

# Chapter 2. Alternatives Including the Proposed Action

## Introduction

This chapter describes and compares the alternatives considered for the Ojo Caliente proposed transmission line. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., locating the transmission line as proposed versus along an existing corridor) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., the amount of change to visual quality caused by locating the transmission line as proposed versus along an existing corridor).

The purpose and need for the proposed action, along with the significant issues serve as the objectives and framework around which the alternatives were developed. Each alternative is designed to address one or more issues that surfaced during the analysis process.

## Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act (NEPA) to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for improving consistency in electrical power, increasing efficiency in providing that power and expanding the capacity of the system in areas Kit Carson Electric Cooperative (KCEC) provides electrical power through conventional transmission and distribution lines; duplicative of the alternatives considered in detail or; determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

### Energy Conservation

Energy conservation is the more efficient use of electricity by customers. Though energy conservation can reduce energy consumption, this alternative would only forestall the increase in energy demands. It is also doubtful that conservation measures would be adequate to alleviate the existing demands on the system. The fact that these communities have grown over the past 50 or so years, and are likely to continue to grow at a somewhat similar rate, further reduces the chance that conservation alone could provide a reliable level of energy in the future.

This alternative is dependent on individual consumer response to develop conservation habits, select energy efficient appliances, develop and utilize more solar energy and/or heat pumps and thermal storage, as well as to improve insulation properties of homes and businesses. Because energy conservation is voluntary on the part of the consumer, conservation cannot be relied upon as a means of improving reliability of service. Therefore, this alternative would not meet the purpose and need for the proposal.

## **Alternative Generating Sources**

Kit Carson Electric Cooperative is only a distributor of electric power and does not generate it. Therefore, pursuing other generation options is outside the scope of this analysis. In addition, this alternative assumes there would be construction of additional generating and, to some degree, transmission facilities. Such facilities would have to be large enough to satisfy the current and future load growth. The installation and operation costs of a new generating facility would be significant and potentially not economically feasible. There is currently no proposal for any such development, therefore, this alternative would not meet the purpose and need for the project.

This does not preclude any such proposal for development of local or regional alternative energy generation in the future. Any number of options exists for such proposals that could eventually augment energy demands, including natural gas, solar, wind or even solid wood or wood fiber burning electrical generation plants.

## **Alternative Routes**

One route was considered that would use the shortest possible route from the existing 115 KV Hernandez to Taos transmission line to the proposed substation north of Ojo Caliente. This route is similar to the proposed action, but would be basically a straight line which would cross more sensitive portions of the lands administered by the Bureau of Land Management (BLM), including the Ojo Caliente Area of Critical Environmental Concern (ACEC) established for the high density of pueblo sites and cultural values. [7, 8] It would also cross a small area of badlands, which would create difficulties with access and surface protection.

Another route considered was from the Ojo substation southwest of Black Mesa up the Rio Ojo Caliente drainage to the proposed substation north of Ojo Caliente. This would be a new corridor route about twice as long as the proposed action and would run through the entire length of the Ojo Caliente ACEC and the community of Ojo Caliente. It would have high visual and social impacts, and given the numerous pueblo and cultural sites known in the area, there would be excessive expense in both time and money for archeological surveys, mitigation and excavation.

## **Underground System**

A number of scoping comments suggested burying the lines to address the visual impacts of a transmission line on the landscape. The economics of this option are cost prohibitive. Many members of the Kit Carson Electric Cooperative living in Taos County and the service area of Rio Arriba County are on low, fixed incomes. The cost of an above ground 115kV transmission line is estimated at approximately \$112,000 per mile while the cost of 1 mile of a buried system is approximately \$1,363,000. Buried line is done at the request of the residents, with reimbursement of the difference in costs between the above ground versus the buried line.

Although there are visual advantages, there are also significant resource disturbance considerations as a trench approximately 5 to 6 feet deep and about the same width is required for burial. The surface disturbance adjacent to the trenching also becomes much wider. If a failure should occur the cost is much greater along with the outage time for locating and repairing the problem.

## Replacement of Current Lines With Heavier Conductors

An option was considered that would convert the existing conductors (lines) with much larger conductors. This option was rejected, because even though the losses could be improved with a much larger conductor, the voltage problem would not be adequately addressed. Also the current poles and crosspieces do not permit sufficient clearance between the heavier conductors or adequate height separation required for transmission currents. This would also require changing out the conductors crossing the Rio Grande Wild and Scenic River Corridor.

