2.0 ALTERNATIVES

2.1 Introduction

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

2.2 Alternatives Considered in Detail

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

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

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

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

Ultimately, five alternatives were identified:

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

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

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

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

(5) **Alternative D-Options 1 and 2** – Rebuild and upgrade the transmission line primarily on existing utility ROWs (preferred alternative). Option 1 was selected as a component of the preferred alternative.

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

2.2.1 Alternative A – Keep the Existing Transmission Line (no action)

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

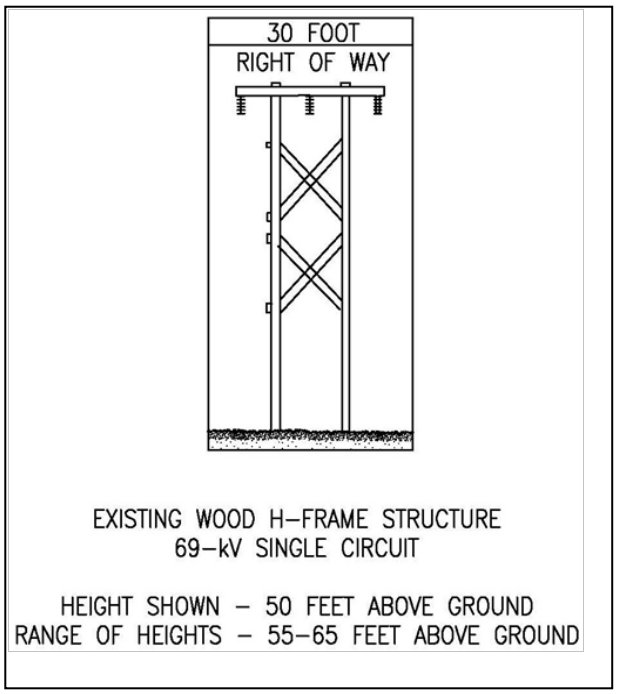

Figure 2-1. Existing H-Frame Wood Structure Profile.

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

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

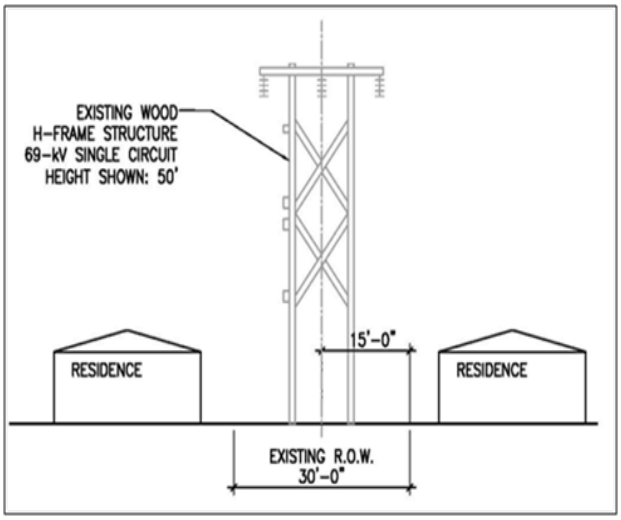

Figure 2-2. Typical Profile of Alternative A ROW through Residential Developments.

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

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

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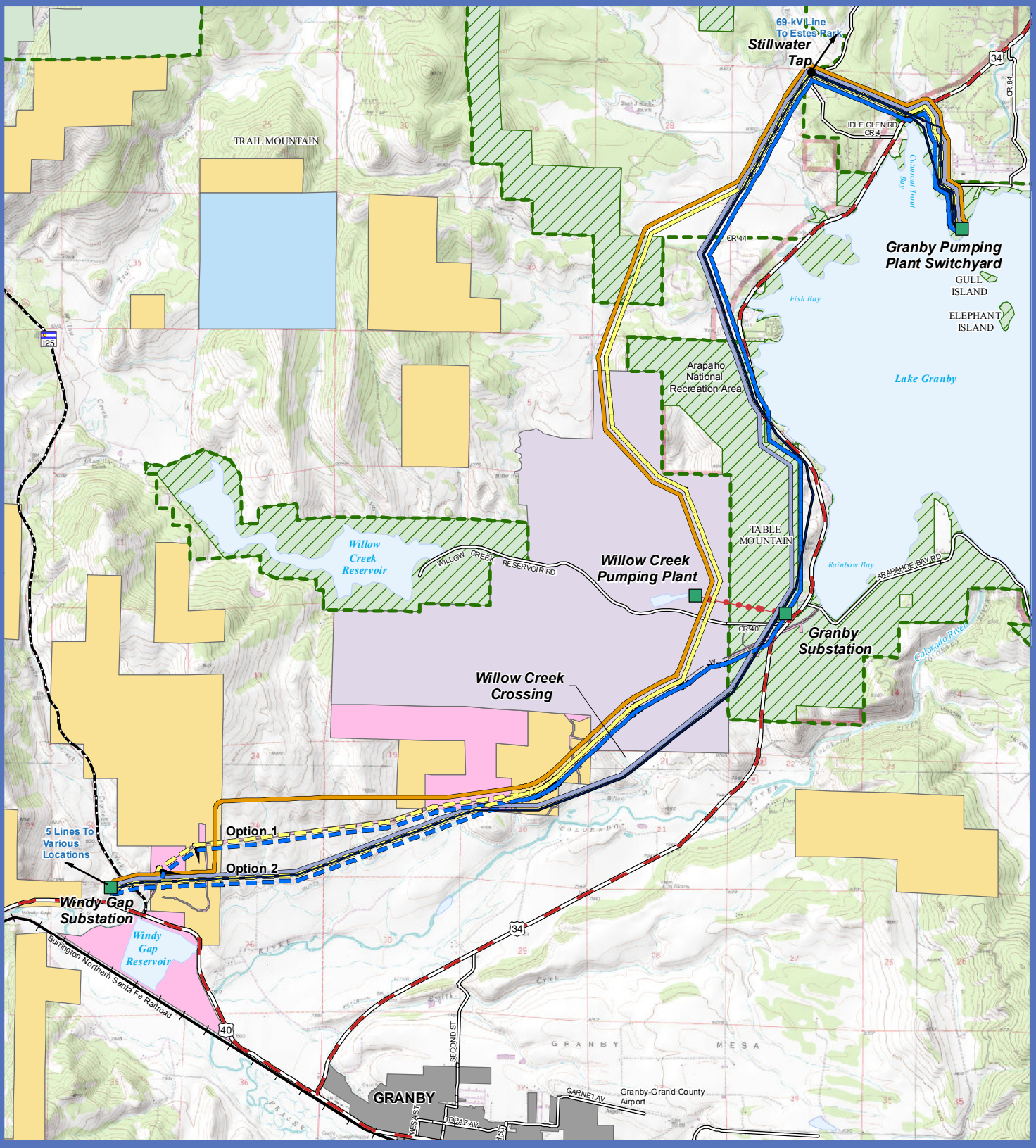


