

Section 5 Alternatives

An important aspect of the environmental review process is the identification and assessment of a reasonable range of alternatives that have the potential for avoiding or minimizing the impacts of a proposed project while still achieving the project objectives. A discussion of alternatives reviewed for the proposed Project is included here for the CPUC's review.

The Project has the following objectives:

- Provide highly-flexible economic natural gas storage services to a variety of customers, which could include gas utilities, electric utilities, independent electric generators, gas marketers, gas producers, industrial gas users and other wholesale and retail gas customers.
- Provide storage services using reservoirs with geologic characteristics suitable for conversion to multiple turn, high deliverability storage.
- Diversify the location of storage facilities in California by providing centrally-located storage capacity in the southern San Joaquin Valley.
- Provide storage services in a geographic area with less intensive present land use and with land use projected to be less intensive over the long-term.
- Provide storage services at a location with reasonable access to PG&E's gas and electric facilities and make use of existing transportation and utility corridors.
- Create additional natural gas storage capacity in California in order to enhance natural gas supply reliability.
- Aid in mitigating natural gas price volatility.

5.1 ALTERNATIVES EVALUATED IN THIS PEA

This section describes and evaluates a reasonable range of options and alternatives to attain these Project objectives. The evaluation addresses:

- Alternative gas storage locations
- Alternative wellpad and central compressor station locations
- Alternative pipeline alignments
- Alternative electrical power line routes

- Alternative compressor drivers and auxiliary equipment configurations
- The "No Project" alternative

This assessment does not address other potential means of gas storage. Other potential gas storage methods include the use of larger pipeline systems that may have excess storage capacity with increased operating pressure by allowing more gas to be contained in the same length of pipeline; use of natural gas storage tanks; or storage of liquefied natural gas. However, in California, only depleted production fields are currently used as gas storage facilities. Depleted production fields are considered the most desirable by storage facility developers for several reasons: the field was already used for gas production; the geology of the reservoir is generally well-known; and the cap rock covering the permeable basin holds natural gas very well, while water below keeps it pressurized for easier withdrawal.

5.2 ALTERNATIVE GAS STORAGE LOCATIONS

GRS evaluated several gas fields prior to selecting the Gill Ranch Gas Field (Gas Field). Given the Project objectives, the Gill Ranch Storage Field (Storage Field) was determined to have the best overall suitability for gas storage development and operations based on several evaluation criteria including geologic characteristics and other storage suitability factors. Table 5.2-1 summarizes the gas field locations that were considered, and the criteria used in the analysis.

An initial screening of depleted gas fields identified six fields that met the Project criteria. Five of these fields are in the Sacramento Basin and one field is in the San Joaquin Basin. Of the six fields, three fields were selected for detailed study. Two of these fields, Putah Sink and Liberty Island, are located in the Sacramento Basin, and one field, Merrill Avenue, is located in the San Joaquin Basin. Based on market options and direct competition with other storage fields, market analysis indicated that a field in the San Joaquin Basin is preferred. However, in the San Joaquin Basin there are only three gas fields that fit the size criterion and only one field that fits the pipeline distance criterion. Before detailed work began on Merrill Avenue, this field was compared to the Storage Field, and was judged superior to Merrill Avenue for geological reasons. The Starkey sands at the Storage Field are very similar to the reservoir sandstone of Putah Sink and Liberty Island, and the Storage Field reservoirs are of the right size. Detailed assessment of the Gill Ranch Storage Field confirmed that it meets the Project objectives of a high deliverability storage field development in an advantageous market area. Although the pipeline distance for the Storage Field is somewhat longer than other options considered, this factor has been offset by the other criteria.

Table 5.2-1: Alternative Gas Storage Field Assessment

Field Characteristic	Ord Bend	Liberty Island	Afton	Merrill Ave.	Suisun Bay	Putah Sink	Gill Ranch
Current Status	Active	abandoned	Active	Active	Active	Active	Active
Size (Bcf)	23	27	19	20	91	47	87
Depth (feet)	3,400	4,700	2,700	6,600	3,650 – 4,650	6,500	4,400-6,200
Geologic Complexity (scale: 1 = least complex)	?	1	1	1	1	2	1
Drive mechanism	Water?	Depletion	Water	Water	Depletion and Water	Depletion	Water and Depletion
Single Zone or Stacked	Multiple	Single?	Single	Single	3 Stacked	Single	Multiple
Original gas quality (BTU)	910	N/A	770	857	1040 - 1220	910	960
No. of production wells	15 (7 P&A)	7	33 (24 P&A)	18 (17 P&A)	10 (8 P&A)	23 (18 P&A)	33 (23 P&A)
Distance to pipeline (miles)	12	8	17	16	12	18	27
Geographical location	80 mi. N. of Sacramento	Between Sacramento and San Francisco	South of Ord Bend.	40 mi. NW of Fresno	Between Sacramento and San Francisco	5 mi. W of Sacramento	25 mi. W. of Fresno
Land use	Agriculture	Agriculture and Wetland	Agriculture	Agriculture	Agriculture and Wetland	Agriculture	Agriculture
No. of surface landowners	6	4	6	6	11	2	9
Estimated surface acres	960	1,920	960	1,280	1,920	960	6,400
Year discovered	1943	1960	1944	1989	1944	1973	1957

The term P&A refers to Plugged and Abandoned.

5.3 ALTERNATIVE WELL PAD, COMPRESSOR, AND ELECTRIC SUBSTATION SITES

The well pads and the central compressor station have very specific siting requirements or constraints related to the location of the gas reservoirs. Therefore, the range of reasonable alternatives is limited. Siting considerations and potential alternatives are discussed below.

