 percent.
- The Mayoworth series consists of moderately deep, well drained soils that formed in alluvium and residuum on hillslopes and mountain slopes of 15-50 percent. Mayoworth soils are fine textured, compaction-prone, and wind erodible when disturbed.

- The Woodhall series consists of moderately deep to lithic bedrock, well drained soils that formed in noncalcareous stony materials weathered from rhyolite, sandstone, andesite, breccia, and Tuff. Woodhall soils are on upland hills, ridges, mesas, and mountain side slopes. Slopes range from 6-50 percent.
- The Youga series consists of very deep or deep, well drained, with medium to rapid runoff soils. The soils formed in glacial till, outwash, alluvium, eolian deposits, or similar material and are considered a Farmland of Statewide Importance. Youga soils are on upland hills, plateaus, foot slopes, fans, and mountainsides of slopes 2-50 percent.
- The Rock outcrop-Cryoborolls complex occurs on extremely steep slopes.
- The Cryoborolls are shallow to lithic bedrock and erodible when disturbed. Approximately 0.5-1.5 miles of rock outcrop is crossed by each alternative.
- The Cimarron series consists of deep, well drained soils that formed in noncalcareous glacial till or similar material derived from sedimentary and metamorphic rocks. Cimarron soils are on hills, ridges, and mountainsides and have slopes of 2-30 percent. Cimarron soils are considered a Farmland of Statewide Importance.
- Cumulic Cryaquolls have a thick organic epipedon and have aquic conditions. These soils are typically wet, sensitive to disturbance, and highly compaction-prone.
- The Waybe series consists of shallow, well drained soils that formed in material weathered from clayey shale. These soils are compaction-prone, especially when moist or wet. Waybe soils are on foothills and mountain slopes of 10-55 percent (NRCS 2007).

3.3.3 Scoping Issues

Potential soil erosion due to project related disturbance was identified as the primary scoping issue for soil resources.

3.4 Paleontological Resources

This section summarizes the affected environment for paleontological resources within the study area. The Paleontological Technical Report (Evanoff 2006) and Technical Report Addendum for the Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project should be consulted for greater detail.

Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms that have been preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth; soft tissues; shells; wood; leaf impressions; footprints; burrows; and microscopic remains. Fossils are considered nonrenewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced.

Miles
0 0.5 1 2

Map 3-1

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Water Erosion

- Kw>=0.28 + Slope>= 15 and Slope>= 30

Water Erosion

November 7, 2011

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Natural Resources Conservation Service Soils (NRCS Soils)

Map 3-2

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Compaction Prone Soils

- Clay >= 28%

Compaction Prone Soils

November 7, 2011

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), and Grand County Natural Resources Conservation Service Soils (NRCS Soils)

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

Map 3-3

Hydric Soils

November 7, 2011

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

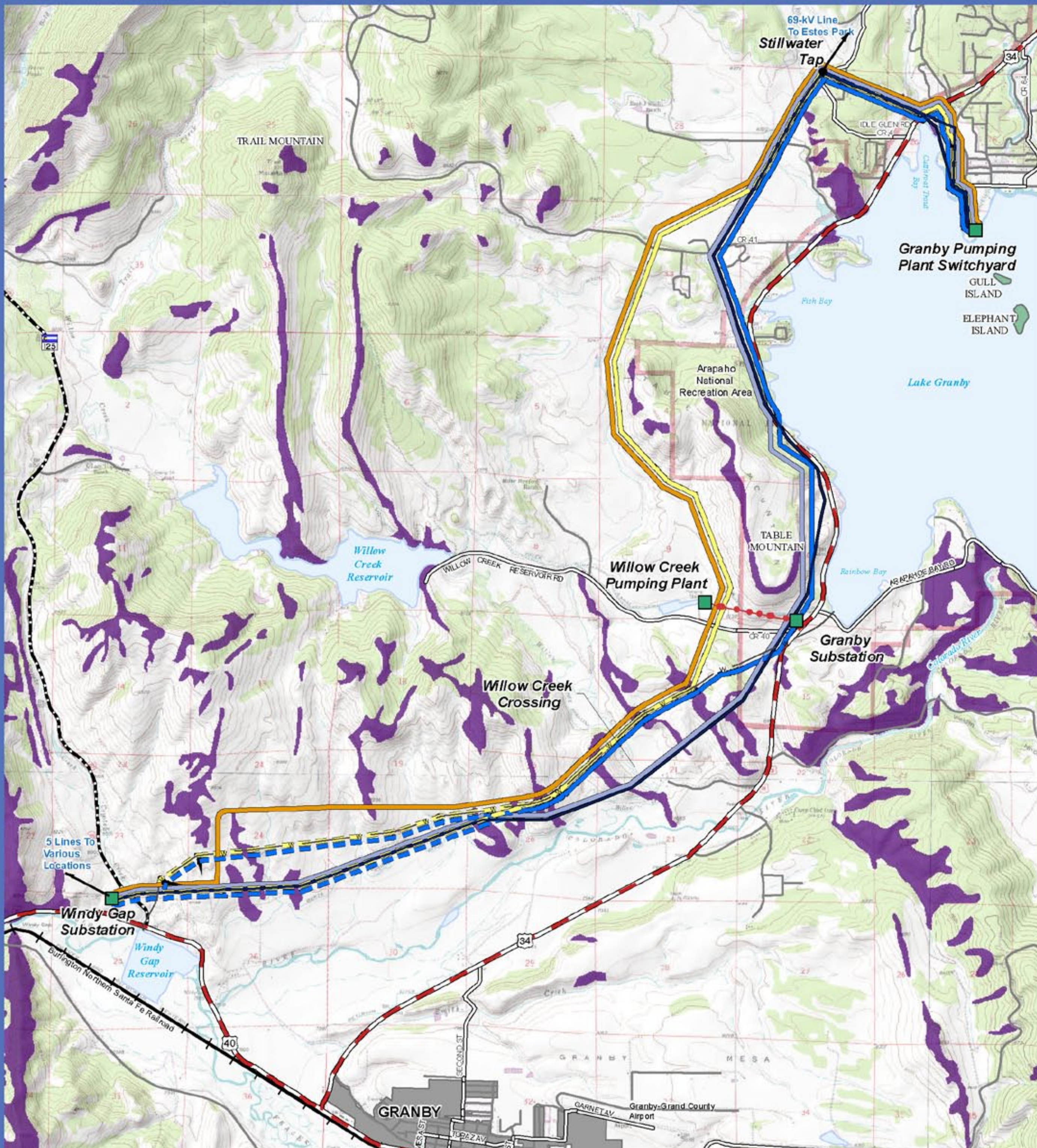
Hydric Soils

- All Hydric
- Partially Hydric

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Natural Resources Conservation Service Soils (NRCS Soils)

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 3-4

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives
- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Compaction Prone Soils
- Lithic Bedrock <= 60 inches

Depth to Bedrock

November 7, 2011

Western AECOM

Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), and Grand County Natural Resources Conservation Service Soils (NRCS Soils)

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

This paleontological resource analysis is based on the results of museum records and literature searches, and a field survey. The paleontological sensitivity of each geologic unit within the study area was evaluated using the Potential Fossil Yield Classification system (PFYC). This system is a predictive tool that ranks paleontological sensitivity from very low (PFYC Class 1) to very high (PFYC Class 5) on the basis of established paleontological data (see Appendix F). The PFYC system was originally developed by the Forest Service's Paleontology Center of Excellence and the Region 2 Paleontology Initiative in 1996. Modifications have been made by the BLM's Paleontological Resources staff in subsequent years. The PFYC version used for this analysis is widely used, and was recently approved as policy by the BLM (BLM 2007).

3.4.1 Analysis Area

The study area is located in Middle Park, Colorado, and is flanked by the Continental Divide of the Rocky Mountains to the northeast and by the Vasquez Mountains to the southwest. Glaciers occurring in the area during the 1.8 million years have shaped the mountains and bench terraces in the Fraser and Colorado river valleys.

Bedrock geologic units in the vicinity of the study area consist of both crystalline and sedimentary rocks. Crystalline rocks (igneous intrusive and extrusive, and metamorphic) include granitic rocks and biotitic gneiss, schist and migmatite of Precambrian age, as well as Tertiary age volcanic rocks. Sedimentary rocks include a variety of marine and terrestrial units of mostly Mesozoic and Cenozoic (Paleocene, Eocene, Oligocene, Miocene) age. The Mesozoic units were deposited in the Western Interior Cretaceous Seaway and adjacent marginal marine environments prior to the Laramide uplift of the Rocky Mountains. These rocks include the Dakota Group, Benton Shale, Niobrara Formation, and Pierre Shale. Following the initial stages of the Laramide uplift during the latest Cretaceous and Paleogene (Paleocene and Eocene), sediments eroding from the newly formed mountains were deposited in the valleys as sandstone, conglomerate, siltstone, mudstone, and volcanic debris that comprises the Middle Park and Coalmont formations. These units were deformed as the mountains continued to be uplifted. Later, during Oligocene and Miocene times, the Troublesome Formation was formed as tuffaceous siltstone and sandstone filled the Fraser River Valley, and Oligocene-age strata of the Troublesome Formation were interbedded with contemporaneous volcanic rocks consisting of basalt and trachyandesite. The crystalline and sedimentary bedrock geologic units in the vicinity of the study area are locally covered by younger alluvial and glacial deposits, and landslides.

3.4.2 Existing Conditions and Context

The existing and proposed transmission line alternatives cross three mapped bedrock geologic units (Cole and Braddock 2009) that are locally mantled by unconsolidated deposits of Quaternary age, including alluvium, colluvium landslide deposits, terrace gravels, and glacial till. The bedrock units include, from oldest to youngest and in approximate ascending stratigraphic order, the Middle Park Formation (PeKm and Peba; basalt and trachyandesite flows); and the Troublesome Formation (NPet, Map 3-5). Of these, only the Middle Park and Troublesome formations are known to contain fossils. The geology and paleontology of the geologic units that occur within the study area are summarized in the following subsections and in Table 3-3.

3.4.2.1 Middle Park Formation

Only the upper part of the Cretaceous and Paleocene Middle Park Formation occurs within the study area. This fluvially deposited unit consists of interbedded, light- to medium-brown, tan or gray, volcanic or arkosic sandstone and siltstone, conglomerate; and red, green, and brown mudstone. Its thickness exceeds 5,000 feet in the Middle Park Basin (Cole and Braddock 2009).

Fossils are uncommon in the Middle Park Formation, and as a result, any new discoveries would be scientifically important. Known fossils include only plants (leaves and pollen) that are typically poorly preserved (Izett 1968). The paleoflora of the Middle Park Formation is currently the subject of scientific research by paleobotanists at the Denver Museum of Nature and Science. Because fossils are scarce and generally poorly preserved in the Middle Park Formation, the unit is considered to have moderate paleontological sensitivity (PFYC Class 3a; see Table 3-3).

3.4.2.2 Basalt and Trachyandesite

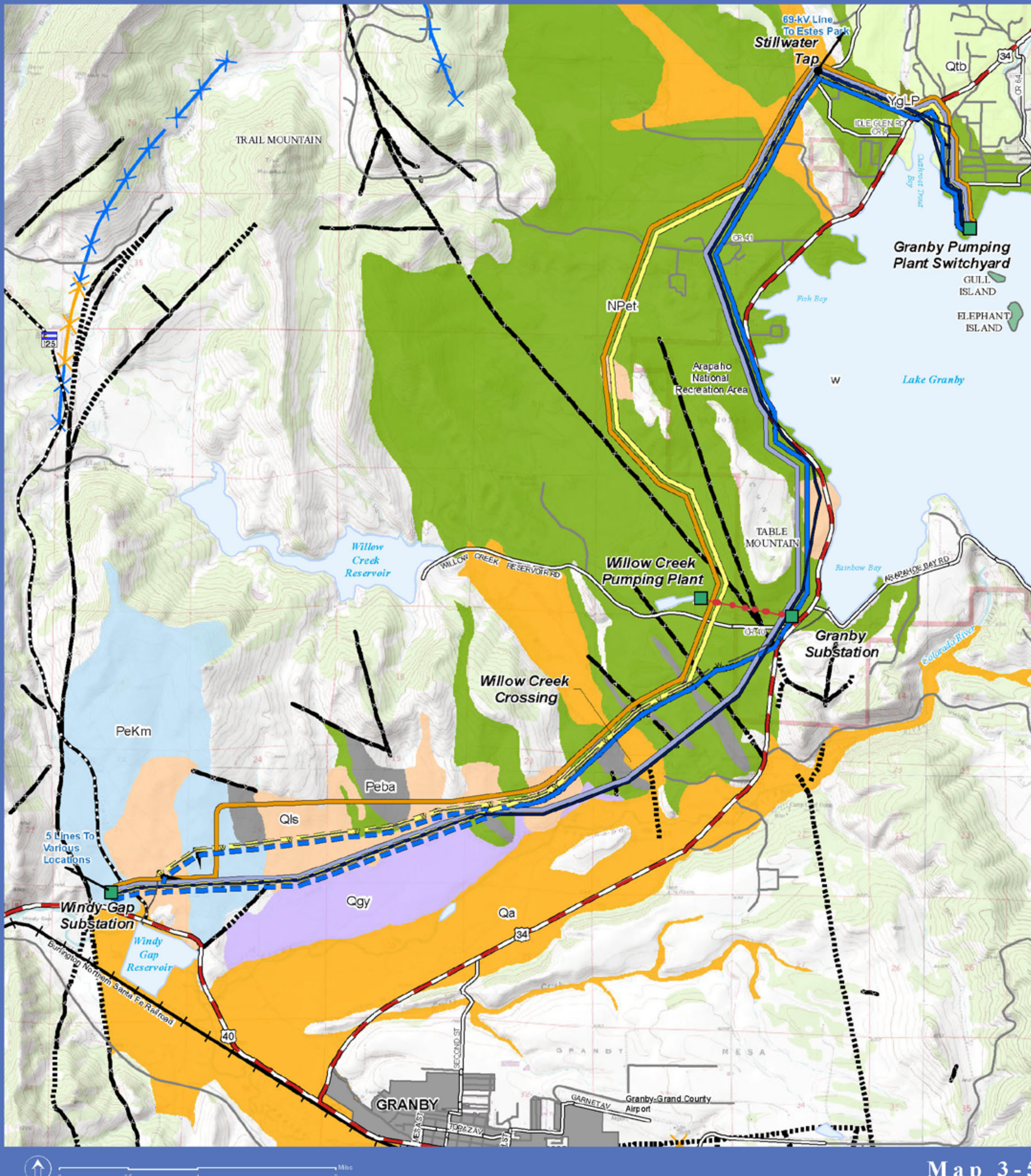
This extrusive igneous rock unit, of upper Oligocene age, consists of dark gray, very fine-grained basalt and trachyandesite that weathers to grayish brown, grayish purple, or moderate red. It is interlayered with the Troublesome Formation (Cole and Braddock 2009).

Igneous rocks are formed at extremely high temperatures and only very rarely preserve fossils. Therefore, they are considered to have very low paleontological sensitivity (PFYC Class 1; see Table 3-3).

3.4.2.3 Troublesome Formation

The upper Oligocene to lower Miocene Troublesome Formation is composed of gray and orange-gray tuffaceous mudstone and sandstone, volcanic ash, and lesser amounts of clayey limestone and conglomerate. It is locally interbedded with upper Oligocene basalt flows (Cole and Braddock 2009).

The Troublesome Formation is the only geologic unit within the study area that is known to produce well-preserved, scientifically significant vertebrate fossils. It is an important formation paleontologically because it is one of only a few known formations that record the mammalian fauna of an upland basin during the late Oligocene and Miocene. The Troublesome Formation has yielded a diverse array of vertebrate fossils including frog, turtle, bats, a variety of insectivores and rodents, camel, antelope, deer, rhinoceros, horse, mastodon, gomphothere, rabbit and pika; and carnivores including canids, felids, mustelids, and the enigmatic bear dog Amphicyon major (Izett 1974 and Kron 1988). Although fossil localities in the Troublesome Formation are sparse due to the mostly vegetated landscape, it does preserve a highly diverse vertebrate fossil fauna. Therefore, it is considered to have high paleontological sensitivity (PFYC Class 4; see Table 3-3).



Map 3-5

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Geology

- Fault - Certain
- Fault - Concealed
- Anticline - Certain
- Anticline - Concealed
- Qa- Alluvium (Holocene and upper Pleistocene)
- Peba- Basalt and trachyandesite (upper Oligocene)
- YgLP- Granite of Longs Peak batholith (Mesoproterozoic)
- Qls- Landslide deposits (Holocene and upper Pleistocene)
- PeKm- Middle Park Formation, upper part (Paleocene and Upper Cretaceous)
- w- Open water
- Qtb- Till of Bull Lake age (upper and middle Pleistocene)
- NPet- Troublesome Formation (lower Miocene and upper Oligocene)
- Qgy- Young gravel deposits at Granby Mesa (upper Pleistocene)

Geology

November 7, 2011

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), and Grand County, USGS

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

Table 3-3. Geologic Units within the Study Area and their Fossil Content and Paleontological Sensitivity using the PFYC.

Unit and Age	Typical Fossils	
Alluvium, Colluvium, Landslides, Terrace Gravels, Glacial Till (Pleistocene and Holocene)	Holocene: no in-situ fossils Pleistocene: typically scattered and poorly preserved vertebrates (primarily mammals), invertebrates, and plants	Holocene, Class 2 Pleistocene, Class 3A
Troublesome Formation (Oligocene and Miocene)	Uncommon but well preserved vertebrates (primarily mammals)	Class 4
Basalt and Trachyandesite (Oligocene)	no fossils	Class 1
Middle Park Formation (Cretaceous and Paleocene)	Plants	Class 3A

3.4.2.4 Quaternary Surficial Deposits

The bedrock geologic units within the study area are locally mantled by surficial deposits of Quaternary (Pleistocene and Holocene) alluvium, colluvium, landslide deposits, terrace gravels, and glacial till. These deposits vary locally significantly in both lithology and thickness.

In general, Pleistocene age sedimentary deposits may contain mineralized or partially mineralized animal bones, invertebrates, and plant remains of paleontological significance. With the exception of some caves, hot springs, and tar deposits, these fossils typically occur in low density and usually consist of scattered and poorly preserved remains. Nevertheless, many Pleistocene fossils provide important paleobiologic, paleobiogeographic, and paleoenvironmental information and are, therefore, scientifically important. The most common Pleistocene vertebrate fossils include the bones of mammoth, bison, deer, and small mammals; but other taxa including horse, lion, cheetah, wolf, camel, antelope, peccary, mastodon, and giant ground sloth, have been reported from the Rocky Mountain region (unpublished paleontological data, University of Colorado Museum [UCM] and Denver Museum of Nature and Science). Pleistocene surficial deposits in Colorado are generally considered to have low to moderate paleontological sensitivity (PFYC Class 3a; see Table 3-3).

Surficial sedimentary deposits of Holocene age are too young to contain in-situ fossil remains, and are considered to have low paleontological sensitivity (PFYC Class 2; see Table 3-3).

3.4.3 Museum Record Search

Three previously recorded UCM fossil localities occur within or immediately adjacent to the ROW for Alternative C1. UCM locality 83217 and UCM locality 83292 occur within the ROW of Alternative C1, while UCM 77030 is located just outside of the ROW. These localities have produced scientifically important fossil mammal remains of Oligocene and Miocene age (Izett 1974; Kron 1988; unpublished UCM paleontological data).

3.4.4 Field Survey

Only one fossil locality was recorded during the initial field survey conducted for this project (Evanoff 2006). This locality, discovered near the western end of Alternative C1 in the Middle

Park Formation, produced poorly preserved plant fossils that were unidentifiable and, therefore, not deemed scientifically important. The fossils were not accessioned by a museum, but were photographed (Evanoff 2006). No additional fossils were found at the previously recorded fossil localities discussed in Section 3.4.3 during the initial field survey.

During the field survey for Alternative D, an additional two fossil localities were recorded in the Troublesome Formation. Both of these yielded poorly preserved fragments of fossilized wood. These fossils were not collected, and were not considered to be scientifically important.

3.5 Cultural Resources

This section provides a description of the affected environment, including information concerning cultural resources in the Project Area.

3.5.1 Analysis Area

The analysis area for cultural resources investigations includes a corridor width of 200-300 feet for existing ROWs, a corridor width of 200-400 feet for new alignments, and a corridor width of 50-120 feet around access roads. The survey area was approximately 1,021 acres and crossed public lands administered by the BLM Kremmling Field Office; Forest Service, ARNF, Sulphur Ranger District, including portions of the ANRA; Colorado SLB; and private land.

3.5.2 Existing Conditions and Context

Cultural resources are fragile and nonrenewable remains of prehistoric and historic human activity, occupation, or endeavor as reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in human history. Cultural resources comprise the physical remains themselves, the areas where significant human events occurred even if evidence of the event no longer remains, and the environment surrounding the actual resource. The cultural resources inventory and analysis were prepared by RMC Consultants, Inc. Because of the sensitive nature of cultural resources, the technical report for this project is on file with Western in Loveland, Colorado, and is not included with the EIS. Cultural resource site location information is protected from public disclosure and is exempt from the Freedom of Information Act.

The NHPA of 1966 and the Archaeological Resource Protection Act of 1979 provide for the protection of historic properties and archaeological resources, respectively. Section 106 of the NHPA outlines the process that federal agencies must follow to identify, evaluate, and coordinate their activities and determinations concerning historic properties, defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. The term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the Nation Regiseter Criteria" (36 CFR 800.16(1)(I).

Significant cultural resources (historic properties) are generally at least 50 years old or older and meet one or more of the criteria presented in 36 CFR 60. Significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and are (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.

Prehistoric cultural resources are generally evaluated with respect to Criterion (D), which pertains to a site's scientific values. The measure of the importance of the scientific data is based upon research questions widely recognized as appropriate by the scientific community. Sites most likely to yield these important data are those with intact cultural deposits, where artifacts and features are relatively undisturbed. In addition to retaining contextual integrity, sites with the highest research value are those likely to contain cultural features. Features such as hearths, storage or habitation structures, or living structures often yield charcoal for radiocarbon dating; macrobotanical, palynological, and faunal evidence of subsistence practices; and associated datable artifact assemblages. Sites with artifacts diagnostic of a particular time period or cultural group are also regarded as having higher research potential than those lacking diagnostic artifacts. Sites attributable to a specific unit may contain data to address specific research questions and are regarded as important resources.

Historic sites may also meet any of the four criteria for eligibility to the NRHP. Frequently, however, the focus is upon architectural significance or association with events or individuals of historical importance. Although site-specific historical research is often warranted after its association with an important individual or event is determined, thus the site's value as an archaeological resource should not be overlooked. Sites that can be confidently ascribed to a particular historic theme and subtheme are generally regarded as having more research value than sites that cannot be ascribed to a theme. Significant historic archaeological resources are those that are relatively undisturbed, can be attributed to a specific theme, and retain sufficient artifacts and features to permit further study. Linear cultural resources such as roads, trails, and ditches generally possess little archaeological value, though in some instances they may retain engineering significance or be associated with important historic events. Roads, trails, and railroad grades, however, may have other historic site types associated with them that are important archaeological resources, the proper interpretation of which may depend upon identification of the linear site.

The significance of place of traditional, religious or cultural importance to Americ Indians or traditional cultural properties is assessed by talking with community members, elders and other knowledgeable individuals of a cultural group and through historical documentation. Some traditional cultural properties may be significant to an entire cultural group, whereas others may be significant to an individual or family.

3.5.3 Regional Cultural Overview

The following discussion is based on the prehistoric context for the region (Reed and Metcalf 1999). The overview divides the archaeological record into four extended temporal units (eras). The various eras (Paleoindian, Archaic, Formative, Protohistoric) are subdivided into either traditions, periods, or phases depending upon which unit best describes the variability within that particular era. The new context summarizes the archaeology of the area, points out gaps in the data, and sets out a series of research questions based on models of subsistence and settlement in each era.

Table 3-4 presents the proposed chronology.

Table 3-4. Northern Colorado River Basin Prehistoric Chronology (Reed & Metcalf 1999).

Era	Tradition/Period/Phase	Dates
Paleoindian	Clovis Tradition	11,500 - 6400 B.C.
	Goshen Tradition	11,500 - 10,500 B.C.
	Folsom Tradition	10,800 – 9500 B.C.
	Foothill-Mountain Tradition	9500 – 6400 B.C.
Archaic	Pioneer Period	6400 – 4500 B.C.
	Settlement Period	4500 – 2500 B.C.
	Transitional Period	2500 – 1000 B.C.
	Terminal Period	1000 – 400 B.C.
Formative	Anasazi Tradition	A.D. 900 - 1100
	Fremont Tradition	A.D. 200 - 1500
	Gateway Tradition	400 B.C. – A.D. 1300
	Aspen tradition	400 B.C. - A.D. 1300
Protohistoric	Antero Phase	A.D. 1300 - 1650
	Canalla Phase	A.D. 1650 - 1881

The Paleoindian era in the Project Area began around 11,500 B.C. and extends to 6,400 B.C. These dates reflect a recent revision in the radiocarbon dates by Fiedel (1999). An analysis of radiocarbon determinations led Fiedel to conclude that the ages of the Paleoindian era were being underestimated by approximately 2,000 years (Reed and Metcalf 1999:56). The dates used in this report reflect the revised radiocarbon ages of Fiedel. However, a few of the sites in the Project Area were radiocarbon dated prior to this revision, and thus they were assigned to an older temporal component than they are under the revised radiocarbon ages. The net effect of this revision has been to assign components previously identified as Late Paleoindian to the early Archaic period (Pioneer period), components previously identified as Early Archaic have been assigned to the Middle Archaic period (Settlement period), and components previously identified as Middle Archaic are assigned to the late Archaic periods (Transitional or Terminal periods).

The first 2000 years of this era encompass the Clovis, Goshen, and Folsom traditions. Modeling of early Paleoindian subsistence and settlement patterns produced the following test implications (Reed and Metcalf 1999:64-66):

- Settlement during the warm season will be in the uplands and cold season settlement will be in lower elevation areas. However, mountain basins, such as Middle Park, may have been occupied on a year-round basis (Frison and Kornfeld 1995). If settlement mobility were restricted, this would differ from the early Paleoindian model of high residential mobility (Kelly and Todd 1988).
- Early Paleoindian components should be characterized by large mammal remains in the archaeofaunal assemblages; macrobotanical samples will be dominated by fruit, nut, and large seeds; and ground stone will occur in lower frequencies than later components.
- Early Paleoindian toolkits will contain higher relative frequencies of bifaces; higher relative frequencies of high quality, nonlocal tool stone; and higher incidences of the rejuvenation and reuse of formal tools.

- Artifacts at early Paleoindian sites will be similar and vary in frequency rather than by functional class; sites will reflect short-term occupations, but repeated use of site locations; and few storage structures will be found.

The later part of the Paleoindian era is the Foothill-Mountain tradition. This tradition was developed by Frison (1992) and appears to have applicability on Colorado's western slope. In this tradition, later Paleoindian groups in the foothills and mountain ecological zones employed a different subsistence strategy than Plains-oriented late Paleoindian groups. In this tradition, settlement areas were more restricted and projectile point styles became more diverse and were often made of local materials (Frison 1992; Pitblado 1994). Bison were hunted, but so were many other game animals. Foothill-Mountain groups also exploited a wider range of plants than plains-oriented groups. Test implications (Reed and Metcalf 1999:67-70) for the context area include:

- Foothill-Mountain components will contain evidence of a more restricted settlement pattern, as evidenced by a higher reliance on local tool stones and the presence of substantial habitation structures.
- Foothill-Mountain components will contain evidence of a broader spectrum subsistence patterns, including the exploitation of a wide range of animals, use of lower caloric return seed foods, and higher usage of ground stone implements.
- Lithic reduction technologies are more oriented toward core reduction than bifacial reduction.

The following Archaic era is well documented throughout the context and Project Area. Excavations and other investigations have produced over 700 radiocarbon ages. Reed and Metcalf (1999:6, 77-79) have abandoned the traditional three-part division of the Archaic into Early, Middle, and Late periods. Their analysis of the Archaic archaeological record resulted in four proposed periods: Pioneer, Settled, Transitional, and Terminal.

- Pioneer: The end of nomadic Paleoindian settlement patterns and the establishment of seasonal settlement systems in the major basins of the western slope characterize the Pioneer period. Paleoindian lanceolate projectile point forms were replaced by a diversity of stemmed and notched forms, and subsistence practices target a wide variety of plants and animals.
- Settled: Settled period attributes include well-established local populations. These groups may have a central place foraging strategy based on predictable winter habitation areas. Processing features are common and the use of pit and basin structures for habitation becomes established.
- Transitional: The Transitional period is much like the previous settled period, but trends in the record indicate greater material culture variability, possibly less sedentary settlement patterns, and possible greater seasonal use of higher elevations.
- Terminal: The Terminal period indicates intensification in subsistence practices, including a greater use of lower caloric return foods and early experiments in growing corn. This period also shows a shift to the use of the bow and arrow.

Throughout the context discussion on the Archaic era, the authors point out that this era is a time of cultural change and continuity, and no single defining characteristic separates the era from the preceding Paleoindian era or following Formative era. Archaic life ways were stable over a long period of time. Changes in settlement patterns, subsistence practices, and material culture are discernable over space and time, but often these changes are a matter of frequency of use rather than replacement.

The Formative era is the time when horticulture became established in parts of western Colorado. This era also includes nonhorticultural groups who lived in the mountains and higher elevations unsuitable for horticulture. Horticultural groups in the context area have been divided into the Anasazi, Fremont, and Gateway traditions. Substantial habitation structures, cultigens, high-quality ceramics, two-handed manos, and specific types of rock art characterize sites within these traditions. Within the context region, these groups are clustered in western Rio Blanco and Moffat counties, in the lower San Miguel and Dolores River drainages in western Montrose County, and near Grand Junction in the Glade Park area. Limited evidence of limited trade or incursion by Plains Woodland people has been found in Grand County; however, several sites have been recorded including cord-marked pottery and the Crying Woman site located just west of the Continental Divide and in Middle Park, respectively (Reed and Metcalf 1999:130).

The Aspen Tradition (Reed and Metcalf 1999:140-145) is proposed for the nonhorticultural sites dating between 400 B.C. – A.D. 1300. This tradition is regarded as the taxonomic equivalent of the Uinta phase in the Wyoming Basin (Zier et al. 1983; Metcalf 1987; Thompson and Pastor 1995). Characteristics of the Uinta Phase include intensification in subsistence, particularly seed procurement (Smith 1988), episodic mass kills of pronghorn (Lubinski 2000), use of large number of pit features with associated ground stone, and a general increase in the number (or visibility) of sites. Aspen tradition occupations should display the following attributes:

- Shift in residential sites to lower elevations than those displayed by Archaic sites.
- Use of several types of structures including basin houses (Shields 1998), stone circles, wickiups, and informal brush and rock structures.
- Increase in the use of rock-filled basins and simple basin hearths over the preceding eras.
- A subsistence pattern similar to the Uinta phase in southwestern Wyoming.

The Protohistoric era begins around A.D. 1100-1300 when horticulture subsistence practices of Formative era groups end and Numic groups, such as the Ute, enter western Colorado. The Protohistoric ends with the removal of the Ute to reservations in A.D. 1881. The Protohistoric is divided into two periods, the pre-contact Antero phase and the post-contact Canalla phase. Attributes of Antero phase occupations include the use of Uncompahgre brown ware ceramics, Desert side-notched and Cottonwood projectile points, wickiups and other brush structures, and a pedestrian hunting and gathering subsistence pattern. The Canalla phase begins with Ute and Euroamerican contact and is characterized by the use of the horse and Euroamerican artifacts along with Uncompahgre brown ware and Desert side-notched and Cottonwood projectile points. Attributes of the Protohistoric subsistence and settlement system may include the following:

- Protohistoric groups engaged in a forager subsistence strategy, with higher relative frequencies of habitation sites and lower frequencies of specialized resource procurement locations than in the preceding periods.
- Use of fewer and less formalized storage features.

- Winter habitation sites were occupied for shorter periods of time, and are characterized by less substantial architecture, smaller site size, less patterned waste disposal, and less diverse and rich artifact assemblages.

Following the prehistoric occupation of the Project Area is the Historic period, including the early interactions of the Native American populations and early Euroamerican explorers and settlers. This brief history of the Project Area is taken from the *Colorado Mountains Historic Context* (Mehls 1984), *Colorado: A History of the Centennial State* (Abbott et al. 1994), *People of the Red Earth* (Crum 1996), *Historical Atlas of Colorado* (Noel et al. 1994), and *Colorado Place Names* (Bright 1993).

The first Europeans to enter western Colorado were Spanish explorers. Juan de Rivera searched western Colorado for mineral resources in 1765. In 1776, the Dominguez-Escalante expedition passed through western Colorado while searching for a route from Santa Fe to California. Neither of these expeditions entered the Project Area. While the Spanish were exploring parts of western Colorado, the Ute, Arapaho, and Cheyenne Indians occupied or used Middle Park in their subsistence rounds. While the Spanish did not venture into Middle Park, Native American culture and settlement systems were altered by the adoption of the horse, use of Euroamerican material culture, and serious demographic shifts caused by disease.

The first Americans to enter the area were fur trappers in the early 1800s. By the late 1830s, trapping ceased to be a viable economic pursuit due to dropping fur prices. Except for a few remaining trappers and scientific exploration and mapping expeditions, Euroamerican presence in Middle Park was minimal until the early 1870s. At that time, large ore deposits had been found in various areas of the Colorado mountains, and miners and their families were attracted to the mountains, including Middle Park. Mining never became a major industry in Middle Park, but the beginnings of the tourism and recreation industries were foreshadowed with interest in the Hot Sulphur Springs hot springs and the fishing at Grand Lake.

Settlement of Middle Park was inhibited by the presence of Native American groups, primarily the Ute, and the lack of roads into the area. The Utes were removed to reservations in 1881, but road development was slower. Wagon roads were established over Berthoud Pass in 1861 and Rollins Pass in 1862, but both of these roads were barely passable and were not used to any great extent until they were rebuilt for stage and mail traffic in 1875 and 1873, respectively. Roads suitable for automobile travel were developed in the 1920s. U.S. Highway 40 was built over Berthoud Pass in 1923 and the highway through Byers Canyon was completed in 1927. Fall River Road was constructed through RMNP (established 1915) in the 1920s.

Rail service was not established in Middle Park until the early 1900s. The completion of the Moffat Tunnel allowed the railroads to reach Hot Sulphur Springs in 1904 and Kremmling in 1906. The development of roads and rail transportation networks lead to the development of towns and commerce. Grand Lake was incorporated in 1885, followed by Hot Sulphur Springs in 1903, Kremmling in 1904, and Granby in 1905. The economy of Middle Park has changed little since the development of the towns. Farming, ranching, and tourism dominate the local economy. Kremmling and Granby serve as commercial centers for the surrounding area, while Hot Sulphur Springs and Grand Lake are primarily tourist destinations. After World War II, ski area development in eastern Grand County added to the tourism base.

Water and power development, beginning in the later 1930s, has contributed to the economic development of Middle Park and altered the landscape. The C-BT Project began in 1938 (Tyler 1992). This project was implemented to deliver water from the western slope to eastern slope cities of Fort Collins, Loveland, Longmont, Boulder, and Greeley. A number of reservoirs, power plants, trans-mountain tunnels, and miles of transmission line were constructed for this project, which was completed in 1957. Near the Project Area, Lake Granby, Shadow Mountain Reservoir, Willow Creek Reservoir and pumping plant, Adams Tunnel, Granby Pumping Plant Switchyard, and the Granby pump canal were constructed or enhanced. Besides providing water and power to east slope cities, these facilities provide employment and recreational opportunities in Middle Park.

3.5.4 Class I Inventory

In order to assess potential impacts to significant cultural resources in the Project Area, a Class I inventory (site file search) was conducted for a 0.5-mile wide corridor around all project facilities at the Office of the State Archaeologist in Denver and at federal land managing agency offices in Fort Collins, Colorado (Forest Service, ARNF) and Kremmling, Colorado (BLM Kremmling Field Office).

The Class I research results are a direct reflection of previous cultural resource investigations; i.e., little or no site data exist for those portions of the Project Area that have not been previously inventoried. Numerous cultural resource inventories have been conducted within or adjacent to the Project Area. Most of these inventories were conducted for other linear projects, such as pipelines and highways. These previous projects have resulted in the recordation of numerous historic linear sites, such as irrigation canals and railroad grades.

A total of 52 projects have been conducted in the vicinity of the proposed project. The project types are both linear and block surveys as well as combinations of the two. Nearly all of the surveys are Class III (intensive) inventories, with some Class II (sample) inventories conducted recently by the Forest Service.

The earliest inventories were conducted in 1976 and 1977 by the University of Colorado associated with construction of the Windy Gap Dam, Reservoir, and Pipeline. In 1981 and 1982, Western Cultural Resource Management, Inc. (WCRM) conducted a program of mapping, sampling, testing, excavation, and monitoring at 10 sites along the Windy Gap Pipeline and its associated facilities for the NCWCD (Wheeler and Martin 1984:1). Relatively recent Class III block inventories have been conducted by the BLM, including inventory of the Granby Landfill (Project #GA.LM.R62), Windy Gap Cultural Resource Management Area (Project #GA.LM.R61), and Windy Gap Land Exchange (Project #GA.LM.R91). Recently, Class II inventories on and around Table Mountain and Willow Creek Reservoir have been conducted by the Forest Service for prescribed burns (Project #GA.FS.R.94), fuel reduction (Project #GA.FS.R75 & #GA.FS.R112), and pine beetle suppression (no project number) projects. All of the pole structures and access roads on federal lands along the existing alignment were inventoried in 2001 by RMC Consultants, Inc. (no State Historic Preservation Office [SHPO] project number).

A total of 71 previously recorded sites are located within 0.5 mile of the Project Area. The previously recorded sites consist of 53 prehistoric sites, 16 historic sites, and two prehistoric/historic sites. The prehistoric sites consist of 33 lithic scatters, 13 open camps, six quarry sites, two open architectural sites, and one isolated find (note: site types are categorized by the predominant activity or feature observed on the site). The historic sites consist of four transmission lines, one homestead, three ditches, three dumps, two isolated features, two artifact scatters, two isolated artifacts, and one road (note: the prehistoric/historic sites are counted as both a prehistoric site and a historic site). Twenty-two of the sites are located along the existing transmission alignment only; five are located along the alternate alignment only. The remaining four sites are located on two or more of the project facilities.

Official determinations and field recommendations of eligibility for inclusion in the NRHP have been made on 30 of the 42 previously recorded sites within the Area of Potential Effect (APE). Of the 42 previously recorded sites within the APE of the current project, nine have been officially determined to be not eligible for inclusion in the NRHP and four sites located within the APE have been officially determined to be eligible. One site has been officially determined to need more data before NRHP eligibility determination can be made (5GA2312).

3.5.5 Class III Inventory

An intensive ("Class III") cultural resource inventory was conducted by RMC Consultants, Inc. in 2007 and 2009. The inventory included 12.45 miles of existing transmission lines, 13.7 miles of a proposed alternative transmission line alignment, 1.68 miles for a deviation of the alternative alignment, and 14.51 miles of access roads. The total acreage inventoried was approximately 1,021 acres.

The inventory of the Windy Gap transmission line resulted in the re-evaluation of 40 previously recorded sites, and the recordation and evaluation of 19 newly discovered sites and 17 isolated finds. Two previously recorded sites have been subsumed within the boundaries of larger sites and were not re-evaluated. Six sites were previously recorded along the existing transmission line, but could not be relocated during the field inventory. These sites may have been destroyed by construction projects or were originally misplotted. In addition, four transmission lines, including the existing Granby Pumping Plant Switchyard to Windy Gap Substation 69-kV transmission line have been recorded.

3.5.6 Native American Consultation

Western contacted Native American tribes with a potential interest in the project and historical ties to the Project Area to inform them of the proposal and request any comments or information they would like to provide. The letter was sent on August 3, 2007, to the following tribes:

- Cheyenne and Arapaho Tribes of Oklahoma
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Northern Ute Tribe
- Shoshone Tribe (Eastern Band)
- Southern Ute Indian Tribe
- Ute Mountain Ute Tribe

One tribe responded (the Northern Cheyenne) and requested a field visit. A subsequent letter was sent on September 6, 2007 to the Native American tribes with regard to the previous identification of an Eagle Catch Trap site through the Class I Survey. The Eagle Catch Trap site is located closest to Alternatives C1 and C2. The letter requested attendance at a field trip that was conducted by Western's Native American Liaison. The Northern Cheyenne attended and during the field trip and review of the area, the tribal representative determined that the site was not an eagle catch trap site.

3.6 Electric and Magnetic Fields (EMF)

3.6.1 Description of EMF

3.6.1.1 Units of Measure

Electric field values are reported in either volts per meter (V/m) or thousands of volts per meter (kV/m).

Magnetic field levels are reported in units of gauss (G), or more typically, in units of milliGauss (mG), which are equal to one-thousandth of a gauss (i.e., 1 mG = 0.001 G). Some technical reports also use the unit Tesla (T) or microTesla (µT; 1 µT = 0.000001 T) for magnetic flux densities. The conversion between these units is 1 mG = 0.1 µT and 1 µT = 10 mG.

3.6.1.2 Overview

EMF occur throughout nature and are one of the basic forces of nature. Any object with an electric charge on it has a voltage (potential) at its surface and can create an electric field. The change in voltage over distance is known as the electric field. When electrical charges move together (known as “current”), they create additional forces on each other. These additional forces are represented by magnetic fields. All currents create magnetic fields.

The strength of EMF is related to the voltage and current respectively, and to the distance away from the source. The strength of the electric field depends on the voltage (higher voltages create higher electric fields) and the distance (electric fields grow weaker as the distance from the source increases). The strength of the magnetic field depends on the current or load (higher currents or loads create higher magnetic fields) and the distance (magnetic fields grow weaker as the distance from the source increases).

EMF can be static/unchanging in direction (direct current) or changing/alternating in direction (alternating current [AC]). Static electric fields can result from taking off a sweater or walking across a carpet. Body voltages as high as 8,000-16,000 volts (8-16-kV) have been measured on a person as a result of walking across a carpet (Chakravarti and Pontrelli 1976). The earth has a natural static electric field of about 120-150 volts/meter (0.12-0.15 kV/m) at ground level due to the 300-400,000 volt potential difference between the ionosphere and the earth. This means that a 6-foot tall person would have a static potential of about 275 volts between the top and bottom of their body. Much stronger static electric potentials can exist underneath clouds, where the electric potential to earth can reach 10-100 million volts. Natural static electric fields under clouds, and in some dust storms, can reach 30-10 kV/m (NRC 1986; CRC 1981). Static magnetic fields also occur in nature. The earth has a natural static magnetic field of about 550 mG (0.550 G) in the general area of Granby, Colorado (Merrill and McElhinney 1983).

The electric power distribution system, wiring in buildings, and electrical appliances create AC EMF. In the United States, the power system uses current that alternates 60 times each second (60 Hertz [Hz]). Almost all household appliances create an electric field. This is due to the voltage on the appliance. To create an electric field, the appliance need not be operating, but just plugged into the electrical outlet. Typical reported values measured 1 foot away from some common household appliances are shown in Table 3-5 (Sheppard & Eisenbud 1977).

Overhead electric transmission lines and distribution lines also create 60 Hz electric fields. The strength of the electric field is primarily a function of line voltage, height of the conductors above ground, the arrangement of the electrical wires, and distance away from the line. Unlike magnetic fields, electric fields can easily be shielded (or weakened) by the presence of conducting objects. For example, a typical house or building shields about 90-95 percent of electric fields from outside sources (Carnegie Mellon University 1995). Other objects, such as trees, shrubs, walls, and fences, will also provide electric field shielding.

Table 3-5. Typical Electric Field Values at 12" From Common Appliances.

Appliance	Electric Field (kV/m)
Electric Blanket	0.250*
Broiler	0.130
Stereo	0.090
Refrigerator	0.060
Iron	0.060
Hand Mixer	0.050
Phonograph	0.040
Toaster	0.040
Hair Dryer	0.040
Coffee Pot	0.030
Clock	0.015

* Electric fields can reach 1-10-kV/m next to blanket wires.

The characteristics of magnetic field attenuation can differ depending on the field source. A magnetic field due to a point source, such as an appliance, decreases rapidly with distance away from the device. The magnetic field also decreases with distance away from linear sources, such as overhead power lines, but not as rapidly as it does with appliances. Overhead transmission line magnetic fields attenuate at a rate that is inversely proportional to the distance squared, whereas magnetic fields from appliances and other point sources attenuate at a rate proportional to the distance cubed. Underground transmission line magnetic fields attenuate more rapidly than those produced by overhead transmission lines, since the current-carrying conductors are typically in closer proximity to each other, thereby increasing field cancellation and the attenuation rate.

The 60 Hz magnetic fields under most overhead transmission and distribution lines are usually smaller than values near many common household appliances. The main reason for this is the height above ground at which electric power lines are supported. Since the field decreases with distance away from the source, the line height above ground effectively reduces the magnetic field to levels that are less than many appliances. Since the magnetic field is caused by the flow of an electric current, a device must be operated for it to create a magnetic field. The magnetic field of a large number of typical household appliances was measured by the Illinois Institute of Technology Research (IITRI) for the U.S. Navy (IITRI 1984), and by Enertech Consultants (Silva et.al. 1989) for the Electric Power Research Institute (EPRI). Typical values for appliances are presented in Table 3-6.

Table 3-6. Magnetic Fields from Household Appliances.

	AC Magnetic Field (mG)	
Appliance	12" Away	Maximum
Electric Range	3 to 30	100 to 1,200
Electric Oven	2 to 5	10 to 50
Garbage Disposal	10 to 20	850 to 1,250
Refrigerator	0.3 to 3	4 to 15
Clothes Washer	2 to 30	10 to 400
Clothes Dryer	1 to 3	3 to 80
Coffee Maker	0.8 to 1	15 to 250
Toaster	0.6 to 8	70 to 150
Crock Pot	0.8 to 1	15 to 80
Iron	1 to 3	90 to 300
Can Opener	35 to 250	10,000 to 20,000
Mixer	6 to 100	500 to 7,000
Blender, Popper, Processor	6 to 20	250 to 1,050
Vacuum Cleaner	20 to 200	2,000 to 8,000
Portable Heater	1 to 40	100 to 1,100
Fans/blowers	0.4 to 40	20 to 300
Hair Dryer	1 to 70	60 to 20,000
Electric Shaver	1 to 100	150 to 15,000
Color Television	9 to 20	150 to 500
Fluorescent Fixture	2 to 40	140 to 2,000
Fluorescent Desk Lamp	6 to 20	400 to 3,500
Circular Saws	10 to 250	2,000 to 10,000
Electric Drill	25 to 35	4,000 to 8,000

Unlike electric fields, most ordinary objects cannot easily shield magnetic fields. Many common materials (wood, air, concrete, earth, people, etc.) do not shield magnetic fields. However, ferromagnetic materials, such as iron or steel, can shield them.

3.6.2 Analysis Area

The strength of EMF is related to the voltage and current respectively, and to the distance away from the source. The strength of the electric field depends on the voltage (higher voltages create higher electric fields) and the distance (electric fields grow weaker as the distance from the source increases). The strength of the magnetic field depends on the current or load (higher currents or loads create higher magnetic fields) and the distance (magnetic fields grow weaker as the distance from the source increases).

For the purposes of this analysis, the area of potential effect is defined as the transmission line ROW and areas immediately adjacent to the ROW.

3.6.3 Alternative-Specific Analysis Areas

3.6.3.1 Alternative A – No Action

The Granby Pumping Plant Switchyard-Windy Gap Substation transmission line is an existing single-circuit 69-kV transmission line. This existing power line is approximately 13.6 miles in length and connects the Granby Pumping Plant Switchyard to the Windy Gap Substation. The power line is a single-circuit, three-phase AC transmission line oriented in a horizontal phase configuration, as shown in Figure 3-1. Each phase is comprised of a single 0.56-inch diameter conductor. In addition, there are two 3/8-inch diameter steel shield wires located above the phase conductors. The transmission line is supported on existing wood H-frame structures within a 30-foot wide ROW and is assumed to be located at an average elevation of about 8,500 feet.

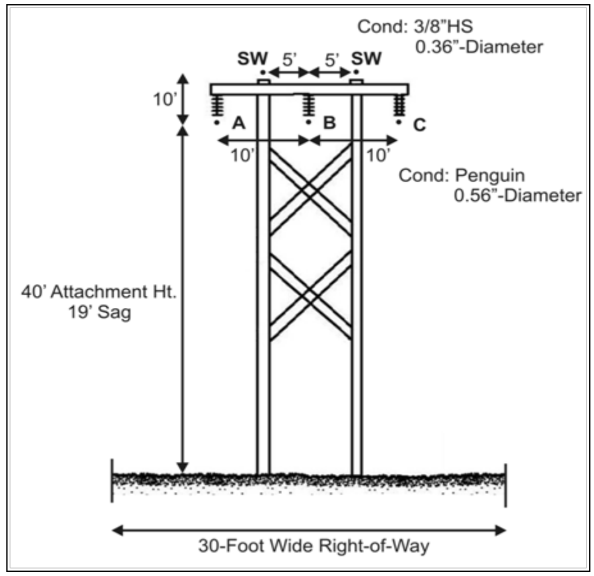


Figure 3-1. Diagram of the Existing 69-kV Transmission Line Configuration.

3.6.3.2 All Action Alternatives – B1, C1, C2, D

The proposed Granby Pumping Plant Switchyard-Windy Gap Substation transmission line would replace the existing single-circuit 69-kV transmission line with a double-circuit 69-kV and 138-kV transmission line. This proposed power line would be approximately 12 miles in length and would continue to connect the Granby Pumping Plant Switchyard to the Windy Gap Substation. The proposed power line would be a double-circuit, three-phase per circuit, AC transmission line oriented in a vertical phase configuration, as shown in Figure 3-2. One circuit would be energized at 69-kV, while the second circuit would be energized at 138-kV. Each phase would be comprised of a single 0.78-inch diameter conductor. In addition, there would be one 0.5-inch diameter steel shield wire located above the phase conductors. The transmission line would be supported on new steel monopole structures within a 100-foot wide ROW.

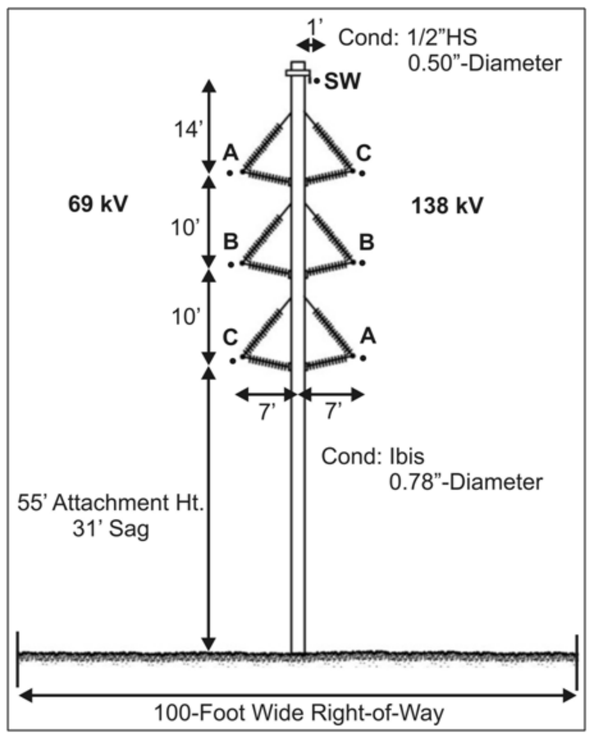


Figure 3-2. Diagram of the Proposed 69/138-kV Transmission Line Configuration.

3.6.4 Existing Conditions and Context

3.6.4.1 Pacemakers and EMF

Public concern has been expressed related to the EMF of transmission lines with the possibility of interference with cardiac pacemakers. There are two general types of pacemakers: asynchronous and synchronous (IITRI 1979). The asynchronous pacemaker pulses at a predetermined rate. It is practically immune to interference because it has no sensing circuitry and is not very complex. The synchronous pacemaker, on the other hand, pulses only when its sensing circuitry determines that pacing is necessary. The concern is that interference could result from transmission line electric or magnetic fields, and cause a spurious signal in the pacemaker's sensing circuitry (Sastre 1997). However, when these pacemakers detect a spurious signal, such as an induced 60 Hz current, they are programmed to revert to an asynchronous or fixed pacing mode of operation and return to synchronous operation within a specified time after the signal is no longer detected. The issue for pacemakers is if power line fields could adversely affect their operation.

The potential for pacemaker interference from power line fields depends on the manufacturer, model, and implantation method, among other factors. Studies have determined thresholds for interference of the most sensitive units to be about 2,000-12,000 mG for magnetic fields and about 1.5-2.0 kV/m for electric fields (University of Rochester 1985). Guidelines for occupational exposure suggest that electric field exposure should not exceed 1 kV/m or 1,000 mG for workers with cardiac pacemakers (ACGIH 2003). It is unclear that reversion to a fixed pacing mode is harmful, since pacemakers are routinely put into reversion with a magnet to test operation and battery life. Some new pacemaker models are dual chamber devices that can be more sensitive to external interference. Some of these dual chamber units may experience inappropriate pacing behavior (prior to reversion to fixed pacing mode) in electric fields as low as 1.2-2 kV/m, while other models appear unaffected in fields up to 20 kV/m. The biological consequences of brief, reversible pacemaker malfunction are mostly benign. An exception would be an individual who has a sensitive pacer and is completely dependent on it for maintaining all cardiac rhythms. For such an individual, a malfunction that compromised pacemaker output or prevented the unit from reverting to the fixed pacing mode, even brief periods of interference could be life-threatening (Sastre 1997). The precise coincidence of events (i.e., pacer model, field characteristics, biological need for full function pacing) would generally appear to be a rare event.

The World Health Organization references information on pacemakers from the National Radiation Laboratory and Ministry of Health in New Zealand (NRL 2008). Concerning pacemakers, they state:

> A very small proportion of cardiac pacemakers has been found to be sensitive to 50/60 Hz EMF close to the International Commission on Non-Ionizing Radiation Protection (ICNIRP) limits (ICNIRP 2003) for public exposure (5 kV/m for electric fields and 1,000 mG for magnetic fields). (These same devices are also likely to be sensitive to other sources of electromagnetic interference, such as car ignition systems.) It is most likely that they will revert to a fixed pacing mode, which poses no immediate threat to the wearer. Since the field levels at which these effects occur close to the ICNIRP limits for public exposure, the risk to members of the general public is thought to be extremely small. However, in workplaces where field strengths approaching the occupational limits are expected (10 kV/m for electric fields and 5,000 mG for magnetic fields), precautions may need to be taken to alert or exclude pacemaker wearers. There are no known instances of adverse

effects on pacemaker users around power lines, or in other areas where exposure limits comply with the ICNIRP reference levels for the public.

3.6.4.2 Audible Noise

Units of Measure

Audible noise is measured in decibels of sound pressure with respect to the threshold of human hearing. Audible noise levels are often reported in A-weighted decibels (dBA) or non-weighted (linear) decibels (dB); dBA weights sound frequencies in a manner approximating the sensitivity of the human ear.

Description of Audible Noise

High voltage transmission lines can experience the natural phenomenon of corona. Corona is a luminous discharge due to ionization of the air surrounding an electrode caused by a voltage gradient exceeding a certain critical value. The electrode may be conductors, hardware, accessories, or insulators on a transmission line. Any electrode or thin wire with a sufficiently strong electric gradient can experience corona. For example, corona is used on the thin bare wires inside a photocopy machine. For a photocopier to work, a field of positive charges must be generated on the surface of both the drum and the copy paper. These tasks are accomplished by the corona wires. These wires are subjected to a high voltage, which they subsequently transfer to the drum and paper in the form of static electricity. The corona wire uses static electricity to coat both the photoreceptive drum and the copy paper with a layer of positively charged ions.

Corona activity on high voltage transmission lines can generate a small amount of sound energy. Corona also results in a small amount of power loss to the transmission line. The audible noise level can increase during foul weather conditions (Figure 3-3). Water drops may collect on the surface of the conductors and increase corona activity so that a crackling or humming sound may be heard near a transmission line. Audible noise decreases with distance away from a transmission line.

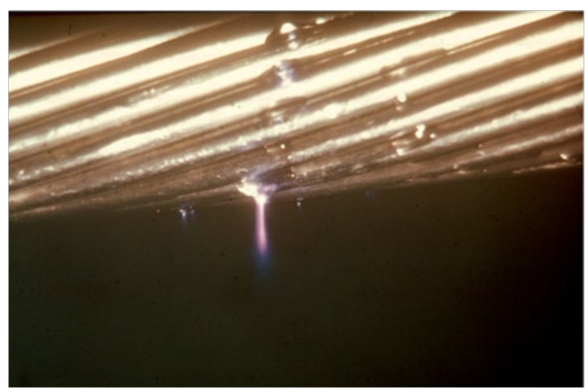


Figure 3-3. Close-Up of a Tiny Corona Discharge at the Surface of a Conductor.

Audible noise is measured in decibels of sound pressure with respect to the threshold of human hearing. The decibel is a dimensionless unit used to compare the level of some quantity to a reference level and it always needs a reference quantity to have meaning. The apparent loudness that we attribute to sound varies not only with the sound pressure but also with the frequency (or pitch) of the sound. The human hearing system is nonlinear and has a complex response. Corona-induced noise tends to be broadband and can sometimes have a pure tone as well (primarily at 120 Hz).

"Noise" is generally defined as unwanted sound. The effects of noise on people can range from annoyance and inconvenience to temporary or permanent hearing loss at very high levels. Since the human ear is not equally sensitive to sound at all frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. Sound wave intensity is measured in dB, but a sound with multiple frequencies (broadband sound) can be perceived differently that a single level in dB might indicate. The dBA performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. The dBA has been chosen by most authorities for purposes of environmental noise regulation.

It is important to remember that transmission line audible noise is variable, and therefore it is characterized using statistics that estimate probability of a certain level of noise occurring. Statistical noise descriptors include what engineers call “exceedance levels”, for example, L10, L50, and L90. These descriptors indicate what percentage of time a certain noise level will be exceeded. For example, a L50 of 65 dBA indicates that 50 percent of the time, noise levels will be greater than 65 dBA at a certain location and, conversely, it could be less 50 percent of the time. The L10 level is high and would only be exceeded 10 percent of the time (i.e., 90 percent of the time, the level would be less than the L10 value).

Additional methods to characterize audible noise have been developed to evaluate the long-term characteristics of sound. The equivalent sound level, Leq, is the energy average of the level of a varying sound over a specified period of time (EPA 1974; Keast 1980). This value is a single-number equivalent representation of the fluctuating sound level in decibels over a specified period of time. The Leq of a time-varying sound is equivalent or equal to the level of a constant unchanging sound.

A number of government agencies have adopted a level similar to Leq called the day-night averaged noise level, which is an equivalent day-night sound level, or Ldn, and it is used as a noise metric to evaluate variable noise. The Ldn represents a time-weighted 24-hour average noise level based on the dBA for a variety of weather conditions. "Time-weighted" refers to the fact that noise occurring during certain sensitive time periods (nighttime, when other background sounds are relatively subdued) is adjusted for occurring at those times. Ldn includes an additional 10 dBA increase that is added to noise events occurring during nighttime (defined by the EPA as 10 p.m. to 7 a.m.). In effect, the Ldn is roughly equivalent to the Leq over a 24-hour period, with "penalties" added to noise events occurring late at night and early in the morning. The Ldn rating is intended to improve upon the Leq rating by adding a correction for nighttime noise, because people are more sensitive to noise at night when background levels may be lower.

The EPA has an outdoor activity Ldn noise guideline of 55 dBA (EPA 1974). This value represents the sound energy averaged over a 24-hour period; it has a 10 dBA nighttime weighting (between 10:00 p.m. and 7:00 a.m.) (EPRI 2005).

Typical sounds in a community may range from about 40 dBA (very quiet) to 100 dBA (very loud) or higher. Conversation is roughly 60 dBA at 3-5 feet. As background noise levels exceed 60 dBA, speech intelligibility becomes increasingly difficult. Noise becomes physically discomforting at 110 dBA. A 10 dBA change in a noise level is perceived by most people as a doubling of the sound level. The smallest perceivable change in noise levels is 3 dBA. An increase of 5 dBA is more clearly noticeable as a change by the human ear. The above sound levels are stated in terms of short-term maximum sound. Some typical noise levels range from the relative quiet of the library to the loud subway trains. Typical sound levels for various environments are presented in Table 3-7 (EPA 1974; IEEE 1974; Miller 1978).

Table 3-7. Typical Sound Levels for Common Sources in dBA.

Source/Location	Sound Level (dBA)
Threshold of Hearing	0
Motion Picture Studio- Ambient	20
Library	35
Chicago Suburbs- nighttime minimum	40
Wind in Deciduous Trees (2-14 mph)	36-61
Falling Rain (Variable Rainfall Rates)	41-63
Tomato Field on California Farm	44
Small Town/Quiet Suburb	47-53
Private Business Office	50
Light Traffic at 100 ft Away	50
Average Residence	50
Large Retail Store	60
Accounting Office	60
Boston Inside House on Major Avenue	68
Average Traffic on Street Corner	75
Inside Sports Car (50 mph)	80
Los Angeles - 0.75 mile from Jet Landing	86
Inside New York Subway Train	95
Loud Automobile Horn (at 1 meter)	115

Audible noise levels on well designed transmission lines are usually not noticeable, or very low in fair weather conditions. For example, a typical calculated fair weather audible noise for a 500-kV transmission line at the ROW edge is similar to or less than ambient levels in a library or typical daytime residential environments, and less than background noise for wind and rain. In foul weather, noise levels can rise and be noticeable near transmission line easements. The corona that causes audible noise results in some power losses on a transmission line. Because power loss is uneconomical and audible noise is undesirable, corona on transmission lines has been studied by engineers since the early part of this century. Many excellent references exist on the subject of transmission line corona. Consequently, corona is well understood by engineers and steps to minimize it are one of the major factors in transmission line design. Corona is an important design consideration for transmission lines rated at 345-kV and higher. The use of large diameter bundled conductors will lower the electrical stress on the air at the conductor surface so that corona activity is at low levels under most operating conditions. Other possible mitigation options (such as corona rings at hardware attachment points and other line hardware designed to avoid sharp edges) may also be considered to reduce audible noise.

In foul weather conditions, audible noise due to transmission lines can be in the range of sound levels created by wind and rain. Often rain and wind noise will mask sound from a transmission line, which will be further attenuated by building structures. The range of sounds from a light wind (2-14 mph) in deciduous trees has been reported to 36-61 dBA, and rain falling at variable rates is 36-63 dBA (Miller 1978). The sound level of rain falling depends on the rain rate and the terrain upon which the rain falls, as shown in Table 3-8 (EPRI 2005).

Table 3-8. Summary of Audible Noise Calculation Results on Different Types of Terrain for Various Rain Rates.

Rain Rate (mm/hr)	Rain Noise – dBA		
	Terrain A	Terrain B	Terrain C
0.10	28.0	34.0	40.0
0.20	31.0	37.0	43.0
0.50	35.0	41.0	47.0
1.00	38.0	44.0	50.0
2.00	41.0	47.0	53.0
5.00	45.0	51.0	57.0
10.00	48.0	54.0	60.0

Terrain A – Essentially bare, porous ground (i.e. plowed field or snow-covered ground); no standing puddles of water; relatively small-leafed ground cover vegetation, such as grass lawn, meadow, hay field shortly after mowing, field of small leafed plants.

Terrain B – A few small, fully leafed deciduous trees at 15-30m; a large, fully leafed tree at 30-90m.

Terrain C – Large area of fully leafed trees or large-leafed crops or vegetation entirely surrounding area of interest.

3.6.4.3 Radio and Television Interference

Description of Radio and Television Noise Interference

In the Granby area, there are approximately eight AM station signal coverage areas with primary coverage, five secondary signal coverage areas, and a few intermittent AM station signal coverage areas. Evaluation of the signal strengths reveals that AM stations would typically have good signal-to-noise ratios at the ROW edge for fair weather. This is not true for some stations with weaker signals. In rain, the radio noise is higher than fair weather, and many AM stations may experience interference if an AM radio is used on or close to the ROW in rain.

Overhead high voltage transmission lines do not, as a general rule, interfere with radio or television (TV) reception for most practical situations. There are two potential sources for interference related to power lines: corona and gap discharges. Corona is a tiny electrical discharge at the surface of a conductor that can occur mostly in foul or rainy weather when water drops form on the conductors. Corona can sometimes generate unwanted radio frequency electrical noise. It is usually not a problem for lower voltage lines, but is an important design consideration for high voltage transmission lines rated at 345-kV and higher. Corona-generated radio frequency noise decreases with distance from a transmission line and also decreases with higher frequencies. When it is a problem, it is usually for AM radio and usually not the higher frequencies associated with FM radio, cell phones, TV, or satellite signals. Gap discharges are different from corona. Gap discharges can develop on all power lines at any voltage and are more frequently found on smaller distribution lines in residential neighborhoods. They can take place at tiny electrical separations (gaps) that can develop between mechanically connected metal parts that are loosely connected or broken. A small electric spark discharges across the gap and can create unwanted electrical noise. The severity of gap discharge interference depends on the nature of the gap, the strength and quality of the transmitted radio or TV signal, the quality of the radio or TV set and antenna system, and the distance between the receiver and power line, among other things. The source of interference that causes more than 90 percent of the interference complaints received by electric utilities is gap discharges. They tend to be found the most often on wood poles where hardware has a greater probability of becoming loose as the wood poles and wood cross arms dry out. Lattice steel structures, concrete poles, and tubular steel poles are much better structures from an interference standpoint than wood because the hardware on the structure usually stays very tightly connected, and the weight of the long spans tends to keep hardware well bonded. Unlike corona interference, which peaks in the rain, gap discharges often decrease or disappear in the rain because the “gaps” are electrically shorted out by water drops.

Radio and TV noise is statistical in nature and varies with many conditions, including surface condition of the conductor and climatic conditions. Levels are affected by size and condition of the conductors, line voltage, weather (higher in foul weather), distance from the line, characteristics of the measurement equipment, and altitude. At higher elevations, the effect of changing air density lowers the corona inception point and there is more corona activity; a rough estimate is that an additional 1 dB of radio noise is added for each 1,000 feet of elevation above sea level. The units used for measurement of radio or TV noise are dB, referenced to 1 microvolt per meter (μV/m) (or one-millionth of a volt per meter) and written as dBμV/m. Sometimes engineers simply use dB for radio or TV noise levels, but it is generally understood that the reference is electric field strength of 1 μV/m at some specific frequency. A decibel is a dimensionless unit and it always needs a reference quantity to have meaning. The level of radio noise is frequency dependent- it is the highest near the AM radio band and decreases with higher frequencies.

Other ambient sources of radio frequency noise can also affect reception quality. The most common measure to evaluate possible interference levels within the frequency band of interest is a quantity called the signal-to-noise ratio (SNR). In general, use of SNR to assess the effect of transmission line noise requires knowledge of the broadcast signal strength at a receptor location, radio frequency noise in the receptor’s frequency band, and allowable SNR levels for the desired level of reception. Tolerable SNRs for radio and TV interference have been estimated for various signal strengths and conditions. For example, a SNR of at least 20-24 dB (or better) should produce a reasonable level of service for AM radio reception.

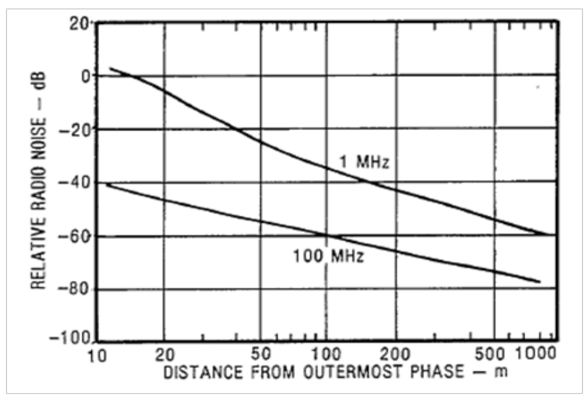


Figure 3-4. Radio/TV Noise: Levels Decrease with Distance Away and Increasing Frequency.

A survey of 19 TV station signal strengths near Granby found no digital TV (DTV) signals that meet the Federal Communications Commission (FCC) minimum threshold coverage level for over-the-air reception. TV stations in the local area are generally based near Denver, and the direction of service provided by their broadcast beam is highly directional and focused on the commercial market and population of the metropolitan Denver area rather than to mountain areas where Granby (and the proposed transmission line project) is located. Over-the-air TV signals are therefore problematic with or without the transmission line project, and adequate TV service would generally require cable or satellite TV service.

An important new issue is the TV conversion to digital broadcast systems. The SNR level for tolerable reception must be evaluated for the new generation of digital technology. In addition, the user of a DTV receiver will experience interference to over-the-air broadcast signals in a different way. Rather than a slowly degrading like TV picture quality for analog systems, DTV interference will have a threshold for performance that is essentially a go/no-go proposition. A digital receiver can function properly with interference without the user noticing anything until it gets so great that the picture breaks up or reception stops. In general, the new digital signal will be less sensitive to interference noise than an old analog signal. At this time, we are not aware of published SNR levels for good reception for the new DTV receivers. However, interference resulting from corona-generated noise would not be expected for digital signals broadcast at the higher frequencies used by FM radio, TV cell phones, and satellites. A possible problem could be a metallic transmission tower in the direct line-of-sight between a microwave dish antenna and a satellite or another ground based antenna, but this could be resolved by moving the dish antenna to a new location.

Global Positioning Systems Interference

The Global Positioning Systems (GPS) is a satellite-based radio navigation system designed to provide world-wide coverage and year-round navigation and positioning data. The space component of GPS presently has a constellation of 32 active satellites divided into six orbital planes located some 12,000 miles above the earth (GPS 1996). Each satellite has four atomic clocks on board and also has antennas that broadcast microwave signals in the 1,227-1,575 megahertz (MHz) range (one megahertz or MHz is one million cycles per second). These microwave signals are used by GPS receivers on earth to determine position, velocity, and time. The GPS signal is broadcast using a sophisticated spread spectrum technique, giving it additional immunity from interference and allowing GPS receivers to use very weak signals from the distant satellites. The GPS signal uses a special modulation method. Modulation is the manner in which information is encoded in a carrier frequency. GPS uses a complex method called code division multiple access to allow many satellites to transmit information (using a different code for each satellite) on the same carrier frequency without interfering with each other. A GPS receiver on earth uses these microwave signals (and a "navigation message" describing the satellites position in space) to compute the distance to each of at least four satellites. These distances are called "ranges" and are used by a GPS receiver to determine its position with respect to an earth centered reference coordinate system. Use of GPS requires an unobstructed view of the sky, and dense foliage or the walls of buildings can attenuate the signal so that a GPS receiver cannot maintain its "lock" on the various satellites.

Electromagnetic interference caused by a transmission line could be due to two sources: low level electromagnetic energy due to corona in rainy weather, or tiny gap discharges on broken or loose fitting line hardware such as insulators or clamps. These electromagnetic sources can differ by frequency, intensity, and occurrence. Especially during rain, corona can occur and create small amounts of electromagnetic energy that attenuates rapidly with increasing frequency and distance. The peak intensity of corona-related noise is located close to 1 MHz near the center of the AM radio band (a band is a range of frequencies) and drops to very low ambient levels above about 20-30 MHz (Ramie et. al. 2002). A gap discharge is a tiny electrical discharge between two surfaces at different voltages. It is most often found on lower voltage distribution lines. Gap discharges can be caused by broken or loose fitting line hardware and are generally active only during dry weather (rain tends to short out the gap and keep it quiet). Low level, intermittent gap discharge energy can extend above 100 MHz. Sources of gap discharges can be located on power lines and repaired.

There is extensive use of GPS signals by the cell phone industry for network synchronization using precise time information from the GPS satellite atomic clocks. GPS is also used for adjusting the cell phone base station clock drift and for processing the different, complex signal modulation schemes used by the cellular carriers. Even more GPS applications are growing such as cell phone locating and real time mapping information provided to subscribers with GPS equipped phones. Many cell phone base stations are now being installed directly on high voltage transmission line towers and have a GPS antenna for precise network operations described above. These GPS antennas are mounted directly on high voltage transmission line towers.

3.6.4.4 Induced Currents and Contact Voltage

Introduction to Induced Currents

Electric currents can be induced by EMF in conductive objects near to transmission lines. For magnetic fields, the concern is for very long objects parallel and close to the line. The majority of concern is related to the potential for small electric currents to be induced by electric fields in metallic objects close to transmission lines. Metallic roofs, vehicles, vineyard trellises, and fences are examples of objects that can develop a small electric charge in proximity to high voltage transmission lines. Object characteristics, degree of grounding, and electric field strength affect the amount of induced charge. An electric current can flow when an object has an induced charge and a path to ground is presented. The amount of current flow is determined by the impedance of the object to ground and the voltage induced between the object and ground. The amount of induced current that can flow is important to evaluate because of the potential for nuisance shocks to people and the possibility of other effects such as fuel ignition.

Agricultural Operations and Contact Currents

Agricultural operations can occur on or near a transmission line ROW. Long fences parallel to a transmission line can present an induced current situation, especially if the fence posts are nonmetallic and insulate wires from ground. This problem is solved by adequately grounding the fence with a ground rod connected to the fencing wire (usually done during power line construction). Electric company engineers typically provide grounding guidelines for objects, including fences, close to high voltage transmission lines.

Irrigation systems often incorporate long runs of metallic pipes that can be subject to field induction when located parallel and close to transmission lines (BPA 2007). Because the irrigation pipes contact moist soil, electric field induction is generally negligible, but annoying currents could still be experienced from electric field coupling to the pipe. However, caution should be used in storing, handling, and installing irrigation pipe near power lines. While moving irrigation pipe under or near power lines, equipment should be kept in a horizontal position to keep away from the overhead wires (never oriented vertically towards the wires). Pipe runs laid at right angles to the transmission line will minimize induced currents, although such a layout may not always be feasible. If there are induction problems, they can be mitigated by grounding or insulating the pipe runs. For example, the possibility of nuisance shocks can be eliminated by having metallic pipes touching ground or by the use of grounding straps for activities, such as unloading sections of pipe from a vehicle.

Operation of irrigation systems beneath transmission lines presents another safety concern. If the system uses a high-pressure nozzle to project a stream of water, the water may make contact with the energized transmission line conductor. Generally, the water stream consists of solid and broken portions. If the solid stream contacts an energized conductor, an electric current could flow down the water stream to someone contacting the high-pressure nozzle. Transmission line contact by the broken-up part of the water stream is unlikely to present any hazard. Guidance on safe operation of irrigation systems near transmission lines can be provided by electric utility engineers.

3.6.5 Management Considerations

3.6.5.1 EMF Standards and Guidelines

Presently, there are no electric or magnetic field health-based standards for the state of Colorado or for the United States. Although there are no federal health standards in the United States specifically for 60 Hz EMF, two organizations have developed guidelines: the ICNIRP and the IEEE (ICNIRP 1998; IEEE 2002). Both of these guidelines are much higher than the calculated EMF levels for the proposed transmission line project. Table 3-9 and Table 3-10 present a summary of the EMF levels of these guidelines, respectively.

The American Conference of Governmental Industrial Hygienists recommends an occupational limit of 1 kV/m for electric fields for workers with cardiac pacemakers (ACGIH 2003); however, this level does not occur outside the transmission line ROW.

Table 3-9. ICNIRP Guidelines for EMF Exposure.

Exposure (60 Hz)	Electric Field	Magnetic Field
Occupational	8.3 kV/m	4.2 G (4,200 mG)
General Public	4.2 kV/m	0.833 G (833 mG)

ICNIRP is an organization of 15,000 scientists from 40 nations who specialize in radiation protection.

Table 3-10. IEEE Exposure Levels for 60 Hz EMF.

Exposure (60 Hz)	Electric Field	Magnetic Field
General public should not exceed	5,000 V/m (5 kV/m)	9,040 mG (9.04 Gauss)
Controlled environments should not exceed	20,000 V/m (20 kV/m)	27,100 mG (27.1 Gauss)

Note: Within the ROW, the general public limit is 10 kV/m.

Two states (New York and Florida) have adopted guidelines or standards for transmission line magnetic fields (NIEHS 2002). These standards are engineering-based since it has not yet been determined whether or not 60 Hz electric or magnetic field exposure constitutes a health hazard, it cannot be determined what levels of exposure are “safe” or “unsafe.” Table 3-11 presents a summary of state EMF standards. Calculated EMF levels for the proposed transmission line project are lower than these state guidelines.

Table 3-11. State Transmission Line Standards and Guidelines.

	Electric Field		Magnetic Field	
State	On ROW	Edge ROW	On ROW	Edge ROW
Florida	8 kV/m [a]	2 kV/m	___	150 mG [a] (max load)
	10 kV/m [b]			200 mG [b] (max load)
				250 mG [c] (max load)
Minnesota	8 kV/m	___	___	___
Montana	7 kV/m [d]	1 kV/m [e]		
New Jersey	___	3 kV/m		
New York	11.8 kV/m	1.6 kV/m	___	200 mG (max load)
	11.0 kV/m [f]			
	7.0 kV/m [d]			
Oregon	9 kV/m	___	___	

[a] For lines of 69-230-kV. [b] For 500 kV lines. [c] For 500-kV lines on certain existing ROW. [d] Maximum for highway crossings. [e] May be waived by the landowner. [f] Maximum for private road crossings.

3.6.5.2 Audible Noise Standards and Guidelines

The EPA has an outdoor activity Ldn noise guideline of 55 dBA (EPA 1974). This value represents the sound energy averaged over a 24-hour period; it has a 10 dBA nighttime weighting (between 10:00 p.m. and 7:00 a.m.) (EPRI 2005). Calculated audible noise levels were also performed with EPRI's EMF Workstation computer program to calculate Leq and then used to calculate a time-weighted daytime/nighttime 24-hour Ldn for audible noise. For foul weather, the calculated noise levels for the proposed transmission line configuration are about 39.1 dBA at the 69-kV ROW edge and 39.9 dBA at the 138-kV ROW edge, which correspond to an Leq of about 37.5 dBA and 38.2 dBA respectively. These are very low levels, as would be expected for a transmission line of this voltage class.

Ldn values can also be derived from daytime and nighttime Leq values using the following computational formula (Keast 1980 and EPRI 2005):

$$\mathrm{Ldn} = 10 \log_{10}\left\{\left(\frac{1}{24}\right)\left[15 \text{ antilog}\left(\frac{\mathrm{Ld}}{10}\right) + 9 \text{ antilog } \frac{\mathrm{Ln} + 10}{10}\right]\right\}$$

where Ld = is the daytime Leq and Ln is the nighttime Leq.

Based upon this formula, Ldn values were calculated for proposed transmission lines using their respective Leq values. Calculated Ldn values for audible noise correspond to about 43.9 and 44.6 dBA for the proposed 69/138-kV transmission line at the ROW edges. These values are well below the EPA outdoor activity Ldn noise guideline of 55 dBA.

Often cities, counties, and other local governmental agencies may also specify noise limits. Although they are typically modeled after the EPA guidelines, local noise ordinances may also be applicable for this project.

3.6.6 Scoping Issues

Public scoping concerns primarily centered on potential human health effects as a result of increased EMF exposure. Additionally, agricultural interests expressed similar concerns about livestock exposure to increased EMF. Agricultural interests also expressed concern about safety hazards of machinery or ranch operations in the vicinity of the transmission line.

3.7 Land Use

This section describes the historical and existing land use patterns in the Project Area. Land use data was collected from Grand County, and local, state, and federal sources.