In addition, this alternative would not create a loop design that would improve the reliability of the system to all its users. Since the existing distribution system is comprised of a single circuit, a line failure can result in a power outage to the entire distribution area. Retaining portions of the existing 25 kV line would provide a power “loop” that would allow for backup power, if there were problems with the new transmission line or substation. Long-term needs would also not be addressed and the expense would still be over 1.1 million dollars.

## Items Common to All Action Alternatives

For any action alternative, the Forest Service or BLM would authorize a 40-foot right-of-way. The permit application would incorporate any guy wire anchor point locations that extend outside the 40-foot corridor as included in the right-of-way.

As a part of this analysis, it was discovered that the portion of the existing 25 kV distribution line on BLM has never been authorized under permit. All action alternatives would include the administrative actions required to authorize the existing 25 kV line along with any associated service drops and upgrades as specified in the alternative.

## Substation

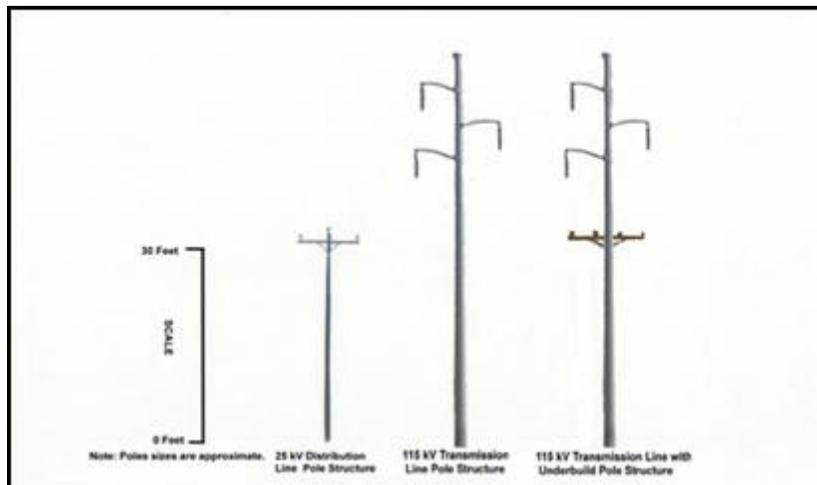
In all action alternatives, the proposed substation would be located at the terminus of the transmission line on BLM lands (T. 24 N, R. 9 E, Sec. 7), just northwest of the intersection of U.S. 285 and NM 111 and 1.5 miles north of Ojo Caliente. It would be approximately 160 yards east-northeast along the existing line from where the current bank voltage regulators are located. The total area required for the substation equipment would occupy approximately 1.5 acres. A chain link-cyclone fence would enclose the substation. For safety purposes, a grounding grid would be buried around the exterior perimeter of the fence.

To increase reliability, all action alternatives would convert the existing single circuit distribution system to several 25 kV circuits. No significant change in the existing lines would be required to do this. Several distribution circuits would leave the substation as buried lines to NM 111, then surface and connect into the existing distribution lines. A single pole would remain between the substation and NM 111, which currently provides service to the State Highway Department facility. Buried lines would require a single trench approximately 30 inches wide, 5 feet deep and 175 yards long. The trench would be located alongside the access road from NM 111 to the substation. The access road would consist of an improved hardened surface between the highway and the substation and would also be approximately 175 yards long. [276]

## Line and Pole Configuration and Appearance

For any transmission line alternative, single wooden poles approximately 65 feet in height and 24 inches in diameter are proposed. In sections where both the 115 kV transmission line and the 25 kV distribution line would be together, the poles would be similar, except for a wooden cross member installed on the pole under the 115 kV line to carry the 25 kV lines. This is called an “underbuild design” (Figure 5). Poles in a single circuit 115 kV transmission line with no underbuild would be around 60 feet tall and average 12 to 13 poles per mile. The underbuild design would generally have poles at the upper height range.

In areas where the new line coincides with the existing route, new taller poles would replace existing poles. In locations where there would be corners or angles in the route, one brown metal pole or multiple pole structures with guy wires may be used. Metal or multiple pole structures provide greater support and strength than single wooden poles.



