

ESTES TO FLATIRON TRANSMISSION LINES REBUILD PROJECT LARIMER COUNTY, COLORADO

Draft Environmental Impact Statement (DOE/EIS-0483)
September 2014



Mission Statement

Western is a Federal agency under the Department of Energy that markets and transmits wholesale electrical power through an integrated 17,000-circuit mile, high-voltage transmission system across 15 western states. Western's mission: Market and deliver clean, renewable, reliable, cost-based Federal hydroelectric power and related services.



Department of Energy
Western Area Power Administration
Rocky Mountain Customer Service Region
P.O. Box 3700
Loveland, CO 80539-3003

AUG 28 2014

Dear Interested Party:

Enclosed for your review is the Draft Environmental Impact Statement (EIS) for Western Area Power Administration (Western) Estes-Flatiron Transmission Lines Rebuild Project. The Draft EIS informs the public and interested parties of potential environmental impacts associated with implementing each route alternative. Western is seeking comments to determine the adequacy of the document and to receive input on the selection of a Preferred Alternative to inform the Final EIS. This Draft EIS has been prepared by Western following the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. §§ 4321-4347); the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR parts 1500-1508); and the U.S. Department of Energy (DOE) and United States Forest Service (USFS) NEPA procedures (10 CFR parts 1021 and 1022 and 36 CFR part 220).

This Draft EIS analyzes the environmental consequences of four possible route alternatives with three routing variations to rebuild and upgrade the existing 115-kilovolt (kV) transmission lines, and a no action alternative, which would keep the existing lines in place and continue established maintenance activities. The proposed route alternatives would improve access to the transmission lines; widen the rights-of-way (ROWs) where existing ROWs are inadequate for public and line crew safety and reliable power delivery; and implement an integrated vegetation management approach within the ROWs to reduce the risk of trees and other vegetation damaging or interfering with the transmission line and power delivery to Estes Park, Loveland and nearby Front Range communities. Western is the lead Federal agency for the Draft EIS. The USFS, a cooperating agency for the Draft EIS, has jurisdiction over National Forest System lands crossed by the transmission lines and will be making its own decision based on this Draft EIS.

Copies of the Estes-Flatiron Transmission Line Rebuild Project Draft EIS are available on the Web site at <http://ww2.wapa.gov/sites/western/transmission/infrastruct/Pages/Estes-Flatiron.aspx>. Locations of hard copies will be listed on the project Web site.

How to provide input and comments

Comments will be accepted for 45 days following the publication of the Environmental Protection Agency notice of availability in the *Federal Register*. All comments will be considered by Western in determining the Agency Preferred Alternative in the Final EIS. All substantive comments and information submitted will be summarized and addressed in the Final EIS. Substantive comments are those that reasonably question the accuracy of, methodology for, or assumptions used in the environmental analysis; present new information relevant to the analysis; present alternatives other than those analyzed and result in changes or revisions in one or more alternatives; or identifies evidence for why an alternative is preferable. Western can best use your comments and information if received within the public review period.

Those individuals wishing to submit comments are asked to do so in writing and submit them by any of the following methods:

E-mail: RMR_estesflatironeis@wapa.gov;
Fax: (720) 962-7269; or
Mail: Mark Wieringa
Western Area Power Administration, A7400
P.O. Box 281213
Lakewood, CO 80228-8213

Please include "Estes-Flatiron Transmission Lines Rebuild Project Draft EIS" in the subject line of your e-mail message. Please be aware that your entire comment, including personal identifying information such as address, phone number, or e-mail address, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. You can limit the personal information delivered with your comment.

Public outreach opportunities

Western will host public hearings in Loveland and Estes Park, Colorado, to provide an overview of the proposed project and to take public comments on the Draft EIS. The public hearings will be announced at least 15 days in advance through public notices, news releases to the local media, e-mail and mailings. Public hearing dates and locations will also be posted on the project Web site at <http://ww2.wapa.gov/sites/western/transmission/infrastructure/Pages/Estes-Flatiron.aspx>.

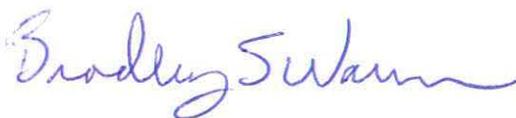
Project background

Western currently owns, operates, and maintains two 115-kV single-circuit transmission lines, dating from 1938 and 1953, that connect Estes Park to the Flatiron Substation in Larimer County, Colorado. The proposed project would remove both existing 115-kV single-circuit transmission lines and wood structures between Flatiron Substation and the intersection of Mall Road and U.S. Highway 36 in Estes Park and replace them with: (1) one double-circuit 115-kV transmission line on steel monopoles within a single ROW, (2) a new double-circuit 115-kV transmission line on steel monopoles within a single ROW with the western portion buried in concrete cable trenches for about 2.6 miles, (3) rebuild of both lines as single-circuit transmission lines on wood-pole H-frame structures on separate ROWs, or (4) the no action alternative, which would keep the existing lines in place and continue established maintenance activities.

The proposed project extends between Lake Estes on the east side of Estes Park and Western's Flatiron Substation. The project area analyzed in the Draft EIS encompasses lands east of the community of Estes Park and west of the Town of Loveland, and includes both private lands in Larimer County and public lands administered by the U.S. Department of Interior, USFS, the Colorado State Land Board, Northern Colorado Water Conservancy District, and Larimer County. Major transportation corridors are U.S. Highways 34 and 36.

Thank you for your continued interest in the Estes-Flatiron Transmission Line Rebuild Project. We appreciate the information and suggestions you have contributed to this process. Should you have any questions, please contact Mark Wieringa, Western Area Power Administration, NEPA Document Manager, at (720) 962-7448.

Sincerely,



Bradley S. Warren
Regional Manager

Enclosure

Estes to Flatiron Transmission Lines Rebuild Project, Larimer County, Colorado, DOE/EIS-0483

Draft Environmental Impact Statement

Responsible Agencies

Lead Federal Agency:

U.S. Department of Energy, Western Area Power Administration

Cooperating Federal Agencies:

U.S. Department of Agriculture, Forest Service

Abstract

The Western Area Power Administration (Western) currently owns, operates, and maintains two 115-kilovolt (kV) single-circuit transmission lines that connect Estes Park to the Flatiron Substation in Larimer County, Colorado. Western is proposing to rebuild the existing 115-kV system between Flatiron Substation and the intersection of Mall Road and U.S. Highway 36 in Estes Park. The proposed project would remove the existing 115-kV single-circuit transmission lines and wood structures and replace them with: 1) a new double-circuit 115-kV transmission line on steel monopoles within a single right-of-way (ROW), 2) a new double-circuit 115-kV transmission line on steel monopoles within a single ROW with the western portion buried in concrete cable trenches for about 2.6 miles, or 3) rebuild both lines as single-circuit transmission lines on wood-pole H-frame structures on separate ROWs. The proposed project would improve access to the transmission lines, widen the ROWs where existing ROW is inadequate, and implement an integrated vegetation management approach within the ROWs to ensure electrical clearance requirements are met and maintained for the life of the proposed project. Western is the lead Federal agency for the Environmental Impact Statement (EIS). The U.S. Forest Service has jurisdiction over National Forest System lands crossed by the transmission lines, and is a cooperating agency for the EIS.

Deadline for Draft EIS Comments

Comments on the Draft EIS must be received at the address provided below no later than November 3, 2014.

For additional information or to comment
on the Draft EIS, contact:

Mark Wieringa
Western Area Power Administration, A7400
P.O. Box 281213
Lakewood, CO 80228-8213
email: RMR_estesflatironeis@wapa.gov
fax: 720-962-7269

For additional information on DOE
NEPA activities, contact:

Ms. Carol M. Borgstrom, Director
Office of NEPA Policy and Compliance, GC-54
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
phone: 800-472-2756 or visit the DOE NEPA
Web site at <http://energy.gov/nepa/office-nepa-policy-and-compliance>

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Summary

Introduction

Western Area Power Administration (Western), is proposing to rebuild and upgrade two 115-kilovolt (kV) single-circuit transmission lines between Flatiron Substation and the intersection of Mall Road and United States (U.S.) Highway 36 in Estes Park, Larimer County, Colorado. The proposed project is subject to the environmental review process mandated under the National Environmental Policy Act (NEPA) of 1969.

This Environmental Impact Statement (EIS) analyzes the environmental consequences of four alternatives with three routing variations to rebuild and upgrade the existing 115-kV transmission lines, and the no-action alternative. Western is the lead Federal agency for the NEPA document. The U.S. Forest Service (USFS) has jurisdiction over National Forest System lands crossed by the transmission lines, is a cooperating agency for the EIS, and will be providing its own decision on this EIS.

The EIS has been prepared in accordance with the NEPA of 1969, as amended (42 United States Code [U.S.C.] Section 4321et seq.), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and U.S. Department of Energy (DOE) and USFS NEPA procedures (10 CFR Part 1021 and 1022 and 36 CFR Part 220).

