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 two 115-kilovolt (kV) single-circuit transmission lines between Flatiron Substation and the intersection of Mall Road and 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 basing its own decision on this EIS.

This 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 (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and DOE and USFS NEPA procedures (10 CFR Part 1021 and 1022 and 36 CFR Part 220).

1.1 Project Location

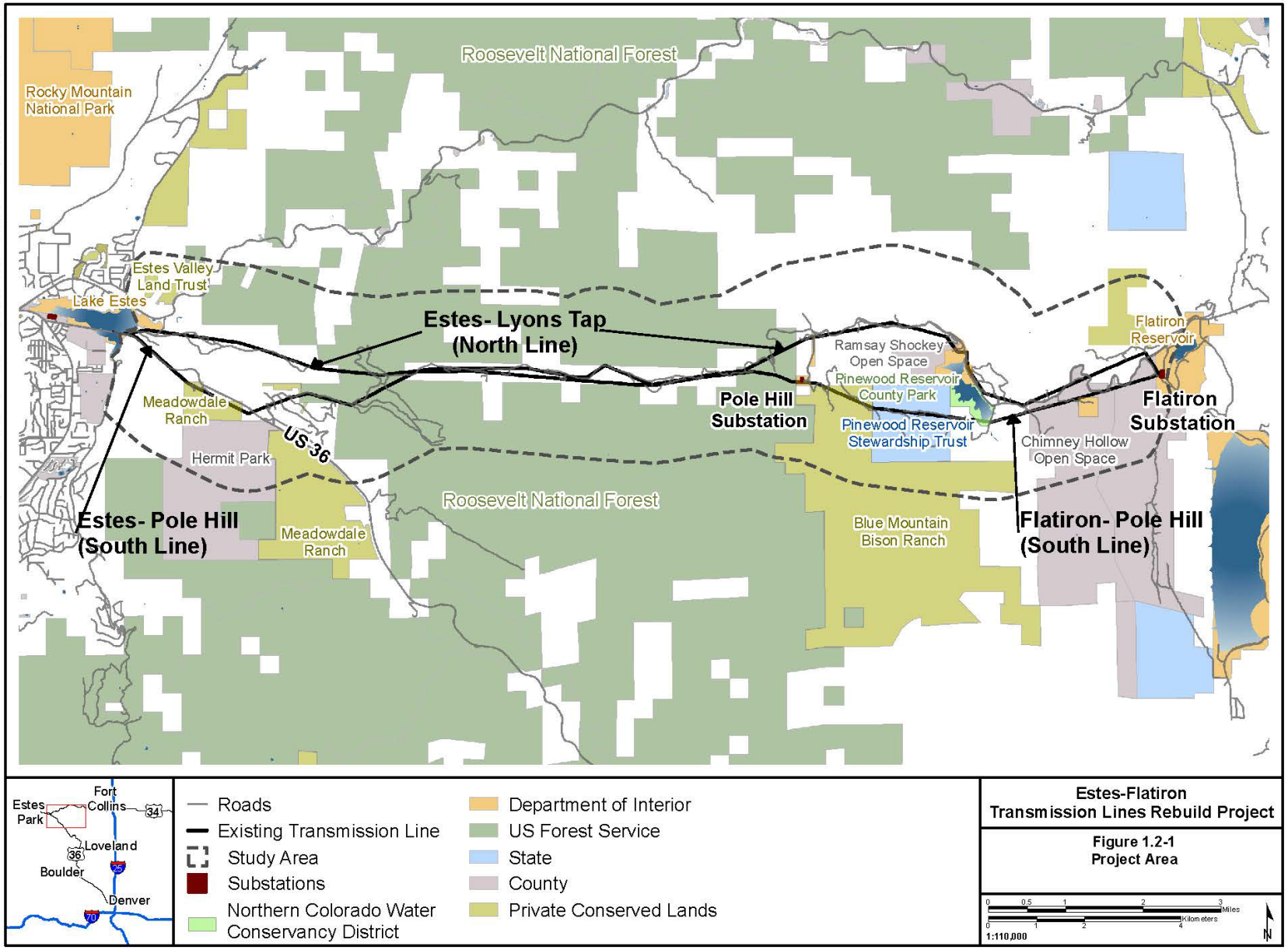
The proposed project is located in Larimer County, Colorado, and extends between Lake Estes on the east side of Estes Park and Western's Flatiron Substation. The project area is situated east of the community of Estes Park and west of the Town of Loveland. Major transportation corridors are U.S. Highways 36 and 34, which provide access between Front Range communities to the east and Rocky Mountain National Park to the west of the project area. 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, Northern Colorado Water Conservancy District (NCWCD) and Larimer County. **Figure 1.2-1** shows the general location of the proposed project.

1.2 Background

Western's mission is to market and deliver reliable, renewable, cost-based hydroelectric power and related services. Western undertakes a variety of construction projects, either on its own or in partnerships with other utilities or power customers. Western owns, operates, and maintains two single-circuit transmission lines between the Estes Park and Flatiron Substations. Prior to the formation of the DOE, the DOI's Bureau of Reclamation (BOR) constructed and maintained the two existing transmission lines as part of the Colorado-Big Thompson (CBT) project. The lines were constructed to transmit electricity from hydropower generation sources within the CBT project. After the formation of the DOE and Western in 1977, ownership of the transmission lines transferred from the BOR to Western.

The Estes-Lyons Tap (E-LS) 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 (F-PH) that connect the Pole Hill Substation to Estes Park and the Flatiron Substation, respectively (**Figure 1.2-1**). 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 1.2-1 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 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, State Land Board, 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.

1.3 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 project. A detailed description of the alternatives under consideration is provided in Chapter 2.0.

1.4 Purpose and Need

1.4.1 Western's Purpose and Need

Transmission systems in the U.S. 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 U.S. To fulfill its statutory mission, meet NERC and NESC standards, and comply with relevant legal requirements. 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.

1.4.1.1 Existing Structure Conditions

The existing wood structures are in poor condition and continue to deteriorate due to both age and the type of material with which they were constructed. Many of the existing structures on both lines suffer from core rot and cracking, and are reaching the end of their anticipated facility life. The majority of wood structures will need replacing in the near future to maintain them to meet the strength requirements found in NESC standards.

1.4.1.2 Existing Access Conditions

The transmission structures along the existing ROWs had access to them at one time for construction and maintenance. However, in the 60 to 75 years since the transmission lines were built, access has deteriorated at many locations. Portions of the existing lines are marginally accessible, if at all, for routine maintenance and structure replacement. Inaccessible areas include sections of the existing transmission lines that span canyons, are located on steep cliff or rocky slopes, or require crossing the Pole Hill penstock.

1.4.1.3 Existing ROW Conditions

Portions of the existing transmission lines run parallel to each other in relatively close proximity. Each line has a separate ROW. The North Line has a ROW width of only 20 to 30 feet at most locations, which is inadequate to meet safety standards. The South Line has ROW widths that range from 75 feet to 130 feet for most of its length. Western would need to widen those portions of the ROW on both lines that have an easement width of less than 110 feet. The area crossed by the transmission lines is susceptible to mountain pine beetle infestation and has heavy fuel loads. Where ROWs have insufficient width and heavy fuel loading, they are more vulnerable to a large wildfire event. This level of risk does not meet applicable standards or Western's commitment to its customers to provide reliable and safe power.

In many cases, ROW maintenance has been limited to removal of hazard trees. This practice typically does not address the encroaching vegetation until it becomes a threat that requires immediate attention to ensure no adverse effect to the transmission line or to avoid a fire caused by a transmission line. This reactive approach to hazardous vegetation maintenance is not conducive to ensuring the level of operating reliability that is required by today's NERC standards, nor is it efficient or cost effective. Today's stricter maintenance standards require a more aggressive, proactive approach to vegetation management, with the goal of ensuring that there will be no tree-caused transmission line outages and minimizing the risk for wildfires. See Chapter 2.0 for further discussion of NERC standards and proposed vegetation management procedures.

1.4.2 Forest Service Purpose and Need

The USFS purpose and need is to determine whether to issue a special use permit for the proposed 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 will require the EIS to ensure the proposed project complies with the Forest Plan.

1.5 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 and 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.

1.6 Public Involvement

1.6.1 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 first round of public meetings was held in Estes Park and Loveland, Colorado, on November 29 and 30, 2011. At that time, Western anticipated preparing an EA for the proposed project. The scoping period for the EA extended from November 29 through January 31, 2012. Additional comments were received through May 2012.

Subsequent to the initial EA scoping period, Western determined that an EIS was the appropriate level of analysis for this proposed project. A Notice of Intent (NOI) was issued on April 17, 2012 (77 Federal Register [FR] 22774; Appendix A). 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.

1.6.2 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 ROW in relation to parcel boundaries. 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.

1.6.3 Areas of Controversy

Rebuilding the transmission line on either the North Line or the South Line is controversial with the public. Neighborhood groups in proximity to the South Line expressed a strong preference for rebuilding the transmission line on the North ROW while neighborhood groups and residential uses in proximity to the North Line expressed a strong preference for rebuilding the transmission line on the South ROW. It should be noted that both of the existing transmission line ROWs were in place prior to these neighborhood developments; the homes were built with the existing transmission lines in place. Homes within the oldest subdivision along the west portion of the North Line were built starting in 1938 and into the 1940s. Homes adjacent to the South Line were first constructed in the early 1960s. A primary goal of alternatives development was to develop alternatives that responded to this conflicting input received from the public during scoping and the alternatives development workshops.

1.6.4 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 in Sections 1.6.4.1 and 1.6.4.2 below.

1.6.4.1 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 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.

1.6.4.2 Other Issues Selected for Detailed Analysis

Other issues define 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.
- Potential effects of electric and magnetic fields (EMF) 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.

1.6.4.3 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 is 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 outside the scope of the EIS.

1.7 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 [NFMA], NEPA, Section 7 of the Endangered Species Act [ESA], National Historic Preservation Act [NHPA], 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 **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.

1.8 Regulatory Framework

The proposed project would need to comply with applicable regulatory requirements, including statutes, regulations, executive orders, DOE orders and guidance and permit requirements. Applicable requirements may include, but are not limited to, those listed below.

1.8.1 Statutes

- Antiquities Act of 1906 (16 U.S.C. §§ 432, 433)
- Archaeological and Historic Preservation Act of 1960 (16 U.S.C. §§ 469-469c-2), as amended
- Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), as amended
- Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d), as amended
- Clean Air Act (CAA) of 1970 (42 U.S.C. §§ 7401 et seq.), as amended
- ESA of 1973 (7 U.S.C. § 136; 16 U.S.C. §§ 1531 et seq.), as amended
- Farmland Protection Policy Act of 1981 (7 U.S.C. §§ 4201-4209)
- Federal Water Pollution Control Act (Clean Water Act [CWA]) of 1972 (33 U.S.C. §§ 1251 et seq.), as amended
- Federal Noxious Weed Act of 1974, as amended (7 U.S.C. §§ 2814 et seq.)
- Historic Sites Act of 1935 (16 U.S.C. § 461)
- Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. §§ 703-712), as amended
- NEPA of 1969 (42 U.S.C. §§ 4321 et seq.)
- NFMA of 1976 (16 U.S.C. §§ 1600-1614)
- NHPA 1966 (16 U.S.C. §§ 470 et seq.)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001 et seq.)
- Occupational Safety and Health Act of 1970 (29 U.S.C. § 1A651), as amended

1.8.2 Regulations

- CEQ Regulations for Implementing NEPA, 40 CFR Parts 1500-1508
- Determining Conformity of General Federal Actions to State or Federal Implementation Plans, 40 CFR Part 93, Subpart B
- Interagency Cooperation, ESA of 1973, as amended, 50 CFR Part 402
- U.S. Environmental Protection Agency (EPA) Administered Permit Programs: the National Pollutant Discharge Elimination System (NPDES), 40 CFR Part 122
- Federal Hazardous Materials Transportation Regulations, 49 CFR Parts 171–180
- Hazardous Waste Management Regulations, 40 CFR Parts 260–270
- National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61
- National Register of Historic Places (NRHP), 36 CFR Part 60
- Occupational Safety and Health Standards and Regulations, 29 CFR Parts 1910 and 1926
- Protection of Historic Properties, 36 CFR Part 800
- U.S. Army Corps of Engineers (USACE) Regulatory Program Regulations, 33 CFR Parts 320-331.

- U.S. DOE NEPA Implementing Procedures, 10 CFR Part 1021
- U.S. DOE Compliance with Floodplain/Wetlands Environmental Review Requirements, 10 CFR Part 1022
- USFS NEPA Implementing Regulations, 36 CFR Part 220

1.8.3 Executive Orders

- Executive Order (EO) 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971
- 11988, *Floodplain Management*, May 24, 1977
- EO 11990, *Protection of Wetlands*, May 24, 1977
- EO 12875, Enhancing the Intergovernmental Partnership, October 26, 1983
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994
- EO 13084, Consultation and Coordination with Indian Tribal Governments, May 14, 1998
- EO 13112, Invasive Species, February 3, 1999
- EO 13175, Consultation and Coordination with Indian Tribal Governments, November 6, 2000
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001
- EO 28357, Actions to Expedite Energy-Related Projects, May 18, 2001

1.8.4 DOE Orders and Guidance

- DOE Order 450.1, Environmental Protection Program
- DOE Order 451.1B, NEPA Compliance Program
- Office of NEPA Policy and Assistance, *Environmental Impact Statement Checklist*, November 12, 1997
- Office of NEPA Policy and Assistance, *Environmental Impact Statement Summary*, September 29, 1998
- Office of NEPA Policy and Compliance, *The EIS Comment-Response Process*, October 8, 2004
- Office of NEPA Policy and Compliance, Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statement, Second Edition (the Green Book), December 23, 2004
- Office of NEPA Policy and Compliance, *EIS Distribution*, June 15, 2006
- Office of NEPA Policy and Compliance, Need to Consider Intentional Destructive Acts in NEPA Documents, December 1, 2006
- Office of NEPA Policy and Compliance, Procedures for Submitting Documents for Posting on the DOE NEPA Website, August 2008

1.8.5 Forest Service Directives

The USFS Directive System consists of the USFS manual and handbooks, which codify the agency's policy, practice, and procedure. The system serves as the primary basis for the internal management and control of all programs and the primary source of administrative direction to USFS employees. The Forest Service Manual (FSM) contains legal authorities, objectives, policies, responsibilities, instructions, and guidance needed on a continuing basis by USFS line officers and primary staff to

plan and execute programs and activities. Forest Service Handbooks (FSH) are the principal source of specialized guidance and instruction for carrying out the direction issued in the FSM. Applicable USFS directives may include, but are not limited to, those listed below.