Map 2-1

Legend

Base Data

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

Transmission Line Alternatives

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

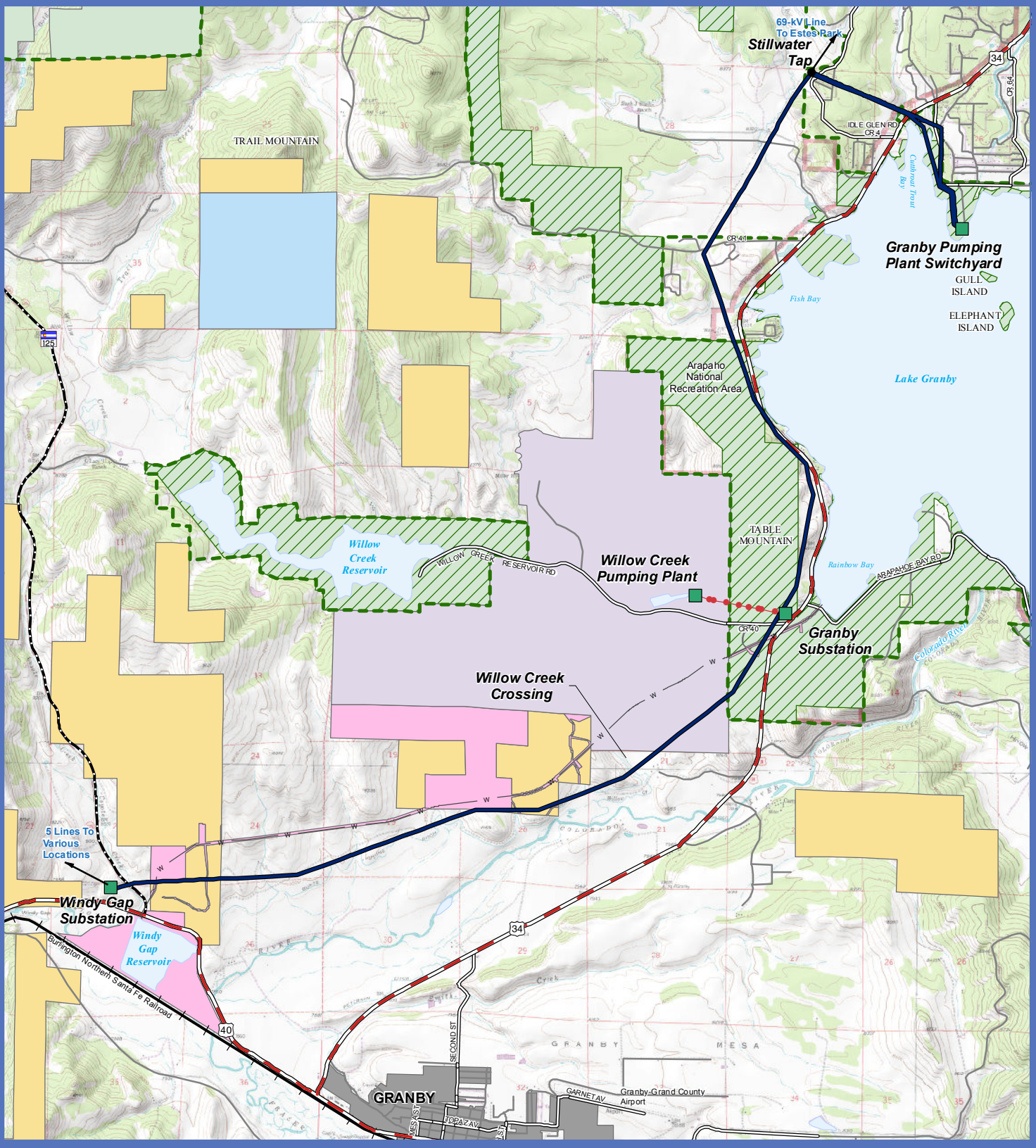
Land Status

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

All Alternatives

November 7, 2011

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



Map 2-2

Legend

Base Data

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

Transmission Line Alternatives

No Action Alternative

Land Status

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

Alternative A

November 7, 2011

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

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

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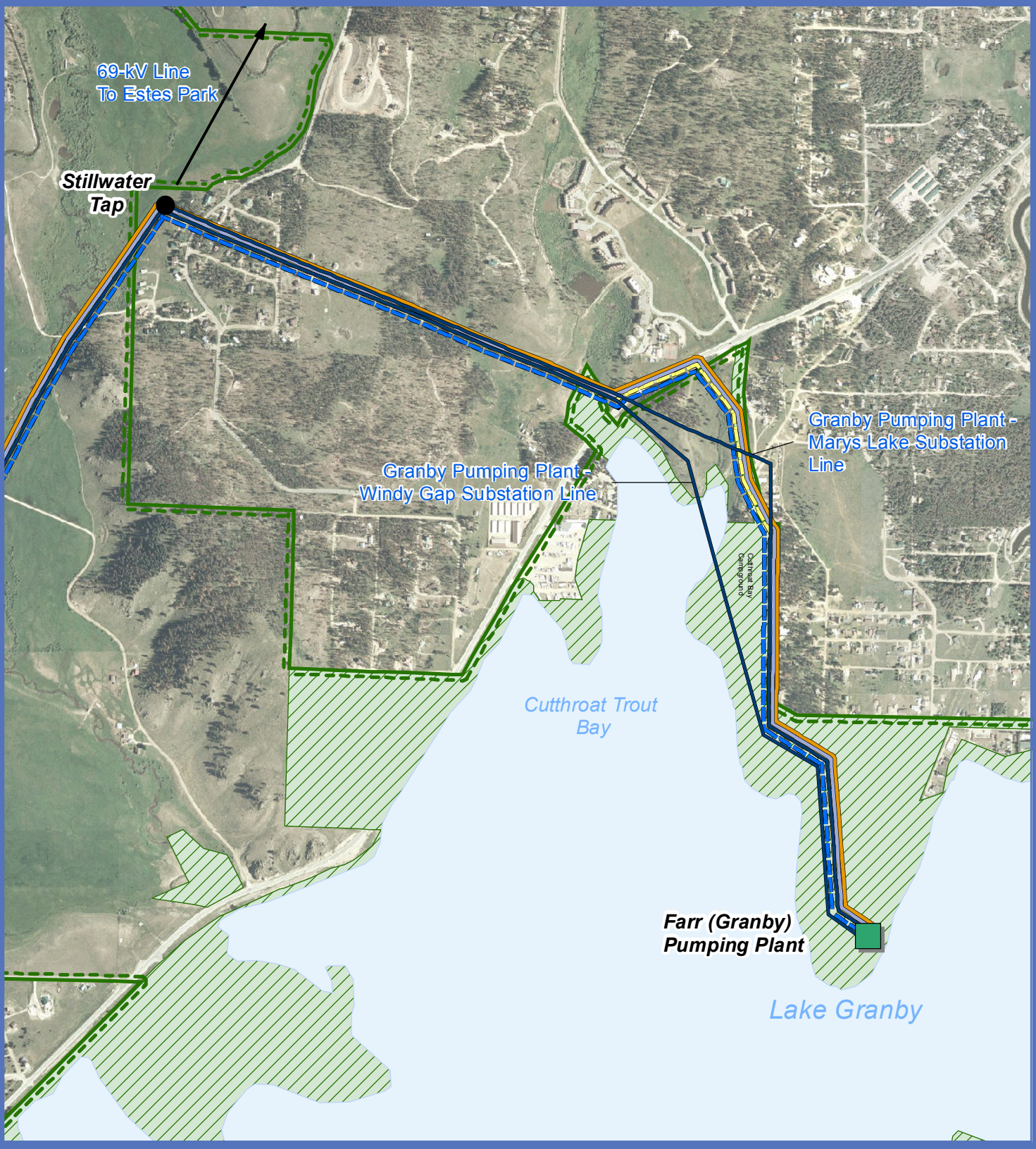