Project Location

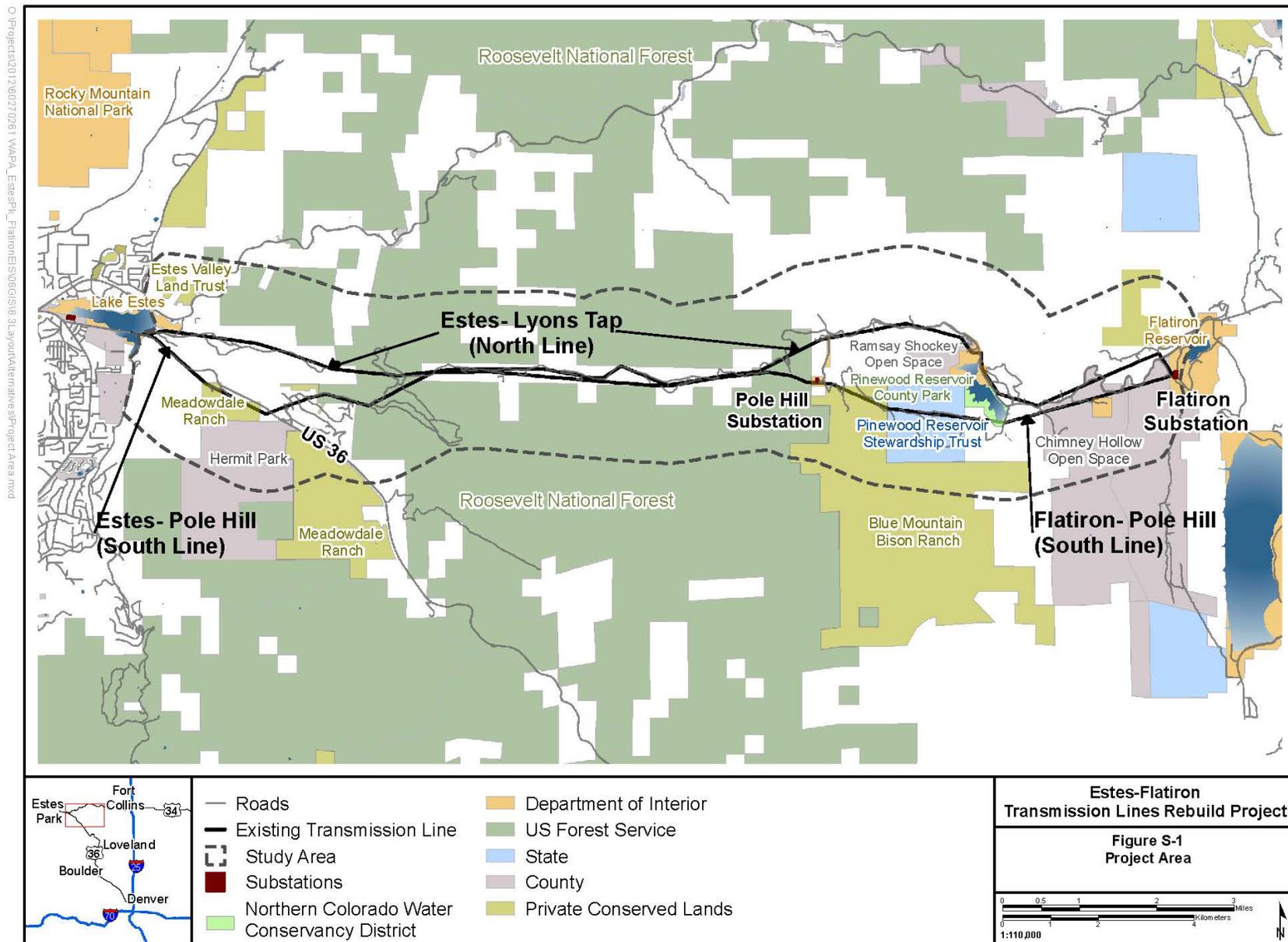
The proposed project is located in Larimer County, Colorado and extends between Lake Estes on the east side of Estes Park and Western's Flatiron Substation. The project area is situated east of the community of Estes Park and west of the Town of Loveland. Major transportation corridors are U.S. Highways 36 and 34. The project area includes private lands in Larimer County, and public lands administered by the U.S. Department of the Interior (DOI), USFS, the Colorado State Land Board (SLB), Northern Colorado Water Conservancy District (NCWCD) and Larimer County. **Figure S-1** shows the general location of the proposed project.

Background

Western's mission is to market and deliver reliable, renewable, cost-based hydroelectric power and related services. Western owns, operates, and maintains two single-circuit transmission lines between the Estes Park and Flatiron Substations. The lines were constructed to transmit electricity from hydropower generation sources within the Colorado-Big Thompson (CBT) project. After the formation of the DOE and Western in 1977, ownership of the transmission lines transferred from the Bureau of Reclamation to Western.

The Estes-Lyons Tap is the more northern of the two lines and will be referred to in the remainder of this document as the North Line. The second, more southerly line consists of the Estes-Pole Hill (E-PH) and Flatiron-Pole Hill lines that connect the Pole Hill Substation to Estes Park and the Flatiron Substation, respectively (**Figure S-1**). The two south segments will be referred to in this document as the South Line. Both existing transmission lines are 115-kV single-circuit lines constructed on wood pole H-frame structures. The South Line is 14.5 miles in length and the North Line is 14.1 miles long. Western's proposal only encompasses the single-circuit transmission lines from the east side of the Estes causeway and does not involve the portions of the double-circuit transmission lines located on steel lattice structures along the Estes causeway.

Figure S-1 Project Location Map



The North Line was built in 1938 and the South Line in 1953. Most of the wood pole H-frame structures on the two lines are original and date from the time of construction. A single mode fiber optic communication cable used by Bureau of Reclamation (BOR), Western, and the Platte River Power Authority is part of the two lines. Although the majority of the existing rights-of-way (ROWs) are located on privately owned land, portions of both are located on public lands administered by the USFS, SLB, Larimer County Natural Resources Department, and BOR. Both of the existing lines are located within a designated utility corridor as defined in the 1984 Forest Plan for Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) and the 1997 Revision.

Proposed Project

Western is proposing to rebuild the existing 115-kV system between Flatiron Substation and the intersection of Mall Road and U.S. Highway 36 in Estes Park. The proposed project would remove the existing 115-kV single-circuit transmission lines and wood structures and replace them with: 1) a new double-circuit 115-kV transmission line on steel monopoles within a single ROW, 2) a new double-circuit 115-kV transmission line on steel monopoles within a single ROW with the western portion buried in concrete cable trenches for about 2.6 miles, or 3) rebuild both lines as single-circuit transmission lines on wood-pole H-frame structures on separate ROWs. The USFS action is to issue an authorization for the portion of the transmission line(s) rebuild that crosses National Forest System lands. The proposed project would improve access to the transmission lines for maintenance and increase the ability to restore outages more quickly, widen the ROWs where existing ROW is inadequate, and implement an integrated vegetation management approach within the ROWs to ensure electrical clearance requirements are met and maintained for the life of the proposed project.

Purpose and Need

Western's Purpose and Need

Transmission systems in the United States are planned, operated and maintained to meet North American Electric Reliability Corporation (NERC) reliability standards and National Electrical Safety Code (NESC) requirements. These organizations establish reliability, safety and other standards for the bulk power system in the United States. To fulfill its statutory mission and meet NERC and NESC standards, Western must ensure its facilities meet current safety standards, are readily accessible for maintenance and emergencies, resistant to wildfire, and are cost effective for its customers. Through field observation and maintenance records, Western has determined that the existing lines need to be upgraded and rebuilt.

Forest Service Purpose and Need

The USFS purpose and need is to determine whether to issue a special use permit for the proposed transmission lines upgrade and rebuild and bring Western's facilities under a current authorization with a defined ROW and an Operation & Maintenance Plan. The USFS requires the EIS to ensure the proposed project complies with the Forest Plan.

Decision to Prepare an EIS

Western initially began preparation of an environmental assessment (EA) for the proposed project. Western's proposal is under a class of actions in the DOE NEPA Implementing Procedures (10 CFR Part 1021) that normally requires the preparation of an EA. Subsequent to the EA determination, Western held public meetings in Estes Park and Loveland, Colorado, on November 29 and 30, 2011. Western received numerous written and oral comments from the public and agencies on the proposal during the scoping period. The public expressed concerns regarding the impacts of the proposal and some of the stakeholders requested evaluation of additional alternatives. In response to input received during the initial EA scoping, Western determined that an EIS would be the more appropriate level of NEPA review.

Public Involvement

Scoping

Potential issues were identified through an expanded public involvement process that included agency discussions, two sets of public scoping meetings, and scoping comments received during two formal scoping periods. The scoping period for the EA extended from November 29 through January 31, 2012. Additional comments were received through May 2012.

A Notice of Intent (NOI) was issued on April 17, 2012 (77 Federal Register 22774). The NOI invited public participation in the EIS scoping process and solicited public comments on the scope of the EIS during a 90-day scoping period initially set to expire on July 16, 2012. An extension of the scoping period to August 31, 2012, was subsequently announced on the project website, through a press release, email notification, and direct mailing of a project newsletter. EIS scoping meetings were held on August 6, 2012, in Loveland, Colorado and August 7, 2012, in Estes Park, Colorado. Both meetings utilized an open house format with exhibits and opportunities for interaction with Western and USFS representatives. In response to public requests to extend the scoping period beyond the August 31, 2012, deadline, Western further extended the scoping period to October 19, 2012.