- FSM 1950, Environmental Policy and Procedures
- FSH 1909.15, Environmental Policy and Procedures Handbook
- FSM 2330, Publicly Managed Recreation Opportunities
- FSM 2520, Watershed Protection and Management
- FSH 2509.25, Watershed Conservation Practices Handbook
- FSM 2550, Soil Management
- FSH 2509.18, Soil Management Handbook
- FSM 2630, Management of Wildlife and Fish Habitat
- FSM 2670, Threatened, Endangered and Sensitive Plants and Animals
- FSH 2609.13, Wildlife and Fisheries Program Management Handbook
- FSM 2710, Special Use Authorizations
- FSH 2709.11, Special Uses Handbook
- FSH 701, Landscape Aesthetics, a Handbook for Scenery Management

1.8.6 State and Local Requirements

Federal agencies are not required to comply with the regulatory requirements of state or local land use regulations. Nevertheless, Western would plan, design, construct and operate the proposed project in accordance with the substantive requirements of state and local plans and policies, whenever practicable.

1.9 Permits and Approvals

Permits and approvals that may be required for project implementation are summarized in **Table 1.9-1**.

Table 1.9-1 Permits and Approvals

Permit or Approval	Description	Statute or Regulation	Administrative Authority
Special-Use Authorization	A special-use authorization is a legal document such as a permit, term permit, lease, or easement, which allows occupancy, use, rights or privileges on National Forest System lands. The authorization is granted for a specific use of land for a specific period of time.	36 CFR Part 251	USFS
CWA § 401 WQC	§ 401 of the CWA requires that federally permitted actions be reviewed for compliance with state water quality standards, if those actions may result in the discharge of pollutants to waters of the U.S within the state. State approval is granted via the § 401 water quality certification.	§ 401 of CWA (33 U.S.C. §§1251 et seq.)	CDPHE
CWA § 402 NPDES Permit(s)	§ 402 of the CWA establishes the NPDES program regulating the discharge of pollutants to waters of the U.S. NPDES permits are required to authorize discharges of storm water associated with construction activities and discharges of construction dewatering effluent.	§ 402 of CWA (33 U.S.C. §§1251 et seq.)	CDPHE
CWA § 404 Department of the Army Permit	§ 404 of the CWA regulates the discharge of dredge and fill material into waters of the U.S. Regulated activities include most earthmoving activities in and along streams below the ordinary high water mark (OHWM), and within jurisdictional wetlands.	§ 404 of CWA (33 U.S.C. §§1251 et seq.)	USACE
ESA Section 7 Consultation	Required for all Federal actions to ensure minimization of adverse impacts to federally listed species.	ESA (16 U.S.C. §§ 1531 et seq.)	USFWS
NHPA Section 106 Consultation	Federal agencies are required to consult with the State Historic Preservation Office to seek ways to avoid, minimize, or mitigate adverse effects of a Federal action on historic properties.	NHPA (16 U.S.C. §§ 470 et seq.); 36 CFR Part 800	Colorado Office of Archaeology and Historic Preservation

CDPHE = Colorado Department of Public Health and Environment; NPDES = National Pollutant Discharge Elimination System; USFWS = U.S. Fish and Wildlife Service; USACE = U.S. Army Corps of Engineers.

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, states the purpose and need for the project, and summarizes public involvement activities conducted in support of the EIS.
- 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 of resources that the proposed alternatives could affect. Resources discussed include air quality; geology and paleontology; soils; water resources and floodplains; wetlands; vegetation; wildlife; special status and sensitive species; fuels and fire; land use and recreation; visual resources; socioeconomics, community resources, and environmental justice; electrical effects and human health; cultural resources; and transportation.
- Chapter 4.0 describes the potential environmental effects of the alternatives. The chapter identifies the direct and indirect, short-term and long-term, beneficial and adverse effects to each resource identified in Chapter 3.0. A discussion of residual impacts, the relationship between short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources is included at the end of the chapter.
- Chapter 5.0 identifies the potential cumulative effects of the alternatives to each resource identified in Chapter 3.0. Cumulative impact is the impact on the environment that results from the incremental impact of the proposal when added to the other past, present, and reasonably foreseeable future actions regardless of who undertakes the other actions.
- Chapter 6.0 provides a list of preparers, a contractor disclosure statement, and the distribution list for the EIS.
- Chapter 7.0 provides a list of references used in the document.
- Chapter 8.0 provides an index for the document.

2.0 Alternatives

2.1 Introduction

This chapter describes the range of alternatives considered to meet the identified Purpose and Need described in Chapter 1.0. The alternatives include rebuilding the two separate transmission lines as a double-circuit line using alternate alignments and designs, including underground construction for selected segments. An additional alternative would rebuild the two lines using structures very similar to those currently in use and generally located along the two existing ROWs. A double-circuit transmission line carries six conductors on a single-pole structure within one ROW, while a single-circuit line carries only three conductors on a single H-frame structure within one ROW. The existing ROWs would be expanded as needed and minor adjustments made to the alignments where necessary to comply with NERC and NESC requirements. The USFS action for each of the action alternatives is to issue an authorization with a defined ROW and an Operation and Maintenance Plan for the portion of the transmission line(s) rebuild that crosses National Forest System lands. The No Action Alternative also is fully considered and described.

As described in Chapter 1.0, Western owns, operates, and maintains two transmission lines between the Flatiron substation and the intersection of Mall Road and U.S. Highway 36 in Estes Park. Both lines begin as two distinct individual single-circuit lines at the Flatiron Substation, near Loveland. The lines combine to a double circuit line at the lattice structure located on Mall Road, near Estes Park. This project ends where the lines become double circuit at the lattice structures. The E-LS line 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, consisting of the E-PH and the F-PH lines will be referred to in this document as the South Line. Both existing transmission lines are 115-kV single-circuit lines constructed on wood H-frame structures.

Western does not have a preferred alternative at this time. The USFS, which is a cooperating agency on this project, also has not identified a preferred alternative. All of the alternatives, and portions thereof described in detail are under consideration as well as No Action. Western will identify a preferred alternative following public review of the Draft EIS. The preferred alternative could be one of the alternatives analyzed in detail in this Draft EIS or some combination of each of the alternatives.

2.2 Alternatives Considered in Detail

The development of a reasonable range of alternatives is an essential element of an EIS. As stated in the CEQ regulations for implementing NEPA, an EIS must rigorously explore and objectively evaluate all reasonable alternatives (40 CFR 1502.14a). NEPA also 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 proposed project.

Alternatives Development Workshop

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 lines 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, and in greater detail in Sections 2.2.1.1 through 2.2.1.8. In this document "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 2.2-1**. The alignments of routing variations using underground construction methods are shown on **Figure 2.2-2**.

- **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 2.2-3**).
    - **Variant A1** – Variant A1 is identical to Alternative A for all but the westernmost segment (**Figure 2.2-4**). 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 2.2-2**).
- **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 2.2-5**).
- **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 2.2-6**).
    - **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 2.2-2**).
- **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 2.2-7**).

Each of these alternatives is described in detail in the remainder of this chapter, starting with a discussion of the alignments that were utilized and the process used to develop those alignments. Other elements of the alternatives are described in subsequent sections, including construction methods, design considerations and other project features. Many of these elements are discussed under the heading Activities Common to All Action Alternatives (Section 2.3).

Figure 2.2-1 Alternatives for Overhead Construction

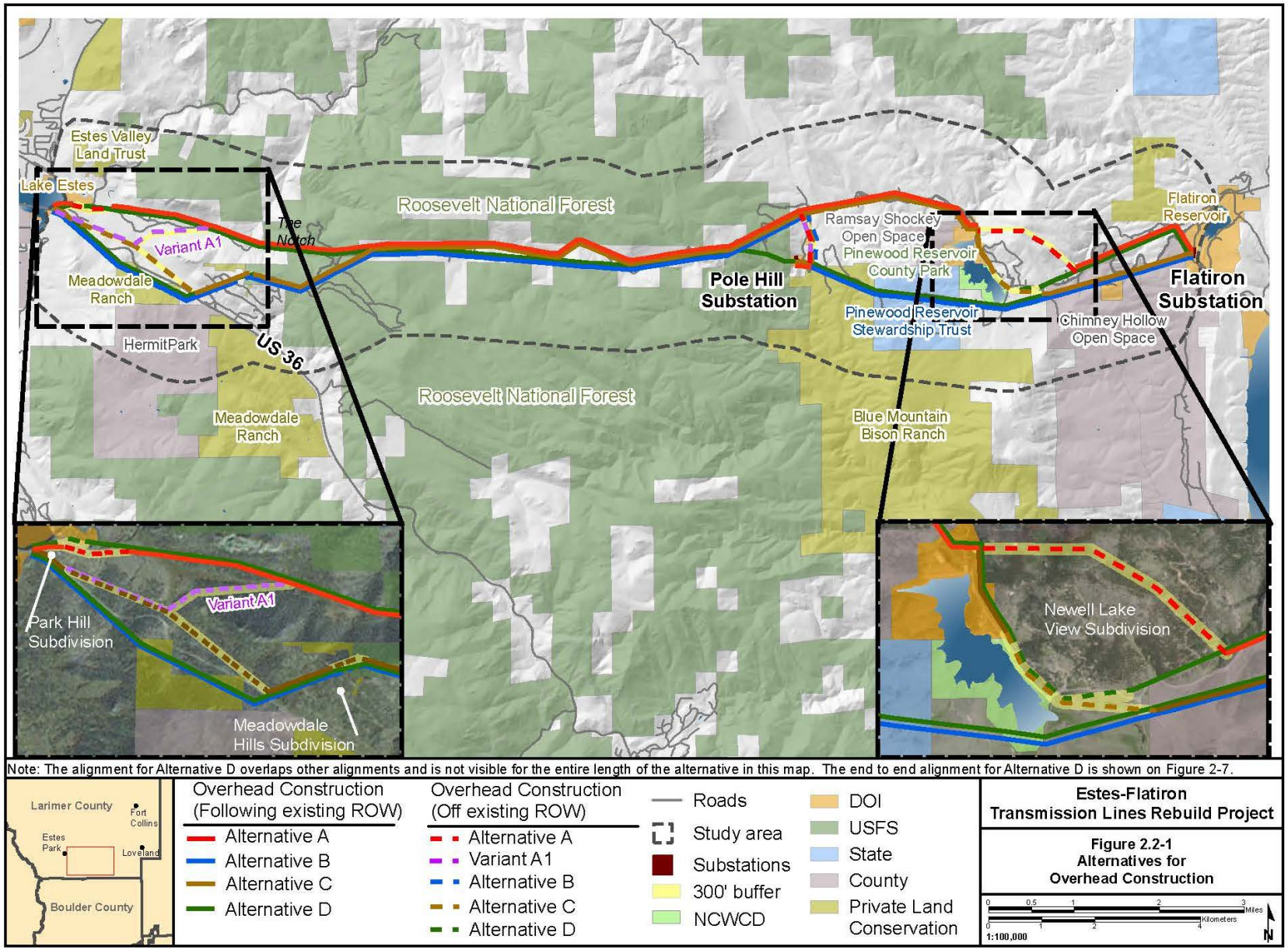
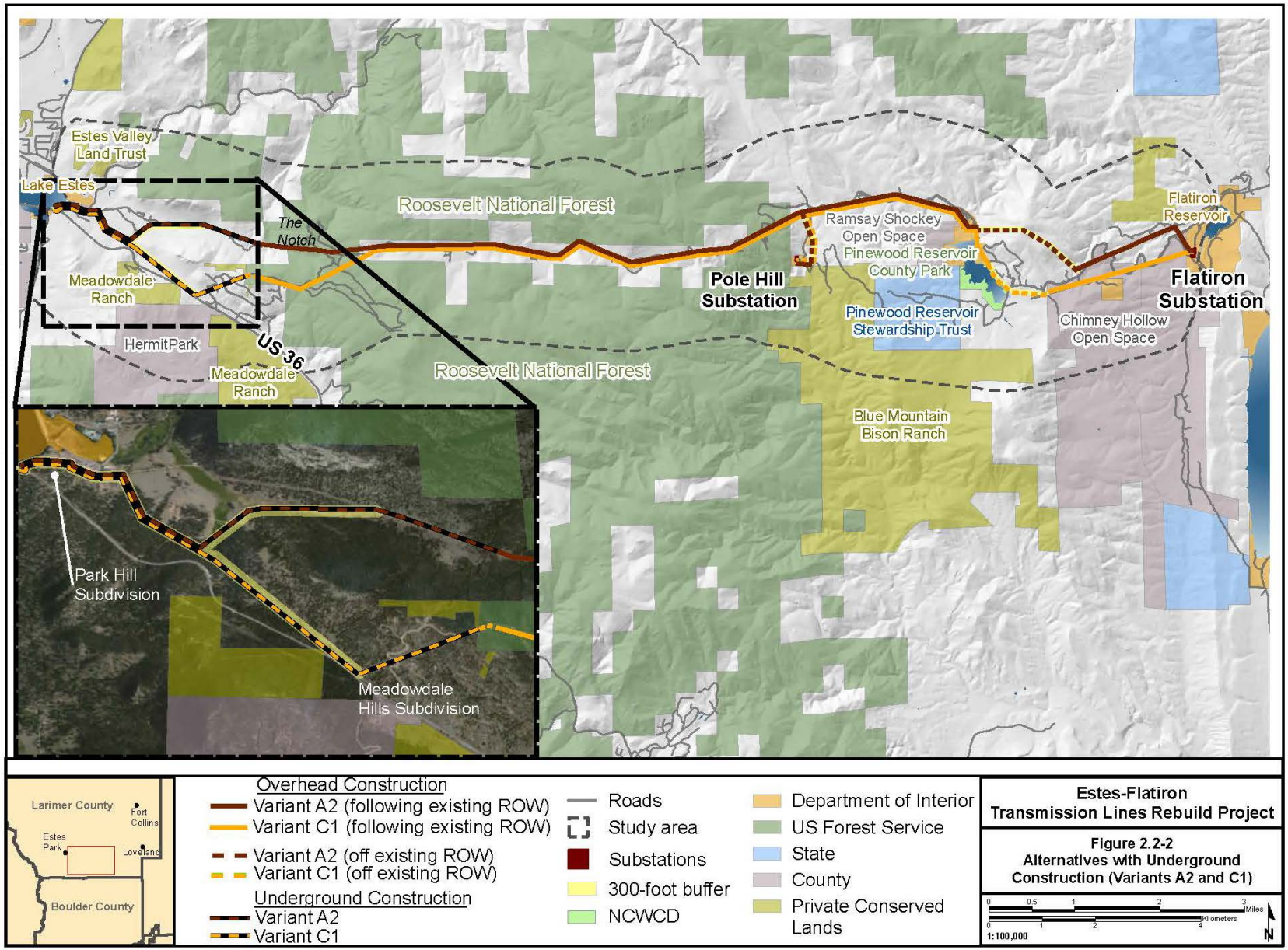