5.3.1 Alternative Well Pad Sites

As discussed in Section 3.5 and shown on Figure 3.1-2, four proposed Injection/Withdrawal (IW) well pads have been identified, and up to four wells will be consolidated on each well pad. The proposed IW well pad sites are located at existing gas production well pads because these sites are most directly above the target gas storage reservoirs, and because they are located within already disturbed sites with existing access, and would thus avoid or minimize potential resource impacts. Several alternate IW well pads have been selected within the Storage Field. As shown on Figure 3.1-2, the proposed and alternate well pad sites are very similar, and no single site is significantly more beneficial than other sites in terms of land use and resource impacts.

The final selection of the IW well pad sites will be based on the results of reservoir analyses that are ongoing at this time.

Directional (deviated) drilling techniques will be used at each of the four consolidated IW well pads. Further consolidation (e.g., from four IW well pads to two well pads) could potentially be achieved by siting more wells on each pad but due to the size, shape and proximity of the reservoirs, the use of four well sites appears to be optimal. Further consolidation would possibly result in less overall disturbance to agricultural operations but may make accessing the entire reservoir in the subsurface, very difficult or impossible. The four sites provide the necessary surface access to the Starkey reservoirs at the desired subsurface locations adequately to operate the injection and withdrawal operations in a manner that optimizes the use of the reservoir. However, given the relatively small footprint of the individual well pads, and the overall lack of nearby disturbed sites, further consolidation of the IW well pads would provide only minimal benefits in terms of reduced agricultural disturbance. Consequently, further consolidation of the IW and well pads and identification of additional IW and OM well pad sites were not considered feasible.

The 14 candidate OM well pad sites are located in areas that are presently in agricultural production. These sites have been selected based on the reservoir location, and with consideration of the surface uses, in coordination with the surface landowners. Each of the candidate well pad sites is very similar, and no single site is significantly more beneficial than other sites in terms of land use and resource impacts. Up to seven OM well pads will be selected, with one OM well at each site. Although further consolidation and use of directional drilling may be feasible, the OM sites are very specific to the reservoir, and therefore the options for surface locations are limited. Given the site specific requirements for the OM wells, and the lack of developed sites within the OM well pad areas, the potential alternatives sites would not offer any benefits over the identified candidate sites.

5.3.2 Alternative Compressor Station Sites

The proposed compressor site was selected based on its central location relative to the proposed IW wells (which are based on the subsurface reservoirs); proximity to existing site access; and remoteness from developed areas. With the exception of the surrounding agricultural operations, the site is remote from residential, commercial, and industrial developments and major roads. The IW wells would be located throughout the Storage Field, and gathering lines would be constructed between the IW well pads and the compressor station.

In concept, the compressor station could be located within previously disturbed sites in the Storage Field, or co-located with other industrial facilities, and the gathering lines could be extended a longer distance to reach the compressor site. Table 5.3-2 summarizes alternative compressor station sites that were considered, and these sites are summarized below.

Table 5.3-2: Alternative Compressor Station Locations

Alternative Compressor Station Site Characteristics	Proposed Compressor Station Site	Former Cotton Processing Facility	Spreckels Sugar Plant	PG&E Newhall Electrical Substation	Madera Energy Center
Location	Road 16 and Avenue 3 in Madera County	Road 16 and Avenue 4 in Madera County	San Mateo Avenue at Hwy 180, Fresno County	Firebaugh Blvd., Madera County	East of Hwy 99, Madera County
Gathering Line distance from IW wells to compressor station site (miles)	<1 - 2	1 - 3	5 - 7	10 - 12	>25
Gas transmission pipeline distance to PG&E tie-in (miles)	27	28	22	>30	>50
Onsite Land Uses	Agriculture	Developed	Developed	Electrical substation, agriculture	Electrical generation (proposed)
Nearby Land Uses and Roads	Agriculture and gas production well pads	Residential, agricultural airstrip, and agriculture	Industrial, agriculture, and residential (south of I-180)	Agriculture, Firebaugh Blvd.	Agriculture and urban

Former Cotton Processing Facility. A former cotton processing facility is located on approximately 25 acres immediately north of and contiguous with the Storage Field, along Road 16 and Avenue 3. This site is already disturbed and potentially provides sufficient acreage for the 10-acre compressor facility (this site is proposed as a construction staging area for the Project). However, the site is located adjacent to existing residences on the west side of Road 16, and there is an agricultural airstrip adjacent to the site. The proximity of these existing uses would result in a greater potential for land use, noise, visual, and safety impacts, as compared to the proposed compressor station site. There are no other existing industrial or disturbed sites within the Storage Field boundary that are of sufficient size to accommodate the proposed compressor station.

Spreckels Sugar Plant. The Spreckels Sugar Plant is located on San Mateo Avenue, approximately 5 miles southwest of the proposed compressor station site, south of the San Joaquin River. Although this site would allow for a slightly shorter gas transmission line, this potential benefit would be offset by the extended distance of the multiple gathering lines from the IW wells, which would require pipeline construction under the San Joaquin River. This design would likely require additional surface facilities within the Storage Field to manage the distribution of gas to and from the IW wells. The increased distance between the wells and compressor station at this site would result in a design that either increases gathering line pipe sizes or the required compressor horsepower or both. This change would not be offset by the benefits of shortening the transmission line and being closer to the pipeline interconnect. This site is closer to public roadways and residential development than the proposed site. The proximity of these existing uses would result in a greater potential for land use, noise, and visual impacts, as compared to the proposed compressor station site.

PG&E Newhall Electrical Substation. PG&E's existing Newhall Substation is located approximately 10 miles northwest of the Storage Field, north of Avenue 7 between Firebaugh and Madera. In concept, the proposed compressor station could be co-located with this facility. This would require conversion of 10 acres of agricultural land to industrial use, and would significantly extend the distance of both the gas transmission pipeline and the gas and water gathering lines. The site is adjacent to Firebaugh Boulevard., and would be more visible from public roadways. Based on these factors, use of this site (or any other industrial or disturbed site between Firebaugh and Madera) would result in a greater potential for land use, agriculture, noise, and visual impacts, as compared to the proposed compressor station site.