**Figure 5. Three types of power line pole structures (pole sizes are approximate).**

In all alternatives, a static line containing a fiber optic cable would run atop the poles. The fiber optic capability would only be used for KCEC operational purposes to remotely control switching station and substation equipment. A switching device would also be included in all action alternatives and would be located at the point where the new transmission line taps into the existing 115 kV line. The switching station would be fenced and occupy one-quarter acre or less.

All action alternatives would use a system designed to protect birds, especially raptors, from accidental electrocution. Nonspecular (nonglare) wire would be used for any transmission line alternative and new segments of distribution lines.

To minimize the removal of trees in the piñon-juniper, access along the utility corridor would meander around as many trees as possible. Clearing through piñon-juniper may be required if the trees approach the height of the lines. Although most piñon and juniper trees in this area are less than 30 feet tall, tree trimming may be necessary at the lowest point of line sag to maintain adequate clearance. Poles would be brought in on trucks and laid next to the route. Cranes would be used to insert the poles into holes and buried 8 feet.

Where the line would cross a NM Department of Transportation easement a State permit to aerially cross the highway would be needed.

### **Distribution Lines**

All distributions lines would be retained or relocated to provide the backup loop and increase system reliability. The three existing feeder-distribution lines in all action alternatives would be retained and converted to separate circuits to serve areas to the south including Ojo Caliente, to the west and north serving El Rito, La Madera and surrounding communities, and to the east providing power to Carson and Pilar. The distribution lines would originate at the new substation location and relocation varies by alternative.

In all action alternatives, the existing distribution line that runs from the Los Cordovas substation outside Taos would be retained in its current condition. Retention of the existing above ground distribution line back to the Los Cordovas substation would complete the “loop” needed to provide backup power to all the communities the transmission line would serve.

### **Alternatives Considered in Detail**

Alternatives are used to evaluate different ways to resolve significant issues brought forth by the public (see Chapter 1) and satisfy the purpose and need for action. For this analysis, four alternatives have been considered in detail. In addition to the alternatives, an option was developed to address the need for another distribution line to the Tres Piedras area. This issue came up after the proposed action was developed and released to the public for comment. The option could be included with any action alternative. Because the Tres Piedras Option does not fully meet the purpose and need of the proposed action, it could not stand alone as an alternative. The forest supervisor approved the alternatives, as well as the Option, on May 6, 2003. [257]

### **Alternative A**

#### **No Action**

This alternative is the “no action” alternative required by the Council on Environmental Quality for the implementation of NEPA (40 CFR Part 1502.14d). Under this alternative no new upgrade to the existing distribution lines would be authorized across National Forest System or BLM lands. The No Action Alternative is the point of reference for evaluating the action alternatives. This alternative would maintain the existing 25 kV line (Figure 6) in its present location and maintenance of the line would continue as normal. This alternative would not address the purpose and need of the proposed action.

As a part of this analysis, it was discovered that the portion of the existing 25 kV distribution line on BLM lands has never been authorized under permit. Under the No Action Alternative this line would remain and continue to provide electrical service to the area. Any decision by BLM to authorize the existing line and access routes would be an administrative decision unassociated with this alternative.

## **Alternative B**

### **Black Mesa-Cerro Azul Tap (Proposed Action)**

This alternative is the proposed action (Figure 7). It would originate from the existing 115 kV line about 1.5 miles northeast of Black Mesa and about 3 miles southwest of Cerro Azul; it has also been referred to as either the “Black Mesa or Cerro Azul Tap” alternative.

Alternative B would authorize KCEC to construct a new transmission line that would tap into the existing 115 kV Hernandez to Taos transmission line approximately 1.5 miles northeast of Black Mesa on the Carson National Forest. The line would run north/northwest along Forest Road 558 for about 6.7 miles and connect into the existing 25 kV distribution line, located just north of U.S. 285—also located on the Carson National Forest. It would follow the 25 kV right-of-way for about one mile, where it would leave the Carson National Forest and enter lands administered by the BLM. Then the line would follow the existing corridor west and slightly south for 1.9 miles to the location of the proposed substation just north of the intersection of U.S. 285 and NM 111.

This route would total 9.6 miles and involve 7.7 miles on National Forest System and 1.9 miles on BLM administered lands. It would not cross any private land. This alternative would create 6.7 miles of new corridor.