Figure 2.2-2 Alternatives with Underground Construction (Variants A2 and C1)



2.2.1 Development of Alternative Alignments

In order to assure that all reasonable routes were considered, an evaluation of routing constraints and opportunities was completed focusing on an area generally 2 to 3 miles in width and extending between the Flatiron Substation and the project terminus on the east side of Lake Estes. The 2- to 3-mile-wide study area was generated by mapping a 1-mile-wide buffer around all existing ROWs that have been in place for the last 60 to 75 years. This approach reflects Western's need to maximize use of existing ROW in order to reduce ROW acquisition costs, and also to avoid burdening new landowners who bought homes or land with no indication of a utility ROW near them when the property was acquired.

The initial step in this evaluation was to compile resource information within the study area. Using this information, an initial constraint/opportunity analysis was completed. The following constraint and opportunity criteria were incorporated into the analysis to address engineering and construction considerations (particularly access) as well as public scoping comments.

- Steep Slopes, which were defined as areas with slopes 30 percent or greater and no existing access.
- Visual Considerations, including those areas that would be highly visible from residences, recreation areas, and highways.
- Buildings, for which a 55-foot buffer was defined around existing buildings.
- Protected areas, including county open space, lands protected by conservation easement, lands within the Stewardship Trust Program, and State Wildlife Areas.

The results of this analysis were then used to create a composite map by highlighting areas with overlapping constraints. Varying tones were used to depict areas that ranged from no constraints to three overlapping constraints. This information was then used to assist in the identification of alternative alignments, which were subsequently incorporated into a series of overall alternatives.

A key step in the process was a series of alternatives development workshops that were held at the Estes Park Museum and the Bison Visitor Center near Flatiron Reservoir over a 3-day period in early October 2012. Workshop objectives included:

- Present opportunities, constraints, and other considerations that may influence potential transmission line routes.
- Suggest, review, and refine route options and design features.
- Provide a forum for the public to comment on or ask questions about the alternatives screening process.

In preparation for the alternatives workshops, Western compiled map data showing key siting considerations in the project area. Mapped resource data were available for public review and comment and the public was invited to identify route options. Input on transmission line design features, such as structure type and finish, and method of construction also was requested. The workshops were attended by approximately 50 local residents and other interested parties and the input was considered in developing the alternatives described in this chapter.

The resulting alternatives are shown in **Figure 2.2-1** and **Figure 2.2-2**, and described in the remainder of this section. Additional potential alignments also were identified and discussed in Section 2.7, Alternatives Considered but Dismissed. In all cases, the alternatives follow some portion of the existing transmission line alignments and the ROWs they utilize.

2.2.1.1 No Action Alternative

Consideration of the No Action Alternative is a required element of an EIS (40 CFR 1502.14(d)). Under the No Action Alternative, Western would leave in place both existing transmission lines from Mall Road in Estes to Flatiron Substation and replace structures at their current locations as they deteriorated. Maintenance requirements on the existing lines would increase. The lines would become difficult to keep in service in the very near term due to their age and deteriorating condition. Western would need to replace deteriorating structures with an increasing frequency. Approximately 70 to 80 percent of all structures will need replacement in the near future. Replacements of cross arms and other hardware would be required to keep the lines reliable and to ensure public and worker safety. The frequency of repairs would increase as the lines continue to age.

In addition to on-going maintenance activities and structure replacement, the No Action Alternative would involve the acquisition of additional ROW on private lands at locations where an adequate ROW has not been previously acquired. ROW widths along the existing transmission lines range from 20-130 feet. At locations with limited ROW width, it is difficult to maintain appropriate vegetation clearances and compliance with applicable reliability standards per, for example, NERC Standard FAC-003-1, Transmission Vegetation Management Program (NERC 2006). In order to comply with applicable standards and maintain an acceptable level of reliability, Western would acquire additional ROW at all locations on private land where the current ROW width is less than 75 feet, and depending on maintenance requirements, additional ROW may need to be acquired at some locations where the existing ROW width is less than 110 feet. The South Line has a ROW width of 75 feet or more over its entire length. Conversely, the North Line has inadequate ROW width over nearly its entire length, the only exceptions being short segments near Mall Road in Estes and near the Flatiron Substation.

Where there is inadequate ROW on private land, Western would acquire the additional ROW needed to meet applicable standards. For much of the North Line, this would require acquisition of an additional 45 to 55 feet of ROW. At one location, specifically a segment through the Newell Lake View subdivision, the existing line would be relocated to follow Pole Hill Road near Pinewood Reservoir and a new ROW acquired due to the fact that several homes have built immediately adjacent to the existing transmission line ROW. However, the No Action Alternative would require maintaining access to the existing transmission lines in order to maintain the line and replace deteriorated structures. See Section 2.3.2 for a discussion of the type and level of access required.

A basic difference between the action alternatives and No Action is that activities required to access the existing lines to remove and replace deteriorated structures and other access improvements required for maintenance activities would occur incrementally over a longer period of time instead of within a specified construction schedule. Ultimately, the No Action Alternative would be similar to Alternative D in terms of the activities required to maintain the lines in service and the amount of area disturbed also would be similar. Western would coordinate with the USFS regarding pole replacement on National Forest System land, and the USFS would require the appropriate level of NEPA analysis to authorize pole replacements on National Forest System lands. On National Forest System land, Western would not seek authorization to expand its ROW for the South Line. However, additional authorization may be needed for the North Line.

2.2.1.2 Alternative A – Construct a Double-Circuit Line on a Consolidated ROW (North)

Alternative A would construct, operate, and maintain a new double-circuit line along the alignment of the existing North transmission line between the Flatiron Substation and the east shore of Lake Estes at Mall Road and U.S. Highway 36. The existing structures would be removed and replaced with new double-circuit structures. See **Figure 2.2-8** and **Table 2.2-1** for information on structure design and dimensions for a description of the structure design. The new line would require a 110-foot ROW and generally follow the existing alignment except at two locations, off National Forest System land. One of these departures from the existing alignment would occur in the vicinity of Newell Lake View subdivision where existing ROW is inadequate. In order to avoid these impacts, the alignment would

depart from the existing ROW at a point approximately one mile east of the subdivision. At this point, the new alignment would turn to the northwest, using topography to reduce visibility where possible and traversing through steep and rugged terrain. The alignment would rejoin the existing transmission line alignment just north of Pinewood Lake Dam and continue along this alignment for most of the remaining distance to the intersection with the existing double-circuit line at Mall Road. The second departure from the alignment of the existing transmission line occurs east of Mall Road. Just east of the Upper Thompson Sanitation District's office and Mall Road, the new alignment would jog to the south along Mall Road in order to avoid a conflict with the Upper Thompson Sanitation District wastewater treatment plant. The reroute is referred as the Mall Road reroute in this document.

Another element of Alternative A is a short line segment (0.75 mile) that would extend south to the Pole Hill Substation. This segment would require new ROW and would be built using the same design as the double-circuit line. **Figure 2.2-3** shows the alignment of Alternative A.

Construction of a double-circuit line along the alignment of Alternative A would allow the existing South transmission line to be removed and the ROW allowed to return to natural vegetation patterns. See Section 2.3.4 for a discussion of the removal process. Under Alternative A, the western end of Pole Hill Road would not be improved, and the road would retain its challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

2.2.1.3 Variant A1 – Western Alignment Option

Variant A1 is identical to Alternative A for all but the westernmost segment (**Figure 2.2-4**). 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 intersection with the existing double-circuit line at Mall Road. This segment would require a new ROW for most of its length. Under Variant A1, the western end of Pole Hill Road would not be improved, and the road would retain its challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

2.2.1.4 Variant A2 – Underground Construction Along a Segment of Alternative A

Variant A2 is identical to Alternative A for all but the westernmost segment. The transmission line would be rebuilt aboveground following Alternative A until intersecting the eastern end of Variant A2. Structure type and construction methods along the aboveground portions of this alternative would be same as described for Alternative A. The westernmost portion of this variant would be constructed underground following a new alignment as shown on **Figure 2.2-2**. Underground construction methods applicable to Variant A2 are described in Section 2.2.4. Under Variant A2, the western end of Pole Hill Road would not be improved, and the road would retain its challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

Figure 2.2-3 Alternative A – Double-Circuit Line on a Consolidated ROW (North)