3.7.1 Analysis Area

The Project Area is entirely contained within Grand County, Colorado. The towns of Granby and Grand Lake are the largest communities in the Project Area. The Forest Service, BLM, SLB, and NCWCD manage large tracts of land within the Project Area. The remaining lands are privately owned, typically by individuals.

The southwestern portion of the Project Area consists primarily of shrub and grasslands used for grazing and ranching, which are either owned by the BLM or privately. Structures found within this portion of the Project Area are primarily associated with agricultural operations, such as outbuildings for storage of equipment or grains.

The analysis area also contains several residential subdivisions, the largest of which is the Scanloch Subdivision, which consists of 197 residential lots ranging in size from 0.1-1.2 acres along the southwest corner of Lake Granby. U.S. Highway 34 bisects a small portion of the subdivision, but mostly follows its eastern edge. The Grand County Assessor's data shows that 74 of the lots have been improved. Approximately 1.5 miles north of Scanloch is Stillwater Estates. Stillwater Estates contains 49 residential lots, 40 of which are shown to have improved structures.

The C Lazy U Ranch and Resort is a luxury guest ranch controlling approximately 11,000 acres that nearly surround Willow Creek Reservoir. The ranch provides lodging and dining and supports a variety of activities, including fly-fishing and horseback riding. The Orvis-certified ranch has been in operation for over 90 years. The southern boundary of the ranch is located less than 0.5 mile north of Western's Granby Pumping Plant Switchyard-Windy Gap Substation 69-kV transmission line. A portion of the ranch is the C Lazy U Preserves, an agricultural subdivision comprised of 30, 35-acre properties that are located approximately 0.5 mile southwest of the Stillwater Estates Subdivision. Fifteen of these properties have private conservation easements on them, which is roughly the southern half of the subdivision.

There are a number of other smaller subdivisions that are located towards the northern end of the Project Area. Colorado Anglers Club #1 and #2 are resort communities that are partially built. Club #1 is located on the west side of U.S. Highway 34 and consists of approximately 274 0.1-0.5 acre lots. Club #2 is located on the east side of U.S. Highway 34, north of the Cutthroat Bay Campground, and has 7 larger lots, all of which are undeveloped at this time. The Lake Forest Subdivision is located adjacent to and east of the existing ROW that runs along County Road 642. This neighborhood appears to be built out and contains at least 82 homes, including three mobile homes. Other smaller subdivisions within this northern section of the Project Area include Antler Ranchettes, the Lakeridge Mountain Valley Subdivision, Soda Springs Subdivision, and Fox Ridge Estates.

A 1,500-acre+ mixed-use development is planned north of the intersection of U.S. Highway 40 and 34. The development is proposed to include single-family residential, multi-family residential (medium density), residential/business, highway/general business, and open/recreation zoning districts. The development, formerly known as the Shorefox Development LLC, went into foreclosure in 2008 and is now owned by a different development group. In March 2012, the Town of Granby approved a revised development plan for the site, which provides for flexibility and allows density to be transferred across the site in response to market demand. Major improvements were made to the property prior to the foreclosure, including extensive earthmoving for overlot grading, road construction, creation of lakes or ponds for fly casting and fishing, and construction of a new bridge over the Colorado River. The area north of the Colorado River, which is the area of the site crossed by alternative transmission line alignments, is planned to include a mix of open space, multi family and single family residential uses.

Federal lands within the Project Area are managed by the BLM's Kremmling Field Office and the Forest Service's Sulphur Ranger District. The Forest Service manages the land area surrounding Lake Granby and other surrounding reservoirs as part of the ANRA. Within the Project Area, the ANRA contains two campgrounds – the Stillwater Campground with 129 sites, and Cutthroat Bay Campground with two group sites (30 people each). Camping ranges from tent camping to recreational vehicle (RV) sites with hook-ups, and both are open seasonally from late May through November. Further details can be found in Section 3.10, Recreation and Wilderness.

Agricultural lands, which include areas used for the cultivation of hay, are also an important land use. These areas are concentrated in the valley floor along major drainages, such as the Colorado River, Willow Creek, and Stillwater Creek.

There are approximately 13 miles of utility ROW that is managed by Western. The majority of this ROW has a width of 30 feet; however, within the northern quarter of the Project Area, there is a second parallel 69-kV transmission line that results in a combined 150-foot ROW. In addition, the NCWCD owns and manages the Windy Gap Water Pipeline ROW, which has a 100-foot ROW running through the southern half of the Project Area between Lake Granby and Windy Gap Reservoir.

Table 3-12 provides a summary of the land area and ownership pattern found within the Project Area.

The Grand County/Granby Airport is located on Granby Mesa on the northeast edge of the Town of Granby. This facility is located at an elevation of 8,200 feet and is approximately 2 miles southeast of Western's existing 69-kV transmission line.

Table 3-12. Land Ownership and Management within 2 Miles of All Alternative Alignments.

Owner-Manager	Acres
Forest Service - ANRA	7,025
BLM	4,778
NCWCD	3,137

Owner-Manager	Acres
National Park Service (NPS)	769
Grand County	316
Other - Private	22,854

3.7.2 Transportation Overview

Surface transportation in the area is provided by a network of primary, secondary, and local roads. U.S. Highway 34 connects the towns of Granby and Grand Lake, which are approximately 14 miles apart. Highway 34 is also the gateway into RMNP, as drivers continue north past Grand Lake. U.S. Highway 40 connects Granby with the towns of Fraser and Winter Park, approximately 13 miles to the southeast; and the towns of Hot Sulphur Springs and Kremmling, approximately 9 and 25 miles to the west, respectively.

State and county roads, local roads, and Forest Service roads also interlace the Project Area, including Colorado State Route 125 and Grand County roads CR 4, 64, 41, and 40. County roads provide access to the existing transmission line, as well as to area reservoirs and recreation areas. County roads infrequently bisect the alternatives while the U.S. Highways tend to run parallel to alternatives. Local roads connect the primary routes to the residential neighborhoods mentioned in the preceding section, and are bisected by the transmission line at those locations. Permitted uses of smaller roads in the area include for the maintenance of electrical power lines, substations, pipelines, communication towers and other utilities. Traffic volumes to these facilities are low and access to these facilities is infrequent.

The primary U.S. and state routes are hard surfaced and well maintained. Grand County roads are either paved or gravel and in good condition. Roads with direct access to the alternatives are not heavily used. Smaller unpaved dirt roads associated with the existing transmission line, substations and other linear facilities, such as utility ROW managed by Western, provide additional access. Local roads in residential areas are either paved or gravel/dirt, and well-maintained.

3.7.3 Alternative-Specific Analysis Area

3.7.3.1 Alternative A

Alternative A would maintain the existing transmission line and ROW that passes through the Scanloch Subdivision for 1 mile, as well as the Stillwater Estates Subdivision, the Lakeridge Mountain Valley Subdivision, and other smaller neighborhoods along the north end of the Project Area. A 1,500-acre mixed-use development is planned north of the intersection of U.S. Highway 40 and 34. The current alignment crosses through the northern portion of the 1,500-acre parcel, which is zoned primarily for single-family residential zoning.

Approximately 20 homes within 60 improved residential lots are located within 100 feet of the current alignment. Two residential lots with mobile homes are also within 100 feet of the current alignment; an additional 60 improved residential lots and six condominiums are located within 100-300 feet. There are 55 vacant residential lots within 100 feet of the current alignment, and an additional 48 vacant residential lots within 300 feet.

Additionally, Alternative A extends through cultivated lands for a distance of approximately 1.3 miles.

3.7.3.2 Alternative B1

Alternative B1 follows the existing transmission line alignment, except for two locations. Alternative B1 does not cross through the Scanloch Subdivision; instead, it borders its western boundary for approximately 1 mile. Alternative B1 continues along the current alignment through the Stillwater Estates Subdivision, the Lakeridge Mountain Valley Subdivision, and other smaller neighborhoods along the north end of the Project Area, but diverges from the existing alignment for approximately 500 feet slightly northward along U.S. Highway 34 before heading back south at the project terminus. Also, Alternative B1 crosses through a portion of the planned 1,500-acre mixed-use development north of the intersection of U.S. Highway 40 and 34.Alternative B1 would cross through the northern portion of the development, which is zoned primarily for single-family residential zoning.

Approximately 13 homes within 43 improved residential lots are located within 100 feet of the alignment of Alternative B1. Two residential lots with mobile homes are also within 100 feet of the current alignment; an additional 51 improved residential lots and six condominiums are located within 100-300 feet. There are 18 vacant residential lots within 100 feet of the current alignment, and an additional 55 vacant residential lots within 300 feet.

3.7.3.3 Alternative C1

This alternative does not directly pass through either the Stillwater Estates or the Scanloch subdivisions. At its closest points, Alternative C1 travels within approximately 0.5 mile of the Scanloch Subdivision's western boundary, and within 200 feet of Stillwater Estate's northwestern corner. Near Cutthroat Bay, Alternative C1 diverges from the existing transmission line alignment for approximately 500 feet, turning slightly northward along U.S. Highway 34 before heading back south to the project terminus. Additionally, this alternative crosses the C Lazy U Preserves for 0.5 mile along its northeastern edge, including approximately 500 feet of the property that has a conservation easement on it. Alternative C1 would run along its northern boundary or the 1,500-acre mixed-use development planned near the intersection of U.S. Highway 40 and 34 Approximately 13 homes within 35 improved residential lots are located within 100 feet of the C1 alignment, with an additional 30 improved residential lots, six condominiums, and two lots with mobile homes located within 100-300 feet. The alignment is also in proximity to a number of vacant residential lots, including 10 within 100 feet of the centerline and an additional nine vacant residential lots within 100-300 feet.

Additionally, Alternative C1 crosses through cultivated lands for a distance of approximately 1.8 miles.

3.7.3.4 Alternative C2-Options 1 and 2

Alternative C2, which has two options, differs from Alternative C1 only in the approximately 2-mile segment immediately east of the Windy Gap Substation. Alternative C2-Options 1 and 2 would cross through the northern portion of the development planned near the intersection of U.S. Highways 40 and 34, which is zoned primarily for single-family residential uses.

Each of the Alternative C2 options cross through 1.8 miles of land under cultivation.

3.7.3.5 Alternative D-Options 1 and 2

Alternative D-Option 2, follows the existing transmission line alignment for most of its distance, and therefore crosses through an area with existing land uses very similar to those described for Alternative B1.

Alternative D-Option 1 is located north of Option 2 and follows the ROW of the Windy Gap pipeline for several miles. Both Options 1 and 2 would have four homes located within 100 feet of the proposed alignment. There would be 36 improved residential lots, two lots with mobile homes, and 18 vacant residential lots within 100 feet of the alignment; an additional 50 improved residential lots, six condominiums, and 55 vacant residential lots are located within 300 feet of the alignment. Options 1 and 2 would cross through the northern portion of the development planned near the intersection of U.S. Highways 40 and 34, which is zoned for mixed uses. Both options cross through the same distance of cultivated land, approximately 1.3 miles.

3.7.4 Existing Conditions and Context

3.7.4.1 Existing Land Uses and Regulations

Historic land use in the Project Area was primarily related to agriculture, ranching, and forestry. Today, these activities continue and are supplemented by recreation, tourism, and residential development. There are also portions of the Project Area that are permanently protected for conservation and areas used for utility and roadway ROWs.

The ANRA is the only federally designated recreation area in the Project Area and includes the campgrounds previously mentioned, as well as areas for recreational activities such as fishing, water-skiing and boating, hiking, cross-country skiing, wildlife viewing, and scenic driving.

As described previously, the existing alignment passes through Forest Service land in an identified utility corridor that is managed by Western. This area is managed for utility corridors that include electric power transmission lines, and includes lands used for grazing or irrigated hay production.

According to the NRCS, no prime farmland exists within the Project Area; however, there are approximately 9,500 acres of Farmland of Statewide Importance. The NRCS defines such lands as land that has been identified by criteria determined by the Colorado State Experiment Station, the Colorado State Department of Agriculture, and the Colorado State Soil Conservation Board. No management requirements exist for such lands.

Communities within the Project Area include the Town of Granby, Town of Grand Lake, and Three Lakes. Granby's current municipal boundary falls approximately 1.5 miles south of the project, with an Urban Growth Area (UGA) extending northward to U.S. Highway 34 within 1 mile of the project. Grand Lake's current town boundary is approximately 4 miles north of the project, bordering Grand Lake and Shadow Mountain Lake; however, the UGA extends to within the Project Area to the northern border of Lake Granby. This area, which is currently unincorporated, is home to a number of rural residential subdivisions and dispersed homes.

Land use on private lands in Grand County is subject to county zoning regulations administered by the Grand County Department of Planning and Zoning. The county is divided into zoning districts that allow certain types of land uses, with additional zoning overlays to emphasize sensitivity to visual resources where appropriate. The majority of the study area is zoned as

"Forestry / Open" to protect lands suitable for agriculture and related uses such as forestry, mining and recreation, and low density single-family residential uses. Small portions adjacent to Lake Granby are also zoned Mobile Home, Residential, and Tourist. All of these zoning districts permit public utility facilities under special review. The Three Lakes Design Review Overlay District applies to portions of the study area, which identifies siting and building requirements and criteria to ensure that the built facilities in this overlay district blend into the natural environment (Grand County Planning and Zoning website).

According to Grand County's land use regulations, all proposed public utility lines should be routed and constructed to maximize the use of federal and state owned lands; minimize damages to private landowners over which the line passes and adjacent to the proposed line; avoid paralleling major transportation routes; cross any of the major routes at right angles; avoid "tunnel" effect of clearing vegetation; avoid clear stripping of ROW; avoid soils particularly subject to erosion; avoid cultural sites; avoid visually unique scenic vistas and unique natural phenomenon; avoid adverse impacts on wildlife and fish and their habitat; preserve the natural landscape as best as possible; minimize conflict with the existing and planned land uses as shown on the County master plan map; maximize the screening potential of vegetation and topography; avoid crossing or interfering with a fishery; avoid isolated stands of spruce, fir, and aspen, streams, lakes and ponds; avoid skylines visible from a population concentration or major transportation route and minimize alteration or aspect of any hillside (Zoning Regs 11.8(6)(e), last amended May 2009).

3.7.5 Management Considerations

3.7.5.1 Future Land Uses

The Grand County Master Plan (2011) was completed to help Grand County leaders and citizens make choices concerning future growth and growth implications in the county. The master plan consists of broad-based land use goals, policies, and strategies intended to guide future development in a manner consistent with a shared community vision. The document also identifies town and county growth areas, where growth will primarily be directed in the future. The zoning, subdivision, and building code requirements for Grand County are more specific documents and respectively deal with exact boundaries of districts and the uses permitted within such districts, the detailed standards subdivision design, and the maintenance of minimum standards of structural integrity, safety, and soundness. These documents are referred to as land use regulations and are intended to implement the goals, policies and land use proposals of the master plan.

Growth areas for each municipality within Grand County, including Grand Lake and Granby, are identified in the Grand County Master Plan. Growth areas are generally intended to provide land for future growth in a manner where it can best be accommodated and provided with necessary public facilities and services in an environmentally sensitive and fiscally responsible manner. This includes areas for new residential, as well as commercial, industrial, and other land uses. The Granby growth area extends beyond the current town limits and includes areas to the north and east of the intersection of U.S. Highway 34 and 40. The Grand Lake growth area generally extends south from Grand Lake to the north shore of Lake Granby and west from the shorelines of Shadow Mountain Reservoir and Lake Granby approximately 2 miles.

Major development projects on the horizon for Granby include a mixed-use development on approximately 1,500 acres north of the intersection of U.S. Highway 34 and 40 (formerly known as the Shorefox Development).

3.7.6 Scoping Issues

- Consider impacts to airports/pilots
- Consider impacts to rural character of community and county
- Review project consistency with Grand County Zoning and Three Lakes Design Review Area
- Consider impacts to existing and proposed conservation easements
- Consider impacts to local real estate sales
- Concerns regarding towers placed near irrigation ditches
- Consider new subdivisions planned in/near potential alternatives

Some of these issues are addressed in other sections, including visual resources and EMF.

3.8 Visual Resources

3.8.1 Analysis Area

The visual resource analysis area is defined by Forest Service distance zones and by the distance at which visual effects can be mitigated. As defined by the Forest Service, the appearance of physical features is dependent on distance from an observer's position, which is divided in this analysis into the distance zones of foreground, middleground, and background. The foreground distance zone is defined as the area between zero and 0.50 mile from the viewer; the middleground, 0.5-4 miles; and the background, 4 or more miles.

Four miles is generally the distance at which typical visual effects of transmission lines and associated components can be mitigated. At 4 miles, vegetation changes and structures are apparent only in patterns or outlines; the texture and most colors of individual structures are no longer apparent in the landscape. Accordingly, mitigation measures that rely on texture or color to reduce effects are generally not effective beyond 4 miles from the proposed project.

Therefore, the visual resources analysis area for the Granby Pumping Plant Switchyard-Windy Gap Substation transmission line is from the proposed project facilities to 4 miles, or the middleground distance zone, within the viewshed of the project. The viewshed, or seen areas, were determined by Geographic Information System (GIS) terrain analysis to depict the extent of the potential line of sight distance of the facilities in the landscape. The analysis area primarily encompasses the ANRA, Willow Creek Valley, and the Upper Colorado River Valley from Lake Granby to Windy Gap.

3.8.2 Existing Conditions and Context

The analysis area occurs in the Southern Rocky Mountains physiographic region (Fenneman 1964). Lake Granby, Table Mountain, Willow Creek, the Colorado River Valley, and the high peaks of the Continental Divide dominate the visual landscape of the analysis area. Open valleys, grasslands, hayfields, and pastures comprise the lowland visual landscape, with deciduous riparian and wetland systems creating meandering patterns throughout. The vegetation patterns of the upland foothills and mountains vary from sage and shrubland communities to dense conifer stands that offer both enclosed and panoramic views. The Colorado River Headwaters National Scenic and Historic Byway (U.S. Highway 34, or scenic byway) runs north-south through the analysis area, generally parallel to the existing ROW for approximately 12 miles; the scenic byway visually connects the area's features and attractions. Several existing transmission lines are located in the analysis area, including a 25-kV MPEI transmission line and Western's existing 69-kV line, both of which generally parallel the scenic byway. The existing Windy Gap Pipeline ROW is visible from the Colorado River Valley when snow is not present.

The analysis area is divided into three landscape units based on existing landscape character attributes (landform, water, vegetation, and land use).

1. Lake Granby Unit - including the Lake Granby portions of the ANRA.
2. Willow Creek Valley Unit - including the Willow Creek Reservoir portions of the ANRA.
3. Colorado River Valley Unit - southwest of the ANRA to Windy Gap.

3.8.2.1 Lake Granby Unit

Lake Granby, the second largest body of water in Colorado, is located approximately 4 miles northeast of the Town of Granby and includes the majority of the ANRA. When Congress created the ANRA, it directed that the area be administered primarily to provide high quality recreational opportunities, conservation of scenic and historic values, and stewardship of natural resources (16 U.S.C. §460jj). The ANRA provides a wide variety of land and water-based recreational opportunities.

The majority of users experience the Lake Granby Unit from the scenic byway, as well as from a diversity of recreational, residential, and commercial sites. Most foreground views are directed towards Lake Granby; background views consist of the rugged, snowy peaks of the Continental Divide further east. With the exception of distant views afforded by the lakeshore, visibility is limited to the foreground in many locations due to dense, mature stands of lodgepole pine, ponderosa pine, and Engelmann spruce. Extensive pine beetle infestations have affected large portions of these stands, resulting in a brown hue to the forest. Several mechanical and prescribed burn treatments are being implemented, which will increase visibility. In some places along the scenic byway, such as the northwest shore of Lake Granby, openings within the forested areas are created by highway and commercial uses, or by natural openings that provide views toward the lake or working landscapes to the east (north of CR 41).

Most middleground and background viewsheds enjoy a high degree of scenic integrity – especially the views of distant mountains, eastern slopes of Table Mountain, and working landscapes. The scenic integrity of the lakeshore and scenic byway foreground, around Fish Bay and Cutthroat Trout Bay, have been degraded to poor to moderate levels of scenic integrity by alterations of the natural landforms and vegetation. Commercial signage blocks views and creates visual clutter; commercial and residential development and design styles are out of character with the surrounding environment. As noted in the Colorado River Headwaters Byway Corridor Management Plan, some commercial operations located between the scenic byway and the lake are seen very critically by travelers, including those that are prominent, poorly maintained, or visually discordant (CDOT 1998).

One-quarter mile south of the intersection of U.S. Highway 34 and CR 64, Western's existing 69-kV line crosses the highway perpendicularly. More than 18 utility lines cross the scenic byway within a 0.5 mile of this intersection, more than any other segment from Grand Lake to Windy Gap. Western's existing 69-kV line also crosses through five residential subdivisions in the Lake Granby Unit, including the Lakeridge Mountain Valley Subdivision, Colorado Anglers #2 Club, Lake Forest Subdivision, Stillwater Tracts, and the Scanloch Subdivision.

Other deviations from the existing landscape character are a Reclamation maintenance building and the Granby Pumping Plant. The Reclamation maintenance building is the most visually intrusive object along this portion of lakeshore; it is inconsistent with the predominant forms and colors and is visible from many locations.

In general, the undulating terrain and forested condition provide for a high visual absorption capacity (VAC), or relative ability of the landscape to accept human alterations without loss of character or scenic quality. Forest openings and agricultural landscapes have a lower VAC.

3.8.2.2 Willow Creek Valley Unit

The western slopes of Table Mountain, Willow Creek, and Willow Creek Reservoir provide opportunities for biking, hiking, camping, picnicking, fishing, and cross-country skiing. Forest Service and BLM lands are confined to steeper slopes and lands adjacent to Willow Creek Reservoir. Most irrigable lands are privately owned for grazing and hay production.

Willow Creek Reservoir Road (CR 40) is the primary access road for recreationists visiting the Willow Creek Reservoir portion of the ANRA. In the spring and summer, the lush green bottomlands complement the undulating sage-covered foothills, which transition to timbered table-top mountains. In the broad Willow Creek Valley, linear features include CR 40 (oriented east-west), the Willow Creek Canal, and numerous north-south ditches and dirt roads. Due to the vertical architecture, the Willow Creek Pumping Plant and Grand County wastewater treatment facility are contrasting focal points from CR 40, although the latter is less visible from primary roads. Ranch houses and associated outbuildings complement the ranching theme of this unit, which has been more isolated from the fragmenting influences of mountain home development patterns common to the Lake Granby and Colorado River Valley units. However, recent and planned subdivisions may modify the visual cohesiveness of this unit. The Willow Creek Valley Unit has a high degree of scenic integrity, notwithstanding the linear elements. Due to the low vegetation profiles, this unit has a low VAC.

3.8.2.3 Colorado River Valley Unit

The Windy Gap Wildlife Watching Area is a dominant feature of this unit, including lands managed by the BLM. The majority of lands in this unit are privately owned. An important part of this unit's attraction stems from the scenic and historic interest found on the private, large working ranches. These open grasslands are bordered on the north and south by sage and pine-covered foothills, and visibility is high. Several commercial properties and a master planned residential/resort munity have developed or are approved west of the Town of Granby at the intersection of U.S. Highways 34 and 40, as described in Section 3.7, Land Use. With the exception of these developments, this unit has a high degree of scenic integrity and a moderate VAC, which results from a mosaic of landform and vegetation types.

3.8.2.4 Concern Levels

Concern levels refer to the level of public or agency sensitivity and importance over potential changes to the existing landscape character and scenic integrity (Forest Service 1996). Concern levels vary with landscape character, user types, user activity, and viewing distance. Concern levels can be measured by assessing public demands for scenery and related recreational activities through public scoping meetings, correspondence, and surveys such as the National Visitor Use Monitoring Results for the ARNF (Forest Service 2001). Each method used for the National Visitor Use Monitoring report found that residents and tourists are highly concerned with the condition of the natural environment and engage in scenery-dependent activities, such as sightseeing, hiking/walking, driving for pleasure, and picnicking. Therefore, the analysis area has a high concern level.

3.8.2.5 Key Observation Points

Key observation points (KOPs) are viewing locations that are representative of an area's landscape character and visual sensitivity, or locations where the view of the proposed project would be most revealing. Within the analysis area, 18 KOPs were identified by specialists from Grand County, Forest Service, BLM, and through public scoping (Table 3-13). They were limited to areas within view of a project alternative to include major and minor roads, designated and informal recreational areas and scenic viewpoints, dispersed rural residences, and private and public lands (see Map 3-6, Key Observation Points). Field surveys, and input from agency staff and public scoping defined the use frequency, duration of view, relationship to constituent information, and viewshed characteristics within the analysis area.

Table 3-13. Key Observation Points.

KOP Number, Location	Alternative A (No Action) Visible	Alternatives Visible	Visual Resource Issues	Management Objective
1: US 34 – Transmission line crossing looking north	X	B1, C1, C2, D (on same alignment)	Scenic Byway, Residential, ANRA	Grand County Three Lakes Design Review Area, Forest Service (High SIO)
2: US 34 / CR 64 looking southwest	X	B1, C1, C2, D (on same alignment)	Scenic Byway, Recreation, Residential, ANRA	Grand County Three Lakes Design Review Area, Forest Service (High SIO)
3: CR 64 at Cutthroat Bay Campground looking northwest	X	B1, C1, C2, D (on same alignment)	Recreation, Residential, ANRA	Grand County Three Lakes Design Review Area, Forest Service (High SIO)
4: CR 41 – 2 miles west of US 34 looking southeast		C1, C2 (on same alignment)	Residential	Grand County Three Lakes Design Review Area, Forest Service (Moderate SIO)
5: Stillwater Campground looking northeast	X	B1, C1, C2, D (on same alignment)	Scenic Byway, Recreation, ANRA	Grand County Three Lakes Design Review Area, Forest Service (High SIO

KOP Number, Location	Alternative A (No Action) Visible	Alternatives Visible	Visual Resource Issues	Management Objective
6: US 34 / CR 41 looking northwest	X	B1, D (on same alignment) C1, C2 (on same alignment)	Scenic Byway	Grand County Three Lakes Design Review Area
7: CR 41 – 1 mile west of US 34 looking north	X	B1, D (on same alignment) C1, C2 (on same alignment)	Residential	Grand County Three Lakes Design Review Area
8: CR 4106 – East of Three Lakes wastewater facility looking west		C1, C2 (on same alignment)	Residential	Grand County Three Lakes Design Review Area, Forest Service (Moderate SIO)
9: Sunset Point Campground looking west	X	B1, D (on same alignment)	Scenic Byway, Recreation, ANRA	Grand County Three Lakes Design Review Area, Forest Service (High SIO)
10: Willow Creek Road – 1 mile east of Willow Creek Campground looking east		C1, C2 (on same alignment)	Recreation	
11: Willow Creek Pumping Plant looking east		B1, D (on same alignment) C1, C2 (on same alignment)	Recreation, Residential	
12: Granby Substation – US 34 / Willow Creek Road looking southwest to north	X	B1 D	Scenic Byway, Recreation, ANRA	Grand County Three Lakes Design Review Area, Forest Service (High SIO)
13: Windy Gap Watchable Wildlife Area (SWA) looking north	X	B1, C1, C2, D (on same alignment)	Scenic Byway, Recreation	BLM (Class II)
14: US 34 – 1.5 miles north of US 34 / 40 looking north		C1 B1, C2-Option 2, D-Option 2 (on same alignment) C2-Option 1, D-Option 1 (on same alignment)	Scenic Byway	BLM (Class III)
15: Lake Granby (Grand Elk) Marina looking southwest	X	B1, D (on same alignment)	Scenic Byway	Grand County Three Lakes Design Review Area, Forest Service (High SIO)
16: US 34 / Colorado River crossing near CR 620 looking northwest	X	B1 C1, C2, D (on same alignment)	Scenic Byway	BLM (Class III)

KOP Number, Location	Alternative A (No Action) Visible	Alternatives Visible	Visual Resource Issues	Management Objective
17: US 34 at the former Shorefox Development looking northwest	X	B1, C2-Option 2, D-Option 2 (on same alignment) C1 C2-Option 1, D-Option 1 (on same alignment)	Scenic Byway, Master Planned Community	BLM (Class III)
18: US 34 – 1 mile south of CR 41 looking west	X	B1, D (on same alignment)	Scenic Byway, Residential, ANRA	Grand County Tree Lakes Design Review Area, Forest Service (High SIO)

3.8.3 Management Considerations

3.8.3.1 Forest Service

The 1997 Forest Plan (Forest Service 1997b) uses the Scenery Management System to evaluate and assign management objectives on Forest Service managed lands (see Map 3-7, SIO / VRM Areas). There are 'Predominant' and 'Secondary' Scenic Integrity Objectives (SIO) listed in the Final EIS of the Forest Plan (Table 3.136, p. 402) that describe the degree of acceptable alteration of the landscape. Generally, the Predominant Scenic Integrity Objective (SIO) applies to the entire management area. However, some on-the-ground situations may require a Secondary, or less restrictive SIO. Consequently, the ANRA, which is managed for High, allows for a Secondary SIO of Moderate or Low. The goal is to hold the deviations to a level subordinate to the whole management area, and to allow the activity or use to occur and meet other important goals and objectives desired in the management area. Standard 154 in the amended Forest Plan states: “Prohibit management activities that are inconsistent with the scenic integrity objective unless a decision is made to change from the scenic integrity objective. A decision to change from the scenic integrity objective will be documented in a project level NEPA decision document” (Forest Service 1997b). Because the Forest Plan allows flexibility in SIO as long as the change from Predominant SIO is documented in the project level NEPA, a change in SIO to Low will not violate Forest Plan standards and guidelines.

Forest Service lands in the analysis area are predominantly managed for either High or Moderate SIOs. A High SIO “retains a natural appearing environment with no evident human alterations” (Forest Service 1997b). However, an exception occurs on Forest lands along U.S. Highway 34. These lands are classified in the Forest Plan Final EIS as “remarkable and outstanding,” and managed to a High SIO in the ANRA. Referring to the scenic byway, the 1997 Forest Plan Final EIS further states that, “existing facilities, such as power lines, roads, campgrounds, and picnic grounds, in these areas may be obvious,” but are designed to be less evident and more natural in appearance than in many other portions of the Forests.

Smaller portions of Forest Service lands north and northwest of the ANRA are managed to a Predominant SIO of Moderate. Moderate SIO “manages the environment with human alterations evident but subordinate to the character of the natural landscape.” Within the ANRA, a Secondary SIO of Moderate “manages the environment with human alterations evident but subordinate to the character of the natural landscape.” As an example of how Moderate SIO is applied, “A power line that uses flat, low reflectivity, natural colors that blend with the background could meet this level, as could irregularly shaped timber harvests with some trees left and feathered edges, or ski slopes in areas with natural openings that allow some blending” (Forest Service 1997b).

Within the ANRA, a Secondary SIO of Low also “manages the environment with human alterations evident and somewhat dominating the natural landscape’s character.” As an example of how Low SIO is applied, “Roads that are evident, created openings from some timber harvests, and ski slopes on completely forested slopes are examples of this level” (Forest Service 1997b).

3.8.3.2 Bureau of Land Management

The 1984 BLM Kremmling Resource Management Plan, which is being updated, provides the framework for land use decisions on public lands managed by the BLM (see Map 3-7, SIO / VRM Areas). In order to evaluate scenic resources on public lands, the BLM uses a system similar to the Forest Service: the Visual Resource Management system (VRM). Like the Forest Service, BLM VRM classifies lands according to five levels, ranging from very high (Class I) to very low (Class V), as shown in Table 3-14. VRM Class II and III lands are located within the analysis area.

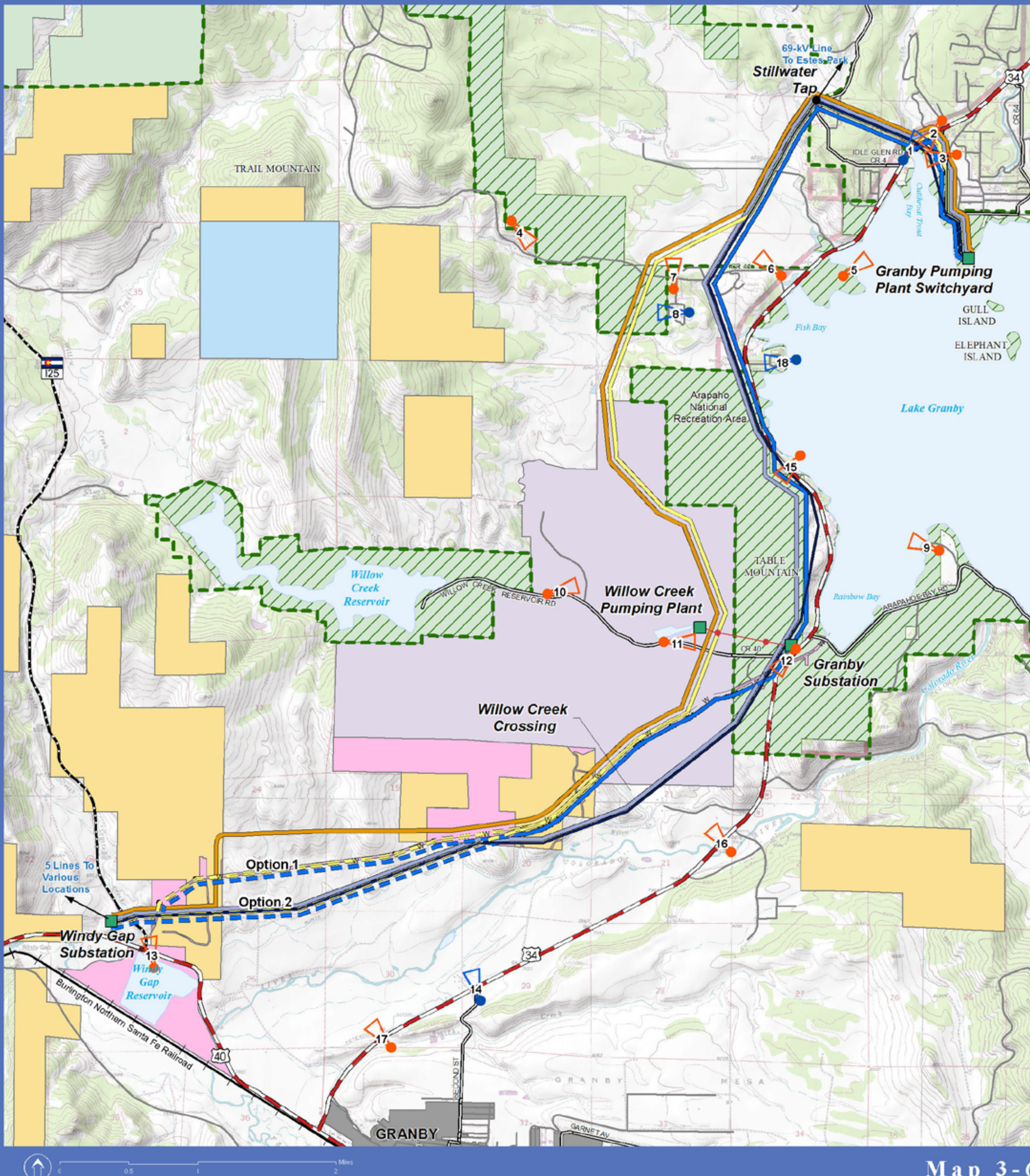
Table 3-14. Crosswalk between Forest Service SIO and BLM VRM Classes.

Forest Service SIO Classes	BLM VRM Classes
Very High	Class I
High+	Class II+
Moderate	Class II and III+
Low	Class IV
Very Low	Class V

+Management objectives of public lands crossed by alternatives.

VRM Class II lands “should retain the existing character of the landscape. The level of change to the characteristic landscape should be low; that is, they may be seen but should not attract the attention of the casual observer” (BLM 2010). VRM Class II lands crossed by the alternatives occur immediately east of the Windy Gap Substation.

The remainder of BLM land in the analysis area is managed to a VRM Class III objective. Class III lands “should partially retain the existing character of the landscape. The level of change to the characteristics of the landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape” (BLM 1986). VRM Class III lands crossed by the alternatives occur southwest of Willow Creek.



Map 3-6

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Key Observation Points

- Photosimulation Points
- KOPs Not Simulated

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Options 1 and 2

Land Status

- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Key Observation Points

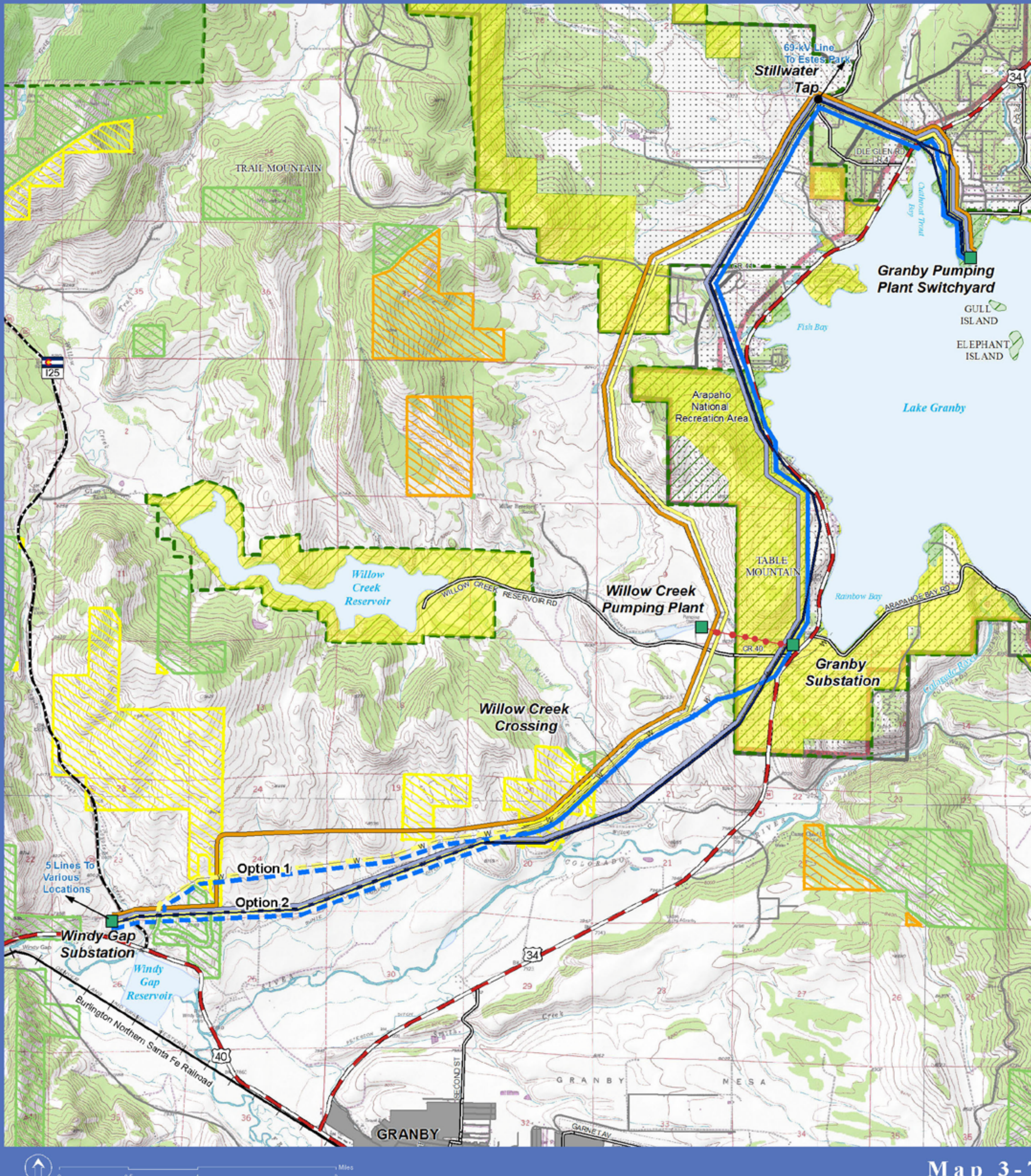
April 2, 2013

Western Area Power Administration

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County Wetland Field Delineation, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 3-7

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Visual Resource Objectives

BLM	USFS SIO
VRM Class II	Very High
VRM Class III	High
VRM Class IV	Moderate
	Low

Grand County

- Three Lakes DRA

SIO/VRM Areas

April 2, 2013

Western Area Power Administration

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

3.8.3.3 Grand County Master Plan

As discussed under Section 3.7, Land Use, the Grand County Master Plan (2011) was completed to help Grand County leaders and citizens make choices concerning future growth and growth implications in the county. The master plan includes policy guidelines for the preservation of unique and scenic vistas, specifically minimizing visual impacts resulting from development along Highways 34 and 40 and encouraging energy development that compliments the County's rural character.

3.8.3.4 Grand County Zoning Regulations

Land use on private lands in Grand County is subject to county zoning regulations administered by the Grand County Department of Planning and Zoning. Section 14.5 of the Zoning Regulations establishes the Three Lakes Design Review Area as an overlay area upon the existing zoning districts along the U.S. Highway 34 corridor (see Map 3-7, SIO / VRM Areas). The Three Lakes Design Review Area applies design criteria to the unique natural area formed by the three lakes – Grand Lake, Shadow Mountain Lake, and Lake Granby. Grand County Zoning Regulations (Grand County 2009) establish the visual landscape as a basic resource that needs to be conserved, stating that "the protection and perpetuation of panoramic mountain and scenic views from parks and public spaces within the Design Review Area is required in the interests of pride, enjoyment, environmental enrichment and maintenance development." Relevant visual resource design principles for electric utilities and communication facilities in this overlay district include: avoiding duplication by coordinating utilities; using nonreflective structures; following an appropriate permit review process; maximizing the use of public lands and minimizing damage to private landowners; avoiding paralleling major transportation routes; avoiding the "tunnel" effect of clearing vegetation; avoiding cultural sites; and minimizing conflict with existing and planned land uses.

3.8.3.5 Grand County Land Conservation Plan

The Grand County Land Conservation Plan (Grand County 1999) provides the community with a guide for realizing future land conservation; outlines an approach for protecting sensitive natural, scenic, and cultural resources; and promotes compatible land use practices throughout Grand County. One of the plan's main objectives is to provide direction to the county for encouraging developers and landowners to conserve significant views and visual corridors. The plan identifies specific scenic resources within the county, including visible wildlife, unobstructed views from roadways, and natural landscapes. The plan identifies specific visual concerns within the county as the loss of scenic agricultural lands to insensitive and overwhelming residential development, and the need to protect character-defining viewsheds and foreground views along transportation corridors.

3.8.3.6 Colorado River Headwaters Scenic and Historic State Byway Management Plan

The Colorado River Headwaters Scenic and Historic Byway, designated as a national scenic byway on September 22, 2005, parallels the entire length of the alternatives (NSBP 2009). To be designated a national scenic byway, U.S. Secretary of Transportation recognizes an Identified Intrinsic Quality; U.S. Highway 34's Intrinsic Quality is historic, owing to the historic water diversion projects, museums, railroads, and roadside parks (NSBP 2009). A corridor management plan was prepared in 1998, which established goals and objectives for resource protection and interpretation (CDOT 1998). Relevant goals include the following:

- Maintain the integrity of the byway's intrinsic qualities, both public and private.
- Enhance the intrinsic qualities of the byway, where appropriate, in ways consistent with the overall objectives of the State Scenic Byways Program, to better protect, rehabilitate, develop, maintain, interpret, or provide accessibility to these sites and features; and enhance the visual quality of other lands and developments along the byway.

3.8.4 Scoping Issues

- Potential incompatibility with the following management policies:
  - Forest Service High or Moderate Predominant SIOs in the ANRA
  - BLM VRM Class II managed lands
  - Three Lakes Design Review Area (Section 14.5) of the Grand County Zoning Regulations
  - Colorado River Headwaters Byway Corridor Management Plan
- Compromised recreational experience and scenic vistas at the following designated use areas within 4 miles of the alternatives (from north to south):
  - Cutthroat Bay Group Campground
  - Stillwater Campground and Boat Launch
  - Sunset Point Boat Launch
  - Quinette Picnic Area
  - Rainbow Bay Picnic Area
  - Willow Creek Canal Picnic Area
  - Continental Divide National Scenic Trail and other designated trails
  - Colorado River Headwaters Scenic and Historic Byway (U.S. Highway 34)
  - Compromised experience approaching the above use areas on access roads
- Potential improvements to the scenic integrity of the ANRA and Cutthroat Bay Campground through removal of the existing line

3.9 Socioeconomics and Environmental Justice

The purpose of the socioeconomic analysis is to address the economic impacts of the proposed project and alternatives, including employment and labor income, on the major sectors of the local economy; and to examine potential impacts to property values. Particular emphasis will focus on the reliability of the electrical system and short-term construction impacts as related to the tourism industry.

3.9.1 Analysis Area

The analysis area lies entirely within Grand County and within close proximity to both Granby and Grand Lake; these areas are the focus of the following social and economic analysis. The portion of the system affected by this transmission system includes approximately 7,000 customers in the area, including the towns of Hot Sulphur Springs, Granby, Grand Lake; and rural areas, particularly those along U.S. Highway 34. Many residents of the county depend directly and indirectly upon recreation-oriented activities for their economic livelihood. Because the demand for recreational activity and second homes in mountain environments continues to grow in Grand County, electrical service reliability is increasingly important.

3.9.2 Alternative-Specific Analysis Area

The analysis area is the same for all alternatives; however, Alternatives C1 and C2 would affect more agricultural land uses within the analysis area.

3.9.3 Existing Conditions and Context

3.9.3.1 Population, Employment, and Income

The main population centers in Grand County consist of the six communities of Fraser, Granby, Grand Lake, Hot Sulphur Springs, Kremmling, and Winter Park and their surrounding areas. Socioeconomic characteristics throughout the county are dominated by recreation and tourism, with service industries and suppliers to the tourism industry largely driving the local economy. Agriculture (hay production and cattle ranches) and logging-related employment are present, but these two categories account for only a very small percentage of jobs. The 2010 population of Grand County was 14,843 (U.S. Census Bureau 2011). Grand County population data within the analysis area is summarized in Table 3-15.

Table 3-15. Population, 1990-2015.

	Census 1990	Census 2000	Census 2010	Forecast 2015
Grand County	7,966	12,442	14,843	14,852
Granby	966	1,525	1,864	NA
Grand Lake	259	447	471	NA

Source: U.S. Census Bureau 2011a,b,c; CODOLA, State Demography Office 2011

From 1990-2010, Grand County grew by 86 percent, from 7,966 to 14,843 (U.S. Census Bureau 2011). The two main communities within the Project Area are Grand Lake and Granby, both of which also experienced significant population growth in the period 1990-2010: population increased nearly 82 percent in Grand Lake from 259 to 471 people, and nearly 93 percent in Granby from 966 to 1,864 people (U.S. Census Bureau 2011). Population growth slowed between 2000 and 2010, primarily after 2007; as the county and Grand Lake experienced only minor increases in population, and Granby lost more than 3 percent of the population. From 2010 to 2015, population within the county is expected to grow slowly. From 2010 to 2030, forecasted population increases for Grand County are 66.8 percent, which is a substantially lower growth rate than the increases experienced between 1990 and 2010. Census population does not take into consideration the growing number of second homeowners in the Three Lakes Area. Assuming a 2.28 household size (average household size of owner-occupied unit in 2010 census) for second homeowners, an additional population of 1,217 to 1,472 lives in the Grand Lake area at least part of the year. Countywide, the second homeowner population is even larger.

Seasonal homes are a small percent of the total housing units in Colorado, but in Grand County, these homes make up 52 percent of total housing units. The percentage of seasonal homes shows a census increase of 73 percent in the last 10 years; second homes comprise the largest portion of the market in Grand Lake and the surrounding area. According to the Grand County Master Plan (2011), 63 percent of homes in Grand Lake are not locally owned. The majority of these homes are second homes. The Grand County assessor estimates that second home ownership in Grand Lake represents 82 percent of total units based on where property valuation and tax notices are mailed.

Employment in Granby is provided by the town, school district, federal government, and local service industries. Granby has a recreation-based economy that does not fluctuate seasonally as much as nearby Winter Park, and is therefore considered less transient. Employment in Grand Lake is directly related to the recreation and tourist industries. Grand Lake offers year-round recreational opportunities and amenities; it is widely regarded as the “Snowmobile Capital” of Colorado. In addition, RMNP and the ANRA draw a large number of visitors to Grand Lake and the surrounding area.

The 2009 median household income in Grand County was $58,981; 2009 per capita income was $39,023 (U.S. Census Bureau 2011). The unemployment rate in Grand County was estimated at 8.3 percent in 2009. From 2003 to 2009, total non-farm job growth was 5.0 percent, from 10,088 to 10,588 jobs. Accommodations/food and retail trade (2,717 jobs) comprise approximately 25.7 percent of total wage and salary employment in Grand County; government 12.5 percent (1,323 jobs); and recreation/entertainment related, real estate, and construction 34.6 percent (3,661 jobs) (CODOLA 2011). These employment figures show the dependence of the county economic base on the tourism and second home industries.

Table 3-16. Grand County Census Data: Population, Households, and Employment.

	Grand County	Colorado
Home Ownership rate, 2010	68.9%	65.5%
Households, 2010	6,469	1,972,868
Persons per household, 2010	2.26	2.49
Per capita money income, 2009	$39,023	$41,895
Median household income, 2009	$58,981	$56,222
Persons below poverty, %, 2009	8.1%	11.9%
Non-farm proprieters, 2009	3,510	750,214
Private non-farm employment, 2009	9,265	2,664,525
Private non-farm employment, % change, 2001 to 2009	4.83%	6.41%

Source: U.S. Census 2011a.

Wage rates in Grand County reflect the typical tourist-based economy with many jobs in lower paying positions, such as restaurants, accommodations, and retail trade ($10-$14 per hour). These rates are competitive with other tourist areas, but the overall countywide income levels reflect lower hourly rates.

3.9.3.2 Housing

In 2010, there was an estimated total of 16,061 housing units in Grand County, of which 6,469 units were owner occupied; 2,012 units were renter occupied; and the remainder were vacant (Table 3-17). Of the vacant housing units, 8,273 were for seasonal, recreation, or occasional use. These units include those that are owned by non-residents (second homes) as well as seasonal and recreational rentals.

Table 3-17. Housing Occupancy and Tenure.

	1990	2000	2010
Total Housing Units	9,985	10,894	16,061
Occupied Housing Units	3,168	5,075	6,469
Vacant Housing Units	6,817	5,819	9,592
For Seasonal, Recreational, or Occasional Use	5,800	4,783	8,273
Vacancy Rate	68.3%	53.4%	61.37%
Owner-Occupied Units	1,828	3,461	4,457
Renter-Occupied Units	1,340	1,614	2,012
Owner-Occupied Household Size	2.62	2.43	2.28
Renter-Occupied Household Size	2.31	2.25	2.21

Source: U.S. Census 2011

Housing prices have fluctuated through the period 2004 through 2009, as shown in Table 3-18, which tracks the average sales price of single family homes in Granby and Grand Lake. The mountain pine beetle epidemic and the sluggish economy in the past 2 years have had an effect on property sales and sales prices in the Grand County area, particularly in development areas within severe lodgepole mortality areas. The area has been experiencing lodgepole pine mortality since 1997 at increasing rates, with peak mortality occurring in 2001 and 2002 (Forest Service 2004). Most of the infested lodgepole pines are now dead and have shed their needles in the Three Lakes area. The change in viewshed and economic downturn in 2008 have affected the real estate market in the area. Total sales of Multiple Listing Service (MLS) listed single family units declined 25 percent in Granby and 45 percent in the Three Lakes Area from 2004-2008. Condo sales increased by 17 percent in Granby and declined by 21 percent in the Three Lakes Area. Average sales prices have ranged from $352,000 (2004) to $435,938 (2006) in the Granby market, and $287,469 (2009) to $488,850 (2007) in the Three Lakes market for single family units. Average condo sales price ranged from $147,991 (2006) to $196,430 (2007) in Granby, and $183,094 (2006) and $225,851 (2005) in the Three Lakes area.

Table 3-18. Average Sales Price of Residential Property 2004 through 2009 (year-to-date 8/1/09).

	2004	2005	2006	2007	2008	2009
Granby Residential						
Active Residential Units	240	328	356	430	347	289
Sold Units	75	69	76	90	56	28
Average Sales Price	$352,198	$361,516	$435,938	$401,158	$379,124	$363,898
Median Sales Price	$345,000	$348,106	$367,250	$392,686	$383,450	$370,000
Average Days on Market	216	250	192	223	180	137
Active Condo Units	216	250	192	223	146	178
Sold Units	29	33	54	88	34	14
Average Sales Price	$148,141	$152,724	$147,991	$196,430	$177,270	$358,036
Median Sales Price	$158,000	$147,500	$151,735	$189,500	$182,500	$426,500
Average Days on Market	210	328	195	189	149	163

	2004	2005	2006	2007	2008	2009
Three Lakes Area Residential						
Active Residential Units MLS	240	271	291	302	273	241
Sold Units	71	72	67	65	39	32
Average Sales Price	$334,359	$363,261	$344,492	$488,850	$366,510	$287,469
Median Sales Price	$274,000	$328,000	$306,000	$365,000	$269,000	$235,000
Average Days on Market	196	204	177	232	225	233
Active Condo Units	54	58	55	50	43	37
Sold Units	14	18	16	16	11	1
Average Sales Price	$219,875	$225,851	$183,094	$187,727	$217,364	$325,000
Median Sales Price	$274,000	$328,500	$306,000	$365,000	$269,000	$235,000
Average Days on Market	155	156	173	152	292	1
Non-MLS Residential and Condo Sales Grand Lake	197	133	133	84	42	2

Source: Grand County Realtors (Brosh 2009, pers. comm.; Maki 2009, pers. comm.)

Six subdivisions are within close proximity of the transmission line. These predominately single family subdivisions include Lake Forest, Colorado Anglers Club, Lakeridge Mt. Valley (Idle Glen), Scanloch, Stillwater Estates, and Y-Lee. Recent sales of single family dwellings in these subdivisions range from $250,000-$550,000, with most sales prices in the upper $200,000 and $300,000 range, depending on location and other amenities such as views and proximity to water. Despite a decline in units sold, sales values are holding steady overall.

There are often concerns of the potential impacts of overhead electric transmission lines on property values. Studies related to these impacts conclude that other factors, such as location, property size, and real estate supply/demand factors are more important criteria in determining residential real estate values. As noted earlier, the existing transmission line travels through or adjacent to six housing subdivisions.

Sixty-two residential properties are within 100 feet of the existing transmission line ROW, 92 are within 200 feet, and 120 are within 300 feet. Some studies suggest that transmission lines appear to have little impact at distances beyond 300 feet; however, substantial differences in selling prices may exist between 50 and 300 feet from the transmission line (Colwell and Foley 1979, p. 498). The properties located within the 0-300-foot range within the study area are older properties that were built at their present location after the transmission line was already in service. These property values have been well established over the years. Table 3-19 shows the number of residences within 100 and 300 feet of the transmission line ROW.

Table 3-19. Residences in Proximity of Existing Transmission Line ROW Centerline.

Distance	Residences
100-foot distance from ROW	62
200-foot distance from ROW	92
300-foot distance from ROW	120

There is an abundance of affordable short-term accommodations, rental units (motels, condos, cabins, cottages), and campground sites available in Grand Lake, Granby, and the Three Lakes region that would provide adequate housing for construction workers.

In summary, Grand County has experienced growth in employment and income, although wages are lower on average than Colorado average weekly wages by sector. The economy in the county has slowed in the past several years due to the effects of the mountain pine beetle on forest health and the economic recession, with a reduction in visitors and residential and land sales and development. However, as the economy improves, it is anticipated that Grand County will recover.

3.9.3.3 Community Facilities and Services

Public services throughout the Project Area are provided by various private and public entities, including counties, municipalities, special districts, and private interests. Because of the minimal level of population impacts anticipated during the construction phase of the project, only public facilities, which might potentially be impacted by accidents of transmission line construction, will be covered in this section.

It is assumed that all necessary public services and facilities are available within the study area. In most cases, adequate capacities and service levels exist.

In Grand County, public services are provided by the county and the incorporated towns, or special districts. Grand County, municipal governments, and special districts provide general government and administrative services, sheriff and police protection, road and bridge construction and maintenance, ambulance and fire protection, medical services, and social services.

Grand Lake and Granby provide various city/town services for their local residents. Service capacities are generally adequate for the existing population in all towns. The Town of Grand Lake has maintained a stable financial situation in spite of the economic downturn, drought, and fire conditions that have prevailed in the past years.

Granby provides basic services to the population and is currently in a stable financial condition.

3.9.3.4 Public Safety and Fire Protection

Grand County Sheriff provides public safety throughout Grand County, with the main office in Hot Sulphur Springs. The sheriff's department has 23 sworn positions, including sheriff, undersheriff, two lieutenants, two patrols, three investigators, and 14 patrol deputies. There are also two detention sergeants and 14 detention officers, three animal control officers, eight communications officers, and four administrative professionals. The department offers boat, snowmobile, bicycle, DUI patrols, and search and rescue.

The Granby Police Department has a staff of 28 department members and five dispatchers.

The Grand Lake Fire Protection District (FPD) and Grand FPD provide volunteer fire fighting in the study area. The Grand Lake FPD is a small combination fire and rescue agency that provides service from CR 4 to Trail Ridge, a service area of 105 square miles.

Grand Lake FPD has employed staff members in support of 22 volunteer firefighters. The firehouse in Grand Lake is staffed seven days a week (7:00 a.m. to 6:00 p.m.) with a crew of four paid staff, while all department members are available via pager to respond to emergency calls 24/7. The department has nine firefighting apparatus.

Grand FPD covers a 150-square-mile area, from Stillwater Curve to U.S. Highway 40. The fire department is staffed by volunteer and resident firefighters and staff (currently 30), operating out of two stations and running 12 firefighting apparatus. They are responsible for all phases of fire protection and fire prevention services.

Grand County Emergency Medical Services provides pre-hospital care and medical transportation in Grand County, with a service area of 1,800 square miles. Grand County Emergency Medical Services employs 39 full-time staff members and operates a fleet of eight ambulances, two paramedic quick response units, and five command staff quick response units. The staff and fleet operate from four stations strategically located throughout the county.

Granby Medical Center (St. Anthony's hospital) in Granby, Mountain Valley Medical Center in Kremmling, and Kremmling Memorial Hospital provide medical care within the study area. Kremmling Memorial is a short-term care service hospital with 19 beds.

3.9.3.5 Environmental Justice

Grand County is predominantly white; however, minority groups have more than doubled in the last two decades, with African American and Asian populations showing the most growth. Table 3-20 provides a breakout of persons by race and the number of persons below poverty level in Grand County.

Table 3-20. Census Community Statistics for Environmental Justice, 1990-2010.

	1990		2000		2010	
	Number	%	Number	%	Number	%
Persons Below Poverty Level	735	9.2	1,704	7.3	1,053	7.1
Hispanics	243	3.05%	543	4.36%	1,116	7.52%
White*	7,641	95.92%	11,577	93.05%	13,313	89.69%
Black*	16	0.20%	60	0.48%	51	0.34%
American Indian & Eskimo*	28	0.35%	47	0.38%	52	0.35%
Asian*	37	0.46%	82	0.66%	121	0.82%
Hawaiian & Pacific Islander*	-	-	10	0.08%	7	0.05%
Other*	1	0.01%	15	0.12%	10	0.07%
Two or More Races*	-	-	108	0.87%	173	1.17%
Total Population	7,966	100.00%	12,442	100.00%	14,843	100.0%

* Non-Hispanic only; in 1990 "Asian" includes Hawaiians and Pacific Islanders.
Source: U.S. Census Bureau 2011

3.9.4 Management Considerations

Grand County seeks to implement policies that promote a stable, diversified, year-round economic base that encourages a range of employment opportunities for area residents. County goals with regard to community and public facilities are to: (1) work with towns and other jurisdictions to develop plans to address community and public facility infrastructure issues, and (2) ensure infrastructure is planned, funded, and built to support new development (Grand County 2011).

3.9.5 Scoping Issues

Scoping concerns identified for socioeconomics included the potential effects of the proposed project on the following:

- Electric rates
- Property values, including rural character, views, and concerns about structure heights
- Cost-effective electric service reliability
- Costs of undergrounding line over time compared to other alternatives' costs

3.10 Recreation and Wilderness

This section provides a description of the affected environment for recreational opportunities, resources, and activities in the Project Area.

3.10.1 Analysis Area

The analysis area for recreation includes the entire Project Area for all alternatives as well as recreation on surrounding lands, including tracts of land managed by the BLM Kremmling Field Office; Forest Service, ARNF, Sulphur Ranger District, including portions of the ANRA; Colorado SLB; and private land.

3.10.2 Existing Conditions and Context

In general, recreation in the Project Area consists of a wide range of high quality, year-round recreational opportunities including, but not limited to, hot-air ballooning, biking, boating/jet skiing, camping, canoeing/sailing, cross-country skiing, fishing, golfing, hiking/backpacking, horseback riding, hunting, ice fishing, ice skating, jeep tours, kayaking/rafting, mountaineering/rock climbing, outfitter and guide services, scenic driving, scenic/wildlife viewing, alpine skiing/snowboarding, snow sledding/tubing, sled dog rides/races, snowmobiling, and snowshoeing (Grand County 2006).

3.10.2.1 Recreational Opportunities on Federal Lands

BLM

The majority of recreational opportunities on BLM land in the Project Area are dispersed activities, including camping, hunting, hiking, ATV use, and wildlife viewing. Opportunities for developed recreation in the Project Area exist, but are more limited. The Windy Gap Watchable Wildlife Site is located along the Colorado River Headwaters Scenic Byway (U.S. Highway 40) approximately 1 mile west of Granby. This location provides an opportunity to view migratory birds and nesting waterfowl. The site provides restrooms, picnic tables, and a 0.25-mile interpretive trail.

Arapaho-Roosevelt National Forest

Recreational opportunities on Forest Service land in the Project Area occur entirely on the Sulphur Ranger District. Forest Service lands support a variety of developed and dispersed recreation facilities and activities for a broad range of user groups. The Sulphur Ranger District encompasses over 442,000 acres in Grand County, and provides numerous recreational opportunities including, but not limited to, hiking, mountain biking, hunting, fishing, nature and wildlife viewing, ATV use, snowshoeing, and Nordic skiing.

Arapaho National Recreation Area

Within the Project Area, the majority of Forest Service land is within the ANRA. The ANRA is located approximately 4 miles northeast of the Town of Granby and adjacent to the Town of Grand Lake. The ANRA was established by Congress in 1978 and contains five major lakes: Lake Granby, Shadow Mountain, Monarch, Willow Creek Reservoir, and Meadow Creek Reservoir. Grand Lake, adjacent to the ANRA, is the largest natural lake in Colorado. Together, the lakes and reservoirs are often referred to as the "Great Lakes of Colorado." National Recreation Areas are showcases for excellence in outdoor recreation, and environmental and economic assets to the state and local communities where they are located. When Congress created the ANRA, it directed that the area be administered to provide for public recreation and enjoyment. The Forest Service manages the ANRA to provide high quality recreation, conservation of scenic and historic values, and stewardship of natural resources. Maintenance of water quality and quantity are paramount in the multiple-use management of the ANRA and surrounding National Forest lands (Forest Service 2006b).

The ANRA is adjacent to RMNP and the Indian Peaks Wilderness. The ANRA consists of 35,802 acres, of which 3,981 acres are privately owned (Forest Service 1997a). Elevations range from 8,035 feet along U.S. Highway 34 near Granby to 11,831 feet near Columbine Lake. There is a wide range of public recreation facilities, such as campgrounds, boat launches, picnic grounds, and trails, including the Continental Divide National Scenic Trail, all on or adjacent to one of the area’s lakes. Lake water surface comprises one-quarter of the ANRA; the major tributaries and rivers in the ANRA include Meadow, Arapaho, Stillwater and Willow creeks, and the Colorado River (Forest Service 1997a).

The Forest Service has developed methods for describing recreation settings and opportunities and quantifying the amount of participation in different recreational activities, called the Recreation Opportunity Spectrum (ROS). ROS provides a framework for describing and defining classes of outdoor recreation environments. ROS classes are delineated and mapped to identify which areas of the Forest provide certain types of recreation environments, ranging from urban settings to unmodified primitive settings. The only ROS class currently applicable to the ANRA is the “roaded natural” class. The roaded natural class is characterized by a predominately natural-appearing environment with moderate evidence of the sights and sounds of humans; conventional motorized use is allowed in this ROS class. Evidence of humans usually harmonizes with the natural environment. The interaction between users may be moderate to high and evidence of other users is apparent. Resource modification and utilization practices are evident but harmonize with the natural environment (Forest Service 2006a).

Water-based recreation is the main attraction in the ANRA. The five lakes within the ANRA offer a variety of recreational opportunities, as shown in Table 3-21. Lake Granby is the second largest body of water in Colorado and provides motorized and nonmotorized recreational opportunities. Monarch Lake and the surrounding lands were acquired by the Forest Service in 1962 for public recreation; it provides a high quality, nonmotorized recreational experience. Shadow Mountain Lake is maintained at a constant level at the same elevation as Grand Lake. This shallow reservoir is connected to Grand Lake by a canal that allows boat passage between the two bodies of water. Willow Creek Reservoir is located west of U.S. Highway 34 and is oriented toward fishing and canoeing recreational opportunities. Motorized boats are allowed, but are restricted to a "no wake" speed. Meadow Creek Reservoir is located at 10,000 feet elevation in the most remote part of the ANRA. It is open to nonmotorized watercraft, and is popular with visitors who prefer camping and fishing in an undeveloped area (ANRA 2006).

Table 3-21. Water-Based Recreational Opportunities in the ANRA.

Lake	Size	Recreational Opportunities
Lake Granby	7,256 acres	▪ Power boating ▪ Sail boating ▪ Water-skiing ▪ Windsurfing ▪ Fishing
Monarch Lake	150 acres	▪ Non-motorized recreation
Shadow Mountain	1,400 acres	▪ Power boating ▪ Sail boating ▪ Water-skiing ▪ Windsurfing ▪ Fishing
Willow Creek Reservoir	750 acres	▪ Fishing ▪ Canoeing ▪ “No wake” speeds
Meadow Creek Reservoir	50 acres	▪ Non-motorized recreation

There are four developed campgrounds open for public use. The four campgrounds within the ANRA offer a variety of amenities and recreational opportunities, as shown in Table 3-22. Cutthroat Bay Campground is a large, group-only campground located on the north shore of Lake Granby in Cutthroat Trout Bay. The campground is open Memorial Day to Labor Day with full services. After Labor Day, camping is available on a first come, first serve basis with reduced services while weather permits. There are two group sites that can accommodate 20-50 each. The campground offers vault toilets, fire grates, picnic tables, drinking water, horseshoe and volleyball pits, and a covered pavilion. Nearby recreational activities include boating, fishing, ATV trails, mountain biking, and hiking. Use at Cutthroat Bay Campground has been steady over the past few years. In 2007, approximately 1,695 campers used Cutthroat Bay Campground. Between 2001 and 2006, the following use levels (number of campers) were recorded at Cutthroat Bay Campground: 1,941 (2001); 2,107 (2002); 1,783 (2003); 2,078 (2004); 2,001 (2005); and 2,266 (2006) (Kruse 2006, pers. comm.; Orr 2007, pers. comm.).

Stillwater Campground is located on the west shore of Lake Granby, adjacent to Fish Bay. The campground is open Memorial Day to Labor Day with full services. After Labor Day, camping is available on a first come, first serve basis with reduced services while weather permits. The campground has 129 individual tent and RV sites. The campground offers modern restrooms, fire grates, picnic tables and drinking water, a boat ramp, a courtesy dock, an amphitheater, RV dump station, flush toilets, showers, 2 double sites, and tent pads. Nearby recreational activities include fishing, scenic drives, boating, ATV use, and mountain biking. No use data is available for Stillwater Campground.

Sunset Point Campground is located on the south shore of Lake Granby adjacent to Rainbow Bay. The campground is open Memorial Day to mid-October, while weather permits. The campground has 25 individual tent and RV sites on a first come, first serve basis. The campground offers vault toilets, fire grates, picnic tables, drinking water, an ADA accessible site, three double sites, lakeside sites on Lake Granby, a boat launch, a courtesy dock, tent pads, and lantern posts. No use data is available for Sunset Point Campground. Nearby recreational activities include boating, fishing, and mountain biking.

Willow Creek Campground is located on the south shore of Willow Creek Reservoir, approximately 3 miles west of U.S. Highway 34. The campground is open from Memorial Day to mid-October, while weather permits. The campground has 33 individual tent and RV campsites, as well as one group site capable of accommodating up to 20 people. The campground offers vault toilets, fire grates, picnic tables, bear-proof lockers, drinking water, boat ramps, a picnic ground, a scenic overlook pavilion, trails, lantern posts, tent pads, and 3 double sites. Nearby recreational activities include fishing, boating, an osprey platform for bird watching, and hiking. No use data is available for Willow Creek Campground (Sulphur Ranger District 2006).

Table 3-22. Developed Campgrounds within the ANRA.

Campground	Campsite Types	Dates of Operation	Amenities	Nearby Recreation Activities
Cutthroat Bay	▪ 2 group sites accommodating 20-50 persons	Full services Memorial Day – Labor Day; as weather permits with reduced services	▪ Vault toilets ▪ Fire grates ▪ Picnic tables ▪ Drinking water ▪ Horseshoe and volleyball pits ▪ Covered pavilion(s)	▪ Fishing ▪ Boating ▪ ATV trails ▪ Mountain biking ▪ Hiking
Stillwater	▪ 129 individual sites ▪ 2 double sites	Full services Memorial Day – Labor Day; as weather permits with reduced services	▪ Modern restrooms/flush toilets/showers ▪ Fire grates ▪ Picnic tables ▪ Drinking water ▪ Boat ramp ▪ Courtesy dock ▪ Amphitheater ▪ RV dump station ▪ Tent pads	▪ Fishing ▪ Scenic driving ▪ Boating ▪ ATV trails ▪ Mountain biking

Campground	Campsite Types	Dates of Operation	Amenities	Nearby Recreation Activities
Sunset Point	▪ 25 individual sites, 1 ADA accessible site ▪ 3 double sites, Lakefront sites on Lake Granby	Memorial Day – mid-October, weather permitting	▪ Vault toilets ▪ Fire grates ▪ Picnic tables ▪ Drinking water ▪ Boat launch ▪ Courtesy dock ▪ Tent pads ▪ Lantern posts	▪ Boating ▪ Fishing ▪ Mountain biking
Willow Creek	▪ 33 individual campsites ▪ 1 group site for up to 20 people ▪ 3 double sites	Memorial Day – mid-October, weather permitting	▪ Vault toilets ▪ Fire grates ▪ Picnic tables ▪ Bear-proof lockers ▪ Drinking water ▪ Boat ramp(s) ▪ Picnic ground ▪ Scenic overlook pavilion ▪ Trails ▪ Lantern posts ▪ Tent pads	▪ Fishing ▪ Boating ▪ Bird watching ▪ Hiking

*Source: Kruse 2006, pers. comm.

There are also several developed picnic areas within the ANRA. These picnic areas are described below in Table 3-23.

Table 3-23. Developed Picnic Areas within the ANRA.

Picnic Area	Period of Use	Amenities
Quinnette	Daily until 10pm, year-round	▪ 7 individual sites ▪ Picnic tables ▪ Vault toilet ▪ Fire grates ▪ Fishing access
Rainbow Bay	Daily until 10pm, year-round	▪ 6 individual sites ▪ Picnic tables ▪ Vault toilet ▪ Canoe/kayak launch ▪ Fishing access

Picnic Area	Period of Use	Amenities
Sunset Point	Daily until 10pm, year-round	▪ 4 individual sites ▪ Picnic tables ▪ Vault toilets ▪ Boat launch ▪ Courtesy boat dock
Willow Creek Boat Launch	Daily until 10pm, year-round	▪ 3 individual sites ▪ Picnic tables ▪ Vault toilets ▪ Fire grates ▪ Boat launch
Willow Creek Canal	Daily until 10pm, year-round	▪ 6 individual sites ▪ Picnic tables ▪ Vault toilets ▪ Fire grates ▪ Fishing access

Source: Sulphur Ranger District 2006, use data not available.

3.10.2.2 Local Recreational Opportunities

Winter recreation is very popular in the Project Area; the Town of Grand Lake is widely regarded as the “snowmobile capital of Colorado” and is consistently ranked in the top twenty of best places to snowmobile in the United States. In addition to snowmobile trails, the forest and ANRA is available for snowshoe and cross-country ski excursions. Ice fishing on the lakes within the ANRA is also popular, and Grand Lake annually hosts a major ice fishing derby.

3.10.2.3 Other Recreational Opportunities

Scenic driving along the Colorado River Headwaters Scenic Byway is also a popular recreational activity in the Project Area. The byway provides motorists with a scenic 80-mile route along the Colorado River from Grand Lake to State Bridge, Colorado (Sulphur Ranger District 2006).

3.10.3 Management Considerations

A number of land management plans and policies exist in the Project Area. These include the ARNF 1997 Forest Plan, the 2008 Colorado Statewide Comprehensive Outdoor Recreation Plan (SCORP), and county land use regulations. These plans and policies, as they relate to recreational opportunities, are described further below.

3.10.3.1 1997 Revision of the Land and Resource Management Plan for the Arapaho and Roosevelt National Forests

The 1997 Forest Plan provides desired conditions (goals or objectives) and guidelines and standards for recreation. Specific guidelines state that “…utility corridors and electronic sites will be located and designed to blend with the landscape. They will be compatible with the scenic integrity objectives of adjacent management areas” (Forest Plan Chapter 3.0, Section 8.3, Goal 2). The desired scenic condition for developed recreation areas is that biological communities will be maintained or improved to provide a pleasing appearance for visitors, complement the recreational values, and provide a variety of vegetation structural stages and plant communities. Furthermore, the health, sustainability, and appearance of these communities will be emphasized to maintain their desirability for recreational use, including manipulating vegetation to accommodate both existing and new facilities. The Forest Plan also states that evidence of disturbance and human use may be present, but a healthy and attractive appearance of these ecosystems should be maintained because of their desirability for recreational use (Forest Service 1997b).

3.10.3.2 2008 State Comprehensive Outdoor Recreation Plan

The 2008 SCORP states that over 75 percent of Coloradans participate weekly in outdoor recreational activities. The most popular forms of recreation participation are walking, family gatherings, viewing/photographing natural scenery, sightseeing, pleasure driving, and wildlife viewing/photography. Outdoor recreation and tourism, of all types, is a highly popular and very important component of both Grand County's identity and economy, which falls within the SCORP Northwest Region. The Northwest Region is anticipated to experience an 80 percent increase in population, which is anticipated to significantly impact the demand for recreation in the area. Grand County alone is anticipated to experience a 75 percent increase in population by 2030. Spending related to recreation and tourism in the Northwest Region is also highly important. It is estimated that in 2006 alone, recreation and tourism contributed more than $3.8 billion to the economy of the Northwest Region.

3.10.3.3 2011 Grand County Master Plan

The 2011 Grand County Master Plan consists of broad-based land use goals, policies, and proposals intended to guide future development in the county (Grand County 2011). The master plan generally recognizes that recreation is an important asset of the county. The master plan identifies several recreation-related goals under wildlife, water quality, land use, transportation, and visual resources, and a section entitled Recreation and Tourism Based Industry, which include the following applicable policies:

- Encourage and support high quality year-round recreation and tourist activities, facilities and services and make efforts to retain Grand County's unique rural, western and scenic character that is so appealing to tourists.
- Preserve public access to public lands.

3.10.4 Wilderness

There are no federally designated wilderness areas in the study area. The closest wilderness area, Indian Peaks Wilderness, is located approximately 5 miles east of the Project Area.

3.11 Aquatic Resources

3.11.1 Analysis Area

The analysis area for aquatic resources includes the western portion of Lake Granby, as well as streams and man-made canals that drain into the lake and the Colorado River north of Granby. Three perennial streams (Willow, Stillwater, and Soda creeks) and two reservoirs or lakes (Willow Creek Reservoir and Lake Granby) are located within the study area (Map 3-8).

3.11.2 Alternative-Specific Analysis Area

The alternative-specific analysis area for aquatic resources includes the specific water bodies that are crossed by each of the alternatives. Three perennial streams (Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay) would be crossed by all alternatives, although the crossing location is different for some alternatives. Most of the intermittent streams and canals are associated with the Bunte and Willow Creek canal systems.

3.11.3 Existing Conditions and Context

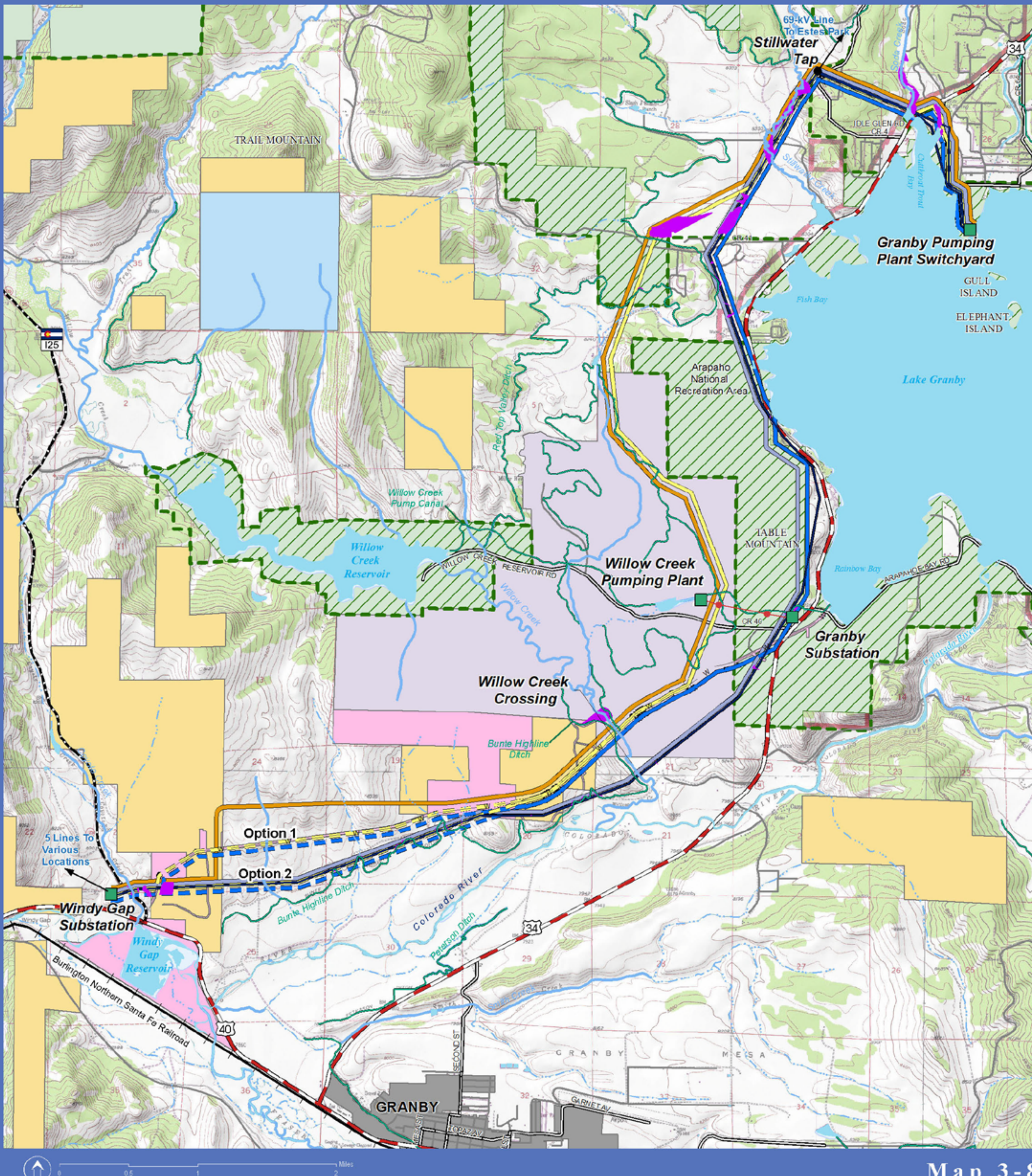
Aquatic resources in the Project Area include fish, invertebrates, plants, amphibians, and their habitat (i.e., perennial and intermittent streams, ditches/canals, lakes, and wetlands). The description of aquatic resources focuses on perennial streams and the Cutthroat Trout Bay portion of Lake Granby, since these types of water bodies provide persistent habitat for aquatic species. Three man-made ditches or canals (Bunte Highline Ditch, Willow Creek Pump Canal, and an unnamed ditch) would also be crossed by the transmission line route alternatives, but these water bodies do not support recreational game fish species. Fish of particular interest for this analysis include species with recreational value (i.e., game fish) or special status species in terms of federal or state listing. All special status fish species are discussed in Section 3.16. Since amphibians use both terrestrial and aquatic habitat during their development, their occurrence in the Project Area is discussed in Section 3.15.