In total, more than 660 comment letters, forms and emails were received during the two scoping periods for the EA and the EIS. Both the EA and EIS Scoping Summary Reports are available for download from the project website located at: <http://go.usa.gov/rvtP>.

Alternative Development Workshops

Western implemented an expanded public involvement process for the Estes to Flatiron Transmission Lines Rebuild Project EIS. The expanded public involvement process included three public alternatives workshops held in Estes Park and Loveland during the public scoping period. The purpose of alternatives workshops was to solicit public input on route options and design features to be considered during the alternatives development process for the EIS. Workshops were held on October 2, 2012, in Loveland, and on October 3 and October 4, 2012, in Estes Park.

Alternatives workshops utilized an open house format, and sought to engage meeting attendees in interactive exercises to identify route options. Large-format informational displays provided information about the public involvement process, transmission line siting considerations, and context-sensitive design options. Maps depicting steep slopes, park and open space, parcel boundaries, and viewsheds were on display, as well as large-format composite opportunity and constraint maps, to assist meeting participants with making informed suggestions on potential route options. Map booklets with detailed maps showing existing and proposed ROWs in relation to parcel boundaries also were available. Transmission structure options also were available for public review. A total of 49 meeting attendees signed in at the public alternatives workshops, including 27 at the meeting in Loveland, and 22 at the meetings in Estes Park.

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 through internal scoping between Western and the USFS. Each potential issue was evaluated to determine its relevance to the proposed project. If the issue was determined to be a substantial concern, Western evaluated whether it should be considered a “key issue” during the alternative development process. Key and other issues identified through scoping for the EIS are described below.

Key Issues

Key issues are issues that were used to drive the development of alternatives and compare the differences between the alternatives analyzed in detail. Key issues identified during scoping that influenced the alternative development include:

- Effects of new ROW acquisition from the proposed project on land uses, property owners, and Western's customers.
- Effects of the proposed project on scenic travel corridors (e.g., U.S. Highway 36), residential, and recreational viewsheds in the vicinity of Estes Park, residential developments, such as Meadowdale Hills and Newell Lake View subdivisions, and on National Forest System lands.
- Effects of new road construction in inaccessible areas with steep topography.
- Effects of the proposed project on recreational uses and experiences in the vicinity of Estes Park and Pinewood Reservoir, and on National Forest System lands accessed by USFS Road 122 (Pole Hill Road).
- Effects of the proposed project on protected areas, including county open space, lands protected by conservation easement, lands within the Stewardship Trust Program, and State Wildlife Areas. No protected areas have been identified on National Forest System lands.
- Effects of ROW expansion or new ROW acquisition on existing infrastructure (e.g., Upper Thompson Sanitation District's treatment plant) and other structures.

Other Issues Selected for Detailed Analysis

Other issues define proposed project effects that should be analyzed in detail in the EIS, but that have not driven alternatives development. Other issues identified for detailed analysis include:

- Effects of the proposed project on property values, as well as sources of revenue from tourism and outdoor recreation that Front Range communities and the regional economy rely upon.
- Effects of the proposed project (ground disturbance for access, pole removal, and new structure installation) on cultural resources.
- Effects of ROW clearing and road construction, road reconstruction, road reconditioning and ongoing maintenance on wetlands, soils, and water quality.
- Effects of electric and magnetic fields from high-voltage power lines on human health.
- Effects of the proposed project on wildlife; plant; fisheries; threatened, endangered and USFS sensitive species; management indicator species; and general species of wildlife, plant (vegetation) and fish species.

Issues Considered but Not Analyzed Further

The following issues were considered but not analyzed further:

- Comments that Western should replace the lattice structures along the causeway of Lake Estes as part of this proposed project. The lattice structures are already double-circuit and are not in need of replacement.
- Comments that the E-PH transmission line are not within the USFS designated utility corridor as outlined in the ARP Forest Plan, and that consolidating the two lines on the southern alignment would not be in compliance with the ARP Forest Plan. The USFS has stated that the designated utility corridor includes both the transmission line ROWs (USFS 2012a).
- Comments that the proposed project is a "waste of taxpayer funds" were determined to be outside the scope of the EIS.
- A request that Western complete a socio-economic analysis of tourist and recreation based economies in Denver, Fort Collins, Boulder, and other Front Range cities supported by the Roosevelt National Forest. This issue is analyzed in the EIS; however, because socio-economic effects of rebuilding the transmission would not extend beyond the immediate project vicinity, the analysis area is limited to the Town of Estes Park and Loveland.

- A request that Western expand notification during scoping and publish notices in papers in Denver, Boulder, and Longmont. Newspaper notices are targeted for those communities where there is the greatest interest and potential for effects. Residents of Estes Park and Loveland would experience the greatest effects, and represent approximately 50 percent of the mailing addresses in the project mailing list. Therefore, newspaper notices have been published in the Estes Park Trail-Gazette and Loveland Reporter-Herald. The USFS publishes notices in their Newspaper of Record, which is the Fort Collins Coloradoan. Direct mailings, press releases, and website updates are the primary means to communicate project updates to individuals that have shown an interest in the project and reside outside Estes Park and Loveland.

Comments expressing general support for or opposition to the proposed project without supporting rationale were determined to be expression of opinion, non-substantive, or outside the scope of the EIS.

Decisions Framework

Western and the USFS prepared the EIS as the lead and cooperating Federal agencies, respectively. The results of the analysis are presented in this EIS and will form the basis for decisions regarding the proposed project.

Following the Draft EIS review and comment period, Western and the USFS will consider comments submitted by the public, interested organizations, and government agencies, and will respond to all substantive comments. Based on the Draft EIS and public input, Western and the USFS will designate their preferred alternative in the Final EIS. Western will issue a Record of Decision (ROD) no sooner than 30 days following the issuance of the Final EIS. Western may combine elements of alternatives considered in the EIS in the ROD.

As a cooperating agency, the USFS will prepare its own ROD in accordance with their respective policies and guidelines. The USFS is required to comply with all laws (National Forest Management Act, NEPA, Section 7 of the Endangered Species Act [ESA], National Historic Preservation Act, etc.), regulations, and policies for the portion of the proposed project on lands under its jurisdiction.

Instrumental to the decisions will be the consideration of measureable indicators that have been defined to measure the effects of the different alternatives with regard to key and other issues. The measurable indicators used to compare the alternatives are presented in Chapter 2.0, **Table 2.8-1**. The USFS decision will be subject to a pre-decisional objection process. In order to have standing to object to the USFS decision, a person(s) or organization must submit specific written comments during the 45-day (at a minimum) public comment period on this Draft EIS. These comments will be addressed in the Final EIS. The Final EIS and USFS draft ROD will be made available to the public. The 45-day Objection Period will begin with publication of a legal notice in the USFS newspaper of record, the Fort Collins Coloradoan. This objection process was provided by the Consolidated Appropriations Act of 2012.

Alternatives Considered in Detail

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 that occur within the project area. 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.

Ultimately, four alternatives with three routing variations to rebuild and upgrade the existing 115-kV transmission lines, and the No Action Alternative were identified for detailed analysis in the EIS. These are described briefly below. In this EIS “variants” refer to routing variations off the main alternative, whereas “reroutes” are any section of the alignment that is off existing ROW. The alignments of

alternatives and routing variations using overhead construction methods are shown on **Figure S-2**. The alignments of routing variations using underground construction methods are shown on **Figure S-3**.

- **No Action Alternative** – Keep the existing transmission lines in service through continuing structure replacement and maintenance. The existing ROWs would be expanded, as needed, and minor adjustments made to the alignments where necessary in order to comply with NERC and NESC requirements.
- **Alternative A** – Rebuild and consolidate the transmission lines primarily on the existing North transmission line ROW. This alternative includes a reroute to the north and northeast of Newell Lake View subdivision and along Mall Road in Estes Park (**Figure S-2**).
 - **Variant A1** – Variant A1 is identical to Alternative A for all but the westernmost segment (**Figure S-2**). At a point in the valley between Mount Olympus and Mount Pisgah, this routing variation would depart from the alignment of the existing North Line and traverse along the base of Mount Pisgah before turning to the northwest and generally following an alignment parallel to U.S. Highway 36 for the remaining distance to the existing steel lattice double-circuit structure at the intersection of U.S. Highway 36 and Mall Road.
 - **Variant A2** – Variant A2 follows an alignment similar to Variant A1; however, the westernmost 2.7 miles of the transmission line would be constructed underground (**Figure S-3**).
- **Alternative B** – Rebuild and consolidate the transmission line, primarily on the existing South transmission line ROW. This alternative includes a 0.25-mile reroute along Pole Hill Road on National Forest System lands, and a 0.75-mile reroute to the North Line on new ROW in the vicinity of Pole Hill Substation (**Figure S-2**).
- **Alternative C** – Rebuild and consolidate the transmission lines along an alignment that utilizes a combination of the existing North and South transmission line ROWs. This alternative includes reroutes off existing transmission line ROW east of Pinewood Reservoir, along Pole Hill Road on National Forest System lands, and on privately held land on the west end of the project area (**Figure S-2**).
 - **Variant C1** – Rebuild and consolidate the transmission lines along an alignment that utilizes a combination of the existing North and South transmission line ROWs. This alternative follows an alignment similar to Alternative C; however, the westernmost 2.7 miles of the transmission line would be constructed underground (**Figure S-3**).
- **Alternative D** – Rebuild the two existing transmission lines in-kind as single-circuit lines located on separate ROWs. This alternative would utilize structures very similar to those currently in use, although structure height may increase by 5 to 10 feet. The existing ROWs would be expanded as needed and minor adjustments made to the alignments where necessary to comply with NERC and NESC requirements. This alignment includes a reroute to Pole Hill Road where there is inadequate ROW through Newell Lake View subdivision and relocation of one structure on the north side of the Upper Thompson Sanitation District parcel in Estes Park, to accommodate expansion of their facility (**Figure S-2**).