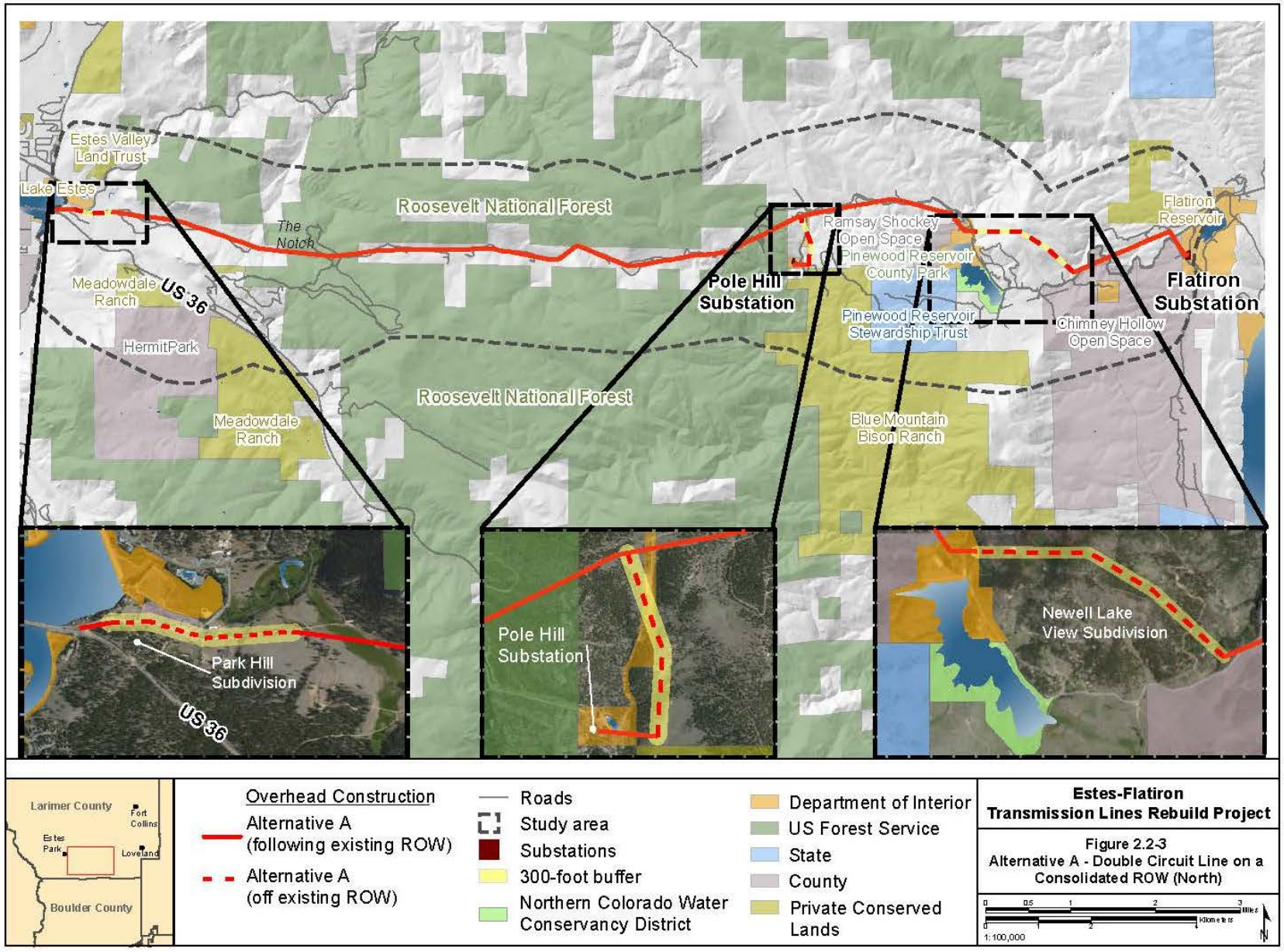
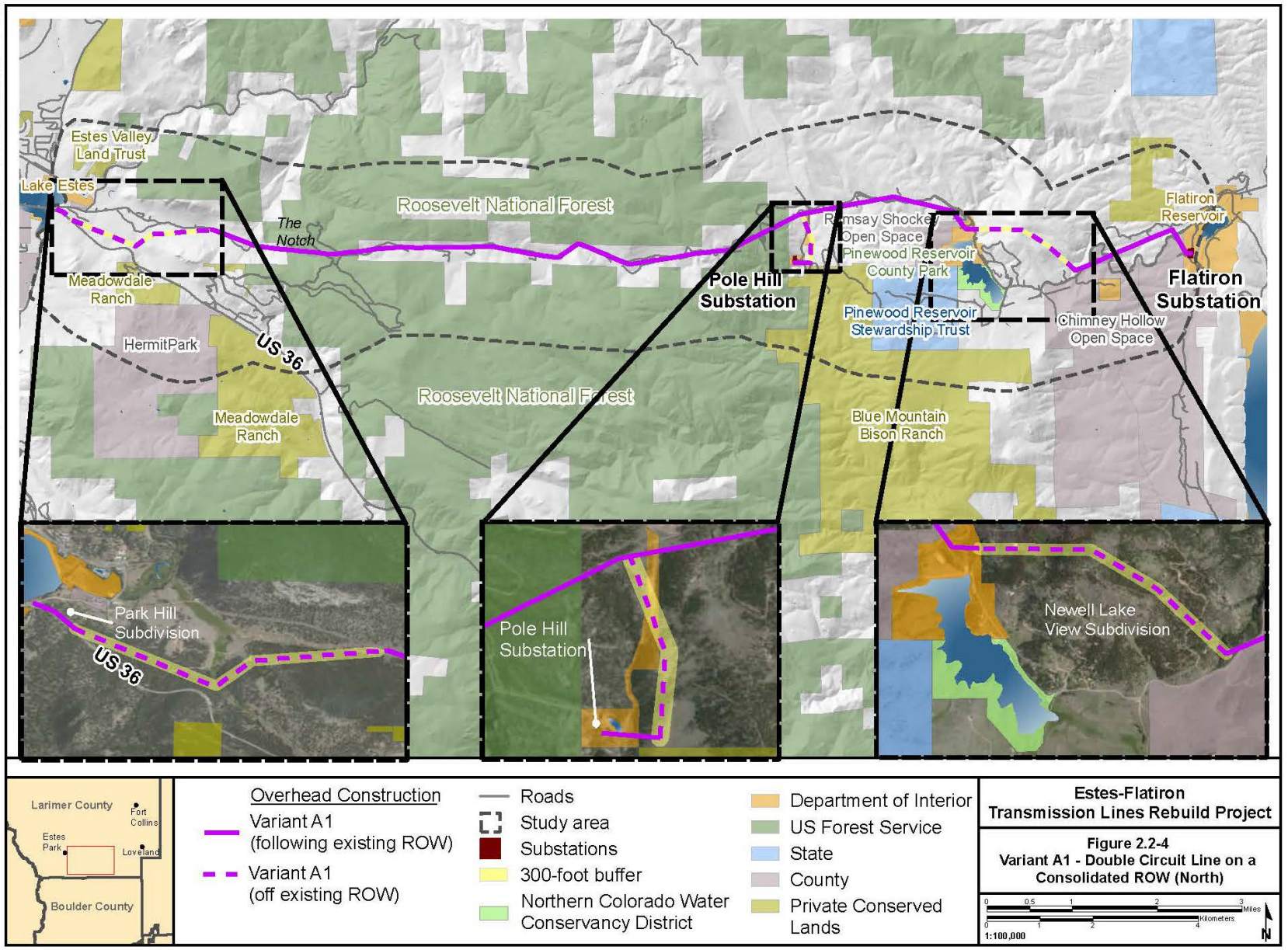


Figure 2.2-4 Variant A1 – Double-Circuit Line on a Consolidated ROW (North)



2.2.1.5 Alternative B – Construct a Double-Circuit Line on a Consolidated ROW (South)

Alternative B would construct, operate, and maintain a new double-circuit line along the alignment of the existing South transmission line for most of the distance between Flatiron Substation and the intersection of Mall Road and U.S. Highway 36. The existing structures would be removed and replaced with new double-circuit structures. See **Figure 2.2-8** and **Table 2.2-1** for information on structure design and dimensions. The new line would require a 110-foot ROW and generally follow the existing alignment except at two locations. Just east of the Pole Hill Substation the alignment of Alternative B would turn north and partially parallel Lone Elk Road for 0.75 mile until intersecting the alignment of the existing North transmission line. A new ROW would be required for this segment. Alternative B diverts to the north at this location in order to avoid: 1) crossing the penstock and 2) crossing the steep and rocky terrain located west of the Pole Hill Substation. Both the penstock and the rough terrain west of Pole Hill Substation would make permanent structure access problematic.

Alternative B would then follow the alignment of the existing North transmission line for approximately one mile to a point where the alignments of the two existing lines converge and parallel each other on separate ROWs. West of this point, Alternative B would follow the alignment of the existing South transmission line. A second 0.25 mile reroute would move the transmission line off the existing ROW to parallel the western end of Pole Hill Road on National Forest System land (see **Figure 2.2-5**).

Because Alternative B turns to the north prior to reaching the Pole Hill Substation, a short (less than 0.25 mile) segment of transmission line would have to be constructed to maintain an electrical connection to the substation.

Construction of a double-circuit line along the alignment of Alternative B would allow the existing North transmission line to be removed and the ROW to return to natural vegetation patterns. See Section 2.3.4 for a discussion of the removal process. However, it would be necessary to leave a portion of the existing structures in place to maintain the existing fiber optic service provided to Pinewood Dam. This would be accomplished by leaving a single pole in place at each existing structure site along the North Line between the dam and the vicinity of the Green Mountain Drive. The remaining single pole at each structure site would be utilized to support the fiber optic line.

Under Alternative B, the western end of Pole Hill Road would not be improved, and the road would retain its challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

2.2.1.6 Alternative C – Construct a Double-Circuit Line on a Consolidated ROW Using a Combination of Alignments

Alternative C would build a new double-circuit line between Flatiron Substation and the intersection of Mall Road and U.S. Highway 36 using a combination of alignments, including the alignments of both existing lines as well as new alignments in some locations. See **Figure 2.2-8** and **Table 2.2-1** for information on structure design and dimensions. After leaving the Flatiron Substation, Alternative C would follow the alignment of the existing South Line for a distance of just over 2 miles before turning to the northwest as it approaches Pinewood Lake. Just east of Pinewood Lake, Alternative C would leave the alignment of the existing South Line and follow a new alignment, generally paralleling Pole Hill Road along the south edge of the Newell Lake View subdivision until intersecting with the alignment of the existing North Line near Pinewood Lake Dam. From this point Alternative C would follow the alignment of the existing North Line to the point where the North and South lines diverge just east of The Notch (**Figure 2.2-6**). Alternative C would then cross over to the alignment of the South transmission line at the point where the two existing lines separate and continue on existing

Figure 2.2-5 Alternative B – Double-Circuit Line on a Consolidated ROW (South)

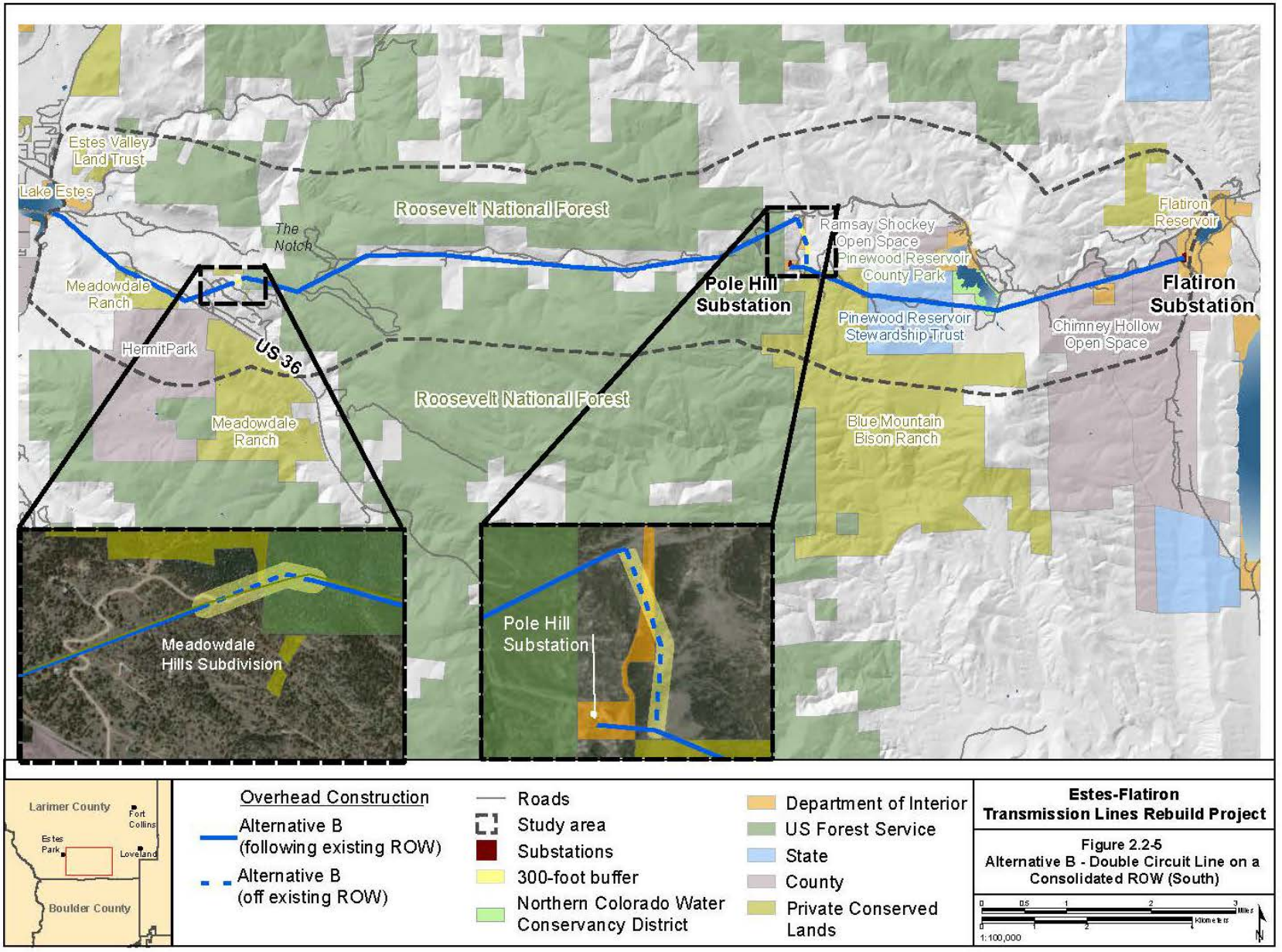
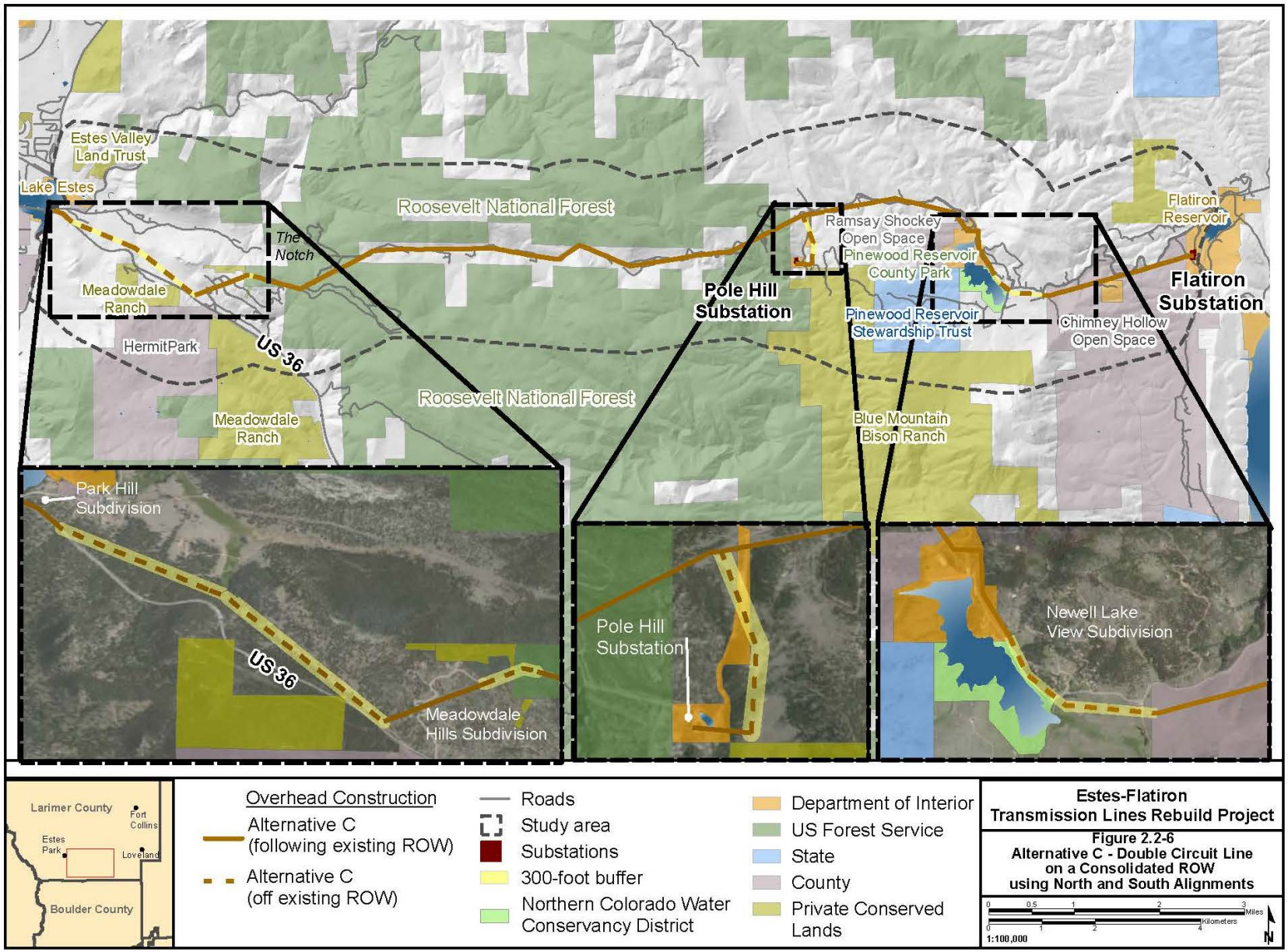


Figure 2.2-6 Alternative C – Double-Circuit Line on a Consolidated ROW Using North and South Alignments



ROW and a 0.25-mile reroute to parallel the western end of Pole Hill Road on National Forest System land. The alignment continues on existing ROW through Meadowdale Hills subdivision to U.S. Highway 36. Instead of crossing the highway at this location, Alternative C would follow a new alignment generally parallel to U.S. Highway 36 for the remaining distance to the intersection of Mall Road and U.S. Highway 36.