In total, the proposed transmission line route alternatives would cross three perennial streams in the study area, including Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay. These three streams are considered coldwater fisheries by CPW and contain game fish species. The following summarizes the type of habitat in the vicinity of the crossings, as well as descriptions of fish species occurrence.

Federal Emergency Management Agency (FEMA) flood insurance rate maps were reviewed for the Project Area. According to the FEMA maps, no FEMA floodplains occur on the southwestern half of the no action and action alternative alignments. FEMA flood insurance rate maps are not available for the areas north of the Granby Substation. Flooding, although possible north of the Granby Substation, does not pose a high risk to the proposed project facilities because of reservoir spillways and relatively smaller drainages. The existing and proposed alignments are or would be designed to safely span all drainages capable of flooding.

3.11.3.1 Willow Creek

The portion of Willow Creek at the proposed route alternative crossings contains a mixture of riffles and pools with sand-dominated substrate. Some large pools exist in this section of the stream as a result of beaver activity. Streamside vegetation consists of dense willows in scattered locations.



Map 3-8

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Hydrology
- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Wetlands Field Delineated
- Waterbodies

Transmission Line Alternatives
- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Options 1 and 2

Land Status
- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Hydrology

April 2, 2013

Western Area Power Administration
AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, Wetland Field Delineation, USGS Land Cover, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

Fish species in this stream contain a mixture of trout and nongame species. Trout numbers are dominated by brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*), with low numbers of brook trout (*Salvelinus fontinalis*) and kokanee salmon (*Oncorhynchus nerka*) (Ewert 2007, pers. comm.; CDOW 2007). Rainbow trout populations are sustained by CPW stocking of catchable size fish, while natural recruitment from spawning maintains numbers for brown trout and brook trout (Ewert 2007, pers. comm.). Brook and brown trout are fall spawning species. Kokanee salmon do not spawn in Willow Creek. The proposed stream crossing areas do not contain trout spawning habitat, as indicated by the general lack of gravel substrates. Nongame fish species include Paiute sculpin (*Cottus beldingi*), mottled sculpin (*Cottus bairdi*), fathead minnow (*Pimephales promelas*), longnose dace (*Rhinichthys chrysogaster*), longnose sucker (*Catostomus catostomus*), and white sucker (*Catostomus commersoni*) (CDOW 2007). Previous studies have also detected the presence of whirling disease in brown trout in Willow Creek downstream of Willow Creek Reservoir (Thompson 2006).

Recreational fishing in this portion of Willow Creek is limited to activity controlled by private landowners. A high use recreational area exists in Willow Creek Reservoir and the outlet stream, which is managed as the ANRA. The ANRA boundary is located approximately 1.5-2 miles upstream, depending on the particular proposed crossing.

3.11.3.2 Stillwater Creek

The portion of Stillwater Creek crossed by the proposed transmission line route is a relatively small meandering stream, with a mixture of riffles and pools and gravel-dominated substrates. Dense riparian vegetation exists at the proposed crossing. The adjacent areas to the stream are pastureland. Cattle grazing has occurred within the channel and floodplain.

Fish information is not available for Stillwater Creek. Due to its connection with Lake Granby, the lower portion of the stream could support brown trout and rainbow trout. Brook trout also could occur in the stream based on the stream size and available habitat. The gravel-dominated substrates at the proposed crossing could be used by trout for spawning. No trout stocking occurs in Stillwater Creek (Ewert 2007, pers. comm.). Other nongame species, such as fathead minnow, longnose dace, sculpin, and suckers, could be present in the stream.

3.11.3.3 Soda Creek/Cutthroat Trout Bay

The proposed crossing of Cutthroat Trout Bay is located in Lake Granby just below the confluence with Soda Creek. The bay is approximately 100 feet wide at the crossing, with a mixture of silt, gravel, and cobble substrates and scattered boulders. Water levels are highest in the spring and summer and then decrease in late summer through winter. The bay likely provides foraging habitat for fish species, including trout during moderate to high water levels. The bay may be used as a movement corridor for fish into Soda Creek for spawning in the spring (e.g., rainbow trout). Relatively low water levels in the bay during the fall may limit movements into the creek for fall spawners, such as brown trout.

Lake Granby contains a coldwater fishery consisting of rainbow trout, brown trout, cutthroat trout (*Oncorhynchus clarki*), lake trout or mackinaw (*Salvelinus namaycush*), and kokanee salmon. Kokanee salmon comprise the largest portion of fish numbers in the lake (Johnson and Martinez 2000). Other nongame species include white sucker, longnose sucker, mottled sculpin, and johnny darter (*Etheostoma nigrum*) (Johnson and Martinez 2000). Of the game fish species, only lake trout spawns in the lake. Numbers for the other trout species are sustained by stocking of fry (kokanee salmon) or catchable size fish (brown and rainbow trout). Brown and rainbow trout also may use tributary streams to the lake for spawning.

3.11.3.4 Macroinvertebrates

Since site-specific data are lacking for macroinvertebrate occurrence in the project study area water bodies, the discussion for this aquatic group is based on general information. It is assumed that macroinvertebrates are present in all perennial streams, ditches, and wetlands crossed by the proposed transmission line routes. Macroinvertebrate communities that occur in the water bodies crossed by the proposed transmission line alternatives likely include a mixture of worms, immature and adult insect groups, beetles, and other groups. Streams similar to those in the project study area typically contain a variety of mayfly, caddisfly, and stonefly larvae, with mayflies often representing a dominant group in terms of abundance and number of taxa. Chironomid midges also are abundant in these types of streams. Wetland areas likely contain species such as snails and beetles that are adapted to abundant vegetation and standing water. Macroinvertebrates serve important roles in the aquatic environment through their food web dynamics. They also represent important food sources for fish and are used as indicators of water quality conditions (Barbour et al. 1997).

3.11.3.5 Special Status Aquatic Species

An evaluation of special status aquatic species occurrence was conducted through discussions with the USFWS and CDOW (now CPW), and a review of Colorado Natural Heritage Program (CNHP) data. No special status fish species were identified as occurring within project study area streams (see Section 3.16). In addition, discussions with the Forest Service did not identify any fish Forest Service Sensitive (FSS) Species or Management Indicator Species (MIS) for the project study area (see Section 3.16). Special status amphibian species are discussed in Section 3.16.

Management objectives for aquatic resources within the project study area focus on protection and regulation of game and nongame species, as described in CPW Regulations Chapters 01 and 10, as well as Colorado Revised Statutes, Title 33: Wildlife and Parks and Recreation, 33-1-1-1 through 33-15-114. In addition to implementation of fishing regulations by CPW, aquatic resources also are managed to avoid effects of nuisance organisms (whirling disease and invertebrates such as zebra mussel). Management of aquatic resources in Willow Creek Reservoir and the outlet stream is the responsibility of the ANRA. Management focus is on protection of habitat and game fish species.

3.11.4 Scoping Issues

The following scoping issues were identified for aquatic resources:

- Effects on riparian, wetlands, or other aquatic habitats as a result of construction
- Assess floodplain risks

3.12 Vegetation Resources

A list of all species observed in the alternative ROWs is available in Appendix G.

3.12.1 Analysis Area

Vegetation resources for the Project Area are described for the area north of the Town of Granby, stretching generally from Lake Granby on the northeast to the Windy Gap Reservoir on the southwest. Elevations in the project study area range from a low of approximately 7,900 feet to a highpoint of approximately 8,520 feet.

3.12.2 Existing Conditions and Context

The project lies within the Southern Rockies Ecoregion, and may be further divided into two mapped level 4 ecoregions: Sagebrush Parks and Sedimentary Mid-Elevation Forest (Chapman et al. 2006). Sagebrush Parks dominate the south and west-facing slopes in the southern portion of the Project Area. North and east-facing slopes are dominated by the Sedimentary Mid-Elevation Forest ecoregion.

Sagebrush parks occupy high intermontane valleys from approximately 7,500-9,500 feet. These parks are typified by moderate gradient streams and are underlain by Quaternary alluvium, colluviums, and loess. Sagebrush Parks are dominated by mountain big sagebrush (*Seriphidium vaseyanum*), western wheatgrass (*Pascopyrum smithii*), bottlebrush squirreltail (*Elymus elymoides*), and elk sedge (*Carex geyeri*). Bunchgrasses typically include Arizona fescue (*Festuca arizonica*) and mountain muhly (*Muhlenbergia montana*). Precipitation averages 10-16 inches and there are normally 60-90 frost free days.

The Sedimentary Mid-Elevation Forest ecoregion is a partially glaciated landscape of low mountain ridges, slopes, and outwash fans. This ecoregion has forested areas with moderate to high gradient perennial streams. The streams have boulder, cobble, and bedrock substrates. In the Project Area, they are found at elevations ranging from 8,200-8,900 feet. Tertiary sediments of limestone, siltstone, shale, and sandstone underlay the forested terrain. The dominant forest types are lodgepole pine (*Pinus contorta*) and aspen (*Populus tremuloides*), with lesser amounts of mixed conifer stands that contain Douglas-fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*), and limber pine (*Pinus flexilis*).

A general floristic survey was accomplished during the course of field work for this project in the summers of 2007, 2008, and 2009. Results of the floristic survey are provided in Appendix G. A total of eight general plant community types were observed during the field work and were mapped. Vegetation communities are shown on Map 3-9. Acreage of the vegetation communities in each ROW is provided in Table 3-24.

Table 3-24. Transmission Line ROW Acreage Calculations

Community Type	Alternative A-Existing	Alternative B1	Alternative C1	Alternative C2-O1	Alternative C2-O2	Alternative D-O1	Alternative D-O2
Aspen	0	4.8	0	0	0	4.8	4.8
Disturbed	10.1	9.6	6.3	6.3	6.3	9.6	9.6
Grassland	8.6	11.4	8.9	8.9	8.9	9.4	9.4
Highway	0.3	0.8	0.8	0.8	0.8	0.8	0.8
Lodgepole	12.1	17.7	14.4	14.4	14.4	17.3	17.3
Man Made Pond	0.9	0.8	0.1	0.1	0.4	0.2	0.5
Sagebrush	31.9	75.0	95.4	92.4	87.2	80.1	78.1
Weedy Shoreline	2.0	0	0	0	0	0	0
Wetland	8.4	23.2	22.8	21.6	21.8	20.7	21.7

O1 = Option 1; O2 = Option 2

*Acreage calculations are based on National Land Cover Dataset (NLCD) and do not account for mortality including mountain pine beetle logged areas

Lodgepole pine forest (*Pinus contorta*) forests and woodlands are the most extensive conifers in the Project Area. Lodgepole pine is typically found at elevations ranging from 8,400-10,500 feet. This species can be either a succession species promoted by fire or a climax species under certain combinations of soils and topography. Other species commonly found in this community include common juniper (*Juniperus communis*), bitterbrush (*Purshia tridentata*), kinnikinnik (*Arctostaphylos uva-ursi*), lupine (*Lupinus argenteus*), sulfur buckwheat (*Eriogonum umbellatum*), and junegrass (*Koeleria macrantha*). The Project Area has recently experienced a mountain pine beetle (*Dendroctonus ponderosae*) infestation over numerous lodgepole stands, which has resulted in the death of many of the pines. Lodgepole pine stands have been affected throughout the Project Area.

Other conifer communities in the Project Area may be described as **mixed conifer forest** and include combinations of lodgepole pine, Douglas-fir, blue spruce (*Picea pungens*), limber pine, and aspen. The blue spruce tends to occur in proximity to riparian areas and at lower elevations in the project study area. Limber pine was observed rarely and in locations such as exposed ridgelines.

Sagebrush shrublands are found on drier terraces, benches, and foothill areas in much of the Project Area. This vegetation type is dominated by mountain big sagebrush with an understory of mixed grasses and forbs. Common understory grass species include western wheatgrass, bluebunch wheatgrass (*Pseudoroegneria spicata* ssp. *Spicata)*, Idaho fescue (*Festuca idahoensis*), junegrass, needleandthread (*Hesperostipa comata*), blue grass (*Poa pratensis*) and elk sedge. Common understory forbs include lupine, Drummond's milk vetch (*Astragalus drummondiana*), locoweed (*Oxytropis sericea*), sulfur buckwheat, Indian paintbrush (*Castilleja occidentalis*), and Mariposa lily (*Calochortus nuttallii*), and arrowleaf balsamroot (*Balsamorhiza sagittata*). Other shrubs found with mountain big sagebrush include bitterbrush, green rabbitbrush (*Chrysothamnus viscidiflorus*), and fringed sage (*Artemisia frigida*). More mesic areas of these shrublands included some snowberry (*Symphoricarpos rotundifolius*), serviceberry (*Amelanchier alnifolia*), Rocky Mountain maple (*Acer glabrum*), and wax currant (*Ribes cereum*). Extensive sagebrush areas are located primarily along the southern reaches of the Project Area and are interspersed among other communities towards the north end of the Project Area.

Aspen forest communities are typically found as minor components of much larger conifer (lodgepole pine) stands in the Project Area. They are perhaps most common in the Project Area along the east side of Table Mountain. Bitterbrush and common juniper were common understory components of this forest community.

Grassland communities in the Project Area are commonly dominated by annual and perennial grasses, including needle and thread, western wheatgrass, Kentucky bluegrass, and bluebunch wheatgrass. Nonnative species, such as smooth brome (*Bromus inermis*), are also common throughout grasslands in the Project Area. This community is a minor component within the Project Area.

Riparian areas were observed in and along several creeks in the Project Area. Willow species were common dominants in this community type. Willow species include mountain willow (*Salix monticola*), Geyer's willow (*S. geyeriana*) and Booth's willow (*S. boothii*). **Herbaceous riparian** communities are found as understory vegetation or as small patches within the general riparian areas, and can include various sedges such as beaked sedge (*Carex utriculata*), water sedge (*C. quatilis*), Nebraska sedge (*C*. *nebrascensis*), as well as spikerush (*Eleocharis palustris*) and arctic rush (*Juncus arcticus*). Narrow stands of willows occur occasionally along the irrigation ditches crossed along the alignment, as well as along the riparian area of Willow Creek and several small ephemeral draws in the southern portion of the Project Area. Patches of willows are also found at the margins of wetland areas found along the northern portion of the Project Area. The **riparian shrub** community is a minor community that is sometimes interspersed with or adjacent to the willow community. Shrub species may include red-osier dogwood (*Swida sericea*), Woods' rose (*Rosa woodsii*), water birch (*Betula fontinalis*), and currant (*Ribes lacustre*). The **riparian cottonwood** community is also a minor component in the Project Area, found along Willow Creek, and is dominated by narrowleaf cottonwood (*Populus angustifolia*), scouring rush (*Equisetum arvense*), and cattails (*Typha angustifolia*).

Wetlands/wet meadows exist within several portions of the project study area. One of the most significant areas is located north of CR 41. All five project alternatives cross these wetlands. These wetlands and wet meadows form a mosaic, with some of the wetlands displaying characteristics of rich diversity of vegetation, hydrology, and peat formation typical of fens. Fen wetlands are designated by USFWS as Resource Category 1. This means that impacts to fens are considered nonmitigable. The USACE also designates fens as special aquatic sites, which complicates permitting for dredging or fill in fen wetlands. Additional emergent wetlands/wet meadows are crossed by Alternatives C1 and C2. Dominant species in these wet meadows include smooth brome, timothy (*Phleum pretense*), meadow foxtail (*Alopecurus aequalis*), and redtop (*Agrostis* spp.). There are wetlands associated with the riparian zones of Willow Creek and Stillwater Creeks. All project alternatives cross both of these riparian systems. There is a wetland complex associated with a pond and stream course on the west side of U.S. Highway 34 and immediately west of the northern reach of Cutthroat Trout Bay. These wetlands are on Forest Service land. There are also wetlands associated with the shoreline of Lake Granby in the vicinity of the Granby Pumping Plant. See also Section 3.14, Wetland Resources.

Rock and talus slopes and rock outcrops are in areas where vegetation is less than 10 percent ground cover. These areas make up minor components of the Project Area and are typically associated with ridgelines.

There are no designated special management areas for the conservation of rare or sensitive habitats or species known in the Project Area. Special Status Plant Species are discussed in Section 3.13.

3.12.2.1 Noxious Weeds

State-listed noxious weeds identified in the Project Area are shown in Table 3-25.

The following state-listed noxious weeds were identified in the project area:

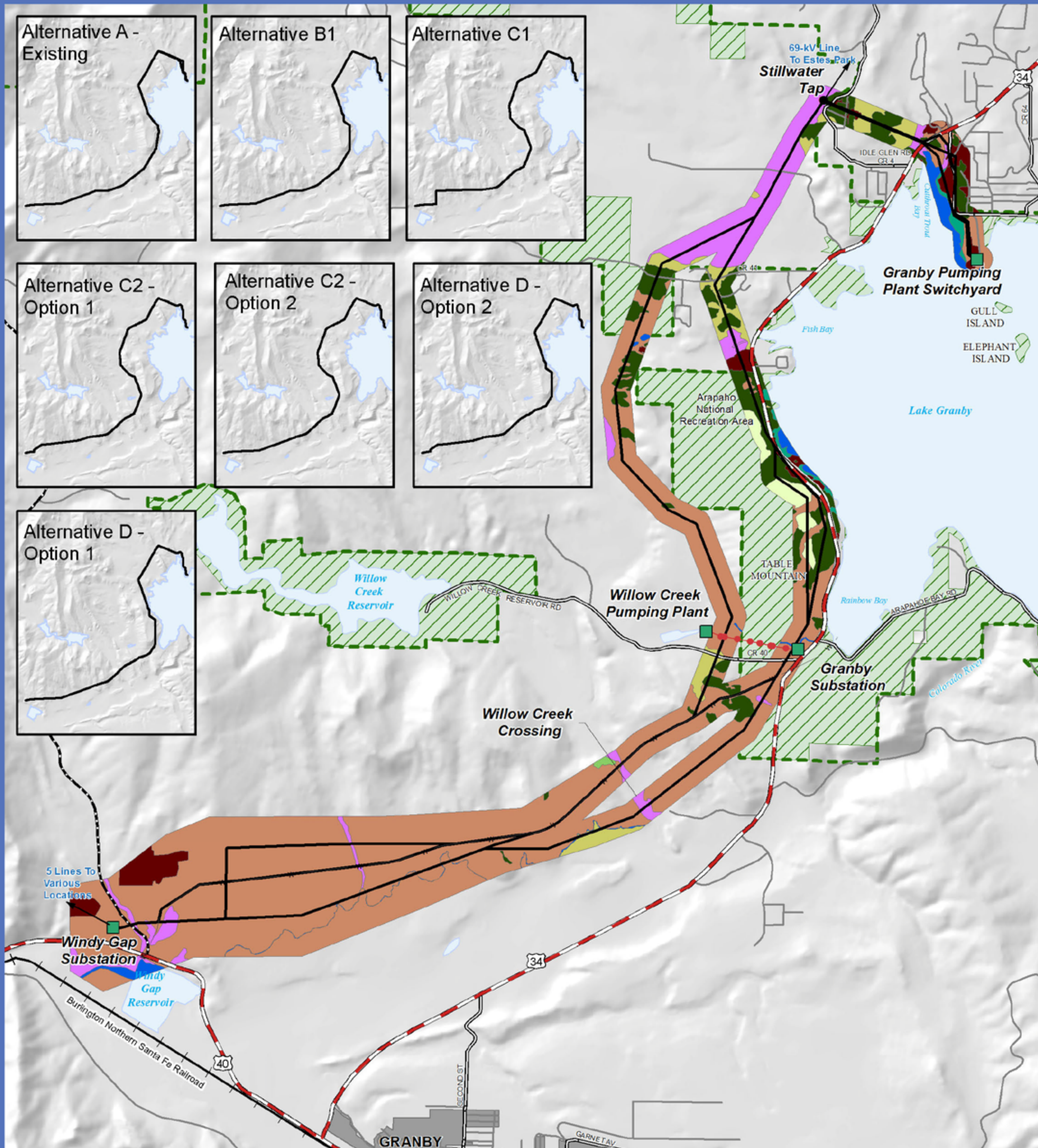
- black henbane (*Hyoscyamus niger*)
- Canada thistle (*Breea arvensis*)
- cheatgrass (*Anisantha tectorum*)
- common mullein (*Verbascum thapsus*)
- field bindweed (*Convolvulus arvensis*)
- hoary cress (*Cardaria draba*)
- houndstongue (*Cynoglossum officinale*)
- musk thistle (*Carduus nutans*)
- scentless chamomile (*Matricaria perforata*)

Occurrences of these weeds are generally more common in the disturbed ROW corridor of the NCWCD Windy Gap buried pipeline. The two areas of greatest concern include a stretch of the revegetated existing water pipeline site south of CR 40 and immediately west of U.S. Highway 34 (where *Cardaria draba, Breea arvensis*, and *Carduus nutans* occur), and the exposed shoreline of Lake Granby and adjacent uplands at Cutthroat Bay (where *Breea arvensis and Matricaria perforata occur*). Several small polygons of weed populations were mapped for the water pipeline area totaling 0.1 acres within the ROW for Alternative D-Options 1 and 2. The weedy shoreline and adjacent upland site was mapped and the resultant polygon covered 2.1 acres. This area encroaches in ROWs for all five project alternatives (A, B1, C1, C2, and D). Locations of noxious weeds are shown on Map 3-10.

Table 3-25. State-Listed Noxious Weeds Observed in the Project Area ROW.

Common Name	Scientific Name	State List
black henbane	*Hyoscyamus niger*	B
bindweed	*Convolvulus arvensis*	C
Canada thistle	*Breea arvensis*	B
chamomile, scentless	*Matricaria perforata*	B
cheatgrass	*Anisantha tectorum*	C
field bindweed	*Convolvulus arvensis*	C
hoary cress (Whitetop)	*Cardaria draba*	B
houndstongue	*Cynoglossum officinale*	B
Common mullein	*Verbascum thapsus*	C
musk thistle	*Carduus nutans*	B

Source: Colorado Noxious Weed Act, 35-5.5-101-119 C.R.S.



Map 3-9

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status
- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives
- Transmission Line Alternatives

Vegetation Communities
- Aspen
- Developed
- Disturbed
- Grassland
- Highway
- Lodgepole
- Man Made Pond
- Mixed Conifer
- Sagebrush
- Weedy Shoreline
- Wetland

Vegetation

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Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

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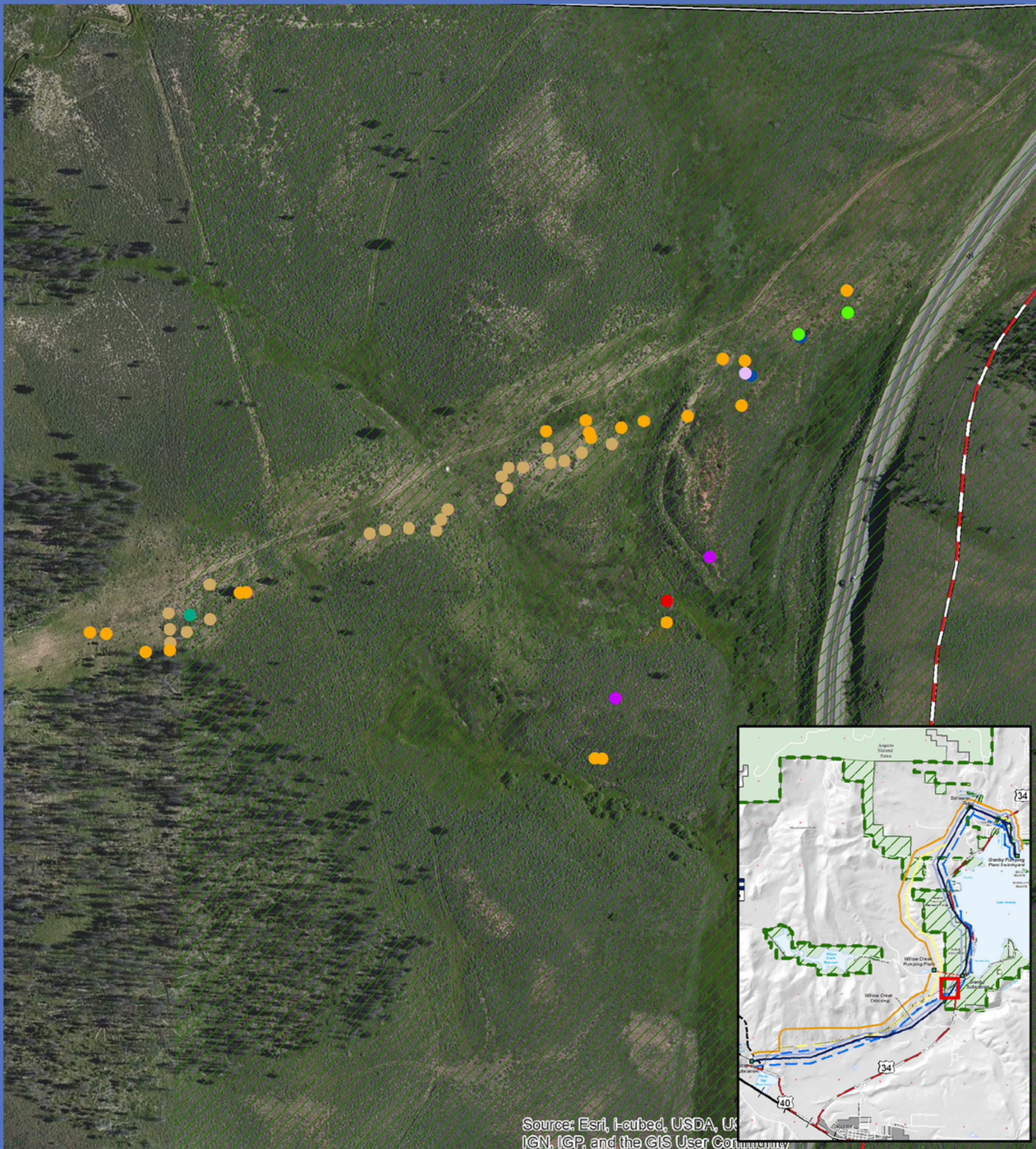

Feet 0 100 200

Map 3-10

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- W Windy Gap Water Pipeline (NCWCD)

Land Status
- Forest Service Land within Arapaho National Recreation Area
- U.S. Forest Service (USFS)
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives
- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Option 1 and 2

Weeds
- Canada Thistle
- Elongated Mustard
- Horay Cress (Whitetop)
- Houndstongue
- Leafy Spurge
- Lenspod (Whitetop)
- Mayweed Chamomile
- Musk Thistle

Weeds

April 2, 2013

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

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3.13 Special Status Plant Species

3.13.1 Analysis Area

Surveys for federally listed and FSS plants and species of local concern were conducted in spring 2009 using a methodology approved by the Forest Service. The federally listed species Osterhout's milk vetch (*Astragalus osterhoutii*) and Penland beardtongue (*Penstemon penlandii)* were surveyed for in each of the alternative ROWs. The surveys for FSS and species of local concern were confined to the alternative alignments that transected Forest Service lands in the project study area. More general vegetation surveys were conducted for all ROW lands and for all alternatives during the summers of 2007, 2008, and spring of 2009.

In addition to the project specific surveys performed by AECOM, a Forest Service Botanist conducted several surveys between 2007 and 2011 in the area where the current ROW crosses the intersection of County Road 40 (Willow Creek Reservoir Road) and U.S. Highway 34, including several hundred yards within the ROW on either side of the road intersection. The surveys were to detect presence of the globally rare lichen Idaho xanthoparmelia lichen (*Xanthoparmelia idahoensis*) and the rare to locally common rim lichen (*Aspicilia fruticulosa*), both known to occur northwest of Kremmling in habitat similar to habitat found in the surveyed area. The survey was also intended to determine the presence of locally rare vascular plants associated with tall (*Artemisia tridentata*) and low (*Artemisia arbuscula*) sagebrush sites. Among other common non-vascular plants, the common lichens *Aspicilia hispida* and *Xanthoparmelia chlorochroa* were found. Additionally, the locally rare form of a common lichen, *Dermatocarpon reticulatum* vagrant "form", was found. It may be the first occurrence of the vagrant form known in Colorado (Popovich 2011, pers. comm.) .The locally uncommon vascular plants *Penstemon cyathophorus* and *Penstemon crandallii* (if recognized as distinct from *P. caespitosum*) and *Pediocactus simpsonii* were also encountered.

3.13.2 Existing Conditions and Context

The special status plant discussion analyzes impacts to federally listed species as well as FSS and species of local concern. The analysis area for special status plants includes the proposed ROW for the preferred alternative and other project alternatives. The analysis area was expanded in suitable habitat for federally listed species to be in compliance with the USFWS survey requirements. Federally listed species and FSS species with potential to occur in the Project Area that were surveyed for are listed in Table 3-26

The species included in Table 3-26 were determined based on the List of Threatened, Endangered, and Proposed Species in Grand County, the Region 2 Regional Forester's Sensitive Species list, communications with ARNF botanist Steve Popovich, and data gathered from the CNHP. A detailed discussion of species considered for analysis is provided in the project's Biological Report (BR) (AECOM 2011). The BR includes the project Biological Assessment (BA), Biological Evaluation (BE), Management Indicator Report, and Review of State and Local Species of Concern. The BR includes detailed accounts for the species considered for this project.

Table 3-26. Special Status Plants Considered for Survey Analysis in the Project Area.

Scientific Name	Common Name	Status	Habitat	Elevation	Observed During Field Surveys?
Federally Listed Plant Species					
Astragalus osterhoutii	Osterhout's milk vetch	E	Grows on high-selenium grayish-brown clay soils derived from the Niobrara and Troublesome Formations. On moderate slopes sometimes growing up into sagebrush.	7,400-7,900	N
Penstemon penlandii	Penland beardtongue	E	Strongly seleniferous clay-shales of the Troublesome formation. It grows on steep barrens with sparse plant cover, sagebrush badlands.	7,500-7,700	N
Forest Service Sensitive Species					
Astragalus leptaleus	Park milk vetch	FSS	Riparian willow carrs	6,500-9,500	N
Botrychium campestre	Prairie moonwort	FSS	Aspen/limber pine forest	3,700-10,800	N
Botrychium lineare	Narrow-leaved moonwort	FSS	Aspen	7,900-9,500	N
Carex diandra	Lesser panicled sedge	FSS	Fens/boggy wetlands		N
Carex livida	Livid sedge	FSS	Fens	9,000-10,000	N
Cypripedium parviflorum	Yellow lady's slipper	FSS	Shaded moist habitat, aspen, rich humus and decaying leaf litter in wooded areas, moist creek sides.	7,400-8,500	N
Eriogonum exilifolium	Dropleaf buckwheat	FSS	Clay hills and flats or granitic sandy slopes, mixed grassland and sagebrush communities	7,500-9,000	N
Penstemon harringtonii	Harrington's penstemon	FSS	Sagebrush	6,800-9,200	N
Rubus arcticus var. *acaulis*	Dwarf raspberry	FSS	Riparian edges, fens	8,600-9,700	N
Salix candida	Hoary willow	FSS	Fens, willow carrs	8,800-10,600	N
Salix serissima	Autumn willow	FSS	Fens, willow carrs	7,800-9,300	N
Utricularia minor	Lesser bladderwort	FSS	Fens, slow moving waters	5,500-9,000	N
Viola selkirkii	Selkirk's violet	FSS	Aspen forests, moist woods, thickets	8,500-9,100	N

Scientific Name	Common Name	Status	Habitat	Elevation	Observed During Field Surveys?
Forest Service Species of Local Concern					
Botrychium hesperium	Western moonwort	LC	Disturbed sites, aspen/limber pine forest	8,300-12,000	Y
Botrychium minganense	Mingan moonwort	LC	Disturbed sites, aspen/limber pine forest	8,300-12,000	Y
Cypripedium fasiculatum	Purple lady's slipper	LC	Limber pine forest	8,000-10,500	N
Fern Species/all except *Cystopteris fragilis*		LC	Moist, rich soil in forests, bases and cracks of rock cliffs	5,000-11,000	N
Petasites sagittatus	Arrowhead colt's foot	LC	Wetlands, moist meadows	8,000-10,500	N
Penstemon cyathophorus	Cupped penstemon	LC	Sagebrush	7,000-8,500	Y
Primula incana	Bird's eye primrose	LC	Fens	Upper montane	N

Key: E = Federally Endangered; FSS = Regional Forester's Sensitive Species; LC = Local Concern.

3.13.2.1 Federally Listed Species

Section 7 of the ESA of 1973, as amended, requires federal agencies to ensure that their actions (authorized, funded, or carried out) are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitats. In order to document project effects on federally listed species, a Biological Assessment (BA) is required if listed species or critical habitat may be present in the Project Area. The BA determinations included in this document apply only to federally listed species and their designated and proposed critical habitat (AECOM 2011).

Because the USFWS botanist for the region is located in the USFWS's Grand Junction office, this office was designated as the lead on the project. Western's consultant, AECOM, met with the USFWS in their Grand Junction office on April 20, 2009 to discuss project updates, the species of federal concern in the Project Area, and to discuss survey protocols for threatened and endangered plant species.

Federally listed species, including the Colorado butterfly plant (*Gaura neomexicana ssp. Coloradensis*), Ute ladies'- tresses orchid (*Spiranthes diluvialis*), and the western prairie fringed orchid (*Platanthera praeclara*), are not included in this analysis because no suitable habitat occurs in the project area and there are no anticipated water depletions associated with this project.

Osterhout's milk vetch (Astragalus osterhoutii)

Osterhout's milk-vetch is a perennial herbaceous species in the family Fabaceae (Pea). Osterhout's milk-vetch occurs in scattered colonies over a 15-mile range in Middle Park near Kremmling, Colorado (USFWS 1992). The USFWS Recovery Plan for this species documented approximately 25,000-50,000 plants as of 1992. These plants were spread among populations north of the Town of Kremmling, in the vicinity of Muddy Creek, and another population on Troublesome Creek northeast of Kremmling.

Plants are restricted to badlands of shale and siltstone sediments in seleniferous soils derived from shales of the Niobrara, Pierre, and Troublesome formations. Osterhout's milk-vetch is considered to be an obligate selenophyte (O'Kane 1988). The badland habitats are characterized by open, grassy vegetation with scattered shrubs of big sagebrush, (*Artemisia tridentata*), rabbitbrushes (*Chrysothamnus* spp.), bitterbrush (*Pursia tridentate*), winterfat (*Ceratoides lanata*), snowberry (*Symporicarpos* spp.), and/or mountain mahogany (*Cercocarpos montanus*) (USFWS 1992). This species can be found on moderate slopes, sometimes growing up through sagebrush, and may be found at elevations around 7,500 feet (50 CFR 17).

Flowering in this species is typically June through August. Osterhout's milk-vetch shares generalist pollinators with other milk-vetches, but is also more self-compatible than related species and thus has higher fruit set.

This species is federally listed as endangered. It is ranked as globally imperiled (G1) and state imperiled (S1) in Colorado.

A rare plant survey was conducted for this project in 2008 and 2009 using an approved USFWS protocol. This species was not found in the Project Area, nor was habitat identified. The Project Area generally lacked the badlands expanses of known sites. Immediately prior to the rare plant survey on site, project botanists did positively identify this species along with Penland beardtongue approximately 16 air-miles west of this project's location.

Penland's beardtongue (Penstemon penlandii)

Penland's beardtongue is a perennial herbaceous plant in the figwort family (*Scrophulariaceae*). This species is federally listed as endangered. It is ranked as globally imperiled (G1) and state imperiled (S1) in Colorado.

Penland's beardtongue is found in habitat similar to that described for Osterhout's milk-vetch (relatively barren expanses of seleniferous soils with sparse plant cover) and shares a common USFWS recovery plan (USFWS 1992). The recovery plan estimates the plant's population at approximately 5,500 individuals in two populations along Troublesome Creek northeast of the Town of Kremmling. Little is known about the reproductive biology of the Penland's beardtongue, except that it must be visited by animals (including several native bee species) to reproduce sexually (50 CFR 17).

A rare plant survey conducted for this project in 2008 and 2009 did not detect this species, nor was suitable habitat identified. The Project Area generally lacked the badlands expanses of known sites. Immediately prior to the rare plant survey on site, project botanists did positively identify this species along with Osterhout's milk-vetch approximately 16 air-miles west of this project's location.

3.13.2.2 Forest Service Sensitive Species

Forest Service Manual (FSM) 2600, Chapter 2670 *Threatened, Endangered and Sensitive Plant and Animals*, provides additional guidance on habitat management for all sensitive species (Forest Service 2007). The direction establishes the process, objectives, and standards for conducting a Biological Evaluation (BE) and ensures that all FSS will receive full consideration in the decision making process. Region 2 Manual Supplement 2600-94-2 provides additional direction for conducting the analysis required of the BE. The Biological Report (BR) for the project was finalized in September 2011. It includes a BE that provides additional detail on FSS plant species, including a discussion on species distribution, natural history, environmental baseline, and direct, indirect and cumulative impacts to each species.

It is Forest Service policy to analyze impacts to sensitive species in a BE (FSM 2670.31-32: Forest Service 1995). Sensitive species are identified by the Forest Service Regional Forester as “those...for which population viability is a concern, as evidenced by…significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution.” (FSM 2670.5; Forest Service 1995). Western reviewed the Region 2 FSS list received from the Regional Forester in March 2009. The following list includes current FSS potentially found within the ARNF. A complete list for Region 2 and for the forest/grassland can be obtained by contacting the ARNF, Sulphur Ranger District. The following species are carried forward for evaluation:

Autumn willow (Salix serissima)

Autumn willow is a perennial woody shrub species in the willow family (Salicaceae). This species is found in wetland areas, including marshes, fens, and bogs. Autumn willow ranges from Canada to the northern United States. In the Rocky Mountains, it is found in Montana, Wyoming, and Colorado. In Colorado where the species reaches its southernmost distribution, autumn willow is known from Custer, Park, Larimer, and Routt counties. Elevational range varies from 7,800-10,200 feet. Globally, the species is secure (G4). In Colorado, autumn willow is critically imperiled (ranked S1). Population trends are unknown (Decker 2006).

A rare plant survey in the Project Area in late spring of 2008 and 2009 did not detect this species. There are several locations in the project ROW with wetlands, riparian fringe, and willow communities; therefore, suitable habitat for this species exists in the Project Area.

Dropleaf buckwheat (Eriogonum exilifolium)

Dropleaf buckwheat is a perennial herbaceous species in the buckwheat family (Polygonaceae). In Middle Park, dropleaf buckwheat is reported most frequently on clay soils of the Troublesome Formation. It is also known from a location underlain by the Coalmont Formation and other Cretaceous and Tertiary strata at Hot Sulphur Springs (Anderson 2006). Dropleaf buckwheat is a regional endemic whose global distribution is limited to 26 occurrences in Carbon and Albany counties, Wyoming; and Jackson, Grand, and Larimer counties, Colorado. In Colorado, dropleaf buckwheat is known from 14 occurrences in Middle Park (Grand County), North Park, and the upper Laramie River Valley. The plant is typically found at elevations of 7,500-9,000 feet.

Dropleaf buckwheat is ranked globally vulnerable (G3) by NatureServe (NatureServe 2010h), and is considered imperiled (S2) in Colorado by the CNHP. The Forest Service Region 2 considers dropleaf buckwheat to be a sensitive species (Forest Service 2003). It is not considered sensitive by the BLM in Colorado (BLM 2000).

Because the species is a long-lived perennial, changes in population size may occur gradually and be difficult to detect. There is evidence to suggest that dropleaf buckwheat numbers are trending downward as the result of human activities and habitat loss. Reservoir filling may have destroyed large areas of dropleaf buckwheat in Colorado, including nearby Willow Creek

Reservoir (Anderson 2006). Other activities such as residential development, energy exploration, and road construction can also threatened populations

A rare plant survey in the Project Area in late spring of 2008 and 2009 did not detect this species. Many portions of the Project Area are underlain by the Troublesome Creek Formation; therefore, suitable habitat for this species exists in the Project Area.

Dwarf raspberry (Rubus arcticus var.acaulis)

The dwarf raspberry is a perennial herbaceous species in the family Rosaceae (Rose). The plant typically flowers from late June through early July. It will set fruit in late July through August. The species apparently seldom produces fruit in Colorado. Dwarf raspberry can be found in riparian fringes, fens, and willow carrs. The plant can be found in association with shrubby cinquefoil, dwarf birch, diamondleaf willow, water sedge, and alpine meadowrue. The species has a circumboreal distribution. Elevation range is normally 8,600-9,700 feet. Dwarf raspberry is ranked globally as secure (G5), but is critically imperiled in Colorado (S1; fewer than 5 occurrences).

A rare plant survey in the Project Area in late spring of 2008 and 2009 did not detect this species. There are several locations in the project ROW with wetlands, riparian fringe, and willow communities; therefore, suitable habitat for this species exists in the Project Area.

Harrington's beardtongue (Penstemon harringtonii)

Harrington's beardtongue is a perennial herbaceous species that is in the figwort family (Scrophulariaceae). This is a large showy penstemon that occurs between 6,800 and 9,200 feet in open sagebrush habitat or sagebrush habitat with encroaching pinyon-juniper woodland trees (Dawson and Grant 2002). Associated soils are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials, especially Pleistocene gravels, but also limey shales, limestones, and other parent rocks. Scattered populations occur in Eagle, Garfield, Grand, Pitkin, Routt, and Summit counties.

This species is ranked as vulnerable throughout its range (G3) and vulnerable in the state (S3). It is designated as FSS and BLM sensitive. This species was formerly a Category 2 Candidate for ESA listing.

Harrington's penstemon populations can vary from year to year and may peak every 4-5 years due to its short-lived perennial life cycle. Population numbers seem to have declined from the early 1980s and may be a response to drought (Panjabi and Anderson 2006).

A rare plant survey in the Project Area in late spring of 2008 and 2009 did not detect this species. There are extensive areas of sagebrush habitat within the applicable elevational range for this species. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Hoary willow (Salix candida)

The hoary willow is a low to medium-sized shrub in the plant family Salicaceae. The species typically grows to 4 feet tall. It may be readily distinguished by densely white-tomentose ventral leaf surfaces and a revolute leaf margin (Hitchcock and Cronquist 1964). Habitat for this species occurs on hummocks in nutrient-rich (alkaline) fens, and thickets at the edges of ponds and on river terraces. The species grows in association with many other willow and sedge species and with dwarf birch (*Betula glandulosa)*. Hoary willow flowers from May through June. Hoary willow is distributed from Alaska, northern Canada, and the northern United States down through Colorado. In Colorado, the plant is found in Gunnison, Hinsdale, La Plata, Lake, Larimer, and Park counties. Elevational range for this species is approximately 8,800-10,600 feet. The species is ranked as globally secure (G5), but is imperiled in Colorado (S2).

Rare plant surveys were conducted in the Project Area in 2007, 2008, and late spring 2009 and did not detect this species. There are several locations in the project ROW with wetlands, including probable fen wetlands that would be suitable habitat for this species; however, the transmission line project would be sited below the typical elevational range for this species (i.e., below 8,800 feet).

Lesser bladderwort (Utricularia minor)

Lesser bladderwort is a perennial herbaceous plant in the family Lentibulariaceae (bladderwort family). The plant is an aquatic species that is carnivorous, producing bladders that facilitate the trapping of small animals, such as paramecium (Weber and Wittmann 2001). The plant is widely distributed throughout Canada and the northern United States. The species reaches its southern limits in California, Colorado, and North Carolina. In Colorado, the plant has been documented in Boulder, Delta, Jackson, La Plata, Larimer, Montezuma, and Park counties (NatureServe 2010l). Altitudes range from approximately 5,500-9,000 feet. Lesser bladderwort is ranked globally secure (G5) and imperiled in Colorado (S2; due to rarity).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are several locations in the project ROW with wetlands and riparian ecosystems. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Lesser panicled sedge (Carex diandra)

The lesser panicled sedge is a perennial graminoid in the family Cyperaceae. This plant is a tussock-forming species that may be distinguished by red dots on the inner band of its leaf sheaths. It occurs in wet peaty meadows, calcareous fens, and the peaty or marly shores of lakes and ponds (Hipp 2008). The species flowers May to June, sets fruit in June, and the perigynia fall in July or August (Hipp 2008). This sedge is widely scattered throughout Canada and the northern two-thirds of the United States. It is relatively common in the northern portions of its range, becoming uncommon to rare in much of its distribution southward in the United States. In Colorado, the species appears limited to six counties, including Boulder, Garfield, Grand, Jackson, Larimer, and Saguache. The species is ranked as globally secure (G5), but is imperiled in Colorado (S2).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There is at least one location in the project ROW with fen wetlands. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Livid sedge (Carex livida)

Livid sedge is a perennial plant in the family Cyperaceae. It is commonly found in rich fen wetlands. These ecosystems are mineral-rich and dominated by graminoid species. This sedge typically flowers in June and July in Colorado, and produces fruit in July and August. It may be found at elevations in Colorado of 9,000-10,000 feet, which is slightly higher than the elevation of this Project Area. The species is ranked as globally secure (G5), but is critically imperiled in Colorado (S1).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There is at least one location in the project ROW with fen wetlands. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Narrow-leaved moonwort (Botrychium lineare)

The narrow-leaved moonwort is a small fern in the adder's tongue family (Ophioglossaceae). The plant reproduces by means of spores that are normally produced in June in Colorado. Habitat for this species includes grassy slopes and along the edges of streamside forests. It may be associated with previously disturbed ground. The species may be found at elevations ranging from 7,900-11,000 feet. Narrow-leaved moonwort is known to occur in Alaska, Colorado, California, Minnesota, Montana, Oregon, South Dakota, Washington, and Wyoming. It has also been documented from Alberta and Yukon Territory, Canada. Historically, it has also been found in California, Nebraska, Idaho, and Utah; Quebec and New Brunswick, Canada. In Colorado, the species has been documented in Boulder, Clear Creek, El Paso, Grand and Lake counties (NatureServe 2011f). The species is ranked as globally imperiled (G2) and critically imperiled in Colorado (S1).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are many locations in the project ROW with grassy slopes and several streamside or riparian habitat locations. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Park milkvetch (Astragalus leptaleus)

The Park milk vetch is a perennial herbaceous species in the pea family (Fabaceae). This species inhabits wetlands, including sedge-dominated meadows, swales, and hummocks. The plant may also be found in aspen glades and riparian willow communities. This species typically flowers and sets fruit from June through August. Distribution for this plant includes occurrence in Montana, Idaho, Wyoming, and Colorado. In Colorado, Park milk vetch has been documented in Gunnison, Jackson, Park, and Summit counties. It has not been documented in Grand County (NRCS 2009). The plant occurs between 6,550 and 9,500 feet in elevation.

The species is ranked as apparently secure globally secure (G4), but is imperiled in Colorado (S2). The population trend for the species is unknown, but it may be in decline. Historically, the species was described as locally abundant. Many herbarium voucher specimens have been collected but few plants are being collected currently, and several historic occurrences have not been rediscovered (Ladyman 2006). This milk vetch produces relatively few flowers and seeds, thus contributing to its rarity.

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are many locations in the project ROW with aspen glades and riparian willow communities. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Prairie moonwort (Botrychium campestre)

The prairie moonwort is a diminutive spore-bearing plant in the Grape Fern family (Ophioglossaceae). The leaves of the prairie moonwort are produced in early spring. Spores are produced from early spring through July. This plant may be found on dry, gravelly hillsides, frequently in association with little bluestem (*Schizachyrium scoparium*). This species has been found in portions of Canada and through much of the northern United States. It has been documented to occur in Clear Creek and Yuma counties in Colorado (Wagner and Wagner 1994; NatureServe 2011g). These plants may be found over a wide range of elevations from 3,700-10,800 feet. The species is ranked as globally threatened (G3) and critically imperiled in Colorado (S1).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are many locations in the project ROW with dry gravelly hillsides, especially in the southern and western areas, but no documentation of prairie moonwort could be made. Suitable habitat in the project vicinity is assumed to be marginal.

Selkirk's Violet (Viola selkirkii)

The Selkirk's violet is a perennial herbaceous plant species in the family Violaceae. The species occupies habitat in aspen forest or other relatively moist woods, such as alder thickets at elevations typically ranging from 8,500-9,100 feet (NatureServe 2010u). The plant is distributed in Alaska and Canada, south through the Northeastern United States and the upper Midwest, and Washington state. There are populations as far south as New Mexico and Colorado. The plant is only known from three locations in Colorado, including RMNP, the base of Devil's Head in the Pike National Forest, and the Wet Mountains. The species is ranked as globally secure (G5), but is critically imperiled in Colorado (S1).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are many locations in the project ROWs with aspen forest and other moist forest habitats. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

Yellow lady's-slipper (Cypripedium parviflorum)

The yellow lady's-slipper is a perennial herbaceous plant species in the lady's slipper family (Cypripediacea). This species flowers in Colorado from June through July. Yellow lady's slipper habitat in Colorado typically includes aspen groves and mixed ponderosa pine/Douglas-fir forests (FNA 2002). This species is widely distributed throughout Canada and the United States. In Colorado, the species is found in 12 counties, including Clear Creek, Custer, Douglas, El Paso, Garfield, Huerfano, Jefferson, La Plata, Larimer, Las Animas, Park, and Pueblo. The species has not been documented in Grand County (Weber and Wittmann 2001; Spackman et al. 1997). Elevation range for the species is between 7,400 and 8,500 feet. The species is ranked as globally secure (G5), but is imperiled in Colorado (S2).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are many locations in the project ROW with aspen glades and some mixed conifer stands, but no documentation of ponderosa pine/Douglas-fir forests. For this reason, it is assumed that suitable habitat for this species does exist in the Project Area.

3.13.2.3 Forest Service Plant Species of Local Concern

Plant species that are categorized as species of local concern include those plants tracked on a Forest or District level because of potential rarity or their importance to local biodiversity. These species may represent plants that were previously listed on the Region 2 Sensitive Species List. These species may also be of local concern because there is currently insufficient information on their distribution or population viability.

Western moonwort (Botrychium hesperium)

The western moonwort is a small, erect perennial fern in the family Ophioglossaceae (Adder's Tongue Family). It produces spores in July. It is documented from several counties in Colorado including, Grand County (NatureServe 2011h). In the mountains, the species occupies habitat in the forested montane zone in open canopy sites with periodic disturbance evident. The plant is also found in subalpine meadows, snowfields melt areas, mesic grassy slopes, and on coarse, gravelly soils. This species is typically found at elevations ranging from approximately 3,300-11,500 feet. The species is ranked as apparently globally secure (G4), but is imperiled in Colorado (S2).

The rare plant survey conducted in spring 2008 and 2009 did detect and document the location of a *Botrychium* believed to be western moonwort. The location is within the ROW of the preferred proposed action alternative, and it occupied a site in an old drainage ditch that appears to no longer be used. A detailed description of this individual and its habitat is available in the project *Biological Report (*AECOM 2011*)*.

Mingan moonwort (Botrychium minganense)

The Mingan moonwort is a small perennial fern in the plant family Ophioglossaceae. It typically produces spores in July in Colorado. The plant has been documented from several counties in Colorado, including Grand County (NatureServe 2010n). The plant is found in a variety of habitat types, including meadows, prairies, woods, sand dunes, and riverbanks. The species is ranked as apparently globally secure (G4), but is critically imperiled in Colorado (S1).

The rare plant survey conducted in spring 2008 and 2009 did detect and document the location of a *Botrychium* believed to be Mingan moonwort. The plant was found in the ROW of Alternative D, and it occupied a site in an old drainage ditch that appears to no longer be used. A detailed description of this individual and its habitat is available in the project *Biological Report* (AECOM 2011).

Purple Lady's Slipper (Cypripedium fasciculatum)

Purple lady's slipper is a perennial plant in the family Cypripediaceae (Lady's Slipper Family). This species is typically in flower from mid-June through mid-July. It occupies habitat in lodgepole pine stands or spruce-fir forests from approximately 8,000-10,500 feet above mean sea level. The purple lady's slipper may occur in sites with no competing vegetation, either in pine needle duff, or simply bare ground under the canopy of conifer trees. The plant produces several small purple flowers that tend to droop and are often hard to see (CONPS 1997). The species is distributed through the Rocky Mountain States, California, and the Pacific Northwest. In Colorado, the species has been documented from Boulder, Eagle, Gilpin, Grand, Jackson, Larimer, Routt, and Summit counties (NatureServe 2011d). The species is ranked as apparently globally secure (G4), but is vulnerable in Colorado (S3).

Rare plant surveys were conducted in the Project Area in 2007, 2008, and late spring 2009 and did not detect this species. There are many locations in the project ROW with lodgepole pine forest featuring an understory dominated by pine duff, but few if any other plant species. These sites could provide suitable habitat in the Project Area for this species.

3.13.2.4 Fern Species

There are many species of ferns in Colorado; all but brittle bladderfern (*Cystopteris fragilis)* are tracked by the Forest Service as species of local concern. Plant surveys conducted in spring of 2009, as well as summer 2007 and 2008, did detect at least two species of moonworts, and the common brittle bladderfern was identified in a number of rocky outcrop locations in aspen forest stands in the project ROW. Otherwise, no fern species were detected during field surveys for this project. It is likely that suitable habitat for other fern species exists within the alternative ROWs.

Arrowhead Colt's Foot (Petasites sagittatus)

Arrowhead colt's foot is a perennial herbaceous plant species in the family Asteraceae (Sunflower). The plant is an obligate wetland species occupying habitats such as marshy meadows. Arrowhead colt's foot typically flowers in May-June. In Colorado, the plant is known to be distributed in Boulder, Gunnison, Jackson, Mineral, and Park counties. The species is ranked as globally secure (G5); it is not ranked at the state level (NatureServe 2011a).

Rare plant surveys were conducted in the Project Area in 2008 and late spring 2009 and did not detect this species. There are many locations in the project ROW with marshy meadows that are crossed by various alternatives. These wetland sites could provide suitable habitat for the arrowhead colt's foot.

Cupped Penstemon (Penstemon cyathophorus)

The cupped penstemon is a perennial herbaceous species in the figwort family (Scrophulariaceae). This species occupies dry sagebrush habitats in North and Middle Park, Colorado, and was documented from several locations in the project ROW. The cupped penstemon is ranked G3 (vulnerable), and has a state rank of S3 (vulnerable). The species is ranked as globally vulnerable (G3) and vulnerable within the state (S3).

The rare plant survey in spring 2008 and 2009 documented a substantial population in the ROW immediately north of the Farr (Granby) Pumping Plant. Several other populations were observed in the proposed action ROW in sagebrush communities. These occurrences are documented in greater detail in the *Biological Report* (AECOM 2011).

Bird's Eye Primrose (Primula incana)

The bird's eye primrose is a perennial herbaceous species in the primrose family (Primulaceae). The plant has a characteristic farinose (mealy covering) flowering stem. Weber and Wittmann (2001) describe habitat for this species as wet meadows and intermountain parks. It has a wetland indicator status of facultative wetland in USACE Region 8, which means that it occurs in wetlands 67-99 percent of the time. This species is ranked globally as apparently secure (G4), and has not been ranked statewide in Colorado (NatureServe 2011e).

A rare plant survey in the Project Area in late spring 2008 and 2009 did not detect this species. Additional plant surveys were conducted in 2007 and 2008, but did not detect this species. There are many locations in the project ROW with wet meadows and other wetland features. Fen wetland occurs just north of CR 41. These wetland sites could provide suitable habitat for the bird's eye primrose.

3.14 Wetland Resources

3.14.1 Analysis Area

Wetland resources present in the project study area are riparian habitats associated with creeks and irrigation ditches, as well as wetlands that receive some portion of their water budget from groundwater sources. These wetlands are generally very limited in areal extent, with the exception of the wetlands, fens, and wet meadows north of CR 41 (Map 3-11).

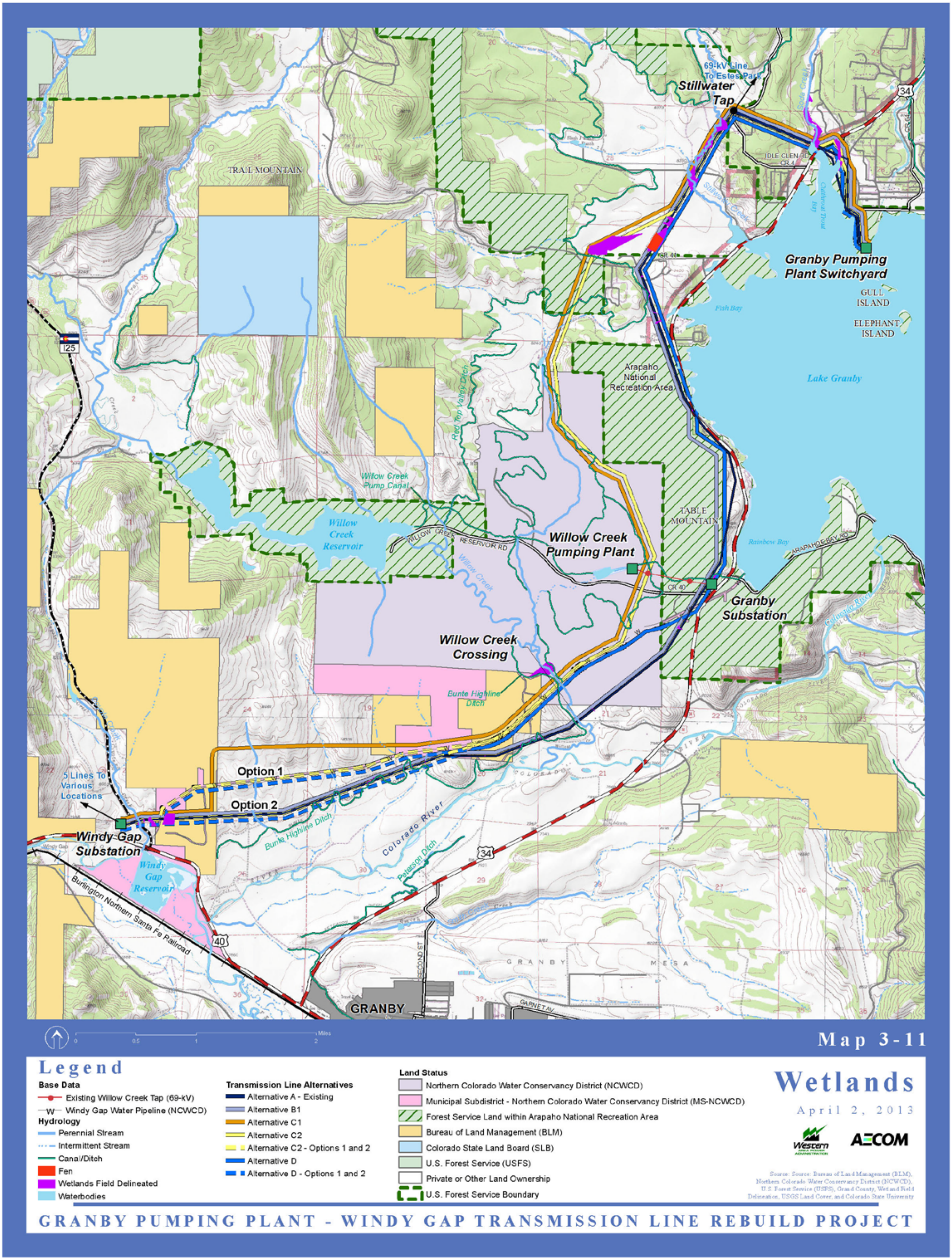
3.14.2 Existing Conditions and Context

Wetlands in the project study area are diverse. They include riparian systems associated with many streams and ditches that are crossed by the project alternatives. Wetlands associated with smaller drainages and irrigation ditches are typically found as narrow vegetated fringe along channel margins. The larger drainages of Willow Creek and Stillwater Creek have generally broader wetland margins. Named stream and ditch features in the Project Area include the following: Willow Creek, Stillwater Creek, Coyote Creek, Soda Creek, Shadow Mountain Canal, Bunte Highline Ditch, and Red Top Ditch.

There are many acres of wet meadows created by historic and current irrigation practices. All of the project alternatives cross over these features at various locations, most notably the valley north of CR 41 and south of CR 40. There are also fen wetlands and other palustrine emergent wetlands located north of CR 41. All of the project alternatives cross over fen wetlands in the valley north of CR 41. Fen wetlands are found in a mosaic; a combination of wet meadows, palustrine emergent wetlands and fens, with interstitial uplands mixed into the overall valley area. These wetlands were documented during field survey work between 2007 and 2009. Fens are a type of wetland typically located at elevations above 8,000 feet, and occurring at low points in the landscape or near slopes where groundwater intercepts the soil surface, maintaining a constant water level. Fens are defined as wetlands that are water logged and characterized by peat formation. These peaty soils are classified as histosols, or mineral soils, with a histic epipedon. Fens are relatively unique and are considered an irreplaceable type of wetland. The USFWS designates fen wetlands as Resource Category 1 (*Federal Register* 1981). This category represents high value wetlands with a mitigation policy of "no loss of existing habitat value."

There are also lacustrine wetlands associated with the lakeshore at Cutthroat Trout Bay on Lake Granby. The lacustrine wetlands are crossed by the current transmission line (Alternative A).

Vegetation associated with Project Area wetland and riparian areas is diverse and includes many different species of willows, sedges, rushes, bulrushes, spikerushes, grasses, and forb species.



69-kV Line To Estes Park
Stillwater Tap
Granby Pumping Plant Switchyard
GULL ISLAND
ELEPHANT ISLAND
Lake Granby
Fish Bay
Rainbow Bay
TRAIL MOUNTAIN
Arapaho National Recreation Area
TABLE MOUNTAIN
Red Top Valley Ditch
Willow Creek Pump Canal
Willow Creek Reservoir
WILLOW CREEK RESERVOIR RD
Willow Creek Pumping Plant
Willow Creek
Granby Substation
ARAPAHOE BAY RD
Colorado River
Willow Creek Crossing
Bunte Highline Ditch
Option 1
Option 2
5 Lines To Various Locations
Windy Gap Substation
Windy Gap Reservoir
Burlington Northern Santa Fe Railroad
Colorado River
Paterson Ditch
GRANBY MESA
GRANBY
SECOND ST
GARNET AV
CR 40
CR 41
IDLE GLEN RD
125
34
40
0 0.5 1 2 Miles
Map 3-11
Legend
Base Data
Existing Willow Creek Tap (69-kV)
Windy Gap Water Pipeline (NCWCD)
Hydrology
Perennial Stream
Intermittent Stream
Canal/Ditch
Fen
Wetlands Field Delineated
Waterbodies
Transmission Line Alternatives
Alternative A - Existing
Alternative B1
Alternative C1
Alternative C2
Alternative C2 - Options 1 and 2
Alternative D
Alternative D - Options 1 and 2
Land Status
Northern Colorado Water Conservancy District (NCWCD)
Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
Forest Service Land within Arapaho National Recreation Area
Bureau of Land Management (BLM)
Colorado State Land Board (SLB)
U.S. Forest Service (USFS)
Private or Other Land Ownership
U.S. Forest Service Boundary
Wetlands
April 2, 2013
Western
AECOM
Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, Wetland Field Delineation, USGS Land Cover, and Colorado State University
GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

3.15 Terrestrial and Avian Wildlife Resources

3.15.1 Analysis Area

The analysis area includes all five alternatives, including the no action alternative (or existing) corridor. The planning area used to assess population viability and habitat impacts for FSS and MIS includes the ANRA and, on a larger scale, the ARNF. Impacts to wildlife and habitats are analyzed on a Forest-wide scale, and cumulatively for surrounding lands.

Elevation in the Project Area ranges from 7,800 feet near the Windy Gap substation to 8,400 feet near the Town of Grand Lake. The Colorado River flows south to southwest, immediately east of the Project Area, and joins with the Fraser River 1 mile south of the Project Area. Willow Creek runs through the Project Area, as well as several intermittent and ephemeral creeks and the Bunte Highline and Red Top irrigation ditches. Average annual precipitation is approximately 14 inches.

The southern segments of the alternatives pass through sagebrush dominated areas and irrigated hay meadows. The central segments of the alternatives pass though sagebrush communities interspersed with evergreen conifer forests. The northern segments of the alternatives pass through predominantly evergreen conifer forest, interspersed with areas of wet meadow wetlands. A larger wetland and fen is located at the northern end of the Project Area, west of U.S. Highway 34.

3.15.2 Alternative-Specific Analysis Area

The analysis area for terrestrial and avian wildlife resources in the Project Area includes the no action and the four action alternative ROWs. The study area was expanded to 0.25 mile from the edge of each of the ROWs to analyze potential impacts to nesting raptors in the Project Area. The analysis included data collection up to 0.50 mile for bald and golden eagles. These distances were selected based on the USFWS and CDOW recommended construction buffers and seasonal restrictions for breeding raptors in Colorado (Appendix D).

3.15.3 Management Considerations

3.15.3.1 Regulatory and Forest Plan Direction

Statutes, regulations, and executive orders that provide authority to manage wildlife, fish, and plant resources on the ARNF, BLM, and state and private lands include the following:

- Agricultural Appropriation Act
- BGEPA of 1940 (16 U.S.C. 668-668c, 54 Stat. 250), as amended
- Non-game, Endangered, or Threatened Species Conservation Act (CO ST 33-2-105)
- ESA of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended
- E.O. 11990, Protection of Wetlands, May 24, 1977
- Federal Land Policy and Management Act (FLPMA) of 1976, as amended (43 U.S.C.1701 et seq.)
- Federal Water Pollution Control Act (Clean Water Act) (CWA) of 1972 (33 U.S.C. 1251 et seq.), as amended

- Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661-666c), as amended
- Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378)
- MBTA of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755), as amended
- Multiple-Use, Sustained-Yield Act of 1960 (P.L. 86-517)
- NFMA of 1976 (16 U.S.C 1600-1614), as amended
- Sikes Act of 1960 (16 U.S.C. 670a-670o, 74 Stat. 1052), as amended

3.15.4 Scoping Issues and History of Agency Consultation

Western has worked with CDOW (now CPW) since the project's inception in 2005 to obtain data regarding species and habitats of state concern within the Project Area. A letter requesting information on state species of concern and habitat was submitted to CDOW on August 24, 2005 and again in 2007. CDOW responded and provided a list of agency concerns, including potential impacts to mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) winter range; greater sage grouse (*Centrocercus urophasianus)* nesting and brooding areas; and compliance with the MBTA of 1918, as amended; and the BGEPA of 1940. These letters are included in Appendix H. Western met with CDOW, USFWS, Forest Service, and BLM on December 11, 2007, and also met 2 years prior, to provide project updates to the CDOW and USFWS and to request any additional information on state-listed species that may occur in the project.

The wildlife concerns identified by CDOW (outlined by CDOW in their 2005 and 2007 letters to Western), Forest Service, USFWS, and BLM include:

- Impacts to winter range and severe winter range for mule deer and elk at Table Mountain and surrounding habitats. Maintenance and construction of this line in winter range between the months of November through April may temporarily displace elk and reduce the available severe winter range habitat in the study area.
- Impacts to sage grouse lek sites, nest, and brood sites from construction of a transmission line in a new, previously undisturbed ROW in sagebrush habitats.
- The presence of a transmission line in proximity to a documented lek site, or an increase in structure heights of the existing transmission line could increase perch sites for raptors in the area and increase predation on sage grouse.
- Increased habitat fragmentation and human disturbance in the Project Area.
- Propagation of noxious weeds in the transmission ROW and the resulting effects to native habitats for wildlife.
- Raptor occurrence in the Project Area and the potential for collisions with the power line or electrocution.
- Compliance with the BGEPA of 1940 and the MBTA of 1918 as amended.
- Potential impacts to wetlands (fens) and riparian communities.

Public scoping meetings identified similar concerns for biological resources as were identified by the agencies.

3.15.5 Existing Conditions and Context

The physical characteristics, including a description of the primary vegetation communities that occur in the area, are discussed above under Section 3.12, Vegetation Resources. Wildlife habitat in the Project Area includes sagebrush shrublands, lodgepole pine stands, aspen forest, irrigated hay meadows, wetlands, and riparian communities. The lodgepole pine stands in the Project Area have been heavily impacted by the mountain pine beetle epidemic that is affecting forested pine communities throughout Grand County and much of Colorado. Portions of the Project Area are currently under construction for residential development or occur within existing residential communities. All project alternatives would cross portions of Table Mountain, which has been mapped by CPW as severe winter range and winter range for deer and elk. There is a pair of golden eagles that nest on the west side of Table Mountain as well as numerous other nesting raptor species including, but not limited to, osprey, Swainson's hawk, Cooper's hawk, and red-tailed hawk.

The Project Area lies to the north of the Colorado River and Windy Gap Reservoir, west of Lake Granby and Shadow Mountain Lake, and east of Willow Creek Reservoir. There are a number of ephemeral drainages located throughout the Project Area. The surface waters crossed by the no action and action alternatives include Stillwater Creek, Willow Creek, the Bunte Highline Ditch, and the Red Top Valley Ditch. The reservoirs and lakes near the Project Area provide foraging and nesting habitat for a variety of avian species. The largest concentration of osprey in Colorado can be found at the reservoirs of eastern Grand County (NDIS 2009).

Amphibian species associated with aquatic habitats that have historically or have the potential to exist within the Project Area include the western chorus frog (*Pseudacris triseriata*), wood frog (*Lithobates sylvaticus*), boreal toad (*Anaxyrus boreas boreas)*, mountain toad (*Anaxyrus woodhousii woodhousii*), tiger salamander (*Ambystoma tigrinum*), and northern leopard frogs (*Lithobates pipiens*), among others (Hammerson 1999).

3.15.5.1 Wildlife Summary by Project Alternative

Alternative A (No Action)

There are nine raptor nests that are believed to be active within 0.25 mile of the Alternative A ROW. This includes one Cooper's hawk, three osprey, one Red-tailed hawk, and four Swainson's hawk nests. The Sulphur Ranger District monitors raptor nests annually and maintains records of locations of nesting raptors.

Six additional osprey nests are located within 1 mile of the Alternative A ROW. Some osprey nests in the area are on man-made nesting platforms. Western constructed these nesting platforms in cooperation with the Forest Service to mitigate nesting on power poles. Other raptor nests within 1 mile from Alternative A include a second Cooper's hawk, two golden eagles, another Red-tailed hawk, and two additional Swainson's hawk nests.

An inactive raptor nest was observed several hundred feet to the east of the Alternative A ROW in the forested segment that occurs just south of the Granby Substation. The nest was in the top of a lodgepole pine that had been affected by mountain pine beetle. Based on a lack of white wash, green material in the nest, prey remains, or presence of raptor in the area, it was assumed the nest was inactive in 2008.

A breeding population of yellow-rumped warblers was also mapped 21 feet from the ROW in proximity to the corvid nest site. Northern flickers, western meadowlarks, song sparrows, and mourning doves were a few of the more commonly observed species in this ROW.

Mule deer and elk sign were observed throughout the Alternative A ROW. The southwestern end of the Project Area has been mapped by CPW as severe winter range and winter range for mule deer and elk.

Greater sage grouse occurrence, relative to the Alternative A alignment, is discussed in detail under Section 3.16, Special Status Terrestrial, Avian, and Aquatic Wildlife Species.

Alternative B1

Alternative B1 is similar to Alternative A, with the exception of the reroute onto ANRA lands on the east side of Table Mountain. The habitat within the reroute portion of the alignment is a mix of sagebrush shrubland/serviceberry communities and aspen forest.

With the exception of the reroute on ANRA land, Alternative B1 is in a previously disturbed ROW that includes some residential development on the northern edge of the Project Area.

Active raptor nests in proximity to the ROW are the same as the nests identified in proximity to the Alternative A ROW.

Greater sage grouse occurrence, relative to the Alternative B1 alignment, is discussed in detail under Section 3.16, Special Status Terrestrial, Avian, and Aquatic Wildlife Species.

Alternative C1

The ROW for Alternative C1 crosses greater sage grouse breeding and nesting habitats. The Alternative C1 ROW would be located within 0.25 mile or less of an active greater sage grouse lek. Greater sage grouse occurrence is discussed in further detail under Section 3.16, Special Status Terrestrial, Avian, and Aquatic Wildlife Species.

The Alternative C1 alignment also crosses winter range and severe winter range for mule deer and elk. On the west side of Table Mountain, Alternative C1 would cross a valley that serves as a migration corridor for big game species in the area.

Three raptor nests are located within 0.25 mile of the Alternative C1 ROW, all of which are Swainson's hawk nests. There is an historic, active golden eagle nest site located on the west side of Table Mountain within 0.50 mile of the proposed ROW for Alternative C1 (as well as Alternative C2). The golden eagle nest was active in 2009 and produced two chicks. A juvenile golden eagle was observed on several occasions foraging in the wetlands and surface waters west of Table Mountain in 2008. As a special status species, golden eagles will be discussed further under Section 3.16.

Nine additional raptor nests are within 1 mile of the ROW including a Cooper's hawk, four osprey, one Red-tailed hawk, and three Swainson's Hawks. Raptors occupying nests documented in proximity to the ROW for Alternatives A and B1 likely frequent hunting and perching grounds in proximity to the Alternative C1 ROW.

Alternative C2

Alternative C2-Option 1 is similar to Alternative C1, with the exception of changes to the alignment leaving the Windy Gap Substation moving to the northeast. Alternative C2-Option 1 follows the existing water pipeline ROW owned by MS-NCWCD. Mountain lion scat was observed on the pipeline ROW in this area.

Alternative C2-Option 2 follows the existing transmission ROW (Alternative A) until it joins the water pipeline ROW southwest of the Granby Substation. From the vicinity of the Willow Creek crossing, Alternative C2 follows the same alignment described for Alternative C1.

Wildlife habitat conditions are very similar to what was described for C1. The ROW for Alternative C2 crosses greater sage grouse breeding and nesting habitats. The Alternative C2 ROW would be located within 0.25 mile or less of an active greater sage grouse lek. Greater sage grouse occurrence is discussed in further detail under Section 3.16, Special Status Terrestrial, Avian, and Aquatic Wildlife Species.

The Alternative C2 alignment also crosses winter range and severe winter range for mule deer and elk. On the west side of Table Mountain, Alternative C1 would cross a valley that serves as a migration corridor for big game species in the area.

Four raptor nests are located within 0.25 mile of the Alternative C2 ROW, including three Swainson's hawk nests and one Red-tailed nest. There is an historic, active golden eagle nest site located on the west side of Table Mountain within 0.50 mile of the proposed ROW for Alternative C2. The golden eagle nest was active in 2009 and produced two chicks. As a special status species, golden eagles will be discussed further under Section 3.16.

Eight additional raptor nests are within 1 mile of the ROW including a Cooper's hawk, four osprey, and three Swainson's hawks. Raptors occupying nests documented in proximity to the ROW for Alternatives A and B1 likely frequent hunting and perching grounds in proximity to the Alternative C1 ROW.

Alternative D

Alternative D habitat characteristics, nest occurrences, and general wildlife occurrences are similar to those described for Alternative B1, except that Alternative D includes an option to follow the water pipeline ROW (Option 1) or the existing ROW (Option 2) at the western end of the Project Area.

Alternative D-Option 1 wildlife occurrences and habitat characteristics are the same as described for Alternative C2-Option 1.

Alternative D-Option 2 wildlife occurrences and habitat characteristics are the same as described for Alternatives A, B1, and C2-Option 2.

Greater sage grouse occurrence, relative to the Alternative D alignment, is similar to that described for Alternative B1.

Raptors occupying nests documented in the ROW for Alternatives A and B1 likely frequent hunting and perching grounds in proximity to the Alternative D ROW.

3.16 Special Status Terrestrial, Avian, and Aquatic Wildlife Species

For purposes of this EIS, special status species are defined as those species that are listed under the ESA as threatened, endangered, or candidate species; FSS, or MIS; species that are protected by the State of Colorado as threatened and endangered species; or species of local concern.

Information was collected for those species that are known to occur within or with suitable habitat in the Project Area. Data was collected through contacts and information provided by the ARNF, Sulphur Ranger District, USFWS, CDOW (now CPW), CNHP elemental occurrence database, and the BLM.

Habitat assessments were conducted by a qualified biologist(s) and natural resource specialist in the summers of 2005, 2007, 2008, and 2009 for all project alternatives. Formal boreal toad surveys occurred in the summer of 2007. Boreal toad surveys were conducted by CNHP in the summer of 2007. The survey encompassed other amphibian species of concern, including the wood frog and northern leopard frog, as well as general amphibian occurrence.

3.16.1 Analysis Area

The Project Area, as defined for the purpose of analysis of special status species, is the same as described for wildlife overall (see Section 3.15).

3.16.1.1 Alternative-Specific Analysis Area

The specific analysis area and data collection effort for special status species includes 0.25 mile from the edge of each of the alternative ROWs to analyze potential impacts to nesting raptors in the Project Area. However, the analysis included data collection up to 0.50 mile for bald and golden eagles. These distances were selected based on the USFWS and CDOW's recommended construction buffers and seasonal restrictions for breeding raptors in Colorado. Formal surveys were not conducted in areas outside of the project alternative ROWs, but information was collected from Cooperating Agencies and CDOW (now CPW).

The planning area used to assess population viability and habitat impacts for FSS species and MIS includes the ANRA and, on a larger scale, the ARNF. Impacts to wildlife, vegetation, and their habitats are analyzed for each alternative, on a Forest-wide scale, and cumulatively for surrounding lands.

3.16.2 Management Considerations

3.16.2.1 Federally Listed Species

As described in Section 3.13, a BA is required if listed species or critical habitat may be present in the Project Area. The BA determinations included in this document apply only to federally listed species and their designated and proposed critical habitat.

Table 3-27 identifies the complete list of Threatened and Endangered Species for Grand County (USFWS 2010). The species noted as "excluded" are not carried forward for analysis in the BA.

Table 3-27. Federally Listed Species with the Potential to Occur in Grand County.

Common Name	Scientific Name	Federal Status*	Species Excluded?	Reason for Exclusion
MAMMALS				
Canada lynx	*Lynx Canadensis*	T	No	
FISH				
Bonytail chub	*Gila elegans*	E	Yes	No water depletions proposed
Colorado pikeminnow	*Ptychocheilus lucius*	E	Yes	No water depletions proposed
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	T	Yes	No water depletions proposed
Humpback chub	*Gila cypha*	E	Yes	No water depletions proposed
Razorback sucker	*Xryauchen texanus*	E	Yes	No water depletions proposed

Source: USFWS 2010; *T= Threatened, E=Endangered

On February 4, 2013 the U.S. Fish and Wildlife Service (FWS) proposed to list the Distinct Population Segment of the North American wolverine (*Gulo gulo luscsus)* that occurs in the contiguous United States as a Threatened species under the Endangered Species Act. As a “proposed” species, the wolverine does not yet have full protections under the Endangered Species Act, however, the Forest Service is now required to conference with FWS on any action that may jeopardize the continued existence of the wolverine.