Figure S-2 Alternatives for Overhead Construction

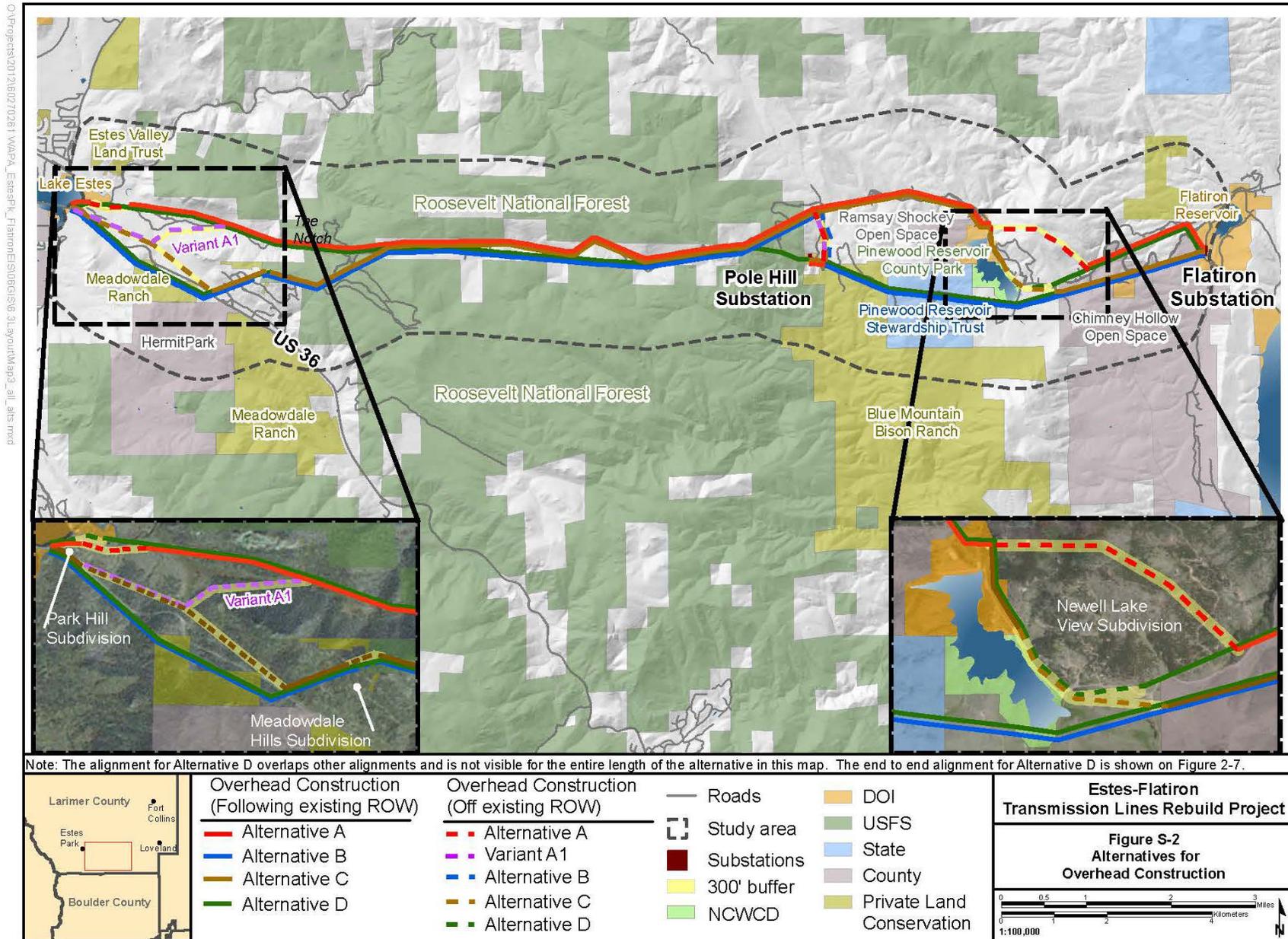
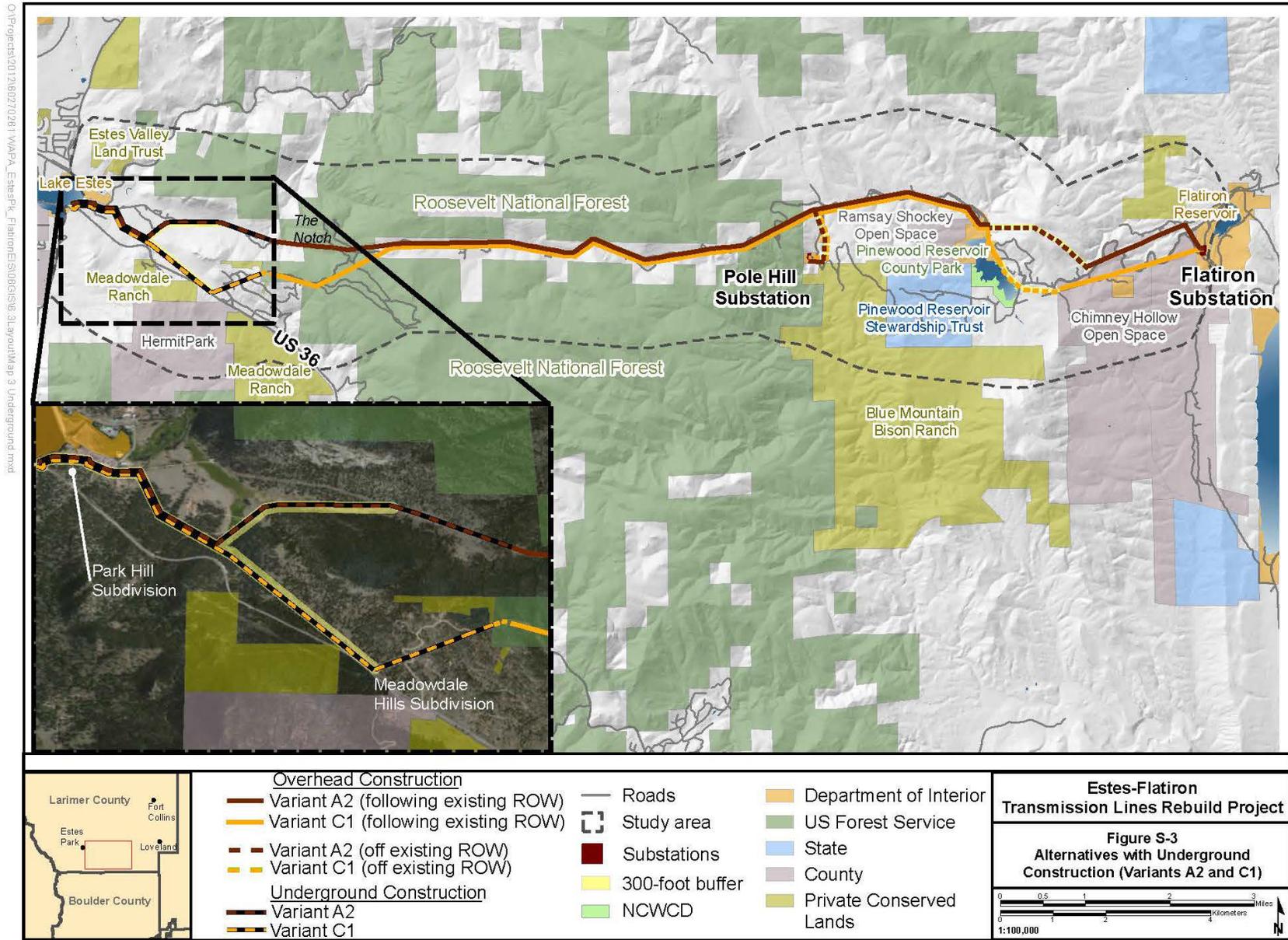


Figure S-3 Underground Construction Options (Variants A2 and C1)



Key Differences between Alternatives

The key differences between the alternatives are route alignment (North or South of Mount Pisgah and North or South of Pinewood Lake), ROW type (new or existing), transmission line type (single-circuit or double-circuit), transmission structure type (steel monopole or wood H-frame), and transmission line construction method (overhead or underground).