New ROW would be required for this segment, which is intended to reduce visibility from U.S. Highway 36. In order to further reduce visibility, special design measures would be considered for this segment and Meadowdale Hills subdivision, including the use of structures with a lower height and shorter span.

Because Alternative C turns to the north prior to reaching the Pole Hill Substation, a short (less than 0.25 mile) segment of double-circuit transmission line would have to be constructed to maintain an electrical connection to the substation.

At locations where the Alternative C alignment follows one of the existing transmission lines the existing structures would be replaced with new double-circuit structures, but the locations would vary depending on final design. At other locations where the new double-circuit line is not using an existing or expanded ROW, the existing structures would be removed and the ROW allowed to return to natural vegetation patterns. See Section 2.3.4 for a discussion of the removal process. Under Alternative C, Pole Hill Road would be reconstructed on National Forest System land to level the grade, removing the challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

2.2.1.7 Variant C1 – Underground Construction along a Segment of Alternative C

Variant C1 is identical to Alternative C for all but the westernmost segment. The transmission line would be rebuilt aboveground following Alternative C until intersecting the USFS boundary near Meadowdale Hills subdivision. Structure type and construction methods along the aboveground portions of this alternative would be same as described for Alternative C. The westernmost portion of this alternative, from Mall Road to the USFS boundary adjacent to the Meadowdale Hills subdivision, would be constructed underground following a new alignment as shown on **Figure 2.2-2**. Underground construction methods applicable to Variant C1 are described in Section 2.2.4.

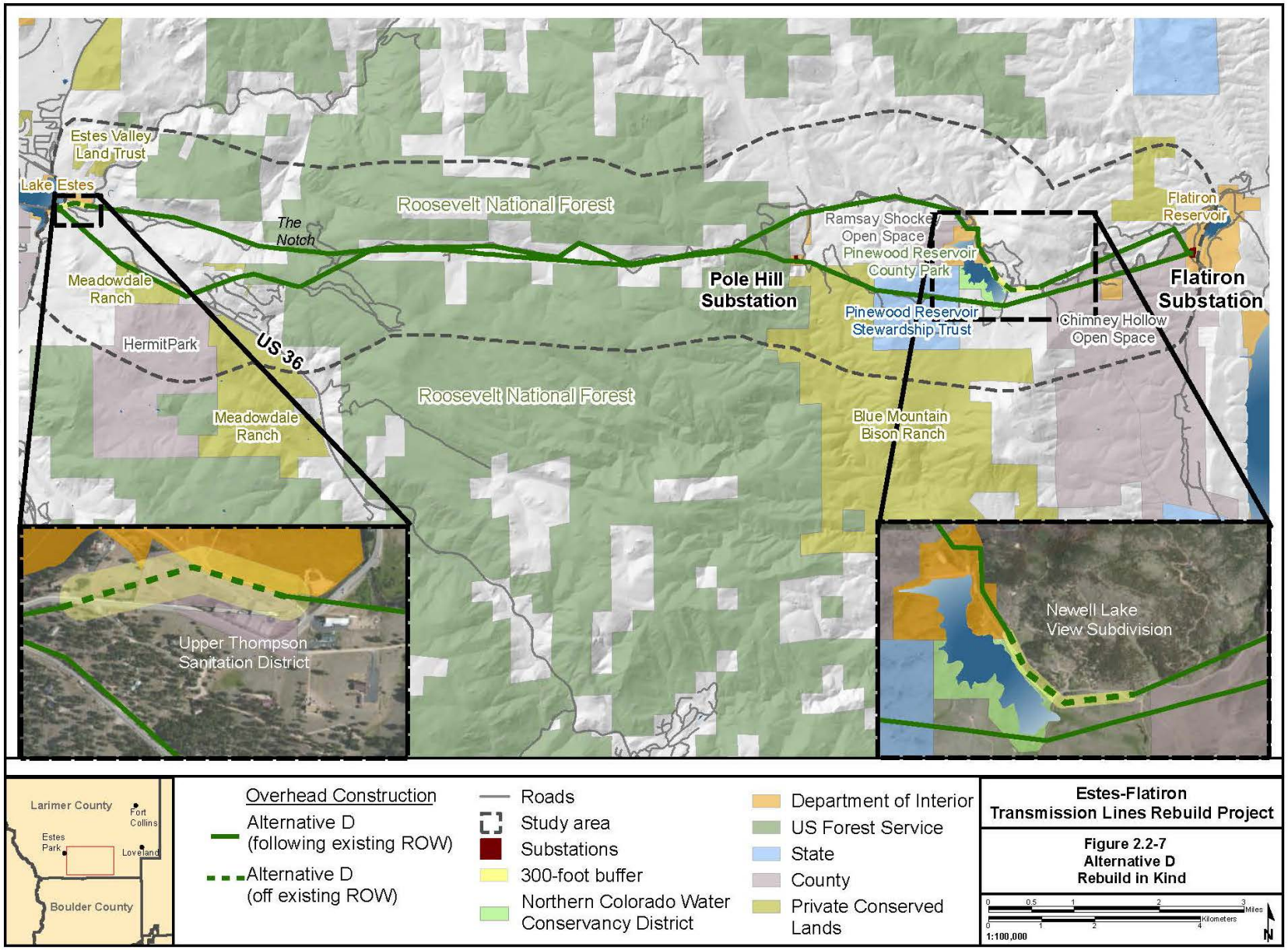
Under Variant C1, Pole Hill Road would be reconstructed on National Forest System land to level the grade, removing the challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

2.2.1.8 Alternative D – Rebuild In-Kind

Alternative D would rebuild both the existing North and South transmission lines in-kind as single-circuit lines using structures very similar to those currently in use. See **Figure 2.2-8** and **Table 2.2-1** for information on structure design and dimensions. The existing ROWs would be expanded as needed and minor adjustments would be made to the alignments where necessary for compliance with NERC requirements. An adjustment to the alignment would occur in the vicinity of Newell Lake View subdivision where there is inadequate ROW. In order to avoid these impacts, the alignment would depart from the existing ROW near the eastern boundary of the subdivision and follow an alignment generally along Pole Hill Road, rejoining the existing ROW just north of Pinewood Lake Dam. The location of one structure on the north side of the Upper Thompson Sanitation District parcel in Estes Park also would be adjusted to accommodate expansion of their facility (**Figure 2.2-7**).

Under Alternative D, the western end of Pole Hill Road would not be improved, and the road would retain its challenge for four-wheel drive use. See Section 2.3.2.1 for additional information on access requirements under each of the alternatives.

Figure 2.2-7 Alternative D – Rebuild In-Kind



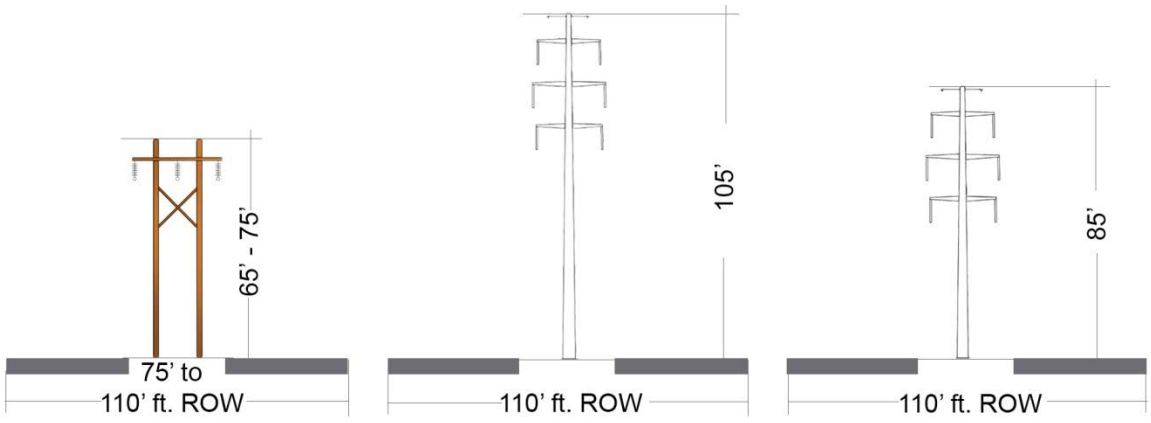
2.2.2 Description of Transmission Facilities

Figure 2.2-8 shows a typical single-circuit 115-kV wood H-frame structure, which is the structure type that is utilized along both the existing North and South Lines, and a 115-kV double-circuit steel structure. The single-pole double-circuit steel structures would replace the existing single-circuit wood structures and would be utilized for all segments of Alternatives A, B, and C; Variant A1; and overhead sections of Variants A2 and C1. The structures would be set in augered holes with an average depth of 18 feet; however, a maximum depth of up to 30 feet may be required at some locations. Structures located at a point where the alignment makes major angles would have a larger diameter and require a concrete foundation to provide additional support.

The steel pole structures would be self-weathering steel or galvanized steel. Conductor size would be increased from 397.5 Aluminum Conductor Steel-Reinforced (ACSR) to 795 ACSR. The new steel structures would average 105 feet tall, approximately 40 feet higher than the existing 65-foot-tall H-frame structures (**Table 2.2-1**). The additional height is required to accommodate the double-circuit and configuration. Structure heights would vary depending on site specific considerations. At locations where visibility from sensitive viewpoints is a major concern, structures with a shorter average height (85-foot) and shorter span length could be utilized. For example, structures with a shorter average height and span would be considered parallel to U.S. Highway 36 or adjacent to residential subdivisions, such as Park Hill, Meadowdale Hills, and/or Newell Lake View subdivisions, and on National Forest System lands. The shorter design would result in roughly twice the number of structures in a given length of ROW in order to meet required conductor clearances.

The wood H-frame structure design that would be utilized for Alternative D would be very similar to the design shown in **Figure 2.2-8**. However, the conductor size would be increased to 795 ACSR on each line, resulting in taller structures (5 to 10 feet) than those currently in use. Two groundwires, including one optical ground wire fiber optic communication line, would be added to the top of the structures to replace the existing system that would be removed by reconstruction of the two existing lines. Under the No Action alternative, the conductor would not be replaced and any poles replaced during routine maintenance of the line would be similar in appearance and dimension to the existing poles.

Figure 2.2-8 Existing 115-kV Single-circuit Wood Pole H-frame Structure and Proposed 115-kV Double-circuit Single-pole Steel Structures



115-kV Single-circuit Wood Pole H-frame Structure Alternatives D and No Action

115-kV Double-circuit Single Pole Standard Steel Structure Alternatives A, A1, A2, B, C, C1

115-kV Double-circuit Single Pole Standard Steel Short Structure Alternatives A, A1, A2, B, C, C1

Table 2.2-1 Typical Transmission Structures

Description	Alternatives A, A1, A2, B, C, and C1 115-kV Double-circuit Single-pole Standard Steel Structures	Alternatives A, A1, A2, B, C, and C1 115-kV Double-circuit Single-pole Shortened Steel Structures[1]	Alternative D 115-kV Single-circuit Wood-pole H-frame Structures
ROW width	110 feet	110 feet	110 feet
Span between structures (average)	850 feet	450 feet	600 to 700 feet
Span between structures (maximum)	1,300 feet	700 feet	1,300 feet
Number of structures (average)	6 per mile	12 per mile	8 per mile
Height of structure (average)	105 feet	85 feet	65 feet
Height of structure (typical range)	100 to 130 feet	80 to 110 feet	50 to 75 feet
Width of structure cross/davit arm	20 feet at davit arm	20 feet at davit arms	25 feet at cross arm
Width of structure at ground level	4 to 8 feet	3 to 7 feet	12 feet
Structure base area	28 square feet per structure	23 square feet per structure	3.5 square feet per pole
Land disturbed by construction at each structure base	11,350 square feet (0.26 acre) on average	11,350 square feet (0.26 acre) on average	9,500 square feet (0.22 acre) on average
Distance between conductor stringing sites	1.5 to 3 miles	1.5 to 3 miles	1.5 to 3 miles
Land disturbed at each stringing site	0.25 acre 105 feet x 105 feet	0.25 acre 105 feet x 105 feet	0.25 acre 105 feet x 105 feet
Conductor type and size	ACSR 795 kcmil	ACSR 795 kcmil	ACSR 795 kcmil
Circuit conductors configuration	Vertical	Vertical	Horizontal
Minimum ground clearance beneath conductors	22 feet	22 feet	22 feet

[1] Structures with a shorter average height and span would be considered parallel to U.S. Highway 36 or adjacent to residential subdivisions.

kcmil = thousand circular mil.