Map 2-3

Legend

Base Data

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

Transmission Line Alternatives

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

Land Status

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

North End Routes

November 7, 2011

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

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

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

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

2.2.2 Alternative B1 – Rebuild and Upgrade Existing Transmission Line

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

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

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

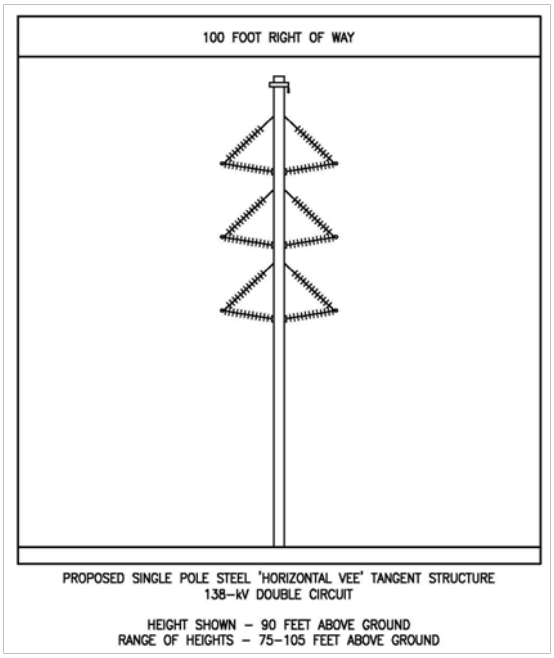


Figure 2-4. Typical Single-Pole Steel Structure Profile.

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

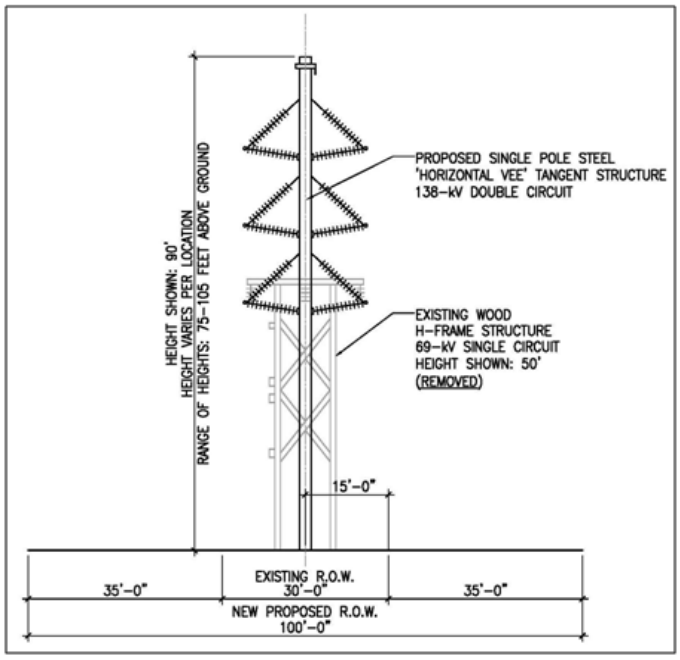


Figure 2-5. Typical Profile of New Single Steel Structures on Existing but Expanded ROW.

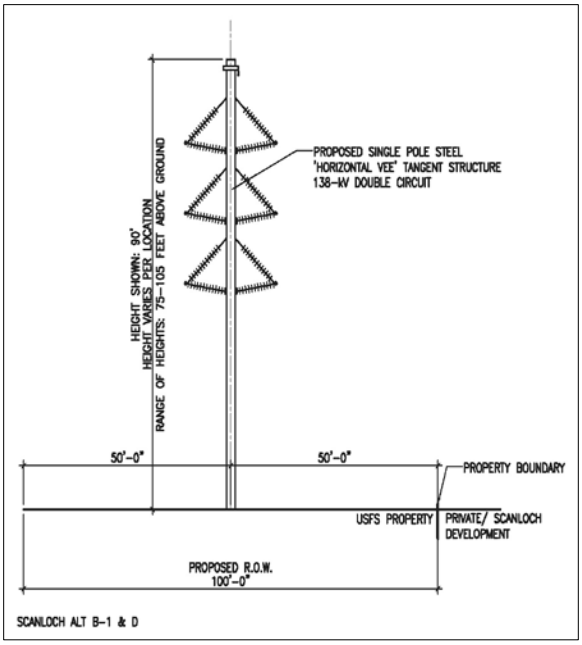
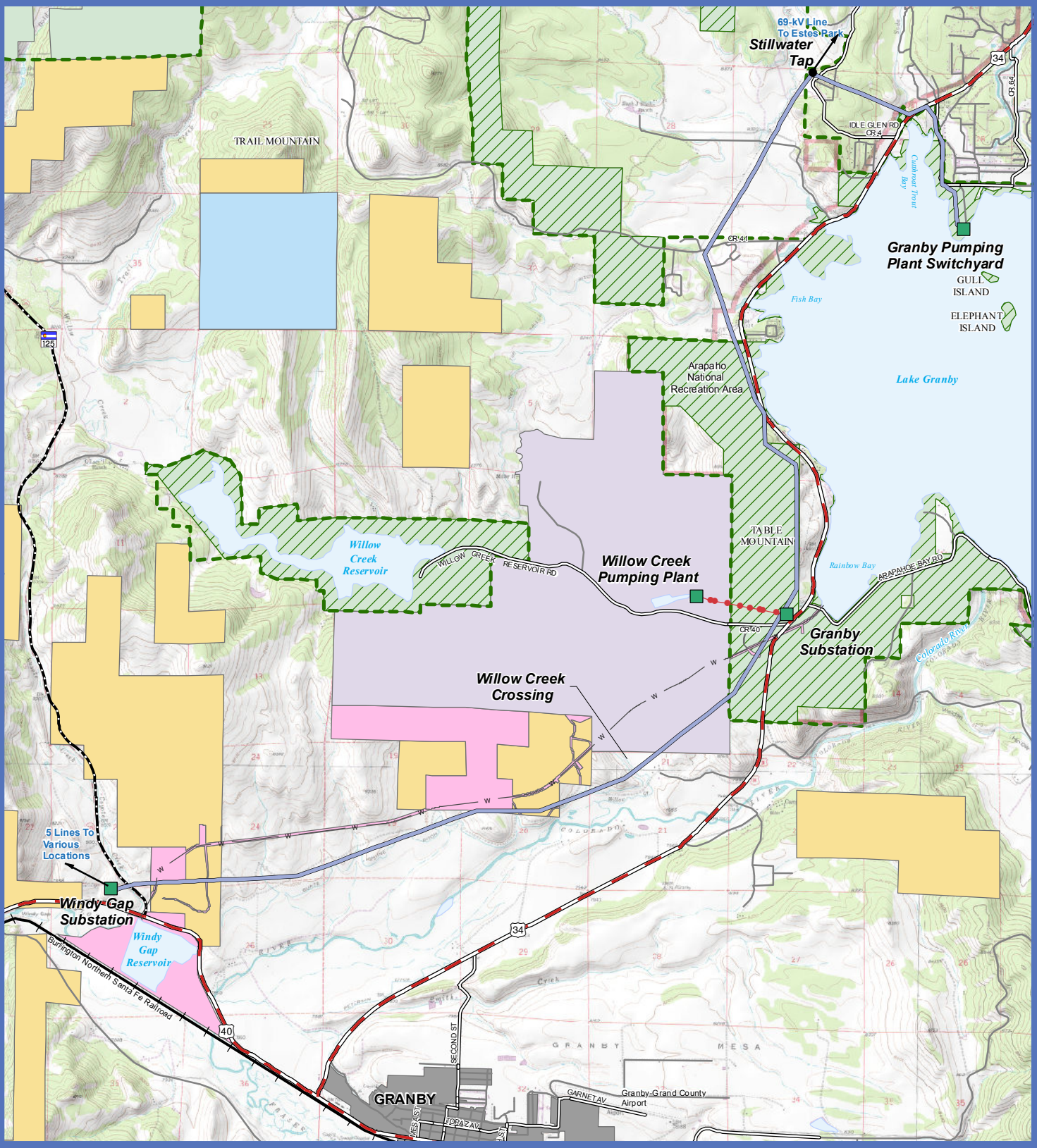