Madera Energy Center and PG&E Borden Electrical Substation. The proposed Madera Energy Center site and the adjacent PG&E Borden Substation are located approximately 20 miles northeast of the Storage Field, east of State Route (SR) 99. Even if these or other offsite locations could be used, co-location of the compressor station could still require conversion of agricultural land to industrial use. The site would be closer to urban uses east of SR 99, and would significantly extend the distance of both the gas transmission pipeline and the gas and water gathering lines, resulting in greater overall impacts in several areas, as compared to the proposed compressor station site.

Summary of Alternative Compressor Station and Well Pad Sites. The location of the existing wells and other land uses within and adjacent to the Storage Field dictate that the Central Compressor Station be located within the boundaries of the Storage Field. The selected location is centrally located among I/W wells, and is appropriately set back from residential uses, roadways, and existing agricultural operations. Although the proposed site would require the conversion of agricultural land, no other sites were identified that would offer environmental benefits over the proposed site. A key attribute of the proposed site is its remoteness to any residences or public roads. The nearest residence is over one mile away, and there is one occupied residence within the Storage Field located approximately 2 miles from the Central Compressor Station. As such, this location minimizes the land use, noise and visual issues associated with project operations.

5.3.3 Alternative Electric Substation Sites

The siting and location for the electrical substation were based on the following criteria:

- Proximity to the Storage Field compressor station operations (the end use) ;
- Minimization of impacts to land use and agricultural operations; and
- Minimization of new access requirements.

As described in Section 3.5, an electric substation would be constructed within the perimeter of the 10-acre central compressor station. As a result, siting of the electric substation is dependent on siting of the compressor station. The substation location is shown on the compressor station site plan in Appendix A, Drawing 12361-130B-100. The substation would occupy 20,000 square feet (0.46 acres) along the northern perimeter of the compressor station adjacent to Avenue 3. The substation would be fenced and gated with a dedicated access from Avenue 3. Access to and from the substation will be via existing public roads north of the Storage Field (Avenue 7 and Road 16), and existing private agricultural roads within the Storage Field (a portion of Road 16, and Avenue 3). The proposed 115 kV power line would cross Avenue 3 and enter the substation at a point immediately across from the substation.

The substation is integral to the central compressor station operations. Therefore, from an operational standpoint, the proposed Central Compressor Station site is the optimal site for the substation in terms of meeting the end user's requirements for onsite electrical power.

Existing roads will be used to access the substation for operations and maintenance. Agricultural operations will not be affected by substation operations. The substation will contribute to the conversion of agricultural land to non-agricultural use at the proposed site. However, the substation will occupy only approximately 0.5 acre, or approximately 5 percent of the total 10-acre site. Therefore the substation does not represent a major factor in the Project's overall potential impacts related to agricultural land conversion.

Alternative Electric Substation Options Considered

Expansion of Newhall Substation

The nearest existing electric substation is the Newhall Substation located on Firebaugh Boulevard approximately 10 miles north of the central compressor station site. This site was considered during the preliminary interconnection study done by PG&E but it was determined that increasing substation and distribution line capacity would not be preferred over constructing a new 115 kV power line. Attempting to serve 36 MW from an existing substation would require at a minimum 3-12 kV circuits, associated 12 kV bus and distribution line work for each circuit and a new 45 MVA bank at Newhall sub. Additionally, new right of ways or easements would be required to construct the new distribution lines. Considerable voltage support equipment along the 3 distribution line circuits also would be needed to address

voltage line loss. This alternative would not allow for future expansion in order to meet increased electric load and as a result this option was dismissed from further consideration.

Summary of Alternative Substation Sites. From a utility siting and routing standpoint, and based on the above criteria for substation siting, the proposed site within the central compressor station is the preferred site due to its consolidation with the proposed central compressor station. Alternative sites do not offer operational benefits. Alternative sites would potentially be more visible from public viewing locations than the proposed site.

Based on the remoteness of the proposed substation site, there would be no benefit to constructing the substation at a location outside of the compressor station. The proposed site is superior to previously dismissed alternative sites in terms of potential conflict with other land uses, potential natural resource impacts, and visibility from public areas.