2.2.3 Comparison of ROW Lengths and Land Ownership Crossed

Table 2.2-2 provides a comparison of alternative ROW lengths and land ownership crossed by alternative ROWs.

Table 2.2-2 Comparison of Alternative Elements

Alternative	Total Length (miles)	Within Existing ROW (miles)	Within New ROW (miles)	Land Ownership Crossed (miles)					
				County	SLB	NCWCD	USFS	DOI	Private/ Other
No Action	28.6	27.6	1	2.5	1	0.2	3.8	1.0	20.0
A	15.0	12.6	2.4	0.8	-	-	1.7	0.6	12.0
Variant A1	15.1	11.4	3.7	0.6	-	-	1.7	0.6	12.0
Variant A2	15.3	11.3	4.0	0.6	-	-	1.7	0.6	12.1
B	14.8	13.8	1.0	1.6	1	0.2	2.2	0.4	9.4
C	15.5	12.1	3.4	1.8	-	0.1	2.2	1.0	10.6
Variant C1	15.7	11.7	4.0	1.8	-	0.1	2.2	1.0	10.6
D	28.6	27.6	1	2.5	1	0.2	3.8	1.0	20.0

SLB = State Land Board (Colorado), NCWCD = Northern Colorado Water Conservancy District, DOI = U.S. Department of the Interior.

2.2.4 Underground Construction

Variants A2 and C1 would build a portion of the new line underground. The locations of the underground segments are shown in **Figure 2.2-2**. The length of underground construction for Variant A2 is 2.67 miles and for Variant C1 it would be 2.74 miles.

Solid dielectric cable is the customary cable choice for new underground electric transmission lines operating at 230 kV and below. Cross-linked polyethylene cable is the proposed type for the underground Variants A2 and C1. Each transmission line circuit utilizes three separate cables, just as three bare conductors are required for aboveground transmission lines. The single duct bank required for the proposed double-circuit E-LS and E-PH transmission lines will accommodate six cross-linked polyethylene power cables, two fiber optic communications cables, and two spare conduits. PVC conduits would be set in a concrete duct bank designed to enclose and protect the conduits, and to dissipate the normal heat generated by the power cables. Installing two circuits underground in a common concrete-encased duct bank entails deep excavation using sloped trenches or trench boxes. The duct bank would be approximately 4 feet in height and 6 feet wide, located at the bottom of a 9-foot deep trench. The top of the concrete duct bank is covered with 5 feet native soil backfill (HDR 2013). Photos of typical underground construction methods are provided in **Figure 2.2-9**.

Trench dimensions would be wider and deeper in places where vaults are located. Vaults are large concrete boxes buried at specific intervals along the route centerline to provide permanent access to the conduits, for cable installation, and space for installing and securing polymer pre-molded cable splices. Separate vaults are used for each circuit. The number and spacing of vaults, required for an underground transmission line, is dictated by the length of cable that can be transported on a reel, the cable's allowable pulling tension, elevation changes along the route, and the internal cable sidewall pressure encountered as it is installed through bends in the centerline. A 115-kV cross-linked polyethylene cable requires a splice every 900 to 3,500 feet, depending on topography (Public Service Commission of Wisconsin 2011).

The conceptual design for the proposed underground transmission circuits assumes 11 separate splice vaults would be constructed for each circuit, for a total of 22 splice vaults (HDR 2013). Vault dimensions are approximately 10 by 30 feet and 10 feet high. They have two chimneys constructed with manholes which workers use to access the vault interior for cable pulling, splice installation and periodic inspection. Covers for the manholes are flush with the finished road surface or ground elevation. Vaults may be either prefabricated, and transported to the site in two pieces, or constructed onsite (HDR 2013).

Most commonly, backhoes are used to dig trenches for the duct bank and vaults. Where the transmission lines would be constructed in unpaved areas, all shrubs and trees would be cleared in the area to be trenched, approximately 25 feet each side of centerline. Jack and bore construction may be used in areas where open trench construction is prohibited by major existing features such as railroads, waterways, or other large facilities or utilities. For the route selections studied, no such obstructions are anticipated. When bedrock or subsoils primarily consisting of large boulders are encountered, blasting may be necessary. Small controlled blasts would fracture the rock, with little to no fly rock rising from the site. The blasts would create a short-term boom (less than 0.5 second), resulting in a short-term localized change in noise levels and ground vibrations. Direct impacts on wildlife from blasting could range from minor behavioral responses to change in the use of an area. There would be no measurable long-term effect on population numbers or distribution over a species range of occurrence.

Cable pulling and splicing would occur after the duct banks and vaults are completed. A typical setup is to position the supply reel trailer at the transition structure, or at one vault and position pulling winch equipment at the next vault. Cables would be individually pulled through the duct bank between vaults, or from the transition structure to the nearest vault. Cables are usually pulled in the direction of higher elevation to lower elevation (Public Service Commission of Wisconsin 2011).

The connections between overhead and underground lines require mounting porcelain cable terminations on special single-pole steel structures, also known as transition structures. These structures would be approximately 100 feet tall and 5 feet wide at the base (HDR 2013). They would each accommodate three cable terminations, with relatively wide separations, to meet the electrical code safety requirements of the overhead line. Two transition structures are required at each termination site for the proposed double-circuit transmission line. Alternatively, cable terminations may be located in a small enclosed, secured area, again with two customary single-pole dead-end structures. This approach would reduce the visibility of the cable terminations and yield simpler construction and inspection access.

Site restoration for underground construction is similar to overhead transmission line construction restoration. Disturbed areas would be restored with top soils that were excavated and stockpiled during construction or with new topsoil. Permanent surface monuments would be installed to mark the easement centerline, and to document the presence of the duct bank beneath. Any infrastructure impacted by the construction project such as roadways, driveways, curbs, and private utilities would be restored to their previous function, and yards and pastures vegetated as specified in landowner easements. Post-construction, trees and large shrubs would not be allowed within a 75-foot ROW for underground sections of the line. Some herbaceous vegetation and agricultural crops may be allowed to return to the ROW.

Figure 2.2-9 Examples of Underground Transmission Line Construction

230-kV duct bank under construction, Longmont, Colorado

115-kV duct and termination structure in open space in Jefferson County, Colorado

Exposed sections of conduits, duct bank, and backfill constructed for 230-kV in Longmont

Interior of a vault, before cable installation, for 230-kV transmission line in Denver

2.3 Activities Common to All Action Alternatives

This section describes those activities that would occur with any of the action alternatives, though each alternative would have some differences based on the site specific conditions encountered, e.g., the type of terrain crossed, vegetation types, and availability of existing access roads. Conventional, aboveground construction methods would be used exclusively under Alternatives A, B, C, D, and Variant A1, and would be used in combination with underground construction methods under Variants A2 and C1. Western would take only one line circuit out of service at a time to maintain electrical service during construction and also would keep the fiber optic communications system in service.

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.

Standard construction practices (SCPs) would be employed to minimize potential adverse effects during construction activities (see Section 2.5, Standard Construction Practices).

Western's standard construction specification requires the construction contractor to have a Safety and Health Program and to take necessary precautions to protect the safety and health of employees and members of the public, and to prevent damage to public and private property. Prior to the start of construction, the construction contractor would be required to submit its Safety and Health Program to Western for approval. At a minimum, the Safety and Health Program would be required to include designation of an on-site superintendent, safety and health policy statements, provisions for first aid and medical care of any injured employees, provisions for employee training, fire protection, health and sanitation facilities, procedures for specific sequences of work to ensure adequate activity hazard analysis, provisions for use of personal protection equipment, procedures for protecting the public, company policy and procedures for enforcing safety and health regulations, procedures required by Occupational Safety and Health Administration (OSHA) 1926, Subpart D (Occupational Health and Environmental Controls), inspection program, fall protection policy and program, and provisions for line-clearance tree trimming operations per OSHA 1910.269.

The construction contractor would be required to keep roads open without unreasonable delays and to provide and maintain suitable detours. Protection of the public would be provided as required by OSHA 1926, Subpart G, "Signs, Signals, and Barricades," and by the public agency having law enforcement jurisdiction for the roadway.

2.3.1 Acquisition of Land Rights

To access, construct, and maintain the proposed project, Western would need to obtain easements for some segments of the transmission lines or access roads. In order 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 areas where it does not have an existing easement. 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 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 realty specialist 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 Western 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 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 realty specialist.

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.

2.3.2 Access

Regardless of the alternative selected, Western would need access to each structure site to construct and maintain the new transmission line and/or remove existing line. Western would utilize existing access that was developed during the construction of the existing lines to the extent possible. Where existing access is inadequate for line removal or new construction, Western would need to establish new access from the nearest existing road or spur road to each structure site.

At some locations where there are existing roads, improvements may be needed to provide the necessary degree of access. Western would reconstruct or recondition roads only to the extent that it is necessary to provide access for construction equipment. Native material would be the primary source of road fill needed. Aggregate would be used only when needed to reduce further impacts to the road prism or as called for by specific engineering activities (i.e., for culvert installations).

It should be noted that new structures would not be specifically sited until the transmission line is designed following completion of the EIS and issuance of a ROD. Once new structure sites are identified, Western would consult with landowners and the USFS on the location of new access routes needed for construction and maintenance. Western would conduct cultural and biological surveys along the access routes identified, and document the results in reports. Western would only authorize construction of a new access routes following receipt of appropriate USFS, State Historic Preservation Office (SHPO), and USFWS approvals or concurrences.

In order to minimize road building, Western would consider overland access where topography, soil, and vegetation conditions support overland travel with minimum disturbance and compaction. In most cases, where slopes are less than 15 percent, Western would not need to establish new access roads. Instead, access would be by travel within the ROW from the closest existing access road or spur road, resulting in temporary disturbances. Western would expect vegetation to recover quickly at these locations because it would not be graded or cleared.

For alternatives that propose to consolidate ROWs (Alternatives A, B, and C, and the variants), permanent access would be needed on the ROW where the consolidated double-circuit transmission line would be rebuilt; only temporary access would be required to remove the existing single-circuit line from the ROW that would be abandoned. In areas with steep and rough slopes, temporary access to structures that need to be removed would be accomplished by foot, tracked vehicle, or all-terrain vehicle (ATV). Alternative D would rebuild single-circuit lines on both existing ROWs, and permanent access would be needed to each structure on both the North and South Lines.

Table 2.3-1 provides estimates of the lengths of temporary and permanent access improvements needed for removal of the existing line and new construction under each of the action alternatives.

Table 2.3-1 Temporary and Permanent Access Requirements by Alternative

Access Type*	A	A1	A2	B	C	C1	D
Temporary access for decommissioning the existing line only (miles)	7.1	7.1	7.1	7.1	8.2	8.2	0.1
Permanent access for long-term maintenance of rebuilt line (miles)	5.6	5.7	5.9	6.8	5.5	4.8	11.3

*Estimated mileage is for access spurs from existing state, county, private, or USFS roads.

2.3.2.1 Access Requirements on National Forest System Land

National Forest Service Roads

USFS roads that provide access to Western's existing ROWs are all classified as Maintenance Level 2 (ML2). ML2 is assigned to roads open for use by high clearance vehicles where passenger car use is not considered. No change in classification is proposed for any USFS road. However, under Alternative C and Variant C1, Western proposes to reconstruct sections of USFS Roads 122 and 247.D, to allow for passage of semi-trailer trucks to structure locations. Under this alternative, grinding, chipping, or blasting could be used to level the grade on the west end of Pole Hill Road. Use of imported aggregate would be limited and would be used only when needed to achieve proper grades for haul. Alternatives A, B, and D and Variants A1 and A2 propose either no improvements to USFS roads or limited reconditioning to remove ruts post-construction. Western's SCPs would be applied as appropriate.

The miles of USFS road where road reconstruction or limited road reconditioning is proposed, is summarized by alternative in **Table 2.3-2**.

Table 2.3-2 National Forest Service Road Reconstruction or Reconditioning

Road Category	A, A1, & A2	B	C & C1	D
Unimproved system road (miles)	1.4	0.4	0.0	0.4
Limited reconditioning of existing ML2 system road post-construction (miles)	2.2	3.2	0.2	3.2
Reconstruction of existing ML2 system road for construction (miles)	0	0	3.4	0

Permanent Access

Permanent access between USFS roads and structure sites is needed to access the rebuilt line on either one ROW (Alternatives A, B, C, and variants) or two ROWs (Alternative D). The roads Western currently use for access to the transmission lines would continue to be used to the extent feasible. Where existing access is inadequate, new permanent access roads are proposed. Permanent access roads are proposed to be classified as Maintenance Level 2 and Traffic Service Level "C." Western would recondition/reconstruct roads only to the extent that it is necessary to provide access for construction and maintenance equipment. The proposed designation is for administrative use only. During the design phase, Western would consult with the USFS on access road alignments and conduct biological and cultural surveys for any new roads not previously surveyed.

Temporary Access

Temporary access for line decommissioning would utilize Western's existing access roads, new temporary access roads, existing non-system two-track, and overland travel, as needed for each of the alternatives. New temporary access roads would have a design width of 8 feet. Western would construct temporary access roads to the extent that it is necessary to provide access for four-wheel drive trucks. Once implementation is complete these temporary access roads would be obliterated and revegetated as needed.