Alternatives A, B, and C and routing Variants A1, A2, and C1 would all consolidate a rebuilt double-circuit transmission line onto a single ROW. The transmission line would be constructed overhead on steel monopoles for the entire length of the line under Alternatives A, B, and C and Variant A1; Variants A2 and C1 would construct the westernmost 2.7 miles of the double-circuit line underground on different alignments. Alternative D proposes to rebuild both existing transmission lines as single-circuit lines on primarily existing ROW using wood H-frame structures.

Access requirements also are a key difference between the alternatives. Alternative A and Variants A1 and A2 traverse steep terrain with poor access on National Forest System lands in the vicinity of The Notch (**Figure S-2** and **S-3**). Other areas with steep terrain and poor access include the alignment for Alternative B on existing ROW south of U.S. Highway 36, and the alignment for Alternative D on existing ROW west of Pole Hill Substation.

An estimate of short-term disturbance areas associated with transmission line construction are provided in **Table S-1** below. Long-term disturbance for structure bases would be less than 0.1 acre for any alternative.

Table S-1 Summary of Short-Term Disturbance for Transmission Line Construction by Alternative

Project Component	Disturbance Area	Short-term Disturbance by Alternative (acres)					
		A/A1	A2	B	C	C1	D
Structure installation	11,350 square feet per structure	18 - 24	15 - 20	20 - 26	19 - 25	15 - 21	56 - 65
Conductor stringing sites	0.25 acre per site	1 - 3	1 - 2	1 - 3	1 - 3	1 - 2	2 - 5
Staging areas	2-3 sites; 5 acres per site	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15	10 - 15
Removal of existing H-frame structures	9,500 square feet per structure	45	44	45	45	44	41
Pulling sites for line removal	0.25 acre per site	1 - 3	1 - 2	1 - 3	1 - 3	1 - 2	2 - 5
Underground construction	9 acres per mile	NA	24	NA	NA	25	NA
Total		75 - 90	95 - 108	77 - 92	75 - 90	96 - 108	112 -132

A comparison of rough order magnitude life-cycle costs for the seven end-to-end alternatives is provided in **Table S-2** below.

Table S-2 Preliminary Transmission Line Cost Estimates by Alternative

	Alternative (\$ millions)						
	A	A1	A2	B	C	C1	D
80-year construction cost	19.7	19.2	37.9	23.1	19.1	39.6	22.7
80-year maintenance cost	1.3	1.3	1.2	1.4	1.3	1.1	1.1
80-year vegetation management cost	1.6	1.6	1.4	1.8	1.7	1.4	3.2
Total 80-year life cycle cost	22.6	22.1	39.5	26.3	22.1	42.2	27.0
Easement acquisition cost	1.6	1.3	1.3	0.4	0.8	1.0	1.8
Total	24.2	23.4	40.8	26.7	22.9	43.1	28.8

Alternatives Considered but Eliminated

Alternative Alignments

In addition to the alignments carried forward for detailed analysis in the Draft EIS, several additional routing alternatives were identified. Some of these alternatives emerged through a series of public workshops held in October 2012 that were intended to review the constraint/opportunity criteria and to solicit public comment on potential alternative alignments. Through this process, a wide range of potential routing alternatives, some of which were carried forward for detailed analysis, while others were eliminated following an initial consideration of their feasibility. Alternative alignments considered but eliminated, including the reasons for their elimination, are summarized in **Table S-3** below.

Table S-3 Alternative Alignments Dismissed from Detailed Analysis

Potential Reroute	Reason for Dismissal
U.S. Highway 34 and U.S. Highway 36 reroutes	Proposals to reroute the transmission line along Highways 34 and 36 would not use existing transmission line ROWs and would instead follow existing transportation ROWs. These proposals were not carried forward because they do not address the issues raised during scoping, but simply displace impacts to new landowners. Locating the lines along these routes also adds flooding as another possible major catastrophic future event that may affect the transmission lines reliability.
Reroute west of Meadowdale Hills subdivision, on the east slope of Mount Pisgah	This potential route crosses steep slopes without any existing access roads, and would be difficult and costly to construct resulting in substantial erosion risks and related increased maintenance costs. Road construction across this topography would require excessive cut and fill and increase visual impacts.
Reroute to the south side of the northern alignment, below The Notch	This potential route is located in an area with steep slopes and poor access; also it follows a riparian corridor. Western's standard construction practice (SCPs) direct that structure sites, access ways, and other disturbance areas will be located at least 100 feet, where practical, from rivers and streams (including ephemeral streams). Because this route follows a riparian corridor it is not suitable for siting the transmission line.

Potential Reroute	Reason for Dismissal
Reroutes far to the south of the South Line in the vicinity of Pinewood Reservoir Stewardship Trust and Blue Mountain Bison Ranch	This routing strategy was suggested during workshops to reduce effects to recreational and residential viewsheds at Pinewood Lake. These reroutes were dismissed because they crossed protected lands, did not fully address the visual resource issue, and displaced impacts to new landowners. To more effectively respond to concerns regarding viewshed effects, a reroute around the north side of Newell Lake View subdivision was identified and carried forward for detailed analysis (Alternative A).
A reroute that followed a gas pipeline between the northern and southern alignment on the east end of the project area, between the access road to the Bald Mountain radio facility and the intersection of Pole Hill Road and Chimney Hollow Road	This reroute was suggested as a means to co-locate linear infrastructure. However, the reroute fails to effectively address other scoping issues related to visual impacts and would require new ROW acquisition. There also may be additional mitigation required by the gas utility, if Western were to site a transmission line parallel to an existing gas line.
Reroute following Flatiron Penstocks (CBT project)	In an effort to further consolidate linear facilities, consideration was given to an alignment that paralleled the penstocks that descend Bald Mountain to Flatiron Reservoir. The penstocks emerge aboveground well below the summit of Bald Mountain and follow an alignment that is prominent in the viewshed from Flatiron Reservoir, one that doesn't take advantage of the opportunities for concealment provided by the surrounding terrain. Further, the penstocks are iconic facilities that date to the 1940s and have historic significance.
Reroute along Cottonwood Creek	This reroute would extend from the vicinity of Flatiron Reservoir and follow an alignment to the northwest generally along Cottonwood Creek, rejoining the ROW of the existing North Line near Pinewood Lake Dam. This alternative would require several miles of construction through steep terrain with poor access. It was dropped in favor of Alternative A that accomplishes an avoidance of the Pinewood Lake viewshed and the adjacent subdivision in a more direct and effective manner.

Alternative Structure Types

In addition to routing options, alternative project designs were considered and presented during the public workshops held in October 2012. Other structure types considered included a lattice structure and double-circuit H-frame. Neither the lattice nor double-circuit H-frame designs were supported by public comments, and were not carried forward for further analysis.

Other Alternatives

Other alternatives also were considered, as discussed below.

Use of Olympus Tunnel

The Olympus tunnel begins below Lake Estes and extends to the east through Mount Olympus, eventually meeting up with the Pole Hill Tunnel and other CBT project facilities that extend all the way to Flatiron Reservoir. The possibility of placing an underground cable system within the Olympus Tunnel and other below ground facilities was identified as a potential opportunity, one that would reduce or eliminate visual impacts and other identified concerns. Although such systems have been installed in other water conveyance tunnels, including the Adams Tunnel through Rocky Mountain

National Park, it is only feasible when the facility was specifically designed to accommodate the cables and splices at the time of its initial construction. Placing a cable within a tunnel not designed and constructed to accommodate one would diminish the capacity of the facility to deliver water and function as designed and also create considerable operational, scheduling, and maintenance challenges. For these reasons, this alternative is infeasible and it was dropped from further consideration.

Underground Construction near Pinewood Lake

Due to the sensitivity of the viewshed south of Pinewood Lake, underground construction was considered for a segment of the project through this area, following the alignment of Alternative B. Underground construction presents a number of challenges, including greatly higher costs than conventional aboveground construction. Several alternatives, specifically Alternatives A and C, avoid the viewshed south of Pinewood Lake, providing an alternative that eliminates these impacts at a much lower cost. For this reason, underground construction at this location was dropped from further consideration.

Underground Construction on National Forest System Land

Variant C1 rebuilds the transmission line underground to the Forest boundary near the north end of the Meadowdale Hills subdivision. Western considered extending Variant C1 further east onto National Forest System lands, but dismissed it based on the following technical reasons.

- Extending Variant C1 further east along the proposed alignment for Alternative C would involve trenching within a rough section of Pole Hill Road that is noted for its recreational value to four-wheel drive users. Restoring Pole Hill Road to previous conditions following installation of cable trenches would not be possible, unless the cable trenches were buried deeper. Continued use of Pole Hill Road would impact the integrity of cable trenches.
- Terminating the underground section on National Forest System land would require an underground service vault. This vault could not be located on Pole Hill Road and would require that the vault be located off the road. The installation of the vault would require the clearing of a large forested area to accommodate the vault installation and future access.
- Extending Alternative C1 along the existing Estes-Pole Hill transmission line route (the route for Alternative D) would require extensive clearing within a mixed coniferous forest. The width of the clearing would need to accommodate the trench, a spoil pile, and a service road to accommodate the installation of the cable trench and service vault.