Figure 2-7. Typical Profile of New ROW on East Side of Table Mountain.



Map 2-4

Legend

Base Data

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

Transmission Line Alternatives

- Alternative B1

Land Status

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

Alternative B1

November 7, 2011

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

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT

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

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

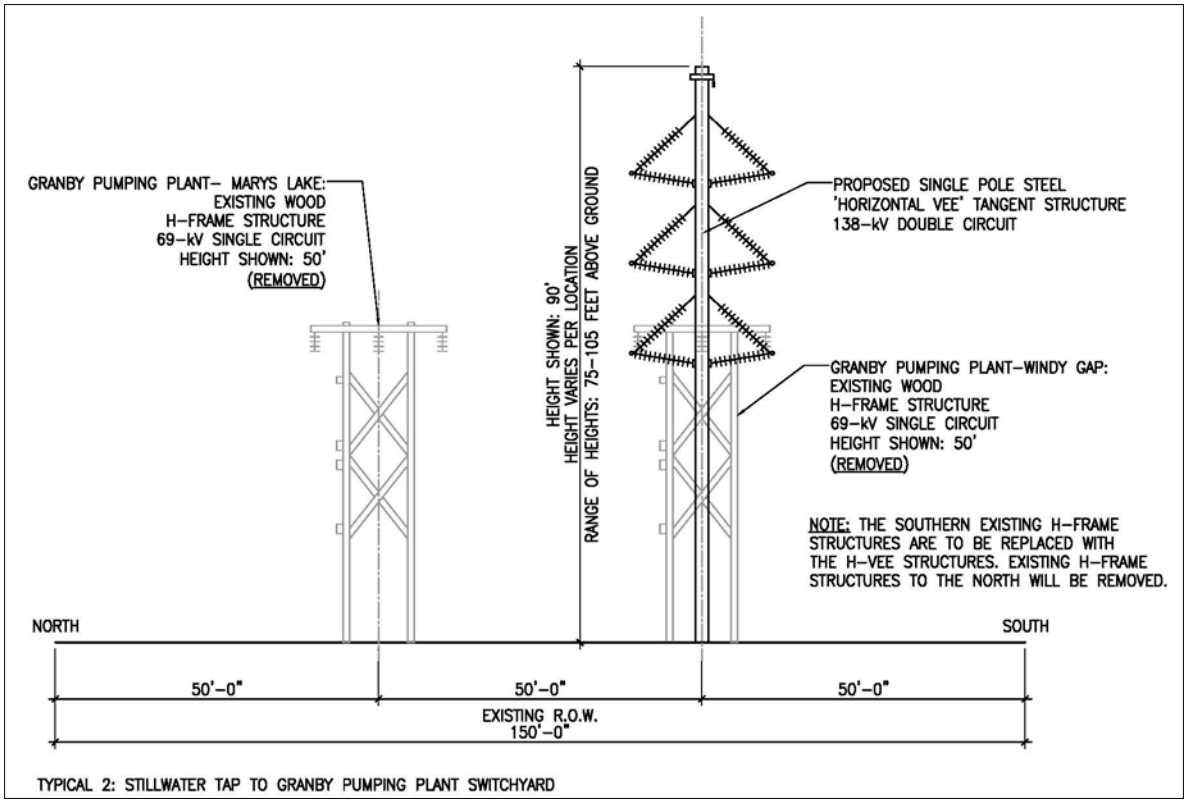


Figure 2-8. Typical Profile of Existing Parallel ROW Versus New Single ROW Leaving Stillwater Tap towards Granby Pumping Plant Switchyard.

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

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

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

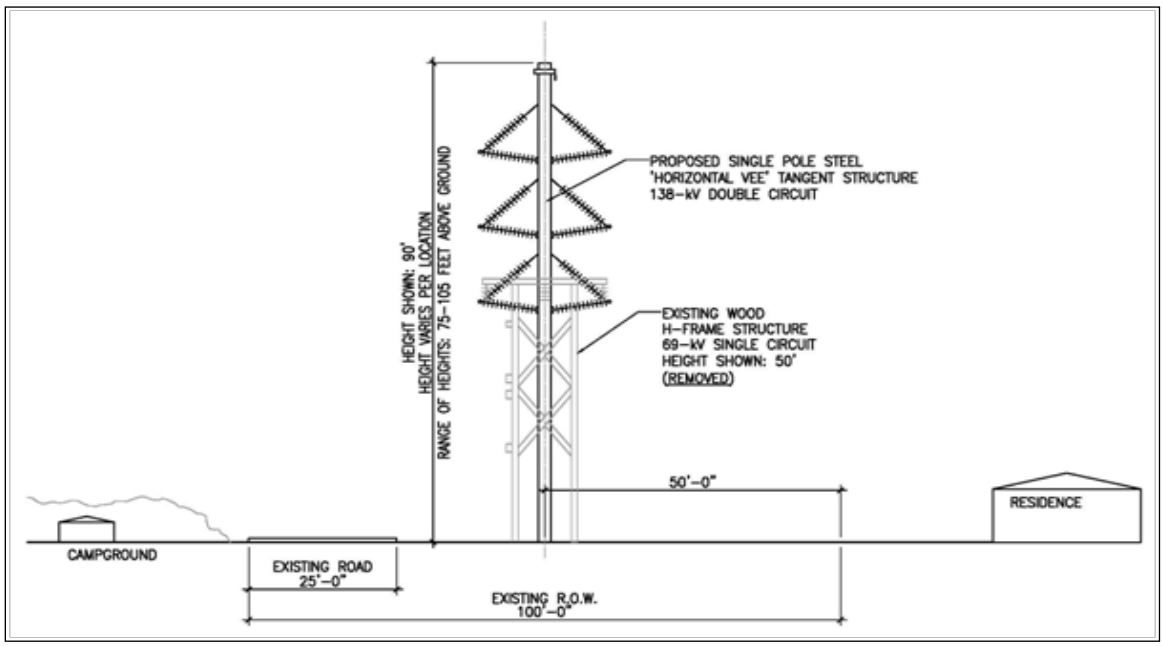


Figure 2-9. Typical Profile of Existing ROW with New Single-Pole Steel Structure East of CR64 and Cutthroat Bay Campground.