Road Decommissioning

Alternatives A, B, C, and the variants propose to rebuild the transmission line as a double-circuit line on one of two existing ROWs. The other ROW would be decommissioned by removing structures, insulator bundles and crossarms, and conductors, and revegetating the ROW as needed. Once the ROW is decommissioned, Western's existing or temporary access to that ROW on National Forest System land also would be decommissioned. Access decommissioning may consist of providing for proper drainage and allowing the access route to naturally revegetate, or involve more active restoration methods such as scarification and reseeding, depending on local site conditions.

Access by Alternative

The miles of permanent and temporary access on National Forest System lands for line removal and new construction under each of the action alternatives and variants are summarized in **Table 2.3-3** below.

Table 2.3-3 Access on National Forest System Lands by Alternative

Road Category	A, A1, & A2	B	C & C1	D
Permanent Access (Administrative Designation)				
Existing Western access designated for administrative use	0.4	0.2	0.2	0.6
New administrative road for permanent access	0.9	0.6	0.6	1.9
Temporary Access				
New temporary road for line decommissioning	0.4	0.9	0.9	0.0
Temporary access by non-system two-track	0.6	0.5	0.5	0.0
Temporary access by overland travel	0.3	0.3	0.3	0.0
Decommissioning				
Existing Western access to be decommissioned	0.2	0.3	0.3	0.0

2.3.3 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 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 (**Table 2.5-1**) and would be located at sites previously disturbed where practical. Existing or portable concrete batch plants would be used to supply poured concrete for foundations for transmission line structures. In accordance with the SCPs, staging areas would be surveyed, as necessary, for cultural and other resources prior to disturbance.

2.3.4 Existing Line Removal

The construction contractor would determine how to remove existing structures. Landowners would be consulted to determine if structures would be cut off below ground level or completely removed. Generally, structures would be lowered to the ground and stripped of hardware, arms, and braces. The conductor would be removed and coiled up prior to "laying" down existing structures or coiled up after the structures have been removed from the ROW. Pulling sites may be needed to pull the conductors. The construction contractor would have the option to remove guy anchors or cut them off 30 inches below ground level. In areas with steep topography or poor access, wood-pole structures may be left in place, removed by dragging with a drag line, or removed by other means. If poles are left in place, they would be flush cut at the ground and left on-site in the ROW in long sections.

Construction waste materials would be collected, hauled away, and recycled or disposed of at approved sites. Often old utility poles are offered to landowners for their use. 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 roads, 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.

2.3.5 Clearing and Grading

Crews would remove trees and shrubs from the structure location and along the ROW, as necessary, to provide access for construction equipment and activities. Methods for vegetation clearing and debris disposal are described in detail in **Appendix B**. Vegetation removal for ROW maintenance is described in Section 2.6.1.

2.3.6 Structure and Conductor Installation

Direct embedded single-pole steel structures are proposed for Alternative A, Variant A1, and Alternatives B and C. A truck-mounted or track-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 or helicopter 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 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. The fully assembled 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.

For Alternative D, which involves wood pole structure replacement, holes would be augered for new structure poles. Approximately 10 percent of the total structure height plus an additional 2 feet of each structure would be placed underground (e.g., a 70-foot-tall structure would have approximately 9 feet underground). Construction crews would assemble new structures within the ROW, and then position the structures into augered holes using cranes. Dirt from the excavations would be used to backfill around the new poles and to fill in the holes from the removed structures. Excess dirt would be spread near the pole and leveled with existing topography.

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.

The proposed project would require level sites approximately every 2 to 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. The conductor pulling, sagging, and clipping operations would take place once the structures are in place. The conductor would not touch the ground during stringing or tensioning. 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 install the pulling cable. Where necessary, traffic would be slowed or alerted while activities are occurring that could affect public safety.

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. Most disturbance during this phase of construction would occur within the existing or expanded ROW. However, at some locations (e.g., at pulling and tensioning sites near an angle in the alignment) areas outside the ROW may be disturbed during construction.

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. Where appropriate, usually areas with compactive soil types or where compaction would cause a problem, 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 an approved mix as soon as practical after construction activities are completed in any given area. On National Forest System lands, an approved 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, as negotiated with the public or private land managers.

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 or three crews of five to six persons each.

2.3.9 Construction Sequencing

The transmission line rebuild is expected to take eight to twelve months to construct, depending on which alternative is selected. **Table 2.3-4** lists the typical sequence of construction activities for overhead transmission line and the equipment needed for each task. Photos of typical overhead construction methods are provided in **Figure 2.3-1**. Underground construction methods applicable to Variant A2 and Variant C1 are described in Section 2.2.4.

Table 2.3-4 Construction Activities and Equipment

Task	Equipment
Surveying	Utility vehicles, pickups, ATVs
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, semi-trailer trucks, helicopters
Cable Pulling	Boom trucks/man lifts, 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 Disturbance and 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 design criteria (Section 2.5). An estimate of short-term disturbance areas associated with transmission line construction and access routes are provided in **Tables 2.3-5** and **2.3-6** below. Long-term disturbance for structure bases would be less than 0.1 acre for any alternative.

Table 2.3-5 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

NA = not applicable.

Table 2.3-6 Summary of Short-Term and Long-Term Surface Disturbance for Access Routes

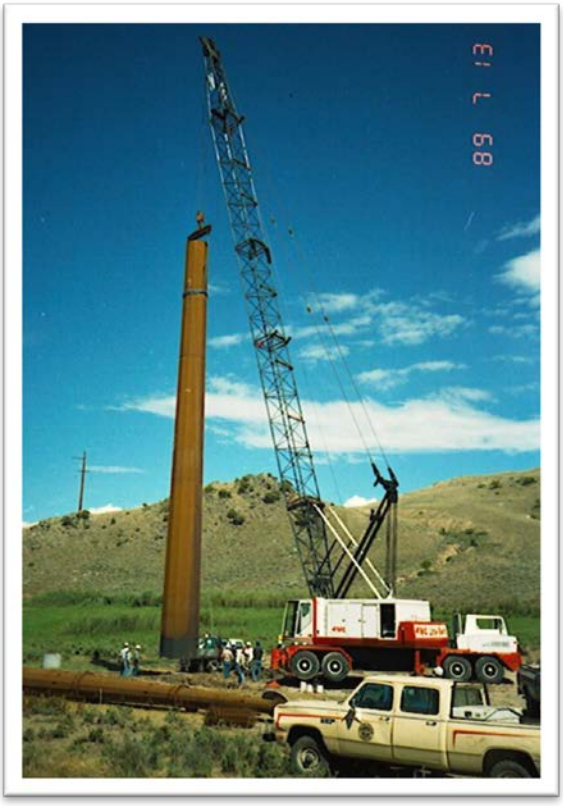
Disturbance Type	A	A1	A2	B	C	C1	D
Short-term disturbance for temporary access (acres)	7	7	7	7	8	8	0
Long-term disturbance for permanent access (acres)	10	10	11	13	10	9	21

* Assumes 8-foot-wide access route for temporary access and 15-foot-wide access route for permanent access.

Figure 2.3-1 Examples of Overhead Transmission Line Construction

Hauling structure on an access road

Auger drilling for structure base



Setting a structure base

Setting the top of a structure

2.4 Comparison of Alternative Costs

A comparison of rough order magnitude life-cycle costs for the seven end-to-end alternatives is provided in **Table 2.4-1** below. Estimated construction costs take into account the terrain, construction difficulty, length of line, and escalation for projected construction date. Estimated construction costs do not include costs for planning, lands and rights, environmental surveys and compliance, geologic investigations, designs and specifications, or construction supervision. The number of acres of land to be acquired for new or expanded ROWs is estimated as follows: Alternative A (153 acres); Variant A1 (157 acres); Variant A2 (152 acres); Alternative B (42 acres); Alternative C (117 acres); Variant C1 (110 acres); and Alternative D (177 acres). Land acquisition costs in **Table 2.4-1** are based on a market analysis completed by Western to determine landowner compensation and land acquisition costs, including: acquisition labor costs, surveys, legal review, title policies, appraisals, and possible condemnations.

Table 2.4-1 Preliminary Transmission Line Cost Estimates by Alternative[1,2]

	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

[1] Overhead transmission line costs for Alternative D includes replacement costs after 40 years due to use of wood structures.

[2] Underground cost estimates include replacement cost of the dielectric cables after 40 years.

2.5 Standard Construction Practices

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 Estes-Flatiron transmission lines rebuild, Western's SCPs identified in **Table 2.5-1** 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. Maintenance activities under the no action alternative may be performed by a Western maintenance crew, rather than by a construction contractor; however, SCPs would still apply.

Table 2.5-1 Western's Standard Construction Practices

Ref. #	Standard Construction 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.
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 from 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 National Forest System lands.

Ref. #	Standard Construction Practices
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.
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 National Forest System 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.

Ref. #	Standard Construction Practices
SCP 21	Structures will be carefully located to avoid sensitive vegetative conditions, including wetlands. If roads would cross wetlands, crossings occur 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 25*	Disturbed areas not needed for maintenance access will be reseeded using mixes approved by the 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 to 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 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.
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 SHPO and Indian tribe if on tribal lands. The survey reports and recommendations will be reviewed with the SHPOs and other appropriate agencies. Western's Standard Operating Procedure is to avoid all culturally sensitive sites. If not possible, 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.

Ref. #	Standard Construction Practices
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 NHPA 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, 24, 36, 40, and 41 are not applicable to this project and are not included in this table.

2.5.1 Project-Specific Design Criteria

The design criteria below were developed to minimize or avoid impacts to avian species and minimize visual effects of vegetation management. The following project-specific design criteria apply to all action alternatives:

2.5.1.1 Avian Wildlife

- Western will design and construct the transmission line in conformance with the Suggested Practices for Avian Protection on Power Lines (Avian Power Line Interaction Committee [APLIC] 2006).
- The siting of structure locations and/or timing of construction related activities will adhere to Colorado Parks and Wildlife (CPW) 2008 *Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors*. When distance buffers are not possible because of project proximity, then seasonal restrictions will be implemented.
- 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. 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 proposed project complies with the MBTA.

2.5.1.2 Visual Resources

- Clumps or islands of trees will be left in openings created by danger tree removal (where sagging lines and ground clearance are not a concern) to break sight distance and to maintain natural-appearing landscape mosaic pattern.
- Western will limit the use of foliar application of herbicide to reduce creation of large areas of browned vegetation.
- At road crossings, highway or visual overlooks, Western will leave sufficient vegetation, where possible to screen views of the ROW.

- If an area is visually very sensitive, Western will: (1) soften the straight line of ROW edges by cutting some additional trees outside the ROW during initial construction (with landowner permission); and/or (2) if possible, leave some low-growing trees within the ROW; and/or (3) implement a less-aggressive treatment of the ROW and ensure a higher frequency of monitoring vegetation conditions and scheduling re-treatments when needed.
- Western will treat unnatural-appearing soil disturbances by smoothing piles of soil created by machinery or any other soil disturbance from machine piling within 100 feet of areas requiring Partial Retention Visual Quality Objective/Moderate Scenic Integrity Objective or higher, scenic byways, hiking or multi-use trails, camping areas, other areas of moderate to high use recreation, or any other areas of visual significance.
- At locations where visibility from sensitive viewpoints is a major concern, structures with a shorter average height (85-foot) and shorter span length could be utilized. The shorter design would result in roughly twice the number of structures in a given length of ROW in order to meet required conductor clearances.

2.5.1.3 Special Status Wildlife and Plants

- Upon designation of a preferred alternative after issuance of the Draft EIS, and prior to project implementation, Western would conduct pre-construction surveys along portions of its preferred alternative including access roads not previously surveyed to identify sensitive species habitat or populations, and occurrences of noxious weeds. If special status individuals or populations are discovered, Western would develop mitigation to minimize effects in consultation with the USFS and natural resource agencies.

2.6 Operation and Maintenance Activities Common to All Alternatives

Operation and maintenance of the lines would be the responsibility of Western. Throughout the life of the proposed 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. Aerial line patrol is recognized as the most efficient and cost effective method to customers for maintaining the electric power grid. Western maintains and operates their helicopters under Federal Aviation Regulations Parts 135, 133, and 91 as is applicable to the mission being flown.
- 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. Western could conduct climbing inspections on transmission line structures if aerial or ground inspections find problems.
- Maintenance of access roads for Western's use, including surfacing, adequate drainage, and removing downed trees and/or branches.
- Removal of trees and brush that create access, safety, or clearance problems for operation of the transmission lines, and noxious weed control as described in Section 2.6.1 below.

2.6.1 Vegetation Management

Vegetation management practices to be implemented under the No Action and rebuild alternatives are described below.

2.6.1.1 No Action Alternative

Under the No Action Alternative, Western would continue its infrastructure, ROW, and access road maintenance practices as they are currently defined under existing authorizations and other agreements. Due to increasingly more stringent NERC standards, Western must pursue ROW

acquisition to allow for maintaining vegetation. Some of the existing transmission line ROW's do not allow enough room for adequate vegetation maintenance for more recent NERC compliance standards.

The current management approach to controlling vegetation, ensuring access, and maintaining equipment is largely reactive and responds to maintenance problems when they occur. Methods to control vegetation are manual, mechanical, and chemical (herbicides). As new practices are required due to new regulatory requirements and internal program requirement changes, Western would propose, review and adopt these changes.