One brown metal pole or 2 to 3 wooden pole structures with guy wires may be used to provide greater support and strength where four to five corners or angles in the line occur. Approximately 3 miles of underbuild would be required from the point where it connects into the existing 25 kV line down to the proposed substation. The 25 kV line would be underbuilt on the same poles to provide a loop and backup system in case of a failure at the substation or along the 115 kV line.

This alternative would include a new substation location, the line and pole appearance and the use of the distribution lines described in the previous section, *Items Common to All Action Alternatives*. Alternative B would be consistent with the Carson Land and Resource Management Plan [5] and the BLM’s Taos Resource Management Plan [7].

## **Alternative C**

### **Existing Corridor**

During the scoping process, a common concern expressed in the comments was that the proposed transmission line would create a new corridor. Alternative C addresses the significant issue of the environmental impacts related to creating a new utility corridor (see Chapter 1, *Issues*). This alternative was developed based on meeting the purpose and need for the proposed action and utilizing the existing power line corridor, rather than creating a new one. It would run entirely through an existing corridor. Alternative C will also be referred to as the “Existing Corridor” alternative.

Alternative C would construct a new transmission line that would tap into the existing 115 kV Hernandez to Taos transmission line on private land in the vicinity of where it crosses NM 567 (Figure 8). A new 115 kV transmission line would proceed west along the existing 25 kV distribution line corridor on State or private land for approximately 2.8 miles, then cross onto the Carson National Forest. It would continue west and then along U.S. 285 (also crossing two parcels of private land) for approximately 10.9 miles (~2 miles on private), where it would enter

lands administered by the BLM. Then the line would follow the existing corridor west and slightly south for 1.9 miles to the location of the proposed substation just north of the intersection of U.S. 285 and NM 111.

This route would total 15.6 miles and cross through 4.8 miles of private land, in addition to 8.9 miles of National Forest System lands and 1.9 miles on BLM lands. This alternative would not create any new utility corridor.

One brown metal pole or 2 to 3 wooden pole structures with guy wires may be used to provide greater support and strength where four or five corners or angles in the line occur. Existing poles would be replaced to enable the higher voltage lines to be positioned properly above the existing 25 kV distribution line. The 25 kV line would be underbuilt on the same poles the entire length of the new line (15.6 miles) to provide a loop and backup system in case of a failure at the substation or along the 115 kV line.

This alternative would include a new substation location, the line and pole appearance and the use of the distribution lines described in the previous section, *Items Common to All Action Alternatives*. Alternative C would be consistent with the Carson Land and Resource Management Plan [5] and the BLM's Taos Resource Management Plan [7].

## **Alternative D**

### **285P Tap**

Another public concern expressed during the scoping process was that the proposed transmission line would impact scenic values to residents and travelers along U.S. 285. Alternative D addresses the significant issue of the visual impacts related to the new transmission line route across the open terrain between Black Mesa and U.S. 285 as proposed (see Chapter 1, *Issues*), and along Highway 567 and U.S. 285 using the existing route in Alternative C. This alternative was developed based on meeting the purpose and need for the proposed action and using topographic features, such as draws, swales and hills, to obscure the majority of the line from the view of residents in the Carson area and/or motorists along U.S. 285. Alternative D will also be referred to as the "285P Tap" alternative.

Alternative D would authorize KCEC to construct a new transmission line that would tap into the existing 115 kV Hernandez to Taos transmission line on National Forest System lands where it intersects Forest Road 285P (Figure 9). A new 115 kV transmission line would proceed north, following the bottom of Cañada Embudo for 4.8 miles. It would swing west and cross U.S. 285 where the highway turns westward to Ojo Caliente. It would run parallel to U.S. 285 for about 5.7 miles on national forest, at a distance of up to one-half mile north from the highway. It would then enter BLM lands and intersect with the existing 25 kV distribution line. The line would follow the existing corridor west and slightly south to the location of the proposed substation just north of the intersection of U.S. 285 and NM 111 for 1.9 miles on BLM lands.

This route would total 12.4 miles and involve 10.5 miles of National Forest System lands and 1.9 miles of BLM administered lands. It would not cross any private land. This alternative would create 11.1 miles of new corridor, however 5 miles of existing line and poles would be removed. One mile of existing line would still remain through private land.