2.2.3 Alternative C1 – Reroute and Upgrade the Transmission Line

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

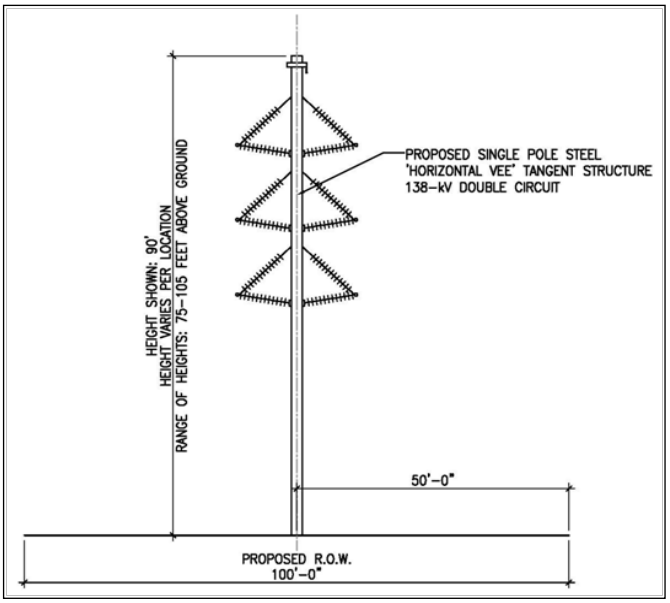


Figure 2-10. Typical Profile of Single-Pole Steel Structure on All New ROW.

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

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

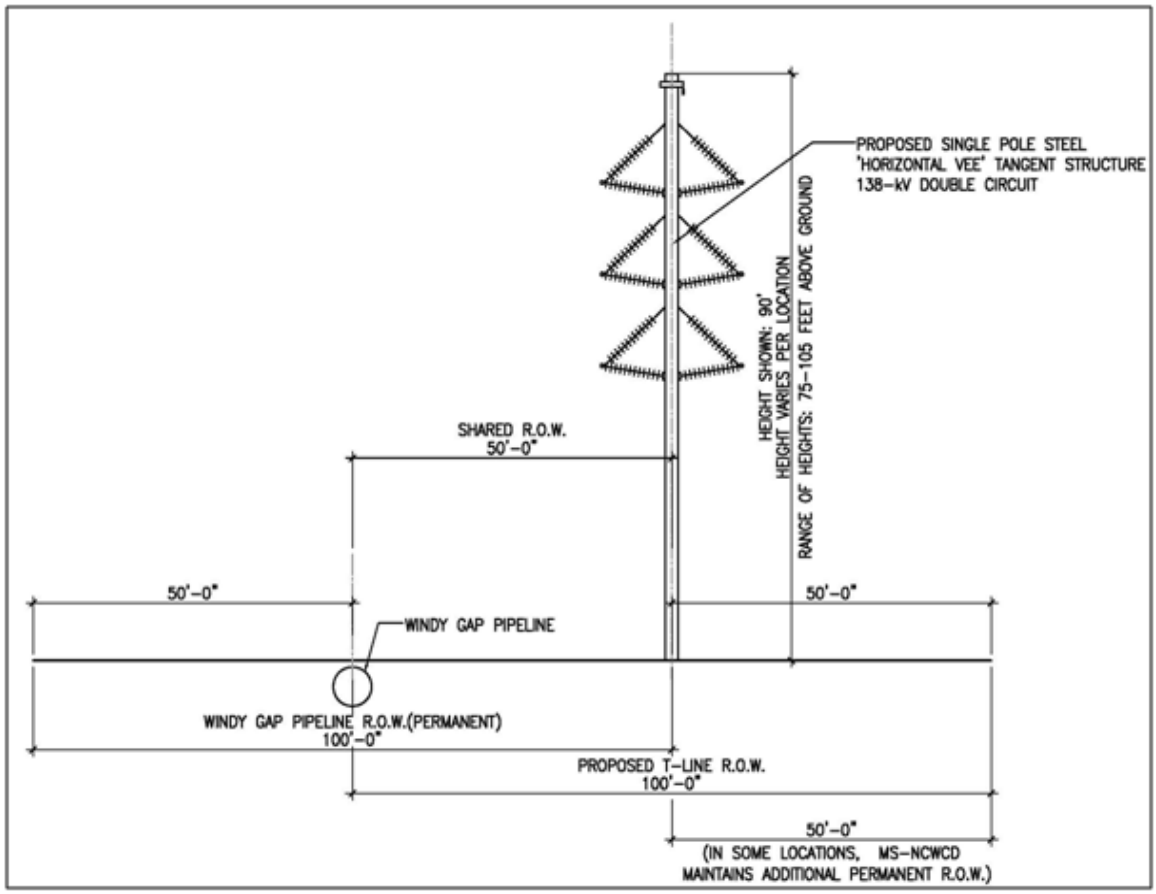
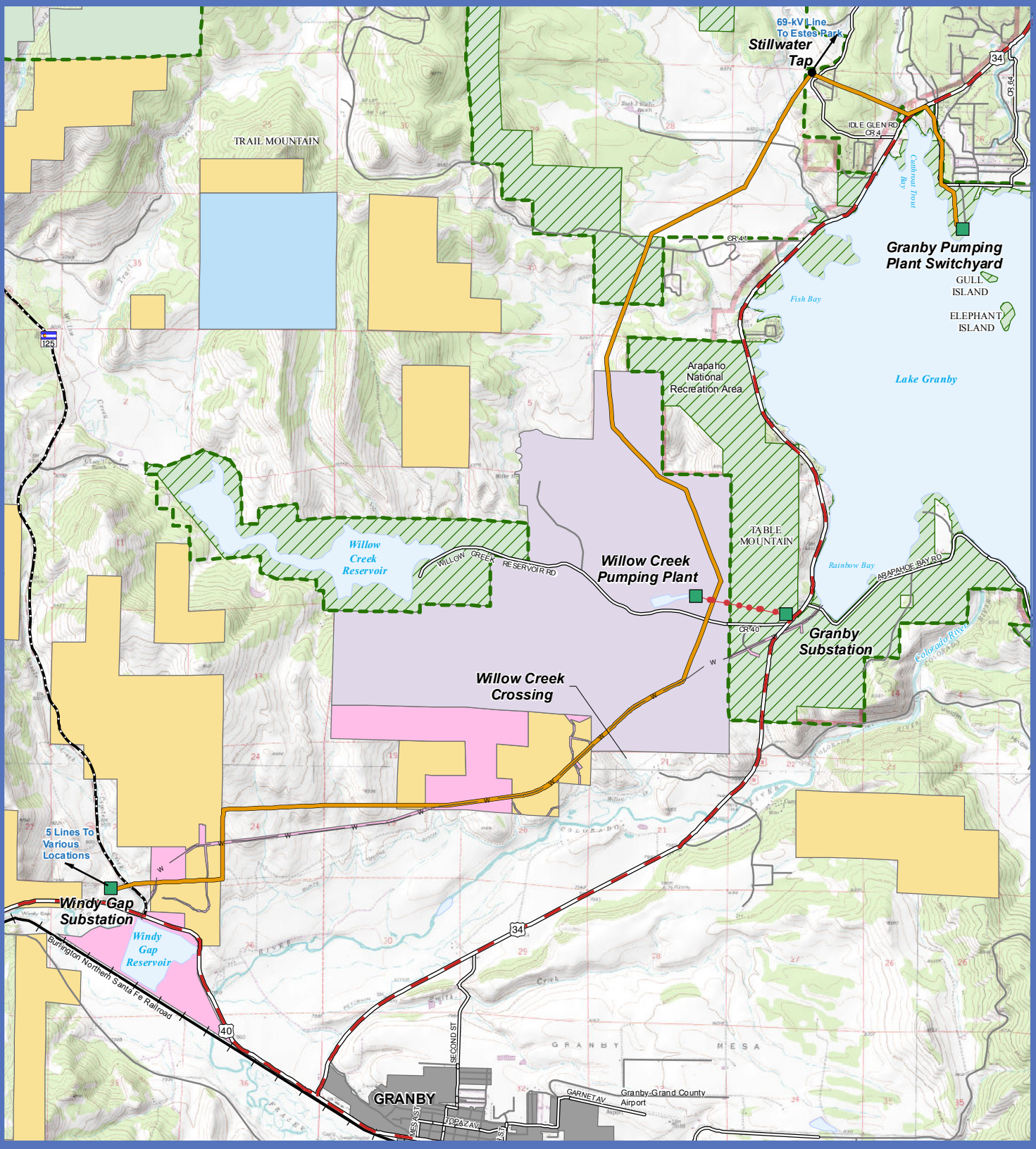