Impact Comparison

Table S-4 compares the alternatives with regard to key and other issues identified in Section 1.6.3, using selected measurable indicators. **Table S-5** provides a summary comparison of environmental effects by resource and alternative. Additional information regarding the specific effects of each alternative to each resource can be found in Chapter 4.0.

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Table S-4 Measurement Indicators for Key and Other Issues

Measurement Indicators for Issues	Alternative A	Variant A1	Variant A2	Alternative B	Alternative C	Variant C1	Alternative D	No Action
Issue: ROW acquisition								
Acres of new ROW acquisition	153	157	152	42	117	110	177	122
Acres of new ROW acquisition (USFS lands)	23	23	23	31	31	31	55	0
Acres of ROW to be decommissioned	143	151	150	42	139	143	4	2
Miles of land ownership crossed	Private - 12.0 USFS - 1.7 DOI - 0.6 SLB - 0.0 NCWCD - 0.0 County - 0.8	Private - 12.0 USFS - 1.7 DOI - 0.6 SLB - 0.0 NCWCD - 0.0 County - 0.6	Private - 12.1 USFS - 1.7 DOI - 0.6 SLB - 0.0 NCWCD - 0.0 County - 0.6	Private - 9.4 USFS - 2.2 DOI - 0.4 SLB - 1.0 NCWCD - 0.2 County - 1.6	Private - 10.6 USFS - 2.2 DOI - 1.0 SLB - 0.0 NCWCD - 0.1 County - 1.8	Private - 10.6 USFS - 2.2 DOI - 1.0 SLB - 0.0 NCWCD - 0.1 County - 1.8	Private - 20.0 USFS - 3.8 DOI - 1.0 SLB - 1.0 NCWCD - 0.2 County - 2.5	Private - 20.0 USFS - 3.8 DOI - 1.0 SLB - 1.0 NCWCD - 0.2 County - 2.5
Issue: effects on visual resources								
Existing Scenic Integrity Objective (SIO) (NFS lands)	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Resulting SIO (NFS lands)	Very Low ¹	Very Low ¹	Very Low ¹	Very Low ¹	Very Low ¹	Very Low ¹	Moderate	Moderate
Issue: Forest road construction/reconstruction								
Miles of new administrative road on NFS land for permanent access	0.9	0.9	0.9	0.6	0.6	0.6	1.9	0
Reconstruction of existing ML2 system road on NFS lands (miles)	0	0	0	0	3.4	3.4	0	0
Limited reconditioning of existing ML2 system road post-construction (miles)	2.2	2.2	2.2	3.2	0.2	0.2	3.2	0
Miles of permanent access on NFS lands in areas with difficult constructability	0.6	0.6	0.6	0.0	0.0	0.0	1.0	0
Issue: recreational uses & experiences								
Long-term changes in recreation opportunities on NFS lands	NA	NA	NA	NA	Diminished off-highway vehicle (OHV) opportunities	Diminished OHV opportunities	NA	NA
Issue: protected lands								
No. protected lands crossed	4	4	4	5	4	4	7	7
Issue: effects on infrastructure								
Conflicts with Upper Thompson Sanitation District	No	No	No	No	No	No	No	Limits facility expansion
Issue: property values & economic effects								
No. of landowners affected by ROW acquisition	46	48	42	19	36	36	40	40
New ROW	8	10	7	4	9	9	5	5
Expanded ROW	38	38	35	15	27	27	35	35
Subdivisions affected by ROW acquisition (new or expanded ROW)	Park Hill Newell Lake	Park Hill Newell Lake	Park Hill Newell Lake	Park Hill	Park Hill Newell Lake	Park Hill Newell Lake	Park Hill Newell Lake	Park Hill Newell Lake
No. of landowners with ROW to be decommissioned	36	36	36	51	33	33	7	7
Businesses directly affected	NA	NA	NA	NA	OHV tour operator	OHV tour operator	NA	NA
Issue: cultural resources								
Number of National Register of Historic Place-eligible historic sites potentially impacted	6	6	6	3	5	5	8	7
Issue: water resources, floodplains, and wetlands²								
Waterbodies Crossed	43	41	41	49	47	47	80	80
Wetlands Present	13	11	12	6	11	9	15	16
Waters of the U.S.	20	17	18	14	22	18	28	28

Measurement Indicators for Issues	Alternative A	Variant A1	Variant A2	Alternative B	Alternative C	Variant C1	Alternative D	No Action
Issue: ROW clearing & maintenance								
Soil types in Analysis Area								
Low revegetation potential (acres)	32	32	13	44	21	14	60	60
Compaction prone (acres)	58	57	56	26	71	70	90	90
Water erodible (acres)	82	76	63	57	52	50	115	115
Vegetation types in ROW								
Ponderosa pine woodland (acres)	139	139	136	116	130	134	207	207
Mixed conifer forest (acres)	13	13	9	38	16	9	42	42
Mountain shrub mosaic (acres)	24	24	27	30	31	26	62	62
Upland meadow, or upland meadow/wetland mosaic (acres)	24	24	31	37	30	30	70	70
Issue: electric and magnetic fields								
Electric fields at the ROW edge (kilovolt per meter)	0.12	0.12	0	0.12	0.12	0	0.34	0.34
Magnetic fields at each ROW edge (milligauss)	5.2/1.8	5.2/1.8	0.05	5.2/1.8	5.2/1.8	0.05	5.2/5.3	5.2/5.3
Issue: effects on plants, wildlife, & fish								
Special Status Plants								
Threatened and endangered	LP	LP	LP	LP	LP	LP	LP	LP
Sensitive species	MAII	MAII	MAII	MAII	MAII	MAII	MAII	MAII
Species of local concern	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA
Issue: effects on plants, wildlife, & fish								
Elk and Mule Deer Winter Range (acres)	112	104	104	97	106	124	142	142
Moose Winter Range (acres)	49	45	45	44	47	55	61	61
Special Status Wildlife								
Threatened and endangered	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA
Sensitive species	MAII	MAII	MAII	MAII	MAII	MAII	MAII	MAII
Management indicator species	NC	NC	NC	NC	NC	NC	NC	NC

¹ Would require lowering of SIO and documentation of change of SIO in MA 8.3 - Utility Corridor for this project area, in accordance with Forest Plan Standard 154 and also documentation in the USFS ROD.

² Wetlands and waterbodies were determined from desktop analysis and augmented with survey data where available. Ground surveys were completed early in the NEPA process during initial EA alternative development. Therefore, survey data was not collected for the full site of alternatives. A full delineation of water resources will be performed on the Preferred Alternative route after the Preferred Alternative is selected.

NA = not applicable.

LP = low probability of species presence.

MAII = may adversely impact individuals, but not likely to result in a loss of viability on the Planning area, or cause a trend to federal listing.

NLAA = may affect, not likely to adversely affect.

NC = no change in population trend.

Table S-5 Comparison of Alternative Effects

Resource	Alternative A	Alternative A1	Alternative A2	Alternative B	Alternative C	Alternative C1	Alternative D	No Action Alternative
Soils	Potential impacts to soils include compaction, rutting, erosion, and contamination. Compaction and erosion impacts would be minimized through SCPs.	Potential impacts would be the same as Alternative A. Acres of impacted soil types would be the same as Alternative A.	Potential impacts would be the same as Alternative A. Fewer acres would be affected than Alternative A. More soil disturbance would result from trenching, possibly reducing soil productivity.	Potential impacts would be the same as Alternative A. Acres of impacted soil types would be the same as Alternative A2.	Potential impacts would be similar to Alternative A. More acres of bedrock would be affected. Reconstruction of Pole Hill Road and USFS Road 247.D would reduce erosion associated with these ML2 roads in the long term and have long-term beneficial effects for soils on National Forest System lands.	Potential impacts would be the same as Alternative A. Soil disturbance acreages would be similar to Alternative C. More soil disturbance would result from trenching, possibly reducing soil productivity. Reconstruction of USFS Roads 122 and 247.D would reduce erosion associated with these ML2 roads in the long term and have long-term beneficial effects for soils on National Forest System lands.	Potential impacts would be the same as Alternative A. The most acres of soils and bedrock would be affected.	Natural and anthropogenic actions would continue to impact soil resources at current levels. Impacts associated with relocation of the line would be similar to Alternative A.
Water Resources and Floodplains	Impacts to surface water or groundwater quantity and quality would be minor to negligible through implementation of SCPs and compliance with permit provisions. Measurable effects would be avoided within the Federal Emergency Management Agency (FEMA)-designated floodplain.	Additional potential for changes in runoff, erosion, and sedimentation would occur in areas of new access roads and ROW construction. Impacts to surface water or groundwater quantity and quality would be minor to negligible through implementation of SCPs and compliance with permit provisions. Measurable effects would be avoided within the FEMA-designated floodplain.	Variant A2 would have impacts similar to Variant A1. In addition, construction for the underground portion of the ROW may encounter groundwater; if this occurred, it would be addressed in compliance with state permit approvals.	Potential impacts would generally be of the same type as Alternative A. Additional potential for impacts to existing runoff conditions, erosion, and sedimentation would occur in the steep terrain near Meadowdale Ranch and Ravencrest areas. Potential impacts would be minor to negligible, and would be addressed similar to Alternative A. The FEMA-designated floodplain would be avoided.	Potential impacts would generally be the same as Alternative B. An area that may have shallow groundwater and domestic occurs along Alternative C at the east side of Pinewood Reservoir. Impacts to surface water or groundwater quantity and quality would be minor to negligible through implementation of SCPs and compliance with permit provisions.	Potential impacts would be the same as for Alternative C. Shallow groundwater also may be encountered where deeper excavation would occur for underground construction along the western 2.7 miles of the ROW.	The potential for impacts from ROW use and construction would be similar to Alternatives A and B. The re-route in the vicinity of Pinewood Reservoir would have the potential for shallow groundwater impacts similar to Alternative C. Implementation of SCPs and compliance with permit provisions would reduce impacts to minor or negligible levels.	Potential impacts to surface or groundwater quantity and quality would be similar to Alternative D, but would be spread out in space and time. Implementation of SCPs and compliance with permit provisions would limit impacts to minor or negligible levels. Negligible impacts to floodplains would occur.
Wetlands and Waters of the U.S.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Erosion and sedimentation impacts would be minimized or mitigated through implementation of SCPs and proposed mitigation measures.	Fewer potential impacts would be anticipated because of decreased construction disturbance.
Vegetation	Ponderosa pine, mixed conifer forest, mountain shrub mosaic, and upland meadows would be impacted by project disturbance.	Potential impacts to vegetation types would be the same as Alternative A.	Potential impacts to vegetation types would be similar to Alternative A.	Potential impacts to vegetation types would be similar to Alternative A, although slightly less ponderosa pine woodlands would be affected and more mixed conifer forest, mountain shrub mosaic, and upland meadows would be affected.	Potential impacts to vegetation types would be similar to Alternative A, although slightly less ponderosa pine woodlands would be affected and more mixed conifer forest, mountain shrub mosaic, and upland meadows would be affected.	Potential impacts to vegetation types would be similar to Alternative A, although slightly less ponderosa pine woodlands and mixed conifer forest would be affected and more mountain shrub mosaic and upland meadows would be affected.	Potential impacts to vegetation types would be greater than Alternative A. A greater amount of ponderosa pine, mixed conifer forest, mountain shrub mosaic, and upland meadows would be affected.	Disturbance acreage of vegetation communities within the ROW would be 147 acres. Potential impacts to all vegetation types would be similar to Alternative D.