One brown metal pole or 2 to 3 wooden pole structures with guy wires may be used to provide greater support and strength where six or seven corners or angles in the line occur. Since 5 miles of the existing corridor along the south side of U.S. 285 would be eliminated, about 7.6 miles of underbuild would be required from the point where the line connects into the existing 25 kV line down to the proposed substation. The 25 kV line would be underbuilt on the same poles to provide a loop and backup system in case of a failure at the substation or along the 115 kV line.

This alternative would include a new substation location, the line and pole appearance and the use of the distribution lines described in the previous section, *Items Common to All Action Alternatives*. Alternative D would be consistent with the Carson Land and Resource Management Plan [5] and the BLM’s Taos Resource Management Plan [7].

**Option**

**Tres Piedras Connection**

This option addresses the significant issue brought forth during public scoping that Kit Carson Electric Cooperative does not have the means of serving the residents south of Tres Piedras along U.S. 285 at all (see Chapter 1, *Issues*). This option would provide electrical service through a new distribution line. This option will also be referred to as the “Tres Piedras Connection.” Since this option does not fully meet the purpose and need for action, it is not a stand-alone alternative. It could only be selected as part of one of the action alternatives.

The Tres Piedras Connection would authorize KCEC to construct a new distribution line that would tap into the existing 25 kV distribution line in the vicinity of the microwave station just north of the intersection of NM 567 and U.S. 285 (Figure 10). It would cross the highway to the west side and proceed north along U.S. 285, where it would cross back east of the highway to connect into the existing line that comes south from Tres Piedras along U.S. 285. This route would total 7.5 miles. With the exception of 1.5 miles through private land, this option would be on National Forest System lands.

**Table 4. Comparison of alternatives**

	Alternative				Option	
	A	B	C	D		
Total miles new 115 kV line	0	9.6	15.6	12.4		
Miles on NFS lands	0	7.7	8.9	10.5		
Miles on BLM lands	0	1.9	1.9	1.9		
Miles on Private/State lands	0	0	4.8	0		
Miles creating new corridor	0	6.7	0	11.1		
Miles of underbuild	0	2.8	15.6	7.6		
Miles of existing corridor eliminated	0	0	0	5.0		
New substation	No	Yes	Yes	Yes		
Total miles new 25 kV line						7.5
Miles on NFS lands						6.0
Miles on PVT lands					1.5	