In this document, wolverine is evaluated as a sensitive species (its status prior to February 4, 2013). Anticipated project effects to wolverine have not changed as a result of its changed status, but the determination language changes from “impact” to “effect” and is reflected below.

3.16.2.2 Forest Service Sensitive Species

As described in Section 3.13, it is Forest Service policy to analyze impacts to sensitive species in a BE (FSM 2670.31-32: Forest Service 1995).

Table 3-28 lists the FSS wildlife species carried forward for evaluation based on the Region 2 Forest Service Sensitive Species List dated May 19, 2011.

Table 3-28. Forest Service Sensitive Species Retained for Further Analysis.

Forest Service Sensitive Species	
WILDLIFE	
American marten North American river otter North American wolverine Pygmy shrew	Mammals
American bittern American peregrine falcon Bald eagle Black tern Boreal owl Brewer’s sparrow Greater sage grouse	Birds

Forest Service Sensitive Species	
WILDLIFE	
Loggerhead shrike Northern goshawk Northern harrier Olive-sided flycatcher	
Boreal toad Northern leopard frog Wood frog	Amphibians

3.16.2.3 Management Indicator Species

The NFMA of 1976 requires that national forest planning "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." To implement this mandate, in 1982 the Forest Service developed and implemented regulations requiring the identification of MIS to be used as planning and analysis tools to set goals, objectives, and minimum management requirements in Forest Plans; to focus the analysis of effects of plan alternatives; and to monitor the effects of plan implementation at the project level. MIS species were created to evaluate the effects of management practices on fisheries and wildlife resources. The Forest Service monitors select species whose population trends are believed to reflect the effects of management activities on forest ecosystems (36 CFR 219.9). Specifically, the regulations state that "these species shall be selected because their population changes are believed to indicate the effects of management activities" (36 CFR 219.19). The MIS designation is not intended to provide special protective status, serve as biological diversity benchmarks, nor represent every species of plant or animal found in the forest.

Available information regarding MIS populations and trends was considered for this project. Monitoring and evaluation is carried out to address populations across the entire Forest. Forest Plan goals are to maintain or improve MIS habitat. Numerous Forest Plan goals, objectives, standards, and guidelines provide coordinated direction for MIS management (Forest Service 1997).

The Forest Plan requires sufficient habitat to support at least a minimum of reproductive MIS individuals. As a result, the ARNF tiers their analysis of MIS species to a community-based analysis of habitats. These habitats are designated Management Indicator Communities (MIC). The MICs for the ARNF are as follows:

- existing and potential old-growth forests
- interior forests
- young to mature forest structural stages
- openings within/adjacent to forests
- aspen forests
- montane riparian areas and wetlands montane aquatic environments

Table 3-29 lists all MIS species considered for analysis based on the MIS list, as amended May 3, 2005. Certain MIS are also listed as FSS. These species are denoted in the following table; background information for these dual-listing species is not repeated in this section.

Table 3-29. MIS Carried Forward for Analysis.

Management Indicator Species	
Elk Mule deer	Mammals
Golden-crowned kinglet Hairy woodpecker Mountain bluebird Pygmy nuthatch Warbling vireo Wilson's warbler	Birds
Boreal toad*	Amphibian

*Species is also included as a FSS.

3.16.2.4 Migratory Birds

The MBTA states it is "unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not."

The Project Area provides nesting, foraging, and stopover habitats for a variety of avian species protected under the MBTA. The project also lies 0.5-1 mile to the north of the Colorado River, a major migratory corridor for a variety of species. Sandhill cranes, bald eagles, pelicans, and other avian species migrate through the Project Area, particularly on the southern end near the Colorado River (Sumerlin 2007, pers. comm.). A variety of avian species are known to nest within or in proximity to the project alternatives.

The USFWS recommends that surveys be conducted no earlier than 72 hours prior to any ground-disturbing activity during the avian breeding season to avoid the incidental take of a migratory bird or nest. The avian breeding season is species dependant, but for most species is generally March 15-September 1. Recommended time constraints for construction near bald and golden eagles would begin as early as November or December.

3.16.2.5 State-Listed or Other Species of Concern

CPW designates state threatened and endangered species as well as Species of State Concern. Those species that may occur within the Project Area include the greater sage grouse (Species of State Concern), boreal toad (State Endangered), the northern leopard frog (Species of State Concern), wood frog (Species of State Concern), bald eagle (State Threatened), American peregrine falcon (Species of State Concern), Canada lynx (State Endangered), and the North American wolverine (wolverine) (State Endangered). Other species of concern include the golden eagle, osprey, and the American white pelican, all of which are protected by the MBTA.

3.16.3 Scoping Issues and History of Agency Consultation

As required by Section 7 of the ESA, interagency consultation has occurred between Western, Forest Service, and USFWS regarding listed and proposed species in the Project Area. Informal consultation with USFWS was initiated on June 30, 2005 when Western submitted a letter to the USFWS requesting information on threatened and endangered species in the Project Area. Western received a response letter on July 13, 2005. The USFWS was not able to provide species-specific information for the Project Area at that time, but did include a list of endangered, threatened, and candidate species for Grand County. Western met informally with USFWS on November 2, 2005 and again on December 11, 2007 to provide project updates to the USFWS, and to request any new information on federally listed species that may occur in the Project Area. The USFWS in Lakewood, Colorado determined in December 2008 that the primary wildlife species of federal concern in the Project Area is the Canada lynx (*Lynx canadensis*). See previous discussion for the changed status of North American wolverine.

CDOW was also consulted to obtain data regarding species and habitats of state concern within the proposed Project Area. A letter requesting information on state species of concern and habitat was submitted to CDOW on August 24, 2005 and again in 2007. CDOW responded in 2005 and 2007 (Appendix H). A list of their concerns was provided in Section 3.15, Terrestrial and Avian Wildlife Resources. Western met with CDOW in December 2007 to provide project updates to the CDOW and USFWS and request any additional information on state-listed species that may occur in the project.

3.16.4 Existing Conditions and Context

3.16.4.1 Forest Service Sensitive Species

Nineteen FSS were analyzed for this Project. The only species observed during field investigations conducted in 2005, 2007, 2008, and 2009 were Brewer's sparrow, olive-sided flycatcher, and greater sage grouse. Each of these species was observed in sagebrush shrubland/serviceberry communities on the western end of the Project Area. Suitable habitat for the remaining species exists within the Project Area.

A brief description of each of the FSS carried forward for evaluation is included in the remainder of this section.

American bittern

In Colorado, the bittern can be found in cattail marshes and adjacent wet meadows. It is seen outside of marshes around lakes and in riparian areas, primarily during fall and spring migration (NDIS 2005). This species breeds and overwinters in freshwater wetlands with emergent vegetation and shallow water. According to NatureServe (2010a), loss and degradation of wetlands is the most serious threat to bittern viability. According to NDIS (NDIS 2009), this species is known to occur in Grand County; however, there are no known incidental or breeding occurrences of this species within or adjacent to the Project Area. No bitterns were observed during field surveys conducted in 2005, 2007, 2008, or 2009.

Habitat for the American bittern occurs within portions of all alternative ROWs in areas that would cross wetland and wet meadow habitats. (Wetland communities in the Project Area were described in detail above under Section 3.14.) The largest wetland complex in the Project Area can be found within the ROW for all of the alternatives to the north of CR 41. The wetland areas are bordered by irrigated hay meadows that also provide suitable habitat for the bittern.

American marten

In Colorado, marten occur in most areas of coniferous forest habitat in the high mountains (Fitzgerald et al. 1994). According to NatureServe (2010b), marten populations are apparently secure. Marten inhabit subalpine spruce-fir and lodgepole pine forests, alpine tundra, and occasionally montane forests. They prefer late-successional or mixed age stands with over 30 percent, and preferably 40-60 percent canopy cover. Marten den in tree cavities, logs, rocks, rock piles, and burrows, and frequently rest on tree limbs during the day.

According to NatureServe (2010b) threats to marten include timber harvest that reduces canopy cover and removes structure from the forest floor, and trapping for pelts. Marten are susceptible to overharvest.

The Project Area does not contain contiguous blocks of forested areas that would provide suitable habitat for breeding marten populations. Marten habitat in the Project Area is limited to the individual forested segments that occur in each of the alternative ROWs. Alternatives A, B1, and D would cross forested habitats on the east side of Table Mountain, north and south of the Granby Substation, and near the campground at Cutthroat Trout Bay. Alternatives C1 and C2 would cross forested habitats on the west side of Table Mountain, specifically the Forest Service parcels located just south of CR 41. All of these forested communities have been heavily impacted by the mountain pine beetle epidemic and do not provide quality habitat for the American marten. Surveys were conducted for martens in 2005 on Table Mountain and there were no signs or tracks of martens found.

American peregrine falcon

In Colorado, peregrine eyries are scattered throughout the mountains and canyons, with highest concentrations along the Dolores and Colorado River canyons and in Dinosaur National Park (Kingery 1998).In Grand County, peregrine falcons are rare spring and fall visitors in aspen, canyon, riparian and tundra habitats (Jasper and Collins 1987). An active eyrie was discovered near Hot Sulphur Springs in Grand County in 2009, which was also active in 2010 (Forest Service n.d.).

Peregrines nest on ledges on cliff faces, and also on other structures/micro-habitats, including riverbanks, tundra mounds, bogs, large stick nests of other species, tree hollows, and man-made structures (e.g., ledges of city buildings). Nests are typically situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey (NatureServe 2010s).

Review of Forest Service and CDOW (now CPW) data for the Project Area showed there are neither anecdotal sightings nor historic occurrence records for peregrine falcons in the Project Area (prairie falcons are far more common cliff occupants in Grand County) (Forest Service n.d.). The cliff habitats on the west side of Table Mountain contain marginal cliff habitat, which may provide habitat for some smaller avian species, but it is highly unlikely a peregrine would nest in the area.

The Colorado River, Stillwater Creek, Willow Creek and Reservoir, and the agricultural properties within the greater Project Area provide suitable foraging habitat for this species.

Peregrines feed primarily on birds (medium-size passerines up to small waterfowl), and secondarily, small mammals (e.g., bats), lizards, fishes, and insects. Prey pursuit is initiated from perches or while soaring (NatureServe 2010s). All of the project alternatives would cross wetlands and riparian communities associated with Willow and Stillwater creeks. Alternatives C1 and C2 would cross the west side of Table Mountain. These alternatives would occur within suitable foraging and potential nesting habitat for the falcon.

Bald eagle

Bald eagles prefer to roost in conifers or other sheltered sites in winter, and typically select larger trees. Communal roost sites used by two or more eagles are common, and 100 or more eagles may use some roosts during winter. Winter roost sites vary in their proximity to food resources (up to 20 miles) and may be determined, to some extent, by a preference for a warmer microclimate at these sites. Wintering areas are commonly associated with open water, though in some areas eagles use habitats with little or no open water if other food resources (e.g., carrion) are readily available. Winter roosts generally avoid areas with nearby human activity (pedestrians) and development (buildings) (NatureServe 2010d).

The closest bald eagle roosting sites to the Project Area occur northeast of Lake Granby and south along the Colorado River (Sumerlin 2005, pers. comm.). A winter concentration area also exists north of Lake Granby and at Shadow Mountain Lake. Summer forage habitat for bald eagles exists along the northern edge of Lake Granby and north to the southern end of Shadow Mountain Lake, and along the Colorado River south of the Project Area.

Wintering bald eagles may be found along ice-free sections of the Colorado River. Winter concentrations include portions of the Colorado River below the Shadow Mountain Dam and at Windy Gap Reservoir. Spring and fall bald eagle migrants also occur along the Colorado River, Lake Granby, Shadow Mountain Reservoir, Grand Lake, and other large creeks and lakes/reservoirs. Bald eagle winter forage and communal roost sites are known to exist along the Colorado River, directly south of the western end of the proposed transmission line alignment (AECOM 2011).

Black tern

The black tern's preferred breeding habitat includes marshes, along sloughs, rivers, lakeshores, and impoundments, or in wet meadows, typically in sites with mixture of emergent vegetation and open water. Nests may be placed in a variety of vegetative situations, from dense stands of emergent vegetation to open water (Bergman et al. 1970; Novak 1990; and NatureServe 2010e), but moderate or sparse vegetation appears to be preferred (Cuthbert 1954; Weller and Spatcher 1965; Dunn 1979).

Regionally, Willow Creek Reservoir to the west of the Project Area, Lake Granby and Grand Lake to the east, and the Colorado River provide habitat for the black tern. Within the Project Area, suitable habitat for this species is found at Willow Creek, Cutthroat Trout Bay, and associated wetlands; and the wet meadows and wetland communities associated with irrigation ditches, and Stillwater Creek north of CR 41. Although rare, the black tern has been documented in Grand County on at least three occasions (Sulphur Ranger District Records 2010).

Boreal owl

Considered imperiled in Colorado, boreal owls occupy a circumpolar distribution in Northern hemisphere boreal forests. In North America, boreal forests in Colorado and northern New Mexico delineate the southernmost extent of their distribution. Although boreal owls are considered globally secure, their trend is unknown due to unreliable population estimates and nomadism caused by fluctuations in prey base abundance and distribution (NatureServe 2010f). Boreal owls appear to be distributed in Colorado between 9,200 and 10,400 feet. In Grand County, boreal owls are rare summer breeders in coniferous habitats, and are believed to remain within and around their home ranges through the winter (NatureServe 2010f).

In Colorado, boreal owls utilize late-successional, multi-layered habitats of spruce-fir and lodgepole pine interspersed with meadows. These owls may also be found in aspen and mixed conifer stands. Boreal owls are secondary cavity nesters, usually occupying cavities excavated by woodpeckers. Nest cavities are commonly found in snags with a diameter of at least 10 inches, and may be used in consecutive years. In Colorado, nesting occurs from mid-April to early June.

Although suitable boreal owl habitat occurs within the Project Area, breeding bird survey (BBS) data has not documented boreal owl occurrences in the Project Area (Kingery 1998). Boreal owl surveys have not been conducted in the Project Area, and there are no historic or recent records of this species within the Project Area.

The Project Area and the Forest have been heavily impacted by the mountain pine beetle epidemic. As a result, stand structure has been significantly altered within the Project Area and forest-wide. The structural stages that boreal owls prefer have been compromised by the epidemic.

Suitable habitat in the Project Area is associated with the lodgepole, aspen, and meadows found in all project alternatives. Alternatives B1 and D would cross a dense aspen community on the east side of Table Mountain, located on the boundary of the ANRA just west of U.S. Highway 34.

Brewer's sparrow

Brewer's sparrows are often the most abundant bird species in appropriate sagebrush habitats. There has been significant decline, however, throughout its range in the last 10-20 years (Rotenberry et al. 1998). Brewer's sparrows are a common to fairly common spring and summer visitor in Grand County's grasslands and pinyon-juniper woodlands, with confirmed breeding in grassland habitats (Jasper and Collins 1987). BBS records document Brewer's sparrow occurrences in the Project Area vicinity as well as confirmed breeding (Kingery 1998).

Direct causes of widespread decline on breeding grounds are uncertain; but are possibly linked to widespread degradation of sagebrush habitats in the western United States, especially on private lands (NatureServe 2010g, Forest Service 2002).

Breeding is strongly associated with sagebrush habitat but can also occur in mountain mahogany, rabbitbrush, bunchgrasses, bitterbrush, ceanothus, manzanita, and openings in pinyon-juniper habitats (NatureServe 2010g). In Colorado, courtship begins late in May or early June, with eggs laid in June and hatched young from late June through late July (Kingery 1998).

One Brewer's sparrow was observed on the western end of Alternative A in 2008. Suitable habitat exists for the sparrow within all the alternative's ROWs, where the transmission line would leave Windy Gap Substation and head east towards Willow Creek.

Greater sage grouse

The greater sage grouse is a species of concern for the Forest Service, BLM, and CPW. Greater sage-grouse are found throughout northwestern Colorado, with the majority of the birds occurring in Grand, Moffat, and Jackson counties. Additional counties with sage-grouse include Eagle, Larimer, Garfield, Rio Blanco, Routt and Summit. They typically occur between 7,000-9,500 feet elevation in sagebrush habitats (Kingery 1998). Range-wide, greater sage-grouse occur from southwestern North Dakota and northwestern South Dakota west to Montana, Washington, Oregon and Idaho, north into Canada, and south as far as California, Nevada, Utah, and Colorado (GSGCP 2008). In Grand County, sage-grouse can be found in sagebrush habitat from Kremmling to Granby, as well as within the Muddy Creek, Troublesome, Williams Fork, and Blue River drainages (GSGCP 2008). The USFWS determined that listing the greater sage-grouse is warranted, but precluded as of March 2010.

Greater Sage-grouse Conservation Plan-Middle Park (GSGCP 2008) reports that habitat for this species is restricted to sagebrush-steppe areas adjacent to riparian areas. Habitat preferences vary seasonally. Grouse would use sage-dominated habitats in the spring and more diverse mountain shrub habitat during the summer. Greater sage grouse would move to sagebrush habitats at lower elevations during the winter. This species feeds on leaves of sagebrush, and leaves and flowers of forbs within sagebrush habitats. Male grouse display on leks in the spring; usually flat, open areas within sagebrush habitats. Females build ground nests under sagebrush near the leks and incubate their clutches for 25-27 days. Moist areas with forb and insect availability are used for brood-rearing and often occur near riparian areas. Threats to sage grouse include disturbance to lek and nest sites, large-scale sagebrush habitat loss, and predation from a variety of egg, chick, and adult predators.

The Project Area contains breeding (lek), foraging, and nesting habitats for the greater sage grouse. Habitat assessment surveys conducted within the Project Area in July 2005 and again in 2008 found signs of heavy sage grouse use within the Alternative C1 ROW and along the NCWCD water pipeline. Up to 18 sage grouse have been observed near the ROW for Alternatives C1, C2-Option 1, and D-Option 1. There was no sign of sage grouse within the ROW for Alternative A. Suitable habitat exists for the sage grouse within the ROW of Alternative A; however, the existing transmission line and disturbance from ongoing construction in the area may deter sage grouse from frequenting the area.

CPW currently monitors two sage-grouse leks in proximity to the project alternatives: the Horn West and the (historic) Horn lek. The Horn West lek is located on private property on the western end of the project area and is approximately 0.8 mile north of Alternative A, B1 and D-Option 2. The lek is 0.29 mile north of Alternative C1 and 0.5 mile from C2-Option 1 and 0.79 mile north of C2-Option 2. This lek was located and found to be active in 2005. The high count for the males from 2005-2010 is five males.

A historic (last known to be active in 1993) sage-grouse lek, known as the Horn lek occurs on BLM property to the east of the Horn West lek. The Horn lek is 0.24 mile north of Alternative A, B1, and C2-Option 2 and D-Option 2. The lek is 0.17 mile from Alternative C1 and C2-Option 1 and D-Option 1. Individuals are also known to disperse north from the Linky lek, which lies to the south of the Colorado River, into the project area (Holland 2005, pers. comm.; Oldham 2005, pers. comm.).

Habitat assessment surveys conducted by AECOM within the Project Area in July 2005, 2008, and 2009 found signs of high sage grouse use within Alternatives C1, C2 (north), and D leaving the Windy Gap Substation and further east, up to the hillside north of Willow Creek. There was no sign of sage grouse within the ROW for Alternative A. Suitable habitat exists for the sage grouse within the ROW of Alternative A; however, the existing transmission line and disturbance from ongoing construction in the area may deter sage grouse from frequenting the area. Existing transmission lines provide perch sites for raptors in the area and may increase predation on sage grouse.

Alternative C1 and C2-Option 1 occur in relatively intact sagebrush communities. Alternatives A, B1, and D would occur within or in proximity to existing transmission or water pipeline ROWs.

Loggerhead shrike

Habitat for the Loggerhead Shrike includes open riparian areas, agricultural areas, grasslands, and shrublands, especially semi-desert shrublands, and sometimes open pinyon-juniper woodlands. Breeding birds are usually near isolated trees or large shrubs. They frequent greasewood draws in both summer and winter in Mesa County and probably elsewhere in western Colorado (NDIS 2010).

This species has shown significant population declines over much of North America (NatureServe 2010m), and for that reason is listed on the National Audubon Society Blue List and is a Colorado Species of Special Concern. This species apparently has been extirpated from some areas of eastern Colorado as a breeding species, but it does not appear to have declined in western Colorado (NDIS 2010).

According to the 2010 Occurrence Records of Grand County birds, Loggerhead shrikes are uncommon, but have been observed in the fall through early spring in Grand County. This species can occur in all habitats of the project area including aspen and coniferous forests, grasslands, wetlands, agricultural and sage brush communities.

Northern goshawk

In Colorado, goshawks occur at elevations of 7,500-11,000 feet (NatureServe 2010o; Kennedy 2003), and 64 percent of BBS breeding observations occurred in coniferous forests. In Grand County, goshawks occur uncommonly year-round within aspen and coniferous forests, and also in riparian, wetland, and meadow habitats.

Northern goshawks inhabit mature forests of various cover types, including aspen, lodgepole, ponderosa pine, and spruce-fir. Individuals feed primarily on birds of small to medium size, as well as grouse and small mammals such as rodents and hares. Goshawks may use marshes, meadows, and riparian zones for foraging (NatureServe 2010o; Kennedy 2003).

Regardless of the cover type, goshawks require large blocks of forest for nesting and foraging. According to NatureServe (2010o), threats to northern goshawk include timber harvest, fire suppression, grazing, and insect and tree disease outbreaks that can result in the deterioration or loss of nesting habitat. Known or suspected predators include martens, fishers, black bears, and wolverines.

According to Sulphur Ranger District Records, a northern goshawk nest is located in the project vicinity, approximately 1 mile north of the northern extent of all the project alternatives.

Northern goshawks require large tracts of forest for foraging and nesting, and the Project Area does not contain this type of habitat, in part, due to the mountain pine beetle epidemic. The occurrence of forested communities is higher on Alternatives B1 and D. These alternatives follow the existing transmission line for the majority of the ROW and have been cleared of forest vegetation to maintain safety standards for transmission lines. The mountain pine beetle epidemic has had a significant impact on forested habitats that goshawks prefer for nesting. The residential and recreational use within the Project Area is also expected to reduce the likelihood of goshawks nesting in the Project Area. It is unlikely that these species have breeding habitat in the Project Area.

Northern harrier

Northern harriers are considered vulnerable in Colorado where they occur in lower elevation grasslands, agricultural lands, and marshes, but may range up to the tundra in the fall. The most common breeding habitats are emergent wetlands, croplands, and tall desert shrublands; their current distribution in Colorado favors the shortgrass prairie and lower elevations of the western slope (Kingery 1998). In Grand County, Jasper (1983) reported northern harriers as fairly common to uncommon in the spring through fall in coniferous forests, wetlands, grassland, and tundra habitats, with no breeding records. BBS data (Kingery 1998) indicate northern harrier occurrences as possible to probable, with breeding in far northwestern Grand County.

Generally found from 5,000-9,000 feet in Colorado, with additional fall use in high elevations (Kingery 1998), northern harriers are strongly associated with natural wetlands, moist grasslands, and other irrigated agricultural habitat, and tundra in the fall (NatureServe 2010p). In Colorado, breeding chronology is affected by elevation, with courtship from mid-April to late June, eggs laid from April through June, and chicks fledged from May-August (Kingery 1998). Nests are built on the ground in areas of dense vegetation and are composed of grasses, forbs, and twigs. The female incubates and feeds the young and rarely leaves the nest. Males deliver small mammal and bird prey items captured in open grassland, shrubland, and agricultural habitats (NatureServe 2010p). In Colorado, the greatest threat to northern harriers is the continued loss of wetland habitat from urban, residential, industrial, and agricultural development (Kingery 1998).

Suitable nesting and foraging habitat in the Project Area is associated with the wetland and riparian communities found throughout the alternative alignments. Suitable foraging and nesting habitats are present on the west side of Table Mountain where Alternatives C1 and C2 are located. The wetland and riparian communities associated with Willow and Stillwater creeks also provide foraging and potential nesting habitat for this species. All project alternatives would cross portions of these creeks and associated wetlands communities.

River otter

River otters inhabit riparian habitats that traverse a variety of other ecosystems ranging from semidesert shrublands to montane and subalpine forests. The species requires permanent water of relatively high quality and with an abundant food base of fish or crustaceans (NDIS 2010). Their diet includes aquatic animals including crayfish, frogs, fish, young muskrats and beavers (CDOW 2010).

Because of their high mobility and low densities, river otters require relatively long reaches of streams and rivers. They will occupy lakes and reservoirs, as long as shoreline cover and food resources are adequate (Forest Service 2006a), and river otter presence has been reported in several large lakes and reservoirs in Colorado (Forest Service 2006a). The physical habitat attribute most important to river otters besides water is riparian vegetation, which provides security cover when they are feeding, denning, or moving on land (Forest Service 2006a). The importance of cover along waterways for river otter habitat is clear. If riparian vegetation is lacking, rock piles or similar physical structures may provide such cover. River otters generally avoid areas where cover is lacking, such as reservoir shorelines with little vegetation or structural cover, even if food is abundant (Forest Service 2006a).

Most of the surface waters in the project area lack the riparian vegetation that this species prefers. However, according to the Forest Service, North American river otters likely inhabit Granby Reservoir (Forest Service 2006a). All project alternatives parallel the reservoir. Alternatives A and B1 parallel the reservoir for greater distances.

Olive-sided flycatcher

The olive-sided flycatcher is considered vulnerable in Colorado (NatureServe 2010r). The causes for the flycatcher's decline are not well understood, but may be due to changes in their breeding range and migration and wintering areas. In Grand County, olive-sided flycatchers are considered fairly common summer visitors, using aspen and coniferous forests, meadows and riparian areas. Breeding records exist within coniferous forest (Jasper 1983).

BBS records document possible to probable olive-sided flycatcher breeding in the Project Area vicinity (Kingery 1998). Olive-sided flycatchers are documented from nearly all Sulphur Ranger District point count transects, and are commonly recorded in other coniferous habitats district-wide (Forest Service n.d.). Surveys conducted by the Forest Service on Table Mountain recorded one occurrence in 2004 and four occurrences in 2005. One individual was observed within the potential ROW of Alternative D in 2008. The flycatcher was observed perched on a serviceberry shrub in a mixed sagebrush/serviceberry community.

The presence of large snags for perching and foraging appears to be the most important habitat component for olive-sided flycatchers. Snag abundance in the Project Area and adjacent landscape is extremely high as a result of a mountain pine beetle infestation. Pending any future plans for salvage of dead and dying trees, abundance, and distribution of snag trees are dramatically increasing within the Forest and portions of the Project Area. Suitable habitat is present throughout the Project Area in associated habitats within all project alternatives.

Pygmy shrew

The pygmy shrew is relatively specialized within its range, occupying high-elevation, mesic coniferous forest with possible preference for late-seral stands and possibly the edges between wet, lowland forest and dry, upland forest (Forest Service 2006). The species has been found in subalpine forests, clear-cut and selectively logged forests, forest-meadow edges, boggy meadows, willow thickets, aspen-fir forests, and subalpine parklands. Pygmy shrews build runways under stumps, fallen logs, and litter (NatureServe 2010t, Fitzgerald et. al. 1994). Pygmy shrews have short lives (12 months) and reproduce only once in their lives at about 10 months. It is possible that this species occupies suitable habitat throughout the mountains of northern and central Colorado; however, populations may be discontinuous relicts from glacial times (Fitzgerald et al. 1994).

In Colorado, pygmy shrews appear to occur in higher elevations (9,600 feet and above), which are above the project area elevation. However, the project area does contain other suitable pygmy shrew habitat characteristics including moist forest habitats (mixed conifer and aspen), forest-moist meadow edges, and wet meadow habitats. Pygmy shrews have not been documented on the Sulphur District, but survey records are scarce. There are no records of the pygmy shrew within the project area; however, formal surveys have not been conducted.

Given the wide range of habitats used by pygmy shrews (wetlands, moist lodgepole pine, spruce-fir, and aspen habitats), it is possible, but unlikely, that the pygmy shrew could occur in the Project Area. Suitable habitat is present within all of the alternative ROWs. However, the Project Area is below the elevation where pygmy shrews have been historically found in Colorado (9,600 feet), and the spread of mountain pine beetle in the Project Area has likely reduced habitat suitability for this species.

There are no records of the pygmy shrew within the Project Area; however, formal surveys have not been conducted.

North American wolverine

Considered critically imperiled in Colorado (NatureServe 2010t), and proposed as a Threatened species in the contiguous United States by the FWS on February 4, 2013, the North American wolverine (wolverine) occurs over a large range in northern Canada and Alaska, where populations are in good condition. Wolverines have been extirpated from most of its historic range in the contiguous 48 states. Recently there are signs of semi-recovery in selected western states.

Wolverines are solitary, wide-ranging, and exist in low densities in large roadless or isolated areas. Wolverines have historically had one of the lowest densities of any carnivore (Fitzgerald et al. 1994). Suitable habitat includes alpine and arctic tundra and boreal and mountain forests (primarily coniferous). Wolverines use habitats with snow on the ground in the winter. Riparian areas may also be important winter habitat. In Colorado, historical and current reports show nearly all wolverines are from higher elevations, in areas with heavy timber. However, they may also hunt in open areas (CDOW 2009).

When inactive, wolverines occupy dens in caves, rock crevices, under fallen trees, or in thickets. Young are born in March or April in natal dens among rocks or tree roots, in hollow logs, under fallen trees, or in dense vegetation, including sites under snow. Reproductive success is low, due in part to loss of kits, lack of mating opportunities, and age at first litter. Wolverines are omnivores, feeding on small mammals, birds, fish, carrion, and plant material. In winter, the diet is mostly mammalian prey and carrion, with more diversity at other times of the year (Fitzgerald et al. 1994, Ruggiero et al. 1994). Wolverines are nocturnal and remain active year-round.

It is unlikely that wolverine home range occurs within or adjacent to any of the project alternatives, given the wolverine's intolerance for human activity, lower density forested stands, and the lack of contiguous forested areas within all of the project alternatives.

Boreal toad

Although once considered fairly common in most mountainous areas of the Southern Rocky Mountains, it is much less common today and absent from many historically occupied locations. Boreal toads occur in a handful of locations on the ARNF and also on surrounding National

Forests, including Routt, Pike-San Isabel, Grand Mesa, Uncompahgre and Gunnison, Rio Grande, and White River (Loeffler 2001).Boreal toads historically occurred in many locations on the Sulphur Ranger District. CDOW (now CPW) and CNHP surveys throughout the 1990s and ongoing have been unable to detect historic occurrences in many areas of the District, including Berthoud Pass, Rollins Pass, Shadow Mountain Lake, Strawberry Bench, and the Never Summer Mountains (Loeffler 2001; Lambert et al. 2000). Neither historic nor current survey data indicate the presence of boreal toads within the Project Area. The closest known breeding occurrence of boreal toads to the Project Area is located at Pole Creek Golf Course above the Town of Fraser and in the Big Meadows areas of Rocky Mountain National Park (Sumerlin 2005, pers. comm.)

Southern Rocky Mountain boreal toads occupy forest habitats between 7,500 and 12,050 feet. Boreal toads require breeding ponds, summer range, and overwinter refugia, within or adjacent to lodgepole pine or spruce-fir forests. Breeding habitat includes large lakes, glacial ponds, beaver ponds, man-made ponds, wetlands, and roadside ditches and puddles. Egg placement occurs in shallow, quiet water where thermal effects of the sun on egg masses can be optimized. Young toads are restricted to moist habitats while adult toads can move several miles through upland habitats. Hibernacula include rodent burrows, beaver dams, and lodges. Summer range includes upland forests and rocky areas with spring seeps (Loeffler 2001).

Western contracted the CNHP to conduct an inventory focused on the boreal toad within and adjacent to the proposed Granby – Windy Gap Transmission Line Rebuild project area during the summer breeding season of 2007. The objectives of the inventory were to quantify the amount and quality of habitat, find suitable breeding sites, and evaluate historic or current activity of boreal toads and other amphibians along the alternative ROWs. Survey results indicated that there is currently no known occupied habitat for the State Endangered boreal toad in the project area. Refer to the Biological Report for this project (AECOM 2011) for a more detailed discussion of this species.

Northern leopard frog

Considered vulnerable in Colorado (NatureServe 2010q), northern leopard frog range includes the southern provinces of Canada, south through the United States to Texas (Hammerson 1999). Although still widespread and common in many areas, many populations have drastically declined, especially in the Rocky Mountains of Colorado, Wyoming, and Montana. This species remains abundant in some parts of Forest Service Region 2, such as the Black Hills (Smith and Keinath 2007). Leopard frog records from Colorado occur from 3,500-11,000 feet, but exclude southeastern Colorado (Hammerson 1999).

Northern leopard frogs can be found in springs, slow-moving streams, marshes, bogs, ponds, canals, floodplains, reservoirs, and other lakes with rooted aquatic vegetation. They can also be found in wet meadow habitats in the summer. Leopard frogs disperse from breeding sites using creeks and riparian areas. They overwinter underwater. Shallow, still, permanent water with good exposure to sunlight is needed for egg deposition and development. Metamorphosed frogs eat a variety of small invertebrates. Tadpoles eat algae, plant tissue, organic debris, and some small invertebrates. Threats to leopard frogs include habitat loss, overharvest, disease, water quality degradation, and competition with and predation by introduced bullfrogs and nonnative predaceous fish. Like many amphibians, leopard frog declines appear related to environmental changes that alter the frog’s susceptibility to disease (e.g., red leg disease, ranavirus, and chytrodiomycosis) (NatureServe 2010q; Hammerson 1999).

According to Smith and Keinath (2007), northern leopard frogs in Colorado are now scarce: 9 high elevation population extirpations, and extirpations or severe population reductions at most low elevation sites were documented. There are currently no known populations of leopard frogs on the ARNF. The potential ROWs of project alternatives contain areas of suitable leopard frog habitat associated with wetlands and surface waters. Only one amphibian was observed during field surveys conducted in 2005, 2008, and 2009, and this was a chorus frog. Historic records of leopard frog occurrence in Grand County are scarce and do not include any occurrences within the Project Area, although Hammerson (1999) includes an historic site within the Fraser Valley. There have been no prior records of northern leopard frogs in the Willow Creek or Stillwater Creek drainage basins (CDOW 2007, CNHP 2007).

Wood frog

In Colorado, this species occurs in the mountains surrounding North Park, along the upper tributaries of the Colorado River in Grand County, and in the upper Laramie River drainage of Larimer County (Hammerson 1999). The elevation range in Colorado for this species is approximately 7,900-9,800 feet. Wood frog populations typically undergo large fluctuations over periods of several years and, as a result, decades of monitoring are necessary to assess populations.

Wood frogs inhabit subalpine marshes, bogs, pothole ponds, beaver ponds, lakes, stream borders, wet meadows, willow thickets, and forest bordering these mesic habitats. During the summer, wood frogs can often be seen along the edges of wetlands and marshy ponds (Hammerson 1999). In winter months, wood frogs hibernate in holes or under logs or rocks in forested areas. Wood frogs emerge from hibernation in May. Breeding habitats include small, shallow, natural ponds, which lack a permanent inlet and outlet; inactive beaver ponds; and sometimes in human created ponds. Most breeding sites are ephemeral pools, which dry out in the summer. The primary vegetation types associated with breeding sites are lodgepole pine and aspen (Hammerson 1999).

Activities that have reduced population numbers and lead to extirpations in Grand County include; dredging of breeding ponds, clearing of shoreline vegetation, expansion of residential areas, and highway construction (Hammerson 1999). There are no recent occurrences of the wood frog within the Project Area. The Colorado River, to the south of the Project Area, historically provided habitat for wood frogs.

There have been no prior records of wood frogs in the Willow Creek or Stillwater Creek drainage basins (CDOW 2007, CNHP 2007). Wetlands and riparian communities associated with Willow Creek, Stillwater Creek, and other surface waters within the Project Area, and along potential alternative ROWs, do provide habitat characteristics suitable for the wood frog. No wood frogs were observed, however, during boreal toad and general amphibian surveys conducted in 2007 within the Project Area by CNHP.

3.16.4.2 Management Indicator Species

The MIS analyzed for the project include boreal toad, elk, mule deer, golden-crowned kinglet, hairy woodpecker, mountain bluebird, pygmy nuthatch, warbling vireo, and Wilson’s warbler. The boreal toad analysis is presented above in the FSS section. MIS are analyzed in greater detail in the project’s Biological Report (AECOM 2011).

The MIC located in the project includes:

- Young to mature forest structural stages (elk, mule deer, and hairy woodpeckers)
- Openings within/adjacent to forests (elk, mule deer, and the mountain bluebird)
- Interior forest (golden-crowned kinglet)
- Old growth (Pygmy nuthatch)
- Aspen forests (Warbling vireos)
- Montane riparian and wetlands (Wilson's warblers)

The MIC communities that may occur within the potential ROW of Alternatives A, B1, C1, C2, and D are the young to mature forest structural stages, openings within/adjacent to forests, aspen forests, and montane riparian and wetlands.

Habitat for elk and mule deer are found throughout the Project Area and along all alternatives. Alternatives C1 and C2 would cross a larger extent of severe winter range and winter range on the western end of the Project Area, and along the segments that cross the west side of Table Mountain.

Interior forest habitat for the ruby-crowned kinglet is limited in the Project Area because of the mountain pine beetle epidemic. This species was not observed in the Project Area, but may occur in the forested sections of the alternative ROWs.

Aspen stands are primarily associated with Alternatives B1 and D. The segment of these ROWs that occurs on the boundary of the ANRA, on the east side of Table Mountain, may provide suitable habitat for warbling vireos. Forest Service has conducted avian surveys on Table Mountain since 2002. In 2004, the Forest Service recorded 12 warbling vireos on the east side of Table Mountain.

Wilson's warbler may be found within the wetland and riparian communities along each of the project alternatives, particularly along Willow and Stillwater creeks.

Old-growth habitat, which pygmy nuthatch prefer, is limited in the Project Area. The mountain pine beetle epidemic has substantially altered forest structure and composition on the ANRA and ARNF. Pygmy nuthatch may be found in the mixed-conifer and aspen stands in the Project Area.

Hairy woodpeckers are associated with young to mature forest structural stages. Forest Service surveys from 2004 recorded one hairy woodpecker occurrence west of Alternatives C1 and C2, north of the water treatment plant. Surveys conducted by AECOM in 2008 recorded one hairy woodpecker in proximity to the ROW of Alternative A in a lodgepole pine stand that had been hit by mountain pine beetle. The mountain pine beetle epidemic is expected to increase hairy woodpecker habitat and abundance on the ANRA.

The last recorded Forest Service documented occurrence of pygmy nuthatch on Table Mountain is from 2002. Old-growth habitat does not occur in the Project Area because of the mountain pine beetle epidemic and residential developments. Pygmy nuthatch that may occur in the Project Area would likely occur in the mixed conifer, lodgepole pine, and aspen communities. The aspen communities would be associated with Alternatives B1 and D.

Mountain bluebirds were observed in the Project Area during surveys (conducted by AECOM in 2008 and 2009) on the edges of lodgepole pine forests along Alternatives A, B1, C1, C2, and D.

The mountain pine beetle epidemic has created forest openings and increased snag densities throughout the Project Area and in each of the alternative ROWs.

Elk, Cervus elaphus

Elk is an MIS for young to mature forest structural stages and openings within and adjacent to forests (Forest Service 1997b).

Elk are found throughout the ARNF, finding both forage and cover in and near forested ecosystems. They are often associated with semi-open forests and forest edges adjacent to parks, meadows, and alpine tundra. Elk are both grazers and browsers; and in the northern and central Rocky Mountains, grasses and shrubs compose most of the winter diet. Forbs become increasingly important in late spring and summer, and grasses dominate again in the fall. Elk tend to inhabit higher elevations during the spring and summer and migrate to lower elevations for winter (Forest Service 1997b).

Threats to elk include loss of winter and summer range habitat quality and quantity and severed migration corridors. Invasive plants, such as cheatgrass, are threats to habitat quality. Hunting and collisions with vehicles would reduce numbers locally. Disturbance on summer ranges, especially calving and young-rearing areas, may lead to indirect effects on populations. Chronic wasting disease (CWD) is a new threat to Colorado elk populations, and the first CWD positive elk was detected in Grand County in September 2002 (CDOW, pers. comm.).

The Project Area is located within elk severe winter range, winter range, and winter concentration areas; elk migration corridors adjacent to the Project Area; and also includes elk summer range and production areas (CDOW 2003).

Mule deer, Odocoileius hemionus

Mule deer is an MIS for young to mature forest structural stages, openings within and adjacent to forest, and prairie woodlands (Forest Service 1997b).

Mule deer occupy all ecosystems in Colorado, from grassland to alpine tundra. Spring and summer ranges are most typically mosaics of meadows, aspen woodlands, alpine tundra subalpine forest edges, or montane forest edges. In the Rocky Mountains, winter diets for mule deer consist mainly of browse from a variety of trees and shrubs with some forbs. In the spring, browse contributes half of the diet, and forbs and grasses make up the remainder. During the summer months, grass consumption declines in favor of forbs. Browse consumption increases and forb use declines throughout the fall and into winter. Over much of Colorado, the species is migratory, summering at higher elevations and moving down slope to winter range (Forest Service 1997b).

Threats to deer include loss of winter range habitat quality and quantity and blocked migration corridors. Invasive plants, such as cheatgrass, are threats to habitat quality. Hunting and collisions with vehicles would reduce numbers locally. Disturbance on summer ranges, especially calving and young-rearing areas, may lead to adverse effects on populations. Chronic wasting disease is a new threat to Colorado deer populations; CWD has been recently been confirmed in Grand County (CDOW, pers. comm.). In the project area between 2006-2008, chronic wasting disease was detected in approximately 1 to 5 percent of mule deer.

The Project Area falls within mule deer winter, crucial winter range, and summer ranges, and a north–south mule deer migration corridor runs from Willow Creek Reservoir, west of Table Mountain and south to the Colorado River.

Golden-crowned kinglet, Regulus satrapa

Golden-crowned kinglet is an MIS for interior forests (Forest Service 1997b).

Golden-crowned kinglets utilize Douglas fir, spruce fir, lodgepole, and aspen habitats for feeding and nesting. They breed primarily in dense coniferous forests, especially where spruce is present, and winter in coniferous forests (occasionally in deciduous woodland scrub and brush). This kinglet eats insects and their eggs, and fruit and seeds. Golden-crowned kinglets forage in tall dense conifers, concentrating at medium heights. Food is gleaned from foliage, small twigs, limbs and bark of trees and shrubs, or they may also hover to clean food from vegetation. Golden-crowned kinglets are fairly uncommon summer residents on the ARNF. This interior forest species tolerates little change on nesting grounds (Kingery 1998; Forest Service 1997b).

Severe winter storms can significantly contribute to local mortality rates. Habitat modification due to lumber activities, spruce die-off, burned areas, open canopy, and pure stands of lodgepole pine or hardwoods may reduce local populations. Brown-headed cowbird parasitism is uncommon but has been known to occur (NatureServe 2010i). Threats to passerines also include suburban and rural sprawl, which fragments habitat and increases predation by domestic cats, raccoons, and other species that thrive along with human settlement.

Forest-wide, there exists about 193,700 acres of interior forest habitat, or 15 percent of the total NFS land (Forest Service 1997b). However, as a result of a mountain pine beetle epidemic in lodgepole pine habitats, this large block of interior forest habitat has been reduced by about half to now only include the spruce and fir portion of the block. The dead mature lodgepole pine component no longer has a closed canopy to provide the attributes needed to provide for interior forest conditions.

Hairy woodpecker, Picoides villosus

Hairy woodpecker is an MIS for the snag component of young to mature forest structural stages (Forest Service 1997b).

Hairy woodpeckers are found in wooded areas throughout North America, from the northern tree line to Panama. Mountain forests, mixed woodlands, and river groves are all suitable habitat for hairy woodpeckers. Six to 9 acres per pair is required for successful breeding. It excavates cavities in snags or in live trees with decaying heartwood, and consumes a diet that is about 80 percent animal food (wood boring beetles removed from dead and diseased trees are an important source of food). Hairy woodpeckers also eat other insects, fruits, corn, nuts, and cambium (Forest Service 1997b).

Local threats to the species may include loss of cavity trees/snags from forest thinning, and competition for nesting cavities by house sparrows or starlings (NatureServe 2010k). Threats to the woodpecker also include suburban and rural sprawl, which fragments habitat and increases predation by domestic cats, raccoons, and other species that thrive along with human settlement.

Forest-wide amounts of snags are generally high, and the Project Area is no exception. The current mountain pine beetle epidemic has resulted in significant increases in snag density in the Project Area. Therefore, the existing condition of snags is not a concern or issue for woodpeckers or other snag-dependent wildlife in the Project Area. Young to mature forests make up about 86 percent (815,000 acres) of all forest vegetation on ARNF (Forest Service 1997b). Since tree mortality, including mountain pine beetle-induced mortality, occurs in most tree sizes, the area provides a continuous source of existing and future snags for woodpeckers.

There has been one recorded occurrence of the hairy woodpecker just west of the Alternatives C1 and C2 in 2002. A hairy woodpecker was observed in 2008 in a pine beetle infested lodgepole pine stand to the south of Granby Substation.

Mountain bluebird, Sialia currucoides

Mountain bluebird is an MIS for openings within and adjacent to forests (Forest Service 1997b).

Mountain bluebirds are common from Alaska and British Columbia, south throughout the west to southern California and Oklahoma. Mountain bluebirds nest in nearly all forest types of the Rocky Mountain region, usually from 7,000-11,000 feet in open forests or near forest edges. During migration and in winter, mountain bluebirds also frequent grasslands, open brushy country, and agricultural lands. Mountain bluebirds usually nest in old woodpecker holes, natural cavities, or nest boxes in open areas near forest edges. Bluebirds hunt from high perches or fly to the ground to catch prey. Nearly 92 percent of the bluebird's diet is animal material; the small amount of herbivorous food includes fruits, hackberry seeds, and cedar berries (Forest Service 1997b).

Local threats to the species may include loss of cavity trees and snags from forest thinning and competition for nesting cavities by house sparrows or starlings. Threats to songbirds also include suburban and rural sprawl, which fragments habitat and increases predation by domestic cats, raccoons, and other species that thrive along with human settlement.

Pygmy nuthatch, Sitta pygmaea

Pygmy nuthatch is an MIS for existing and potential old-growth forests (Forest Service 1997b).

The pygmy nuthatch typifies Colorado's ponderosa pine forests. They rely on healthy, mature ponderosa pine trees and occur less frequently in logged tracts. Because they excavate their own cavities, they need large trees with old or decayed wood (Kingery 1998), hence their association with old growth and near old-growth habitats. Pygmy nuthatches tend to forage in the crowns of ponderosa pine, and their diet consists of insects, spiders, and conifer seeds (Kingery 1998).

Although pygmy nuthatches are most often associated with mature ponderosa pine habitats, they also inhabit late-successional lodgepole pine and aspen habitats, where cavities are available for nesting. Home range size is approximately 3 acres per breeding pair. They altitudinally migrate during the winter months and are gregarious outside of the breeding season. Food is mainly insects that are gleaned from bark, but they also eat conifer seeds. During poor pine cone years, pygmy nuthatches may switch from pine to spruce and fir seeds (Forest Service 1997b).

Local threats to the species may include loss of cavity trees and snags from forest thinning in the ponderosa woodland, and competition for nesting cavities by house sparrows or starlings. Threats to passerines also include suburban and rural sprawl, which fragments habitat and increases predation by domestic cats, raccoons, and other species that thrive along with human settlement.

Although closely associated with ponderosa pine habitats, pygmy nuthatches are an indicator for old-growth habitats on the Planning Area. On the Sulphur Ranger District, lodgepole pine and spruce-fir cover types used to represent this MIC; however, with beetle kill in lodgepole pine, old spruce-fir, old growth now represents old-growth habitat conditions. There are no old-growth forests present within any of the project alternatives.

Warbling vireo, Vireo gilvus

The Warbling vireo is an MIS for aspen communities (Forest Service 1997b).

Warbling vireos forage and breed almost exclusively in deciduous habitats. Warbling vireos in Colorado occupy two main habitat types: riparian stream bottoms and aspen forests. Breeding habitat in Colorado is primarily aspen woodlands. Warbling vireos build their nests in aspens or shrubs within 12 feet of the ground. Warbling vireos glean most of their food from the mid to upper canopy of deciduous trees, and their diet consists of caterpillars, beetles, grasshoppers, and ants (Forest Service 1997b). In Colorado, warbling vireos are common on the plains in migration and in the mountains in summer.

Brown-headed cowbird parasitism of nests can be up to 80 percent, creating sink populations in some places (NatureServe 2010v). Threats to passerines also include suburban and rural sprawl, which fragments habitat and increases predation by domestic cats, raccoons, and other species that thrive along with human settlement.

Considered secure in Colorado (NatureServe 2010v), the warbling vireo is a fairly common summer resident in the foothills and lower mountains. In the western valleys and eastern plains, it is considered uncommon to fairly common. As a spring and fall migrant, it is thought to be uncommon in the western valleys, foothills, and eastern plains (Andrews and Righter 1992). Confirmed nesting occurs throughout much of Grand County and in other counties in the Planning Area.

Transect counts in and near ARNF since 1998 indicate that population trends are variable, increasing in 2000 through 2001 and then decreasing through 2004, with highest bird densities in aspen, high elevation riparian, and ponderosa pine habitats.

Surveys conducted in July 2005 by the Forest Service (McCormick 2006) show occurrences of warbling vireos on Table Mountain, east of Alternatives C1 and C2, and located within or adjacent to Alternatives A, B1, and D. Isolated patches of aspen exist along portions of U.S. Highway 34, adjacent to Alternatives A, B1, and D.

Wilson’s warbler, Wilsonia pusilla

Wilson’s warbler is an MIS for montane riparian and wetlands (Forest Service 1997b).

Wilson’s warbler breeds from northern Alaska, northern Yukon, northern Ontario, southeastern Labrador, and Newfoundland; south to southern California, central Nevada, northern Utah, northern New Mexico, central Ontario, northern New England, and Nova Scotia. Wilson's warblers winter from southern California and southern Texas to Panama. They prefer wet clearings in early stages of regeneration. Wilson's warblers also inhabit peat or laurel bogs with scattered young or dwarf spruces, tamaracks, and riparian willow and alder thickets. Wilson's warblers usually build nests at the base of small trees or shrubs, often well concealed in a grass hummock. They eat insects gleaned from the ground and twigs or caught by flycatching, and spiders and fruit pulp (Forest Service 1997b).

Habitat change, particularly destruction of riparian habitats, is thought to play a part in regional decreases in the west. Brown-headed cowbird parasitism of nests may also be a threat, but more study is needed (NatureServe 2011i). Threats to passerines also include suburban and rural sprawl, which fragments habitat and increases predation by domestic cats, raccoons, and other species that thrive along with human settlement.

Stillwater and Willow creeks support riparian vegetation, which may provide suitable habitat for the warbler within the various alternative ROWs.

Brook trout, Salvelinus fontinalis

Brook trout is an MIS for montane aquatic environments (Forest Service 1997b).

High elevation rivers and streams in Colorado provide clear, cool, well-oxygenated habitat. Water temperature is a key requirement; preferred temperatures are 14-16°C and spawning usually takes place over gravel in shallow water less than 15°C. Water exceeding 20°C for extended periods is usually avoided (NatureServe 2011b).

Habitat change, including warmer water temperatures and increased sedimentation, are greatest threats to this species. In Colorado, river and creek structures or high waterfalls limit the upstream dispersal of brook trout. In these headwater streams, native trout species have a better chance at success.

This species is an exotic in Colorado (it is native to the eastern United States). The brook trout was introduced in the late 1800s. This prolific feeder would often out-compete native trout species (CDOW 2009). Suitable habitat exists for this species in Stillwater and Willow creeks.

Brown trout, Salmo trutta

Brown trout is an MIS for montane aquatic environments (Forest Service 1997b).

Medium to high gradient streams in Colorado with cold temperatures but tends to occupy deeper, lower velocity, and warmer waters than other species of trout. Spawning usually takes place in shallow gravelly headwaters, rocky lake margins, or sand/hard clay within a variety of waters ranging from large streams to small spring-fed tributaries. Habitat for juveniles includes quiet waters along shorelines or in areas sheltered from the main flow (NatureServe 2011c).

Habitat change, including warmer water temperatures and increased sedimentation, are likely the biggest threats. Overfishing is also a threat to this species.

An exotic species in Colorado (native to Europe and western Asia), the brown trout was introduced in the 1890s. A popular game fish occupying different habitat, the brown trout is less of a threat to the native cutthroats. Suitable habitat exists for this species in Stillwater and Willow creeks and Lake Granby.

Boreal toad, Anaxyrus boreas boreas

Refer to the boreal toad description and impact analysis under the FSS Species discussion.

3.16.4.3 Other Species of Project Concern

Golden Eagle

The golden eagle is found in North America: mainly western and northern Alaska; east through the Northwest Territories to Labrador; south to northern Mexico, Texas, western Oklahoma, and western Kansas; and east to New York and New England (rare). The eagle is also known to breed in the Palearctic. This species winters in south-central Alaska, southern Canada south through breeding range, casually southward. In the United States, golden eagles are most numerous in winter in the Rocky Mountain states, Great Basin, and western edge of the Great Plains (Root 1988). Northernmost populations in Eurasia winter south to northern Africa (Sibley and Monroe 1990). Golden eagles are protected under the MBTA of 1918, as amended, and the BGEPA of 1940.

In Colorado, the golden eagle is a winter resident in western valleys, foothills, lower mountains, mountain parks, and eastern plains. The greatest winter concentrations occur in northwestern Colorado. The golden eagle is an uncommon summer resident in western valleys, foothills, mountains, mountain parks, and eastern plains (NDIS 2006).

Golden eagles occur in grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. They may occur in other habitats during the winter and migration. Golden eagles nest on cliffs and sometimes in trees in rugged terrain. Breeding birds range widely over surrounding habitats. Hunting territory can extend up to 160 square miles. Golden eagles begin breeding by 4 years of age and can live up to 20 years. Unlike bald eagles, golden eagles do not congregate in the winter. Besides small mammals, golden eagles would prey upon birds, reptiles, amphibians, and insects. Studies have shown a positive correlation between breeding success and jackrabbit numbers in Idaho, Colorado, and Utah (NatureServe 2010j).

There are two golden eagle nests located on the west and north side of Table Mountain, less than 0.50 mile above the ROW of all alternatives. In 2009, two chicks were produced at one of the nest sites. A juvenile golden eagle was observed perching on the ROW for Alternative C on the west side of Table Mountain during habitat assessment surveys conducted in July of 2005 and again in 2007.

Osprey

Osprey occur near surface waters including lakes, rivers, reservoirs, and seacoasts. They can often be found traveling between habitats providing surface water. They nest in large stick nests and man-made structures above or near water.

According to Sulphur District 2010 records, eight Osprey nests are located in proximity to the project. There are three osprey nests located to the east of Alternative A and the project area, on the east side of Rainbow Bay. Two nests have been identified near Willow Creek Reservoir to the west of all project alternatives, and another two nests are located to the south of Granby Tap Substation. Of the eight nests in the project area, four osprey nests are located in proximity (within 0.5 mile) to Alternatives A and B1. These nests are located approximately 26, 177, 324, and 2,000 feet away from these two alternatives. Two osprey nests are located in proximity to Alternatives C1 and C2. These nests are located 1,817 and 2,030 feet from the alternatives. Alternative D is similar to Alternatives A and B1, located in proximity to the same four nests, with a slight increase in nest distance. The Osprey nests are located approximately 26, 387, 482, and 2,200 feet away from Alternative D. Osprey have also been observed over Windy Gap and the Fraser river inlet area. The other 4 nests in the project area are greater than 0.5 mile from any alternative.

American White Pelican

American White Pelican occurs throughout western and central North America. Several dozen colonies supporting more than 60,000 nesting pairs occur over a large nesting and winter range in Canada, United States, and Mexico (NatureServe 2010c). King and Anderson (2005) determined that at least 27 American White Pelican colonies and 48,240 nests occur east of the Continental Divide and at least 15 colonies and 18, 790 nests exist west of the Divide, for a total of about 134,000 breeding pelicans in North America.

Nesting colonies occurs have also been documented in south-central British Columbia, Alberta, Saskatchewan, Manitoba, southwestern Ontario, northern California, Nevada, Utah, Colorado, South Dakota, and Minnesota (Knopf and Evans 2004). Wintering range of the American White Pelican includes Florida, Gulf of Mexico coast south to northern Yucatan Peninsula, and central California south to southern Baja California and through western mainland Mexico to Nicaragua (AOU 1983, Knopf and Evans 2004). The area of southern Texas has been documented to have the largest wintering population of American White Pelicans (Root 1988); other important wintering areas include the Gulf coast and Everglades region of Florida (NatureServe 2010c).

Habitats of the American White Pelican include rivers, lakes, reservoirs, estuaries, bays, and open marshes, and inshore marine habitats. Pelicans are often observed roosting on islands and peninsulas. Nests usually are on islands or peninsulas (natural or dredge spoils) in brackish or freshwater lakes, or on ephemeral islands in shallower wetlands as in the northern Great Plains or on the Texas coast (Knopf and Evans 2004).

American White Pelicans are abundant summer resident on eastern plains and rare in western valleys and mountain parks. Many reservoirs have large populations of non-breeders, especially on eastern plains. The species is also an abundant spring and fall migrant on the eastern plains. They are rare in western valleys and mountain parks and rare in mountains outside parks, mostly only noted flying overhead. There are several observations of individuals spending the winter at eastern plains reservoirs (NDIS 2010).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter discusses the anticipated direct and indirect environmental effects (Environmental Consequences) of the alternatives presented in Chapter 2.0.

Alternative A, the no action alternative, describes anticipated future conditions if none of the action alternatives are implemented. (Cumulative effects are addressed in Chapter 5.0.)

The analysis of the potentially affected resources is based on the professional judgment and experience of Western, Forest Service, BLM, and contractor resource specialists; discussions with other agency resource experts and professionals; literature reviews; and field trips to the study area by resource personnel. The level of analysis is commensurate with the expected level of potential effects.

The goal of this chapter is to disclose, to the greatest extent possible, the effects of each alternative on the affected resources. If quantitative estimates are not possible, qualitative estimates are provided to facilitate the comparison of alternatives by the public and decision makers.

4.1.1 Impact Thresholds

4.1.1.1 Impact Type

Classifies the effect as direct, indirect, or cumulative, and then determines whether the effect would result in beneficial or adverse effects.

Direct: Effect caused by the alternative and occurs in the same time and place (e.g., removal of vegetation, use of machinery, etc.).

Indirect: Effect caused by the alternative but is later in time or farther removed in distance, but is still reasonably foreseeable (e.g., increased development in the area, accelerated erosion).

Cumulative: Incremental effect caused by the alternative when added to other past, present, and reasonably foreseeable future actions (e.g., combined effect of project and other nonproject actions). Cumulative effects are addressed in Chapter 5.0.

For each impact type – direct, indirect, or cumulative – a determination of whether the effect is anticipated to be beneficial or adverse is provided.

Beneficial: Positive change in the condition or appearance of the resource.

Adverse: Negative change that detracts from the condition or appearance of the resource.

4.1.1.2 Impact Duration

Describes the length of time an effect would occur as short or long term.

Short Term: Lasting no longer than the immediate 1-2-year project implementation period (e.g., construction period, build-out period).

Long Term: Lasting beyond the implementation period (beyond 5 years), typically extending beyond a decade or indefinitely.

4.1.1.3 Impact Intensity

Describes the degree, level, or significance of an effect as no effect, negligible, minor, moderate, or significant.

No effect: No discernable effect.

Negligible: Effect is at the lowest level of detection and causes very little or no disturbance or improvement.

Minor: Effect that is slight but detectable, with some perceptible effects of disturbance or improvement.

Moderate: Effect is readily apparent and has measurable effects of disturbance or improvement.

Significant: Effect is readily apparent and has measurable effects of disturbance or improvement that are of local, regional, or global importance; or sets a precedent for future project undertakings by federal agencies. The significance criteria or threshold is determined on an individual resource basis; significance criteria are provided in each resource section.

4.1.2 Key Assumptions

4.1.2.1 Final Structure and Facility Siting

Final engineering and design have not been completed for all project facilities at this time. Final structure locations, in particular, have not been fully defined in terms of their exact locations, although reasonable estimations can be made. Construction impacts have been calculated on the basis of a planned ROW width of 100 feet with the assumption that construction activities may occur anywhere within the ROW. Because of this, some impacts may be overstated.

Transmission Line Spacing and Disturbances

The impact analyses are based on typical structure spacing of 600 feet between single-pole steel structures, compared to an average 500 feet between the existing H-frame structures that would be replaced. Actual spacing may vary, with maximum spacing reaching 800 feet; although on a site-by-site basis, structures can be designed and constructed to span longer distances. Direct ground disturbances at each structure site are estimated based on the assumption that 900 square feet per structure could be impacted. A direct ground disturbance is defined to include compaction, auguring, grading, and similar activities.

4.1.2.2 Western's Standard Construction, Operation and Maintenance Practices, and Adopted Project-Specific Environmental Protection Measures

The impact analysis assumes that Western's SCPs and project-specific design criteria are (Table 2-5 and Table 2-6) fully incorporated into the proposed project and routing alternatives. The SCPs and project-specific environmental protection measures should be regarded as components or elements of the proposed action and alternatives.

4.2 Air Quality, Climate, and Global Climate Change

4.2.1 Significance Criteria

Significant air quality and climate impacts would result if the effects resulting from implementation of the proposed action and alternatives would cause a permanent or detrimental increase in criteria air pollutant concentrations or greenhouse gas emissions. Additionally, significant effects would result if project construction or operation would result in pollutant concentrations that permanently exceed the NAAQS or CAAQS and expose sensitive receptors to substantial pollutant concentrations (Table 3-2).

4.2.2 Methodology

The air quality effects discussion includes an analysis of emissions during construction, operation, and maintenance for all alternatives. This evaluation discusses potential air emissions that could occur during construction of each alternative from fugitive dust and construction equipment exhaust. Potential operational and maintenance activities are also discussed. Measures to avoid potential nuisance dust conditions and minimize construction equipment effects are also described.

4.2.3 Direct and Indirect Impacts

4.2.3.1 Alternative A

Under Alternative A (no action), Western would not upgrade or rebuild the existing transmission line system between the Windy Gap Substation and the Granby Pumping Plant Switchyard. Repairs and other maintenance activities would be necessary, with increasing frequency as the transmission line ages. Alternative A would have a negligible effect on air quality in the project region and would not cause or contribute to existing or projected ambient air quality standards violations. Future operational emissions may increase slightly due to increased needs for maintenance of the aging line. However, these emissions would not cause or contribute to existing or projected ambient air quality standards violations. Emissions associated with routine maintenance on the transmission line include direct short-term intermittent generation of dust from vehicle traffic and auguring if poles need to be replaced; short-term intermittent emissions of particulates associated with the use of diesel-powered equipment traveling along the ROW and access roads during line inspections or to get to the line for repairs; and short-term intermittent emissions of ozone, especially associated with hardware conditions and wet weather.

Diesel engine emissions would be sporadic and short term and cause direct impacts to local air quality, but dissipate quickly. The effects on air quality or human health would be expected to be negligible. For routine maintenance, approximately 1-6 diesel-powered vehicles would be expected to be used depending on the type of work that would be performed. Vehicles vary from pickup trucks to pole trucks, backhoes, and truck-mounted cranes. Routine maintenance jobs are typically of short duration (2 weeks or less), and the equipment does not typically operate in a small area for more than a day or two since it moves along the ROW to sites needing maintenance attention (e.g., vegetation management, structure replacements, hardware replacement, erosion control work).

Alternative A would have no measurable effect on global climate change nor would it be affected in a measurable way by global climate change.

If global climate changes result in more dramatic weather patterns in the Project Area, either in the form of wetter or drier seasons or more severe winter storms, the existing wooden H-frame structures would be at increased risk of damage, such as rotting and ice or wind damage. Subsequently, Western's maintenance and operations demands would also increase and service to the Project Area may be adversely affected as a result of more frequent outages. The existing wooden H-frame structures therefore represent a minor to moderate disadvantage in light of uncertain future global climate conditions.

4.2.3.2 Alternative B1

Construction

Alternative B1 would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant Switchyard. Alternative B1 would result in short-term construction-related fugitive dust and exhaust emissions. Fugitive dust emissions would be associated with ground disturbance activities, such as site clearing, grading, excavation, and vehicle travel on unpaved roads. Exhaust emissions would occur due to fuel combustion associated with heavy construction equipment, haul trucks, and construction workers traveling to and from the construction sites. The transmission line rebuild is anticipated to take 1-2 years to construct. Construction emissions associated with the rebuild and upgrade would be temporary and minor, and would not lead to an exceedance of NAAQS and CAAQS.

Project construction activities would also include vegetation clearing from the structure location and along the ROW, as necessary. Western would dispose of slash piles and woody debris in a manner acceptable to the county and landowner, but may dispose of the debris by hauling, burning, chipping, or windrowing at the edge of the ROW for stormwater control. If slash burning is required, Western shall comply with the Grand County Burning Management Plan. This includes complying with open burning permit stipulations and complying with the slash piling and burning guidelines.

Private buildings, including residences and unoccupied outbuildings, are located immediately adjacent to or directly under the existing transmission line. A limited number of residents in the ROW may be affected by a temporary increase in fugitive dust. Total construction time at each transmission structure location would be approximately 1-2 weeks spread over a period of 18 months. Therefore, a particular receptor would not be exposed to construction emissions for more than this duration. Thus, project generated emissions of criteria air pollutants and ozone precursors would not expose sensitive receptors to substantial pollutant concentrations.

Fugitive dust emissions during construction are anticipated to occur in minor quantities and would be associated with activities such as site clearing, grading, and excavation. Incorporation of Western's adopted SCPs would ensure that fugitive dust emissions are minimized. These measures are presented in detail in Section 2.4. Additionally, construction generated dust would rapidly settle out of the air, thus avoiding visibility impacts at the RMNP Class I area. Given that the construction would be temporary, no significant effects to Class I areas are expected to occur from construction.

A principal Hazardous Air Pollutant (HAP) of concern for the proposed action is diesel particulate matter, which would be associated with the use of off-road diesel equipment required for construction activities, in addition to diesel-fueled on-road haul trucks used for hauling debris and construction material. The dose to which sensitive receptors are exposed (a function of concentration and duration of exposure) is the primary factor used to determine health risk (i.e., potential exposure to HAP emission levels that exceed applicable standards). Health risk assessments, which determine the exposure of sensitive receptors to HAP emissions, are usually based on a 70-year exposure period; however, such assessments are limited to the period/duration of activities associated with the project. Construction of the proposed action would be short term (less than 2 years), and the diesel particulate matter emissions would cease after completion of construction. In addition, total construction time at each transmission structure location would be limited to approximately 1-2 weeks. Construction of the proposed action would represent less than 3 percent of the 70-year exposure period for a nearby sensitive receptor in the area. In addition, diesel particulate matter is highly dispersive, and studies have shown measured concentrations of vehicle-related pollutants, including ultra-fine particles, decrease dramatically within approximately 300 feet of the source (Zhu et al 2002).

Therefore, because the use of mobilized equipment would be temporary in combination with the dispersive properties of diesel particulate matter, construction-related HAP emissions would not be anticipated to expose sensitive receptors to substantial pollutant concentrations.

Operations

No adverse air effects are expected from ongoing operation and maintenance associated with Alternative B1. Routine maintenance activities would include ground inspections of the transmission lines once per year, and as needed after weather events, to identify repair or routine maintenance needs. Maintenance activities would include repairing damaged conductors, insulators, or structure components. An occasional maintenance vehicle would be required to perform maintenance activities. Other possible activities include maintenance of permanent access roads and vegetation clearing. Air emissions from these activities are anticipated to be minor.

The potential would exist for trace amounts of ozone production resulting from corona effects, the electrical breakdown of air into charged particles around the conductors, as explained in Section 3.6, Electric and Magnetic Fields. During damp or rainy weather (the peak conditions for corona effects), the 1-hour average ozone concentration produced from similar transmission lines is less than 1 part per billion (ppb) (DOE 2001). Background ozone measurements in Rocky Mountain National Park showed a maximum 1-hour average ozone level of 89 ppb in 2007, considerably higher than levels generated by corona effects (NPS 2008). Maximum generation of ozone from corona effects would be during damp or rainy weather. Therefore, ozone generation associated with corona would be intermittent and minor compared to background levels and fluctuation in background levels. Thus, no adverse effects to air quality would be associated with the operation of Alternative B1.

Alternative B1 would have a minor effect on air quality due to construction and operation, and would not lead to an exceedance of NAAQS and CAAQS.

4.2.3.3 Alternative C1

Alternative C1 would reroute and upgrade the transmission line between the Windy Gap Substation and the Granby Pumping Plant Switchyard. The majority of the rebuild and upgrade would occur on a new 100-foot ROW; the remainder of the upgrade would occur on the existing alignment. The short and long-term effects of Alternative C1 would be similar to Alternative B1, as the alignment difference would not result in a measurable difference in air emissions. The duration, intensity, and nature of construction activities would be very similar across all alternatives. Given the temporary nature of construction and the limited effects during operation, Alternative C1 would have a minor effect on air quality due to construction and operation, and would not lead to an exceedance of NAAQS and CAAQS.

4.2.3.4 Alternative C2

Alternative C2 would reroute and upgrade the transmission line between the Windy Gap Substation and the Granby Pumping Plant Switchyard, with options to use the existing ROW or parallel the Windy Gap Pipeline in a segment just east of the Windy Gap Substation. The short and long-term effects of Alternative C2 would be similar to the other alternatives. Alternative C2 would have a minor effect on air quality due to construction and operation, and would not lead to an exceedance of NAAQS and CAAQS.

4.2.3.5 Alternative D

Alternative D would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant Switchyard, with options to use the existing ROW or parallel the Windy Gap Pipeline in a segment just east of the Windy Gap Substation. The short and long-term effects of Alternative D would be similar to the other alternatives. Alternative D would have a minor effect on air quality due to construction and operation, and would not lead to an exceedance of NAAQS and CAAQS.

4.2.3.6 Effects Common to All Action Alternatives

For the purposes of this analysis, each of the action alternatives is expected to have similar effects on or as a result of global climate change and is therefore analyzed collectively.

Trees or woody shrubs, which would otherwise eliminate CO_2 from the atmosphere, would be cleared from existing and new ROWs. Western would dispose of cleared vegetation by chipping, lopping, and scattering branches on the ROW. This vegetation would then gradually degrade, releasing small quantities of carbon to the atmosphere over an extended period of time. The effects of ROW clearing under any of the action alternatives is expected to result in negligible effects to or influences on climate change at both the local and global scales.

Given that this project is driven by system reliability concerns, there is no direct connection to increased generation emissions. Due to the relatively low-voltage and small service area, it is likely that the action alternatives would have locally or regionally negligible effects on generation emissions; these effects would be infinitesimal at the global scale. Moreover, the primary generation source of electricity for the service area is hydroelectric, which has minimal air emissions to begin with.

It is highly unlikely that this project would be affected by global climate change. Unlike projects located in coastal, Arctic, or Antarctic environments where sea level fluctuations may threaten infrastructure investments, this project is located in a very stable area.

If global climate change results in more dramatic weather patterns in the Project Area, either in the form of wetter or drier seasons or more severe winter storms, the single-pole steel structures proposed for each of the action alternatives would be better suited to withstand these conditions without damage. The use of single-pole steel structures represents a minor beneficial advantage for the project in light of uncertain future global climate conditions.

4.2.4 Mitigation Measures

Appropriate fugitive dust and exhaust emission control measures would be implemented during construction. Western's adopted SCPs include measures that would minimize air emissions. These measures would be implemented for the construction of any action alternative. No further special mitigation measures are recommended.

4.3 Soil Resources

4.3.1 Significance Criteria

A significant impact on soils would result if any of the following were to occur from construction or operation of the proposed project:

- Long-term loss or reduction in soil productivity and quality resulting from detrimental compaction or rutting, severe erosion, soil mixing, or contamination.
- Increased soil instability and the potential for mass wasting events.
- Impacts to sensitive soils found in wetlands and riparian areas.

4.3.1.1 Overview

The analysis of the impacts to soil resources is based on the assumption that Western's SCPs and project-specific design criteria would be implemented as part of the project. These proposed measures address the compensation for damage to ditches, terraces, and other land features; erosion control correction of rutting and compaction; recontouring; and other practices that would minimize soil resource impacts when implemented. To minimize construction related impacts to soil resources, reclamation would be conducted as soon as practical following surface disturbance.

Appendix E provides a table listing the soils occurring in the analysis area and their relative extent based on each alignment and proposed and alternative routes. Baseline information used to characterize soils was derived from SSURGO database review and Soil Data Viewer for ArcGIS 9.2 analyses. Table 4-1 provides an assessment of the soil characteristics located within the ROW for each alternative. Wind erodible and low reclamation potential soils (soils high in salts or sodium) are not present and will not be discussed further. The calculation of area is based on a ROW width of 100 feet, which reflects the area of potential disturbance but it is not anticipated that all areas within the ROW would be disturbed.

Table 4-1. Soil Characteristics for each Alternative (acres).

Alternative	Water Erosion-Prone	Compaction-Prone	Farmland of Statewide Importance	All Soil Components Hydric	Partially Hydric	Shallow Depth to Bedrock
Alternative A-Existing	6.0	19.8	22. 5	5.0	22.2	4.4
Alternative B1	18.2	64.7	31.3	12.4	16.4	10.8
Alternative C1	8.2	59.2	36.5	10.3	20.2	6.6
AlternativeC2-Option 1	8.2	61.2	35.5	10.3	20.2	6.6
Alternative C2-Option 2	8.2	60.4	40.0	10.3	20.4	9.8
Alternative D-Option 1	20.7	60.9	30.4	10.3	16.9	6.5
Alternative D-Option 2	20.7	59.8	35.0	10.3	17.1	9.7

4.3.2 Direct and Indirect Impacts

Impact assessments were based on a wide range of physical and chemical soil characteristics. The primary impacts that would occur during construction activities are discussed in further detail in subsequent paragraphs. These impacts would apply to all action alternatives.

4.3.2.1 Effects Common to All Alternatives

Erosion by Water and Wind

Susceptibility to erosion is a complex function of characteristics such as soil texture and structure, topography, surface roughness, soil cover (made up of vegetation, duff/litter, rock, and woody debris), and climate. Erosion may also be influenced by the length of time the soils are bare and by disruption of drainage and erosion control structures. Erosion resulting from water occurs primarily on loose, noncohesive soils on moderate to steep slopes, particularly during high intensity storm events. Map 4-1 displays the soils in the Project Area that are prone to water erosion. Soils with steep slopes (slopes greater than 30) area also depicted due to the increased potential for erosion when disturbed.

Although accelerated erosion due to construction related soil disturbance could occur at any stage of construction, the maximum potential for erosion within the construction ROW would be expected when soils are disturbed or loose, in spoil piles, or where there is a lack of soil cover protecting the surface of the soil. Protecting soil from wind and water erosion is essential in areas near waterways.

SCPs and design criteria would be applied to reduce erosion and sedimentation to nearby waterways. Particular attention would be given to erosion and sedimentation controls along steeper slopes.

Soil Productivity

The removal of surface organic matter may limit the soil's ability to function. Surface soil organic matter is essential for nutrient cycling, long-term productivity, and ecosystem function. The majority of soil nutrients and organic matter is located on the surface and, in particular, the A-horizon. In addition, the fine surface litter provides organic matter and ground cover, and reduces raindrop impact and subsequent erosion. Displacement and loss of the A-horizon could result in a reduction in long-term productivity until soil horizons form and recover, which might take decades or centuries. The mixing of soil horizons would lower soil productivity of agricultural and rangeland by diluting the physical, biological, and chemical properties of the topsoil with less productive subsoil. This could affect reclamation. If topsoil is lost or diluted, mitigation can be difficult because it may take hundreds to thousands of years for a topsoil horizon to form naturally.

Erosion of the topsoil could occur during construction. This could affect nutrient cycling and soil productivity. Rutting may also mix the subsoil and topsoil horizon, thereby diluting the productivity of the soil. Rutting restrictions mitigate this impact.

Soil Compaction and Rutting

Soil compaction occurs when soil particles are pressed together and the pore spaces between them are reduced and bulk density is increased. Moist fine textured soils are most susceptible to severe compaction. However, compaction may occur on loamy to coarse textured soils and under drier conditions due to multiple passes by heavy mechanical equipment. Compaction prone soils in the project vicinity are displayed on Map 4-2.

Rutting occurs when the soil strength is not sufficient to support the applied load from vehicle traffic. Rutting affects the surface hydrology of a site as well as the rooting environment. The process of rutting physically severs roots and reduces the aeration and infiltration of the soil, thereby degrading the rooting environment. Rutting also disrupts natural surface water hydrology by damming surface water flows, creating increased soil saturation upgradient from ruts, or by diverting and concentrating water flows creating accelerated erosion. Rutting is most likely to occur on moist or wet fine textured soils, but may also occur on dry sandy soils due to low soil strength. Soil rutting is an important indication that other physical soil impacts may be occurring on a site.

Soil compaction and rutting could result from the movement of heavy construction vehicles along the construction ROW and on temporary access roads. The degree of compaction would depend on the moisture content and texture of the soil at the time of construction. Compaction would be most severe where heavy equipment operates on moist to wet soils with high clay contents. Detrimental compaction can also occur on soils of various textures and moisture contents if multiple passes are made by high ground-weight equipment. If soils are moist or wet, topsoil may also adhere to tires or tracked vehicles and be carried away. Rutting restrictions help to mitigate these concerns.

Soil that is excessively compacted is limited in its ability to function. Compaction damages soil structure and reduces pore space, which impedes the movement of air and water to plant roots, and can result in lower growth rates and hinder revegetation. Compaction reduces infiltration and results in excessive surface runoff, erosion, nutrient loss, and potential water quality problems. Detrimental soil compaction, when extreme and unmitigated, can result in a loss in soil productivity.

Hydric Soils

A hydric soil is defined by the U.S. Department of Agriculture as soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. Hydric soils are sensitive to vehicle traffic due to frequent saturation. Map 4-3 displays hydric soils crossed by the proposed alternatives.

Soil Contamination

Soil contamination along the proposed routes could result from material spills during construction. If large spills occur, it could result in the removal and disposal of large amounts of soil. Back-filling with clean soil may be required, depending on the volume of excavated material.

Saturated soils may have the potential to diffuse contaminants. Design criteria that buffers wetlands and water bodies from refueling or fuel storage would help prevent spills in saturated areas.

Roads

The direct effect of roads is removal of land from the growing base. Indirect effects may include landslides, gullies, and generation of side cast materials (sediment); and disruption and interception of subsurface flow of water could alter soil moisture regimes upslope and downslope from the road. Other indirect effects may be trespass and off-road use.

Road closure, which involves barricading the road to inhibit vehicular use, helps reduce effects. However, erosion, compaction, and flow diversion may persist until roads revegetate and pore space is increased. Decompaction is essential for infiltration and acceleration of revegetation.

4.3.2.2 Alternative A

Alternative A would not upgrade or rebuild the existing transmission line system, resulting in no new temporary or permanent removal of soils for the transmission line components or substations. Alternative A would result in minimal direct, indirect, or cumulative effects to soils in the Project Area. Activities associated with the maintenance and repairs of the existing line, including soil compaction and other disturbances, would result in minor short-term effects in localized areas. Maintenance frequency is expected to increase as the line ages.

4.3.2.3 Alternative B1

Alternative B1 would upgrade and rebuild the existing transmission line within the existing ROW. Much of the soil disturbance would occur within the existing ROW. Minor adverse temporary impacts from construction activities would occur within the ROW due to construction traffic along the ROW, temporary staging areas, and work areas around each structure. Permanent structures would impact approximately 0.05 acre of soils.