Under the No Action Alternative, Western would continue its management approach for ROW and transmission line maintenance. Because Western addresses primarily danger trees, as defined in its authorization, it must review the ROWs at least once a year to ensure that no new danger trees have appeared and remove them. This focus requires annual reentries, and in some areas more frequent reentries, into the ROW to address vegetation problems that were identified during periodic line patrols or when maintenance forces are in the ROW for other activities. Western manages vegetation using the mix of manual, mechanical, and chemical methods to control vegetation in transmission line and access route ROWs. The No Action Alternative also includes the practice of spot application of approved herbicides. Western also performs access route repairs, as needed. Transmission system maintenance activities would consist of regular aerial and ground patrols to find problems, scheduling and performing repairs to correct problems, and preventative maintenance.

2.6.1.2 Proposed Vegetation Management for All Rebuild Alternatives

As part of the Estes-Flatiron Transmission Lines Rebuild, Western proposes to change the way it manages vegetation in the ROWs to a more proactive approach. This applies to each action alternative for the proposed transmission lines rebuild. Western proposes to manage its transmission line ROWs to better ensure the reliability and safety of the transmission lines, ensure adequate access for maintenance, protect the public and ensure worker safety, and manage risk from fire, all while ensuring the protection of environmental resources. For National Forest System lands, Western proposes to acquire new authorization along with the development of a new operation and maintenance plan to include a more proactive approach for managing vegetation along Western ROWs on National Forest System lands using an integrated vegetation management approach. This approach is based on the American National Standard Institute (ANSI) Tree, Shrub and Other Woody Plant Maintenance-Standard Practices (Integrated Vegetation Management, a. Electric Utility ROW (ANSI A300 (Part 7)-2006 IVM). Western would proactively control vegetation growth and fuel conditions that threaten its transmission lines. For private lands, where new easements are needed for the proposed transmission lines rebuild, Western proposes to include provisions in new easements to include a more proactive approach for managing vegetation using an integrated vegetation management approach. Depending on the rebuild alternative and where existing easements are adequate for proposed transmission line rebuild, Western would implement a more proactive approach for managing vegetation within the ROW to the extent allowed by any restrictions included with the existing easements. Western's proposed approach to vegetation management is summarized below. A more detailed description is provided in **Appendix B**.

2.6.1.3 Categories of Right-of-Way Conditions and Vegetation Treatment Methods

The existing transmission lines are in various conditions concerning vegetation management and fuel loading. For example, there are areas that need relatively little treatment, areas that need significant treatment to bring them to a desirable condition that could then be managed efficiently, and areas with mixed conditions. This is the result of a variety of past actions, including the extent of vegetation clearing along the ROWs when transmission lines were constructed and how these areas were subsequently managed over the years; maintenance practices over many years in a variety of vegetation types that could have contributed to excessive fuel loading in the ROWs; past danger-tree

cutting; site conditions (e.g., slope, soil types, rainfall, pine beetle and other beetle attacks, and diseases); tree species distribution; topography; and other variables.

Western has identified six broad categories of ROW conditions along the existing transmission lines. **Table 2.6-1** lists the six categories of ROW conditions and proposed treatment methods during initial construction as well as for ongoing maintenance. Photos illustrating typical ROW conditions associated with each category along the existing transmission lines are provided in **Appendix B**.

Table 2.6-1 Categories of Right-of-Way Conditions and Vegetation Treatment Methods

Category	Vegetation	Frequency of Treatment	Treatment Methods
1	ROW vegetation is compatible with the transmission line based on topography and/or presence of natural, stable, low-growing vegetation communities.	None expected, but ROW monitoring would be needed to ensure conditions have not changed.	None expected.
2	Fast-growing incompatible species that are not acceptable; over the long term, the vegetation is likely to include incompatible vegetation types that would require monitoring and treatment.	Initial treatment would occur with construction of the line. Maintenance treatments are expected to be relatively frequent (expected 2- to 6-year return intervals).	Accessible sites would favor use of mechanized equipment and removal of salvageable material. Inaccessible sites would favor use of hand felling.
3	Fast growing incompatible species of trees that are in an acceptable condition, but over the long term, Western would need to treat incompatible vegetation.	Initial treatment would occur with construction of the line. Maintenance treatments are expected to be relatively frequent (expected 2- to 6-year year return intervals, but this would vary depending on site conditions).	Accessible sites would favor mechanized equipment, with removal of salvageable material. Inaccessible sites would favor use of hand felling.
4	Slow-growing incompatible species of mature vegetation that is not acceptable, and in the long-term incompatible; vegetation treatments would be needed to control re-growth.	Initial treatment would occur with construction of the line. Maintenance treatments are expected to be relatively infrequent on sites with incompatible species with slow growth rates, perhaps 5 or more years, depending on site conditions.	On sites with good access, mechanized equipment would be favored and salvageable material would be removed. On sites with poor access, hand felling and other manual methods would typically be used.

Category	Vegetation	Frequency of Treatment	Treatment Methods
5	These sites have slow-growing incompatible species, and the ROW condition is acceptable. However, over the long term, Western would need to monitor and treat the incompatible species.	Initial treatment would occur with construction of the line. Maintenance treatments are expected to be relatively infrequent, perhaps 5 years or longer, depending on site conditions.	On sites with good access, mechanized equipment would be favored and salvageable material would be removed. On sites with poor access, hand felling and other manual methods would typically be used.
6	Treatments in these areas of ROW are driven largely by the conditions of the fuel load. Typically, they include areas with low-growing vegetation types characterized by having high fuel loads. Sites are characterized by dense, woody vegetation capable of high-intensity fire, with transmission lines having relatively low conductor-to-ground clearances.	Initial treatment would occur with construction of the line. This could include mechanical removal of vegetation near structures and from areas of the ROW. Maintenance treatments as needed. Need is determined from ROW monitoring.	In areas with good access, mechanized treatment such as mowing would be favored. In areas with poor access, manual treatments would typically be used.

2.6.1.4 Establishing the Desired ROW Vegetation Condition During Construction

Western would assess current conditions in the ROW to identify areas that need initial treatments during construction based on the categories described above. Treatment of ROW vegetation during construction of new line would emphasize the following activities:

- Cut danger trees if any are present;
- Manage slash that has built up in the ROW to reduce fuels density;
- Grind or crush regeneration that has grown in the ROW to reduce the density of live, green fuels; and
- Cut tree species that at mature height would threaten safe, reliable transmission-line operation.

During construction of the transmission line, Western proposes to remove undesirable vegetation (typically trees) that at mature height would interfere with transmission line safety and reliability. The desired condition would be a ROW dominated by grasses, forbs, shrubs, and lower-growth tree species that, at maturity, would not interfere with the transmission line.

2.6.1.5 Maintaining Desired ROW Condition

Western's proposal includes monitoring and retreating ROW areas at appropriate intervals based on the results of reviews of ROW conditions during line patrols. In ROW areas with relatively low conductor-to-ground clearances, Western would typically retain lower-growth native plant species to maintain the desired vegetation condition. Western would do this through active management to remove tall-growth species. Depending on the specific site conditions, desirable native species could

include grasses, forbs, and shrubs, through appropriately sized small or lower-growing tree species. Generally, more selective control methods can be used to maintain this condition along the ROW. ROW maintenance activities and treatment intervals would vary in the ROW depending on the success of previous treatments, vegetation type, rates of vegetation re-growth, environmental protection requirements, and risks to the transmission line.

An important component of ROW maintenance is fuels management to mitigate the risk of wildfires. Western would evaluate the risk to transmission line operations and security from wildfire and manage fuels in the ROWs. ROW fuel loads associated with vegetation re-growth or control treatments must be evaluated and controlled as needed. All vegetation (dead or live) can be considered fuel because it can contribute to fire intensity and duration. In addition to reducing the risk of incompatible vegetation in a ROW, Western's proposed ROW reclamation and long-term maintenance strategies would address areas where accumulated fuel poses an unacceptable risk. Western would reduce fuel density in ROWs using mechanical and manual treatment approaches, as described below.

There could be areas along the existing transmission lines that need no or minimal vegetation management – for example, some areas in canyons and drainages or other steep topography in which trees might not grow to heights or densities that would threaten the transmission line that crosses high above (see Category 1). In some of these areas few if any control methods would be needed for years. In other vegetation communities, occasional mowing of vegetation around structures could be needed to ensure access to the structures and to reduce the risk of fire to the transmission line structures (e.g., mowing sagebrush around wooden structures). Regardless, Western would need to monitor all ROWs to continuously evaluate vegetation conditions and ensure they meet the management requirements, and that changed conditions have not resulted in unacceptable threats.

Vegetation Control Methods

Western proposes several general control methods, individually or in combination, to manage vegetation. These methods include a variety of control methods utilities typically use to manage their ROWs. Western would use the techniques to alter the vegetation condition so that it can be maintained more efficiently and effectively. The following paragraphs describe the general vegetation-control methods.

Manual Control Methods

Manual vegetation control includes the use of hand-operated powered tools and non-powered hand tools. Manual techniques—mainly using chainsaws—can be used where equipment access is limited by terrain, soil conditions, or other environmental conditions. One or two trucks carrying equipment and workers drive along the access road to the appropriate site. Crews of two or more with chainsaws then hike along the ROW and cut target vegetation. Crews often use ATVs instead of trucks. Crew sizes for this type of activity usually range from two to four.

Mechanical Control Methods

Mechanical vegetation control uses machine platforms with various interchangeable treatment-head attachments to remove or control target vegetation along transmission line and authorized access route ROWs. Rubber-tired mechanical equipment platforms are generally limited to operating on slopes less than 30 to 35 percent. Specialized tracked equipment platforms, with articulating control cabins, are typically used on slopes up to 60 percent. Both types of specialized equipment platforms can operate with very low ground pressures. However, site-specific obstacles such as rocks or other extreme terrain conditions can reduce their efficiency. Mechanical operations usually involve a crew of two to three.

Herbicides and Growth Regulators

Western would use spot application of herbicides approved for use to treat undesirable, mostly herbaceous vegetation. Western applies herbicides to invasive species. Herbicides are applied directly to the vegetation using a hand or powered sprayer. Herbicides are used on incompatible vegetation that sprouts after initial treatment by cutting or mowing. Herbicide applications typically involve a crew of one to two.

Western uses herbicides that are approved for use in ROW maintenance and by the USFS. Western uses EPA and state-registered herbicides, and appropriately licensed or certified applicators apply the herbicides following the label requirements.

Herbicides can be applied in different ways, depending on the targeted plants, vegetation density, and site circumstances. Western proposes herbicide treatment either by spot application or localized (site-specific) application.

When making decisions about the use of these methods, Western considers the area being treated, the presence of sensitive plants and other environmental resources, the herbicide label requirements, and whether the method is cost effective and efficient.

Site-specific Herbicide Application

Site-specific or localized herbicide application is the treatment of individual or small groupings of plants. Western typically uses this application method only in areas of low to medium target-plant density. The application techniques include, but are not limited to, basal treatment, low-volume foliar treatment, and cut stump treatment.

Debris Disposal

Managing vegetation includes cleanup – the treatment of slash and debris disposal. Methods of disposing of vegetation debris generated when vegetation is cut, include logging, chipping, lopping and scattering, mulching, and pile burning. Each of these methods are described further in **Appendix B**.

Mechanical Fuel Reduction Methods

Western would reduce existing fuel loads through mechanical thinning, mowing, chipping, and debris removal. Western would use site-specific treatments to reduce potential impacts from wildfire on the transmission line ROW by reducing the likely intensity and duration of fires in the ROW. Western would use a range of mechanical and manual methods, depending on site conditions. These include tree removals, mechanical and hand thinning of small-diameter trees to reduce ladder fuels, mechanical mastication (e.g., grinding and chipping), and hand and mechanical piling. The target fuels of these treatments include downed trees, slash, debris from past treatments, green fuels such as regenerated lodgepole pine, and brush such as Gambel oak and sagebrush.

Western would use prescribed burning only under optimum conditions, such as during periods of minimal wind speeds or high moisture content in fuels, to reduce the risk of fire escape and impacts from smoke. Prescribed fire treatments would include mechanical piling and burning and broadcast burns to reduce surface fuels over larger areas. Large pockets of dead and down woody material and slash generated from mechanical treatments would be broadcast burned or piled and burned to further reduce fuel loadings.

2.7 Alternatives Considered but Dismissed

2.7.1 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 2.7-1** below.

Table 2.7-1 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 U.S. 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 and may require constructing an additional length of transmission line. Locating the lines along these routes also adds flooding as another possible major catastrophic future event that may affect the transmission lines.
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; it also follows a riparian corridor. Western's 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.
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.

Potential Reroute	Reason for Dismissal
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 accomplish an avoidance of the Pinewood Lake viewshed and the adjacent subdivision in a more direct and effective manner.

2.7.2 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.

2.7.3 Other Alternatives

Other alternatives also were considered but dismissed, as discussed below.

2.7.3.1 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.

2.7.3.2 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. As discussed in Section 2.2.4, 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 alternatives that eliminate

these impacts at a much lower cost. For this reason, underground construction at this location was dropped from further consideration.

2.7.3.3 Underground Construction on National Forest System Lands

Variant C1 rebuilds the transmission line underground to the Roosevelt 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 lands 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 E-PH 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.

2.8 Comparison of Alternative Effects

Table 2.8-1 compares the alternatives with regard to key and other issues identified in Section 1.6.3, using selected measurable indicators. **Table 2.8-2** 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.

Table 2.8-1 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 (National Forest Service [NFS] 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	Unquantifiable Diminished off-highway vehicle (OHV) opportunities	Unquantifiable 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 NRHP-eligible historic sites potentially impacted	6	6	6	3	5	5	8	7
Issue: water resources, floodplains, and wetlands[2]								
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 [kV/m])	0.12	0.12	0	0.12	0.12	0	0.34	0.34
Magnetic fields at each ROW edge (milligauss [mG])	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 2.8-2 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 (221acres).	Vegetation communities in the ROW that support special status and sensitive wildlife species would be affected at approximately the same level as Alternative A (207acres).	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 (381acres).	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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