Figure 2-11. Typical Profile of New Single-Pole Steel Structure on Shared Windy Gap Pipeline ROW. The actual offset from the pipeline centerline for the transmission line structures would be approximately 50 to 100 feet.

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



Map 2-5

Legend

Base Data

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

Transmission Line Alternatives

- Alternative C1

Land Status

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

Alternative C1

November 7, 2011

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

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

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

2.2.4 Alternative C2 – Reroute and Upgrade the Transmission Line, with Options to Use Existing ROW

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

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

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

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

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

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

Under both options, Alternative C2 would generally follow the contours of the western toe of Table Mountain after leaving the Windy Gap Pipeline ROW. At the north end of Table Mountain, Alternative C2 would cross private land for approximately 0.5 mile prior to entering ANRA lands due west of Fish Bay. After crossing CR 41, the alignment would cross private land on a new alignment until joining the existing transmission line alignment at the section boundary (Sections 27 and 28). From this point to the Stillwater Tap, Alternative C2 would be located on the existing but expanded ROW. At Stillwater Tap, the existing Marys Lake-Granby Pumping Plant 69-kV

line would join the new Granby Pumping Plant-Windy Gap 69-kV line to form a three-terminal line with a new three-way switch. The new 138-kV circuit would bypass the three-way switch. The existing segment of the Marys Lake-Windy Gap 69-kV line between Stillwater Tap and Granby Pumping Plant Switchyard would be removed. The existing segment of the Granby Pumping Plant-Windy Gap 69-kV line would be removed between Stillwater Tap and Granby Pumping Plant Switchyard, and a new 138-kV/138-kV double-circuit line (operated at 69kV/138-kV) would be constructed (Map 2-3).

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

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

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

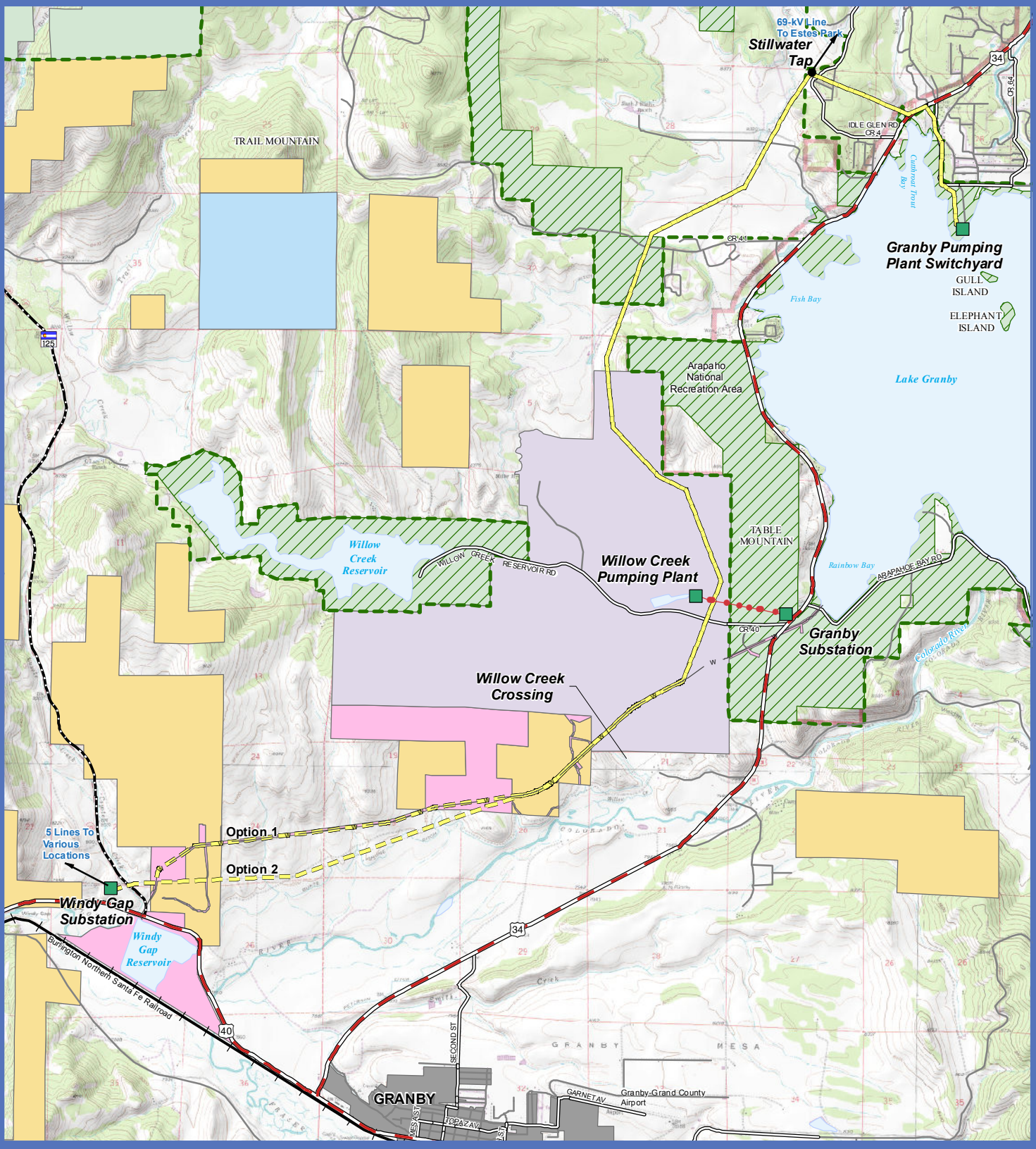
This alternative was derived from the original Alternative B presented during the scoping process. From Windy Gap Substation to the Granby Substation, Alternative D has two options, as discussed below. From Granby Substation to Granby Pumping Plant Switchyard, Alternative D is identical to Alternative B1.