Since the specific locations of each structure or access road cannot be defined at this time, soil conditions are characterized for the entire ROW.

Within the ROW for Alternative B1, soil inventories indicate that fine textured soils are common. These soils are prone to rutting and compaction when wet or moist. There is a potential for encountering localized areas of hydric soils on approximately 29 acres of the ROW. Approximately 11 acres of soils have hard bedrock within 60 inches of the surface. Rock drilling may be necessary in these areas; blasting will not be allowed. Map 4-4 displays the locations where soils with shallow bedrock may occur. Approximately 18 acres of soils within the ROW are highly erodible. Runoff and erosion controls would be implemented within the ROW in accordance with National Pollutant Discharge Elimination System (NPDES) and stormwater construction permit requirements for construction. Particular attention would be given to erosion and sedimentation controls at or near stream banks and along steeper slopes.

4.3.2.4 Alternative C1

Alternative C1 would reroute and upgrade the transmission line. Most of the soil disturbance would occur on a new length of ROW. Minor adverse temporary impacts would occur within the ROW due to construction traffic along the ROW, temporary staging areas, and work areas around each structure.

Within the ROW for Alternative C1, soil inventories indicate that fine textured soils are common. These soils are prone to rutting and compaction when wet or moist. There is a potential for encountering localized areas of hydric soils on approximately 31 acres of the ROW. Approximately 7 acres of soils have hard bedrock within 60 inches of the surface. Rock drilling may be necessary in these areas; blasting will not be allowed. Approximately 8 acres of soils within the ROW are highly erodible. NPDES and stormwater permit requirements would be the same as described for Alternative B1.

4.3.2.5 Alternative C2

Alternative C2 would reroute and upgrade the transmission line with options to use the existing ROW. Chapter 2.0 provides further detail on the routing for Alternative C2 and Options 1 and 2. Temporary impacts would occur within the ROW due to construction traffic along the ROW, temporary staging areas, and work areas around each structure.

Within the ROW for Alternative C2, soil inventories indicate that fine textured soils are common. These soils are prone to rutting and compaction when wet or moist. There is a potential for encountering localized areas of hydric soils on approximately 31 acres of the ROW. The acreage of soils that are potentially highly erodible would be the same as described for Alternative C1. The primary difference between soil characteristics for Alternative C2-Option 2 is approximately 10 acres of soils have hard bedrock within 60 inches of the surface compared to 7 for Alternative C1. NPDES and stormwater permit requirements would also be the same as described for Alternative B1.

4.3.2.6 Alternative D

Alternative D would upgrade and rebuild the existing transmission line with options to use the existing ROW. Chapter 2.0 provides further detail on the routing for Alternative D and Options 1 and 2. Temporary impacts would occur within the ROW due to construction traffic along the ROW, temporary staging areas, and work areas around each structure.

Within the ROW for Alternative D, soil inventories indicate that fine textured soils are common. These soils are prone to rutting and compaction when wet or moist. There is a potential for encountering localized areas of hydric soils on approximately 27 acres of the ROW. Approximately 7 acres of soils have hard bedrock within 60 inches of the surface. Rock drilling may be necessary in these areas; blasting will not be allowed. The soil characteristics for Option 2 are similar, with the exception of approximately 10 acres of soils that have hard bedrock within 60 inches of the surface. Approximately 20 acres of soils within the ROW are highly erodible. NPDES and stormwater permit requirements also would be the same as described for Alternative B1.

4.3.3 Mitigation Measures

Western's adopted SCPs and project-specific design criteria include measures that would minimize soil impacts. These measures would be implemented for the construction of any action alternative. No further special mitigation measures are recommended.

4.4 Paleontological Resources

FLPMA mandates the treatment of paleontological resources as a scientific value (FLPMA section 102[8]). The Paleontological Resources Preservation Act (section 6302[a]) requires that paleontological resources on public lands (or affected by federal actions) be managed using scientific principles and expertise. For the purpose of this analysis, scientifically significant paleontological resources are defined as vertebrate fossils that are identifiable to taxon or element, noteworthy occurrences of invertebrate and plant fossils, and vertebrate trackways.

Paleontological resources within the study area may be classified in one of two categories: 1) those which have already eroded onto the ground surface and are thus visible (surface fossils); and 2) those that are still buried within rock strata and are thus not visible (subsurface fossils). Surface fossils may be located during a field survey, evaluated, and salvaged by paleontologists prior to a surface disturbing action. Because they are not visible, subsurface fossils cannot be located and evaluated prior to ground disturbance. Rather, the likelihood of adverse effects on subsurface fossils can only be estimated by determining the number and types of fossils that have been previously discovered within the study area and elsewhere within the same fossil-bearing geologic units (formations, members, submembers, and individual strata). The existence of subsurface fossils can only be ascertained by monitoring excavations during a surface-disturbing action. Thus, it is not possible to precisely quantify impacts on subsurface fossils prior to their discovery because their locations are unknown.

It is important to point out that subsequent to the location and removal of surface fossils during a paleontological field survey and issuance of a surface clearance recommendation, additional subsurface fossils will continue to erode onto the ground surface over time. This effect is particularly prevalent in areas that are prone to high rates of erosion.

The potential for adverse impacts to both surface and subsurface paleontological resources is directly proportional to the amount of ground disturbance associated with a proposed action. Thus, the higher amount of surface disturbance associated with development, the greater the potential for adverse impacts to paleontological resources.

4.4.1 Significance Criteria

Significance criteria and impact thresholds have not been formalized for NEPA analyses of paleontological resources. However, in keeping with established professional standards, and because of the fact that paleontological resources are nonrenewable, the threshold for significant impacts to paleontological resources may be considered to be reached with the damage or destruction of fossils that are scientifically significant and the loss of associated scientific information. This includes destruction as the result of surface and subsurface disturbance as well as unlawful vandalism and unauthorized collection of fossil remains.

4.4.2 Methodology

Because no scientifically significant surface fossils were identified within any of the ROWs of the proposed alternatives, surface fossils are irrelevant to this analysis. Because the locations of subsurface fossils are unknown, the first step in the analysis was to determine the paleontological sensitivity of the geologic units within the study area based on published scientific literature and museum records (see Section 3.4). The results of the sensitivity analysis indicate that the Troublesome Formation is the only geologic unit within the study area with a high potential to contain subsurface vertebrate fossils. Three museum fossil localities in this unit have been previously recorded within the study area. Because the potential for impacts to subsurface fossils is directly proportional to the amount of ground disturbance in paleontologically sensitive geologic units, the anticipated amount of ground disturbance under each alternative was used to analyze the potential for impacts on subsurface fossils.

4.4.3 Paleontology-Specific Impact Definitions

The following are definitions of types of direct and indirect impacts and related effects on paleontological resources, followed by an analysis of impacts anticipated under each alternative. Because paleontological resources are nonrenewable, direct and indirect effects that result in their loss are considered to be long term.

4.4.3.1 Direct Impacts

Direct impacts on nonrenewable surface or subsurface paleontological resources are the result of destruction by breakage and crushing during surface disturbing actions. Surface disturbance has the potential to impact an unknown quantity of fossils that 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 destroyed, rendering them permanently unavailable. Direct impacts can typically be mitigated to below a level of significance through implementation of paleontological mitigation. Mitigation also results in the salvage of fossils that may never have been unearthed as the result of natural processes, thus creating a beneficial impact. With mitigation, these newly exposed fossils become available for scientific research, education, display, and preservation at a public museum.

Direct impacts on surface fossils associated with the proposed transmission line rebuild are anticipated to be negligible because no scientifically significant fossil localities were identified within the ROW of the proposed alternatives during the field survey. Direct impacts on subsurface fossils are likely if these resources are present at the locations of any project-related excavations.

4.4.3.2 Indirect Impacts

Indirect impacts typically include those effects that result from the continuing implementation of management decisions and associated activities. For paleontological resources, they most commonly occur as the result of management actions that increase the accessibility of public lands, increasing the potential for loss of paleontological resources by vandalism and unlawful collecting (poaching). Indirect impacts are difficult to mitigate to below the level of significance, but they can be greatly reduced by increasing public awareness about the scientific importance of paleontological resources through education, community partnerships, and interpretive displays, as well informing the public about penalties for unlawful destruction or unlawful collection of these resources from public lands.

Indirect impacts associated with the proposed transmission line rebuild are anticipated to be negligible.

4.4.4 Direct and Indirect Impacts

As indicated in Section 4.4.3, direct impacts on subsurface (buried) paleontological resources are the only impacts that are anticipated to be possible given the results of the field survey and combined with the nature of the ground disturbance associated with the proposed project. Therefore, the following impacts analysis is focused on potential direct impacts on subsurface fossils only.

Under each action alternative, installation of steel power poles constitutes the only significant ground disturbance. The ROW width, average span of poles, maximum span of poles, and pole diameters are identical (5 feet) under all action alternatives. Installation of power poles would involve significant bedrock disturbance by auguring and possibly other excavation equipment. Construction staging areas are not anticipated to have a significant effect on fossiliferous bedrock Troublesome Formation. However, in portions of the study area underlain by high sensitivity Troublesome Formation strata, impacts on paleontological resources are possible wherever excavations for each power pole occur, and in the surrounding areas of surface disturbance (temporary and permanent) at each pole location.

4.4.4.1 Alternative A – No Action

No new impacts on paleontological resources are anticipated under the no action alternative.

4.4.4.2 All Action Alternatives

Each of the action alternatives would have a similar amount of temporary and permanent land disturbance. The potential for impacts to paleontological resources would also be similar for each alternative and difficult to quantify (see discussion of mitigation measures that follows).

4.4.5 Mitigation Measures

In addition to project-specific design criteria described in Chapter 2.0, the following resource-specific mitigation measures are recommended.

The Troublesome Formation is the only geologic unit for which paleontological mitigation is recommended. The development and implementation of a project-specific mitigation strategy for paleontological resources is appropriate because 1) the Troublesome Formation is considered to have high paleontological sensitivity; and 2) although no new significant surface fossils were documented during the field survey undertaken for this analysis, three previously recorded vertebrate fossil localities occur within or immediately adjacent to one of the proposed alternatives. This indicates that the Troublesome Formation is fossiliferous in the study area vicinity, and that bedrock disturbance has the potential to adversely impact scientifically significant paleontological resources.

Prior to construction, a qualified and permitted paleontologist should examine the construction design plans and develop an appropriate mitigation monitoring program. Monitoring of numerous prior excavations in fossiliferous rock performed with augers has demonstrated that the auguring process is highly destructive to fossils because the rock and fossils preserved therein are pulverized during excavation. The smaller the auger, the more likely the destruction of fossils. Small mammal fossils have been salvaged from rock excavated using larger diameter augers, depending upon the degree to which the rock fractures during the auguring process. Because it is not known how Troublesome Formation rock will respond to auguring and whether fossils will remain intact given the size of the auger to be used, it is recommended that testing (including screenwashing of excavated matrix at one or two power pole installation sites) take place as an initial step to determine whether intact fossils can be salvaged from the auguring locations. If intact fossil are recovered, or are likely to be recoverable given the condition of the augured rock, additional monitoring of power pole installation sites is recommended with the goal of fossil salvage. If project excavations are conducted using other types of digging equipment, monitoring of these sites is recommended since they are likely to produce larger fragments of rock that are more suitable to fossil recovery. If it is determined that, for whatever reason, intact identifiable fossil remains would be unlikely to be recovered from any project excavations, the monitoring program should be suspended.

In the absence of a paleontological monitor, if subsurface fossils or other potential bones are encountered within the study area during construction, excavations within a 50-foot radius of the site should cease immediately, and a qualified and permitted paleontologist should be called to assess the discovery and make additional recommendations.

4.5 Cultural Resources

4.5.1 Significance Criteria

The following significance criteria were used to assess potential impacts to cultural resources with regard to project alternatives.

Sites are evaluated for the NRHP listing with regard to their research value and tangible links to important persons or historical events. Direct impacts to cultural resources could occur from ground-disturbing activities associated with the proposed transmission line rebuild (i.e., earth moving activities needed for construction of the new proposed transmission line and substation expansions, and dismantling of the existing transmission line), as well as the upgrade and use of existing access roads and the construction of new roads to structure sites within the ROW. Cultural resources may also be subject to indirect impacts that may result from increased access due to new or upgraded access roads or vandalism to sites by the general public.

4.5.2 Methodology

The analysis area for cultural resource investigations includes a corridor width of 200 feet centered on the proposed alignments and a corridor width of 50 feet centered on access roads. The analysis focuses on sites within the analysis area that may be eligible, sites determined eligible, or sites listed in the NRHP that may be impacted by the project.

4.5.3 Impacts Common to All Alternatives

All alternatives would potentially cause impacts to sites shown in Table 4-2. Note that alternatives following a different alignment than the existing transmission line would still affect cultural resources along the alignment of the existing line through removal of the existing structures. Also, though the level of disturbance at any point in time may be less, over time the no action alternative and the more intensive maintenance required to keep the existing line in operation could also adversely affect these sites. For each site shown in Table 4-2, specific recommendations are provided to avoid disturbance or conduct additional testing if avoidance is not practical. The final treatment of sites in the alternative ROWs, and mitigations for adverse effects, will be determined in consultation with the SHPO under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Consultation with the SHPO is on-going (correspondence is included in Appendix K).The application of Western's SCPs (Table 2-5) would avoid significant impacts to known cultural resources and minimize the risk of adverse effects to previously unrecorded sites.

4.5.3.1 Sites Recommended as Needing Additional Data

Based on SHPO correspondence dated March 29, 2011, twenty-six (26) sites need additional data in order to formulate a NRHP evaluation recommendation. These sites may be associated with significant persons or events in the history of the area, or may be able to provide additional important information on the prehistory of the area. Although additional information is needed to evaluate NRHP eligibility, not all of these sites would be impacted by the proposed activities. Recommendations for the need data sites include avoidance or test excavations, and historic research.

Where testing is recommended, these sites have the potential to yield important information on the prehistory of the area (Criterion D), including information on chronology, lithic technology, and settlement/subsistence. All of the sites are located in deposits that have a high probability of yielding intact, buried cultural materials.

Table 4-2. Sites Potentially Affected by All Alternatives.

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Open Camp	RMC 2005 (this report); RMC 2001; WCRM 1978, 1981, 1982	Private	Recommend Eligible	Removal of existing structures; placement of new metal tower within site Boundary/Unknown Effect	Avoid site or test within ROW to determine potential project effects
Prehistoric Lithic Scatter	RMC 2005 (this report); WCRM 1981	USDA Forest Service – Arapaho National Recreation Area	Recommend Needs Data	Removal of structure and placement of new metal towers; upgrading of unimproved access road /Unknown Effect	Avoid impacts to site or test for eligibility and project effects
Prehistoric Open Camp	RMC 2005 (this report); RMC 2001; WCRM 1981	Private	Recommend Needs Data	Removal of existing structure; placement of new metal tower within site boundary /Unknown Effect	Avoid impacts to site or test for eligibility and project effects
Prehistoric Open Camp/Lithic Procurement	RMC 2005 (this report); WCRM 1981, 1982	BLM-Kremmling Field Office	Officially Eligible	Possible visual impacts to potential TCP /Adverse Effect	Native American consultation on visual impacts to stone cairn (Feature 1)
Prehistoric Open Camp	RMC 2005 (this report); RMC 2001; Forest Service 1998	Arapaho and Roosevelt National Forest	Officially Needs Data	Continued vehicle usage and potential upgrading of unimproved access roads /Unknown Effect	Restrict vehicle travel across site or test to determine eligibility and project effects
Historic Transmission Line	RMC 2005 (this report); RMC 2001; ACRE 1998	Western Area Power Administration	Recommend Eligible	Removal of existing structures/Adverse Effect	Avoid or assess integrity of pole structures. If contributing follow recommendations of Schweigert (1998:5-117)

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Granby-Windy Gap Transmission Line	RMC 2005 (this report); ACRE 1998	Western Area Power Administration	Recommend Eligible	All wooden structures on line to be replaced with metal ones /Adverse Effect	Avoid or assess integrity of pole structures. If contributing follow recommendations of Schweigert (1998:5-117)
Historic Irrigation Ditch	RMC 2005 (this report); RMC 2001	Private/ BLM-Kremmling Field Office	Recommend Needs Data	Removal of existing structures, placement of metal towers; stringing of conduit and groundwire; vehicle travel along ROW; reseeding and reclamation /No Adverse Effect	Monitor construction
Historic Irrigation Ditch	RMC 2005 (this report); RMC 2001	Private	Recommend Needs Data	Removal of existing structures; placement of metal towers; stringing of conduit and groundwire ; vehicle travel along ROW; reseeding and reclamation /No Adverse Effect	Monitor Construction
Prehistoric Lithic Scatter	RMC 2005	Forest Service, Arapaho-Roosevelt National Forest	Recommend Needs Data	Upgrading of unimproved access road and vehicular travel in ROW /Unknown Effects	Avoid impacts to site or test site to determine eligibility and project effects
Historic Ditch	RMC 2005	Private	Recommend Needs Data	Removal of existing structures ; placement of new metal towers ; stringing of conduit and groundwire; vehicle travel along ROW; reseeding and reclamation /No Adverse Effect	Monitor Construction

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Prehistoric Lithic Scatter	RMC 2005	Forest Service, Arapaho-Roosevelt National Forest	Recommend Needs Data	Upgrading of unimproved access road /Unknown Effect	Avoid impacts to site or test site to determine eligibility and project effects
Prehistoric Lithic Scatter	RMC 2005	Forest Service, Arapaho-Roosevelt National Forest	Recommend Needs Data	Upgrading of unimproved access road /Unknown Effect (All but Alternative C)	Avoid impacts to site or test site to determine eligibility and project effects
Prehistoric Lithic Scatter	RMC 2005	BLM-Kremmling Field Office	Recommend Needs Data	None- site is outside current project ROW/No effect	No further work recommended
Prehistoric Lithic Scatter/Historic Homestead	WCRM 1981	Private	Recommend Needs Data	Site is outside likely area of disturbance	No further work recommended
Prehistoric Lithic Scatter	WCRM 1978	Private	Recommend Needs Data	Outside area of potential effect.	No further work recommended

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Prehistoric Lithic Scatter	Midwest Archaology Center 1978	Forest Service, Arapaho-Roosevelt National Forest	Recommend Needs Data	Inadvertent vehicular travel outside the ROW	Avoid impacts to site or test site to determine eligibility and project effects
Prehistoric Lithic Scatter/Historic Artifact Scatter	University of Colorado, 1976	BLM-Kremmling Field Office	Officially Not Eligible	Outside area of potential effect.	Although previously considered not eligible, SHPO recommends a finding of Needs Data
Prehistoric Lithic Procurement/Open Camp	Burney 1979, RMC 2001	Private	Officially Not Eligible	Placement of metal tower structures; stringing of conduit and groundwire ; vehicle travel along ROW; reclamation and reseeding	Although previously considered not eligible, SHPO recommends a finding of Needs Data
Prehistoric Lithic Scatter	RMC 2002	Private	Recommend Needs Data	Placement of new metal tower within site boundary; upgrading of unimproved access road/Unknown Effect	Although previously considered not eligible, SHPO recommends a finding of Needs Data
Prehistoric Lithic Scatter	RMC 2002	Private	Recommend Needs Data	Placement of new metal tower within site boundary; upgrading of unimproved access road/Unknown Effect	Although previously considered not eligible, SHPO recommends a finding of Needs Data

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Prehistoric Lithic Scatter	RMC 2001	Forest Service, Arapaho-Roosevelt National Forest	Recmmend Needs Data	Placement of new metal tower within site boundary; upgrading of unimproved access road/Unknown Effect	Although previously considered not eligible, SHPO recommends a finding of Needs Data
Prehistoric Lithic Scatter	WCRM 1979	Private	Recmmend Needs Data	Outside area of potential effect.	Although previously considered not eligible, SHPO recommends a finding of Needs Data

Table 4-3. Additional Sites Potentially Affected by Alternatives C1 and C2.

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Prehistoric Lithic Procurement/Open Camp/Architectural Site	RMC 2005 (this report); BLM-Kremmling 1994; WCRM 1981, 1982; U of Colorado 1976	BLM-Kremmling Field Office/Private	Officially Eligible	Potential new tower structure in northern saddle locality; upgrading of unimproved access road; upgrading of unimproved access road	Avoid or test tower location in northern saddle area and within ROW of unimproved access roads where they cross northern saddle area and lower terrace to determine project effects
Prehistoric Lithic Procurement/Open Camp	RMC 2005 (this report); BLM Kremmling 1995; WCRM 1982, 1981; U of Colorado 1977; U of Colorado 1976	Private	Officially Eligible	Only noncontributing portions impacted/No Adverse Effect	No further work
Prehistoric Habitation Site	RMC 2007 (this report); WCRM 1982, 1981, 1978; U of Colorado 1976	Northern Colorado Water Conservancy District	Officially Eligible	Only noncontributing portions impacted/No Adverse Effect	No further work
Prehistoric Open Camp/Historic Artifact Scatter	RMC 2005 (this report); Gordon & Kranzush 1977; BLM-Craig District Office 1976	Private	Recommend Eligible	None- site is outside current project ROW/No effect	No further work
Historic Ditch	RMC 2005	Private-unknown	Recommend Needs Data	Placement of metal tower structures; stringing of conduit and groundwire ; vehicle travel along ROW; reclamation and reseeding /No Adverse Effect	Monitor Construction

Site Type	Recorded By	Ownership	NRHP	Project Impacts/ Project Effects	Management Recommendations
Prehistoric Lithic Procurement/Open Camp & Historic Artifact Scatter	RMC 2005	Northern Colorado Water Conservancy District	Recommend Needs Data	Placement of new metal tower within site boundary (Alt. C); upgrading of unimproved access road (Alt. C)/Unknown Effect	Avoid impacts to site or test site to determine eligibility and project effects
Prehistoric Lithic Scatter	RMC 2005	Northern Colorado Water Conservancy District	Recommend Eligible	Vehicular travel on access road and upgrading of the access road/Adverse Effect	Avoid site
Prehistoric Lithic Procurement/Open Camp & Historic Artifact Scatter	RMC 2005	Northern Colorado Water Conservancy District	Recommend Needs Data	Upgrading of unimproved access road /Unknown Effect	Avoid impacts to site or test site to determine eligibility and project effects
Prehistoric Lithic Scatter/Open Camp	BLM (Harrison) 1995	BLM-Kremmling Field Office/ Northern Colorado Water Conservancy District	Recommend Needs Data	Placement of new metal tower within site boundary; upgrading of unimproved access road/Unknown Effect	Although RMC Report concludes site is not eligible, SHPO (2011) states should be a finding of needs data. Avoid impacts to site or test site to determine eligibility and project effects
Prehistoric Lithic Procurement site	WCRM 1978, RMC 2005	Private	Recommend Needs Data	Placement of new metal tower within site boundary; upgrading of unimproved access road/Unknown Effect	Avoid impacts to site or test site to determine eligibility and project effects
Historic Ditch	RMC 2005	Private-Unknown	Recommend Needs Data	Upgrading of unimproved access road /Unknown Effect	Monitoring during construction to avoid impacts

Source: RMC 2007; RMC 2008

4.5.3.2 Sites Recommended as Eligible

Based on the SHPO correspondence dated March 29, 2011, eight (8) sites sites are officially determined to be eligible for nomination to the NRHP. These sites have either demonstrated their potential to yield additional important information on the prehistory of the area (Criterion D), are associated with significant historic events (Criterion A) or represent a unique method of construction (Criterion C). Two eligible sites are existing, wooden line structures, which would be replaced by new steel structures. The integrity of the wood structures would be further evaluated and other mitigation applied (Schweigert 1988) before these structures would be removed. One eligible site, an open campsite, would be avoided or further tested prior to disturbance. This site, a prehistoric open camp/lithic procurement site, would not be directly affected but would have a visual effect. Consultation would occur with Native Americans to determine if impacts to a TCP would occur, as shown in Table 4-3.

4.5.3.3 Alternative A

Alternative A would have the same effects described for Impacts Common to All Alternatives.

4.5.3.4 Alternative B1

Alternative B1 would have the same effects described for Impacts Common to All Alternatives. In addition, Alternative B1 may affect one additional site, a prehistoric lithic scatter that has been identified as needing additional data. This site would be avoided or further tested if avoidance was not practical.

4.5.3.5 Alternatives C1, C2

In addition to the sites previously discussed, Alternative C1 and C2 (both options) would also potentially affect eight additional sites that are either recommended as eligible or have been officially determined to be eligible for nomination to the NRHP. One of these sites, a prehistoric lithic procurement/open camp/architectural site determined eligible, would be avoided or further tested to avoid disturbance of any important resources. A second site, a prehistoric lithic scatter, would be avoided to prevent any disturbance. The remaining three sites are outside the area of disturbance and require no further work.

4.5.3.6 Alternative D

Alternative D (both options) would have the same effects described for Impacts Common to All Alternatives.

4.5.4 Mitigation Measures

Western’s adopted SCPs and project-specific design criteria include measures that would minimize impacts to cultural resources. These measures would be implemented for the construction of any action alternative. Should avoidance of significant cultural resources not be possible, consultation with the SHPO will occur to mitigate potential adverse effects through the development of a memorandum of agreement.

4.6 Electric and Magnetic Fields

4.6.1 Significance Criteria

Since there are no state or federal guidelines regarding EMF, there is no standard by which to evaluate significance, positive, negative, or cumulative.

4.6.2 Methodology

4.6.2.1 Computer Modeling of Electric and Magnetic Fields

Computer modeling was used to evaluate the EMF levels for both the existing and proposed transmission line design. The software program “EMF Workstation,” which is an EPRI EMF computer modeling program, was used to perform these field calculations (EPRI 1989). The EMF Workstation software can model the EMF from transmission and distribution lines. EMF Workstation can also model substation equipment, such as power transformers, buswork, circuit breakers, and capacitor banks. The software can also produce two-dimensional magnetic field contour maps of the calculation results, as well as calculation values along a predefined route. For this evaluation, field calculations were performed as profiles extending perpendicularly away from the transmission line center. The magnetic field was calculated as the “maximum value” (semi-major axis of the magnetic field ellipse).

AECOM provided the transmission line geometry information (such as loading, phasing, conductor information, and minimum ground clearance) used to create an EMF Workstation computer model for EMF calculation purposes. Table 4-4 presents a summary of the loading conditions used for the magnetic field calculations as provided by AECOM. A 5 percent overvoltage condition was applied for the electric field and corona-related calculations as a worst case assumption. EMF calculations were performed at 1 meter (3.28 feet) above ground level in accordance with IEEE Standards (IEEE 1994).

Table 4-4. Summary of Loading Conditions for Magnetic Field Calculations.

	Load Condition	
Transmission Line	Normal Load (Amps)	Maximum Load (Amps)
Existing 69-kV	113	394
Proposed 69/138-kV	57/29	293/147

Figure 4-1 and Figure 4-2 present the calculated electric field for the existing 69-kV transmission line and for the proposed 69/138-kV transmission line, respectively. As shown in Figure 4-1, the calculated electric field for the existing transmission line configuration is about 0.956 kV/m at the ROW edges (which is also the maximum electric field within the ROW).

Figure 4-2 presents the calculated electric field for the proposed 69/138-kV transmission line. The calculated electric field for the proposed transmission line configuration is about 0.052 kV/m at the 69-kV ROW edge, about 1.406 kV/m for a maximum electric field within the ROW, and about 0.031 kV/m at the 138-kV ROW edge.

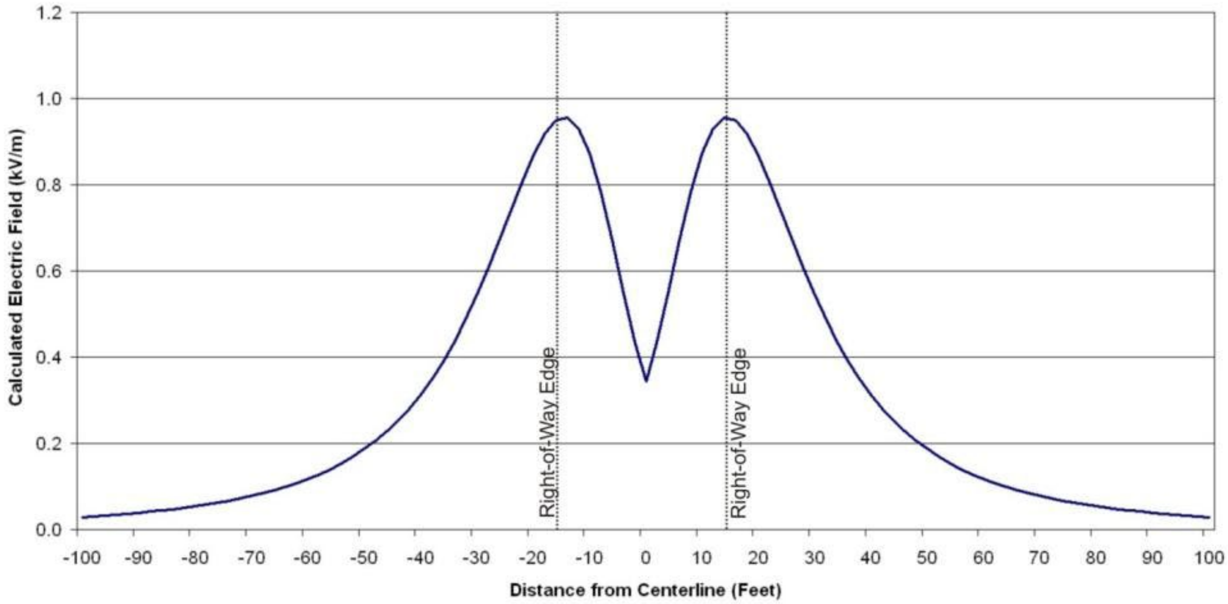


Figure 4-1. Calculated Electric Field for Existing 69-kV Transmission Line.

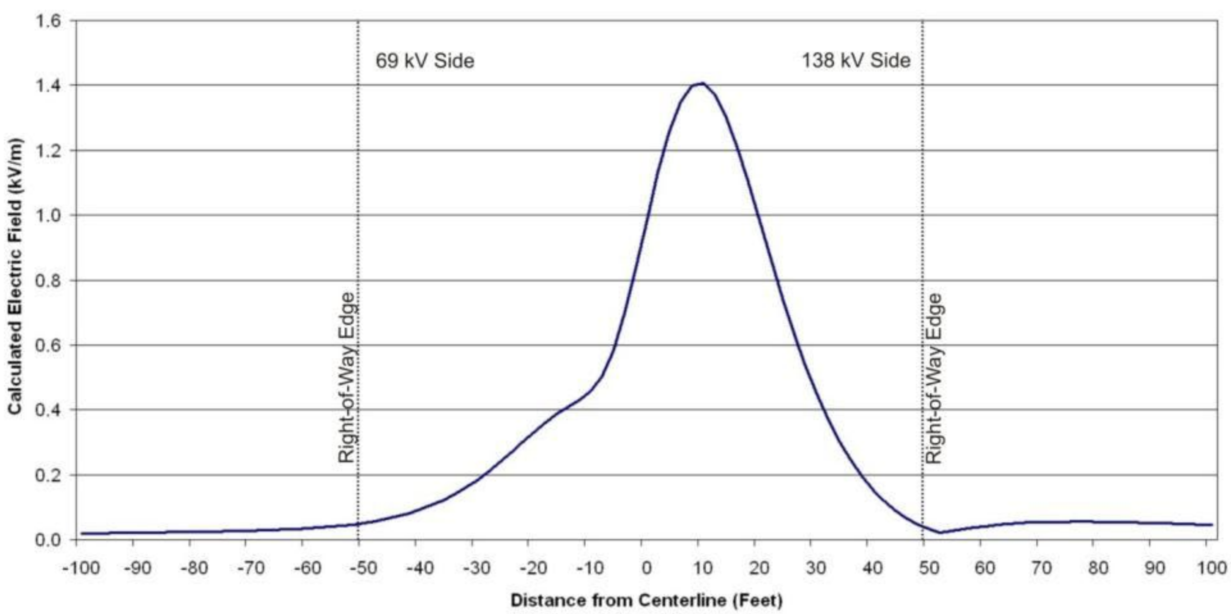


Figure 4-2. Calculated Electric Field for Proposed 69/138-kV Transmission Line.

Calculated electric field levels are lower at the ROW edge for the proposed 69/138-kV transmission line configuration due to the wider ROW width, additional ground clearance, and use of optimum phasing. The maximum electric field level within the ROW increases from an existing field level of 0.956 kV/m-1.406 kV/m for the proposed configuration due to the increased voltage rating of the 138-kV circuit.

Figure 4-3 and Figure 4-4 present the calculated magnetic field for the existing 69-kV transmission line and for the proposed 69/138-kV transmission line, respectively. As shown in Figure 4-3, the calculated magnetic field for the existing transmission line configuration under normal loading conditions is about 23.1 mG at the ROW edges, with a maximum magnetic field within the ROW of 31.0 mG. For maximum loading conditions, the calculated magnetic field for the existing transmission line configuration is about 80.4 mG at the ROW edges, with a maximum magnetic field within the ROW of 108.2 mG.

As shown in Figure 4-4, the calculated magnetic field for the proposed transmission line configuration under normal loading conditions is about 1.6 mG at the 69-kV ROW edge, about 6.5 mG for a maximum magnetic field within the ROW, and about 0.5 mG at the 138-kV ROW edge. For maximum loading conditions, the calculated magnetic field for the proposed transmission line configuration is about 8.0 mG at the 69-kV ROW edge, about 33.3 mG for a maximum magnetic field within the ROW, and about 2.8 mG at the 138-kV ROW edge.

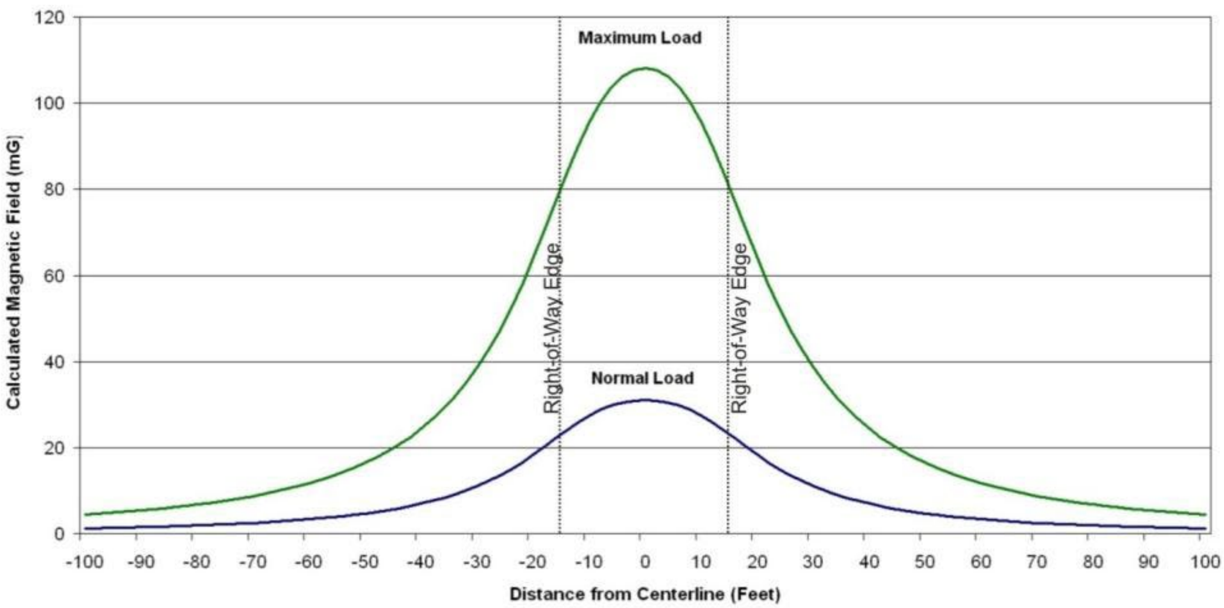


Figure 4-3. Calculated Magnetic Field for Existing 69-kV Transmission Line.

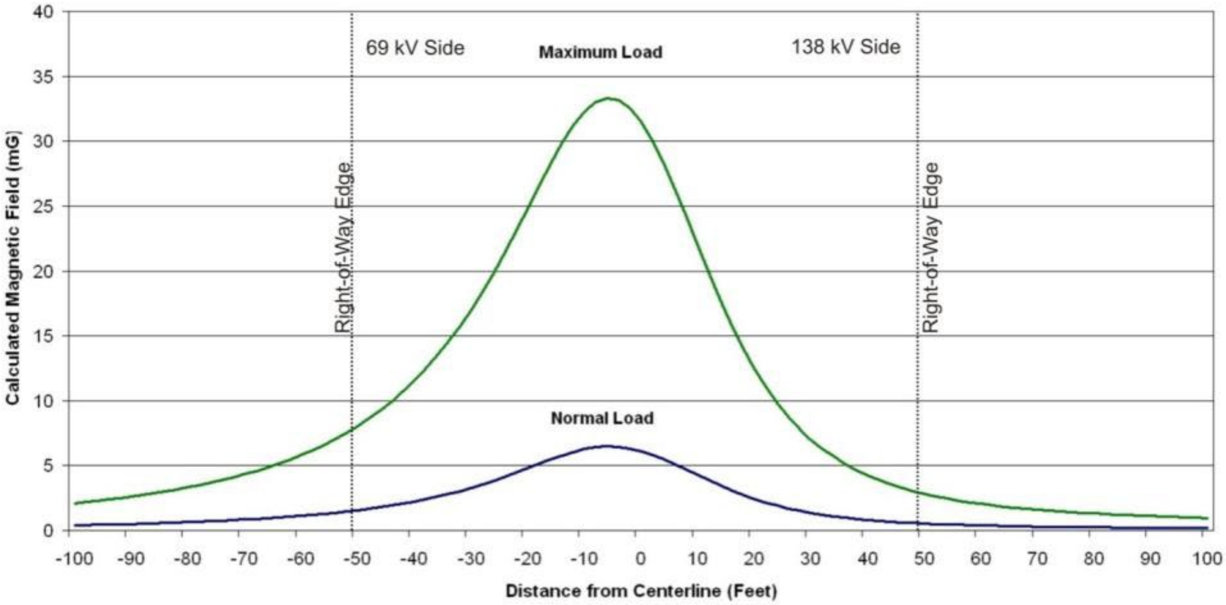


Figure 4-4. Calculated Magnetic Field for Proposed 69/138-kV Transmission Line.

Calculated magnetic field levels are lower at the ROW edge for the proposed 69/138-kV transmission line configuration due to wider ROW width, additional ground clearance, and use of optimum phasing. The maximum magnetic field level within the ROW decreases from an existing field level of 31.0 mG under normal loading to 6.5 mG for the proposed configuration due to the vertical configuration used for each of the proposed circuits, additional ground clearance, optimum phasing arrangement, and lower loading (less amperes).

Table 4-5 and Table 4-6 summarize the calculated EMF levels, respectively, for both the existing 69-kV and the proposed 69/138-kV transmission line configurations. Detailed EMF calculation results are presented in Appendix I.

Table 4-5. Summary of Electric Field Calculation Results.

	Calculated Electric Field (kV/m)		
Transmission Line	ROW Edge	Max on ROW	ROW Edge
Existing 69-kV	0.956	0.956	0.956
Proposed 69/138- kV	0.052	1.406	0.031

Table 4-6. Summary of Magnetic Field Calculation Results.

	Calculated Magnetic Field (mG)					
	Normal Load			Maximum Load		
Transmission Line	ROW Edge	Max on ROW	ROW Edge	ROW Edge	Max on ROW	ROW Edge
Existing 69-kV	23.1	31.0	23.1	80.4	108.2	80.4
Proposed 69/138-kV	1.6	6.5	0.5	8.0	33.3	2.8

4.6.2.2 Computer Modeling of Audible Noise

Computer modeling of the existing 69-kV transmission line and the proposed 69/138-kV transmission line were performed to calculate potential audible noise levels due to the operation of the lines. The EMF Workstation software (EPRI 1989) was used to perform these audible noise calculations. For this evaluation, field calculations were performed as profiles extending perpendicularly away from the transmission line center. Transmission line geometry information used for the computer calculations was provided by AECOM. A 5 percent over-voltage condition was modeled with average conductor heights at an altitude of 8,500 feet.

Figure 4-5 and Figure 4-6 present the calculated audible noise levels for the existing 69-kV transmission line and for the proposed 69/138-kV transmission line, respectively. As shown in Figure 4-5, there is no fair weather noise from the existing 69-kV transmission line and very little noise during rainy conditions (maximum calculated audible noise of 5.9 dBA for L50 rain within the ROW).

Figure 4-6 presents the calculated audible noise levels for the proposed 69/138-kV transmission line. The calculated audible noise levels during fair weather (L50 fair) for the proposed transmission line configuration are about 29.4 dBA at the 69-kV ROW edge, about 32.2 dBA for a maximum noise level within the ROW, and about 30.2 dBA at the 138-kV ROW edge. During foul weather (L50 rain), calculated audible noise levels for the proposed transmission line configuration is about 39.1 dBA at the 69-kV ROW edge, about 41.9 dBA for a maximum noise level within the ROW, and about 39.9 dBA at the 138-kV ROW edge.

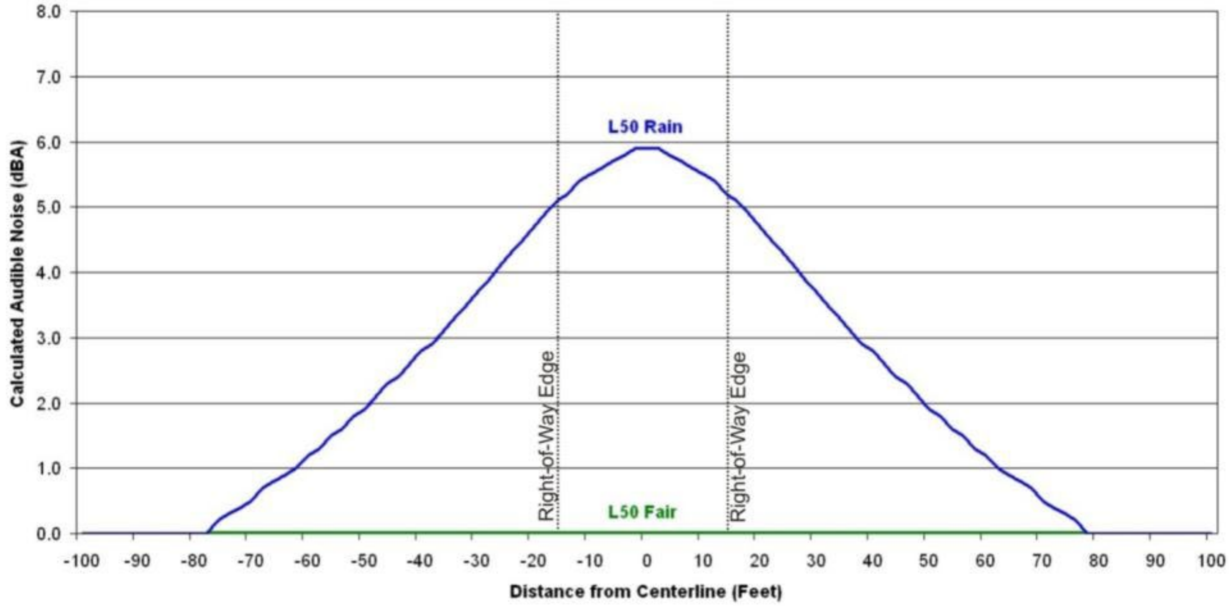


Figure 4-5. Calculated Audible Noise Levels for Existing 69-kV Transmission Line.

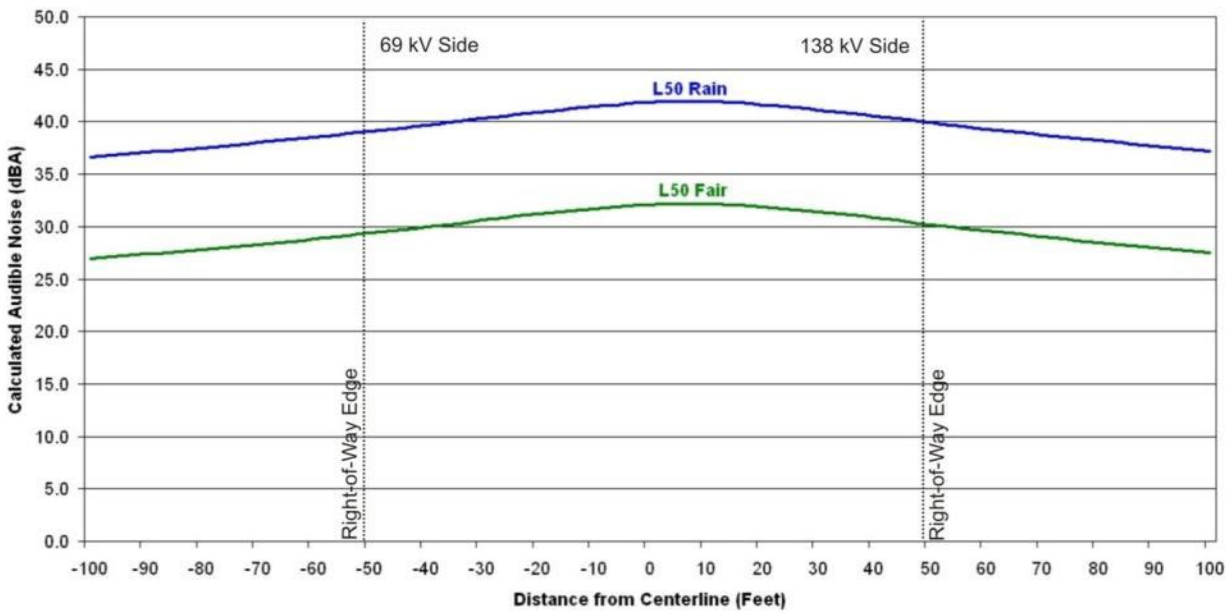


Figure 4-6. Calculated Audible Noise Levels for Proposed 69/138-kV Transmission Line.

Table 4-7 presents a summary of the calculated audible noise levels for the project. Calculated audible noise levels are higher at the ROW edges for the proposed 69/138-kV transmission line configuration due to the addition of the higher voltage 138-kV circuit and circuit configuration. The noise levels are also a result of the higher elevation (8,500 feet). At higher elevations, the effect of changing air density lowers the corona inception point and there is more corona activity, which produces higher audible noise. Nevertheless, these are very low levels, and it is likely that corona-related audible noise would not be heard under most practical conditions for this transmission line.

Table 4-7. Summary of Audible Noise Calculation Results.

	Calculated Audible Noise (dBA)					
	L50 Fair			L50 Rain		
Transmission Line	ROW Edge	Max on ROW	ROW Edge	ROW Edge	Max on ROW	ROW Edge
Existing 69-kV	0.0	0.0	0.0	5.1	5.9	5.1
Proposed 69/138-kV	29.4	32.2	30.2	39.1	41.9	39.9

4.6.2.3 Calculated Radio and Television Noise Levels

The Bonneville Power Administration (BPA) Corona and Field Effects (BPA 1977) program was used to calculate interference levels for radio and TV signals. The calculated fair weather radio noise level at either edge of the existing 69-kV transmission line ROW (15 feet from centerline) is 22.8 dBµV/m at 1 MHz (center of the AM radio band), while the calculated fair weather radio noise level for the proposed 69/138-kV transmission line is 37.7 dBµV/m on the 69-kV side and 40.6 dBµV/m on the 138-kV side at the proposed ROW edge (50 feet from centerline). For foul weather, the calculated radio noise level at either edge of the existing 69-kV transmission line ROW is 39.8 dBµV/m, while the calculated foul weather radio noise level for the proposed 69/138-kV transmission line is 54.7 dBµV/m on the 69-kV side and 57.6 dBµV/m on the 138-kV side at the proposed ROW edge. These noise levels are more than other typical 69/138-kV lines, primarily due to the assumed 8,500-foot elevation.

For AM radio stations, there are three types of service areas: (1) primary service area, (2) secondary service area, and (3) intermittent service area (FCC 2008). **Primary service** areas are defined as “areas of a broadcast station in which the ground wave is not subject to objectionable interference or objectionable fading.” The ground wave signal strength required to render primary service is 66 dB for communities with populations of 2,500 or more, and 54 dB for communities with populations of less than 2,500. **Secondary service** areas are defined as “areas of a broadcast station served by the sky wave and not subject to objectionable interference, and in which the signal is subject to intermittent variations in strength.” Secondary service is provided during nighttime hours in areas where the sky wave field strength, 50 percent or more of the time, is 54 dB or greater. Satisfactory secondary service to cities is not considered possible unless the field strength of the sky wave signal approaches or exceeds the value of the ground wave field strength that is required for primary service. Secondary service is subject to some interference and extensive fading, whereas primary service areas of a station are subject to no objectionable interference or fading. **Intermittent service** areas are defined as “areas receiving service from the ground wave of a broadcast station but beyond the primary service area, and subject to some interference and fading.” Intermittent service is rendered by the ground wave, and begins at the outer boundary of the primary service area and extends to a distance where the signal strength decreases to a value that is too low to provide any service.

The EPRI AC Transmission Line Reference Book (EPRI 1982) provides radio noise design guide curves for assessing AM radio interference. A signal-to-noise ratio of 24 dB (grade B4) provides very good reception with no intrusive background noise, and a signal-to-noise ratio of 20 dB (grade C3) provides fairly satisfactory reception with plainly evident background noise. Calculated AM radio noise levels due to corona were compared to signal strength maps from public sites on the internet (many provide the signal strength data/maps from their FCC license submission) for the Granby area. There are approximately eight AM station signal coverage areas with primary coverage in the Granby area (66 dB or greater), five secondary signal coverage areas (54 dB or greater), and a couple of intermittent AM station signal coverage areas. Evaluation of the signal strengths reveals that AM stations would typically have good signal-to-noise ratios (20+ dB) for fair weather. This is not true for some stations with weaker signals. In rain, the radio noise is estimated by the BPA software program to be 17 dB microV/m higher than fair weather, and many AM stations may experience interference if an AM radio is used on or close to the ROW in rain.

Radio noise due to corona quickly attenuates with increasing frequency, so noise levels are much lower at FM radio and TV frequencies (over 30 dB less at 100 MHz based on curves from the EPRI AC Transmission Line Reference Book). More importantly, FM radio uses a modulation scheme that provides a high degree of immunity to corona type impulse noise. A survey of FM radio station signal strengths from public sites on the internet reveals that the area near Granby has strong city coverage of FM signal strengths (60-120 dB) for four stations. Therefore, FM radio interference is not anticipated from the proposed transmission line project due to robust signals and the strong immunity to noise inherent in FM radio design.

A survey of 19 TV station signal strengths from public sites on the internet reveals that the area near Granby has no DTV signals that meet the FCC minimum threshold coverage level (28 dB for channels 2-6, 36 dB for channels 7-13, and approximately 41 dB for higher channels) (FCC 2004). TV stations in the local area are generally based near Denver, and the direction of service provided by their broadcast beam is highly directional and focused on the commercial market and population of Denver rather than to mountain areas where Granby (and the proposed transmission line project) is located. Figure 4-7 presents a diagram of the service area coverage for a local TV station, which demonstrates the TV broadcast beam focus towards the Denver metropolitan area and away from the mountain areas with lower population bases. In addition, topography will also cause TV signal degradation as Granby is located in mountainous terrain. Over-the-air TV signals are therefore problematic with or without the transmission line project, and adequate TV service would require cable or satellite TV service. It is probable that cable or satellite service is required for good reception of TV signals, and a transmission line does not interfere with either of these signals. The only potential problem would be a situation where a steel transmission line tower was directly blocking the line-of-sight between a terrestrial microwave dish antenna and the geosynchronous satellite (or land-based antenna) that provides the signal. In this exceptionally unlikely situation, the antenna could be relocated a short distance.

Certain assumptions were made in the course of performing radio noise and TV interference calculations. The transmission line geometry information (including subconductor size, number, spacing, and type; phase spacing; circuit-to-circuit spacing; ROW widths; and average ground clearance) used for the computer calculations was provided by AECOM. A 5 percent over-voltage condition was modeled for the existing 69-kV transmission line and for the proposed

69/138-kV transmission line. Average conductor heights were used for the radio noise and TV interference calculations, as provided by AECOM. All modeling of radio and TV noise was conducted with the BPA calculation software (BPA 1977) assuming 8,500 feet elevation.

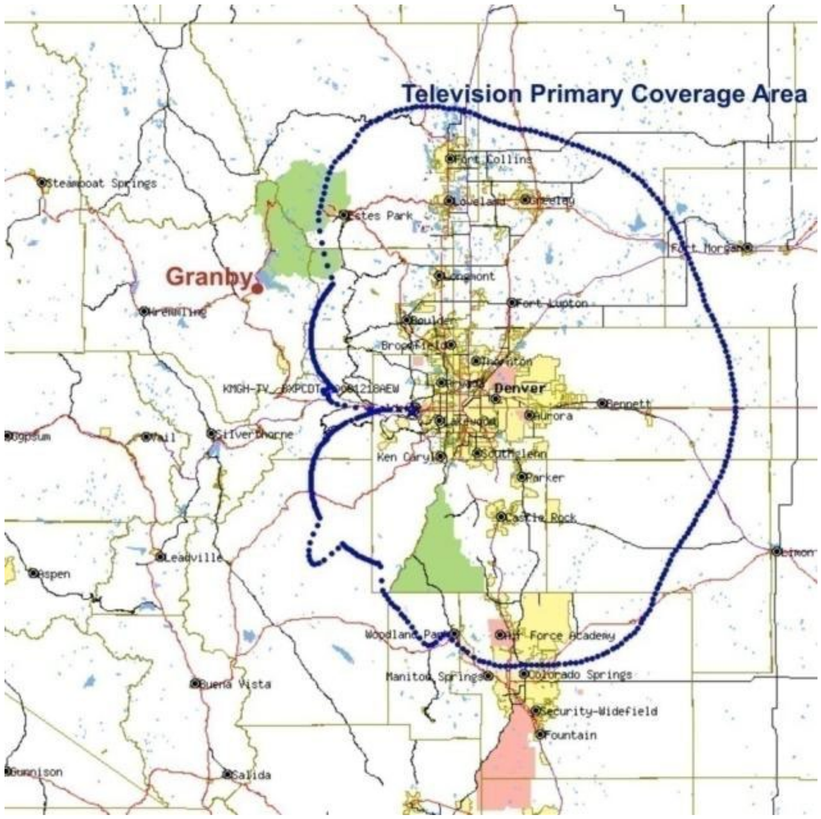


Figure 4-7. Sample TV Service Coverage Near Granby.

(The TV Broadcast Beam is Directional to Serve the Denver Market)

4.6.2.4 GPS Interference

A concern that GPS devices may be unable to receive a signal from the GPS satellites because of the proximity to a proposed transmission line is sometimes raised. Because of the nature and microwave frequency of GPS signals and the very different nature of EMFs around high voltage power lines, there is no reason to expect that interference would occur (Silva & Olsen 2002). As a practical matter, power lines produce little to no noise at the microwave frequencies used by GPS. The results of studies indicate it is unlikely that high voltage transmission lines will interfere with the GPS satellite signals. Therefore, it is likely that GPS would not be affected by the proposed 69/138-kV transmission line. However, operating a GPS receiver very close to a transmission line steel pole, building, or tree could potentially block a satellite signal, depending on the relative instantaneous satellite positions.

4.6.2.5 Contact Current Calculations

The amount of induced contact current can be used to evaluate the potential for harmful or other effects. Previous work on appliance leakage current can provide some insight into this issue. Leakage (and induced) current is commonly measured in units of milliamperes (mA) (i.e., one mA is 0.001 amperes of electric current). Many appliances have a small amount of leakage current that flows through the body of the user. Usually, the amount of current is very small and below the threshold of perception. Many factors affect the magnitude of current flows. In addition to appliance design and age, contact resistance and insulation from ground affect the magnitude of current that flows through the user. Appliance leakage currents have been measured for a variety of appliances, and levels ranged from 0.002 mA to tens of mA (Kahn & Murray 1966; Stevenson 1973).

There is a United States standard for the leakage current from appliances that was developed to minimize the potential for electric shock hazards and sudden involuntary movements that might result in an accident (ANSI 1992). The standard limits appliance leakage current to 0.5 mA for portable appliances and 0.75 mA for stationary or fixed appliances. The standard was developed with consideration of the variable threshold of human perception of electric current. Different people and different situations produce a range of contact current perception values. As an example, when an average person grips an energized conductor, the median (50-percentile) threshold for perception of an AC electric current is 0.7 mA for women and 1.1 mA for men (Dalziel 1972; EPRI 1982). If the current is gradually increased beyond a person's perception threshold, it becomes bothersome and possibly startling. With sufficiently large currents, the muscles of the hand and arm involuntarily contract and a person cannot release the gripped object. The reasonably safe value at which 99.5 percent can let go (0.5 percent cannot) is 9 mA for men and 6 mA for women (Bridges et. al. 1985:10). An equivalent let-go value of 5 mA has been estimated for children (EPRI 1982:377). However, before the current flows in a shock situation, contact must be made; and in the process of establishing contact, a small arc occurs. This causes a withdrawal reaction that, in some cases, may be a hazard if the involuntary nature of the reaction causes a fall or other accident. Consideration of let-go currents was the basis for the NESC to set an induced current limit of 5 mA for objects under transmission lines in the code section #23 on clearances (ANSI 2007).

The proposed 69/138-kV transmission line would have the highest electric field within the ROW of approximately 1.4 kV/m in the region under the conductors at the lowest point of sag. Other locations on the ROW would be less. The calculated electric field is approximately 0.050 kV/m or less at the ROW edge.

Induced currents can be calculated for common objects for a set of theoretical (worst-case) assumptions: the object is perfectly insulated from ground, located in the highest field, and touched by a perfectly grounded person. Calculations can be made using experimentally determined induction coefficients and the calculated electric field (EPRI 1982). Calculated induced current for common vehicles placed on the ROW for the theoretical conditions for the proposed 69/138-kV line, with minimum ground clearance of 24 feet at midspan, was conducted and are presented in Table 4-8.

The maximum electric field only occurs on a small portion of the ROW, with calculated electric field levels above 1 kV/m occupying only 16 feet of the ROW. In addition, perfect insulation and grounding states are not common. For these assumptions, however, the calculated induced current values shown in Table 4-8 for the pickup truck, farm tractor pulling crop wagon, school bus, and tractor-trailer are well below hazardous levels where a person could not let go of an object (9 mA for men and 6 mA for women). At the ROW edge, the induced current values are below the threshold of perception. However, under the proposed 69/138-kV line near midspan, the calculated induced currents on one of these objects are above the threshold of perception and for certain conditions may be perceived. Typically induced currents and contact voltage can be an issue with higher voltage transmission lines (for example, 345-kV or 500-kV lines) and are usually not an issue with lower voltage transmission lines, such as the project voltages (69 and 138-kV).

Table 4-8. Summary of Calculated Induced Current for Vehicles Under the Proposed 69/138-kV Transmission Line for Theoretical Conditions.

Vehicle	Length (feet)	Induced Current Coefficient (mA/kV/m)	Induced Current (mA) Near Midspan	Induced Current (mA) At ROW Edge
Pickup Truck	17	0.10	0.14	0.005
Farm Tractor & Wagon	31	0.30	0.42	0.015
Combine	30	0.38	0.53	0.019
School Bus	34	0.39	0.55	0.020
Tractor-Trailer Parallel to Transmission Line*	52	0.64	0.90	0.032

* If tractor-trailer is located perpendicular to the transmission line, then induced currents would be lower.

4.6.3 Direct and Indirect Impacts

4.6.3.1 Alternative A

For power-frequency electric fields, calculated field levels for the existing transmission line configuration are about 0.956 kV/m at the ROW edges (which is also the maximum electric field within the ROW).

For power-frequency magnetic fields, calculated field levels for the existing transmission line configuration are about 23.1 mG at the ROW edges under normal loading, with a maximum field within the ROW of 31.0 mG. For maximum loading conditions, the calculated magnetic field for the existing transmission line configuration is about 80.4 mG at the ROW edges, with a maximum magnetic field within the ROW of 108.2 mG.

For radio noise, calculated fair weather levels at either edge of the existing 69-kV transmission line ROW are low (22.8 dBµV/m at 1 MHz - the center of the AM radio band). For foul weather, the calculated radio noise level at either edge of the existing ROW is 39.8 dBµV/m. Calculated audible noise levels show that there is no fair weather noise from the existing 69-kV transmission line and very little noise during rainy conditions (maximum calculated audible noise of 5.9 dBA for L50 rain within the ROW).

4.6.3.2 All Action Alternatives – B1, C1, C2, and D

For the proposed transmission line, calculated power-frequency electric field levels are about 0.052 kV/m at the 69-kV ROW edge, about 1.406 kV/m for a maximum electric field within the ROW, and about 0.031 kV/m at the 138-kV ROW edge. Field levels are lower at the ROW edge for the proposed line due to a wider ROW width, increased ground clearance, and use of optimum phasing. The maximum electric field level within the ROW increases for the proposed line due to the additional 138-kV circuit. Calculated EMF levels at the ROW edges decrease from existing levels to the proposed levels. So the proposed line would have less impact than the existing line, since field levels are lower outside of the ROW.

The calculated magnetic field for the proposed transmission line configuration under normal loading conditions is about 1.6 mG at the 69-kV ROW edge, about 6.5 mG for a maximum magnetic field within the ROW, and about 0.5 mG at the 138-kV ROW edge. For maximum loading conditions, the calculated magnetic field for the proposed transmission line configuration is about 8.0 mG at the 69-kV ROW edge, about 33.3 mG for a maximum magnetic field within the ROW, and about 2.8 mG at the 138-kV ROW edge. Calculated field levels are lower at the ROW edge for the proposed line due to the wider ROW width. The maximum magnetic field level within the ROW also decreases for the proposed line due to the vertical circuit configuration, optimum or opposite phasing arrangement, increased ground clearance, and associated lower loading conditions.

High voltage transmission lines can have some corona activity, especially in foul or rainy weather (corona is tiny electrical discharges at the conductor surface). This can create audible noise and radio noise, but is only a major consideration for much larger transmission lines rated at 345-kV and above. For the proposed 69/138-kV transmission line, calculated audible noise levels during fair weather (L50 fair) are about 29.4 dBA at the 69-kV ROW edge, about 32.2 dBA for a maximum noise level within the ROW, and about 30.2 dBA at the 138-kV ROW edge. During foul weather (L50 rain), calculated audible noise levels for the proposed transmission line configuration are about 39.1 dBA at the 69-kV ROW edge, about 41.9 dBA for a maximum noise level within the ROW, and about 39.9 dBA at the 138-kV ROW edge. Calculated audible noise levels are higher at the ROW edges for the proposed line due to the additional 138-kV circuit and a result of the high elevation (at higher elevations, the effect of changing air density lowers the corona inception point and there is more corona activity, which produces higher audible noise). However, these calculated noise values are below the EPA outdoor activity Ldn noise guideline of 55 dBA. For audible noise, calculated levels will be higher due to the increased voltage of the line. However, these calculated levels (about 30 dBA in fair weather) are comparable to or less than a library environment and should not be a significant impact. In foul weather, the calculated noise levels (about 40 dBA) will be masked by the sound of the wind and rain (41-63 dBA).

A survey of FM radio station signal strengths reveal that the Granby area generally has relatively good FM signal strengths for four stations. FM radio interference is not anticipated from the proposed transmission line project due to robust signals and the immunity to corona-type impulse noise inherent in FM radio design.

For radio noise, calculated fair weather radio noise level for the proposed line is 37.7 dBμV/m on the 69-kV side and 40.6 dBμV/m on the 138-kV side. Calculated foul weather radio noise level for the proposed line is 54.7 dBμV/m on the 69-kV side and 57.6 dBμV/m on the 138-kV side at the proposed ROW edge. These noise levels are a bit more than other typical 69/138-kV lines, primarily due to the assumed 8,500-foot elevation – at higher elevations, the effect of changing air density lowers the corona inception point and there is more corona activity.

For TV and radio interference, the effect is dependent upon the existing strength of the TV and radio station signals in the area. If the signal strength is already weak, then thresholds for interference are lower. If the signal strength is strong, then the threshold is higher. Calculated interference levels are higher for the proposed line than for the existing line at the ROW edges. There are approximately eight AM radio stations with primary coverage in the Granby area, five secondary stations, and a couple of intermittent stations. Many AM radio stations may experience interference if an AM radio is used on or close to the ROW in rain. In fair weather, the AM interference would be less. FM radio stations should not experience interference from the proposed line. A survey of 19 TV station signal strengths in the Granby area indicate that none of them meet the FCC minimum threshold coverage level, so TV already has very weak signal strength. TV reception near the proposed line would only add to an existing poor reception environment.

The proposed 69/138-kV transmission line would not affect GPS satellite-based navigation systems signals. Corona noise does not significantly extend up to the much higher microwave frequencies used by GPS equipment. However, operating a GPS receiver very close to a transmission line steel pole, building, or tree could potentially block one or more satellite signals, depending on the relative instantaneous satellite positions.

Transmission lines can induce currents on objects very close to or within the ROW. For evaluation of induced currents, the highest electric field of 1.4 kV/m was considered; this level only occurs within a small portion of the ROW in the region under the conductors at the lowest point of sag. At other locations on the ROW, the electric field will be less. Calculations were made of the induced current on common vehicles placed on the ROW. In addition to the maximum field, perfect insulation for the object and grounding for a person are assumed for these calculations (these conditions are not common). Calculated induced currents range from about 0.14 mA for a pickup truck to 0.90 mA for a tractor-trailer based upon these theoretical conditions. These calculated induced current values are well below hazardous levels and easily comply with the NESC limit of 5 mA. At the ROW edge, the induced current values are below the threshold of perception.

For induced currents, the proposed 69/138-kV transmission line would have the highest electric field (1.4 kV/m) within a small portion of the ROW in the region under the conductors at the lowest point of sag. Other locations on the ROW will be less. Calculations were made using experimentally determined induction coefficients, and the calculated electric field for induced current on common vehicles placed on the ROW. In addition, perfect insulation and grounding states, as are assumed for these calculations, are not common. Calculated induced currents range from about 0.14 mA for a pickup truck to 0.90 mA for a tractor-trailer based upon these theoretical conditions. These calculated induced current values are well below hazardous levels where a person could not let go of an object (9 mA for men and 6 mA for women). At the ROW edge, the induced current values are below the threshold of perception. However, under the proposed line near midspan, the calculated induced currents on larger objects are above the threshold of perception and for certain conditions may be perceived. Typically induced currents and contact voltage can be an issue with higher voltage transmission lines (for example, 345-kV or 500-kV lines) and are usually not an issue with lower voltage transmission lines, such as the project voltages (69 and 138-kV). For permanent objects (such as long fences parallel to the power line or metallic sheds), the possibility of nuisance shocks can be eliminated by having permanent grounding connections for these objects.

Although there are no federal health standards in the United States specifically for 60 Hz EMF, two organizations have developed guidelines: the ICNIRP and the IEEE (ICNIRP 1998; IEEE 2002). Both of these guidelines are much higher than the calculated EMF levels for the proposed transmission line project.

Overall, the proposed line design has benefits over the existing line design. EMF would significantly decrease at the ROW edges, audible noise would increase but probably not be noticeable, AM radio interference may increase near the ROW edges, FM radio would remain unaffected, over-the-air TV reception would remain poor as it presently is, and induced currents and contact currents are not anticipated to be an issue.

4.6.4 Mitigation Measures

4.6.4.1 Common to All Action Alternatives

Contact Current Mitigation

The strength of a contact current is based upon many factors, including object characteristics (size and shape), degree of grounding, and the electric field strength that is present. For the proposed project, increasing the transmission line height above ground would reduce the electric field at locations where large conductive objects may be present. Typically, induced currents and contact voltage can be an issue with higher voltage transmission lines (for example, 345-kV or 500-kV lines) and are usually not an issue with lower voltage transmission lines, such as the project voltages (69 and 138-kV). For permanent objects (such as long fences parallel to the power line or metallic sheds), the possibility of nuisance shocks can be eliminated by having permanent grounding connections for these objects. If grounding were to be required, electric company engineers typically provide guidance. As described in SCP 20 (Section 2.4), Western would develop and apply necessary mitigation, including grounding connections, to eliminate problems of induced currents and voltages on conductive objects sharing the ROW.

4.7 Land Use

Land use topics described in this section are related to land jurisdictions and ownership, existing and planned land uses, and local land use plans and policies. The Project Area for land use encompasses the proposed and alternative transmission line ROWs, existing access roads, substation sites, construction areas, and surrounding land uses within the project vicinity. Impact issues include direct changes or disruptions to existing and planned land uses that may occur during the construction and operation of the proposed project and alternatives, impacts to farmlands, and temporary increases in noise levels that would result during project construction. While this section addresses the physical impacts of land use change, other related issues are discussed in Section 4.8 Visual Resources, Section 4.9 Socioeconomics and Environmental Justice, and Section 4.10 Recreation and Wilderness.

4.7.1 Significance Criteria

Impacts to land use would be considered significant if effects substantially deviated from existing land use regulations and guidelines, precluded certain future land use types, and resulted in diminished economic viability or “uneconomic remnants.” Impacts may also include:

- Unresolved conflict with existing utility ROWs.
- Conflict with state or federally established, designated, or reasonably foreseeable planned special use areas (e.g., recreation, wildlife management area, game management areas, waterfowl production areas, scientific and natural areas, wilderness areas, etc.).
- Substantial loss of prime or unique farmlands in the region.

4.7.1.1 Transportation

The following significance criteria were used to assess potential impacts to transportation as a result of project alternatives:

- Impacts to transportation would be significant if use of public highways and roads was restricted, resulting in adverse impacts to emergency response capability or economic hardships to local businesses.

4.7.2 Methodology

The analysis considered impacts to land use resources that intersect the proposed transmission line and each of the alternatives. The analysis used Grand County Assessor's Office datasets to determine the number of improved residential or vacant residential lots that would be within 100 feet or 300 feet of the centerlines of any of the alternative alignments. For the purpose of this analysis, parcels assigned a usage of "Improved Metes and Bounds" by the Assessor's Office were included in the count of "Improved Residential."

4.7.3 Direct and Indirect Impacts

4.7.3.1 Impacts Common to All Action Alternatives

Land use impacts would primarily consist of localized direct effects to existing land uses within and adjacent to the proposed and alternative ROWs. Direct impacts would mainly entail short-term disruptions to existing agricultural lands and irrigation systems during construction, resulting from the periodic presence of construction equipment, crews, and vehicles within the ROW. These types of construction impacts would be short-term and minor to moderate.

Other short-term impacts to land uses would include construction-related noise that is produced by machinery and vehicles. Noise levels would be typical of diesel powered machinery and gasoline or diesel powered vehicles. Cement trucks, cranes, and auguring equipment would produce noise during their operation; and increased noise would be noticeable to local residents and others in the vicinity of construction activities. Overall, noise levels would be similar in type and degree to noise currently produced by farm machinery, trucking, highway noise, and other construction projects. Due to the temporary and intermittent nature of noise effects, and the presence of similar noise sources within the Project Area, impacts from noise would be moderate and short term.

Long-term impacts would result from the need for additional ROW since the Proposed Action and other action alternatives would result in widening the existing 30-foot ROWs to a width of 60 to 100 foot ROW along much of the project. No occupied structures would need to be removed from the widened or new ROW easements; however, long-term impacts would result from the inability to build new structures within the expanded ROWs. Such impacts would be most likely to occur in areas that are adjacent to existing neighborhoods or other existing or planned developments.

Other long-term impacts would include the direct loss of farmland to accommodate new transmission line structures, as well as complications to agricultural activities that result from having to work around those structures. Although cultivation could continue within the ROW, irrigation, hay cutting, and other activities would require additional efforts to work around the transmission structures, resulting in a minor loss of productivity and increased costs. All Action Alternatives would cross through a similar distance of cultivated lands as the existing transmission line. Long-term impacts to agricultural lands would be mostly off-set by the removal of the existing wood pole H-frame structures and replacement with single pole steel structures, which have a longer average distance between structures. Given the small amount of land affected, overall impacts to agriculture would be minor.

Impacts of each alternative are discussed separately in the remainder of this section.

No residential structures or buildings would be removed.

None of the alternatives would have any effect on operations of the Grand County/Granby Airport. Although the average height range of the new structures would be 20-40 feet greater than the existing transmission line structures, none of the alternatives would result in an alignment closer than the approximately 2 miles that separate the airport from the existing line at the closest point. This distance, combined with the elevated position of the airport, is sufficient to minimize conflicts with the airport.

Transportation-Impacts to All

Impacts to transportation would be associated with short term construction related traffic on the major and local transportation systems within the Project Area. Large truck traffic and traffic associated with employees traveling to and from the job site would occur on a daily basis during project construction. There are no anticipated impacts to local businesses or the emergency response capabilities. Since the proposed project is located in a rural area, work force activities would occur intermittently by relatively small crews.

Unlike pipeline projects that can cause traffic and access disruptions along the entire ROW, transmission construction activities primarily occur at structure sites, which limit where access and traffic impacts occur. Consequently, while construction of the proposed action or alternatives could result in short, temporary interruptions of traffic on roads near structure sites along the ROW. Construction and existing line removal activities would occur at some locations adjacent to U.S. Highway 34, especially along the 2-mile segment north of Granby Substation. However, lane closures would be minimized and delays would be largely limited to drivers slowing to observe the construction or removal activities. These impacts would not obstruct access to businesses or impede emergency response capabilities in the region.

Permitted uses of smaller roads in the area include the maintenance of electrical power lines, substations, pipelines, communication towers and other utilities. Traffic volumes to these facilities are low and access to these facilities are infrequent Construction and existing line removal activities will result in short, temporary interruptions to these permitted authorized uses.

Two construction staging areas would be needed along any action alternative. These temporary use areas would require approximately 1.4 acres each and would be used to store construction materials, which would be hauled to the staging areas using existing roads and streets. Generally the contractor negotiates staging areas with a private landowner. At this time the location of the staging areas are not known, however, they would be located on private land easily accessible from a major transportation route and would not impact public property or public access routes.

4.7.3.2 Alternative A

Land use impacts would remain similar to current levels (negligible or low). However, maintenance activities would be likely to increase over time as the transmission structures continue to age and require an increasing level of repair or replacement. These activities would affect residences and other commercial, industrial, or agricultural land uses. The total number of homes located within 100 feet of the centerline of the existing transmission line is 20. These more proximate homes would be most likely to notice the increased activity and resulting disturbance associated with vehicle movement and equipment operations. A total of 60 improved residential lots and two lots with mobile homes are located within 100 feet of the existing alignment. An additional 60 improved residential lots and six condominiums are located within 100-300 feet of the centerline, a distance at which impacts level diminish. A 1,500-acre mixed-use development planned north of the intersection of U.S. Highway 40 and 34, is proposing large lot residential development in areas through which the current alignment crosses. Development plans are being refined, and the exact number of vacant lots that would be impacted is unknown at this time. With proper coordination and planning, the impacts to future residential development at this site would likely be limited to visual effects rather than limits on the level of development.

4.7.3.3 Alternative B1

Approximately 13 homes within 43 improved residential lots are located within 100 feet of the proposed alignment of Alternative B1. All of these homes are located along that portion of the route that follows the existing transmission line alignment between Stillwater Tap and the Granby Pumping Plant Switchyard. These homes would experience moderate short-term impacts from construction activities. An expanded ROW and its associated restrictions on buildings would result in a low level long-term impact to these properties. No existing residences would be located within 100 feet of the centerline of a new ROW alignment, i.e., locations where a transmission line does not currently exist.

An additional 51 improved residential lots and six condominiums are located within 100-300 feet of the proposed alignment. At this distance, effects on these properties would be largely limited to visual; direct effects associated with an expanded ROW, and associated restrictions on the use of these properties, would be negligible. Short-term effects from construction activities would be minor to moderate.

Approximately 18 vacant residential lots lie within 100 feet of the centerline along Alternative B1. Most of these are located along the existing transmission line where the line would be re-built on an expanded ROW. An expanded or new ROW acquisition would result in a minor to moderate long-term effect on the future use of these parcels. Effects on land values are discussed in Section 4.9.

A 1,500-acre mixed-use development planned north of the intersection of U.S. Highway 40 and 34 is proposed for large lot residential development in areas through which Alternative B1 would cross. Specific development plans are being refined, and the exact number and location of planned lots that would be impacted is unknown at this time. The area that would be crossed by Alternative B1, which would follow an expanded ROW where the existing transmission line is located, is planned for single family (medium density) uses. With proper coordination and planning, the impacts to future residential development at this site would likely be limited to visual effects rather than limits on the level of development. However, with an increased ROW width (100 feet), a somewhat higher level of conflict may exist with planned development at this location compared to Alternative A.

On the east side of Table Mountain, Alternative B1 would be routed just inside the ANRA immediately adjacent to the western boundary of the Scanloch Subdivision. Alternative B1 would locate the transmission line out of the Scanloch Subdivision, farther west of US 34, and at a higher elevation. Impacts to recreation and visual resources are discussed in Sections 4.8 and 4.10.

Alternative B1 would consolidate the two existing lines onto an alignment paralleling the east side of County Road 64 through the Lake Forest Subdivision to the Granby Pumping Plant Switchyard. Removal of the existing circuit through the campground would result in disruptions or closures to all or portions of the facility. These disruptions or closures would be temporary and short-term, only for several hours. Removal of the existing line would result in a long-term beneficial impact to the campground. See Section 4.10 for more information on the impacts of the project to recreational resources.

Alternative B1 would cross through agricultural lands for a distance of approximately 1.3 miles, all of which would occur as a rebuild along the alignment of the existing transmission line. Depending upon the timing of construction, a moderate level of adverse short-term effects may occur on these lands as a result of construction disturbance and interruption of farming activities. The landowner would be compensated for any losses in production. Long-term adverse effects would be associated with the placement of transmission structures within agricultural areas. However, these effects would be negligible, since the project would replace the existing H-frame structures with single pole steel structures.

4.7.3.4 Alternative C1

The alignment of Alternative C1 departs from the existing transmission line ROW and avoids residential development near Lake Granby. Approximately 13 homes within 35 improved residential lots are located within 100 feet of the proposed alignment. These homes are located along the existing transmission line, where a new line would be built on an expanded ROW. These homes would experience moderate short-term impacts from construction activities. An expanded ROW and its associated restrictions on buildings would result in a low level long-term impact to these properties.

An additional 30 improved residential lots, two lots with mobile homes, and six condominiums are located within 100-300 feet on either side of the centerline. At this distance, effects on these properties would be largely limited to visual and direct effects associated with an expanded ROW, and associated restrictions on the use of these properties would be negligible. Short-term effects from construction activities would be minor to moderate.

Approximately 10 vacant residential lots lie within 100 feet of the centerline. Most of these are located along the existing transmission line. An expanded or new ROW acquisition would result in a minor to moderate long-term effect on the future development of these parcels. Effects on land values are discussed in Section 4.9.

A 1,500-acre mixed-use development planned north of the intersection of U.S. Highway 40 and 34 is proposed for residential development in areas north of the Colorado River. Development plans are being refined, and the exact number and locations of lots that would be impacted is unknown at this time. However, the C1 alignment is located at the northern edge of this planned development and would have little physical effect on the number of residential lots that could be developed. Effects would be largely visual. Overall, Alternative C1 would have a lower level of potential conflict with future development compared to the other alternatives.

Alternative C1 would cross through agricultural lands for a distance of approximately 1.8 miles, most of which would occur as a rebuild along the alignment of the existing transmission line. Depending upon the timing of construction, a moderate level of adverse short-term effects may occur on these lands as a result of construction disturbance and interruption of farming activities. The landowner would be compensated for any losses in production. Long-term adverse effects would be associated with the placement of transmission structures within agricultural areas. However, these effects would be negligible, since the project would replace the existing H-frame structure with a single pole structure that has a longer average distance between structures.