Resource	Alternative A	Alternative A1	Alternative A2	Alternative B	Alternative C	Alternative C1	Alternative D	No Action Alternative
Special Status and Sensitive Plant Species	No federally listed species are found along Alternative A. Due to limited distribution of federally listed species and low quality of habitat, no impacts to these species would be expected. Potential impacts to sensitive plant species and species of concern would be minor and short-term due to limited surface disturbance in the ROW, and reclamation of disturbed areas.	Potential impacts would be the same as Alternative A.	Potential impacts would be the same as Alternative A.	Due to limited distribution of federally listed species and low quality of habitat, no impacts to these species would be expected. Potential impacts to sensitive plant species and species of concern would be minor and short-term due to limited surface disturbance in the ROW, and reclamation of disturbed areas.	Potential impacts would be the same as Alternative A.	Potential impacts would be the same as Alternative A.	Due to limited distribution of federally listed species and low quality of habitat, no impacts to these species would be expected. Potential impacts to sensitive plant species and species of concern would be minor and short-term due to limited surface disturbance in the ROW, and reclamation of disturbed areas.	Due to low quality of habitat and reduced surface disturbance, no impacts to federally listed species would be anticipated. Potential impacts to sensitive plant species and species of concern would be minor and short-term due to limited surface disturbance in the ROW, and reclamation of disturbed areas.
Wildlife Habitat	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative.	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative.	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative. Impacts due to surface disturbance would be greater where the transmission line would be constructed underground.	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative.	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative.	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative. Impacts due to surface disturbance would be greater where the transmission line would be constructed underground.	Elk and mule deer winter range, and moose winter range habitat would be affected by this alternative.	Acres of big-game habitat impacted would be similar to Alternative D.
Raptors and Other Birds	Implementation of proposed mitigation measures, as well as seasonal restrictions to prevent impacts to raptors and migratory birds potentially would minimize direct impacts. Remaining impacts (e.g., loss of habitat) are anticipated to be minor.	Potential impacts would be the same as Alternative A. There would be reduced risk of raptor collisions where the transmission line would be constructed underground.	Potential impacts would be the same as Alternative A. There would be reduced risk of raptor collisions where the transmission line would be constructed underground.	Potential impacts would be the same as Alternative A.	Potential impacts would be the same as Alternative A.	Potential impacts would be the same as Alternative A. There would be reduced risk of raptor collisions where the transmission line would be constructed underground.	Potential impacts would be the same as Alternative A.	Displacement of upland game birds, raptors, and other birds as a result of increased human activity during maintenance activities would be short-term and minor. Relocation of the line would result in potential impacts similar to Alternative A.
Special Status and Sensitive Wildlife Species Habitat Disturbance	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected (200 acres).	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected at the same level as Alternative A	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected at approximately the same level as Alternative A (203 acres).	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected at a greater level than Alternative A (221 acres).	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected at approximately the same level as Alternative A (207 acres).	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected at approximately the same level as Alternative A (199 acres).	The most vegetation communities in the ROW that support special status and sensitive wildlife species would be affected than any other alternative (381 acres).	Fewer acres (147 acres) of vegetation communities in the ROW that support special status and sensitive wildlife species would be affected than any action alternative.

Resource	Alternative A	Alternative A1	Alternative A2	Alternative B	Alternative C	Alternative C1	Alternative D	No Action Alternative
Land Use and Recreation Land Use	Long-term adverse impacts to land use from the acquisition of new or expanded ROW (153 acres) would range from negligible to moderate depending on the location and ownership of the acquired ROW. Beneficial effects where existing ROW would be decommissioned.	Impacts are similar to A; however, Variant A1 would require 157 acres of new ROW.	Impacts are similar to A; however, Variant A2 would require 152 acres of new ROW.	Impacts are similar to A; however, Alternative B requires the fewest acres of ROW acquisition (42 acres).	Impacts are similar to A; however, Variant A1 would require 110 acres of new ROW.	Impacts are similar to A; however, Variant C1 would require 110 acres of new ROW.	Impacts are similar to A; however, Alternative D would maintain two ROWs and therefore requires the most ROW acquisition (177 acres). The beneficial effects of ROW consolidation would not be realized under this alternative.	Existing ROWs would be expanded to a minimum width of 75 feet. New ROW would be acquired to relocate the line from Newell Lake View subdivision (through which there is inadequate ROW). The beneficial effects of ROW consolidation would not be realized.
Recreation	Potential short and long-term impacts to recreation from access roads, staging areas, and construction and maintenance activities would range from negligible to moderate depending on the location and timing of activities. The long-term recreational experience would be enhanced in areas where existing transmission line would be decommissioned.	Potential impacts would be the same as Alternative A.	Potential impacts would be the same as Alternative A.	Short-term recreation opportunities on the Besant Point Trail could be affected depending on the timing of construction. Long-term impacts would include effects to the recreational setting on Pole Hill Road. Other potential impacts to recreation would be similar to Alternative A.	Moderate short and long-term impact to the recreation setting and recreation facilities along the eastern side of Pinewood Reservoir County Park. Other potential impacts to recreation would be similar to Alternative A. Four-wheel drive recreation opportunities would be significantly adversely impacted on sections of USFS Road 122 and USFS Road 247.D that would be reconstructed.	Moderate short and long-term impact to the recreation setting and recreation facilities along the eastern side of Pinewood Reservoir County Park. Other potential impacts to recreation would be similar to Alternative A. Four-wheel drive recreation opportunities would be significantly adversely impacted on sections of USFS Road 122 and USFS Road 247.D that would be reconstructed.	Moderate short and long-term impact to the recreation setting along the eastern side of Pinewood Reservoir County Park. Other potential impacts to recreation would be similar to Alternative A. The beneficial effects of ROW consolidation would not be realized under this alternative.	Moderate short and long-term impact to recreation setting along the eastern side of Pinewood Reservoir County Park. Negligible to minor adverse effects to recreation setting where additional ROW would need to be acquired. The beneficial effects of ROW consolidation would not be realized under this alternative.
Visual Resources	New, taller structures and associated disturbance would result in short- and long-term adverse effects ranging from minor to moderate with localized strong visual changes. Long-term beneficial effects would occur where the South Line would be removed. Moderate adverse effects would occur from new access roads and vegetation management	Potential impacts would be the same as Alternative A, except for along 0.5 mile of U.S. Highway 36 where the adverse effect would be greater.	Potential impacts would be the same as Alternative A, except for the underground segment near Estes Park which would be less visible than an overhead transmission line.	Adverse effects would occur to Chimney Hollow Open Space, Pinewood Lake, Meadowdale Hills and Ravencrest subdivisions, and U.S. Highway 36. Beneficial effects would occur to the valley between Mount Pisgah and Mount Olympus as seen from the Estes Valley. Other potential impacts to scenic resources would be similar to Alternative A.	Adverse effects would occur to Chimney Hollow Open Space, and Meadowdale Hills and Ravencrest subdivisions, and along 0.75 mile of U.S. Highway 36. Beneficial effects would occur to the valley between Mount Pisgah and Mount Olympus as seen from the Estes Valley. Other potential impacts to scenic resources would be similar to Alternative A.	Potential impacts would be the same as Alternative C, except for the underground segment near Estes Park which would be less visible than an overhead transmission line.	Potential long-term impacts would be the similar as the No Action Alternative. Beneficial changes would result within the Newell Lake View subdivision. Moderate adverse effects would occur from new access roads and vegetation management similar to Alternative A.	Minor adverse to moderate impacts from visible portions of the two existing transmission lines and ongoing structure replacement and vegetation maintenance activities would continue similar to existing conditions. Beneficial changes would result within the Newell Lake View subdivision.