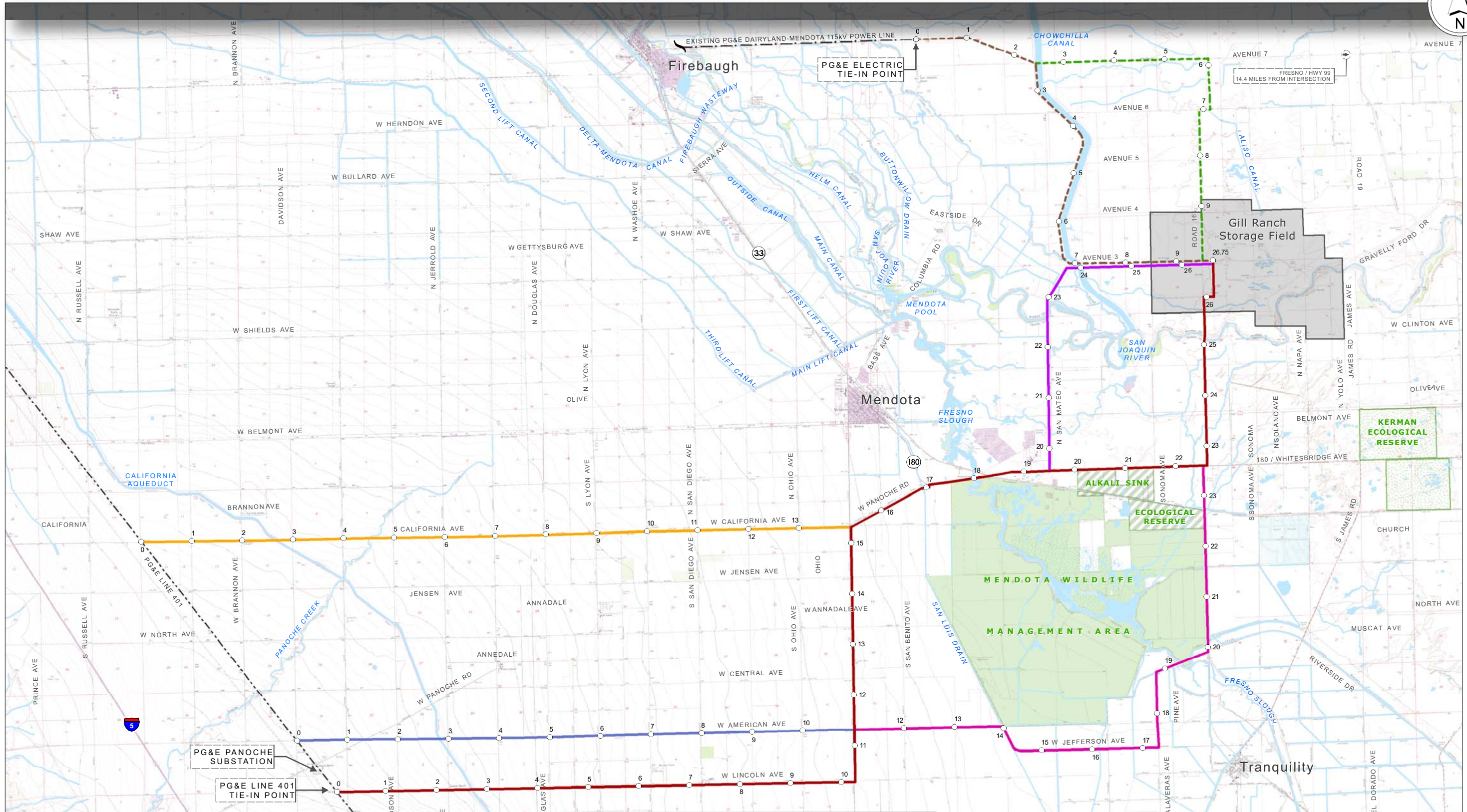
5.4 ALTERNATIVE PIPELINE ALIGNMENTS

The proposed gas pipeline alignment is described in Section 3 Project Description, and detailed alignment sheets for the proposed alignment are provided in Appendix A. Several factors were considered in the siting analysis and identification of pipeline route alternatives. These factors include:

- Minimize potential impacts to sensitive biological and cultural resources;
- Minimize potential conflicts with agricultural infrastructure and orchard crops where feasible;
- Minimize residential and commercial land uses;
- Minimize overall length of the alignment;
- Location within established linear corridors including county and private roads and existing utility corridors, to the extent that such corridors exist; and
- Minimize overall number of affected property owners.

Figure 5.4-1 shows four alternative alignments that were considered during the pipeline siting process based on the siting criteria noted above. Existing land uses and natural resources for these routes (as well as for the proposed route) are also shown on the vegetation maps, in Appendix B. These alternative pipeline alignments are referred to as:

- Alternate Route A. San Mateo Avenue
- Alternate Route B. West California Avenue
- Alternate Route C. West American Avenue
- Alternate Route D. South of Mendota Wildlife Management Area



GILL RANCH STORAGE

LEGEND

— Proposed Pipeline Route - 26.75 Miles	— Alternate C - 26.46 Miles	- - PG&E Line 401	 Gill Ranch Storage Field
— Alternate A - 26.58 Miles	— Alternate D - 27.80 Miles	— Existing PG&E Electric Power Line	
— Alternate B - 25.46 Miles			
- - Proposed PG&E Electric Power Line - 9.5 Miles	- - Alternate PG&E Electric Power Line - 10.3 Miles		

Each of these alternatives was evaluated in order to develop a project that minimizes potential impacts on local community and environmental resources, and with consideration of economic factors. The key environmental factors associated with each alternative route are described below and compared to the proposed pipeline route.

Alternate Route A. San Mateo Road (26.6 miles). Alternative A is common with the proposed alignment for the initial 19.5 miles. From the intersection of I-180 and San Mateo Avenue, the route would run north on San Mateo Avenue to the San Joaquin River; cross the San Joaquin River via HDD methods at San Mateo Avenue; run northeasterly to the Chowchilla Canal Road; cross the canal and levees via trenching and boring techniques; and then run east to the proposed central compressor station plant along Avenue 3.

Alternative A is a technically feasible route. Should the route be pursued, no potentially significant impacts or resource constraints are anticipated along this alternative route, provided that the Applicants' proposed measures and other recommended mitigations described for the proposed alignment are implemented. The key difference between Alternative A and the proposed alignment is that Alternative A avoids a 2-mile segment of the proposed alignment along I-180 and east of San Mateo Avenue. This area is presently disturbed by grazing, and non-native grassland species are prevalent. However, the two-mile segment also exhibits valuable wildlife habitat and wetlands associated with the alkali sink scrub vegetation community, and it is near (but not within) the Alkali Sink Ecological Reserve (ASER). As discussed in Section 4.4, the biological assessment of this segment of the proposed alignment indicates that these vegetation communities and associated wildlife habitats would not be significantly impacted by Project activities after implementation of Applicant proposed measures and other recommended mitigation measures. The alternative alignment would avoid the alkali sink scrub habitat, and the route would be restricted to cultivated agricultural areas, similar in nature to the remainder of the proposed pipeline alignment.

Alternative A would also avoid crossing the Four-Mile Slough, an isolated agricultural pond located in agricultural crop lands east of the alkali sink scrub area. However, Alternative A would require crossing through the Chowchilla Bypass Canal and the Lone Willow Slough (a narrow agricultural canal west of the Chowchilla Bypass Canal). The canals are dry during most of the year and support limited habitat including the host plant for the federally listed Valley elderberry longhorn beetle. Under Alternative A, the pipeline would be bored under levees and trenched through the canals. Construction areas would be set back from sensitive habitats. On balance, the proposed route is considered equivalent to Alternative A after consideration of biological resource mitigations that would be applied to either the proposed route or the alternative route.