A portion of the C Lazy U Preserves, including an area with a conservation easement in place, would be crossed by Alternative C1. The total length through the Preserve would be approximately 0.1 mile, and this location is not currently crossed by a transmission line. Although the direct, physical effect to land use would be minor, the construction of a transmission line is in conflict with the conservation intent of the easement. The project would also be visible from other locations on the Ranch. See Section 4.8 for a discussion of visual effects.

Alternative C1 skirts behind Table Mountain, hiding it from the viewsheds along Lake Granby, U.S. Highway 34, and adjacent neighborhoods.

4.7.3.5 Alternative C2

Alternative C2-Option 1

This alternative would have similar effects on land use as those described for Alternative C1, except that Alternative C2-Option 1 would follow the water pipeline easement through the proposed 1,500-acre mixed-use development planned north of the intersection of U.S. Highway 40 and 34. With proper coordination and planning, the impacts to future residential development at this site would likely be visual effects rather than limits on the level of development. Development plans are being refined, and the exact number of planned lots that would be impacted is unknown at this time.

Alternative C2-Option 2

This alternative would have similar effects on land use as those described for Alternative C1, except that Alternative C2-Option 2 would follow the existing transmission line alignment through the proposed 1,500-acre mixed-use development planned north of the intersection of U.S. Highway 40 and 34. Impacts on this planned development would be the same as were described for Alternative B1.

4.7.3.6 Alternative D-Options 1 and 2

The land use effects of this alternative would be similar to those described for Alternative B1. Impacts on planned residential development would be identical to those described for Alternative B1.

However, Alternative D would have 4 homes within 36 improved residential lots located within 100 feet of the centerline. This compares to a total of 13 homes within 43 improved residential lots for Alternative B1. The lower number reflects the alignment adjustment along CR 64. Both options would have a distance through agricultural land of approximately 1.3 miles.

4.7.4 Mitigation Measures

Western's adopted SCPs and project-specific design criteria include measures that would minimize impacts to land use. These measures would be implemented for the construction of any action alternative. No further special mitigation measures are recommended. However, additional efforts to specifically address the impacts to recreation and visual resources may also be effective in the avoidance of identified land use impacts.

4.8 Visual Resources

The section describes the potential impacts on visual resources from physical changes associated with the alternatives.

4.8.1 Significance Criteria

Impacts to visual resources were determined on the basis of whether the predicted visual change caused by the proposed action and alternatives would be within the management guidelines for that area. Visual impacts are changes to the existing form, line, color, and texture of landforms, vegetation, and structures. The degree of change (referred to as a contrast rating) affects viewers and the scenic integrity of the setting. The degree of contrast is compared to management guidelines that are designed to maintain a specific visual experience to determine whether it is within or exceeds the allowable degree of visual contrast for the area.

The following significance criteria assume that all action alternatives would result in some degree of visual change because they all have a component that would be visible from some location, however remote. A significant impact on visual resources may result if any of the following were to occur from construction or operation of the proposed project:

- Unresolved conflict with visual standards identified by the BLM, Forest Service, or Grand County.
- Substantial, dominant visual changes in the landscape that are seen from highly sensitive viewer locations, such as community enhancement areas (community gateways, viewpoints, scenic byways, and historic markers); or locations with special scenic, historic, recreational, cultural, archaeological, or natural qualities that have been recognized as such through legislation or some other official declaration.

4.8.2 Methodology

Potential impacts were evaluated through viewshed analyses, contrast ratings, and photographic simulations for all alternatives.

Viewshed analyses for each alternative were conducted using GIS to quantify the number of poles that are visible within the analysis area (Map 4-1 through Map 4-7). To aid with the comparison, all of these maps are located at the end of this subsection. The GIS analyses do not take into account the screening effect of vegetation; they are a “bare-ground” scenario of views limited solely by terrain. Nor do they take into account viewer distances; field observations indicate that poles beyond 2 miles in distance were typically imperceptible to viewers. Each alternative viewshed analysis shows the number of poles that would be visible from a particular location. Alternative A was modeled at 65 feet high. All action alternatives were modeled at 105 feet high. These heights are the maximum heights anticipated; the average height range is anticipated to be 75-105 feet for the action alternatives. By comparison, the average height range of the existing line is 55-65 feet.

The BLM’s Visual Contrast Rating Worksheet (Form 8400-4) was customized to account for Forest Service methods, documenting the VAC, existing scenic integrity, existing landscape character, and degree of contrast of proposed facilities. As seen from KOPs, the difference between the existing visual condition and future visual condition after construction of the project is referred to as the degree of contrast. Contrast rating worksheets found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations, document the extent of visual effects as negligible, minor, moderate, or strong, and identify measures to mitigate these effects.

Photographic simulations were prepared for 14 KOPs to inform the contrast ratings. Grand County, Forest Service, and BLM assisted in selecting which KOPs to simulate. The simulations were based on preliminary engineering information, and were prepared by collecting GPS points of each KOP, existing photography using a 50mm digital SLR camera, locating poles in GIS (ArcINFO 9.1), rendering poles in 3DMax, and adding the rendered poles to photographs from each KOP. Photographic simulations of the alternatives can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

Analysis findings were then compared to Grand County, Forest Service, and BLM Visual Resource Objectives to determine compliance.

4.8.3 Direct and Indirect Impacts

4.8.3.1 Alternative A – No Action

Under the no action alternative, the existing adverse effects from the existing 69-kV transmission line would continue. Since its construction approximately 70 years ago, viewers have become accustomed to the adverse effects of the existing transmission line, lessening its visual impact. However, views from existing commercial and residential buildings and Cutthroat Bay Campground facilities, located directly under the existing transmission line or immediately adjacent to the ROW, would continue to be significantly affected. Foreground views from existing commercial and residential buildings, the scenic byway, Lake Granby, and use areas within the ANRA would continue to be adversely affected, though to a lesser degree than what would occur under the action alternatives (see Map 4-1, Alternative A Viewshed Analysis).

Over time, structures would require repairs or replacement, and may be replaced with newer materials that are inconsistent with the existing transmission line, such as laminate wood poles or steel poles. The mix-matched materials would result in an additional minor degree of contrast when accounting for the existing adverse effects.

Maintenance operations would include aerial and ground patrols for monitoring, tree trimming, and equipment repair. Residents or visitors in the vicinity of the route would be able to see ground inspections. Given the nature of the vegetation communities in the Project Area and the existing 30-foot ROW, visual effects from long-term tree removal maintenance are anticipated to be negligible. These annual maintenance activities would result in no change or a minor change to the visual environment.

Effects on Visual Resource Objectives

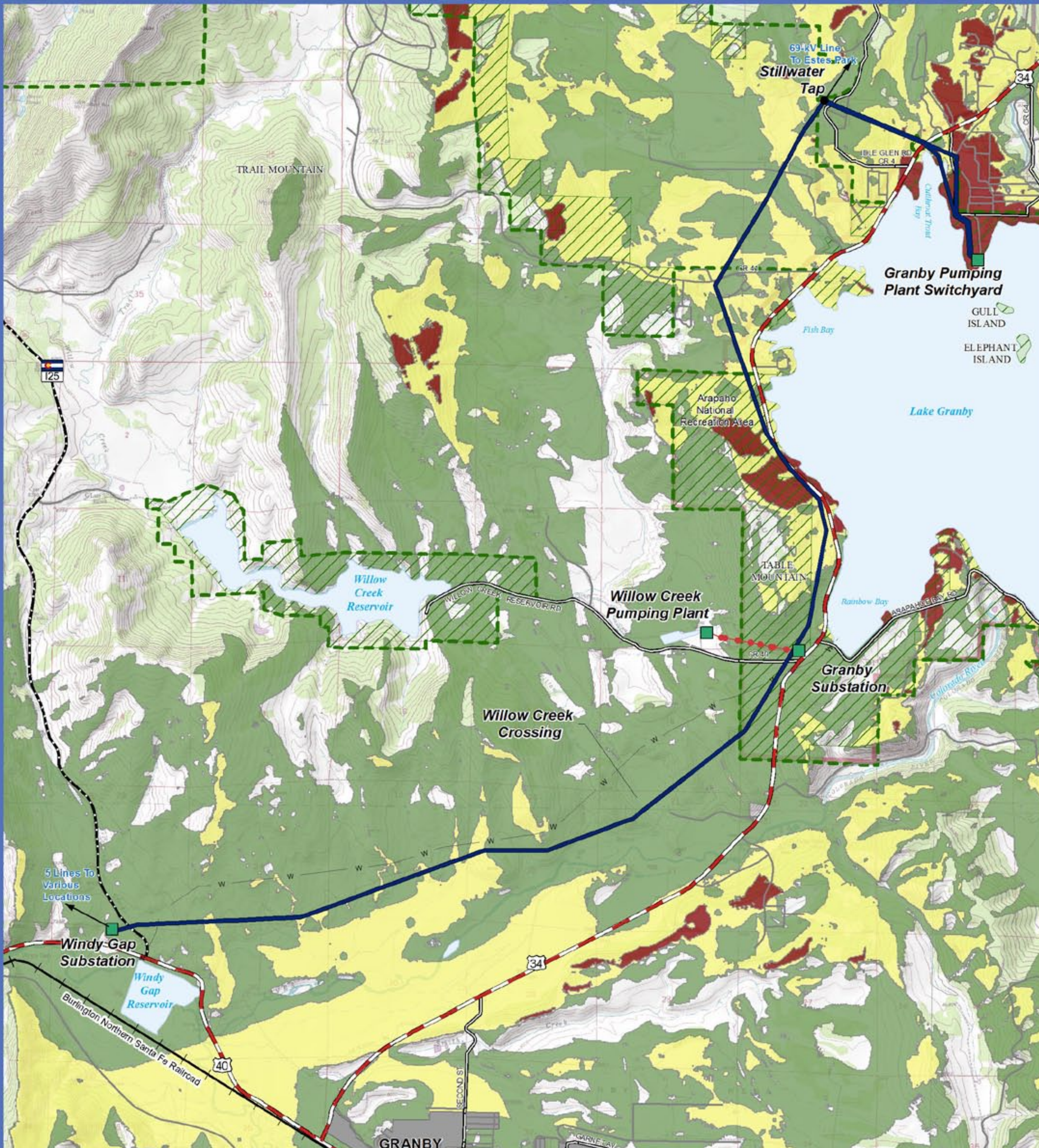
The existing transmission line is located within an area of Forest Service SIO of High, from one-half mile southwest of the Granby substation to a point north that is opposite the Stillwater Recreation Area, because of the adjacent Scenic Byway; and again where Alternative A crosses the Scenic Byway at the junction of County Road 64, as shown on Map 3-7.

As seen from KOP 12 at the Granby Substation (intersection of the scenic byway and Willow Creek Road), the existing H-frames are highly visible from the scenic byway north-south and connecting to the Granby Substation. The substation and multiple visible lines (both Western and MPEI) dominate the recreational and natural-appearing landscape character, resulting in strong form and line contrasts that are not compatible with the Forest Service SIO of High.

As seen from KOPs 1, 2, 3, and 5 (from the Stillwater Tap to the Granby Pumping Plant Substation), the existing single-circuit transmission lines cross the scenic byway and cross Cutthroat Bay Campground directly above campground facilities. The existing condition of this area is best described as “heavily altered” because of extensive private development, some of which is unsightly. Most private development is low profile. The southwestern circuit is skylined on a hill north of the campground and crosses above the lake surface, which is a major destination for campground users. The existing single-circuit transmission lines are highly visible from the scenic byway, lake, and Cutthroat Bay Campground, where viewer sensitivity is high and viewing duration is long. Due to the multiple single-circuit H-frame structures (including one bright laminate angle structure) and urban development and infrastructure in the foreground scenic byway, lake, and Cutthroat Bay Campground, the Forest Service SIO of High is not currently achieved.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative A, multiple other electrical distribution lines and ROWs, and extensive private development seen in the foreground of the scenic byway, lake, and Cutthroat Bay Campground. The Secondary SIO of Low would be met. Therefore, Alternative A still complies with Forest Plan Standards and Guidelines.

Under Alternative A, Tri-State would still need to expand their transmission system in the valley with a new transmission line in order to ensure reliable service and plan for increasing load demands without the participation of Western. Due to topographic and environmental constraints, their expansion would likely occur in the same general vicinity of Western’s line and would require a new ROW.



Miles 0 0.5 1 2

Map 4-1

Viewshed-Alternative A

April 2, 2013

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative A - Existing

No Action Alternative

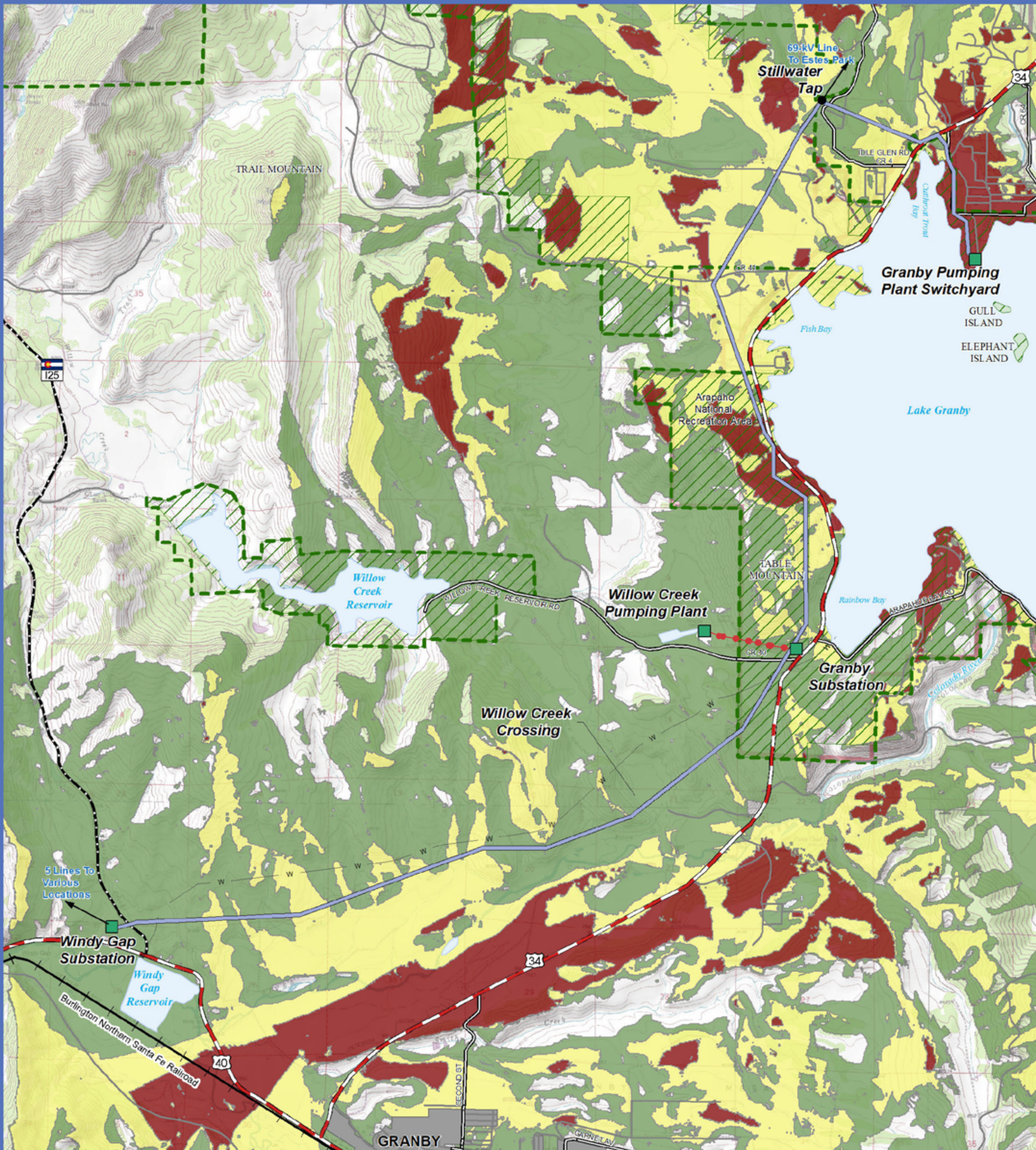
Transmission Line Visibility

- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 4-2

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative B1

Transmission Line Visibility

- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

Viewshed-Alt B1

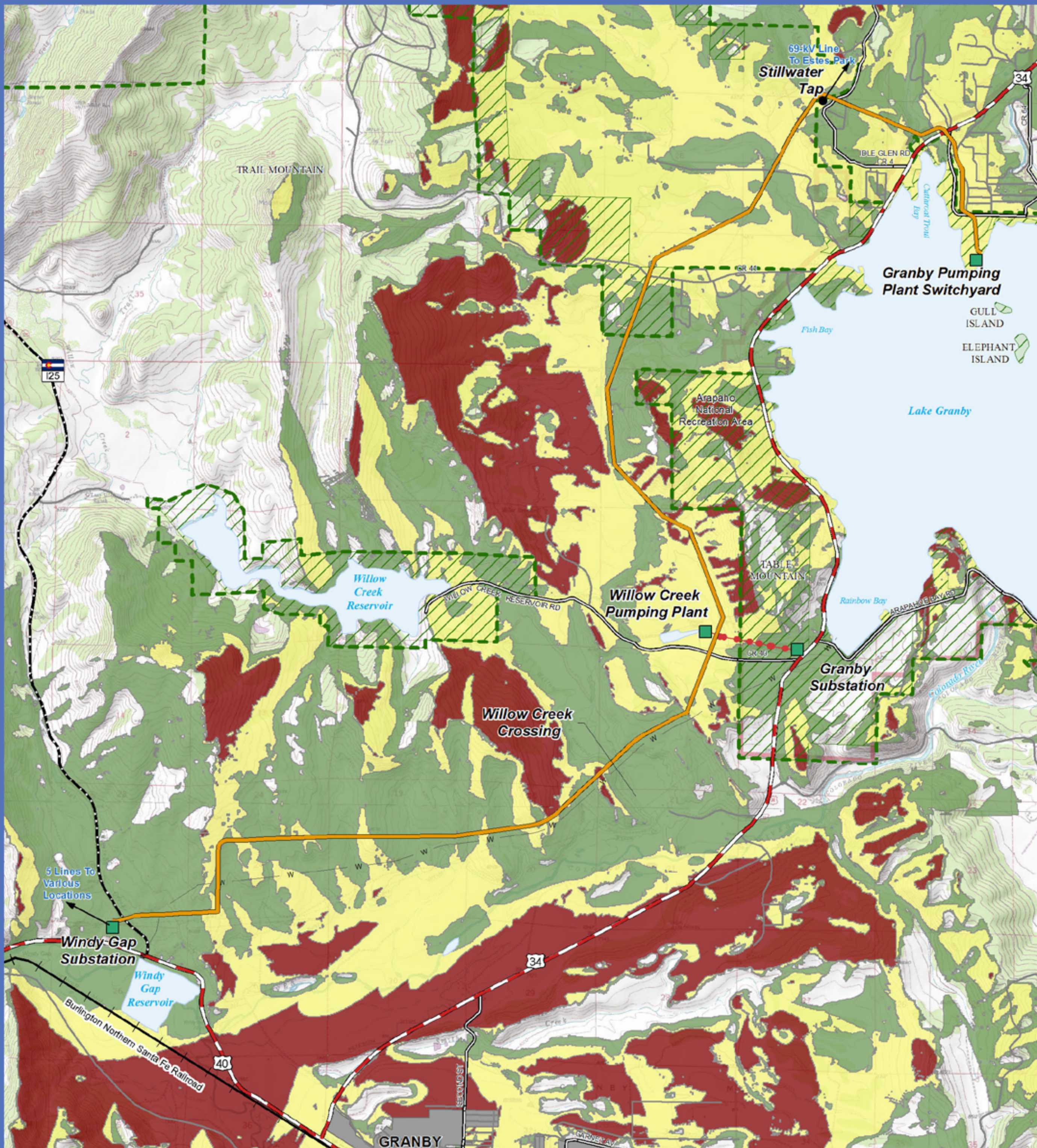
April 2, 2013

Western Area Power Administration

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), and Grand County

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



0 0.5 1 2 Miles

Map 4-3

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative C1

Transmission Line Visibility

- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

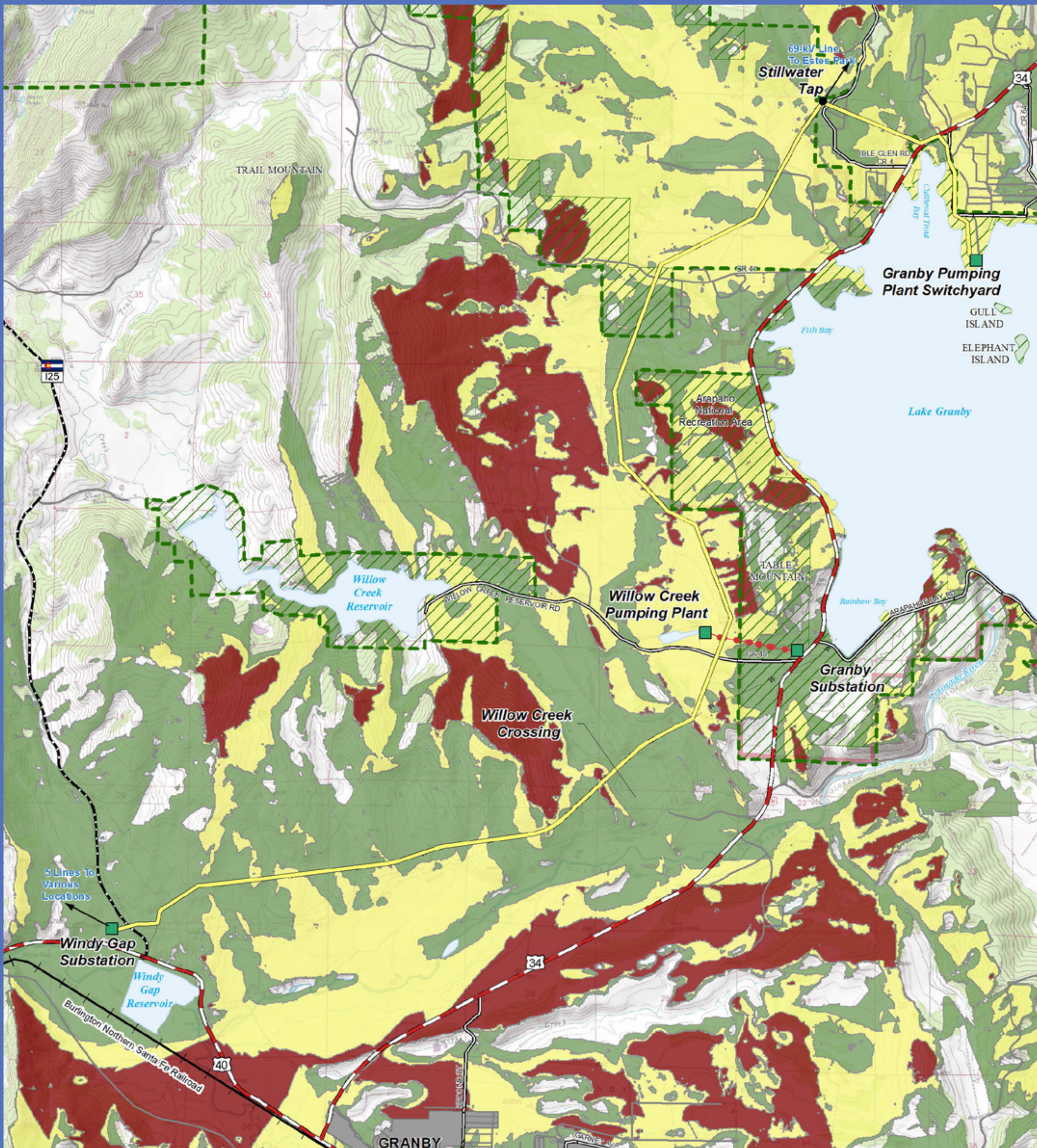
Viewshed-Alt C1

April 2, 2013

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), and Grand County

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 4-4

Viewshed-Alt C2 (Option 1)

April 2, 2013

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative C2 - Option 1

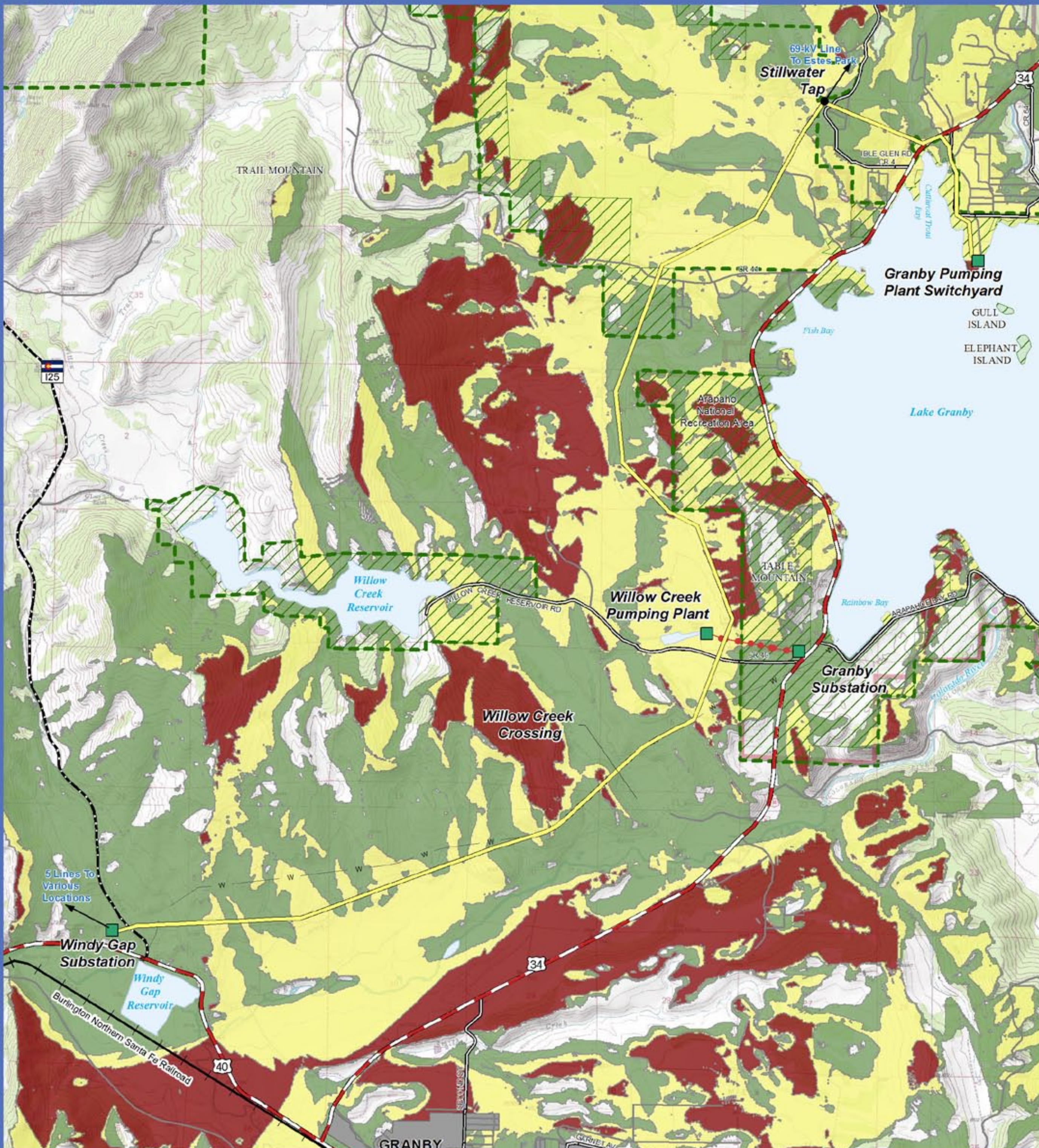
Transmission Line Visibility

- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

Western

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University



Map 4-5

Legend

Base Data
- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status
- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives
- Alternative C2 - Option 2

Transmission Line Visibility
- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

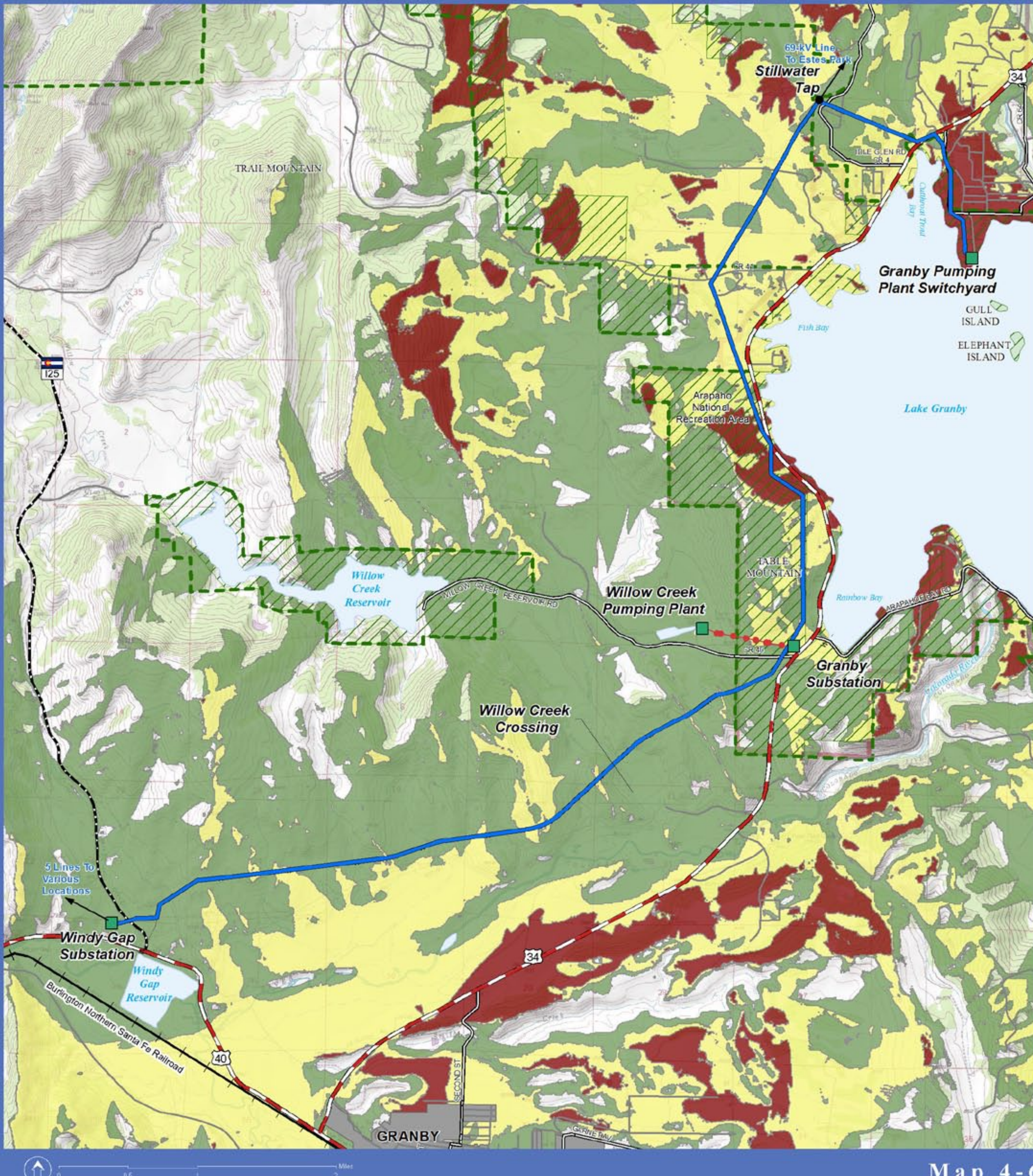
Viewshed-Alt C2 (Option 2)

April 2, 2013

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 4-6

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- W Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative D - Option 1

Transmission Line Visibility

- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

Viewshed-Alt D (Option 1)

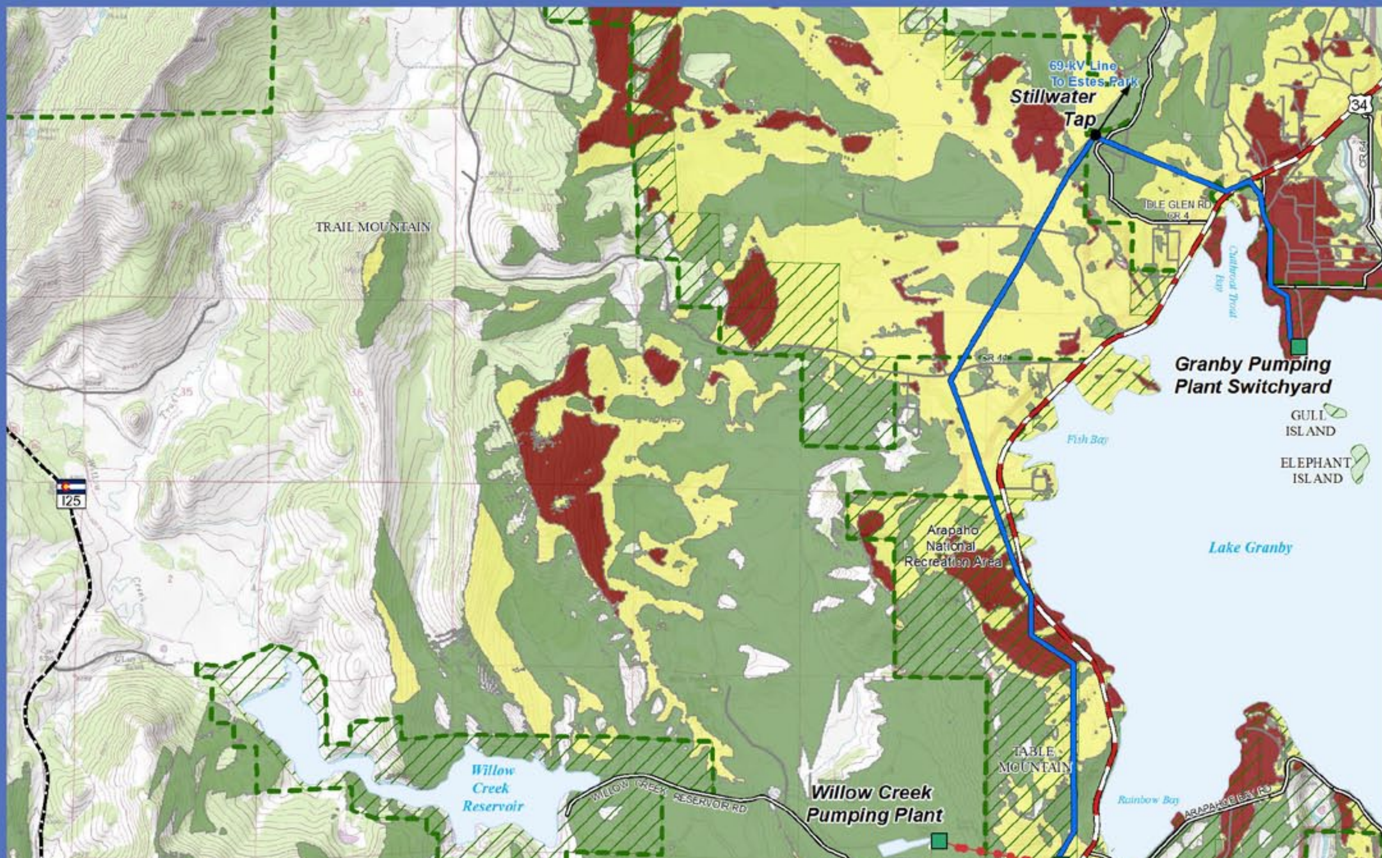
April 2, 2013

Western Area Power Administration

AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, and Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 4-7

Viewshed-Alt D (Option 2)

April 2, 2013

Legend

Base Data

- Existing Willow Creek Tap (69-kV)
- Windy Gap Water Pipeline (NCWCD)

Land Status

- Forest Service Land within Arapaho National Recreation Area
- Private or Other Land Ownership
- U.S. Forest Service Boundary

Transmission Line Alternatives

- Alternative D - Option 2

Transmission Line Visibility

- Low (Up to 1.5 miles of project Visible)
- Moderate (Up to 3.5 miles of project visible)
- High (More than 3.5 miles of project visible)

Western AECOM

Source: Source: Bureau of Land Management (BLM), Northern Colorado Water Conservancy District (NCWCD), U.S. Forest Service (USFS), Grand County, Colorado State University

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

4.8.3.2 Effects Common to All Action Alternatives

Short and long-term direct impacts to visual resources would occur from all action alternatives. As large-scale forms and lines, transmission lines create long-term changes to the visual setting and can be visible from many locations to great distances. Effects common to all action alternatives would result from the following components, as described in Chapter 2.0, Activities Common to All Action Alternatives, and Chapter 2.0, Design Criteria and Environmental Protection Measures:

- Construction Activities, Clearing, Grading, and New or Expanded ROWs
- Construction Staging Areas
- New Access Roads
- New Transmission Line
- Upgraded Existing Tap and Substation Facilities
- Operations and Maintenance Activities

Construction Activities, Clearing, Grading, and New or Expanded ROWs

Short-term surveying, demolition, clearing, staging, and construction activities would occur continuously along the ROW for all action alternatives. Trucks and cranes would be used for structure and conductor installation. Construction impacts on visual resources include the presence of equipment, materials, and associated dust, as well as a workforce along the alternatives. Residents or visitors in the vicinity of the route would be able to see construction equipment and activities. Construction activities would be most visible along those portions of the analysis areas adjacent to the scenic byway, the ANRA, or in proximity to Granby. Direct and indirect short-term adverse visual impacts would occur in these locations.

The typical ROW would be up to 100 feet wide. Trees and shrubs along the ROW would be cleared, consistent with Western's 2008 Transmission Vegetation Management Program guidelines. Transmission segments located in areas with low vegetation would require clearing at the base of structures and along new access roads. Where crossing evergreen or riparian forests, trees within the ROW would be removed if they are capable of growing within 22 feet of the transmission line conductors. This would result in the removal of most tree species, resulting in the ROW having a mix of shrub, herbaceous, and low growing tree species. The edges of clearings and cuts through trees, shrubbery, or other vegetation would be irregularly shaped to soften the undesirable visual impact of straight lines. In densely forested areas, this would result in an open, linear feature in an area currently characterized by a closed canopy. Short-term soil disturbance in the ROW would be visible until the areas have been successfully revegetated. Short-term significant effects would occur on Forest Service lands within the foreground of the scenic byway and recreational use areas during construction.

Construction Staging Areas

Existing substations and their immediate surroundings would be used to the extent possible for temporary equipment staging, material laydown, and storage facilities. These areas have lower scenic quality than their surroundings due to the existing facilities; however, each substation is highly visible from a major road or use area. Short-term soil disturbance in the ROW would be visible until the areas have been successfully revegetated. Direct short-term minor adverse impacts on visual resources include the presence of equipment, materials, and associated dust, as well as a workforce at staging areas along the routes.

New Access Roads

Where existing roads are not available and overland access is not feasible, new access roads would be created. New access roads would create a new line and color on the landscape.

New Transmission Line

All action alternatives remove the existing H-frame wood poles, resulting in a beneficial long-term effect.

All action alternatives use the existing ROW for a portion of their route. Where utilizing the existing ROW, effects to visual resources would have lower effects than areas where a new line would be located for several reasons. Access roads exist along the existing ROW, vegetation has been cleared in the existing ROW, and viewers are accustomed to seeing the existing transmission line and therefore have a lower viewer sensitivity.

One 138-kV double-circuit transmission line would be constructed with single-column steel poles in the existing ROW. Structures would consist of steel monopoles and would range from 75-105 feet tall, constructed of rust-colored COR-TEN steel. The typical span between poles would be approximately 600 feet, with a maximum span of 800 feet. Nonreflective conductors and insulators would be used.

The form, lines, colors, and textures of these vertical structures would be discernible to the viewer, particularly within the foreground and middleground viewshed distances. Visual contrasts increase during periods of snow cover as the COR-TEN finish would not blend with the ground. The upgraded lines would incrementally modify the high country ranch and recreational character of the region. Negligible effects would occur for viewpoints located more than 2 miles from the transmission line as a result of the distance and the ability of the landscape to absorb visual change as distance increases.

The project is generally located in a rural setting away from populated areas; however, it would sometimes traverse areas with occupied residences. Although alternatives were sited to avoid residential subdivisions whenever possible, the new transmission lines would create high contrasts in the immediate foreground of residences. Section 4.7, Land Use, describes the number of occupied residences within 300 feet of each alternative. Within this distance, viewers could distinguish the details of transmission line components, including the texture and color of a pole, and residents may perceive the project as permanently degrading the scenic quality of the existing landscape.

Upgraded Existing Tap and Substation Facilities

New equipment would be installed at existing tap and substations. Visual contrasts to KOP 13, the scenic byway, and State Highway 125 would be negligible due to upgraded equipment at Windy Gap Substation for all action alternatives. Visual contrasts to KOP 12 and the scenic byway would be negligible due to upgraded equipment at the Granby Substation.

Maintenance Activities

Long-term routine activities include aerial inspections, ground inspections, maintenance and repair of project components, and vegetation management. Maintenance operations would include aerial and ground patrols for monitoring, tree trimming, and equipment repair. Residents or visitors in the vicinity of the route would be able to see ground inspections. These annual maintenance activities would result in a negligible change to the visual environment.

Effects on Visual Resource Objectives

In the short term, visual resource objectives would not be met during construction of the new or expanded ROW, construction staging areas, new access roads, new transmission line, and tap and substation facilities, as described above. Vegetation clearing, grading, occupancy, facility construction, and revegetation of the project phases would result in areas of disturbed soil surface, human activity, and dust resulting in strong color, line, and texture contrast, which would be prominent from the scenic byway, residential areas, recreational use areas, and KOPs. Though temporary, anticipated strong visual changes from construction would be inconsistent with the applicable BLM VRM Class II and III areas and Forest Service High or Moderate SIO areas until revegetation occurred.

In the long term, visual contrasts and compliance with visual resource objectives were determined qualitatively through contrast ratings, viewshed analyses, and photographic simulations. Table 4-9, Visual Resource Objective Consistency by KOP, shows that the degree of contrast ranges from none to strong, depending on scenic quality, viewer sensitivity, distance, the nature of the proposed facility, and other considerations. The degree of contrast was compared to visual resource objectives to determine compliance. Table 4-10, Linear Impacts to Visual Resource Objectives, summarizes the length of management areas crossed by the action alternatives.

As seen from KOPs 1, 2, and 3 (from Stillwater Tap to the Granby Pumping Plant Substation), all action alternatives cross the scenic byway near the intersection with County Road 64 and are in proximity to Cutthroat Bay Campground. At the U.S. Highway 34 crossing, two or more poles would be highly visible in the immediate foreground at locations north of where the two existing lines cross the highway. Note that Alternative D has a slightly different alignment than the other action alternatives in the vicinity of County Road 64. See the discussion in Section 4.8.3.7 for details.

The action alternatives would remove the existing southwestern circuit, which currently crosses Cutthroat Bay Campground, resulting in a long-term beneficial effect to views from the lake and campground. Simulations of KOPs 2, 3, and 5 (Appendix J) simulate the scenic byway crossing, the view along CR 64 near the Cutthroat Bay Campground, and a representative view from the lake towards Cutthroat Bay Campground. The new structures would follow existing linear features (the existing ROW and CR 64) and share portions of these existing ROWs. However, despite these beneficial effects, the action alternatives would result in moderate to strong form and line contrasts due to the width of the new ROW, scale of new poles immediately adjacent to a pedestrian recreational setting, and height of structures above the existing forest canopy. The introduction of new transmission structures adds another element that is out of scale with existing low profile private development and recreational facilities, and thus highly contrasting.

As seen from KOP 5 (Stillwater Campground) looking north towards the intersection of the scenic byway and CR 64, all action alternatives would meet the Forest Service SIO of High and/or Moderate due to distance, screening of the lower two-thirds of the new transmission poles by the tree canopy, and color compatibility with the brown-grey forest background As seen from KOP 5 looking towards the Granby Pumping Plan Substation, all action alternatives would continue to not meet the Forest Service SIO of High and/or Moderate, as the new transmission poles and expanded substation would not be screened (although backdropped) by evergreens, resulting in moderate form and line contrasts.

There are Predominant and Secondary SIOs listed in the Final EIS of the Forest Plan (Table 3.136, p. 402). The Predominant SIO, high, is defined as “Areas in which changes in the landscape are not visually evident to the average person unless pointed out. They appear not to have occurred” (p. 400). Because all action Alternatives rebuild the existing wooden pole transmission line using metal monopole structures approximately twice as high with twice as many conductors, in some areas the Predominant SIO would continue to not be achieved. Secondary SIOs are meant to be transitory and subordinate with the Predominant SIOs prevailing in the management area (p. 401). While the transitory nature of the Secondary SIOs is not defined in the Plan, the useful life of all action Alternatives is many decades and would not meet the Desired Future Visual Condition as listed in the Forest Plan EIS (p. 402) in some areas. While not requiring an amendment to the Plan, all action Alternatives are considered to be in contrast with the intent of the Forest Plan where they cross Forest Service lands (between 1.5 and 3.8 miles).

All action alternatives cross US 34 near the intersection of Country Road 64. On Forest Service lands within 0.5 mile of the crossing, the predominant Forest Service SIO of High would continue to not to be achieved in the long term. The secondary SIO of Low would be achieved. Therefore, the Predominant SIO within 0.5 mile of the US 34 and CR 64 intersection would be changed to an SIO of Low as per Standard 154 of the Forest Plan (p. 38).

In the long term, all action alternatives would achieve BLM VRM Class II and III objectives. The range of alternatives address, and were influenced by, the Grand County Three Lakes Design Review Area criteria, namely consolidating utilities (along the Windy Gap Pipeline and roads), maximizing the use of public lands to minimize damage to private landowners (along Scanloch Subdivision and County Road 64), use non-reflective structures and conductors, and seek to minimize conflicts with existing and planned land uses.

Table 4-9. Visual Resource Objective Consistency by KOP.

Location	Management Objective	Photo-Simulation	Alternative Contrast Rating[1] Alt A	B1	C1	C2-O1	C2-O2	D-O1	D-O2	Management Objective Met for Each Alternative Alt A	B1	C1	C2-O1	C2-O2	D-O1	D-O2
1: US 34 – Transmission line crossing looking north	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)		Moderate	Strong	Strong	Strong	Strong	Strong	Strong	No	No	No	No	No	No	No
2: US 34 / CR 64 looking southwest	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)	X	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	No	No	No	No	No	No	No
3: CR 64 at Cutthroat Bay Campground looking northwest	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)	X	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	No	No	No	No	No	No	No
4: CR 41 – 2 miles west of US 34 looking southeast	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of Moderate)	X	None	None	Minor	Minor	Minor	None	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5: Stillwater Campground	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)	X	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Partial	Partial	Partial	Partial	Partial	Partial	Partial

Location	Management Objective	Photo-Simulation	Alternative Contrast Rating[1] Alt A	B1	C1	C2-O1	C2-O2	D-O1	D-O2	Management Objective Met for Each Alternative Alt A	B1	C1	C2-O1	C2-O2	D-O1	D-O2
6: US 34 / CR 41 looking northwest	Grand County Three Lakes Design Review Area	X	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7: CR 41 – 1 mile west of US 34 looking north	Grand County Three Lakes Design Review Area	X	Negligible	Minor	Moderate	Moderate	Moderate	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8: CR 4106 – East of Three Lakes wastewater facility looking west	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of Moderate)		None	None	Minor	Minor	Minor	None	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9: Sunset Point Campground looking west	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)	X	Negligible	Minor	None	None	None	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10: Willow Creek Road – 1 mile east of Willow Creek Campground looking east	None	X	None	None	Minor	Minor	Minor	None	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11: Willow Creek Pumping Plant looking east	None	X	None	None	Strong	Strong	Strong	None	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12: Granby Substation – US 34 / Willow Creek Road looking southwest to north	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)	X	Moderate	Strong	None	None	None	Moderate	Moderate	No	No	Yes	Yes	Yes	No	No

Location	Management Objective	Photo-Simulation	Alternative Contrast Rating[1] Alt A	B1	C1	C2-O1	C2-O2	D-O1	D-O2	Management Objective Met for Each Alternative Alt A	B1	C1	C2-O1	C2-O2	D-O1	D-O2
13: Windy Gap Watchable Wildlife Area (SWA) looking north	BLM (Class II)	X	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14: US 34 – 1.5 miles north of US 34 / 40 looking north	BLM (Class III)		Negligible	Minor	Moderate	Moderate	Moderate	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15: Lake Granby (Grand Elk) Marina looking southwest	Grand County Three Lakes Design Review Area, Forest Service (Predominant SIO of High)	X	Minor	Moderate	None	None	None	Moderate	Moderate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16: US 34 / Colorado River crossing near CR 620 looking northwest	BLM (Class III)	X	Minor	Moderate	Minor	Minor	Minor	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17: US 34 at the former Shorefox Development looking northwest	BLM (Class III)	X	Minor	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
18: US 34 – 1 mile south of CR 41 looking west	Grand County Tree Lakes Design Review Area, Forest Service (Predominant SIO of High)		Negligible	Minor	None	None	None	Minor	Minor	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[1] Contrast Rating: None: Not seen or no discernable effect; Negligible: Effect is at the lowest level of detection and causes very little or no disturbance or improvement; Minor: Effect that is slight but detectable, with some perceptible effects of disturbance or improvement; Moderate: Effect is readily apparent and has measurable effects of disturbance or improvement; Strong: Effect is readily apparent and somewhat dominates the natural landscape character.

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Table 4-10. Linear Impacts to Visual Resource Objectives.

Management Direction	Alt A	Alt B1	Alt C1	Alt C2-O1	Alt C2-O2	Alt D-O1	Alt D-O2
	Length Affected (miles)						
Forest Service - Predominant SIO of High SIO, ANRA Lands	3.3	3.8	1.5	1.5	1.5	3.3	3.3
BLM – VRM Class II Lands	0.5	0.5	0.5	0.0	0.5	0.0	0.5
BLM – VRM Class III Lands	0.3	0.3	0.3	0.0	0.0	0.0	0.0

Effects on the Colorado River Headwaters National Scenic and Historic Byway

Effects to visual resources would be more pronounced where the action alternatives would be visible within the foreground of high volumes of viewers, such as along the scenic byway. Table 4-11, Effects to U.S. Highway 34, shows the length (in miles) of the scenic byway that may be within view of new transmission poles (depicted as a range from low to high). Map 4-1 through Map 4-7 show the degree of visibility by alternative. All action alternatives would be highly visible from the Colorado River Valley (at varying degrees) and from the intersection of the scenic byway and CR 64. While viewer duration is briefer for motorists than residents and recreationists, long-term adverse visual impacts would occur along segments of the scenic byway where the alternatives are moderately to highly visible.

Table 4-11. Effects to U.S. Highway 34.

Degree of Visibility	Alt A	Alt B1	Alt C1	Alt C2-O1	Alt C2-O2	Alt D-O1	Alt D-O2
	Length Affected (miles)						
Miles of Byway where poles are **highly** visible[1]	0.8	3.2	3.6	2.8	3.1	2.0	2.4
Miles of Byway where poles are **moderately** visible	6.1	5.3	3.5	3.9	3.5	6.4	6.1
Miles of Byway where poles have **low** visibility	7.1	5.5	6.9	7.2	7.3	5.5	5.5

[1] A visibility rating of "highly visible" indicates that more than 3.5 miles of transmission line would be visible from a given location if vegetation and viewing distance were not considered. "Moderately visible" indicates that up to 3.5 miles of transmission line would be visible, and a rating of "low visibility" indicates that less than 1.5 miles of transmission line would be visible.

4.8.3.3 Alternative B1

In addition to the effects common to all action alternatives, Alternative B1 would result in long-term moderate to significant adverse effects to residences, the scenic byway, and visual resource objectives, depending on the angle of view. Alternative B1 follows the existing ROW and crosses several residential areas where an expanded ROW would be required, potentially resulting in strong form and line contrasts to residential areas, depending on the angle of view.

As seen from KOP 12 (Granby Tap Substation) and KOP 15 (Lake Granby Marina), Alternative B1 would continue to not meet the Forest Service SIO of High. New steel monopoles would replace the existing H-frames in the view, making them more visible from the scenic byway. Alternative B1 would remove the existing transmission line from the Scanloch Subdivision and place it higher on Table Mountain, decreasing impacts to the residential areas but would result in partially skylined new structures above the Table Mountain ridgeline as seen from the scenic byway.

Alternatives B1 and D would require fewer new access roads relative to other action alternatives, resulting in fewer line and color soil contrasts.

The existing substation and multiple lines (both Western and MPEI) would continue to dominate the existing recreational and natural-appearing landscape character, resulting in strong form and line contrasts that are not compatible with the Forest Service SIO of High.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative B1. The Secondary SIO of Low would be met. Therefore, Alternative B1 is consistent with the Forest Plan.

Additional descriptions of Alternative B1 by KOP can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

4.8.3.4 Alternative C1

In addition to the effects common to all action alternatives, Alternative C1 would result in long-term adverse minor to moderate effects to residences and the scenic byway, with localized areas of significant effects. Alternative C1 creates a new ROW north of the residential and commercial mixed use project formerly known as the Shorefox Development, and from south of the Willow Creek Reservoir Road to north of CR 41.

In the Colorado River Valley, Alternative C1 would result in the following effects:

- As seen from KOP 14 (U.S. Highway 34, 1.5 miles north of U.S. Highway 40), the new ROW along the north boundary of the former Shorefox property would be located at a higher elevation than the other action alternatives and more visible on the hillside. The 90° angle would not appear to follow the natural forms and lines of the landscape.
- As seen from KOP 16 (U.S. Highway 34 at the Colorado River crossing near CR 620), Alternative C1 is located 0.25-0.5 mile farther from the scenic byway than Alternative B1. It may be skylined in several locations. Line and color contrasts are reduced as it follows the existing band of disturbance from the Windy Gap Pipeline, although this is not apparent in winter.
- As seen from KOP 17 (U.S. Highway 34 at the former Shorefox Development), the new ROW north of the former Shorefox property would be located at a higher elevation than the other action alternatives and more visible on the hillside. The 90° angle would not appear to follow the natural forms and lines of the landscape.

From south of the Willow Creek Reservoir Road to north of CR 41, Alternative C1 would result in the following effects:

- As seen from KOP 4 (CR 41, 2 miles west of U.S. Highway 34 looking southeast), Alternative C1 would create a new line on the toe of Table Mountain from a new access road and timber clearing in an area with moderate scenic integrity, resulting in minor contrasts.
- As seen from KOP 10 (Willow Creek Road, 1 mile east of Willow Creek Campground), Alternative C1 creates new lines north-south from the transmission line and access road that would be highly visible to recreationists in a middleground setting. The new line follows the toe of Table Mountain in area with little infrastructure and high scenic integrity, resulting in minor contrasts.
- As seen from KOP 11 (Willow Creek Pumping Plant), Alternative C1 creates new forms and lines north-south from the transmission line and access road that would be highly visible to day use recreational area users in the foreground. The new line follows the toe of Table Mountain in an area with moderate scenic integrity, resulting in moderate to strong contrasts.

South of the wastewater treatment plant, Alternative C1 crosses approximately 0.5 mile of land owned by C Lazy U Preserves held under a conservation easement. The natural qualities of this northwestern toe of Table Mountain include timbered ridges and sagebrush grasslands, above a pasture, canal, and dirt road that parallel Alternative C1. The new transmission line would create moderate to major contrasts from new forms and lines above the canal and dirt road, with linear clearings in forested areas in a viewshed currently void of similar facilities.

Alternative C1 would be most highly visible from the scenic byway relative to the other action alternatives.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative C1. This alternative lowers the SIO less over the entire length of the project than Alternatives A, B1, and D. The Secondary SIO of Low would be met. Therefore, Alternative C1 is consistent with the Forest Plan.

Additional descriptions of Alternative C1 by KOP can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

4.8.3.5 Alternative C2-Option 1

Effects from Alternative C2-Option 1 would be the same as Alternative C1, except as seen from the Colorado River Valley, where it would follow the existing Windy Gap Pipeline.

- As seen from KOP 14 (U.S. Highway 34, 1.5 miles north of U.S. Highway 40), Alternative C2-Option 1 would follow the existing line of disturbance from Windy Gap Pipeline. In winter when the pipeline ROW is not visible, this option would create a higher degree of contrast than Alternative C2-Option 2 due to its elevated location. If new residential and commercial mixed use development occurred on the former Shorefox property, Option 1 would traverse through a developed area with limited visibility from the scenic byway.
- As seen from KOP 17 (U.S. Highway 34 at the former Shorefox Development), Alternative C1-Option 1 would be highly visible from this KOP as a new line. If new residential and commercial mixed use development occurred on the former Shorefox

property, Option 1 would traverse through a developed area with limited visibility from the scenic byway.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative C2-Option 1. This alternative lowers the SIO less over the entire length of the project than Alternatives A, B1, and D. The Secondary SIO of Low would be met. Therefore, Alternative C2-Option 1 is consistent with the Forest Plan.

Additional descriptions of Alternative C2-Option 1 by KOP can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

4.8.3.6 Alternative C2-Option 2

Effects from Alternative C2-Option 2 would be the same as Alternative C1, except as seen from the Colorado River Valley, where it would follow the existing transmission line.

- As seen from KOP 14 (U.S. Highway 34, 1.5 miles north of U.S. Highway 40), Alternative C2-Option 2 would traverse through a developed area with limited visibility from the scenic byway if the former Shorefox Development occurred.
- As seen from KOP 17 (U.S. Highway 34 at Shorefox Development), Alternative C1-Option 2 would be highly visible from this KOP as a new line. If new residential and commercial mixed use development occurred on the former Shorefox property, Option 2 would traverse through a developed area with limited visibility from the scenic byway.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative C2-Option 2. This alternative lowers the SIO less over the entire length of the project than Alternatives A, B1, and D. The Secondary SIO of Low would be met. Therefore, Alternative C2-Option 2 is consistent with the Forest Plan.

Additional descriptions of Alternative C2-Option 2 by KOP can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

4.8.3.7 Alternative D-Option 1

Effects from Alternative D-Option 1 would be similar to Alternative B1, with the exception of two locations. In the Colorado River Valley, effects would be the same as were described for Alternative C2-Option 1 rather than Alternative B1. Along County Road 64 Alternative D-Option 1 has a slightly different alignment than Alternative B1 and the other action alternatives, following an alignment generally on the west side of County Road 64 along the edge of the Cutthroat Bay Campground. This alignment would place structures closer to the campground use areas and increase visibility. The increased visibility of the transmission line structure would be partially offset by mitigation measures, which could include vegetation screening to improve the overall setting. Visual and other mitigation possibilities would be coordinated with the Forest Service during final design and construction.

The impacts at the crossing of U.S. Highway 34 near County Road 64 would be very similar to those described for Alternative B1 and the other action alternatives. However, Alternative D makes a more direct crossing of the highway and therefore has a slightly reduced length adjacent to the highway and slightly a slightly lower level of visibility.

Alternative D-Option 1 would be the least highly visible action alternative as seen from the scenic byway.

Alternative D-Option 1 and Alternative B1 would require fewer new access roads relative to other action alternatives, resulting in fewer line and color soil contrasts.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative D-Option 1. The Secondary SIO of Low would be met. Therefore, Alternative D-Option 1 is consistent with the Forest Plan.

Additional descriptions of Alternative D-Option 1 by KOP can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

4.8.3.8 Alternative D-Option 2

Effects from Alternative D-Option 2 would be the same as Alternative B1, except as seen from the Colorado River Valley. In the Colorado River Valley, effects would be the same as Alternative C2-Option 2. In the vicinity of County Road 64, the effects would be the same as were described for Alternative D-Option 1.

Alternative D-Option 2 and Alternative B1 would require fewer new access roads relative to other action alternatives, resulting in fewer line and color soil contrasts.

In the long term, the Forest Service Predominant SIO of High for the scenic byway and Moderate for the remaining lands within the ANRA would continue to not be met by Alternative D-Option 2. The Secondary SIO of Low would be met. Therefore, Alternative D-Option 2 is consistent with the Forest Plan.

Additional descriptions of Alternative D-Option 2 by KOP can be found in Appendix J, Visual Resource Contrast Rating Worksheets and Photographic Simulations.

4.8.4 Mitigation Measures

4.8.4.1 Mitigation Common to All Action Alternatives

The primary mitigating feature for a transmission line for visual resources is proper siting and structure design. As a result, visual considerations were a major factor in refinement of the alternatives and selection of a transmission structure during the EA and EIS process. Beyond siting and structure, the design criteria in Chapter 2.0 were assumed as standard practices in the process of assessing impacts.

The following mitigation measures, when combined with the SCPs and project-specific design criteria, would further reduce the visual contrast created by the action alternatives:

- At the scenic byway crossing, underground MPEI distribution lines (similar to the existing conditions of the MPEI distribution line) in order to keep the height of new poles to a minimum and limit visual clutter.
- At the scenic byway crossing, reroute the line directly east-west to cross immediately south of the tennis courts (northwest of byway).
- Along CR 64, overlap the CR 64 ROW with the new ROW to place new poles as close to CR 64 as feasible, and away from campground facilities.

Additionally, measures taken to specifically address the impacts to recreation, land use, and vegetation are intended to reduce visual resource impacts.

4.9 Socioeconomics and Environmental Justice

4.9.1 Issues and Significance Criteria

Potential issues of the project include impacts to property values, unwanted changes to regional character, and disproportionate impacts to minority or low income populations. The project could result in beneficial impacts, such as short-term economic gains primarily related to construction workforces and expenditures, or long-term economic gains related to power source reliability.

It is difficult to establish definitive figures and costs associated with each impact topic. Therefore, a more general discussion of the impacts on socioeconomic resources is included in the environmental consequences section based on the following impact levels.

4.9.1.1 Impact Level

Significant impacts would result if the effects on socioeconomic conditions would be readily apparent, long term, and would cause substantial adverse or beneficial changes to socioeconomic conditions in the region. Minority or low income populations would be disproportionately affected by the project. If mitigation measures were required to offset potential adverse effects, they would be expensive and their success could not be guaranteed. Significant socioeconomic impacts would include:

- If changes in regional character results in lasting changes to lifestyles or social behaviors.
- Demand for temporary housing exceeds the existing supply when project-related needs are combined with recent occupancy rates during the scheduled construction season.
- Permanent demand on other infrastructure is greater than 10 percent of the current level of demand; construction or operations demand exhausts the carrying capacity in areas where workforce would live.
- Change in local tax bases of greater than 10 percent (positive).
- The change in area population is 10 percent or more.
- Long-term employment increases of more than 10 percent for the study area (positive).
- Property values are impacted from transmission line location within 50-300 feet of property. Key scenic views are altered.

4.9.2 Methodology

The socioeconomic environmental consequences section will determine whether employment and population from the proposed project alternatives would positively or negatively impact governmental or private conditions in the area. In addition, the socioeconomic section briefly addresses some of the concerns related to cumulative impacts from past, present, or foreseeable future events in the area.

Primary areas of concern are impacts to property values, cumulative related impacts related to the mountain pine beetle infestation, energy usage, reliability of electrical system, and short-term construction impacts.

4.9.3 Direct and Indirect Impacts

Socioeconomic impacts of the project may be divided into direct and indirect impacts. Direct impacts result from the construction of the project and consist of fiscal impacts from the construction and related expenditures, increased short-term employment and income, and impacts on the local housing market due to temporary housing of construction labor. Direct project effects during operations include the potential impacts on property values and electricity rates. Indirect impacts include potential growth inducing impacts related to the increased reliability and increased capacity of the electrical system in the region.

Generally, socioeconomic impacts are associated with the entirety of the project; therefore, impacts related to population, employment, income, housing, financial, or growth induced elements would not change dramatically for different alternatives. However, the alternative locations would affect property values and social values differently. Differences in impacts among project components or alternatives are identified where there are discernable differences.

4.9.3.1 Impacts of Alternative A

The existing transmission line and ROW has been established in the Project Area for approximately 70 years. Alternative A would result in no impacts to the socioeconomic, housing, or community service needs within the Project Area or region. Alternative A would not provide employment opportunities for an estimated construction workforce of 10-12 for the proposed transmission line rebuild. Income generated in the form of direct wages to employees and direct expenditures by the transmission line contractor and Western would not be filtered into the local economies adjacent to the route. However, maintenance workers would actively be maintaining the line and maintenance expenditures in the area would occur as is the current situation.

Over time, Alternative A may result in impacts to local socioeconomic factors because of decreasing reliability of electric service delivery and the associated adverse effects to local businesses and industry. Ultimately, if a second source of electrical power is not forthcoming once the Adams Tunnel cable is no longer operational; a reliable electrical power supply could be jeopardized and could indirectly affect economic activities in the service area.

The current transmission line alignment relative to the existing housing subdivisions would not change for this alternative; therefore property values would not be affected.

No new upgrade or modifications to the existing tap and substation facilities would occur.

4.9.3.2 Impacts of Alternative B1

Alternative B may result in a small short-term increase in population in the Project Area from the employment of contract construction workers from outside the county. However, this construction force would represent a negligible increase in population.

The construction phase of the project is anticipated to begin in summer 2011 and end in the latter part of 2013 on the segments of the line. The workforce would average 5-6 people per crew with 1-2 crews working 10-hour days (Trujillo 2009). It is anticipated that the workforce would be mostly local if a local contractor (Colorado) is hired, and 60-70 percent nonlocal if an out-of-state contractor is hired. Construction workers would likely stay in RV campers or short-term rental units. If local, some workers would commute to and from their permanent residence on a daily basis if within 1 hour of the show-up area.

One staging area of 5 acres would be designated for the transmission line. The approved contractor would negotiate the location of the staging area. The staging area is typically on private land and would not affect transportation or use of public lands.

Wage rates for the skilled and unskilled construction workers range from $13.95 and $26.61 per hour for laborers to $30.74 per hour for electric line installers and repairers, including benefits in the Colorado labor market. A portion of this income would be spent in the local area of the transmission line construction for goods and services. Minor short-term beneficial effects to the economy of the Project Area may occur from an increased consumer base as a result of the employment of these contract construction workers. Expenditures during project-related construction activities for equipment, energy, fuel, operating supplies, worker lodging and meals, and other consumer goods, products, and services would benefit local businesses and result in direct short-term positive economic impacts in Grand County.

The most recent total project cost estimate (9-10-08) is $11.6 million. Of this, $7.9 million is for the transmission line, and $3.7 million for the modifications at the Granby Pumping Plant Substation (Western 2009). A portion of this would be spent in the local area for diesel fuel, fuel oil, and miscellaneous supplies and repairs (Trujillo 2009). This would be considered a positive impact to the local economy. Private landowners would be reimbursed for the increase in ROW and also for any crop losses from construction activities.

Temporary housing accommodations provided in the Project Area are more than adequate for the estimated 10-12 short-term employees. Most of the temporary workers for construction of Alternative B1 are expected to be housed in local short-term accommodations, such as motels or inns. The project would have a minor short-term beneficial effect on temporary housing in Grand County. Alternative B1 would not result in effects to housing availability or additional community service needs.

Emergency services, including fire, police, ambulance, and hospital services, would not be impacted by increases in population or employment during the construction phase of the proposed project. The only impacts that would affect the provision of emergency services within the Project Area would be a construction accident or possibly traffic impedance for short periods of time. Basic medical and emergency services, which may be required in the event of an accident, are available throughout the Project Area as described in Section 3.9.

Overall, impacts on the local area population, employment, housing, or infrastructure would be considered indirect, negligible, mostly beneficial, and short term.

According to Western, the purpose of the proposed project would be to provide a reliable, second source of power to improve electrical reliability in the region, improve regional operating efficiency, and improve quality of service. MPEI's customer base has grown 8.6 percent, from 17,581 customers in 2005 to 19,096 customers in 2009 (Ransom 2009, pers. comm.). The economic effect of completing the project would be the greater reliability of electrical power to sustain the existing and growing population in the Grand County, Granby, Grand Lake, and the greater service area currently supplied with power through the Adams Tunnel.

The operations phase of the project would have little or no impact on population, employment, housing, or local infrastructure. The same number of operations workers would maintain the rebuilt line. Maintenance activity could actually be less, considering the improved reliability of the rebuilt line.

Indirect long-term beneficial economic effects would occur as a result of Alternative B1 by providing a reliable source of power for the area. The increased capability to supply energy to residential, commercial, and industrial users may contribute to economic growth and additional tax revenues in Grand County. The rebuild and upgrade of the transmission line, upgrades to the existing Stillwater Tap, and modifications to the Granby Pumping Plant Switchyard would help facilitate this objective.

Property Values

There are two aspects of the proposed transmission line upgrade that would potentially impact property values: visual encumbrances, and health and safety effects. Through literature review, the more significant of the two is the visual effects. EMF-induced health hazards have not statistically proven to have a significant effect on property values (Kinnard et al 1997). To date, research on the impacts of EMFs to human health have been contradictory. Conclusions about the negative effects of exposure to EMFs from high voltage transmission lines have not been substantiated by all researchers to date (see Section 3.6 Electric and Magnetic Fields).

Most of the research reviewed on the impact of transmission lines on property values focused on urban environments. The studies reviewed included assessments of various types of high voltage transmission lines, including a 138-kV, 230-kV, 315-kV, and 345-kV. The overall conclusion for all of the studies reviewed was that urban properties located adjacent to or within 325 feet of the transmission line would experience some property value impacts. In all studies, the transmission line tower was typically a four-legged steel tower or a tower on a pylon; more detracting visually than a single-pole steel structure with conductors. In all studies, the results suggested that the initial impact from the line would be the greatest; after a period of time, the transmission line would become a part of the landscape and have less of an impact on property values (Hamilton and Schwann 1995). Another common conclusion was that no impact to property values occurred after a certain distance (between 200 and 325 feet) because the negative visual impacts diminished rapidly. In some cases, homes located along the easement typically had larger yards to compensate for the adjacent transmission line. Sometimes, these homes had more open space surrounding the home, providing more privacy and an enlarged visual field. These properties were actually valued higher than other properties not visually encumbered by the transmission line.

The resulting quantitative impact to property values was difficult to generalize in the studies. The range of impacts varied from a positive impact to a 20 percent decline in value. The range most commonly identified for properties located within 165-325 feet of the centerline was, on average, 5-10 percent decrease in overall mean house value. Again, these studies were conducted in urban settings, generally in higher density subdivisions. No impact research was found on rural properties.

Local real estate representatives and the Grand County Assessor were also contacted to get their perspective on the local effect of transmission lines on adjacent properties. It was generally agreed that the effect on property values depends on many factors, including whether the property (home site) faces the line or whether the line is located behind the home site, whether the location of the line detracts from the views of the property or use of the property (agriculture), what natural vegetation or topography buffers the impact, how far away the line is located, the size of the parcel affected, whether the property is residential or agricultural, etc. The actual impact on property values would depend on the characteristics of each individual property, but it is generally agreed that some impact to value would occur or the property would take longer to sell. Properties never impacted by a transmission line would be, perceptually, more impacted than properties already affected by a view of a line from the standpoint of sales price (Brosh 2009, pers. comm.). In the case of the proposed project, the existing residential subdivisions located adjacent to the transmission lines were built after the transmission line was in service; therefore, the impact to property values had already occurred when each parcel was originally sold or built.

Future impacts to established residential property values from Alternative B1 are not anticipated. These properties were constructed along the ROW and their market value in this location has been established over the years. Since this alternative follows the existing 69-kV line, the level of impact may be less than in areas in which no transmission line exists. Other factors in the market affect the overall value of these properties more than the transmission line itself, including current economic conditions, housing demand/supply, location, availability of affordable or desirable housing, etc. However, the properties within 300 feet of the ROW would likely be more difficult to sell than properties farther than 300 feet from the ROW.

The transmission line alignment of Alternative B1 would avoid the Scanloch Subdivision by relocating the new 138-kV line onto a new ROW located just inside the ANRA boundary. Property values would likely improve, which in turn would increase the assessed valuation of the property and increase property tax revenues to Grand County. Removal of the existing 69-kV transmission line through this subdivision would have a direct beneficial long-term impact on property values within this subdivision.

Approximately 13 homes within 43 improved residential lots currently lie within 100 feet of the proposed alignment for Alternative B1, along that portion of the route that follows the alignment of the existing transmission line. An additional 51 improved residential lots lie within 300 feet. Approximately 18 vacant residential lots lie within 100 feet of the proposed alignment for Alternative B1, and an additional 55 vacant residential lots are located within a distance of 100-300 feet. Lot sizes range from less than 35 acres to over 35 acres. No effects on property values are anticipated in situations involving a rebuild along the existing alignment. See Section 4.7.3 for a discussion of impacts on the planned development near the intersection of U.S. Highways 34 and 40.

Approximately 1.3 miles of agricultural land is located along the existing alignment where one set of structures would be replaced by another. No additional impacts to property values would occur at these locations. Alternative B1 does not result in the placement of any structures on agricultural lands that are not crossed by the existing transmission line.

4.9.3.3 Impacts of Alternative C1

Impacts of Alternative C1 would be similar to those described for Alternative B1.

Property Values

Alternative C1 would circumvent the residential and commercial mixed use project near the intersection of U.S. Highways 34 and 40 (formerly known as Shorefox).

The transmission line alignment of Alternative C1 would avoid the Scanloch and Stillwater Estates residential subdivisions altogether. Removal of the existing 69-kV transmission line would have a direct beneficial long-term impact on property values within these subdivisions.

A total of 13 homes within 35 improved residential lots currently lie within 100 feet on either side of the centerline of the ROW of Alternative C1, along that portion of the route that follows the alignment of the existing transmission line. An additional 30 improved residential lots, two residential lots with mobile homes, and six condominiums lie within 300 feet on either side of the centerline. Approximately 10 vacant residential lots lie within 100 feet of the proposed alignment for Alternative C1, and an additional nine vacant residential lots are located within a distance of 100-300 feet on either side of the centerline of this alternative.

Approximately 1.8 miles of agricultural land is located along the existing alignment where one set of structures would be replaced by another. No additional impacts to property values would occur at these locations.

Alternative C1 would traverse a portion of the C Lazy U Preserves property. This property has a conservation easement in place. This alternative would visually impact the preserve.

4.9.3.4 Impacts of Alternative C2 and Option 1 and 2

Impacts of Alternative C2 would be similar to those described for Alternative C1.

Property Values

The transmission line alignment of Alternative C2 would avoid the Scanloch and Stillwater Estates residential subdivisions altogether. Removal of the existing 69-kV transmission line would have a direct beneficial long-term impact on property values within these subdivisions.

Both options would have the same effects on residential property. Approximately 13 homes within 35 improved residential lots are within 100 feet of the proposed alignment of Alternative C2. These homes are along the portion of the route that follows the alignment of the existing transmission line between Stillwater Tap and the Granby Pumping Plant Switchyard. An additional 30 improved residential lots and six condominiums are within 300 feet on either side of the centerline. Approximately 10 vacant residential lots lie within 100 feet of the proposed alignment, and an additional nine vacant residential lots are located within a distance of 100-300 feet on either side of the centerline of this alternative.

There are no differences with respect to agricultural lands for the two options. Both would cross approximately 1.8 miles of agricultural land located along the existing alignment where one set of structures would be replaced by another. No additional impacts to property values would occur at these locations.

Alternative C2 would traverse a portion of the C Lazy U Preserves property. This property has a conservation easement in place. This alternative would visually impact the preserve.

4.9.3.5 Impacts of Alternative D-Option 1 and 2

Impacts of Alternative D, both options, would be similar to those described for Alternative B1.

Property Values

The transmission line alignment of Alternative D, both options, would avoid the Scanloch Subdivision by relocating the new 138-kV line onto a new ROW located just inside the ANRA boundary. Property values would likely improve, which in turn would increase the assessed valuation of the property and increase property tax revenues to Grand County. Removal of the existing 69-kV transmission line through this subdivision would have a direct beneficial long-term impact on property values within this subdivision.

Both options would have similar effects on residential property. Approximately 4 homes within 36 improved residential lots would be located within 100 feet of the proposed alignment for Alternative D. These homes are along that portion of the route that follows the existing transmission line between Stillwater Tap and the Granby Pumping Plant Switchyard. An additional 50 improved residential lots and six condominiums are within 300 feet on either side of the centerline.

Approximately 18 vacant residential lots lie within 100 feet of the proposed alignment for this alternative, and an additional 55 vacant residential lots are located within a distance of 100-300 feet.

With respect to agricultural lands, both options would cross approximately 1.3 miles of agricultural land located along the existing alignment where one set of structures would be replaced by another. No additional impacts to property values would occur at these locations.

4.9.3.6 Environmental Justice

Under E.O. 12898 (published in the *Federal Register* February 11, 1994), federal agencies are required to identify and address disproportionately high or adverse human health or environmental effects of their programs, policies, and activities on minority populations and low income populations. Within the area potentially affected by the proposed project, no minority populations are affected. The existing line currently runs through several residential areas, which would be considered moderate (Lakeridge Mountain Valley, Lake Forest, Scanloch) to higher income (Stillwater Estates). During the EIS process, particular efforts were made to ensure that property owners within the affected areas were informed of the proposed project, the EIS procedures, and the opportunity to provide comments.

Neither low income (poverty status) nor minority populations would be disproportionately impacted by the proposed project. As described in the Environmental Justice section (3.6), the economic base of the area is predominately agriculture or tourism. Segments of the population are lower income, but are not disproportionately located along the transmission line routes. Families within the defined poverty status represent an estimated 7.1 percent of the Grand County population (1,053) and are dispersed throughout the county, not just in the analysis area. The project is located in an area where no poverty status population would be directly affected by the rebuild. No new populated areas would be impacted by the proposed project.

The proposed project alternatives would not have a disproportionately high or adverse long-term effect on minority or low income populations, or corresponding property values of minority or low income populations.

4.9.4 Mitigation Measures

No project-specific mitigation measures are recommended.

4.10 Recreation and Wilderness

4.10.1 Significance Criteria

The following significance criteria were used to assess potential impacts to recreational resources as a result of project alternatives:

- Changes in visitor use or experience would be readily apparent and have important long-term consequences. The visitor would be aware of the effects associated with the project and likely would express a strong opinion about the changes.

4.10.2 Methodology

The analysis considered recreational resources within 0.5 mile on either side of the proposed transmission line centerlines and associated substations, regardless of whether a transmission line would physically cross or intersect with a recreational resource. Although a transmission line might not cross or intersect with a recreational resource, the existence of the proposed transmission line and transmission structures within the line of sight of a visitor might have an effect on their recreational experience, because visual quality is one factor influencing a recreational experience. Visual effects beyond the 1-mile wide analysis area are described separately in the visual resources section of this chapter.

The analysis considered the recreational resources potentially affected by the proposed action and alternatives, as well as the potential effects on recreational experiences in the analysis area.

Because the closest designated wilderness area is located approximately 5 miles away, this project does not have the potential to affect, either directly or indirectly, any wilderness resources. Wilderness resources are therefore not described in the following direct and indirect effects discussion.

4.10.3 Direct and Indirect Impacts

4.10.3.1 Alternative A

Direct effects to recreational opportunities or facilities within the Project Area or region from Alternative A would be those resulting from normal operational and maintenance activities of the existing transmission line within ANRA, BLM, or general Forest Service lands. The only developed recreation facility crossed by Alternative A is the Cutthroat Bay Campground within the ANRA on the north shore of Lake Granby. Normal operational and maintenance activities to the existing line within the campground may cause temporary disruptions or closures to portions of the facility. These disruptions or closures would likely be temporary and short term and would most likely occur outside of the peak use season, therefore not disrupting current visitor use. Any direct effects from Alternative A are anticipated to be negligible.