*\*Note: Number of miles is rounded to the nearest 0.1 mile.*

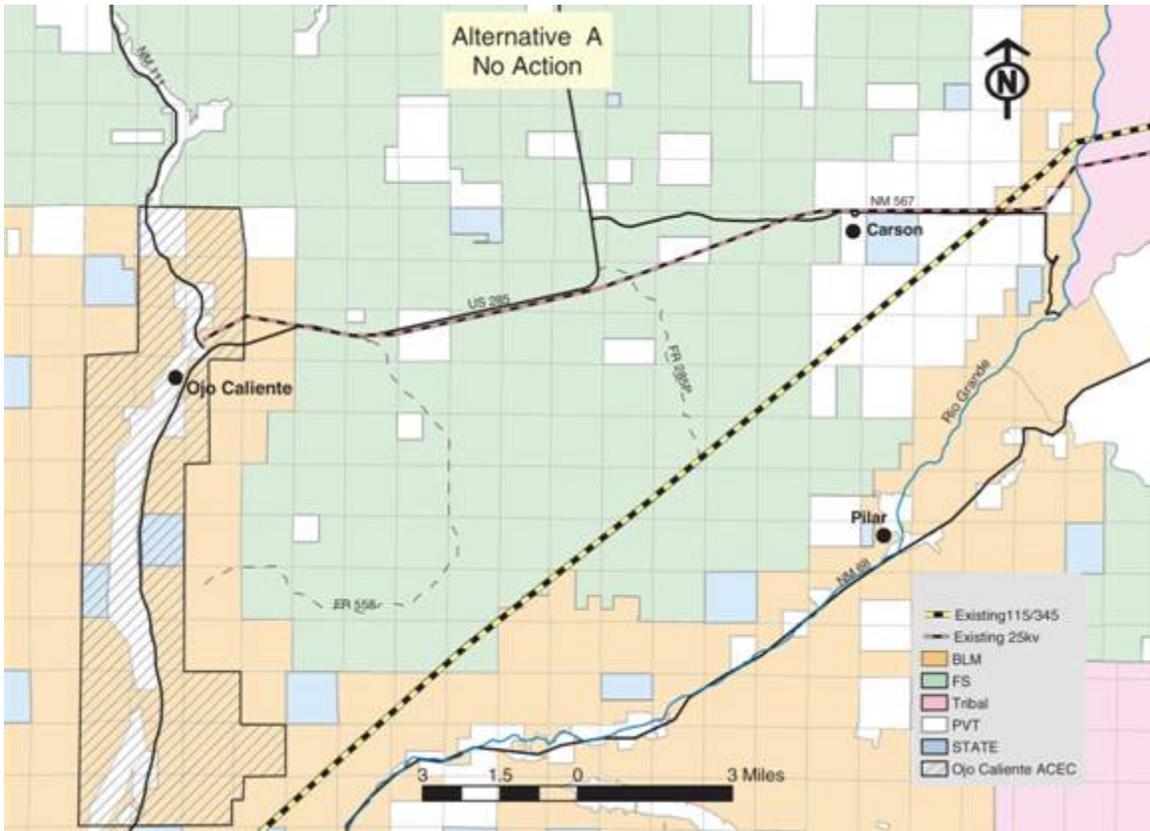


Figure 6. Alternative A – No Action.

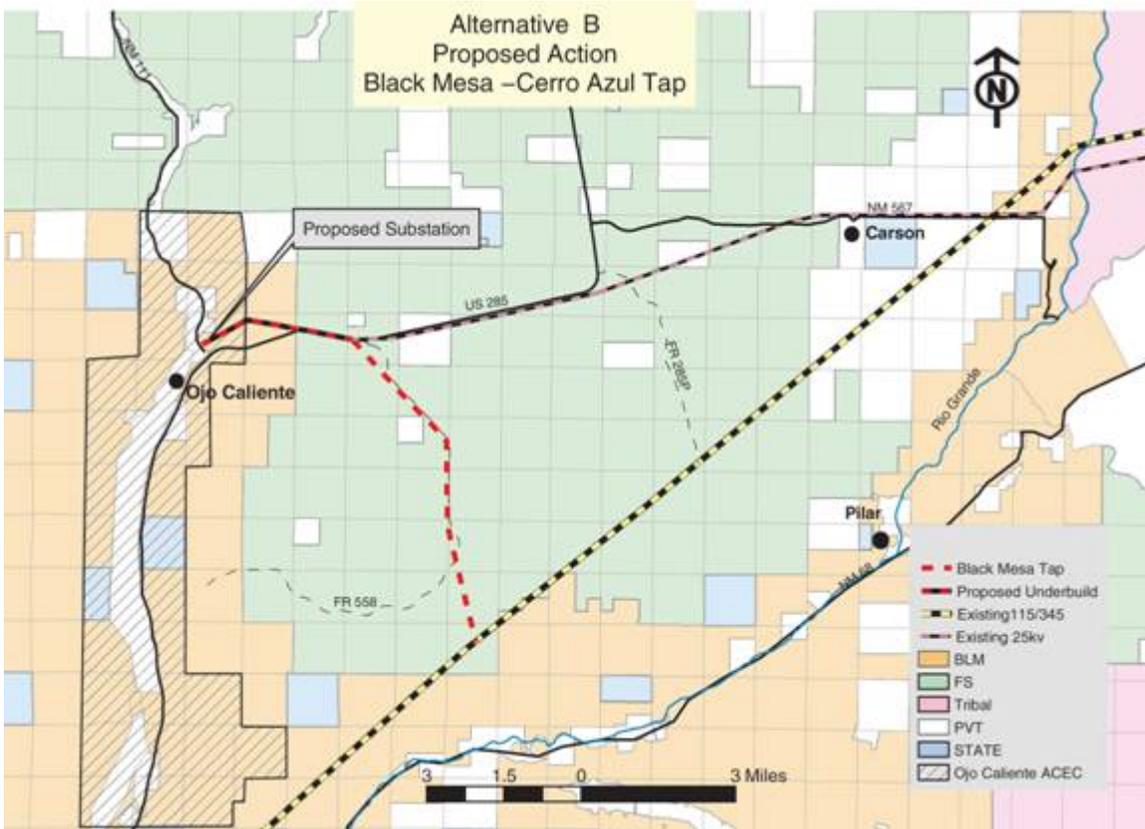


Figure 7. Alternative B – Black Mesa-Cerro Azul Tap.