Alternate Route B. West California Avenue (25.5 miles). Alternative B originates at PG&E's Line 401 on West California Avenue and follows this County road approximately 14 miles to the intersection of SR 33/West Panoche Road. East of this intersection, the route is common with proposed alignment to the proposed central compressor station site.

Alternative B is a technically feasible route. Should the route be pursued, there would be no potentially significant impacts or resource constraints associated with this alternative, provided that the Applicant proposed measures and other recommended mitigations described for the proposed alignment are implemented. Alternative B is equivalent to the proposed route in terms of potential impacts to biological resources, cultural resources, and other natural and physical resource issues. The key difference between Alternative B and the proposed alignment is that Alternative B avoids construction along SR 33. However, Alternative B has a greater concentration of land use constraints along West California Avenue, as compared to the proposed alignment along Lincoln Avenue and SR 33.

In particular, Alternative B passes an electrical utility substation and towers along the north side West California Avenue near the intersection with North San Diego Avenue. Mature orchards on the opposite side of the street near these facilities would be impacted in order to construct the gas transmission pipeline with sufficient setback from the electrical facilities (i.e., to avoid grounding and stray current concerns). Other land uses along West California Avenue include agricultural processing operations, residences, and a generally higher degree of infrastructure and orchards as compared to the proposed alignment and other alternatives.

Alternative B would cross Panoche Creek at a location east of the California Aqueduct (Alternative B Milepost 4.6). Panoche Creek provides riparian habitat and flows seasonally. This resource would be avoided by the proposed alignment.

Alternative B would tie in to the PG&E Line 401 north of PG&E's Panoche Electrical Substation, and avoid potential infrastructure congestion at this site. The proposed alignment would tie in to the PG&E Line 401 south of PG&E's Panoche Electrical Substation, and would similarly avoid this congestion issue.

Although Alternative B is approximately 1 mile shorter than the proposed alignment, the proposed alignment is considered preferable to Alternative B due to the existing land use constraints on West California Avenue; the greater potential for expanded land use development along West California Avenue, as compared to Lincoln Avenue; and avoidance of Panoche Creek.

Alternate Route C. West American Avenue (26.5 miles). Alternative C originates at PG&E's Line 401 on West American Avenue and follows this County road approximately 11 miles to the intersection of West American Avenue/SR 33. North of this intersection, the route is common with proposed alignment to the Gill Ranch central compressor station site.

Alternative C is a technically feasible route. Should the route be pursued, there would be no potentially significant impacts or resource constraints associated with this alternative, provided that the Applicant proposed measures and other recommended mitigations described for the proposed alignment are implemented. Alternative C is equivalent to the proposed route in terms of potential impacts to biological resources, cultural resources, and other natural and physical resource issues. The primary difference between Alternative C and the proposed alignment is that Alternative C follows West American Avenue, which has a greater

concentration of agricultural infrastructure than the proposed alignment along West Lincoln Avenue.

There are large tracts of non-prime/fallow agricultural land along West American Avenue, particularly near SR 33 and immediately west of this road. The potential future use of these areas is unknown but conversion to crops is doubtful due to regionally high concentrations of selenium that may be present, and high cost of remediation. This condition is also present on the proposed alignment.

Although Alternative C is slightly shorter than the proposed alignment, the proposed alignment is considered preferable to Alternative B due to the relative lack of agricultural infrastructure along Lincoln Avenue as compared to West American Avenue. Alternative C would tie in to the PG&E Line 401 north of PG&E's Panoche Electrical Substation, and avoid potential infrastructure congestion at this site. The proposed alignment would tie in to the PG&E Line 401 south of PG&E's Panoche Electrical Substation, and would similarly avoid this congestion issue.

Alternative D. West Jefferson Avenue, South of Mendota Wildlife Management Area (27.8 miles). As shown on Figure 5.4-1, Alternative D is unique from the other alternatives in that it would avoid crossing the Fresno Slough near the Mendota Wildlife Management Area, and thus avoid potential impacts to this resource, and it would avoid construction in proximity to residential and commercial uses near the Fresno Slough. This route would begin at the PG&E tie-in point either on West Lincoln Avenue (similar to the proposed route or on West American Avenue (similar to Alternative C) and proceed east to SR 33. The route would cross Highway 33 and continue east to West Jefferson Avenue near the southern perimeter of the Mendota Wildlife Management Area; then continue north along the eastern perimeter of the management area to I-180; and then continue north along the proposed pipeline alignment to the central compressor station.

Alternative D is approximately 1 mile longer than the proposed alignment. Similar to Alternative A, this route would avoid the alkali sink scrub habitat located along the north side of I-180. However, based on the field reconnaissance along the eastern and southern perimeter of the Mendota Wildlife Management Area, this alternate route has been deemed infeasible due to the lack of suitable construction access; the greater number of water, levee, and utility crossings; and greater potential impacts to sensitive terrestrial and aquatic habitats, as compared to the proposed alignment and the remaining alternatives. Vegetation communities and aquatic habitat features along this route are shown on the site vegetation maps, in Appendix B. Consequently, this alternative is shown on Figure 5.4-1 for informational purposes, but it is not considered further in this assessment.

Other Routes Considered But Dropped From Further Analysis. One additional pipeline route was studied in detail but subsequently dropped from further consideration. The West Central Avenue route is very similar to the proposed alignment except that it would follow West Central Avenue between the PG&E Line 401 tie-in point and SR 33, instead of West Lincoln Avenue. West Central Avenue is located 2 miles north of West Lincoln Avenue, and the overall

length of this alternative would be slightly shorter than the proposed route. However, after detailed review it was determined that this route segment would require extensive borings and other special construction and design measures in order to avoid a high concentration of Westlands Water District irrigation infrastructure along West Central Avenue.

Various other pipeline route options were considered but not carried forward for various reasons, primarily due to greater distance to the PG&E tie-in point; greater number of water or habitat crossings; and landowner restrictions.