Resource	Alternative A	Alternative A1	Alternative A2	Alternative B	Alternative C	Alternative C1	Alternative D	No Action Alternative
Socioeconomics and Community Resources	Beneficial effects associated with job opportunities and to the economic base would be temporary and minor. Minor decreases in property values as a result of taller structures, and conversely minor increases in property values where structures would be removed. No environmental justice concerns were identified.	Potential impacts would be the same as Alternative A.	Cost of construction would increase 80 percent relative to Alternative A. Residences near the underground portion of the variant may experience a minor increase in property values, except near the transition structure.	Potential impacts would be the same as Alternative A.	Potential impacts would be similar to Alternative A. Reconstruction of Pole Hill Road would result in moderate long-term effects to a USFS permit holder that leads OHV tours in the Pole Hill area.	Cost of construction would increase 80 percent relative to Alternative A. Residences near the underground portion of the variant may experience a minor increase in property values, except near the transition structure. Reconstruction of Pole Hill Road would result in moderate long-term effects to a USFS permit holder that leads OHV tours in the Pole Hill area.	Beneficial effects associated with job opportunities and to the economic base would be temporary and minor. Minor decreases in property values as a result of taller structures. Alternative D would maintain two ROWs and the beneficial effects to property values from ROW decommissioning would not be realized, except where the line would be relocated from Newell Lake View subdivision to Pole Hill Road.	Potential impacts include increased maintenance costs as existing lines age and require more maintenance. The No Action alternative would maintain two ROWs and the beneficial effects to property values from ROW decommissioning would not be realized, except where the line would be relocated from Newell Lake View subdivision to Pole Hill Road.
Electrical Effects and Human Health	Effects associated with noise, radio and television interference, and induced current and voltage, as well as effects to cardiac pacemakers would be negligible; SCPs would further minimize noise and induced current and voltage. EMF levels would be less than the existing transmission lines. Health effects would be similar to or less than existing lines.	Potential effects would be the same as Alternative A.	Potential effects would be the same as Alternative A, except that electrical fields would be blocked by the soil where the transmission line is constructed underground and wouldn't be a concern.	Potential effects would be the same as Alternative A.	Potential effects would be the same as Alternative A.	Potential effects would be the same as Alternative A, except that electrical fields would be blocked by the soil where the transmission line is constructed underground and wouldn't be a concern.	Potential effects would be the same as Alternative A.	Electric fields at the ROW edge, and magnetic fields within the ROW, would be higher than for action alternatives. Potential effects would be the same as Alternative A.
Cultural Resources	A total of 6 historic properties, 2 contributing elements of the CBT project Historic District, and 2 unevaluated sites have been documented along this alternative. Unavoidable adverse effects would be minimized or mitigated through a treatment plan, and through implementation of SCPs.	A total of 6 historic properties, 2 contributing elements of the CBT project Historic District, and 2 unevaluated sites have been documented along this alternative. Mitigation of adverse effects would be the same as Alternative A.	A total of 6 historic properties, 2 contributing elements of the CBT project Historic District, and 2 unevaluated sites have been documented along this alternative. Mitigation of adverse effects would be the same as Alternative A.	A total of 8 historic properties and 2 contributing elements of the CBT project Historic District have been documented along this alternative. Mitigation of adverse effects would be the same as Alternative A.	A total of 9 historic properties and 2 contributing elements of the CBT project Historic District have been documented along this alternative. Mitigation of adverse effects would be the same as Alternative A.	A total of 9 historic properties and 2 contributing elements of the CBT project Historic District have been documented along this alternative. Mitigation of adverse effects would be the same as Alternative A.	A total of 12 historic properties, 4 contributing elements of the CBT project Historic District, and 2 unevaluated sites have been documented along this alternative. Mitigation of adverse effects would be the same as Alternative A.	A total of 12 historic properties, 4 contributing elements of the CBT project Historic District, and 1 unevaluated site have been documented along this alternative. At this time, no inventories have been conducted along the line that would be relocated.

Resource	Alternative A	Alternative A1	Alternative A2	Alternative B	Alternative C	Alternative C1	Alternative D	No Action Alternative
Transportation	Potential direct and indirect impacts would be less than significant due to low levels of project-generated traffic. This alternative requires 1.3 miles of temporary access and 1.3 miles of permanent access on National Forest System land, of which 0.6 mile would be constructed in inaccessible areas with difficult constructability.	Potential impacts would be similar to Alternative A.	Potential impacts would be similar to Alternative A.	Potential direct and indirect impacts would be less than significant due to low levels of project-generated traffic. This alternative requires 1.7 miles of temporary access and 0.8 mile of permanent access on National Forest System land, none of which would be constructed in inaccessible areas with difficult constructability.	Potential direct and indirect impacts would be less than significant due to low levels of project-generated traffic. This alternative requires 1.7 miles of temporary access and 0.8 mile of permanent access on National Forest System land, none of which would be constructed in inaccessible areas with difficult constructability. Increased traffic on USFS Road 122 may result from this alternative as the road would be improved.	Potential direct and indirect impacts would be less than significant due to low levels of project-generated traffic. This alternative requires 1.7 miles of temporary access and 0.8 mile of permanent access on National Forest System land, none of which would be constructed in inaccessible areas with difficult constructability. Increased traffic on USFS Road 122 may result from this alternative as the road would be improved.	Potential direct and indirect impacts would be less than significant due to low levels of project-generated traffic. This alternative requires 2.5 miles of permanent access on National Forest System land, 1.0 mile of which would be constructed in inaccessible areas with difficult constructability.	Potential direct and indirect impacts would be less than significant due to low levels of project-generated traffic. There would be no new temporary or permanent access authorized on National Forest System lands.

Note: Impacts in this table described in Chapter 2.0 were determined after implementation of design criteria, SCPs, and mitigation measures described in Chapter 4.0.

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Acronyms and Abbreviations

°F	degree Fahrenheit
µg/m ³	microgram per cubic meter
AAQS	Ambient Air Quality Standards
ACSR	Aluminum Conductor Steel-Reinforced
Alpine	Alpine Archaeological Consultants, Inc.
AM	amplitude modulated
amsl	above mean sea level
ANSI	American National Standard Institute
APCD	Air Pollution Control Division
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
ARP	Arapaho and Roosevelt National Forests and Pawnee National Grassland
ATV	all-terrain vehicle
BCC	Birds of Conservation Concern
BOR	Bureau of Reclamation
CAA	Clean Air Act
CBT	Colorado-Big Thompson
CDA	Colorado Department of Agriculture
CDPHE	Colorado Department of Public Health and Environment
CDWR	Colorado Division of Water Resources
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
CO ₂ e	carbon dioxide equivalent
CPW	Colorado Parks and Wildlife
CWA	Clean Water Act
DAU	Data Analysis Unit
dBA	decibel (A-weighted)
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
EA	environmental assessment
EIS	environmental impact statement
E-LS	Estes-Lyons
EMF	electric and magnetic fields
EO	Executive Order
EPA	U.S. Environmental Protection Agency
E-PH	Estes-Pole Hill
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FM	frequency modulated
F-PH	Flatiron-Pole Hill
FR	Federal Register

FRCC	Fire Regime Condition Class
FSH	Forest Service Handbook
FSM	Forest Service Manual
GHG	greenhouse gas
GPS	Global Positioning System
HUC	hydrologic unit code
kcmil	thousand circular mil
KOP	key observation point
kV	kilovolt
MBTA	Migratory Bird Treaty Act
mG	milligauss
MIS	Management Indicator Species (Forest Service)
ML2	maintenance level 2
NAAQS	National Ambient Air Quality Standards
NCWCD	Northern Colorado Water Conservancy District
NDIS	Natural Diversity Information Source
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NOI	Notice of Intent
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O ₃	ozone
OHV	off-highway vehicle
OHWM	ordinary high water mark
OSHA	Occupational Safety and Health Administration
Pb	lead
PM	particulate matter
PM ₁₀	particulate matter aerodynamic diameter of 10 microns or less
PM _{2.5}	particulate matter aerodynamic diameter of 2.5 microns or less
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
SCP	standard construction practice
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
SIO	Scenic Integrity Objective

SIP	State Implementation Plan
SLB	State Land Board (Colorado)
SMS	Scenery Management System
SO ₂	sulfur dioxide
SWReGAP	Southwest Regional Gap Analysis Project
TCP	traditional cultural properties
tpy	tons per year
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
Western	Western Area Power Administration

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