Other direct effects from Alternative A may occur as a result of normal operational and maintenance activities to the existing transmission line. These impacts would most likely be limited to impacts to the visitor experience in the form of visual disturbance while crews work on the existing lines.

4.10.3.2 Alternative B1

The construction of Alternative B1 would have a direct effect on recreation at the Cutthroat Bay Campground. Alternative B1 would remove the existing southwestern circuit currently routed through the campground and consolidate the two existing lines onto the northeastern alignment, paralleling the east side of CR 64 through the Lake Forest Subdivision to the Granby Pumping Plant Switchyard. Removal of the existing southwestern circuit would result in short-term disruptions or closures to all or portions of the facility. These disruptions or closures would most likely occur outside of the peak use season. No other direct effects to developed recreation sites are anticipated as there are no other developed recreational facilities crossed by Alternative B1.

Direct effects to recreation as a result of Alternative B1 may also include temporary disruptions to dispersed recreation on BLM, Forest Service, and ANRA lands as a result of expanding the existing 30-foot ROW to 100 feet to accommodate safety requirements for construction, operation, and maintenance. These disruptions or closures would likely be temporary and short term and would most likely occur outside of the peak use season, and therefore would be negligible. If these disruptions were to occur during the peak use season, they would be a significant short-term impact.

Other direct effects to current recreational opportunities or facilities within the Project Area or region as a result of Alternative B1 would be minor. Direct effects to recreational opportunities within the Project Area or region from Alternative B1 would be those resulting from normal operational and maintenance activities to the existing transmission line within ANRA, BLM, or general Forest Service lands. Normal operational and maintenance activities may cause temporary disruptions to dispersed recreation. These disruptions would likely be temporary and short term and would most likely occur outside of the peak use season, therefore not disrupting current visitor use. These impacts would most likely be limited to impacts to the visitor experience in the form of visual disturbance while crews work on the existing lines; they would therefore be considered negligible.

Another direct effect as a result of Alternative B1 includes a moderate beneficial effect to the recreational visitor experience as a result of the removal of the existing southwestern circuit that is currently routed through Cutthroat Bay Campground. The removal of the transmission line and pole structures would be permanent and readily apparent to visitors. Removing the transmission line and poles would return the campground to a more natural state, providing less visual interference between the campground and Lake Granby. Removing the line and poles would also allow the trees currently located in the transmission line ROW to grow to maturity without being topped, therefore providing a denser and more natural appearing tree canopy.

The widening of the existing 30-foot ROWs to a width of 100 feet under Alternative B1 may result in negligible indirect effects to the recreation experience due to the potential loss of tree density in recreation areas. Indirect effects as a result of visual impacts to the recreational experience may occur as a result the taller, steel monopoles. These impacts are discussed in detail in Section 4.8, Visual Resources.

Negligible direct effects to recreation are anticipated as a result of the placement of the transmission line within the ANRA boundary on the east side of Table Mountain for 1.3 miles. This alignment is at the outer limits of the ANRA and receives little, if any, regular dispersed recreational or hunting use. No developed recreational facilities or trails exist in this area. Public access along the transmission line ROW would be controlled via a locked gate, thereby prohibiting any unauthorized motorized use in the ANRA.

4.10.3.3 Alternative C1

Direct and indirect effects as a result of Alternative C1 from the Stillwater Tap to the Granby Pumping Plant Switchyard would be the same as those in Alternative B1. As with Alternative B1, from the Stillwater Tap, the existing southwestern circuit currently routed through the campground would be removed and the two existing lines consolidated onto the northeastern alignment, paralleling the east side of CR 64 through the Lake Forest Subdivision to the Granby Pumping Plant Switchyard.

Other direct effects to recreation as a result of Alternative C1 would be the same as those with Alternative B1. These include potential direct effects that may include temporary disruptions to dispersed recreation on BLM, Forest Service, and ANRA lands as a result of the construction, operation, and maintenance of the transmission line and associated 100-foot ROW.

Other direct effects to current recreational opportunities or facilities within the Project Area or region from Alternative C1 would be negligible. Alternative C1 would avoid all other developed recreational facilities. Alternative C1 would also only traverse one other small portion of ANRA lands and two sections of BLM lands; however, there are no developed recreational facilities in these areas. Recreation in these areas is dispersed and no impacts to such recreational opportunities are expected to occur. Indirect effects would likely only occur as a result of the visual presence of transmission lines to dispersed recreational users in areas where they once did not exist. Public access along the transmission line ROW would be controlled via a locked gate, thereby prohibiting any unauthorized motorized use in the ANRA. Indirect effects associated with expanding the existing 30-foot ROWs to a width of 100-foot ROWs would be the same as those under Alternative B1.

Other negligible direct effects from Alternative C1 may occur as a result of normal operational and maintenance activities to the new transmission line. These impacts would most likely be limited to impacts to the visitor experience in the form of visual disturbance while crews work on the existing lines.

4.10.3.4 Alternative C2

Direct and indirect effects from Alternative C2, both Options 1 and 2, would be similar to those described for Alternative C1.

4.10.3.5 Alternative D-Options 1 and 2

From the Windy Gap Substation to the Granby Substation, direct and indirect effects from this alternative would be similar to those described under Alternative C2. The adjusted alignment for Alternative D-Options 1 and 2 on the north end of the project area would move a portion of the alignment for Alternative D from the east side of County Road 64 to the west side, on Forest Service managed lands at Cutthroat Bay Campground. The adjusted alignment for Alternative D would cross back to the east side of County Road 64 near the south entrance to the campground and and would not place structures within the campground loop road or conflict with recreational uses. The existing transmission line located between the use areas and the lakeshore, would still be removed. Impacts to the setting are further discussed in Section 4.8, Visual Resources.

4.10.4 Mitigation Measures

4.10.4.1 Common to All Action Alternatives

Removal of the existing transmission line in Cutthroat Bay Campground and installation of the new structure on the south side of the southern access road to the campground should avoid the peak recreational use season, which is approximately Memorial Day through Labor Day. This would allow for full campground use during the peak season and not adversely affect users. Western will coordinate with the Forest Service to identify windows of opportunity for removal or installation activities on a real-time basis. Western will look at when the campground is reserved, likely high use days, and the availability of the removal or installation contractor(s) to remove the existing line and install the new structure before proposing construction days to the Forest Service. Work would not occur when the campground is occupied, so regardless of removal or installation dates, Western would coordinate with the Forest Service and concessionaire to put a hold on camping reservations on the construction days to ensure public safety. Operation and maintenance activities in ROWs on ANRA, Forest Service, or BLM lands would occur outside of the peak recreational visitor use season, approximately Memorial Day through Labor Day, if possible.

Mitigation measures for effects to the recreational experience from visual impacts are discussed in detail in Section 4.8, Visual Resources.

4.11 Aquatic Resources

4.11.1 Significance Criteria

Impacts to aquatic resources were compared to significance criteria to determine impact concerns that should be considered for mitigation. These criteria were developed based on the types of aquatic communities present within the project study area, combined with direct and indirect impacts that could affect water bodies. Impacts would be considered significant if the following effects resulted from project activities:

- Habitat for fish and invertebrate communities is affected by increased sedimentation or other water quality change on a long-term basis (greater than 1 year).
- Surface disturbance activities permanently alter spawning habitat, migration routes, or critical life stages for game fish and special status aquatic species.

4.11.2 Methodology

The methodology for evaluating impacts on aquatic biology resources involved a comparison of project activities within the project study area to habitat that supports aquatic species. Specifically, the focus of the evaluation was on activities that could affect water bodies that provide habitat on a consistent basis (perennial streams and Lake Granby). As defined in Section 4.1.1, direct and indirect impacts were described based on the technical knowledge of resource specialists and experience with similar types of projects. Impacts are discussed in qualitative terms involving types of habitat that could be affected, as well as the duration and level of effects.

4.11.3 Direct and Indirect Impacts

4.11.3.1 Alternative A – No Action

The existing transmission line crosses three perennial streams, four intermittent streams, and ten canals or ditches. The perennial streams (Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay) provide habitat for fish, invertebrate, and vegetation communities (i.e., attached algae and macrophytes) throughout the year. In contrast, the intermittent streams and canals/ditches provide habitat for only a portion of the year when water is present. Invertebrates and aquatic vegetation are the only groups that likely occur in these habitats.

No new alignments are included in Alternative A. Therefore, construction activities would not affect aquatic species and their habitat.

No new alignments would be required for Alternative A. Therefore, construction activities would not affect aquatic species and their habitat.

Operation activities associated with Alternative A would include routine maintenance and repairs of transmission line facilities. Maintenance checks are typically conducted annually, with repairs completed on an as needed basis. It is anticipated that maintenance and repairs would be required on an increased frequency as the transmission line ages. If repairs occurred near a stream crossing, soil disturbance from equipment could result in adverse impacts to aquatic habitat due to localized erosion. This impact would be considered to be short term in duration with a minor level of impact intensity. Streamside vegetation removal is likely minimal because removal of herbaceous species and shrubs is not required, and existing tree shading is minimal because mountain pine beetle epidemic has likely minimized any canopy cover. Fuel or lubricant leaks also could occur at work areas or along access areas, but none of the sites would be located next to streams.

One structure is currently located in a wetland, but not in proximity to surface waters that support habitat for aquatic species, including fish. Construction and maintenance activities may create minor, short-term impacts to water quality within the wetland, including increased turbidity or changes to dissolved gases. Structure placement is more than 300 feet from the nearest surface water, an intermittent unnamed tributary to Stillwater Creek. Considering the minor extent of impacts and distance to surface waters, it is not anticipated that construction or operations at this structure location would impact aquatic habitats.

In summary, operation and maintenance activities for Alternative A would result in minor effects on aquatic habitat. However, these effects would be considered insignificant due to the short-term duration and relatively small area of disturbance in relation to water bodies.

4.11.3.2 Alternative B1

Alternative B1 would rebuild and upgrade the transmission line from the Windy Gap Substation to the Granby Pumping Station. The rebuild would involve construction of approximately 11.8 miles of circuit lines along the existing alignment. The existing 30-foot ROWs would be expanded to a width of 100-foot ROWs. The Alternative B1 alignment would cross the same number of streams and ditches/canals as listed for Alternative A. The three perennial streams

(Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay) contain the most diverse aquatic communities, including game and nongame fish species, invertebrates, and aquatic vegetation. Alternative B1 and all associated access would avoid all surface waters. One structure would be located in a wetland, but not in proximity to surface waters that support habitat for aquatic species.

Construction and maintenance activities may create minor, short term impacts to water quality within the wetland, including increased turbidity or changes to dissolved gases. Structure placement would be more than 350 feet from the nearest surface water, an intermittent unnamed tributary to Stillwater Creek.

Design standards would minimize soil disturbance in proximity to water bodies. Design criteria would minimize risks to water bodies from fuel of lubricant leaks or fuel spills. Soils would be replaced if a spill occurred.

The effects of completing routine maintenance and repairs for the transmission line under Alternative B1 would be less than impacts (i.e., potential sedimentation and spills/leaks) described for Alternative A. The reason for this difference is that new and upgraded equipment would require less repair work on a long-term basis.

Considering the minor extent of impacts to surface waters that provide habitat for aquatic species, it is not anticipated that construction or operations at this structure location would impact aquatic habitats.

4.11.3.3 Alternative C1

Alternative C1 would upgrade and reroute the transmission line from the Windy Gap Substation to the Granby Pumping Plant Switchyard. The reroute would involve construction of approximately 12.3 miles of circuit lines along the existing alignment. The construction would expand the existing 30-foot ROWs to a width of 100 feet along the existing ROW. The Alternative C1 route would cross the same perennial streams (Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay) that were discussed for Alternative B1. Willow Creek would be crossed at a different location, while Stillwater and Soda creeks would be crossed at the same locations. These streams support game and nongame fish species, invertebrates, and aquatic vegetation. Alternative C1 would also cross eight unnamed intermittent streams and two canals. As previously discussed for Alternatives A and B1, these streams do not provide aquatic habitat throughout the year. Alternative C1 and all associated access would avoid all surface waters.

Construction and maintenance activities may create minor, short term impacts to water quality within the wetland, including increased turbidity or changes to dissolved gases. Structure placement would be more than 400 feet from the nearest surface water, an intermittent unnamed tributary to Stillwater Creek.

The effects of constructing the Alternative C1 facilities on aquatic biology resources would be the same as described the other alternatives. Impacts would be minimized with the design criteria described in Chapter 2.

The effects of repairs and maintenance activities for Alternative C1 would be the same as described for Alternative B1.

Considering the minor extent of impacts to nearby wetlands and distance to surface waters that provide habitat for aquatic species, it is not anticipated that construction or operations at this structure location would impact aquatic habitats.

4.11.3.4 Alternative C2

Alternative C2 would reroute and upgrade the transmission line between the Windy Gap Substation and the Granby Pumping Plant Switchyard. This alternative would cross the same three perennial streams (Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay), as discussed for Alternatives A, B1, and C1. Alternative C2 and all associated access would avoid all surface waters.

Construction and maintenance activities may create minor, short term impacts to water quality within the wetland, including increased turbidity or changes to dissolved gases. Structure placement would be more than 400 feet from the nearest surface water, an intermittent unnamed tributary to Stillwater Creek.

Considering the minor extent of impacts to surface waters that provide habitat for aquatic species, it is not anticipated that construction or operations at this structure location would impact aquatic habitats.

4.11.3.5 Alternative D-Options 1 and 2

This alternative would cross the same three perennial streams (Willow Creek, Stillwater Creek, and Soda Creek/Cutthroat Trout Bay), as discussed for Alternatives A, B1, C1, and C2. Intermittent and canal crossings would vary depending on the two options being considered, but they are the same segments being considered as part of Alternative C2. Alternative D, both options, and all associated access would avoid all surface waters.

Construction and maintenance activities may create minor, short term impacts to water quality within the wetland, including increased turbidity or changes to dissolved gases. Structure placement would be more than 400 feet from the nearest surface water, an intermittent unnamed tributary to Stillwater Creek.

Considering the minor extent of impacts to surface waters that provide habitat for aquatic species, it is not anticipated that construction or operations at this structure location would impact aquatic habitats.

4.11.4 Mitigation Measures

With adherence to project-specific design criteria, no significant impacts on aquatic biology resources would result from any of the action alternatives. No further mitigation is recommended.

4.12 Vegetation Resources

In general, the impacts to vegetation resources associated with project alternatives may result from five basic processes: (1) establishment of staging areas for the construction process, (2) clearing of the alternative route's ROW and construction of access road in specific locations, (3) construction of support poles and stringing of cable, (4) removal of old H-frame support structures, and (5) routine maintenance and operation of the electric transmission line.

This assessment of impacts to vegetation resources includes a separate discussion for noxious weeds for each project alternative.

4.12.1 Significance Criteria

The assessment of impacts on vegetation resources is based on the following significance criteria:

- Effect is readily apparent and has measurable effects of disturbance or improvement that are of local or regional importance; or sets a precedent for future undertakings by federal agencies. Project construction would require the topping or removal of mature trees, or the ROW would cross old growth forest or riparian woodlands.

The assessment of impacts from noxious weeds is based on the following significance criteria:

- Effect is readily apparent and has measurable effects of disturbance or improvement that are of local or regional importance; or sets a precedent for future undertakings by federal agencies. If weeds are introduced by equipment or other construction related sources, and are allowed to spread uncontrolled.

4.12.2 Methodology

Impacts to vegetation will first be judged based on type, i.e., direct and indirect. Direct impacts are those caused by the alternative and which occur at the same time and place as the causative action. Indirect impacts will be judged to be those caused by the alternative, but which may be later in time or farther removed in distance from the causative action. Indirect impacts are still reasonably foreseeable. Direct and indirect impacts can result in beneficial change or adverse change to the vegetation resources. Next, the impacts will be judged on duration. Duration will be considered short term if it lasts no longer than the 1-2 year implementation period for construction and buildout. Long-term effects will be those lasting beyond the project implementation period. Typically, these effects may extend beyond a decade or even indefinitely. Impact intensity on vegetation resources will be judged based on the significance criteria described in the section immediately preceding this methodology section.

4.12.3 Direct and Indirect Impacts

The area (in acres) of vegetation community types crossed by each of the alternative ROWs are presented in Table 4-12.

Table 4-12. Area of Vegetative Cover Types Crossed by Each of the Alternatives (acres)*.

Community Type	Alternative A-Existing	Alternative B1	Alternative C1	Alternative C2-O1	Alternative C2-O2	Alternative D-O1	Alternative D-O2
Aspen	0	4.8	0	0	0	4.8	4.8
Disturbed	10.1	9.6	6.3	6.3	6.3	9.6	9.6
Grassland	8.6	11.4	8.9	8.9	8.9	9.4	9.4
Highway	0.3	0.8	0.8	0.8	0.8	0.8	0.8
Lodgepole	12.1	17.7	14.4	14.4	14.4	17.3	17.3
Man-Made Pond	0.9	0.8	0.1	0.1	0.4	0.2	0.5

Community Type	Alternative A-Existing	Alternative B1	Alternative C1	Alternative C2-O1	Alternative C2-O2	Alternative D-O1	Alternative D-O2
Sagebrush	31.9	75.0	95.4	92.4	87.2	80.1	78.1
Weedy Shoreline	2.0	0	0	0	0	0	0
Wetland	8.4	23.2	22.8	21.6	21.8	20.7	21.7
Total	74.3	143.3	148.7	144.5	139.8	142.9	142.2

*With the exception of Alternative A, all calculations were completed using a 100-foot ROW. Alternative A used 30- and 100-foot ROWs.

4.12.3.1 Alternative A – No Action

Vegetation Resources

Direct Impacts

Alternative A would use the existing route and existing hardware. Routine maintenance would be relied upon to keep the system operational.

Short-term impacts to vegetation include physical damage to individual plants during routine maintenance operations. Vegetation that is trampled or crushed may suffer a loss of vigor or a decreased reproductive capacity. Soils may also be compacted in areas where temporary vehicle travel is required. This soil compaction may limit plant recruitment to the disturbed site. Short-term impacts to vegetation for Alternative A are judged to be negligible to minor in intensity, with the understanding that the frequency and intensity of maintenance would increase as the current infrastructure continues to age.

Long-term impacts to vegetation resources primarily focus on plant removal. Vegetation removal would likely be initiated and be most intense as the frequency and intensity of maintenance on the existing system increases over time. Long-term impacts also would include the removal or topping of danger trees (trees taller than 20-22 feet, generally depending on terrain, tree species and line sag), trees that may fall within proximity to existing structures, and removal of tree species that at mature height would pose a risk to the transmission line. Tree removal may be conducted by a number of methods, including hand crews on steep or difficult terrain, and larger machinery in flat or more gently sloping terrain. Long-term impacts to vegetation for Alternative A are judged to be negligible to minor in terms of intensity, depending on the vegetation cover type with most impacts occurring on forested areas of the ROW. This is based on the fact that Alternative A follows the route of the existing transmission line for its whole length, and structures are not planned for replacement.

Indirect Impacts

With time, there would be an increase in the frequency and intensity of maintenance for Alternative A. Potential indirect impacts resulting from this shift in maintenance intensity might include changes in vegetation cover, pattern, or dominance in a given plant community. There may also be an increase in sedimentation downgradient from the ROW and the spread of noxious weeds. Sheet flow of precipitation could increase with increased travel and compaction on access roads below the existing transmission lines. This would lead to minor sediment transport away from the Alternative A ROW into surrounding downgradient habitat. The spread of weeds is simply a factor of increasing the number of trips and duration of travel by vehicles along the maintenance access route for Alternative A. There is also the possibility of positive indirect impacts for those special status species and species of local concern that tend to take advantage of habitat disturbance, such as *Botrychium* species (moonworts). They may often be found in areas of stabilized areas of previous disturbance. Indirect impacts to vegetation resources from Alternative A would be negligible to minor in intensity.

Noxious Weeds

All project alternatives have the potential to result in an adverse increase in noxious weeds. Alternative A would only have the potential to increase weeds in areas subject to maintenance activities. Maintenance activities may have an impact if vehicles bring in weed seeds or if there is additional soil disturbance during maintenance. Site reconnaissance during the summer of 2007 through the spring of 2009 documented noxious weed infestations along or immediately adjacent to the existing transmission line (Alternative A). These populations have been mapped and should receive treatments for control prior to construction. Noxious weeds are listed in Table 3-25. The intensity of adverse impact from noxious weeds on this alternative is judged to be moderate based on the documented presence of existing noxious weed populations in the Alternative A ROW. Adequate weed control measures should be implemented and the ROW should be monitored regularly.

4.12.3.2 Alternative B1

Vegetation Resources

Direct Impacts

Alternative B1 would include 1.34 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system.

Short-term impacts to vegetation would include physical damage to individual plants. Vegetation that is trampled or crushed may suffer a loss of vigor or a decreased reproductive capacity. Soils may also be compacted in areas where temporary vehicle travel is required. This soil compaction may limit plant recruitment to the disturbed site. Short-term impacts to vegetation for Alternative B1 are judged to be moderate in intensity. This is due to the need for a construction staging area and the clearing of 1.34 miles of new ROW in lodgepole pine and aspen forest community types.

Long-term impacts to vegetation resources include removal of mature trees. Vegetation removal would likely be initiated and be most intense during the construction process, but would be continued into the future as the line receives periodic maintenance. There would be removal of vegetation in areas of new single-pole steel support structures. The permanent footprint for these impacts includes less than 1 acre overall for the placement of new structures.

The ROW is planned to have a width of 100 feet with required limits on vegetation height. This would translate to long-term direct impacts (removal or topping) to trees taller than 20-22 feet (depending on terrain, tree species and line sag). Tree removal may be conducted by a number of methods, including hand crews on steep or difficult terrain, and larger machinery in flat or more gently sloping terrain. Long-term impacts to vegetation for Alternative B1 are judged to be minor to moderate in terms of intensity. This is based on the fact that Alternative B1 contains

1.34 miles of new ROW, which would require clearing of vegetation from lodgepole pine and aspen communities.

Indirect Impacts

Indirect impacts might include changes in vegetation cover, pattern, or dominance in a given plant community. Habitat fragmentation resulting in decreased gene flow between some plant populations could occur. The fragmentation would be induced from the clearing of vegetation in the new segment of ROW. The cleared ROW would be 100 feet wide by 1.34 miles in length. There may also be increased sheet flow of precipitation across the landscape from removal of vegetation. This could result in minor sediment transport away from the Alternative B1 ROW into surrounding downgradient habitat. There is also the possibility of positive indirect impact for those special status species and species of local concern that tend to take advantage of habitat disturbance, such as *Botrychium* species (moonworts). Indirect impacts to vegetation resources from Alternative B1 would be moderate.

Noxious Weeds

All project alternatives have the potential to result in an adverse increase in noxious weeds. Alternative B1 would have the potential to increase weeds in areas subject to maintenance activities, but more importantly, there is a threat of weed increase in new ROW, new steel pole support structure locations, and construction staging areas. Construction activities would have an impact if vehicles bring in weed seeds to the construction area and as soils are disturbed. Soil disturbance removes competition from established native plants and produces a new substrate with new parameters of light, soil moisture, and nutrient availability. In these new conditions, noxious weeds can frequently outcompete natives in the revegetation process. Site reconnaissance conducted from 2007 through spring of 2009 documented noxious weed infestations along or immediately adjacent to the existing transmission line (Alternative A route) and along other alternative routes. These populations have been mapped and should receive treatments for control prior to construction. Noxious weeds are listed in Table 3-25. The intensity of adverse impact from noxious weeds on this alternative is moderate based on mapped state-listed noxious weed infestations along parts of the ROW for this alternative. Adequate weed control measures should be implemented and the ROW monitored regularly.

4.12.3.3 Alternative C1

Vegetation Resources

Direct Impacts

Alternative C1 would include 6.83 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would affect sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities. It would also affect lands designated in this EIS as Developed/Disturbed lands, including residential properties.

Short-term impacts to vegetation would include physical damage to individual plants. Vegetation that is trampled or crushed may suffer a loss of vigor or a decreased reproductive capacity. Soils may also be compacted in areas where temporary vehicle travel is required. This soil compaction may limit plant recruitment to the disturbed site. Short-term impacts to vegetation for Alternative C1 are judged to be moderate in intensity. Clearing of trees and dense shrubs may be necessary along the 6.83 miles of new ROW to construct this alternative.

Long-term impacts to vegetation resources primarily focus on plant removal. Vegetation removal would likely be initiated and be most intense during the construction process, but would be continued into the future as the line receives periodic maintenance. There would be removal of vegetation in areas of new single-pole steel support structures.

The ROW is planned to have a width of 100 feet with required limits on vegetation height. This would translate to long-term direct impacts (removal or topping) to any trees taller than 20-22 feet generally (depending on terrain, tree species and line sag). Tree removal may be conducted by a number of methods, including hand crews on steep or difficult terrain, and larger machinery in flat or more gently sloping terrain. Long-term impacts to vegetation for Alternative C1 are judged to be minor to moderate in terms of intensity. This is based on the fact that Alternative C1 contains 6.83 miles of new ROW, which would require clearing of vegetation from sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities.

Indirect Impacts

Indirect impacts might include changes in vegetation cover, pattern, or dominance in a given plant community. Habitat fragmentation resulting in decreased gene flow between some plant populations could occur. The fragmentation would be induced from the clearing of vegetation in the new segment of ROW. The cleared ROW would be 100 feet wide by 6.83 miles in length. There may also be increased sheet flow of precipitation across the landscape from removal of vegetation. This could result in minor sediment transport away from the Alternative C1 ROW into surrounding downgradient habitat. There is also the possibility of positive indirect impact for those special status species and species of local concern that tend to take advantage of habitat disturbance, such as *Botrychium* species (moonworts). Indirect impacts to vegetation resources from Alternative C1 would be moderate.

Noxious Weeds

Alternative C1 would have the potential to increase weeds in areas subject to maintenance activities, but more importantly, there is a threat of weed increase in new ROW, new steel pole support structure locations, and construction staging areas. Construction activities would have an impact if vehicles bring in weed seeds to the construction area and as soils are disturbed. Soil disturbance removes competition from established native plants and produces a new substrate with new parameters of light, soil moisture, and nutrient availability. In these new conditions, noxious weeds can frequently outcompete natives in the revegetation process. Site reconnaissance conducted from 2007 through spring of 2009 documented noxious weed infestations along or immediately adjacent to the existing transmission line (Alternative A route) and along other alternative routes. These populations have been mapped and should receive treatments for control prior to construction. Noxious weeds are listed in Table 3-25. The intensity of adverse impact from noxious weeds on this alternative should be minor assuming adequate control measures are implemented and the ROW is monitored periodically.

4.12.3.4 Alternative C2

Vegetation Resources

Direct Impacts

Alternative C2 would include 4.77-5.38 miles of new ROW depending on the option chosen, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would affect sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities. It would also affect lands designated in this EIS as Developed/Disturbed lands, including residential properties.

Short-term impacts to vegetation would include physical damage to individual plants. Vegetation that is trampled or crushed may suffer a loss of vigor or a decreased reproductive capacity. Soils may also be compacted in areas where temporary vehicle travel is required. This soil compaction may limit plant recruitment to the disturbed site. Short-term impacts to vegetation for Alternative C2 are judged to be moderate in intensity. This is due to the need for a construction staging area and the clearing of 4.77-5.38 miles of new ROW in sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities.

Long-term impacts to vegetation resources primarily focus on plant removal. Vegetation removal would likely be initiated and be most intense during the construction process, but would be continued into the future as the line receives periodic maintenance. There would be removal of vegetation in areas of new single-pole steel support structures, in areas where access road construction would be required, and in the construction staging areas.

The ROW is planned to have a width of 100 feet with required limits on vegetation height. This would translate to long-term direct impacts (removal or topping) to any trees taller than 20-22 feet (depending on terrain, tree species and line sag). Tree removal may be conducted by a number of methods, including hand crews on steep or difficult terrain, and larger machinery in flat or more gently sloping terrain. Long-term impacts to vegetation for Alternative C2 are judged to be minor to moderate in terms of intensity. This is based on the fact that Alternative C2 contains 4.77-5.38 miles of new ROW, which would require initial clearing of vegetation from sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities.

Indirect Impacts

Indirect impacts might include changes in vegetation cover, pattern, or dominance in a given plant community. Habitat fragmentation resulting in decreased gene flow between some plant populations could occur. The fragmentation would be induced from the clearing of vegetation in the new segment of ROW. The cleared ROW would be 100 feet wide by 4.77-5.38 miles in length. There may also be increased sheet flow of precipitation across the landscape from removal of vegetation. This could result in minor sediment transport away from the Alternative C2 ROW into surrounding downgradient habitat. There is also the possibility of positive indirect impact for those special status species and species of local concern that tend to take advantage of habitat disturbance, such as *Botrychium* species (moonworts). Indirect impacts to vegetation resources from Alternative C2 would be moderate.

Noxious Weeds

Alternative C2 would have the potential to increase weeds in areas subject to maintenance activities, but more importantly, there is a threat of weed increase in new ROW, new steel pole support structure locations, and construction staging areas. Construction activities would have an impact if vehicles bring in weed seeds to the construction area and as soils are disturbed. Soil disturbance removes competition from established native plants and produces a new substrate with new parameters of light, soil moisture, and nutrient availability. In these new conditions, noxious weeds can frequently outcompete natives in the revegetation process. Site reconnaissance conducted from 2007 through spring of 2009 documented noxious weed infestations along or immediately adjacent to the existing transmission line (Alternative A route) and along other alternative routes. These populations have been mapped and should receive treatments for control prior to construction. Noxious weeds are listed in Table 3-25. The intensity of adverse impact from noxious weeds on this alternative should be minor assuming adequate controls measures are implemented and the ROW is monitored periodically.

4.12.3.5 Alternative D-Options 1 and 2

Vegetation Resources

Direct Impacts

This alternative would include 1.34-1.65 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would primarily affect lodgepole and aspen plant communities.

Short-term impacts to vegetation would include physical damage to individual plants. Vegetation that is trampled or crushed may suffer a loss of vigor or a decreased reproductive capacity. Soils may also be compacted in areas where temporary vehicle travel is required. This soil compaction may limit plant recruitment to the disturbed site. Short-term impacts to vegetation for Alternative D, both options, are judged to be moderate in intensity. This is due to the need for a construction staging area and the clearing of 1.34-1.65 miles of new ROW in lodgepole and aspen plant communities.

Long-term direct impacts to vegetation resources primarily focus on plant removal. Vegetation removal would likely be initiated and be most intense during the construction process, but would be continued into the future as the line receives periodic maintenance. There would be removal of vegetation in areas of new single-pole steel support structures.

The ROW is planned to have a width of 100 feet with required limits on vegetation height. This would translate to long-term direct impacts (removal or topping) to any trees taller than 20-22 feet generally (depending on terrain, tree species and line sag). Tree removal may be conducted by a number of methods, including hand crews on steep or difficult terrain, and larger machinery in flat, or more gently sloping terrain. Long-term impacts to vegetation for Alternative D-Options 1 and 2 are judged to be minor to moderate in terms of intensity. This is based on the fact that this alternative contains 1.34-1.65 miles of new ROW, which would require clearing of vegetation from lodgepole and aspen plant communities.

Indirect Impacts

Indirect impacts might include changes in vegetation cover, pattern, or dominance in a given plant community. Habitat fragmentation resulting in decreased gene flow between some plant populations could occur. The fragmentation would be induced from the clearing of vegetation in the new segment of ROW. The cleared ROW would be 100 feet wide by 1.34-1.65 miles in length (depending on the option). There may also be increased sheet flow of precipitation across the landscape from removal of vegetation. This could result in minor sediment transport away from the ROW into surrounding downgradient habitat. There is also the possibility of positive indirect impact for those special status species and species of local concern that tend to take advantage of habitat disturbance, such as *Botrychium* species (moonworts). Indirect impacts to vegetation resources from Alternative D, both options, would be moderate.

Noxious Weeds

Alternative D, would have the potential to increase weeds in areas subject to maintenance activities, but more importantly, there is a threat of weed increase in new ROW, new steel pole support structure locations, and construction staging areas. Construction activities would have an impact if vehicles bring in weed seeds to the construction area and as soils are disturbed. Soil disturbance removes competition from established native plants and produces a new substrate with new parameters of light, soil moisture and nutrient availability. In these new conditions, noxious weeds can frequently outcompete natives in the revegetation process. Site reconnaissance conducted from 2007 through spring of 2009 documented noxious weed infestations along or immediately adjacent to the existing transmission line (Alternative A route) and along other alternative routes. These populations have been mapped and should receive treatments for control prior to construction. Noxious weeds are listed in Table 3-25. The intensity of adverse impact from noxious weeds on this alternative should be minor assuming adequate controls measures are implemented and the ROW is monitored periodically.

4.12.4 Mitigation Measures

The following mitigation recommendations apply to all alternatives.

- The Forest Service may conduct timber sales along the ROW or include the ROW in existing and future sales. Christmas tree, firewood sales, and chip sales (for use as mulch) are other possibilities for using wood materials resulting from tree cutting along the ROW. The alternatives selected may be a combination of techniques to meet current market and economic conditions. These actions would not be included under the actions proposed in this EIS.

4.12.4.1 Alternative A

Immediate revegetation work would not be needed as this alternative would only involve routine maintenance.

4.12.4.2 Alternative B1

Revegetation would be needed for a minimum of 1.34 miles of new ROW for this alternative. Noxious weed management and reclamation would be implemented on temporary access areas used during construction as mitigation for all alternatives. Restoration of sagebrush habitat would be implemented in areas where sagebrush is disturbed. Refer to the Environmental Protection Measures described in Section 2.4.2, Vegetation.

4.12.4.3 Alternative C1

Revegetation would be needed for a minimum of 6.83 miles of new ROW for this alternative. Noxious weed management and reclamation would be implemented on temporary access areas used during construction as mitigation for all alternatives. Restoration of sagebrush habitat would be implemented in areas where sagebrush is disturbed. Refer to the Environmental Protection Measures described in Section 2.4.2, Vegetation.

4.12.4.4 Alternative C2

Revegetation would be needed for a minimum of 4.77-5.38 miles of new ROW for this alternative. Noxious weed management and reclamation would be implemented on temporary access areas used during construction as mitigation for all alternatives. Restoration of sagebrush habitat would be implemented in areas where sagebrush is disturbed. Refer to the Environmental Protection Measures described in Section 2.4.2, Vegetation.

4.12.4.5 Alternative D-Options 1 and 2

Revegetation would be needed for a minimum of 1.34-1.65 miles of new ROW for this alternative. Noxious weed management and reclamation would be implemented on temporary access areas used during construction as mitigation for all alternatives. Restoration of sagebrush habitat would be implemented in areas where sagebrush is disturbed. Refer to the Environmental Protection Measures described in Section 2.4.2, Vegetation.

4.13 Special Status Plant Species

The impacts to special status plant resources result from the same basic processes as those described for general vegetation, namely (1) establishment of staging areas for the construction process, (2) clearing of the alternative route's ROW and construction of access road in some locations, (3) construction of poles and stringing of cable, (4) removal of old H-frame support structures, and (5) routine maintenance and operation of the new electric transmission line.

4.13.1 Significance Criteria

The assessment of impacts to special status plants is based on the following significance criteria:

- If individuals of federally listed threatened and endangered species or a population(s) of Forest Service or BLM sensitive plant species were lost or jeopardized, through direct mortality or loss of critical habitat.

4.13.2 Methodology

A list of special status plants that may occur within the Project Area was developed in consultation with the USFWS and Forest Service. The list was further narrowed down with agency input for consideration in this EIS. Review of the BLM Sensitive Species list for the Kremmling Field Office, indicated that only one species (Harrington's penstemon) might occur on the habitat types found on the BLM parcels of the Project Area. The list of special status plant species is provided in Section 3.13. The informal consultation with the Forest Service botanist for ARNF confirmed the need to evaluate all plant species listed on the Region 2 FSS list, as well as Forest Service species of local concern in this Project Area.

All project alternatives were assessed for the presence of potentially suitable habitat for the two federally listed species (*Osterhout's milk vetch* and *Penland beardtongue*). Surveys for both of these federally listed species were conducted in suitable habitats in spring of 2009 using a USFWS approved protocol. The FSS plant species that were also surveyed for in spring of 2009 were coordinated with the ARNF botanist. A subset of the overall species found on the ANRA/ARNF list was surveyed for based on their likelihood of occurring in the Project Area. Those that the ARNF botanist determined to have a moderate to high likelihood of occurring in the Project Area on Forest Service lands were the focus of the surveys. This subset of species included both FSS and Forest Service species of local concern as described in Section 3.13.

Results of the special status species plant surveys are discussed in greater detail in the BR prepared for the Forest Service (AECOM 2011). The following impact assessment for special status species for each project alternative takes into consideration results of both the background assessment for special status plants in the project study area and the specific results of field survey work.

4.13.3 Direct and Indirect Impacts

Rare plant field surveys in spring 2009 did not detect the occurrence of threatened and endangered, FSS, or BLM sensitive plant species in any of the alternative ROWs. Suitable habitat for threatened and endangered species was not observed along any of the alternative alignments; however, suitable habitat was observed for several FSS species within the project study area.

Field surveys conducted by AECOM in 2009, and the Forest Botanist between 2007 and 2011, documented the presence of five Forest Service species of local concern within or at the edge of the ROW of Alternatives A, B1, and D, both options: *Botrychium hesperium* (western moonwort), *Botrychium minganense* (mingan moonwort), *Pediocactus simpsonii* (Simpson's hedgehog cactus), *Dermatocarpon reticulatum* "vagrant form" (reticulate earth lichen), and *Penstemon cyathophorus* (cupped penstemon).

The *Botrychium* species were found in one isolated location in a former irrigation ditch almost directly underneath the existing transmission line (within ROWs for Alternative A, B1, and D1). This site was on the lower edge of a lodgepole pine stand and the ditch provided a previously disturbed site that still maintains more hydric conditions than the surrounding uplands. These plants were limited to very small numbers. Appoximately 30 individuals of Simpson's hedgehog cactus and several hundred individuals of reticulate earth lichen "vagrant form" occur in an approximately 30-foot by 40-foot area on the west side of the ROW edge (Alternative A, B1, and D1), near where the current ROW crosses the intersection of County Road 40 (Willow Creek Reservoir Road) and U.S. Highway 34. With implementation of Design Criterion 19 (Section 2.4.2), impacts to these individuals should be avoided.

Cupped penstemon was detected in several locations throughout the overall project area, including at the same location where the Simpson's hedgehog cactus was found. The densest populations were on the north end of the project near the Granby Pumping Plant. An estimate of population density was made during the rare plant survey. The population was estimated to be approximately 152 plants per 2,000 square feet, or 3,311 plants per acre. All five project alternatives would require some structures (poles) to be erected in this population north of the

Granby Pumping Plant. The project would result in direct and possibly indirect impacts to this species, due to construction activities, structure placement, and access through the project ROW. Maintenance activities for any of the proposed alternatives would also likely result in the loss or damage of some number of individuals of this species. Adverse impacts are expected to be of a degree insufficient to lead to a loss of viability for this species overall on the Arapaho National Forest.

4.13.3.1 Alternative A – No Action

Alternative A would use the existing route and existing hardware. Routine maintenance would be relied upon to keep the system operational.

Direct Impacts

The physical impact of trampling during maintenance activities may result in loss of plant vigor and mortality of special status plant species individuals. Individuals of Forest Service species of local concern (western moonwort, mingan moonwort, Simpson's hedgehog cactus, reticulate earth lichen, and cupped penstemon) were documented in or at the edge of the ROW of Alternative A. Furthermore, suitable habitat for many FSS was documented in the ROW for Alternative A. Direct impacts for Alternative A are determined to be minor to moderate. No loss of species viability is envisioned as a result of implementation of this alternative nor would it cause a trend toward listing of species.

Indirect Impacts

There may be a potential for several indirect impacts to special status species or their habitat under Alternative A. A selection of these potential indirect impacts includes:

- Changes in vegetation composition, structure, and cover value.
- Creating a thick layer of wood chips on the soil surface.
- Removal or disruption of duff layer in forested habitat, thereby impacting soil mycorrhizae.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in special status plant habitat.
- Changing localized fire regime.
- Changing soil characteristics of the habitat.
- Changing foraging behavior of livestock or wildlife within and adjacent to transmission line ROWs.
- Incidental impact to potential pollinator species.
- Disturbance may benefit certain species, such as *Botrychium*, that thrive in these habitat conditions.
- Noxious weed introduction can indirectly impact special status plants through alleopathy (release of compounds that inhibit the growth of other plants), changing the fire regime, and through direct competition for light, water, and soil nutrients.
- Weed treatment can also indirectly impact threatened and endangered plants by uprooting, clipping, or otherwise causing mortality.

Indirect impacts are determined to be minor to moderate in terms of their effects on suitable habitat for special status species.

4.13.3.2 Alternative B1

Alternative B1 would include 1.34 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system.

Direct Impacts

Direct impacts resulting from Alternative B1 include plant removal due to construction-related activity at staging areas, new ROW clearing, placement of new steel poles and removal of old wood H-frames, stringing of conductors and routine maintenance. The physical impact of trampling during maintenance activities could also result in loss of plant vigor and mortality of special status plant species individuals. Individuals of Forest Service species of local concern (western moonwort, mingan moonwort, Simpson's hedgehog cactus, reticulate earth lichen, and cupped penstemon) were documented in or at the edge of the ROW of Alternative B1. Furthermore, suitable habitat for many FSS was documented in the ROW for Alternative B1. Direct impacts for Alternative B1 are determined to be minor to moderate due to new ROW required for this alternative. No loss of species viability is envisioned as a result of implementation of this alternative, nor would it cause a trend toward listing of species.

Indirect Impacts

There may be a potential for several indirect impacts to special status species or their habitat under Alternative B1. A selection of these potential indirect impacts includes:

- Changes in vegetation composition, structure, and cover value.
- Creating a thick layer of wood chips on the soil surface.
- Removal or disruption of duff layer in forested habitat, thereby impacting soil mycorrhizae.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in special status plant habitat.
- Changing localized fire regime.
- Changing soil characteristics of the habitat.
- Changing foraging behavior of livestock or wildlife within and adjacent to transmission line ROWs.
- Incidental impact to potential pollinator species.
- Disturbance may benefit certain species, such as *Botrychium,* that thrive in these habitat conditions.
- Noxious weed introduction can indirectly impact special status plants through alleopathy (release of compounds that inhibit the growth of other plants), changing the fire regime, and through direct competition for light, water, and soil nutrients.

- Weed treatment can also indirectly impact threatened and endangered plants by uprooting, clipping, or otherwise causing mortality.

Indirect impacts are determined to be minor to moderate in terms of their effects on suitable habitat for special status species.

4.13.3.3 Alternative C1

Alternative C1 would include 6.83 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would affect sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities. It would also affect lands designated in this EIS as Developed/Disturbed lands, including residential properties.

Direct Impacts

Direct impacts resulting from Alternative C1 include plant removal due to construction-related activity at staging areas, new ROW clearing, placement of new steel poles and removal of old wood H-frames, stringing of conductors and routine maintenance. The physical impact of trampling during maintenance activities could also result in loss of plant vigor and mortality of special status plant species individuals. Individuals of Forest Service species of local concern (cupped penstemon) were documented in the ROW of Alternative C1. Furthermore, suitable habitat for many FSS was documented in the ROW for Alternative C1. Direct impacts for Alternative C1 are determined to be moderate due to the length of new ROW required for this alternative. No loss of species viability is envisioned as a result of implementation of this alternative, nor would it cause a trend toward listing of species.

Indirect Impacts

There may be a potential for several indirect impacts to special status species or their habitat under Alternative C1. A selection of these potential indirect impacts includes:

- Changes in vegetation composition, structure, and cover value.
- Creating a thick layer of wood chips on the soil surface.
- Removal or disruption of duff layer in forested habitat, thereby impacting soil mycorrhizae.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in special status plant habitat.
- Changing localized fire regime.
- Changing soil characteristics of the habitat.
- Changing foraging behavior of livestock or wildlife within and adjacent to transmission line ROWs.
- Incidental impact to potential pollinator species.
- Disturbance may benefit certain species, such as *Botrychium,* that thrive in these habitat conditions.

- Noxious weed introduction can indirectly impact special status plants through alleopathy (release of compounds that inhibit the growth of other plants), changing the fire regime, and through direct competition for light, water, and soil nutrients.
- Weed treatment can also indirectly impact threatened and endangered plants by uprooting, clipping, or otherwise causing mortality.

Indirect impacts are determined to be minor to moderate in terms of their effects on suitable habitat for special status species.

4.13.3.4 Alternative C2

Alternative C2 would include 4.77-5.38 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would affect sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities. It would also affect lands designated in this EIS as Developed/Disturbed lands, including residential properties.

Direct Impacts

Direct impacts resulting from Alternative C2 include plant removal due to construction-related activity at staging areas, new ROW clearing, placement of new steel poles and removal of old wood H-frames, stringing of conductors and routine maintenance. The physical impact of trampling during maintenance activities could also result in loss of plant vigor and mortality of special status plant species individuals. Individuals of Forest Service species of local concern (cupped penstemon) were documented in the ROW of Alternative C2. Furthermore, suitable habitat for many FSS was documented in the ROW for Alternative C2. Direct impacts for Alternative C2 are determined to be moderate based on the length of new ROW required for this alternative. No loss of species viability is envisioned as a result of implementation of this alternative, nor would it cause a trend toward listing of species.

Indirect Impacts

There may be a potential for several indirect impacts to special status species or their habitat under Alternative C2. A selection of these potential indirect impacts includes:

- Changes in vegetation composition, structure, and cover value.
- Creating a thick layer of wood chips on the soil surface.
- Removal or disruption of duff layer in forested habitat, thereby impacting soil mycorrhizae.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in special status plant habitat.
- Changing localized fire regime.
- Changing soil characteristics of the habitat.
- Changing foraging behavior of livestock or wildlife within and adjacent to transmission line ROWs.

- Incidental impact to potential pollinator species.
- Disturbance may benefit certain species, such as *Botrychium,* that thrive in these habitat conditions.
- Noxious weed introduction can indirectly impact special status plants through alleopathy (release of compounds that inhibit the growth of other plants), changing the fire regime, and through direct competition for light, water, and soil nutrients.
- Weed treatment can also indirectly impact threatened and endangered plants by uprooting, clipping, or otherwise causing mortality.

Indirect impacts are determined to be minor to moderate in terms of their effects on suitable habitat for special status species.

4.13.3.5 Alternative D-Options 1 and 2

This alternative would include 1.34-1.65 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would primarily affect lodgepole and aspen plant communities.

Direct Impacts

Direct impacts resulting from Alternative D, both options, include plant removal due to construction-related activity at staging areas, new ROW clearing, placement of new steel poles and removal of old wood H-frames, stringing of conductors and routine maintenance. The physical impact of trampling during maintenance activities could also result in loss of plant vigor and mortality of special status plant species individuals. Individuals of Forest Service species of local concern (western moonwort, mingan moonwort, Simpson's hedgehog cactus, reticulate earth lichen, and cupped penstemon) were documented in or at the edge of the ROW of this alternative. Furthermore, suitable habitat for many FSS species was documented in the ROW for this alternative. Direct impacts for Alternative D, both options, are determined to be minor to moderate due to new ROW required for this alternative. No loss of species viability is envisioned as a result of implementation of this alternative nor would it cause a trend toward listing of species.

Indirect Impacts

There may be a potential for several indirect impacts to special status species or their habitat under Alternative D, both options. A selection of these potential indirect impacts includes:

- Changes in vegetation composition, structure and cover value.
- Creating a thick layer of wood chips on the soil surface.
- Removal or disruption of duff layer in forested habitat thereby impacting soil mycorrhizae.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in special status plant habitat.
- Changing localized fire regime.
- Changing soil characteristics of the habitat.

- Changing foraging behavior of livestock or wildlife within and adjacent to transmission line ROWs.
- Incidental impact to potential pollinator species.
- Disturbance may benefit certain species, such as *Botrychium* that thrive in these habitat conditions.
- Noxious weed introduction can indirectly impact special status plants through alleopathy (release of compounds that inhibit the growth of other plants, changing the fire regime and through direct competition for light, water and soil nutrients.
- Weed treatment can also indirectly impact threatened and endangered plants by uprooting, clipping, or otherwise causing mortality.

Indirect impacts are determined to be minor to moderate in terms of their effects on suitable habitat for special status species.

A summary of the determination of effects for federally listed species and impacts to FSS for each alternative is presented in Table 4-13.

Table 4-13. Summary of Effects Determinations for Federally Listed and FSS Species.

Scientific Name	Common Name	Alternative A (No Action)	Alternative B1	Alternative C1	Alternative C2 Opt.1/Opt. 2	Alternative D Opt.1/Opt. 2	Relative Effects Between Alternatives[1]
Federally Listed							
Astragalus osterhoutii	Osterhout milk-vetch	NE	NE	NE	NE	NE	-
Penstemon penlandii	Penland's beardtongue	NE	NE	NE	NE	NE	-
FSS							
FERNS AND ALLIES							
Botrychium ascendens	Upswept moonwort	NI	MAII	MAII	MAII	MAII	B1 > D-Options 1 and 2 > C1 and C2-Options 1 and 2 > A
Botrychium lineare	Narrow-leaved moonwort	NI	MAII	MAII	MAII	MAII	B1 > D-Option 2 > D-Option 1 > C1 > C2-Option 2 > C2-Option 1 > A
MONOCOTS							
Carex diandra	Lesser panicled sedge	NI	MAII	MAII	MAII	MAII	B1 > C1 > D-Option 2 > C2-Option 2 > C2-Option 1 > D-Option 1 > A
Carex livida	Livid sedge	NI	MAII	MAII	MAII	MAII	B1 > C1 > C2-Option 2 > D-Option 2 > C2-Option 1 > D-Option 1> A

Scientific Name	Common Name	Alternative A (No Action)	Alternative B1	Alternative C1	Alternative C2 Opt.1/Opt. 2	Alternative D Opt.1/Opt. 2	Relative Effects Between Alternatives[1]
Cypripedium parviflorum (=C. calceolus spp. parviflorum)	Yellow lady's slipper	NI	MAII	MAII	MAII	MAII	B1 and D1-Options 1 and 2 > C1, and C2-Options 1 and 2 > A
DICOTS							
Astragalus leptaleus	Park milk vetch	NI	MAII	MAII	MAII	MAII	B1 > C1 > C2-Option 2 > D-Option 2 > C2-Option 1 > D-Option 1> A
Drosera rotundifolia	Roundleaf sundew	NI	MAII	MAII	MAII	MAII	B1 > C1 > C2-Option 2 > D-Option 2 > C2-Option 1 > D-Option 1> A
Eriogonum exilifolium	Dropleaf buckwheat	NI	MAII	MAII	MAII	MAII	C1 > C2-Options 1 > C2-Option 2 > D-Option 1 > D-Option 2 > B1 > A
Ipomopsis aggregata ssp. *weberi*	Weber's scarlet gilia	NI	MAII	MAII	MAII	MAII	C1 > C2-Options 1 > C2-Option 2 > D-Option 1 > D-Option 2 > B1 > A
Machaeranthera coloradoensis	Colorado tansy-aster	NI	MAII	MAII	MAII	MAII	B1 > D-Options 1 and 2 > C1 and C2-Options 1 and 2 > A
Penstemon harringtonii	Harrington beardtongue	NI	MAII	MAII	MAII	MAII	C1 > C2-Options 1 > C2-Option 2 > D-Option 1 > D-Option 2 > B1 > A
Rubus arcticus var. acaulis (Cylactis arctica ssp. acaulis)	Dwarf raspberry	NI	MAII	MAII	MAII	MAII	B1 > C1 > D-Option 2 > C2-Option 2 > C2-Option 1 > D-Option 1 > A
Salix candida	Hoary willow	NI	MAII	MAII	MAII	MAII	B1 > C1 > D-Option 2 > C2-Option 2 > C2-Option 1 > D-Option 1 > A
Salix serisissma	Autumn willow	NI	MAII	MAII	MAII	MAII	B1 > C1 > D-Option 2 > C2-Option 2 > C2-Option 1 > D-Option 1 > A

Scientific Name	Common Name	Alternative A (No Action)	Alternative B1	Alternative C1	Alternative C2 Opt.1/Opt. 2	Alternative D Opt.1/Opt. 2	Relative Effects Between Alternatives[1]
Utricularia minor	Lesser bladderpod	NI	MAII	MAII	MAII	MAII	B1> C1 > D-Option 2 > C2-Option 2 > C2-Option 1 > D-Option 1 > A
Viola selkirkii	Selkirk violet	NI	MAII	MAII	MAII	MAII	B1 > D-Options 1 and 2 > C1 and C2-Options 1 and 2 >A

[1]Relative effects between alternatives are assessed by comparing the acres of suitable habitat for FSS species within alternative ROWs. Refer to the Biological Report prepared for this project (AECOM 2011) for a more detailed discussion of impacts to FSS species.

NE: No effect to federally listed species

MAII: May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing. For plants, this determination is based on presumed presence for species in suitable habitat where some or all of the Project Area was not surveyed, or which are difficult to find and may be missed during surveys.

NI: No Impact. The appropriate determination when the proposed action would have no impact on listed species or designated critical habitat. For this determination, the impact of the action should be temporally or spatially separated from the listed species.

4.13.4 Mitigation Measures

Western's adopted SCPs and DC include measures that would minimize impacts to special status plants. These measures would be implemented for the construction of any action alternative. No further special mitigation measures are recommended.

4.14 Wetland Resources

The project would generally seek to avoid work in and around wetlands and riparian areas. There is minor potential to impact wetlands and riparian areas in the following ways:

- Increased erosion and sedimentation in wetlands from exposed, disturbed ground at staging areas, new pole structures, and access areas.
- Placement of fill directly into wetlands for road crossings or pole placement.
- Clearing or physical damage to wetland vegetative cover from work at new pole structures and temporary access to pole locations.
- Altering drainage patterns, resulting in either draining or flooding wetlands.
- Altering the functions and values of wetlands.
- Altering drainage patterns, resulting in either draining or flooding wetlands.

Routine operation and maintenance should not adversely affect wetlands or riparian areas.

4.14.1 Significance Criteria

The significance criteria used in assessing wetlands impacts are as follows:

- Significant impacts may occur where there would be ground disturbance to fens, jurisdictional wetlands, or perennial water courses that would require a USACE Section 404 individual permit.

4.14.2 Methodology

Wetland data were obtained from three sources: (1) national wetland inventory, (2) topographic mapping of the area that indicates stream, lake, and wetland features, and (3) field reconnaissance for wetlands and riparian areas associated with this project conducted over three field seasons (2007, 2008, and 2009).

4.14.3 Direct and Indirect Impacts

4.14.3.1 Alternative A – No Action

Alternative A would use the existing route and existing hardware. Routine maintenance would be relied upon to keep the system operational.

Direct Impacts

Alternative A would have direct impact on wetlands associated with continued transmission line maintenance and replacement of existing pole structures at the end of their lifespan. Every effort would be made to avoid all access into wetland and riparian ecosystems.

Indirect Impacts

Indirect impacts to wetlands and riparian areas is a possibility if more serious maintenance is necessary as the current transmission line continues to age and potentially suffers more major problems. Indirect effects would involve an increase in use of the access area in the ROW for more line repairs. This increased traffic could result in compaction of soils and crushing of existing vegetation in the ROW. The result of this disturbance could be an increase in runoff and entrainment of sediment, which could ultimately make its way in Project Area wetlands and riparian areas. Alternative A does traverse a shoreline of Lake Granby at Cutthroat Trout Bay; crosses wetlands just west of U.S. Highway 34 northwest of the lake; traverses the large wetland complex north of CR 41 stretching as far north as Stillwater Tap; crosses the wet meadows south of CR 40; and crosses several creeks and canals, including Willow and Stillwater creeks. SCPs and design criteria should be capable of adequately preventing sediment transport during any intensive maintenance operations. Indirect impacts to wetlands and riparian areas from Alternative A are judged to be negligible to minor.

4.14.3.2 Alternative B1

Alternative B1 would include 1.34 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system.

Direct Impacts

Short-term impacts to wetlands may result from the need to access new pole locations in areas near wetlands and wet meadows between Stillwater Tap and CR 41. The short-term impacts in this area would include trampling and crushing of wetland vegetation, compaction of wetland soils, and the potential of short-term changes in surface and groundwater flow regimes. Other areas of wetlands and riparian areas are substantially shorter in length inside the ROW, and should be easy to span and work around in terms of access. These short-term effects are likely to be minor to moderate depending on access and engineering constraints. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. No impacts are anticipated to occur to the fen wetland.

It is not anticipated that Alternative B1 would require placement of new structures in wetland areas. Every effort would be made to avoid wetland and riparian features, and where that is not possible, to minimize the impact footprint to the greatest extent possible. Anticipated quantity of vegetation removal and disturbance in wetlands is less than 0.1 acre. Any impacts in excess of 0.1 acre of fill would require notification of the USACE through a pre-construction notification under nationwide permit no. 12 or through an individual permit, if fill exceeds 0.5 acre of into waters of the U.S. Long-term impacts to wetlands and riparian systems would be negligible to minor.

Indirect Impacts

Indirect impacts would be minor due to the design criteria. Indirect impacts include some of the following items:

- Causing changes in vegetation composition, structure, and cover value.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in wetlands or riparian areas.
- Changing soil characteristics of the habitat.
- Alteration of wetland functional properties, including food chain support, sediment retention, ground water discharge and recharge, wildlife habitat, flood attenuation, and nutrient retention.

4.14.3.3 Alternative C1

Alternative C1 would include 6.83 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would affect sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities. It would also affect lands designated in this EIS as Developed/Disturbed lands, including residential properties.

Direct Impacts

Short-term impacts to wetlands may result from the need to access new pole locations in areas of wetlands and wet meadows between Stillwater Tap and CR 41. The short-term impacts in this area would include trampling and crushing of wetland vegetation, compaction of soils, and the potential of short-term changes in surface and groundwater flow regimes. Other areas of wetlands and riparian areas are substantially shorter in length inside the ROW, and should be easy to span and work around in terms of access. These short-term effects are likely to be minor to moderate, depending on access and engineering constraints. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. No impacts are anticipated to occur to the fen wetland.

Long-term impacts to wetlands and riparian areas for Alternative C1 would include a corner pole in a wetland area, where the alignment turns to the northeast. The span from the corner pole would need to be increased to approximately 1,500 feet to avoid a second pole placement in wetland along Alternative C1. To minimize impacts, construction could be limited to the dry periods of the year. As with Alternative B1, every effort would be made to avoid wetland and riparian features, and where that is not possible, to minimize the impact footprint to the greatest extent possible. Anticipated quantity of vegetation removal and disturbance in wetlands is less than 0.1 acre. Any impacts in excess of 0.1 acre of fill would require notification of the USACE, and may require a nationwide permit no. 12 or individual permit, depending on acreage of fill anticipated. Long-term impacts to wetlands and riparian systems would be relatively minor.

Indirect Impacts

Indirect impacts would be minor due to the design criteria. Indirect impacts include some of the following items:

- Causing changes in vegetation composition, structure, and cover value.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in wetlands or riparian areas.
- Changing soil characteristics of the habitat.
- Alteration of wetland functional properties, including food chain support, sediment retention, ground water discharge and recharge, wildlife habitat, flood attenuation, and nutrient retention.

4.14.3.4 Alternative C2

Alternative C2 would include 4.77-5.38 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would affect sagebrush, grasslands, wetlands/wet meadows, lodgepole, aspen, and mixed conifer plant communities. It would also affect lands designated in this EIS as Developed/Disturbed lands, including residential properties.

Direct Impacts

Short-term impacts to wetlands may result from the need to access new pole locations in areas of wetlands and wet meadows between Stillwater Tap and CR 41. The short-term impacts in this area would include trampling and crushing of wetland vegetation and the potential of short-term changes in surface and groundwater flow regimes. Other areas of wetlands and riparian areas are substantially shorter in length inside the ROW, and should be easy to span and work around in terms of access. These short-term effects are likely to be minor to moderate, depending on access and engineering constraints. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. No impacts are anticipated to occur to the fen wetland.

Long-term impacts to wetlands and riparian areas for Alternative C2 would include a corner pole in a wetland area, where the alignment turns to the northeast. The span from the corner pole would need to be increased to approximately 1,500 feet to avoid a second pole placement in wetland along Alternative C2. To minimize impacts, construction could be limited to the dry periods of the year. As with Alternative C1, every effort would be made to avoid wetland and riparian features, and where that is not possible, to minimize the impact footprint to the greatest extent possible. Anticipated quantity of vegetation removal and disturbance in wetlands is less than 0.1 acre. Any impacts in excess of 0.1 acre of fill would require notification of the USACE, and may require a nationwide permit no. 12 or individual permit, depending on acreage of fill anticipated. Long-term impacts to wetlands and riparian systems would be negligible to minor.

Indirect Impacts

Indirect impacts would be minor due to the design criteria. Indirect impacts include some of the following items:

- Causing changes in vegetation composition, structure, and cover value.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in wetlands or riparian areas.
- Changing soil characteristics of the habitat.
- Alteration of wetland functional properties, including food chain support, sediment retention, ground water discharge and recharge, wildlife habitat, flood attenuation, and nutrient retention.

4.14.3.5 Alternative D-Options 1 and 2

This alternative would include 1.34-1.65 miles of new ROW, and would require the placement of construction staging areas, clearing of vegetation in the new ROW, placement of steel pole support structures, demolition of existing H-frame support structures, stringing of new conductor line, and routine maintenance of the system. The new ROW would primarily affect lodgepole and aspen plant communities.

Direct Impacts

Short-term impacts to wetlands may result from the need to access new pole locations in areas near wetlands and wet meadows between Stillwater Tap and CR 41. The short-term impacts in this area would include trampling and crushing of wetland vegetation, and the potential of short-term changes in surface and groundwater flow regimes. Other areas of wetlands and riparian areas are substantially shorter in length inside the ROW, and should be easy to span and work around in terms of access. These short-term effects are likely to be minor to moderate, depending on access and engineering constraints. An existing H-frame structure in the fen wetland would be cut at the base using hand-held chainsaws and removed by a crane during removal of the existing transmission line. No impacts are anticipated to occur to the fen wetland.

It is not anticipated that Alternative D, both options, would require placement of new structures in wetland areas. As with Alternative B1, every effort would be made to avoid wetland and riparian features, and where that is not possible, to minimize the impact footprint to the greatest extent possible. Anticipated quantity of vegetation removal and disturbance in wetlands is less than 0.1 acre. Any impacts in excess of 0.1 acre of fill would require notification of the USACE, and may require a nationwide permit no. 12 or individual permit, depending on acreage of fill anticipated. Long-term impacts to wetlands and riparian systems would be negligible to minor.

Indirect Impacts

Indirect impacts would be minor due to the design criteria. Indirect impacts include some of the following items:

- Causing changes in vegetation composition, structure, and cover value.
- Vectoring and creating habitat for competitive invasive plant species.
- Changing local hydrologic pattern in wetlands or riparian areas.
- Changing soil characteristics of the habitat.
- Alteration of wetland functional properties, including food chain support, sediment retention, ground water discharge and recharge, wildlife habitat, flood attenuation, and nutrient retention.

4.14.4 Mitigation Measures

Western's adopted SCPs and project-specific design criteria include measures that would minimize impacts to wetland resources. These measures would be implemented for the construction of any action alternative. The following mitigation measures are also recommended.

- If construction of the transmission line or associated access areas cannot avoid wetlands, Western would submit a wetland delineation report to the USACE and apply for the necessary permit. It is assumed the project would be covered under a nationwide no. 12 permit. Western would abide by all mitigation measures and permit conditions.

4.15 Terrestrial and Avian Wildlife Resources

4.15.1 Significance Criteria

A significant impact on terrestrial and avian wildlife species would result if any of the following were to occur as a result of the proposed project:

- Loss of individuals or a population of a terrestrial species that would result in the species being listed or proposed for listing as threatened and endangered.
- Adversely modifying designated critical habitat to the degree it would no longer support the species for which it was designated.
- Permanent destruction of crucial wildlife habitat, such as breeding, production, and nesting grounds, primary migration corridors, and permanent loss of vegetation communities that provide habitat for special status species, including wetland, riparian, and aquatic species.
- Loss of individuals of a population of a species that would result in a negative change in species status.

- Violation of any state or federal statutes and regulations pertaining to fisheries, wildlife, or special status species.
- Introduction of constituents in any water body (such as evaporation or sludge ponds) in concentrations that exceed state and federal discharge limits for water quality or quantity.
- Unmitigated drainage or dewatering of, or discharge of dredged or fill material into jurisdictional waters of the United States under Section 404 of the Clean Water Act (CWA) or in violation of a Section 404 permit or applicable state wetland regulations. Wetlands are important habitats for a variety of wildlife in Grand County and the State of Colorado.
- Introduction or increase in the spread of noxious weeds to the extent that would increase the percentage of noxious weeds within the ROW by 10 percent or more, thereby substantially altering the composition and abundance of native habitat within the Project Area.

4.15.2 Methodology

Impacts analysis for terrestrial and avian wildlife resources considers the type of impact (direct, indirect, and cumulative), duration (short term or long term), and impact intensity (no effect, negligible, minor, moderate, or significant). Impacts analysis will also consider the amount of suitable habitats adjacent to the project alternatives and the areas' ability to provide wildlife habitat requirements for existing residents, as well as those that would be displaced as a result of project construction and operation. Impacts analysis will determine if the construction and operation of the proposed project would result in the loss of wildlife populations within the proposed Project Area, within Grand County, the State of Colorado, nationally, or globally. Cumulative effects are also considered for each alternative. Impacts to terrestrial wildlife are also described in greater detail in the BR.

4.15.3 Direct and Indirect Impacts

4.15.3.1 Alternative A – No Action

Alternative A would result in continued impacts to wildlife associated with operation and maintenance of the existing transmission line, including avian collision hazards and habitat fragmentation.

4.15.3.2 Alternative B1

The habitat types within the ROW for Alternative B1 were discussed in detail under the Vegetation Resources section. Lodgepole pine forests, aspen stands, sagebrush shrubland, grassland, wet meadows, wetlands, and water features are all found in the ROW for Alternative B1. With the exception of the transmission line reroutes, Alternative B1 would be constructed entirely within the existing transmission line alignment. Minor permanent impacts to wildlife habitat are expected as the result of the widening of the existing 30-foot ROW to a 100-foot ROW and increasing the structure diameter from 2 feet to 3 feet. Because this alternative occurs predominately in an existing transmission corridor, it is likely wildlife are used to the altered vegetation within the transmission ROW, maintained for compliance with the Federal Energy Regulatory Commission's standards for vegetation management. However, wildlife in the area would need to adapt to the new structure height. The 1.8-mile reroute on the east side of Table Mountain on Forest Service managed lands would result in new disturbance and removal of aspen and sagebrush shrubland habitats. The impacts would be limited to the 100-foot

ROW. Clearing of vegetation in this area would benefit some wildlife species that prefer edge habitats or open habitats, such as mountain bluebirds. Loss of aspen may result in minor adverse impacts to species associated with these habitats, such as warbling vireos and golden-crowned kinglets. Impacts to sagebrush and shrubland habitat in the new alignment would be restricted to the footprints of the transmission structures as well as any necessary overland travel required to access structure locations. Impacts from roads or overland travel cannot be determined at this time until final design is completed.

Alternative B1 occurs in areas mapped as severe winter range for mule deer and elk. With the exception of the 1.8-mile Table Mountain reroutes, Alternative B1 would keep the transmission line adjacent to a previously disturbed ROW, and would result in fewer impacts to big game habitats relative to the other action alternatives. In addition, the Forest Service maintains a closure on Table Mountain effective December 1 to April 15 to protect big game crucial winter range. Western would abide by this closure and would construct outside of this time period. Routine maintenance activities that would be required during the operation of the transmission line would also be scheduled outside of the severe winter range closure. It is possible, however, that some emergency maintenance may be required during the closure and within other areas outside of Forest Service managed lands. Mule deer and elk may temporarily move out of these areas during emergency maintenance activities. The severity of this impact would depend on the snow pack and available forage in any given year. Big game habitat has been impacted by planned and existing recreational and residential developments in the Project Area. The general operation of the transmission line, however, is not expected to result in any long-term adverse effects to big game in the Project Area.

General construction impacts, such as increased noise and human disturbance in the construction zone, would result in some wildlife temporarily avoiding the transmission ROW. Movement corridors and foraging areas would be temporarily altered during construction. Construction and operation of the transmission line would result in habitat fragmentation within the Project Area. Habitat fragmentation is defined as the process by which a natural landscape is broken up into small parcels of natural ecosystems, isolated from one another in a matrix of lands dominated by human activities (Saunders and Hobbs 1991). Operation of the proposed transmission lines could create aerial habitat fragmentation for avian species. Transmission towers may provide increased perching opportunities for raptors, which can result in increased predation on local prey species such as the greater sage grouse, other avian species, small mammals, reptiles, and amphibians.

The transmission line, once constructed, is not expected to result in impacts to wildlife movement and migration corridors for terrestrial species. Construction may result in mortality of smaller, less mobile species, including small mammals, insects, or reptiles that may inhabit the ROW. These impacts are not expected to result in long-term impacts to local, state, or regional populations.

Indirect impacts may include the propagation of noxious weeds in the transmission ROWs and adjacent habitats. These impacts would be mitigated through the implementation of a noxious weed management plan and through the restoration of the transmission ROW upon completion of construction.

4.15.3.3 Alternative C1

The majority of Alternative C1 would be constructed along a previously undisturbed alignment on the west side of Table Mountain. Habitats that would be impacted during project construction include lodgepole pine, sagebrush shrubland, and wetlands. This alternative would span the highest percentage of sagebrush habitats relative to the other action alternatives. General construction impacts and associated mitigation measures discussed above under Alternative B1 also apply to Alternative C. The severity of these impacts, however, is expected to be higher because the transmission line would be constructed along a previously undisturbed alignment. Construction of Alternative C1 would result in direct loss and fragmentation of sagebrush habitats found on the western end of the project that occur from the Windy Gap Substation to Willow Creek. A variety of wildlife species are associated with sagebrush habitats. Sagebrush provides breeding and nesting habitats for the greater sage grouse and severe winter range for mule deer and elk. Construction in this area could result in long-term or permanent impacts to sage grouse populations, which is discussed in greater detail under Special Status Species in Section 4.16.

Big game severe winter range has been and would continue to be compromised by existing and planned residential developments in the area. Construction of Alternative C1 would result in new impacts to big game severe winter range. Permanent habitat loss, however, would be restricted to the footprints of the transmission structures. Temporary impacts would be mitigated through restoration of the site post-construction. Operational impacts to big game are expected to be limited to emergency maintenance activities; however, the severity of the impact is expected to be higher for this alternative because the area has been previously undisturbed. Based on field studies conducted for the project from 2006 through 2008, the area has a higher concentration of big game use relative to Alternatives A and B. The same seasonal closures would apply to Alternative C1.

4.15.3.4 Alternative C2

Habitats that might be impacted by construction of the transmission line in the ROW for Alternative C2 include lodgepole pine, sagebrush shrublands, grassland, water features, and wetlands. This alternative spans the second highest percentage of sagebrush habitats in the Project Area. General construction and operational impacts discussed above for Alternatives B and C1 also apply to C2. Alternative C2-Options 1 and 2 would place the segment of the transmission line running east from Windy Gap Substation along previously disturbed ROWs. Option 1 would follow the Windy Gap Pipeline ROW and Option 2 would follow the existing transmission line. The segment of Alternative C1-Option 1 that spans portions of township-range sections 24 and 19 would span intact sagebrush habitats and would be less than 0.25 mile from an active greater sage grouse lek site. Construction of the transmission line in this ROW would result in minimal impacts to sagebrush habitat, but may result in increased predation on sage grouse and lek abandonment. Impacts to greater sage grouse and other special status species would be discussed in greater detail in Section 4.16.

Option 2 would keep the transmission line adjacent to the existing transmission line between Windy Gap Substation and the Granby Substation, and because there is an existing line, would result in fewer impacts to avian species, big game, and terrestrial wildlife.

The remainder of the C2 alternative would result in impacts to wildlife habitats along a previously undisturbed alignment. Impacts and associated mitigation measures are similar to those described for Alternative C1.

4.15.3.5 Alternative D-Options 1 and 2

Habitats that may be impacted by construction of the transmission line within the ROW for this alternative include lodgepole pine, sagebrush shrublands, grasslands, water features, and wetlands. Alternatives B1 and D, both options, would span the highest percentage of lodgepole pine forests in the Project Area. Impacts discussed for Alternative C2-Options 1 and 2 also apply to the segment of Alternative D-Options 1 and 2. Alternative D, both options, would include the expansion of previously disturbed ROWs and require new ROW for the 1.8-mile reroute on Forest Service managed lands on the east side of Table Mountain. Constructing along previously disturbed ROW minimizes impacts to wildlife habitats compared to previously undisturbed sites. The use of existing ROW would have fewer impacts to habitat, wildlife behavior, and migration paths than previously undisturbed sites because an existing transmission line has been present in the same area for a long period of time and adult resident wildlife species have become habituated to its presence. Construction would result in long-term impacts associated with the loss of forest habitat and plant community conversion to grassland or shrubland. Although the increased pole height may increase the risk of collision for migrant and juvenile raptors, adult resident raptors would likely adapt to these conditions long-term.

Alternative D, both options, occurs in areas mapped as severe winter range for mule deer and elk. With the exception of the 1.8-mile Table Mountain reroute, this alternative would keep the transmission line in a previously disturbed corridor, and would result in fewer impacts to big game habitats relative to the other action alternatives.

4.15.4 Mitigation Measures

Alternative A would result in no new construction or changes within the existing transmission line. The existing transmission line has some existing impacts including collision and habitat fragmentation. Alternative A is a no action alternative; therefore, no additional mitigation is proposed. Additional mitigation for the action alternatives includes the following:

- Project design and construction in conformance with the Suggested Practices for Protection of Raptors on Powerlines (APLIC 2006)
- Construction will not occur within pronghorn, mule deer, or elk winter concentration areas or severe winter range between November 15 and April 30 on public and private lands, unless an exception is granted by the BLM or CPW

4.16 Special Status Terrestrial and Avian Wildlife Species

4.16.1 Significance Criteria

A significant impact on terrestrial and avian wildlife species would result if any of the following were to occur as a result of the proposed project:

- Jeopardized the recovery of federal- or state-listed species.
- Adversely modifying designated critical habitat to the degree it would no longer support the species for which it was designated.
- Permanent destruction of crucial wildlife habitat, such as breeding, production, and nesting grounds, primary migration corridors, and permanent loss of vegetation communities that provide habitat for special status species, including wetland, riparian, and aquatic species.

- Loss of individuals of a population of a species that would result in a negative change in species status.
- Violation of any state or federal statutes and regulations pertaining to fisheries, wildlife, or special status species.
- Introduction of constituents in any water body (such as evaporation or sludge ponds) in concentrations that exceed state and federal discharge limits for water quality or quantity.
- Unmitigated drainage or dewatering of, or discharge of dredged or fill material into jurisdictional waters of the United States under Section 404 of the Clean Water Act (CWA) or in violation of a Section 404 permit or applicable state wetland regulations. Wetlands are important habitats for a variety of wildlife in Grand County and the State of Colorado.

4.16.2 Methodology

The impacts analysis considers the amount of suitable habitats for special status species adjacent to the project alternatives and these areas' ability to provide these species habitat requirements following implementation of any action alternative. The impacts analysis determines if the construction and operation of the proposed project would result in the loss of wildlife populations within the proposed Project Area, within Grand County, the State of Colorado, or nationally.

The primary impacts to special status species resulting from the construction and/or operation of the transmission line are habitat alteration and fragmentation, avian electrocution and collision, and increased predation on sage grouse and other wildlife from transmission structures. The Project Area is located approximately 0.5 mile from the Colorado River. The portion of the Colorado River located to the south of both action alternative transmission alignments contains bald eagle roosting and winter foraging habitat, a major migratory stopover for sandhill cranes and wintering range for rough-legged hawks near Coffey Divide. A more detailed account of the life history, environmental baseline, and detailed impact analysis for federally listed, FSS, and state and other species of concern can be found in the BR for the project. The BR provides detailed justification supporting the impact determinations shown in Table 4-16.

4.16.3 Direct and Indirect Impacts

4.16.3.1 Alternative A – No Action

Alternative A would result in no new construction or changes within the existing transmission line. Disturbance to special status species resulting from on-going maintenance activities would continue. Alternative A would result in no significant impacts to special status species in the Project Area.

4.16.3.2 Alternative B1

Federally Listed Species

Alternative B1 would have no direct or indirect effect on the lynx or its habitat. The ROW does not occur in lynx habitat. The Project Area is below 9,000 feet in elevation and is outside of the closest Lynx Analysis Unit (LAU). The majority of the Project Area exists within sagebrush shrublands and irrigated hay meadows with small areas of forest cover. These forested areas do not contain the understory structure necessary to sustain snowshoe hare populations or the downed woody material necessary for denning habitat. Lynx may move through portions of the Project Area, but the Project Area does not contain habitat suitable to sustain resident populations.

Forest Service Sensitive Species

General construction and operation impacts discussed above under Section 4.15, Terrestrial and Avian Wildlife Resources, also apply to FSS and state-listed species. A more detailed account of the life history, environmental baseline, and detailed impact analysis for FSS species can be found in the BE for the project.

With the exception of one segment of the transmission line, Alternative B1 would be constructed entirely along the existing transmission line. Minor, permanent impacts to FSS wildlife habitat are expected as the result of widening the existing 30-foot ROW to a 100-foot width and from increasing the structure diameter from 2 feet to 3 feet. Because this alternative occurs predominately in an existing transmission corridor, it is likely that adult resident FSS wildlife are used to the presence of the transmission line, and vegetation within a portion of the transmission line ROW has already been altered and maintained to ensure compliance with the Federal Energy Regulatory Commission's standards for vegetation management. Clearing of vegetation in this area would benefit some wildlife species that prefer edge habitats or open habitats, such as mountain bluebirds. Loss of aspen and may result in minor adverse impacts to species associated with these habitats, such as Brewer's sparrow and olive-sided flycatcher (sagebrush and mixed shrublands).

The rebuild of Alternative B1, north of CR 41, would require the removal and replacement of a structure within a fen wetland. Removal of the existing pole would be done by hand, by cutting the pole off at the base and then into pieces, minimizing disturbance from removal activities. Some minor short-term impacts to wildlife, such as amphibians that may inhabit this wetland, may occur. The long-term result would be beneficial as the fen would be restored over time and the transmission line would be moved out of these sensitive habitats. No boreal toads or wood frogs were observed during surveys conducted in the summer of 2007. These species are not expected to occur in the Project Area. The existing transmission line spans wetlands and riparian communities associated with Willow and Stillwater creeks, which were surveyed as potentially having suitable habitat for boreal toads and wood frogs.

Construction of Alternative B1 is expected to result in the minor impacts to FSS species relative to the other action alternatives because it would upgrade the transmission line in the expanded existing ROW, with the exception of the 1.8-mile reroute on the east side of Table Mountain.

State-Listed Species and Other Species of Concern

The state-listed species that may have suitable habitat in the Project Area are also described in detail within the BR prepared for the project. This discussion also includes raptors and migratory birds.

The primary wildlife impact associated with the operation of the action alternatives is the potential collision and electrocution of avian species with overhead lines (particularly static lines), and increased predation on greater sage grouse, small mammals, and birds. Portions of Alternative B1 are located less than 0.5 mile from the Colorado River. The portion of the Colorado River located to the south of Alternative B1 contains bald eagle roosting and winter foraging habitat, a major migratory stopover for sandhill cranes, and wintering range for rough-legged hawks near Coffey Divide (Sumerlin 2006, pers. comm.).