Summary Comparison of Resource Issues along Alternative Pipeline Routes. Overall, the environmental characteristics of the area covered by Alternative pipeline routes A, B, and C are very similar to those of the proposed route. These alternative routes are considered technically feasible and are very similar to the proposed alignment. Should any of these routes be pursued, no potentially significant impacts or resource constraints associated with these alternatives are anticipated, provided that the Applicants' proposed measures and other recommended mitigations described for the proposed alignment are implemented. Alternative D is considered infeasible due to lack of suitable construction access and a greater concentration of terrestrial and aquatic habitat, as compared to the other alternatives.

The proposed pipeline alignment is considered equivalent to Alternative A in terms of potential impacts, and is overall slightly preferable to this alternative route because it is a slightly shorter route.

The proposed pipeline alignment is considered slightly preferred to Alternatives B and C in terms of potential impacts, primarily due to existing land uses and agricultural infrastructure, and is overall preferable to these alternative routes.

From a biological resources and hydrology and water quality standpoint, Alternative C is equivalent to the proposed alignment. Alternative B would require an additional water crossing at Panoche Creek, and is thus slightly less preferable than the proposed route. Alternative A would entail additional water crossings at canals north of the San Joaquin River, but this alternative would avoid the alkali sink scrub habitat along Highway 180 and the Four-Mile slough agricultural pond. On balance Alternative A is equivalent to the proposed alignment.

All of the primary alternative routes, as well as the proposed alignment, would cross the same three major water features: the California Aqueduct, Fresno Slough, and the San Joaquin River. In all cases, HDD techniques would be used at these crossings in order to avoid hydrologic or other resource impacts.

From a cultural resource standpoint, Alternatives A, B, and C are equivalent to the proposed alignment. The areas of highest sensitivity are the Fresno Slough and San Joaquin River crossings; these areas are common to the proposed alignment and Alternatives A, B, and C. Other natural drainage features along the pipeline routes are moderately sensitive, and the remaining upland/agricultural areas are of generally low sensitivity.

From a hazards and public safety standpoint, Alternatives A, B, and C are equivalent to the proposed alignment. The area's low population density is common across all alternatives.

From an agricultural and land use perspective, Alternative A is equivalent to the proposed alignment. Alternative B is slightly less preferable than the proposed alignment or the other alternatives due to the relatively higher concentration of agricultural development along West California Avenue. Alternative C is very similar to the proposed alignment to the extent that both routes exhibit large tracts of non-prime/fallow agricultural land near SR 33, and thus potential conflict with future agricultural operations is less than what could be expected in other alternative routes.

Alternatives A, B, and C are considered equivalent to the proposed alignment in terms of other issue areas including aesthetics, air quality, geology and soils, noise, public services, and traffic. This comparative assessment of alternative pipeline routes is summarized in Table 5.4-1.

Table 5.4-1 Alternative Pipeline Routes*

Pipeline Route Characteristics	Proposed Alignment (West Lincoln Ave.)	Alternative A (San Mateo Avenue)	Alternative B (West California Ave.)	Alternative C (West American Ave.)	Alternative D (West Jefferson Ave.)
Length of route (in miles)	26.8	26.6	25.5	26.5	27.8
Number of property owners crossed ¹	29	Not confirmed; approximately equal to proposed route	Not confirmed; approximately equal to proposed route	Not confirmed; approximately equal to proposed route	Not confirmed; approximately equal to proposed route
Number of canal/water crossings ²	14	13	11 (includes Panoche Creek)	13	16
Number of bores ³	9	8	9	9	12
Number of road and rail crossings ⁴	6	5	6	6	6
Population density and existing residential/commercial land uses	Low	Low	Low	Low	Low (avoids proximity to Highway 180 residential and commercial uses)
Agricultural infrastructure density	Moderate	Moderate	Moderate to High	Moderate to High	Moderate to High
Biological resource/wetland sensitivity ⁵	Low to Moderate	Low to Moderate (avoids route near Alkali Sink Ecological Reserve and avoids Four-Mile Slough; adds Chowchilla Canal)	Low to Moderate	Low to Moderate	Moderate to High
Cultural resource sensitivity ⁵	Low to Moderate	Moderate	Low to Moderate	Low to Moderate	Moderate to High

Notes:

*Routes are shown on Figure 5.4-1

1. Number of property owners is less than the total number of properties. Number of landowners on alternate routes is not confirmed.

2. Includes California Aqueduct; agricultural ponds, canals and ditches; and natural water features including Fresno Slough, San Joaquin River, and seasonally wet areas/depressions. Alternative D

3. Bores include Horizontal Directional Drilling (HDD) under water bodies; and slick bores and conventional bores under roadways and canals.

4. Excludes private agricultural roads.

5. Biological and cultural resource sensitivity for Alternatives B, C, and D is based on literature research, reconnaissance-level field surveys, and photo analysis.

5.5 ALTERNATIVE ELECTRIC POWER LINE ROUTES

As described in Section 3.5, an approximately 9.75-mile electric power line would be constructed between PG&E's existing 115 kV power line on Avenue 7½ and a new electrical substation to be located within the central compressor station. PG&E performed a Land Routing Study to determine an appropriate power line corridor. Preliminary routes were chosen using local maps and aerial photographs. The majority of the study area between the City of Firebaugh and the proposed central compressor station is dedicated to intensive agricultural farming that includes orchards, vineyards, and row crops. The roads in this area are two-lane county roads and unpaved farming roads.

In determining the best route for the new 115 kV electric power line, the following factors have been considered as important criteria in the routing of the new line through this homogenous agricultural area:

- Minimize impacts to land use ;
- Utilize existing corridors, including county and farm roads; and
- Minimize impacts to agricultural operations.

PG&E reviewed these locations during the month of March 2008, and routes were field validated during June 2008. Three routes were chosen using the criteria above. These routes are shown on Figure 5.4-1 and described below.