Alternative D would rebuild and upgrade the existing transmission line from the Windy Gap Substation to the Granby Pumping Plant Switchyard (Map 2-8). This alternative would remove the existing single-circuit 69-kV line and construct approximately 11.7 miles of 138-kV double-circuit line using single-pole steel structures on the existing alignment or the Windy Gap Pipeline ROW (Figure 2-4 and Figure 2-6). Where Alternative D would be located on the existing alignment, the 30-foot ROW would be expanded to a width of 100 feet to accommodate requirements for construction, operation, and maintenance. At Stillwater Tap, this alternative would follow the same alignment described for Alternative B1 (Map 2-3), combining the two existing single-circuit 69-kV lines into one double-circuit line into Granby Pumping Plant Switchyard (Map 2-3).

From Windy Gap Substation, Alternative D has two route options, similar to those described for Alternative C2 (Map 2-7 and Map 2-8):

- Alternative D**-Option 1** – Follow the Windy Gap Pipeline ROW for 5 miles to just south of the Granby Substation, or
- Alternative D-**Option 2** – Follow the existing transmission line alignment for 3 miles, and join the Windy Gap Pipeline ROW for 2 miles to just south of the Granby Substation.

Of these two options, Option 1 is the preferred alternative.



Map 2-6

Legend

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

Transmission Line Alternatives
- Alternative C2
- Alternative C2 - Route Options

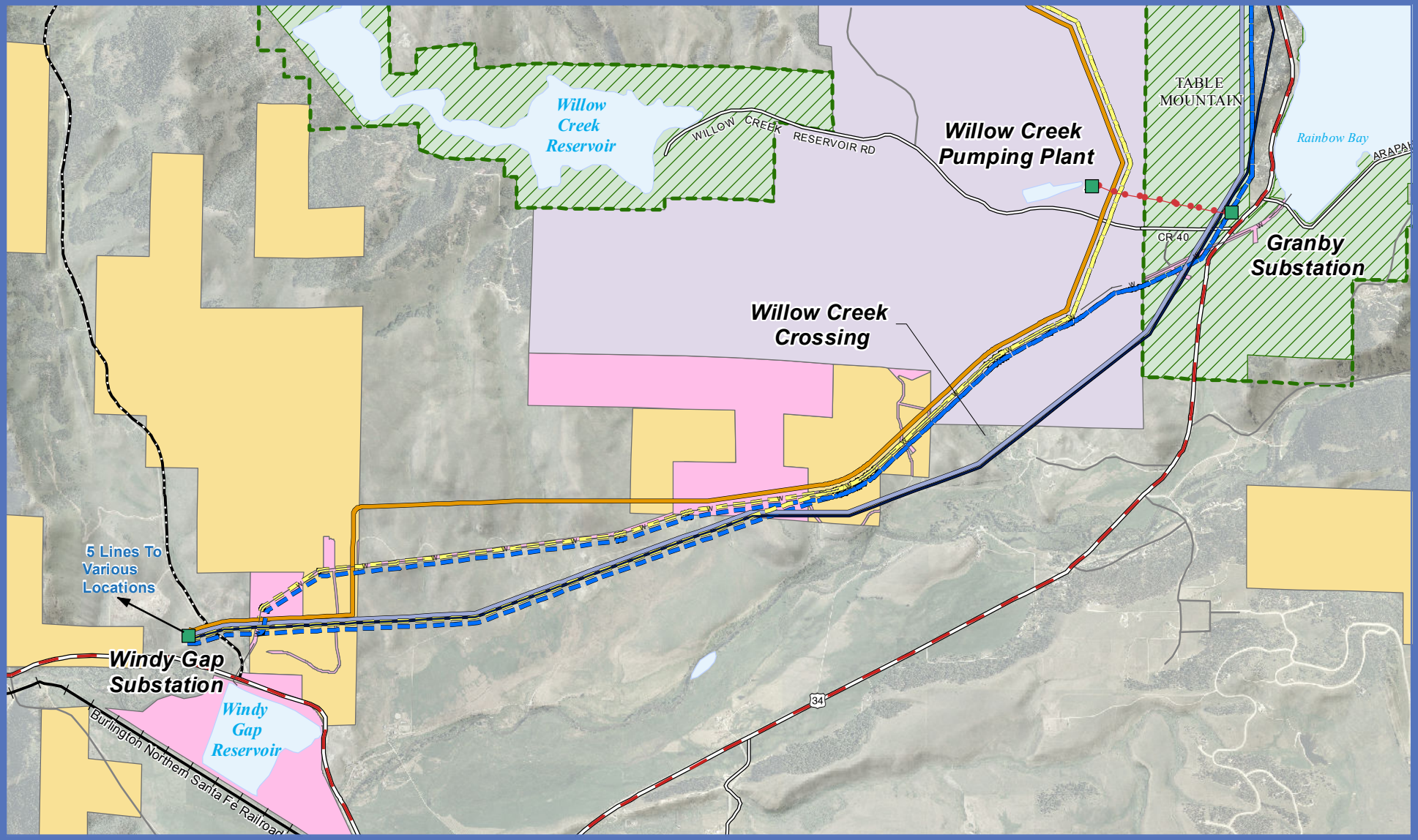
Land Status
- Northern Colorado Water Conservancy District (NCWCD)
- Municipal Subdistrict - Northern Colorado Water Conservancy District (MS-NCWCD)
- Forest Service Land within Arapaho National Recreation Area
- Bureau of Land Management (BLM)
- Colorado State Land Board (SLB)
- U.S. Forest Service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

Alternative C2

November 7, 2011

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

GRANBY PUMPING PLANT - WINDY GAP TRANSMISSION LINE REBUILD PROJECT



Map 2-7

Legend

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

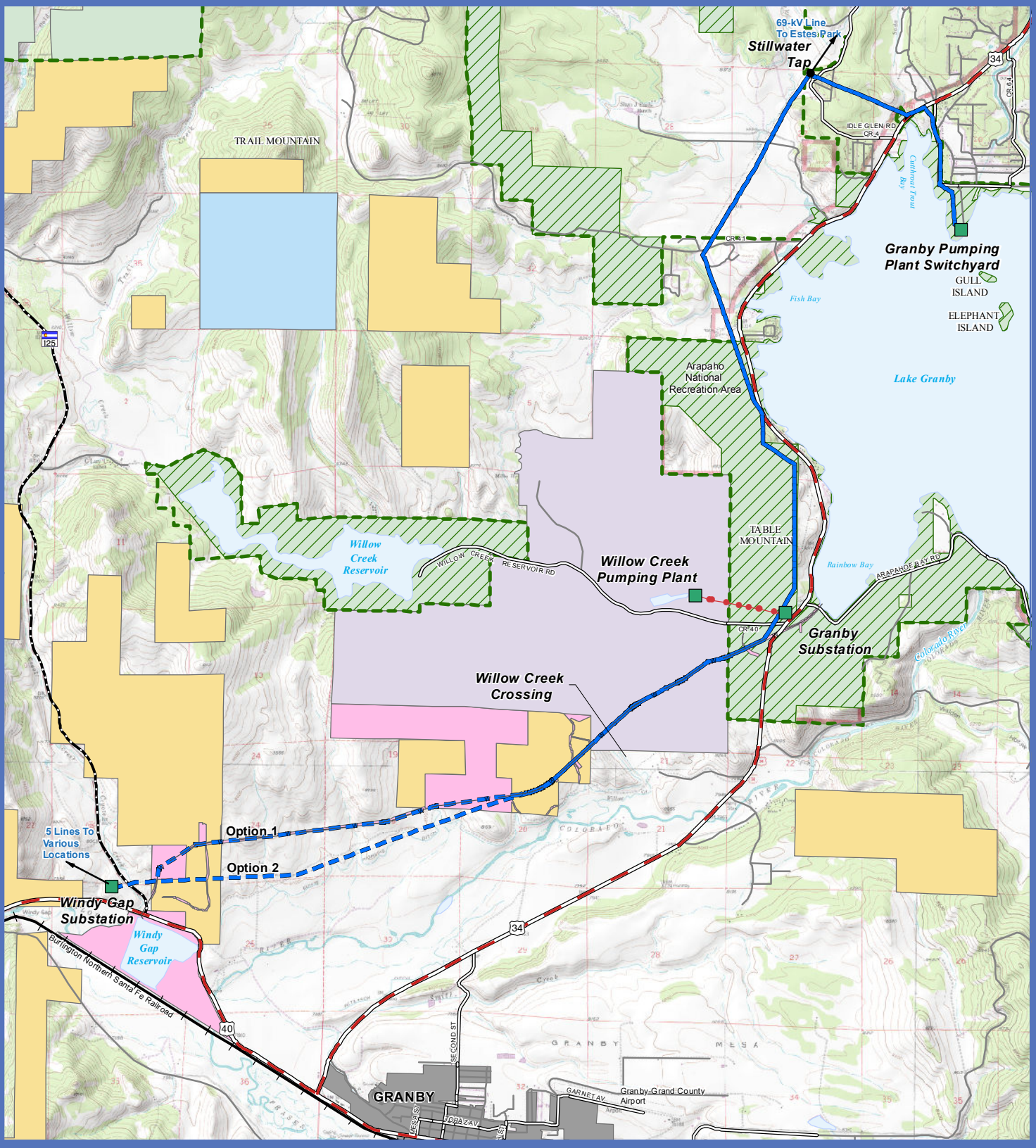
Transmission Line Alternatives
- Alternative A - Existing
- Alternative B1
- Alternative C1
- Alternative C2
- Alternative C2 - Options 1 and 2
- Alternative D
- Alternative D - Options 1 and 2