Mature resident raptors are habituated to the presence of the transmission line in the area and would likely adapt to the taller structure heights. However, juveniles and migratory raptors would be exposed to increased risk of collision due to the new height of structure. Because there is an existing transmission line in the corridor, it is expected that collision risk for Alternative B1 would be lower than alternatives that require substantially new ROW. Transmission towers in new locations may provide increased perching opportunities for raptors, which can result in increased predation on local prey species such as the greater sage grouse, other avian species, small mammals, reptiles, and amphibians. This is more likely in the non-forested habitats where perching opportunities are less abundant. Western would coordinate with the Forest Service to monitor the osprey nests that are currently adjacent to the existing transmission corridor, to ensure the change in structure heights does not result in osprey collision with the transmission line.

The increase in structure heights (ranging from 20-40 feet increase) may temporarily result in increased risk for avian collisions with Alternative B1. Some individual raptors currently found nesting within (or in close proximity to) the existing transmission line ROW would likely become habituated to the presence of the transmission line in the area, and would likely adapt to the taller structure heights. However, some individuals, including juvenile or migrant individuals, would not be habituated to the presence of the line. Because there is an existing transmission line in the corridor, it is expected that collision risk for Alternative B1 would be lower than other alternatives that would be constructed primarily along new ROW.

Construction of Alternative B1 could result in the removal of nesting and foraging habitats for FSS avian species that are known to occur or have suitable habitat within the ROW. In addition, the greater pole height may increase the risk of collision, especially to migratory and juvenile birds.

4.16.3.3 Alternative C1

Federally Listed Species

The only federally listed wildlife species that is known to occur in Grand County is the Canada lynx. The Project Area does not contain suitable habitat for the Canada lynx; and based on the criteria outlined in the Forest Service Lynx Amendment (that includes the ARNF), the lynx is not carried forward for analysis.

Forest Service Sensitive Species

General construction and operation impacts discussed under Section 4.15, Terrestrial and Avian Wildlife Resources, also apply to FSS and state-listed species. A more detailed account of the life history, environmental baseline, and detailed impact analysis for FSS species can be found in the BE for the project.

Impacts to FSS avian species associated with sagebrush habitats within the ROW of Alternative C1 are expected to be higher than the other project alternatives because it would require the transmission line to be constructed in a previously undisturbed area. The Brewer’s sparrow and olive-sided flycatcher were observed in these habitats. Impacts to forest dwelling species, such as the boreal owl and northern goshawk, are expected to be minor because the ARNF has been heavily affected by the mountain pine beetle epidemic. Alternatives C1 and C2 would span fewer forested communities relative to the other action alternatives; however, these alternatives would span a higher percentage of sagebrush shrubland habitats. If construction should occur during the avian breeding season, surveys would be conducted by qualified specialists no sooner than 72 hours prior to any ground-disturbing activities to ensure the project does not result in the "take" of an active nest or FSS bird species.

The reroute on the east side of Table Mountain on Forest Service managed lands (Alternatives C1 and C2) would result in additional disturbance and removal of aspen, mixed conifer, sagebrush, and mixed shrubland habitats. The impacts would be limited to the 100-foot ROW.

Species such as the peregrine falcon, bald eagle, and the American bittern are not known to breed in the Project Area. The transmission line would be constructed using APLIC and USFWS guidelines for mitigating electrocution risks to sensitive and common avian species. Flight diverters would be placed on the transmission lines that are deemed to be of high risk for avian collision (i.e., Cutthroat Trout Bay).

The pygmy shrew has not been documented in the Project Area, but information is lacking on the presence of this species in Colorado. Habitat is limited due to the mountain pine beetle epidemic. If this species should occur, the biggest impact would be incidental mortality as a result of project construction. The project is not expected, however, to impact pygmy shrew populations on the Forest, region, or state level.

The transmission line would span riparian and wetland communities within the ROW for Alternative C1. No wood frogs or boreal toads were recorded during surveys conducted in 2007; neither of these species is expected to occur in the Project Area.

The two special status species of concern for Alternatives C1 and C2 are the greater sage grouse and the golden eagle. The golden eagle is further discussed under State and Other Species of Concern.

Signs of sage grouse concentration and breeding areas were found within the southwestern alignment of Alternative C1. The Horn lek is located 0.25 mile or less to the north of the ROW for Alternative C1. There is a second lek, known as the Horn West lek, on the C Lazy U property, which Alternative C1 spans on the southern end of the Project Area. Construction of the proposed transmission line would result in a temporary increase in human presence in the ROW, noise disturbance, permanent removal and fragmentation of sagebrush, and thus, sage grouse breeding, nesting and foraging habitats, temporary displacement of individuals, and temporary removal of sagebrush habitats within construction areas. The primary permanent direct impact to the greater sage grouse habitat associated with construction of Alternative C1 is the potential for further fragmentation and loss of sagebrush habitats. Habitat fragmentation is defined as a process that divides large expanses of habitat, resulting in a number of smaller patches (Fahrig 2003). Habitat fragmentation is commonly caused by fences, power lines, roads, sagebrush treatments, and the presence of other habitat loss factors (Holloran et al. 2005). The southwestern end of Alternative C1 would result in impacts to undisturbed sagebrush habitats. Planned and existing residential developments in the area have already resulted in decreased habitat for the greater sage grouse.

Studies have shown the amount and frequency of noise associated with development has negative impacts on greater sage grouse. The majority of research on sage grouse reaction to noise, development, and human disturbance has been conducted in Wyoming and has focused coal bed methane development. "Sage grouse numbers on leks within 1 mile of coal bed methane compressor stations in Campbell County, Wyoming were consistently lower than on leks not affected by this disturbance" (Braun et al. 2002). Road noise may also lead to adverse impacts to the greater sage grouse. Connelly et al. (2004) showed there were no active sage grouse leks within 1.24 miles of Interstate 80 (I-80) across southern Wyoming, and only 9 leks were known to occur between 1.24 miles and 2.49 miles of I-80. Holloran et al (2005) showed that traffic during the strutting period, when males are on a lek, results in declines in male attendance when road-related disturbance is within 0.8 mile (Holloran et al 2005). Noise and access impacts are expected to be higher with Alternative C1 because there is not an existing access or utility ROW that the transmission line would traverse.

Construction of Alternative C1 would require access through sagebrush habitats. Road construction would result in impacts to sagebrush habitat and the increased potential for propagation of noxious weeds. Noxious weeds can reduce the quality of foraging and breeding habitats for sage grouse. This impact would be mitigated through the implementation of a noxious weed management plan and restoration of habitat in the ROW.

Operation of the proposed transmission line could result in increased mortality as a result of an increase in raptor perches in the ROW. Increased perching opportunities for raptors leads to increased predation rates on breeding sage grouse. Studies have documented displacement of sage grouse within areas where transmission lines are present. Sage grouse use of areas near power lines, as measured by pellet transects, increases as distance from the power line increases for up to 600 meters (C.E. Braun, unpubl. data in Braun 1998). Power lines fragment habitats for sage grouse and reduce their security in linear strips greater than 0.6 mile in width. Sage grouse are particularly vulnerable when strutting for female grouse on leks. Braun (1998) indicated that "it is possible to markedly reduce the impact of power lines upon sage grouse through elimination of raptor perch sites."

Studies have shown that sage grouse are negatively impacted by power lines through accidental contact while in flight and through predation by raptors that use power line poles as perches (Graul 1980, Ellis 1984, 1987). Sage grouse are at risk for collision with transmission lines, primarily associated with guy wires. Because Alternative C1 occurs in a new ROW and the documented lek site sits above the ROW of Alternative C1, collision is of concern in this area.

Increased predation on sage grouse may result in the permanent abandonment of the active lek sites located less than 0.25 mile from the ROW for Alternative C1. The 2008 Colorado GSGCP recommends a 0.6-mile no surface occupancy or avoidance areas for sage grouse leks. This distance was identified in the GSGCP as the average distance a male grouse will travel from the lek during the breeding season. Sage grouse will often nest and brood within 1-4 miles of the lek site. The conservation plan also recommends a seasonal buffer of 4 miles for greater sage grouse breeding habitats (nesting, early brood-rearing, and summer) from mid-March through September 1.

The greater sage grouse may also be adversely affected by operation of the transmission line within wintering habitats; however, given the option, it is preferred to construct during the fall and winter when development occurs within greater sage grouse habitats.

In order to mitigate potential impacts to greater sage grouse, transmission structures should be placed a minimum of 0.60 mile away from active lek sites (GSGCP 2008). If it is not feasible to move the line this distance, it is preferred that construction should be limited to winter months to avoid breeding season, which begins in March and lasts through mid-July. In addition, if power lines cannot be constructed outside of the 0.6-mile avoidance area, it is highly recommended that perch deterrents are placed within lek areas and those areas that cross greater sage grouse wintering, summer, spring, nesting, and brooding habitats.

Alternative C1 would result in major long-term impacts to the greater sage grouse and associated sagebrush habitats. With proper mitigation, impacts to greater sage grouse are expected to be moderate to major. Without mitigation, impacts could result in major impacts, including the permanent abandonment and loss of crucial breeding grounds (leks).

State-Listed Species and Other Species of Concern

The state-listed species that may have suitable habitat in the Project Area are also FSS species, and therefore have been discussed above and within the BR prepared for the project.

Golden eagles are protected under the MBTA of 1918, as amended, and the Bald and Golden Eagle Protection Act of 1940. There are two golden eagle nests (one being, the alternative) located on Table Mountain, approximately 0.25 mile above the ROW of Alternatives C1 and C2. The juxtaposition of the nest sites and variation in the topographic elevation relative to the transmission line ROW are such that fledgling and adult golden eagles may depart the nest and collide with the transmission line. Based on the Forest Service's ongoing monitoring of these nest sites, these golden eagles are known to forage and fledge their young to the valley west of the ROW for Alternative C1. Fledgling golden eagles are not able to control their flight pattern to avoid structures, such as transmission lines. A juvenile bald eagle was observed perching on the ROW for Alternative C1 on the west side of Table Mountain during habitat assessment surveys conducted in July of 2005 and again in 2007.

In order to avoid disturbance to nesting golden eagles, no surface occupancy (beyond that which historically occurred in the area) would occur within 0.25-mile radius of the nest site and associated alternate nests. Western would also implement a seasonal restriction to human encroachment within 0.25 mile of the nest and any alternate nests from December 15-July 15.

Flight diverters would be required if this alternative was selected. The potential for a golden eagle colliding with the transmission line, even with the use of flight diverters, would be increased. Mitigation may not be effective given the location of the transmission ROW relative to the nest sites.

There are three raptor nests within proximity to Alternative C1, one of which is an active golden eagle nest. A Swainson's hawk nest (previously discussed under Alternative B1) and a red-tailed hawk nest were found in proximity to the proposed ROW. The presence of a new transmission line near active raptor nest sites would increase collision and electrocution risk for these nesting raptors. Collision risk is of concern for all avian species on the segment of the line that occurs on the west side of Table Mountain. This area provides foraging habitat for a variety of avian species, and collision risk is expected to be higher for this alternative relative to Alternatives A and B1. Similar mitigation measures outlined under Alternative B1 for avian protection and nesting sites would apply to Alternative C1.

The presence of a transmission line near active raptor nest sites would increase collision and electrocution risk for these nesting raptors, particularly for juveniles who may not be used to the transmission corridor. Collision risk is of concern for avian species on the segment of the line that would be located in new ROW on the west side of Table Mountain. This area provides foraging habitat for a variety of avian species, and collision risk is expected to be higher for this alternative relative to Alternatives A and B1.

The operation of the transmission line would also increase perch sites for raptors that occur in the area, particularly in non-forested areas where there is limited opportunity for perching. Increased perching sites could result in higher predation of other wildlife, particularly greater sage grouse, within the area. Perch deterrents would be placed on all structures that occur in sagebrush habitats to mitigate the potential for increased predation on this state-listed species and other avian and terrestrial species found in the Project Area.

4.16.3.4 Alternative C2

Federally Listed Species

The only federally listed wildlife species that is known to occur in Grand County is the Canada lynx. The Project Area does not contain suitable habitat for the Canada lynx; and based on the criteria outlined in the Forest Service Lynx Amendment (that includes the ARNF), the lynx is not carried forward for analysis.

Forest Service Sensitive Species

Impacts discussed under Alternative C1 are similar to those that would occur with the construction and operation of Alternative C2, with the exception of the route options at the southwestern end of the Project Area. Options 1 and 2 would construct the transmission line in expanded existing ROWs. Option 1 would follow NCWCD water pipeline (which has been heavily disturbed) and an existing access road. Option 2 would follow the existing transmission line until it joins with the water pipeline ROW further to the northeast (see Map 2-6).

Option 2 would result in fewer impacts than other alternatives related to greater sage grouse populations and other FSS species found in sagebrush habitats, because it would rebuild the line in the existing transmission ROW, which is located further south of the Horn lek site. Both options would increase risk of collision due to the increased pole height, although collision impacts associated with Option 2 may be slightly less for resident adult birds because of the existing line.

Option 1 would use an existing access road and ROW, which would minimize direct impacts to sagebrush habitats and further habitat fragmentation relative to Alternative C1. Sage grouse are habituated to noise and human presence within this area and are frequently observed during the summer by NCWCD maintenance specialists. NCWCD crews have observed as many as 17 sage grouse along the water pipeline ROW (Cowardin 2009). Sage grouse were flushed in proximity to the water pipeline ROW during field surveys conducted in 2008. Sagebrush habitats would be preserved to the greatest extent feasible if this option was selected to minimize impacts to adjoining habitats. Option 1 would minimize impacts to sage grouse habitats and the project's distance to the active lek site relative to Option 2. Construction of a transmission line in proximity to the water pipeline ROW may result in increased predation to sage grouse due to an increase in perch sites for raptors, which may result in lek abandonment. Mitigation in the form of perch deterrents would be used to mitigate predation impacts. The presence of the transmission line in the water pipeline ROW could result in the permanent displacement of sage grouse in the area.

The same seasonal restrictions and construction buffers would apply to both of these options in order to minimize impacts to sage grouse breeding areas.

Impacts for the remainder of Alternative C2 would be similar to those discussed in detail under Alternative C1, including those discussed for the golden eagle.

State-Listed Species and Other Species of Concern

Impacts to state-listed species and other species of concern are similar to impacts of Alternative C1. This alternative is in proximity to the same raptor nests including the golden eagle nest.

Similar to C1, this alternative provides foraging habitat for a variety of avian species, and collision risk is expected to be greater relative to Alternatives A and B1.

4.16.3.5 Alternative D-Options 1 and 2

Federally Listed Species

The only federally listed wildlife species that is known to occur in Grand County is the Canada lynx. The Project Area does not contain suitable habitat for the Canada lynx; and based on the criteria outlined in the Forest Service Lynx Amendment (that includes the ARNF), the lynx is not carried forward for analysis.

Forest Service Sensitive Species

General construction and operation impacts discussed under Section 4.15, Terrestrial and Avian Wildlife Resources, also apply to FSS and state-listed species. A more detailed account of the life history, environmental baseline, and detailed impact analysis for FSS species can be found in the BR prepared for the project.

Impacts discussed under Alternative C2 for Options 1 and 2 also apply to the southwestern segments of this alternative. Impacts along the remainder of this alternative would be similar to those described for Alternative B1. Alternative D, both options, would also follow and expand existing ROWs for the majority of the alignment, with the exception of the 1.8-mile reroute on the east side of Table Mountain.

State-Listed Species and Other Species of Concern

Impacts to this species group, including osprey, would be similar to those described for Alternative B1. Western would coordinate with the Forest Service to monitor the osprey nests that are currently adjacent to the existing transmission corridor, to ensure the change in structure heights does not result in osprey collision with the transmission line. Mature resident raptors are habituated to the presence of the transmission line in the area and would likely adapt to the taller structure heights. However, juveniles and migratory raptors would be exposed to increased risk of collision due to the new height of structure. Because there is an existing transmission line in the corridor, it is expected that collision risk for Alternative D, both options, would be lower than action alternatives that would be constructed almost entirely in new corridors, i.e. Alternative C1. Transmission towers in new locations may provide increased perching opportunities for raptors, which can result in increased predation on local prey species.

4.16.3.6 Determinations of Impacts and Effects

A determination of impacts and effects is presented in Table 4-14 for all federally listed species, FSS, and MIS species with potential to occur in the analysis area(s).

Table 4-14. Determination for Federally Listed, FSS, and MIS Wildlife by Project Alternatives.

		Determination*				
Common Name	Species	Alternative A (No Action)	Alternative B1	Alternative C1	Alternative C2-Opt.1/Opt. 2	Alternative D-Opt.1/Opt. 2
Federally Listed Species						
Canada lynx	*Lynx canadensis*	NE	NE	NE	NE	NE
FSS						
American bittern	*Botaurus lentiginosus*	MAII	MAII	MAII	MAII	MAII
American marten	*Martes americana*	NI	MAII	NI	NI	MAII
Bald eagle	*Haliaeetus leucocephalus*	MAII	MAII	MAII	MAII	MAII
Black tern	*Chlidonias niger*	MAII	MAII	MAII	MAII	MAII
Boreal owl	*Aegolius funereus*	MAII	MAII	MAII	MAII	MAII
Boreal toad	*Anaxyrus boreas boreas*	NI	NI	NI	NI	NI
Brewer's sparrow	*Spizella breweri*	NI	MAII	MAII	MAII	MAII
Greater sage grouse	*Centrocercus urophasianus*	NI	MAII	MAII	MAII	MAII
Loggerhead Shrike	*Lanius lukovicianus*	MAII	MAII	MAII	MAII	MAII
Wolverine (as a proposed Threatened species)	*Gulo gulo luscus*	NE	NE	NE	NE	NE

		Determination*				
Common Name	Species	Alternative A (No Action)	Alternative B1	Alternative C1	Alternative C2-Opt.1/Opt. 2	Alternative D-Opt.1/Opt. 2
North American River Otter	*Lontra canadensis*	NI	NI	NI	NI	NI
Northern goshawk	*Accipiter gentilis*	NI	MAII	MAII	MAII	MAII
Northern harrier	*Circus cyaneus*	NI	MAII	MAII	MAII	MAII
Northern leopard frog	*Lithobates pipiens*	NI	NI	NI	NI	NI
Olive-sided flycatcher	*Contopus borealis*	NI	MAII	MAII	MAII	MAII
Peregrine falcon	*Falco peregrinus*	MAII	MAII	MAII	MAII	MAII
Pygmy shrew	*Sorex hoyi montanus*	NI	NI	NI	NI	NI
Wood frog	*Lithobates sylvatica*	NI	NI	NI	NI	NI
MIS						
Elk	*Cervus elaphus*	No Change	No Change	No Change	No Change	No Change
Boreal toad	*Anaxyrus boreas boreas*	No Change	No Change	No Change	No Change	No Change
Golden-crowned kinglet	*Regulus satrapa*	No Change	No Change	No Change	No Change	No Change
Hairy woodpecker	*Picoides villosus*	No Change	No Change	No Change	No Change	No Change
Mountain bluebird	*Sialia currucoides*	No Change	No Change	No Change	No Change	No Change
Mule deer	*Odocoileus hemionus*	No Change	No Change	No Change	No Change	No Change

		Determination*				
Common Name	Species	Alternative A (No Action)	Alternative B1	Alternative C1	Alternative C2-Opt.1/Opt. 2	Alternative D-Opt.1/Opt. 2
Pygmy nuthatch	*Sitta pygmaea*	No Change	No Change	No Change	No Change	No Change
Warbling vireo	*Vireo gilvus*	No Change	No Change	No Change	No Change	No Change
Wilson's warbler	*Wilsonia pusilla*	No Change	No Change	No Change	No Change	No Change

NE: No Effect to federally listed species

MAII: May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing.

NI: No Impact. The appropriate determination when the proposed action would have no impact on listed species or designated critical habitat. For this determination, the impact of the action should be temporally or spatially separated from the listed species.

4.16.4 Mitigation Measures

4.16.4.1 Alternative A

Alternative A would result in no new construction or changes within the existing transmission line. No further mitigation is recommended.

4.16.4.2 All Action Alternatives

Environmental Protection Measures for action alternatives is provided in Section 2.4.2, Wildlife Resources and Special Status Wildlife. Specifically, additional mitigation would be required to minimize impacts to the golden eagle, greater sage grouse, nesting raptors, and migratory birds.

- Sagebrush habitat restoration, perch deterrents, and a monitoring program would be implemented to minimize impacts to sage grouse and their breeding habitats that occur in the area. A sagebrush restoration plan will be developed during final design for areas where sagebrush would be impacted. It is possible that operation of the transmission line in this area may result in permanent displacement of this sage grouse population, even with the implementation of project-specific design criteria. Compensatory mitigation in the form of habitat restoration for greater sage grouse in Grand County may be an option to mitigate for the loss of sagebrush habitats and the potential displacement of sage grouse in the Project Area.
- In order to mitigate impacts to nesting golden eagles, the transmission line would not be constructed within 0.25 mile of an active golden eagle nest and no construction would occur within 0.5 mile of the nests from December 15-July 15. In addition, construction would occur outside of the nesting season (December 15-July 15) within 0.25 mile of the nest and any alternate nest sites. Flight diverters would be placed on the transmission line up to 0.50 mile from the nest sites to minimize some of the collision risk. Western would assist the Forest Service with monitoring of the golden eagle nest and report any mortality to the USFWS office within 24 hours of the event.

- In order to mitigate potential impacts to greater sage grouse, transmission structures should be placed a minimum of 0.60 mile away from active lek sites (GSGCP 2008). If it is not feasible to move the line this distance, it is preferred that construction should be limited to winter months to avoid breeding season, which begins in March and lasts through mid-July. In addition, if power lines cannot be constructed outside of the 0.6-mile avoidance area, it is highly recommended that perch deterrents are placed within lek areas and those areas that cross greater sage grouse wintering, summer, spring, nesting, and brooding habitats.
- If construction occurs during the avian breeding season (roughly between March 15 and September 1), surveys would be conducted no earlier than 72 hours prior to any ground-disturbing activities to ensure the project complies with the MBTA. Some raptor species in Colorado, including the bald and golden eagles, will initiate nesting much earlier in the year. The Colorado DPW guidelines will be followed to protect active nests.
- To mitigate impacts to raptors nesting in the Project Area, raptor surveys would be conducted within 0.25 mile of the transmission line if construction occurs during the nesting season of any of the raptors that are known to occur or have the suitable habitat in the Project Area.
- The project would be constructed following APLIC and USFWS guidelines (2006) for mitigating electrocution impacts to raptors and other avian species that may occur or migrate through the Project Area. Western would also implement their avian protection plan to mitigate impacts to avian species in the Project Area.
- Western would coordinate with the Forest Service to identify areas where collision risk is highest and use flight diverters to mitigate collision risk in these areas. The areas preliminarily identified by the Forest Service, CDOW (now CPW), and USFWS as highest priority for Alternative B1 are near Coffey Divide, Willow Creek, and at the northern end of the Project Area near Cutthroat Trout Bay.
- The northern end route where the transmission lines would be merged and double-circuited is the same for all action alternatives. Consolidating lines and adding flight diverters as necessary would mitigate collision risk in this area where the lines span Cutthroat Trout Bay. The line would also be constructed in the road ROW to minimize disturbance to habitats.
- Mitigation in the form of perch deterrents would be used to mitigate predation impacts.

4.17 Other Impact Considerations

4.17.1 Pipeline Corrosion Study

A corrosion study was conducted to determine the potential impact of the proposed transmission line with respect to the continued service of the Windy Gap water pipeline (Schiff 2009). Through this evaluation, it was concluded that pipeline voltages would not exceed acceptable levels during either worst-case load conditions or during short-circuit conditions on the transmission lines, so that no corrective measures are required. Without supplemental grounding, pipelines are expected to remain at or near cathodically protected levels, uninfluenced by EMF effects from high voltage transmission lines crossing the alignment at the four locations listed. The intended design limit voltage of 15-V will not be exceeded due to a lack of possible AC interference sources capable of coupling with the pipeline to produce such voltages, either during construction or during operation of the pipeline. The pipeline is well grounded from its own coating system and with the existing corrosion protection system.

The final study report did not foresee any potential harmful effect to the Windy Gap Pipeline as a result of routing the transmission line in a 200-foot proximity. The study did not identify any advisable or preferred routes for the transmission line alignment. No further mitigation measures, additional maintenance, or inspections were recommended in the final study report; however, at the Subdistrict’s request, Western would measure pipeline AC voltages and currents to create a baseline reference for future testing and to ensure that AC voltage levels are within acceptable limits when the new transmission line is completed. If impacts from transmission line are identified, Western would seek appropriate mitigation.

The complete 2009 corrosion study is available as a Technical Support Document to this EIS.

4.18 Accidents and Intentional Acts of Destruction

The DOE Office of NEPA Policy and Compliance has released final and interim guidance on the need to consider accidents and intentional acts of destruction (terrorism), respectively, in NEPA documents (DOE 2002 and DOE 2006). Given this guidance, two possible scenarios are analyzed in this section: catastrophic wildfire and intentional acts of destruction.

4.18.1 Wildfire

The Project Area is naturally susceptible to wildfire as a result of the dominant vegetation types and climatic conditions. However, the recent mountain pine beetle epidemic has resulted in widespread pine stand mortality through Grand County, including the Project Area. Widespread stand mortality has greatly increased short-term wildfire risk, and in the event of a fire start, would likely exacerbate fire intensities. The remaining dead trees equate to an enormous amount of dry hazardous fuel on the ground. In the event of a wildfire start in these conditions, even the most robust fire suppression responses would have little or no effect on fire spread, intensities, or level of destruction.

4.18.2 Intentional Acts of Destruction

Power transmission facilities, such as the Proposed Project, are part of America’s critical infrastructure and are considered to be possible targets of intentional acts of destruction. Potential aggressors include terrorists hoping to cause fatalistic and disruptive events, or activists protesting energy consumption or other resource issues related to the target facilities. This section describes the likelihood of a threat and possible types of threats to this transmission facility, common security measures for protection, and the impact of such an event.

If targeted in an intentional act of destruction, potential threats to the substation or pumping plant facilities located in the Project Area could include bombs delivered via ground vehicle or carried into the facility by an employee or intruder, aircraft collisions, sabotage of electrical systems or other machinery, attacks on plant personnel, or cyber attack of the facilities’ control system causing machinery failure or theft of information. Acts may also be targeted at transmission towers and lines in an attempt to disrupt the regional grid.

4.18.3 Uncertainty Regarding the Analysis

Both of these events are dependent on many complex variables and entirely unpredictable. The degree of uncertainty in this analysis is therefore high. However, the following impacts analysis attempts to disclose the primary risks to life, property, and environmental values.

4.18.4 Potential Impacts

4.18.4.1 Alternative A

Wildfire: The single ROW configuration and the wooden H-frame structures represent significant vulnerabilities for the Alternative A alignment and structures in the event of wildfire in the Project Area. With a narrow ROW, antiquated and flammable structures, and lower overall structure height, this alternative has a greater potential of being affected by lightning strikes that may produce sparks or ignitions. Electrical interruptions as a result of wildfire could result in loss of power service to customers, including residential and water customers.

Intentional Acts of Destruction: The single ROW configuration and the wooden H-frame structures represent significant vulnerabilities for the Alternative A alignment and structures in the event of intentional acts of destruction. The low voltage and remote location of this transmission line make it a relatively undesirable target for aggressors. Short-term or prolonged outages would have no measurable effects on the national electric grid. Electrical interruptions as a result of intentional acts of destruction could result in loss of power service to customers, including residential and water customers.

Overall, the risk to workers (e.g., maintenance crews, linesmen) would be low. However, the risk may be slightly higher on a line of this configuration of wooden poles than on a more robust system. It is conceivable that, with the antiquated line configuration and structure type, maintenance and repair crews may be on the line more often.

4.18.4.2 All Action Alternatives

Wildfire: As noted above, the single ROW is still a vulnerability under all action alternatives. However, risk of short-term outages and long-term damage to steel structures, as well as the duration of outages, would be significantly reduced under any of the action alternatives.

Intentional Acts of Destruction: The small physical size of the project, relatively low voltage (138-kV as opposed to 345- or 500-kV), and remote location make this transmission line a relatively undesirable target for aggressors. Short-term or prolonged outages would have no measurable effects on the national electric grid. Electrical interruptions as a result of intentional acts of destruction could result in loss of power service to customers, including residential and water customers.

If the transmission line facility was attacked and destroyed, fatalities would likely be low given the limited number of employees normally on site at any one time. Collateral destruction of the transmission line facility could interrupt power to local residents as well as impact the regional water supply, including service to the Front Range.

Power interruption would be inconvenient and costly, but would rarely have large-scale adverse health impacts.

4.18.5 Security Considerations and Mitigation

Any institution's specific program or implementation of security considerations must reflect that organization's individual assessment of its own threats, vulnerabilities, and problem consequences, as well as its local customer and community expectations, needs, and tolerance for risk (North American Electric Reliability Corporation 2001). To determine the appropriate level of physical security, potential aggressor intent should be considered. Intent may be to destroy property or equipment; steal equipment, materials, or information; threaten the safety of personnel or customers; or create adverse publicity and induce panic. To ensure effectiveness of security measures and procedures, they should be reviewed regularly. Additionally, potential threats should be proactively monitored and anticipated through intelligence gathering.

Fences, gates, or barriers coupled with the use of keying systems, access card systems, or security personnel at entry points restrict access to the facility. Use of these physical obstructions and warning signage effectively deter and delay intruders.

Personnel identification and control measures, such as photo IDs, visitor passes, and contractor IDs, help quickly identify unauthorized persons within the facility.

Alarm systems and monitoring through closed-circuit television systems or roving security patrols can warn personnel of intrusion or impending intrusion to initiate appropriate response. Adequate lighting is required to provide visibility and closed-circuit television system effectiveness.

All facilities should have a comprehensive security awareness program developed and all personnel should be trained in accordance with that program. This enables quick and certain responses to security breach situations.

In addition to physical security, facilities must consider protection against cyber threats (i.e., hackers attacking computer control systems and information). Access to control systems would be managed to protect critical assets and information, as well as maintain the reliability of the electric infrastructure. This includes logical access (user password protection) to computers and networks and physical access to computer rooms. Policies and procedures would be established to manage authorization and authentication, as well as monitor both logical and physical access. Firewalls would be implemented and proactively maintained. Intrusion detection systems would be implemented and cyber risks regularly evaluated.

Emergency action plans would be developed in the event that an intrusion or attack occurs. These plans may include assistance agreements with local and federal law enforcement, up-to-date training for key responders, quick restoration of service (if possible), and notification to the local community and energy sector.

4.19 Unavoidable Adverse Impacts

Unavoidable adverse effects are those environmental consequences of an action that cannot be avoided, either because modifying the action would change the nature of the project or effective mitigation through project design is not feasible. Pursuant to NEPA Sec. 102 [42 U.S.C. § 4332] (2)(C)(ii), this analysis must identify those alternative actions that would result in unavoidable adverse effects.

The adverse effects of implementing the proposed project would be minimized through the use of SCPs and project-specific design criteria (Chapter 2.0). However, some adverse effects cannot be avoided and are disclosed here.

Adverse effects that cannot be avoided in the proposed project are discussed below. See also the previous individual resource impact analyses for a more comprehensive discussion of adverse effects.

Air quality impacts from construction would include fugitive dust emissions generated by the operation of construction vehicles. Fugitive dust would be concentrated in the immediate vicinity of the transmission lines and would be of short duration. It is not expected to materially affect ambient PM_{10} levels in the project's region. There would also be exhaust emissions from construction vehicles. Given the small number of vehicles involved, the short duration of construction, and the distance of the construction sites from populated areas, no substantial effect on air quality is expected.

The operation and maintenance of the transmission lines would likewise result in the emission of small quantities of dust and exhaust emissions. Corona effects from the operation of the transmission lines could result in small amounts of O_3 and would be a minor contributor to ambient air pollution.

The transmission line construction process would unavoidably have some effects on soil resources. Soils would be disturbed during the construction of towers, monopoles, and equipment access. The construction of footings for towers and monopoles would result in the permanent displacement of soils. Removal of vegetation and compaction would occur in the work areas, with potential impacts on erosion. Soil displacement and compaction would occur during the grading and movement of construction equipment. These impacts would occur on each of the alternative routes. However, construction of Alternatives C1 and C2 would result in more disturbance as these would require more new access routes.

Areas of sensitive soils or low reclamation potential areas may be adversely impacted by project related activities. If project related topsoil erosion occurs, soil productivity may be adversely impacted for an extended period of time. Topsoil formation is a slow process.

Depending upon the nature of ground disturbance, unavoidable adverse impacts on paleontological resources are likely. For example, depending upon the diameter of the hole and type of auger used, power pole excavations that are augered would crush excavated rock and contained fossils during the excavation process. In such cases, it is impossible to mitigate adverse effects on paleontological resources and the impacts are unavoidable. On the other hand, with larger augers and other types of digging equipment, more intact blocks of rock are excavated, and sidewalls are usually accessible and can be inspected for fossils. In these cases, mitigation is possible, and unavoidable adverse effects are minimized.

During construction, daytime noise would increase in areas located near the ROWs. There are no residences in these areas, and recreational use is limited. Since this impact is associated with the construction phase only, it would be temporary and short term. During dry weather conditions (which is almost always the case in the study area), noise associated with corona effects would not be audible beyond the ROWs. During very infrequent rainfall events, the noise level at the edge of the ROWs would be less than 39 dBA. This is a low level (typical of the noise level in a library), which would not be expected to create a disturbance.

Short-term significant effects from construction activities would occur on Forest Service lands with a SIO of High within the immediate foreground of the scenic byway and recreation use areas.

An increase in the amount of land with ROW easement restrictions, which limits future uses and building development, would be unavoidable under all project action alternatives.

Unavoidable adverse impacts to socioeconomic considerations relate to the location of the power line on private property. Since the existing 69-kV line would be rebuilt, these unavoidable adverse impacts have already occurred on the existing ROW. Alternatives C1 and C2 would have unavoidable and adverse impacts on properties that do not currently have a transmission line located on the property. The impacts could have potentially adverse impacts on property values.

By restricting disturbance within 100 feet of streams, the removal of riparian vegetation can be avoided for all alternatives. Other SCPs would minimize adverse water quality effects on aquatic habitat. Although these measures would reduce the impact level to minor levels, this adverse effect would not be completely avoided.

The project alternatives are not expected to result in long-term unavoidable adverse effects to common wildlife resources. However, the operation of a transmission line for Alternatives C1 and C2 may result in permanent, unavoidable impacts to nesting golden eagles. The presence and juxtaposition of a transmission line in proximity to the golden eagles nests may result in the incidental take of a golden eagle. Alternatives C1, C2, and D-Option 1 may also result in permanent, unavoidable impacts to sage grouse and sage grouse breeding habitat on the southwestern end of the Project Area.

The proposed transmission line routes would require the installation of structures within the boundaries of four archaeological sites deemed eligible for inclusion in the NRHP by the Colorado SHPO, resulting in the unavoidable removal of portions of these sites from the archaeological record. However, the SHPO has approved plans for the mitigation of any adverse effects resulting from this action.

4.20 Relationship between Short-Term Uses and Long-Term Productivity

Pursuant to NEPA Sec. 102 [42 U.S.C. § 4332] (2)(C)(iv), this analysis must identify alternative actions that would result in trade-offs between short-term uses and long-term productivity.

For this federal action, “short-term” is defined as within the 1-2-year implementation period. Long-term is defined as any time period beyond the implementation period.

The alternatives under consideration do not pose impacts that would significantly alter the long-term productivity of the affected environment. A good example of this is the existing lines in the study area. They were built in the 1940s through the 1960s. The affected environment has recovered since then, and while there is never complete recovery, the long-term productivity of the affected environment has not been significantly altered. Likewise, if the proposed project was built and then removed and the affected areas restored, little change in long-term environmental productivity would occur.

Where surface disturbance occurs, short-term impacts are anticipated due to construction activities and would be limited to the temporary ROW, staging areas, structure and pad placement, pulling and tensioning areas, and turnarounds. Where multiple passes by heavy mechanical equipment occur, detrimental compaction may occur. If soil mitigation measures (described above) are adopted and implemented immediately following completion of construction, the impacts should be temporary.

Long-term to permanent impacts would be associated with structure footprints. Continued traffic and other surface disturbance associated with operation and maintenance activities would also be considered a long-term impact.

The short-term use of the ROW for the transmission line rebuild would have no long-term effect on surface fossils because none were identified during the field survey. However, because auguring for transmission line pole installation is known to pulverize rock and contained subsurface fossils, it is possible that mitigation of adverse effects on paleontological resources at locations of augured excavations would not be possible, resulting in a permanent loss of productivity of this resource. For other types of excavation in which more complete fragments of bedrock are removed and excavation sidewalls are accessible, implementation of paleontological mitigation measures can reduce adverse impacts to below the level of significance because fossils are not destroyed during the process of excavation. In such cases, mitigation can result in a beneficial impact by salvaging and preserving fossils that otherwise may have never been discovered, and curating them in a public museum where they would be permanently available for scientific research, education, and display. Therefore, depending upon the nature of the excavation equipment, construction-related impacts may or may not result in a diminishment of the long-term productivity of this resource within the study area.

The long-term productivity effects on socioeconomics includes providing the Project Area, the MPEI, Western, and Tri-State service area in Grand County a reliable source of back-up power and improve regional operating efficiency. The proposed project would ensure a back-up source of power for residential, commercial, industrial, public communications, medical, and other critical societal functions. The project would therefore contribute directly to the long-term stability and economic growth of the region.

All alternatives would result in short-term impacts to aquatic biology resources. However, there would be no long-term effects on aquatic resources that would affect the long-term productivity for this resource.

Through the implementation of SCPs, design criteria, and mitigation measures, the project alternatives are not expected to result in long-term impacts to common wildlife resources.

In regards to special status species, particularly the greater sage grouse and the golden eagle, construction of the transmission line is expected to result in short-term impacts to species viability and productivity. It is possible that the operation of the transmission line may result in long-term impacts to sage grouse and golden eagle viability and productivity that cannot be mitigated.

4.21 Irreversible and Irretrievable Commitments of Resources

Pursuant to NEPA Sec. 102 [42 U.S.C. § 4332] (2)(C)(v), this analysis must identify actions that would result in the irreversible or irretrievable commitments of resources. Irreversible and irretrievable commitments of resources occur when implementation of an action would cause the resource to be destroyed or removed, or would affect a resource such that its useful renewal could occur only over an extraordinarily long period of time or at exorbitant expense. An irreversible and irretrievable commitment of a resource precludes other beneficial uses of that resource in the future.

Construction of the proposed project would not result in the irreversible or irretrievable commitment of resources, except for the financial resources, fuel, and other consumable materials required for construction and maintenance.

Construction and maintenance of the transmission line would consume aluminum, steel, wood, gravel, sand, and other nonrenewable materials to construct steel structures, conductors, insulators, access, and other facilities. Small quantities of diesel fuel and gasoline would also be consumed by construction and maintenance equipment. These activities would require the consumption of a relatively small amount of fuel that would not constitute a long-term drain on local resources.

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5.0 CUMULATIVE EFFECTS

5.1 Introduction

The CEQ defines cumulative effects as:

> The impacts on the environment which result 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. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

This chapter analyzes the incremental effects on resources by the proposed action and alternatives from:

- Past actions
- Present actions that are not part of the proposed action or action alternatives
- Reasonably foreseeable future actions that are not part of the proposed action or action alternatives

These effects would be collectively evaluated against legal or administrative thresholds to evaluate the level of significance of the effects. If the proposed project and alternatives would have no effect on a particular resource, there would be no cumulative effect either.

Public scoping comments, local trend analyses (demographic and recreational), and consultation with various agencies or entities, such as the Forest Service, USFWS, BLM, municipalities, and project stakeholders, were used to develop an inventory of past, present, and reasonably foreseeable projects for this cumulative effects analysis.

The effects of various past, present, or future actions (regardless of the entity pursuing the action) and natural processes have the potential to coincide either in time or space with the effects of the Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project. The nexus of these effects will be discussed by resource throughout the remainder of this chapter. Identifying past and present activities is especially important to understanding the environmental baseline of resources within the analysis area.

The geographic scope of cumulative effects analysis varies by resource. Each resource described in the following sections indicates the geographic analysis area relevant for that resource.

5.1.1 Past, Present, and Reasonably Foreseeable Future Actions

The following resource cumulative effects analyses have considered, at a minimum, the effects of the following past, present, and reasonably foreseeable future actions:

Past

- Construction and operation of Reclamation reservoirs
- Multiple communications facilities on Table Mountain, including cell phone and microwave towers for Verizon Cellular and Union

- Habitat fragmentation as a result of development
- Existing and expanding recreational uses
- Construction of subdivision roads
- Private inholdings, conservation easements, subdivision of large parcels
- Construction of local highways

Present

- Mountain pine beetle epidemic
- Salvage harvests
- Prescribed fire activities
- Recent and current population growth
- Large-scale residential development
- Recreation and tourism development
- Various federal/nonfederal land exchanges
- Climate change effects
- Reservoir water level fluctuations
- Spread of noxious weeds

Future

- Mountain pine beetle epidemic
- Forest health planning and treatments
- Proposed water development projects, including increased West Slope diversions
- Various land exchanges – Forest Service/NCWCD, NCWCD/BLM
- Habitat fragmentation as a result of development, build-out
- Climate change effects
- Existing and expanding recreational uses
- New subdivision roads/access
- Private inholdings, conservation easements, subdividing of large parcels
- Reservoir water level fluctuations
- Spread of noxious weeds
- Modifications at the Granby Pumping Plant Switchyard, including the relocation of a transformer

5.2 Air Quality, Climate, and Global Climate Change

5.2.1 Analysis Area

For all of the action alternatives, the geographic scope of the cumulative effects analysis is determined to be the regional area shown on Map 1-1.

5.2.2 Cumulative Effects Assessment

The direct and indirect air quality effects of Alternative A are negligible to minor and would not result in measureable contribution to cumulative effects.

Alternative A would have no direct or indirect effects on climate change; therefore, there would be no incremental contribution to cumulative climate change effects.

As described in Chapter 4.0 of this EIS, the proposed action and alternatives would result in short-term construction related fugitive dust and exhaust emissions. The proposed action would conform to the SIP and would not trigger a conformity determination under Section 176(c) of the CAA. Due to the temporary nature of construction emissions, regional construction emissions from the proposed action (in conjunction with development of the projects listed in Section 5.1) would not result in a cumulatively adverse effect on air quality. Moreover, implementation of Western's adopted SCPs would ensure that all emissions from proposed construction activities within the project region, in combination with any reasonably foreseeable future emission source, would not result in adverse cumulative effects. With these measures, temporary dust associated with construction would be confined to the Project Area and would not result in cumulative effects of dust generated from other projects.

No adverse air effects are expected from ongoing operation and maintenance associated with the proposed action and alternatives. Emissions associated with maintenance activities would be minor, and when added to the impacts from the other projects listed in Section 5.1, would not result in an adverse cumulative effect on air quality.

The direct and indirect effects of vegetation clearing along the ROW are not anticipated to have any measurable incremental contributions to cumulative global climate change effects. Much of the forested area along the existing and new ROWs has been devastated by the recent mountain pine beetle epidemic. Many of the forested stands have died and are no longer serving as carbon sinks in the Project Area. Relative to this widespread die-back of pine forests in the Project Area, the proposed vegetation clearing would be negligible.

In the short term, the incremental contribution of increased emissions from electrical generation resources, as a result of this voltage upgrade, are difficult to quantify and would likely be negligible on a local or regional scale. There is no direct nexus identified between the voltage increase and generation increases. In the short term, the action alternatives would not result in measurable cumulative effects on generation emissions.

Ultimately, with the implementation of an action alternative and the imminent failure of the Adams Tunnel cable, there would be no net change to the loads served in the Project Area. Therefore, in the long term, the action alternatives would not have any measurable cumulative effect on generation emissions.

5.3 Soil Resources

5.3.1 Analysis Area

From west to east, the cumulative effects analysis area for soil resources extends from U.S. Highway 40 east to Lake Granby. From north to south, it extends from Stillwater Tap in the north, then southward to the town of Granby.

5.3.2 Cumulative Effects Assessment

Cumulative impacts to soil resources result from surface disturbance related to fire, timber harvest, agriculture, recreation, urban development, infrastructure, and other natural and anthropogenic activities within the analysis area.

Although a variety of activities have some potential to produce cumulative effects with the project, mountain pine beetle-related activities are one of the more evident. Timber harvest is expected to increase due to the mountain pine beetle epidemic. Salvage harvests could include large clear cuts. Impacts from these types of activities typically result in increased compaction and erosion. A decrease in soil productivity would occur due to the resulting decline in organic matter additions to the soil.

Prescribed fire is commonly used as a tool to reduce fuel loads and restore forest health. Prescribed fires can result in a temporary increase in erosion and sedimentation where vegetation, duff, and litter are removed. Wildfires of high severity result in increased water repellent (hydrophobicity) soil, which limits infiltration, combustion, and increased mobility of some soil nutrients; mortality of some soil organisms; combustion of surface soil organic matter; and loss of effective ground cover, which leaves the soil susceptible to erosion and could contribute to noxious weed spread (Korb et al 2004). Due to the increase in beetle kill timber, wildfires could become more common in the Project Area. High severity fires would be expected to contribute to the cumulative impacts in the Project Area.

However, with implementation of standard and additional mitigation measures, the proposed project and other alternatives would result in only minor long-term impacts on soils. Therefore, little or no cumulative impacts to soil resources are expected.

5.4 Paleontological Resources

5.4.1 Analysis Area

For all the action alternatives, the geographic scope of the cumulative effects analysis is determined to be the regional area shown on Map 1-1.

5.4.2 Cumulative Effects Assessment

Cumulative impacts result from individually minor but collectively significant actions taking place over a period of time. In general, if previously unrecorded scientifically significant paleontological resources are present within the Project Area, the potential cumulative impacts would be low, so long as mitigation was implemented to preserve the resources. The mitigation measures described in Chapter 4.0 would effectively recover the value to science and society of significant fossils that would otherwise have been destroyed by ground-disturbing actions.

Cumulative impacts associated with the proposed transmission line rebuild are anticipated to be negligible.

5.5 Cultural Resources

5.5.1 Analysis Area

The cumulative impacts analysis/influence area is the same as that for direct and indirect impacts and includes the boundaries of adjacent cultural resources.

5.5.2 Cumulative Effects Assessment

The resumption of increased residential or commercial development within the area presents a potential for cumulative effects with the project. Future utilities to support projected growth may also follow similar paths as the proposed alternatives due to topographic and physical constraints in the area.

Over the last decade, there has been an increase in residential housing development as a result of population growth in the area. Alternatives B1, C1, C2, and D pass through or are adjacent to a planned 1,500-acre mixed-use development to be located north of the intersection of U.S. Highway 40 and 34. Should this project re-emerge in the future, along with other future residential development, the result could be a cumulative adverse effect on cultural resources. New roads, structures, and utilities associated with this growth might affect cultural resources. The increased presence of people in the area could also result in the damage or collection of cultural resources.

Several mechanical and prescribed burn treatments are being implemented in response to mountain pine beetle infestations. Burning or mechanical treatment can harm cultural resources. Damage to cultural resources could result over time from fire or repeated incremental damage caused by motorized vehicles associated with mechanical treatment or agriculture. Cumulative impacts would not occur if ground disturbance activities from anticipated projects occur outside of the site boundaries.

Because Western would implement treatment measures such as avoidance, and monitoring, the cumulative effects on cultural resources from the action alternatives are expected to be negligible.

5.6 Electric and Magnetic Fields (EMF)

5.6.1 Analysis Area

The cumulative effects analysis area is confined to the existing and proposed ROWs.

5.6.2 Cumulative Effects Assessment

Since there are no state or federal guidelines regarding EMF, there is no standard for evaluating cumulative effects. Calculated EMF levels at the ROW edges decrease from existing levels (no action) to the proposed levels (all action alternatives) due to the vertical configuration used for each of the proposed circuits, additional ground clearance, optimum phasing arrangement, and lower loading (less amps). The proposed project, combined with past, present, or reasonably foreseeable future actions, would have less of a cumulative effect than the existing line, both within and outside the ROW.

5.7 Land Use

5.7.1 Analysis Area

The cumulative impacts analysis area is the same as that for direct and indirect impacts, and includes the proposed and alternative transmission line ROWs, existing access roads, substation sites, construction areas, and surrounding land uses within the project vicinity.

5.7.2 Cumulative Effects Assessment

The Project Area is largely used for agriculture, residential developments, recreation facilities, transportation corridors, and some commercial development. Irrigated hay production and grazing are expected to continue into the foreseeable future. In the near term, the outlook for increased residential or commercial development within the area is limited, but eventually economic conditions could improve and these activities are expected to resume. The project's cumulative effects on land use are closely related to other development activities, including existing and planned residential developments and planned water development.

Agricultural use in Grand County faces many challenges, particularly from conversion to second home development and other residential uses. A project that adds to these challenges presents a potential for cumulative effects. However, the proposed project is primarily a rebuild of an existing transmission line. With any of the alternatives, agricultural use can continue within the new or expanded ROW, and the direct effects of replacing one set of transmission structures with another would not result in substantial impacts to grazing use or the cultivation of hay. Cumulative effects on agricultural use are therefore not anticipated.

The recent adverse economic conditions, combined with the extensive loss of forest cover due to the mountain pine beetle infestation, have diminished the pace of development activity in Grand County. Those alternatives that use the existing alignment for most of their distance or move the transmission line further from sensitive locations, such as portions of the Scenic Byway, are unlikely to measurably contribute to cumulative impacts on land use.

Transmission lines, pipelines, substations, pumping plants, and other utilities are currently part of the landscape of the Project Area. Reasonably foreseeable future actions include planned residential development. Alternatives were located to avoid, where possible, sensitive receptors such as existing homes and the Scenic Byway. Where possible, alternatives follow the path of existing transmission line or pipeline ROW. Future residential developments are planned in the area. If planned mixed-use development north of the intersection of U.S. Highway 40 and 34 proceeds in the future, and the design does not adequately integrate the transmission line, Alternative C2-Option 1 and Alternative D-Option 1 may have limited cumulative effects this future development.

5.8 Visual Resources

5.8.1 Analysis Area

The cumulative impacts analysis area is the same as that for direct and indirect impacts, and includes viewsheds within the project vicinity.

5.8.2 Cumulative Effects Assessment

The existing scenic and recreational landscape character is defined by a combination of dense conifer stands and more open areas. In forested areas, visibility is limited to the immediate foreground due to mature stands of lodgepole pine, ponderosa pine, and Engelmann spruce. Extensive mountain pine beetle infestations have affected large portions of these stands, resulting in a brown hue to the forest and large-scale die-off. Several mechanical and prescribed burn forest treatments are and would continue to be implemented in response to mountain pine beetle infestations. As a result of large-scale forest succession and planned treatments, the existing landscape character would likely transition from a densely forested, evergreen condition to a mosaic of open patches of grasses, shrubs, deciduous trees (i.e., aspen), and evergreen forests of varying age classes. Openings within forested areas from large-scale die-off, forest succession, planned treatments, and residential and commercial uses may also potentially increase visibility of the project.

Past actions have also modified the landscape character, including reservoir development, water flow changes, transmission infrastructure, state highway and local transportation networks, and residential and commercial land development. The existing scenic values and recreational opportunities continue to attract recreational, residential, and commercial development. As described in the Land Use and Socioeconomic sections, land conversion from ranching and natural open space landscapes to more intensive recreational resorts and residential and commercial subdivisions could continue in the foreseeable future. Land development and forest fragmentation would result in a loss in quality of the existing landscape character.

In combination with past, present, and reasonably foreseeable future actions, the long-term presence of a 138-kV line would incrementally contribute to adverse visual character changes in the region. However, because this project is replacing an existing transmission line, effects are reduced relative to a new ROW in an area without an existing transmission line. The incremental contribution to cumulative effects would be adverse but minor.

5.9 Socioeconomics and Environmental Justice

5.9.1 Analysis Area

For all action alternatives, the geographic scope of the cumulative effects analysis is determined to be the regional area shown on Map 1-1.

5.9.2 Cumulative Effects Assessment

The project is not anticipated to result in any notable cumulative impacts on socioeconomics or environmental justice. The minor amount of additional local spending would not be substantial enough to interact with other economic activities in a manner that would influence local economic conditions, either positively or negatively. Any such effects would be minor and short term. Also, the small workforce required for construction of the project would not result in cumulative effects on housing, demographics, or employment. Any effects would be minor and short term.

In the long term, the effects of the proposed project and alternatives would be to provide a more reliable electrical power system for area residents. This alone would not result in any cumulative effects or economic conditions, trends, or demographics.

5.10 Recreation and Wilderness

5.10.1 Analysis Area

The cumulative impacts analysis area is the same as that for direct and indirect impacts, and includes the entire Project Area for all alternatives and recreation on surrounding lands, including tracts of land managed by the BLM Kremmling Field Office; Forest Service, ARNF, Sulphur Ranger District, including portions of the ANRA; Colorado State land; and private land.

5.10.2 Cumulative Effects Assessment

It is not anticipated that the Granby Pumping Plant Switchyard-Windy Gap Substation Transmission Line Rebuild Project, in conjunction with any other identified past, present, or reasonably foreseeable future actions, would have a cumulative effect on recreation access or opportunities in the Project Area. See Section 5.8 for a discussion of the potential cumulative effects to viewsheds within the Project Area.

As described in Chapters 3.0 and 4.0, the nearest designated wilderness area is located approximately 5 miles away. There is no potential for direct or indirect impacts to the wilderness as a result of any of the project alternatives. Therefore, there is no potential for cumulative effects to wilderness resources.

5.11 Aquatic Resources

5.11.1 Analysis Area

The analysis area for aquatic resources would be the same as discussed for the Windy Gap transmission line rebuild project direct and indirect impact areas. Specifically, the study area would include perennial (Willow, Stillwater, and Soda creeks) and intermittent (Coyote Creek and unnamed) streams and canals that drain into the Colorado River and Lake Granby. The Project Area also includes the western portion of Lake Granby and Willow Creek Reservoir.

5.11.2 Cumulative Effects Assessment

The project proposes to construct and operate transmission lines in the Granby area that may result in soil disturbance within the ROW at crossings of perennial and intermittent streams and canals. This disturbance could result in short-term sediment input to these water bodies, which could adversely affect aquatic communities. However, the proposed project incorporates various SCPs to minimize or avoid sediment input into these water bodies. Water quality effects on aquatic habitat and biota would therefore be considered to be negligible to minor.

Past, present, and future cumulative activities (e.g., new subdivision roads and access, expanding recreation use, salvage harvests, and prescribed fire) have or would result in soil disturbance that could affect streams, canals, Lake Granby, and Willow Creek Reservoir. Present and future activities could overlap with the construction and operation (maintenance) periods for the project.

Overall, the incremental contribution of this project to other activities in the Project Area would be negligible. Therefore, the proposed project would result in negligible adverse cumulative effects in the Project Area.

5.12 Vegetation Resources

5.12.1 Analysis Area

The analysis area for cumulative effects on vegetation resources is based on the Project Area, as shown in Map 1-2.

5.12.2 Cumulative Effects Assessment

Current mountain pine beetle infestation is causing a landscape-scale change in Colorado forests, including the Project Area. The mountain pine beetle infestation is visible throughout the Project Area and is occurring along each of the five project alternatives. This situation is certain to change the forest dynamics of the Project Area for the foreseeable future. Conditions in local and regional forests will continue to be adversely impacted. To address mountain pine beetle effects, the Forest Service and private landowners are conducting salvage harvests in lodgepole pine forests in and near the Project Area. These harvests open the forest canopy, changing the habitat suitability for some species and fragmenting habitat for vegetation that remains in the nonharvested areas. Forest salvage harvesting may also result in weed invasion into some parts of the Project Area, as machinery access areas need to be cut and as soils are disturbed by the harvesting process.

In November 2010, the ARNF issued a Decision Notice and Finding of No Significant Impact for implementation of an Emergency Power Line Clearing Project. This decision provides the utility companies a one-time authorization to fell or remove hazard trees up to 200 feet on either side of center line for transmission lines crossing NFS lands on the ARNF, which includes lands both in and outside the present utility companies authorized ROWs (Forest Service 2010). Environmental effects of this decision were determined to be local in context and not significant. Western and the Forest Service are also in the early stages of preparing an EIS on Western's proposal to change vegetation management practices on NFS lands in Colorado, Nebraska, and Utah. This proposal does not contribute to cumulative effects within the analysis area.

Each of the action alternatives would require some clearing of existing vegetation along new ROWs or in existing, expanded ROWs. However, because of the widespread die-off of forests and salvage harvests in the Project Area, the incremental contribution of ROW clearing is anticipated to be minor (until sufficient regrowth has occurred) and negligible in the long term. The cumulative effects of this project on vegetation resources in the Project Area are adverse but negligible in the long term.

5.13 Special Status Plant Species

5.13.1 Analysis Area

The analysis area for cumulative effects on special status species includes the analysis area described in Chapter 4.0, and expands to special status plant populations locally, regionally, and on a Forest-wide basis.

5.13.2 Cumulative Effects Under ESA

Western consulted with USFWS throughout the NEPA process. USFWS determined that the project would have no effect on federally listed plant species, and therefore is not expected to result in cumulative effects to federally listed species. Further information and explanation of the no effect determination on federally listed species can be found in the BA.

5.13.3 Cumulative Effects Assessment Under NEPA

No federally listed plant species were determined to have suitable habitat in the Project Area based on field survey work in 2008 and 2009, nor were any FSS detected. A total of 31 FSS and 25 Forest Service plant species of local concern were determined to potentially have habitat in the Project Area. Three Forest Service species of local concern – western moonwort, Mingan moonwort, and cupped penstemon – were identified in the Project Area during rare plant surveys in summer 2009.

Past actions have likely caused loss of individuals, loss of suitable habitat, and habitat fragmentation as a result of residential development. Residential development has included roads and other associated infrastructure. Sensitive plant species may also have been impacted historically from increasing recreational use in the Project Area. That increase in recreation likely led to the loss of individuals, loss of suitable habitat, and an increase in habitat fragmentation resulting from access roads, trails, and the construction of reservoirs. The NCWCD pipeline runs parallel to and crosses all five alternative routes for this project. The disturbance created by the pipeline has likely been responsible for an increase in the presence of weeds across a portion of the Project Area.

Current mountain pine beetle infestation is causing a landscape-scale change in Colorado forests and is having a cumulative effect in the area of this project. The mountain pine beetle infestation is visible in every direction from the project vicinity, and is occurring along each of the five route alternatives. This situation is certain to change the forest dynamics of Middle Park for the foreseeable future. This change would result in some level of change to habitat for special status plant species. One FSS and approximately 18 Forest Service plant species of local concern for this project are found in lodgepole pine forest habitats. Conditions suitable for these forest-dwelling species have been and would continue to be adversely impacted. In conjunction with mountain pine beetle effects, the Forest Service and private landowners are conducting salvage harvests in lodgepole pine forests in and near the Project Area. These harvests open the forest canopy, changing the habitat suitability for some species and fragmenting habitat for special status plants that remain in the nonharvested areas. Forest salvage harvesting may also result in weed invasion into some parts of the Project Area, as machinery accesses areas to be cut and as soils are disturbed by the harvest process.

It is anticipated that there could be future population growth in Middle Park, which would put more pressure on the Project Area from residential construction and the associated infrastructure necessary to provide for the larger population. Several portions of the Project Area are privately held and could be affected by future development. This development, should it occur within the vicinity of the project alternatives, could lead to loss of special status plant individuals, loss of suitable habitat, and habitat fragmentation effects.

Each of the project alternatives would have little or no effect on special status plant species. Given this limited effect, any cumulative effects resulting from mountain pine beetle and other activities within the Project Area are also expected to be minor in the short term and negligible in the long term.

5.14 Wetland Resources

5.14.1 Analysis Area

The analysis area for cumulative effects on wetland resources includes the analysis area described in Chapter 4.0, and expands to address wetland ecosystems locally and regionally.

5.14.2 Cumulative Effects Assessment

Past actions in the Project Area have caused the loss of wetland ecosystems and riparian acreage as a result of residential development. Residential development has included roads and other associated infrastructure. Site preparation for the former Shorefox development project north of the intersection of U.S. Highway 40 and 34 resulted in the loss of wetlands adjacent to the Colorado River on the southwest end of the Project Area. It is uncertain how loss of wetlands at Shorefox is being mitigated and at what point in the mitigation process the project proponent may currently be.

Wetlands in Middle Park have been impacted historically from the increase in water resource development and recreational use. These activities likely led to the loss of wetlands from the construction of access roads, trails, and the construction of Willow Creek and Granby reservoirs. The total acreage of wetlands/riparian areas lost due to reservoir construction is unknown.

It is anticipated that there would be future population growth in Middle Park, which would put more pressure on the Project Area from residential and infrastructure construction. Several portions of the Project Area are privately owned and could be affected by future development. This development, should it occur within the project alternatives, could lead to loss of wetland acreage or could adversely affect the hydrology that supports downstream wetlands. Fens located north of CR 41 would be especially susceptible to modification of groundwater flow regimes.

Unlike the effects of residential or other developments in the Project Area, which may permanently affect wetland vegetation or other defining characteristics, the effects of the proposed project are primarily short term, such as temporary trampling and crushing of wetland vegetation, compaction of wetland soils, and temporary changes in surface and groundwater flow regimes. Negligible to minor long-term direct effects are likely, but would be limited to the removal of less than 0.1 acre of wetland vegetation for all alternatives. The loss of less than 0.1 acre of wetland vegetation is negligible overall when combined with the effects of other past, present, and reasonably foreseeable future actions’ effects on wetland resources in the Project Area.

For all alternatives, the incremental contribution of this project to cumulative effects on wetland resources in the Project Area is anticipated to be adverse but negligible in the long term.

5.15 Terrestrial and Avian Wildlife Resources

5.15.1 Analysis Area

The analysis area for cumulative effects on wildlife resources includes the Project Area as shown on Map 1-2.

5.15.2 Cumulative Effects Assessment

Existing and planned residential developments, agriculture, and planned water developments, have resulted in habitat loss and fragmentation to the north and south of the Project Area. Planned development on the former Shorefox property is expected to result in impacts to vegetation on the 1,553-acre Horn Ranch. Planned residential developments on the northern and southern end of the Project Area could result in long-term impacts to big game migration corridors as well as big game severe winter range.

Residential developments in proximity to the Project Area could also increase the propagation of noxious weeds. This is of particular concern on the former Shorefox property where ground has been cleared and the area has not been revegetated. Propagation of noxious weeds can result in decreased foraging opportunities for wildlife and can alter drainage patterns across a landscape.

Although construction of the proposed transmission line would result in relatively minimal direct impacts to habitat, it could result in aerial habitat fragmentation. Aerial habitat fragmentation is a new concept that focuses on how overhead transmission lines may affect avian species and their prey. Depending on the alternative selected, aerial habitat fragmentation may become a cumulative effect, similar to habitat fragmentation. Transmission lines and the communication tower on Table Mountain can increase collision risk for avian species that occur in the Project Area.

The mountain pine beetle epidemic also contributes to wildlife impacts in the Project Area. Forest-dwelling species have been impacted by the loss of lodgepole pine communities on the Hot Sulphur Ranger District. Many of the nest sites observed in the Project Area are currently found in dead lodgepole pine stands. Over time, suitable nesting sites for raptors are expected to decline across the Forest. Cavity nesting species and insectivores, such as woodpeckers, are expected to benefit from the mountain pine beetle epidemic in the short term. Over time, stand replacing fires may occur and habitat for these species would also be significantly impacted. The mountain pine beetle epidemic has altered the structure and density of forests and wildlife habitats. The loss of forest communities on the Hot Sulphur Ranger District, and throughout the state, would have adverse impacts to forest dwelling species in the long term.

The construction and operation of the transmission line, using any of the alternative alignments, would have relatively minor impacts to wildlife resources. Therefore, even considering the trends previously discussed, including residential development and mountain pine beetle, any cumulative effects resulting from the project are also expected to be minor.

5.16 Special Status Terrestrial, Avian, and Aquatic Wildlife Species

5.16.1 Analysis Area

The analysis area for cumulative effects on special status species includes the analysis area described in Chapter 4.0, and expands to address wildlife, fisheries, and special status populations locally, regionally, on a Forest-wide basis, and state scales.

5.16.2 Cumulative Effects Under ESA

Western consulted with USFWS throughout the NEPA process. USFWS has determined that the project would have no impact on federally listed and avian, aquatic, and terrestrial wildlife species, and therefore is not expected to result in cumulative effects to federally listed species. Further information and explanation of the no effect determination on federally listed species can be found in the BA.

5.16.3 Cumulative Effects Assessment Under NEPA

Similar cumulative effects discussed above for wildlife resources are expected for special status species that occur or have suitable habitat in the Project Area. Of particular concern are impacts to the greater sage grouse population that occurs on the southwestern end of the project and golden eagles that nest on the west side of Table Mountain. A combination of residential developments, water developments, transmission lines, access roads, and the propagation of noxious weeds would likely result in permanent impacts to the long-term viability of greater sage grouse populations in the Project Area and within Grand County. Greater sage grouse would be impacted by loss of sagebrush habitats, habitat fragmentation, and the ability to disperse into adjacent breeding habitats.

The Middle Park sage grouse population is located primarily in Grand County, but also occurs in portions of Eagle and Summit counties. The population is bordered by the Gore Range to the west and includes the areas surrounding the towns of Kremmling, Hot Sulphur Springs, and Granby. According to the GSGCP (2008), the lowest density of sage grouse within the Middle Park population is in sagebrush rangelands near Granby. Sage grouse were historically observed along the Colorado River near Granby. Agricultural development and now residential development has resulted in the permanent loss of habitat for sage grouse in proximity to the Project Area. Loss of habitat or increased disturbance to these populations may result in the permanent loss or abandonment of this segment of the Middle Park sage grouse population. The sagebrush communities found west of Lake Granby have been identified as suitable habitat for grouse under the CSGCP and also as areas where restoration activities are recommended. Further residential and water developments on the west side of Table Mountain would compromise existing habitats and potential restoration of currently unsuitable habitats.

The presence of an existing communication tower on Table Mountain, as well the transmission line in the area, may increase golden eagle collision risks around the Table Mountain area.

FSS found in lodgepole pine forests would continue to be impacted by the mountain pine beetle epidemic. Construction and operation of the transmission line is not expected to have cumulative effects to forested habitats for the species associated with those habitats.

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6.0 PERMITTING AND APPROVALS

6.1 Permitting and Approvals

Permits and approvals are required prior to construction of the proposed transmission line. Preparation of an EIS and the actual permitting processes are related but distinctly separate. The permitting process gives individual government decision makers the authority to grant (conditionally grant or deny) individual permit applications with requirements and conditions to eliminate or mitigate adverse environmental effects that are identified in the EIS.

Permits regulate many aspects of facility construction and operations, including the quality of construction, air quality requirements, and discharges to the environment. These permits would be obtained, as required, from the appropriate agency.

A number of federal environmental statutes address environmental protection, compliance, or consultation. Certain federal environmental requirements have been delegated to state authorities for enforcement and implementation. Although this chapter does not address pending legislation or future regulations, the regulatory environment is subject to change, and construction and operation of the projects must be conducted in compliance with all applicable regulations and standards.

As a federal agency, Western is not required to comply with state or local land use regulations. Nevertheless, Western would substantively comply with state and local requirements whenever practicable.

Table 6-1. Potential Permits and Approvals Required for Implementation

Administering Agency	Permit, Approval, or Requirement
Federal Agencies	
U.S. Bureau of Land Management	Record of Decision Permit
U.S. Fish and Wildlife Service	Section 7 Consultation Process Bald and Golden Eagle Protection Act Consultation Migratory Bird Treaty Act Consultation
U.S. Army Corps of Engineers	Section 404 Permit
U.S. Environmental Protection Agency	Review of Floodplain / Wetlands Assessment Review of Environmental Impact Statement National Ambient Air Quality Standards State Implementation Plan NPDES Stormwater Permit
Office of Safety and Health Administration	Regulations and Standards for Transmission Lines
State and Local Agencies	
Department of Natural Resources	Consultation and Written Guidance
Department of Public Health and the Environment	Emissions Permit Water Quality Certification (401 Certification)
State Historical Preservation Office	Cultural Resources Clearance Section 106 Consultation
Department of Transportation	Utility Permit

7.0 PREPARERS, AGENCIES AND PERSONS CONSULTED, AND DISTRIBUTION LIST

7.1 List of Preparers

The following persons were actively involved with the preparation of this EIS.

Name	Firm/Agency	Project Role	Years Of Relevant Experience
Bruce Meighen	Logan Simpson	Principal-in-Charge / Public Involvement	15 years
Tom Keith	Logan Simpson	Principal, Sr. Quality Assurance / NEPA	30 years
Tanya Copeland	Logan Simpson	Project Manager / NEPA	14 years
Molly Cobbs-Lozon	AECOM	NEPA	7 years
Jeremy Call	Logan Simpson	Visual Resources	6 years
Chad Schneckenburger	AECOM	Recreation	6 years
Chris Gaughan	AECOM	Terrestrial and Aquatic Wildlife	12 years
Melissa Sherburne	AECOM	Land Use	6 years
Rebecca Brofft Everette	Logan Simpson	Public Involvement / Administrative Record	2 years
John Van Kirk	AECOM	Air Quality	24 years
Poonam Boparai	AECOM	Air Quality / Climate	3 years
Steve Yarbrough	AECOM	Botany	25 years
Jared Wiedmeyer	AECOM	Visual Resources	4 years
Ashli Gornall	AECOM	Natural Resources Specialist	4 years
Matt Smith	AECOM	Natural Resources Specialist	3 years
Cameron Berglund	AECOM	CAD / Graphics	4 years
Linda Spangler	AECOM	Technical Editor	10 years
Terra Mascarenas	AECOM	Soils	12 years
Rollin Daggett	AECOM	Aquatic Wildlife and Resources	34 years
Cory Bolen	AECOM	GIS	5 years
Jennifer Chester	AECOM	GIS	9 years
Kimberly Karish	AECOM	GIS	
Scott Reyman	AECOM	GIS	6 years
Chris Hooper	Enertech	EMF / Interferences	23 years
Paul Murphey	Rocky Mountain Paleontology	Paleontology / Geology	17 years
Emmett Evanoff	Rocky Mountain Paleontology	Paleontology / Geology	30 years
Jennifer Kathol	Kathol and Co.	Socioeconomics and Environmental Justice	25 years
Dave Killam	RMC Consultants	Cultural Resources	27 years
Ted Hoefer	RMC Consultants	Cultural Resources	14 years
Dulaney Barclay	RMC Consultants	Cultural Resources	17 years
Eric Frechette	Schiff Associates	Corrosion Engineer	18 years
Graham Bell	Schiff Associates	Project Manager	20 years
Rodney Jones	Western Area Power Administration	NEPA / Environmental Document Manager	39 years
Carey Ashton	Western Area Power Administration	Land and Realty Specialist	26 years

Name	Firm/Agency	Project Role	Years Of Relevant Experience
Mark Kueny	Western Area Power Administration	Project Engineer	15 years
Jim Hartman	Western Area Power Administration	NEPA Document Manager	30 years
Roy Gearhart	Western Area Power Administration	Engineering Planning	20 years
Randy Wilkerson	Western Area Power Administration	Public Affairs	19 years
Travis Anderson	Western Area Power Administration	Electrical Engineer	10 years
Lisa Meyer	Western Area Power Administration	Archaeologist	20 years
Stephen Tromly	Western Area Power Administration	Native American Liaison	20 years

7.2 List of Agencies and Persons Consulted

The following persons were consulted during preparation of the EIS.

Name	Agency	Role or Title
Carol Kruse	U.S. Forest Service, Arapaho-Roosevelt National Forest	Special Projects Coordinator
Kevin Colby	U.S. Forest Service, Arapaho-Roosevelt National Forest	Visual Resources
Doreen Sumerlin	U.S. Forest Service, Arapaho-Roosevelt National Forest	Wildlife
Craig Magwire	U.S. Forest Service, Arapaho-Roosevelt National Forest	District Ranger
Wendy Magwire	U.S. Forest Service, Arapaho-Roosevelt National Forest	Wildlife
Brad Orr	U.S. Forest Service, Arapaho-Roosevelt National Forest	Recreation Specialist
Dan Matthews	U.S. Forest Service, Arapaho-Roosevelt National Forest	ANRA Manager
Karen Roth	U.S. Forest Service, Arapaho-Roosevelt National Forest	Forest Environmental Coordinator
Sue Valente	U.S. Forest Service, Arapaho-Roosevelt National Forest	GIS
Patricia Hesch	U.S. Forest Service, Medicine Bow-Routt National Forest	Lands and Realty Specialist
Erich Roeber	U.S. Forest Service, Arapaho-Roosevelt National Forest	Visual Resources
Sue Struthers	U.S. Forest Service, Arapaho-Roosevelt National Forest	Cultural Resources
Kelly Larkin	U.S. Forest Service, Arapaho-Roosevelt National Forest	Fisheries
Kevin Bayer	U.S. Forest Service, Arapaho-Roosevelt National Forest	Hydrology
Steve Popovich	U.S. Forest Service, Arapaho-Roosevelt National Forest	Botany and Rare Plants
Brock McCormick	U.S. Forest Service, Arapaho-Roosevelt National Forest	Wildlife
Norma Van Nostrand	U.S. Forest Service, Arapaho-Roosevelt National Forest	GIS
Susan Linner	U.S. Fish and Wildlife Service, Ecological Services	Colorado Field Supervisor
Edward C. Nichols	Office of Archaeology and Historic Preservation	State Historic Preservation Office
Tom Friar	Northern Colorado Water Conservancy District	Emergency and Security Manager, Instrumentation Control and Electrical Engineering
Jeff Drager	Northern Colorado Water Conservancy District	Deputy Manager, Engineering Division

Name	Agency	Role or Title
Scott Murdoch	Colorado Parks and Wildlife	District Wildlife Manager
Susan Cassell	Bureau of Land Management, Kremmling Field Office	Assistant Field Manager, Realty Specialist
Annie Sperandio	Bureau of Land Management, Kremmling Field Office	Realty Specialist
Diana Leiker	Tri-State Generation and Transmission Association	Senior Environmental Planner

7.3 FEIS Distribution List

7.3.1 Federal, State, and Local Agencies and Officials, and Project Partners

Copies of the FEIS were distributed to the following federal, state, and local agencies and officials, and project partners:

Name/Title	Organization
Federal Elected Officials	
Sen. Mark Udall	U.S. Senate
Sen. Michael Bennet	U.S. Senate
Congressman Jared Polis	U.S. House of Representatives
Tribal Representatives	
Mr. Willford Ferris, Tribal Historic Preservation Officer	Eastern Shoshone Tribe
Ms. Darlene Conrad, Tribal Historic Preservation Officer	Northern Arapaho Tribe
Mr. Darryl O'Neal, Sr., Chairman	Northern Arapaho Tribe
Mr. Darwin St. Clare, Jr., Chairman	Shoshone Business Council
Mr. Jimmy Newton, Jr., Chairman	Southern Ute Indian Tribe
Mr. Alden Naranjo, NAGPRA Representative	Southern Ute Indian Tribe
Mr. Gary Hayes, Chairman	Ute Mountain Ute Tribe
State Elected Officials	
Governor John Hickenlooper	Governor of Colorado
Sen. Jeanne Nicholson (16th District)	Colorado General Assembly
Rep. Randy Baumgardner (57th District)	Colorado General Assembly
Federal Agencies	
Ms. Carol Borgstrom, Director	Office of NEPA Policy and Compliance, U.S. Department of Energy
Ms. Suzanne Bohan, Program Director	NEPA Compliance and Review Program, EPA Region 8
Ms. Carol Kruse, Special Projects Coordinator	USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands
Dr. Willie R. Taylor, Director	Office of Environmental Policy and Compliance, Department of the Interior
Mr. Dave Stout, Field Manager	Bureau of Land Management, Kremmling Field Office
Ms. Susan Linner, Field Supervisor	USFWS Ecological Services, Colorado Field Office
State Agencies	
Mr. Jeff Drager, Deputy Manager, Engineering Division	Northern Colorado Water Conservancy District, Engineering Division
Mr. Mike King, Executive Director	Colorado Department of Natural Resources
Mr. Rick Cables, Director	Colorado Parks and Wildlife
Mr. Lyle Sidener, Area Manager	Colorado Parks and Wildlife, Hot Sulphur Springs
Mr. Christopher Urbina, Executive Director	Colorado Department of Public Health and Environment

Name/Title	Organization
Local Agencies/Officials	
Mr. Merrit Linke, Commissioner, District 2	Grand County Board of Commissioners
Mr. Gary Baumgarner, Commissioner, District 3	Grand County Board of Commissioners
Ms. Kristen Manguso, Planning Director	Grand County Department of Planning and Zoning
Ms. Lurline Curran, Grand County Manager	Grand County/Granby Airport
Ms. Deborah Hess, Town Clerk	Town of Granby
Ms. Judy M. Burke, Mayor	Town of Grand Lake
Project Partners	
Mr. Greg Norwick, President	Mountain Parks Electric, Inc.
Ms. Diana Leiker, Senior Environmental Planner	Tri-State Generation and Transmission Association

7.3.2 Individuals Receiving Copies of the FEIS

Individuals receiving a copy of the FEIS are identified below. A hard copy of the FEIS is also available for public review at the Granby Library (55 Zero Street, Granby, CO), the Juniper Library at Grand Lake (316 Garfield Street, Grand Lake, CO), and the MPEI office in Granby (321 West Agate Avenue, Granby, CO).

Name	Name	Name
Deb Bondi	Stanley Cordell Michael	Bill and Sue Tomasek
Rob and Sarah Burgett	John and Darlene Nelson	Jim Ward
Glenna Bliss Cook	Rick Pederson	Frank and Jane Watts
Bruce Dines	Patricia Person	Tom Wunder
Ardyth Fournier	Patricia D. and John F. Raney	Robert Alesandra
Alicia Gerhart	Kayleen S. Reeve	Joe Burbach
Jack Gerhart	Larry and Michaela Rossi	Daniel McGrail
Suzanne Gerhart	Sandra Schoenebeck	Tom O'Conner
Rod Kauber	Les Shankland and Clare Beth Rutila	Richard Schoenebeck
Paul Klees	Paul L. and Judy C. Shetler	Sandra Schoenebeck
Carla Lawn	Carol Sidofsky and Dave Hazelrigg	Steve Miller
Sally and Robert Linton	Paul Strauss	Pat Potts
Irene Lindgren	Steve and Elizabeth Sugg	Pat Verlo
Gavin Malia	June and Jim Timmerman	

A notice of availability (NOA) containing a link to download the FEIS was also mailed to over 1200 individuals on the project mailing list. The project mailing list includes tribal contacts, owners of properties within 0.5 mile of the alternative alignments, individuals that provided comments during the public scoping period or public review period for the DEIS, individuals on the notification list maintained by the ARNF, and other stakeholders. Individuals for whom mailed notices of the availability of the DEIS were returned with no forwarding address, were not sent a notice of availability for the FEIS.

7.4 Contractor Disclosure Statement

Pursuant to 40 CFR 1506.5(c), we AECOM, Inc., headquartered at 555 South Flower Street, 4th Floor, Los Angeles, CA 90071-2201, do hereby certify we have no financial or other interests in the execution or outcome of the proposed project identified in this EIS, nor any financial or other interests in other developments related to this transmission line rebuild project or to Western Area Power Administration; nor any financial or other interests in any mitigation requirements associated with the proposed action.

8.0 REFERENCES

*50 Code of Federal Regulations (CFR) 17. 1989. *Endangered and Threatened Wildlife and Plants; Final Rule to Determine Astragalus osterhoutii and Penstemon penlandii to be Endangered Species*. FR Volume 54, No. 133, p.29658. 13 July.

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