Power Line Alternative Route1 (approximately 10.38 miles). Power Line Alternative Route 1 (Route 1) would tap a pole from the Dairyland-Mendota 115 kV power line that runs parallel to Firebaugh Road (Avenue 7 ½). The most likely tap off point would occur from one of the following locations:

- Pole #149 (engineered steel pole with a switch)
- The wood pole East of pole #149
- The wood pole West of pole #149

Starting at the tap off point, this route would cross Firebaugh Road and then continue easterly for approximately 0.3 miles toward Avenue 7. The route would travel on the north side of Avenue 7 and cross over the Chowchilla Bypass Canal, and then continue easterly for approximately 3.3 miles on either side of the road, pending final surveying and design. The route would then turn south on County Road 16 for approximately 3.1 miles down to Avenue 3. Route 1 would then continue easterly on Avenue 3, terminating at the proposed electrical substation within the Central Compressor Station.

Existing uses and facilities along Route 1 include:

- A cell tower located at the southeast corner of the intersection of Firebaugh Avenue and Avenue 7;
- Two single family residences are located on Avenue 7, one on the north side of the road and one on the south side of the road, both being located approximately midway between the Chowchilla Bypass Canal and Road 16;
- A cluster of six single family homes located on Road 16, where County Road 16 terminates and becomes unpaved;
- A private airstrip located on the east side of County Road 16, across from the cluster of single family homes and
- Existing utilities include 12 kV electric distribution lines located along Avenue 7 east of the Chowchilla Canal and County Road 16.

Power Line Alternative Route 2 (approximately 9.75 miles). Power Line Alternative Route 2 (Route 2) is the proposed power line route described in Section 3. This route would start at one of the tap off structures identified above for Route 1. Route 2 would proceed easterly for approximately 0.7 mile until reaching the intersection of Avenue 7 and Firebaugh Road (Avenue 7 ½). The route would continue along the north side of Avenue 7 for approximately 1.4 miles, turning southerly at Chowchilla Canal Road. The power line would proceed down the west side of Chowchilla Canal Road for approximately 4.6 miles, eventually crossing the Chowchilla Canal to reach Avenue 3 on the east side of the canal. The route would continue easterly for approximately 2.75 miles on the south side of Avenue 3, terminating at the Central Compressor Station.

Existing uses along Route 2 include:

- Cell tower as mentioned above for SR 1.
- Existing 12 kV electric distribution lines along the west side of Chowchilla Canal Road and the north side of Avenue 3.
- Buried natural gas pipeline (non-PG&E) on alternating sides of Chowchilla Canal Road, the south side of Avenue 7 west of the Chowchilla Canal, and the south side of Avenue 3.
- An agricultural equipment staging area located along the north side of Avenue 3, midway between the Chowchilla Canal and Road 16.

Power Line Alternative State Route (SR) 3 (11.68 miles). Power Line Alternative Route 3 (Route 3) would begin close to the intersection of Firebaugh Road (Avenue 7 ½) and County Road 8, located east of the tangent pole of the Dairyland-Mendota 115 kV power line at this

location. SR 3 would then proceed south over Firebaugh Road along an unnamed irrigation canal road until reaching Avenue 6. The route would continue easterly along Avenue 6, turning south at Chowchilla Canal Road. SR 3 would continue on the west side of Chowchilla Canal Road, cross over the Chowchilla Bypass Canal to reach Avenue 3 on the east side of the canal, and continue east on the south side of the road to the central compressor station, consistent with Route 2.

Existing uses along SR 3 include agricultural farm roads and several canals. The route intersects Route 2 at the west side of Chowchilla Canal Road. The meandering canal between Firebaugh Road and Avenue 3 does not provide for an alignment that is preferred by construction or operations. Therefore, this route was dropped from further consideration.

Land Routing Study Findings and Conclusions. One of the considerations for routing the new 115 kV power line was to utilize existing electric line corridors where feasible. It was determined that the new 115 kV power line could be co-located with existing 12 kV distribution lines to avoid creating a new electric line on the opposite side of a road where no electric transmission or distribution line currently exists. Existing distribution lines can be “underbuilt” on the new power line, thereby avoiding the need to create a new utility pole corridor. Most of the county and farm roads have existing distribution lines that can be transferred under a new power line. The only exception is along the approximately 0.3-mile section of Firebaugh Road (Avenue 7 ½) and the approximately 1.4-mile section of Avenue 7 where there are currently no electric transmission or distribution facilities.

Route 2 does not have any family residences along the alignment. Route 1 would require taller poles along both Avenue 7 and County Road 16, and this route may be visible from nearby residences. Additionally, the private airstrip located along the Route 1 route and its proximity to the proposed line may not be compatible. Further study would be required to determine a compatible location of the pole line in this area.

Route 3 was dismissed from further consideration based on an initial field visit by PG&E personnel. It was determined that a power line built along the meandering canal road would require extensive use of tangent poles and guy wiring to ensure the reliability of the power line. It was also determined that the roads along the canal would prove difficult to patrol during the rainy season.

From a utility siting and routing standpoint, and based on the above criteria for route selection through this agricultural area, Route 2 is the preferred alignment. Route 2 would not be visible to nearby residences. It should also be noted that Route 2 is the shortest route between the Dairyland-Mendota 115 kV line and the proposed GRS central compressor station.

Other Resource Considerations. Power line Route 1 was compared to the proposed power line route (Route 2) in terms of natural resources and potential resource constraints related to the siting of electric power lines. These resource considerations are summarized below.

Biological Resources: Based on field investigations by ENTRIX biologists in May 2008, both Routes 1 and 2 are roughly equivalent in terms of habitat quality and potential resources. In both cases, the poles would be located primarily in previously disturbed road shoulders with little or no vegetation, or in areas presently in agricultural production (primarily row crops, with limited areas of vineyards). The only noteworthy exceptions to this are the Chowchilla Bypass Canal crossing locations.