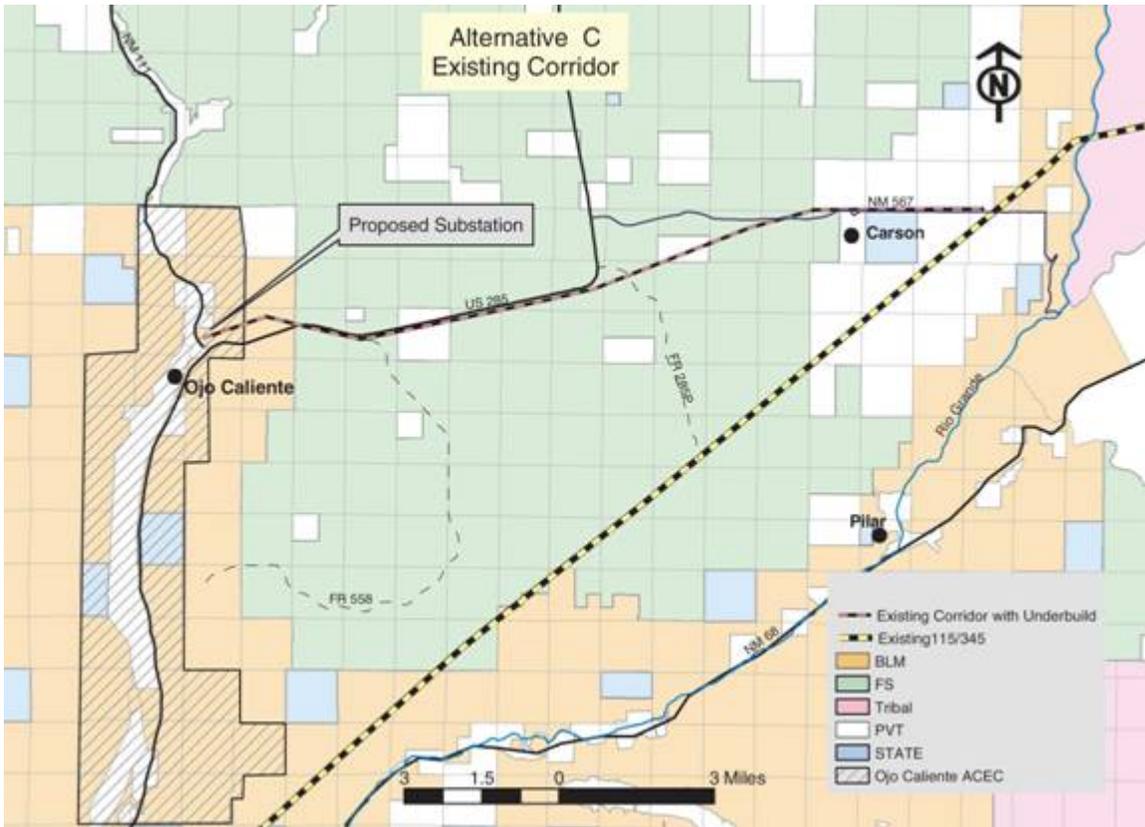


Figure 8. Alternative C – Existing Corridor.