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

Southwest Route Options

November 7, 2011

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



Map 2-8

Legend

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

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

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

Alternative D

November 7, 2011

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

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

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

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

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

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

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

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

2.2.6 Comparison of Alternative Elements

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

Table 2-1. Comparison of Alternative Elements.

Alternative	Total Length (miles)	Miles of Transmission Line within the Existing ROW	Miles of Transmission Line within a New ROW	Land Ownership Crossed (miles)	
Alternative A	13.6	13.6	0	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.8 0.7 0.4 3.3 8.5
Alternative B1	11.9	10.1	1.8	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.8 0.7 0.4 3.8 6.2
Alternative C1	12.3	3.3	9.0	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.7 3.4 1.4 1.5 5.3
Alternative C2-Option 1	11.9	2.8	9.1	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	<0.1 3.4 3.5 1.5 3.5
Alternative C2-Option 2	11.9	5.3	6.6	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.5 3.4 1.0 1.5 5.5
Alternative D-Option 1	11.8	5.1	6.7	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.0 1.2 3.8 3.3 3.5
Alternative D-Option 2	11.7	7.5	4.2	BLM: NCWCD: MS-NCWCD: Forest Service: Private:	0.5 1.2 1.3 3.3 5.4

Table 2-2. Comparison of Alternative Engineering Specifications.

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

AWG = American Wire Gauge
ft = feet
ft^2 = square feet
kCM = kilo Circular Mil (1,000)

2.3 Activities Common to All Action Alternatives

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

2.3.1 Construction Methods and Requirements

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

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

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

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

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

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

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

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

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

2.3.2 Acquisition of Land Rights

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

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

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

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

When construction on a particular ROW is ready to begin, Western would advise the landowner(s) of the construction schedule. Western would make reasonable attempts to take into account the use and condition of the land, such as planting, irrigation, and harvest schedules, to minimize any inconvenience. Western would compensate landowners for crop and property damage that occurs as a result of construction or maintenance of the transmission line. If a landowner

believes that damage has occurred and has not been recognized, he or she could contact the Western land services agent.

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

2.3.3 Access

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

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

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

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

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

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

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

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

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

2.3.4 Construction Staging Areas

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

2.3.5 Clearing and Grading

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

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

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

2.3.6 Structure and Conductor Installation

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

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

2.3.7 Site Cleanup and Restoration

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

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

2.3.8 Workforce

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

2.3.9 Construction Sequencing

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

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

Table 2-4. Construction Activities and Equipment.

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

2.3.10 Construction Monitoring

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

2.3.11 Operation and Maintenance

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

- Routine aerial inspections of the integrity and condition of the transmission lines, and after wind, ice, and lightning events that cause forced outages. Ground inspections once per year, and as needed after weather events, to identify any repair or routine maintenance

needs. Maintenance activities would include repairing damaged conductors, insulators, or structure components.

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

2.3.12 Other Permits and Approvals

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

2.4 Design Criteria and Environmental Protection Measures

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

2.4.1 Western's Standard Construction and Mitigation Practices

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

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

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

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

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

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

USACE = United States Army Corps of Engineers

2.4.2 Project-Specific Environmental Protection Measures

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

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

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

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

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

2.5 Alternatives Eliminated from Further Analysis

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

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

2.5.1 Eliminated Alternative #1

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

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

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

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

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

2.5.2 Eliminated Alternative #2

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

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

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

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

2.5.3 Eliminated Alternative #3

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

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

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

2.5.4 Eliminated Alternative #4

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

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

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

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

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

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

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

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

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

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

Western does not currently own or operate any underground high-voltage-cable circuits. If this underground cable was installed, Western does not have the expertise or equipment to maintain and service the installed cable. It is not practical or feasible for Western to acquire the specialized personnel or equipment necessary to install, maintain, and operate 12.2 miles out of Western's entire 17,000 miles of transmission lines. Western would likely contract cable maintenance to a company with specialized personnel or equipment. This would substantially increase maintenance and operation costs, which ultimately conflicts with the project need to reduce maintenance and operation costs for Western, Tri-State, and NCWCD (see Section 1.2). Furthermore, relying on a third-party company for specialized personnel or equipment to mobilize and respond to repair situations could result in extended outage time for customers.

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

2.5.5 Eliminated Alternative #5

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

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

2.5.6 Eliminated Alternative #6

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

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

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

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

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

2.5.7 Eliminated Alternative #7

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

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

2.5.8 Eliminated Alternative #8

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

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

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

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

The primary obstacle with this alternative is transportation and delivery of the necessary cable lengths from Rainbow Bay to Granby Pumping Plant. It is estimated the cable length required is approximately 3 miles (15,840 feet). Applications of the underwater cable installations

researched showed the underwater cables were installed as continuous lengths of cable between end points. If splices were required, the cables were routed back to shore and spliced at a splice vault. Underground 138-kV cables are typically limited to reel sizes of 3,000 feet or less due to transportation restrictions. Underwater cable is heavier and larger in diameter due to armor protection around the cable; therefore, cable lengths per reel would be significantly less. It should be noted that most underwater cables are typically transported by the ship used for installation.

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

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

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

2.5.9 Eliminated Alternative #9 – Original Alternative B

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

2.5.10 Eliminated Alternative #10 – Original Alternative C

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

2.5.11 Eliminated Alternative #11 – Outside the Project Area

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

2.6 Comparison of Alternative Effects

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

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

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

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

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

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

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

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

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

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

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

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