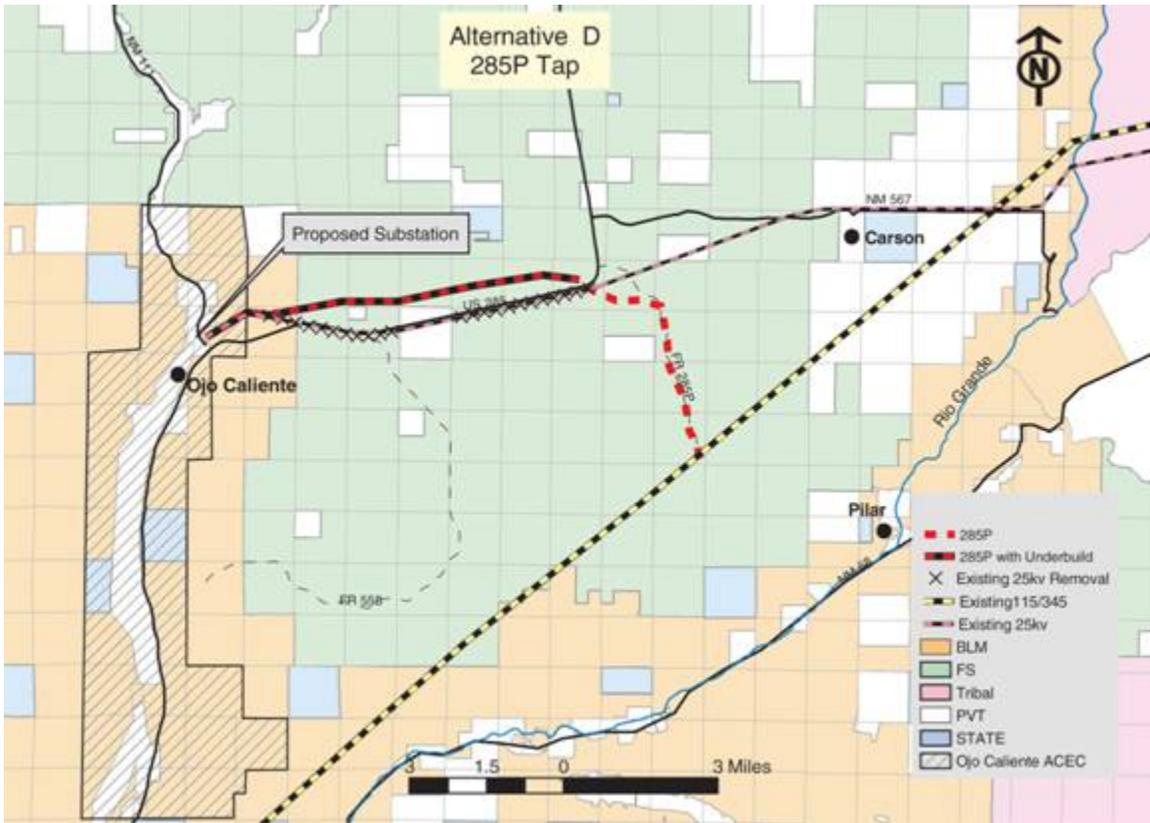


Figure 9. Alternative D – 285P Tap.



Figure 10. Option – Tres Piedras Connection.

### Mitigation Common to All Alternatives

To mitigate is to offset or to lessen real or potential impacts of an activity through the application of additional controls or actions. Counter measures are employed to reduce or eliminate undesirable or unwanted results. Mitigation is a tool to ameliorate an undesirable environmental effect; it is identified and included as part of each alternative, and the analysis of environmental effects in Chapter 3, *Affected Environment and Environmental Consequences*.

To minimize resource impacts, the mitigation measures in Table 5 will be followed for any action alternative chosen. Implementation of the required mitigation measures identified below will be considered and documented at the time of project implementation by the Forest Service and/or BLM, based on current conditions and technologies and success of prior measures.

Environmental effects are based upon the application and effectiveness of these mitigation measures. Monitoring is a vital aspect of project implementation because it tracks the application and effectiveness of mitigation, the accuracy of predictions about environmental effects, and whether or not project objectives are being met, and provides a mechanism for changing how the current project is being implemented or how future projects will be designed and implemented.

Table 5 identifies the mitigation and monitoring required for each alternative if that alternative is selected for implementation. The table also identifies the specific resource to be mitigated or monitored; the location where the mitigation or monitoring will be applied; and for mitigation, the predicted effectiveness of that mitigation measure.

To insure proper execution of mitigation measures, their implementation and effectiveness are monitored frequently. This monitoring process occurs before, during and after (up to several years later) project implementation. Monitoring data will contribute to determining the effectiveness of mitigation as well as aid in determining if the project objectives are being met. The table also identifies when the mitigation will be applied and/or when monitoring will be conducted; who will be responsible for ensuring the mitigation or monitoring is done; and how the information will be reported and used.

Kit Carson Electric Cooperative will designate an inspector to monitor all construction activities on National Forest System and Bureau of Land Management lands and to coordinate with a designated Forest Service or BLM representative. The mitigation and monitoring requirements for this project will be assigned to Kit Carson Electric Cooperative as part of the terms and conditions for the special use permit authorizing construction activities on Federal lands.

**Table 5. Mitigation Measures Required for All Action Alternatives. (see document titled Table 5).**

## **Comparison of Alternatives**

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

**Table 6. Alternative Comparison of Effects (see document titled Table 6).**