Route 1 would cross the Chowchilla Canal on the north south side of Avenue 7. The poles would be located on the tops of the canal banks, or set back from the banks. In either case, no significant habitat was observed at this location. Route 2 would cross the Chowchilla Canal near Avenue 3. In this case, existing poles located in or adjacent to the canal would be removed, and two new engineered steel poles would be constructed, one on each side of the canal, preferably on the tops of the banks or set back from the canal. Pending final engineering and design, the exact locations of the engineered poles is not known at this time, however, the power line would span the canal and no new poles would be placed in the canal. The potential engineered pole locations would not be located in sensitive habitat for listed species. Within and adjacent to the canal there are stands of elderberry shrubs (*Sambucus mexicana*), the obligate host plant for the Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), a federally-listed threatened species. Pole construction would be adequately set back from this habitat, and would therefore avoid potential impacts to this resource.

The overall area, and specifically the canal area, provides suitable habitat for various other wildlife, including several federal and/or state-listed species including blunt-nosed leopard lizard (*Gambelia sila*), Swainson's hawk (*Buteo swainsoni*), and San Joaquin kit fox (*Vulpes macrotis mutica*). However, the proposed new poles and lines would generally replace existing lines, and therefore would not substantially alter the existing setting nor result in disturbance likely to impact wildlife. No potential wetlands were observed on either route, except within the channel of the Chowchilla Canal which would be avoided. No rare plants were observed on either route and none are expected to occur in the area due to existing disturbed conditions.

Cultural Resources: AppliedEarthworks archeological staff visited Routes 1 and 2 in May 2008. Based on field observations and literature record searches for this area, both Routes 1 and 2 are roughly equivalent in terms of cultural resources. The existing land uses noted above indicate a generally low probability of significant cultural resources due to prior land disturbances. However, a segment of Route 2 would be placed within a previously identified cultural resource that spans much of the western portion of Gill Ranch and a segment of the Chowchilla Canal (recorded site CA-MAD-301). Little is known about this site other than what is briefly mentioned on an outdated site record form filed with the State of California. The probability of encountering significant cultural resources in this area during pole installation is unknown; however, due to the land use modifications discussed above, it is considered low. As discussed in Section 4.5 Cultural Resources, a pre-construction pedestrian survey is recommended on the entire route, and additional site testing may be warranted in the vicinity of CA-MAD-301, or at other sites discovered during the survey, depending on the survey findings.

Land Use and Other Resource Considerations. ENTRIX environmental staff performed field observations in May 2008. Both Routes 1 and 2 are characterized by County roads and agricultural land uses, except for the Chowchilla Canal area, as noted above. As noted above, a segment of Route 1 passes two agricultural buildings along Avenue 7, and a cluster of six residences and an office building along the west side of Road 16. A private agricultural air strip and agricultural buildings are located on the east side of Road 16, near these residences.

No residences were observed along Route 2. With the possible exception of the airstrip and residences on Road 16, no other land use constraints were observed. The poles would be primarily located along road shoulders, away from irrigated crops, with limited exceptions on Route 1 where new poles would likely need to be installed adjacent to vineyards. Overall the potential interruption to agricultural operations is low along both routes. No other significant resource constraints were observed on Routes 1 or 2.

Summary. Route 2 was selected based on a siting and routing process that reviewed several criteria, including proximity to existing electric transmission and distribution lines; availability of adequate interconnection facilities; avoidance of impacts to agricultural and natural resources; and avoidance of visual impacts to the residences and commercial operations to the extent feasible. Routes 1 and 2 are very similar in terms of length and construction and operations, however, from both an engineering and environmental resource perspective, Route 2 is preferred to Route 1 because it avoids impacts to existing residences, and avoids potential incompatibility with the private air strip on Road 16.

5.6 ALTERNATIVE COMPRESSOR STATION EQUIPMENT CONFIGURATIONS

Alternative Compressor Designs. Selection of the proposed compression design was based on an assessment of operational flexibility, capital cost, re-occurring operations cost, safety and environmental impacts (in particular air emissions), and reliability. Several compression equipment configurations were considered based on these criteria, including:

- Turbine driven centrifugal compressors
 - One Solar Titan 130S turbine driving C404 compressor
 - One Solar Taurus 70S turbine driving C168V compressor
- Electric motor driven reciprocating compressors
 - Six Ariel JGZ-6 single/two stage compressors driven by 5,500 HP electric motors with VFD speed control
- Gas engine driven reciprocating compressors
 - Seven Ariel JGZ-6 single/two stage compressors driven by Caterpillar G3616TALE natural gas engines

Each of these configurations has certain advantages and disadvantages associated with operational flexibility and reliability. A key element of the analysis was the use of electric-

driven compressors instead of natural gas-driven compressors. Natural gas would be available onsite via the gas transmission pipeline and thus provide a highly reliable fuel source. Use of natural gas would also eliminate the need for a new electric power line and associated potential environmental effects of construction and maintenance of the power lines and poles. The use of electric-driven compressors was selected, however, based on the significant reduction in air emissions, an important consideration in the San Joaquin Valley. The alternatives assessment determined that the use of electric driven compressors and auxiliary equipment would not substantially affect operational reliability or flexibility, as compared to natural gas fired scenarios. As noted above in Section 5.5, the construction and operation of either of the primary power line routes are not expected to result in significant environmental effects.

Additional design considerations included installed capital costs and air emissions. An analysis of installed capital costs showed that electric driven configurations were less expensive than identical natural gas powered configurations while natural gas driven configurations had lower estimated fuel costs. Any fuel costs savings, however, were offset by the greater costs for annual maintenance attributed to the natural gas driven configurations. Additionally, air emission requirements made necessary the use of catalytic reduction systems to reduce emissions for the natural gas driven configurations. This equipment requirement increased maintenance costs and reduced the reliability of the natural gas driven configurations.

5.7 THE "NO PROJECT" ALTERNATIVE

CEQA Guidelines Section 15126.6 (e) requires consideration of the environmental consequences of the Project not being constructed. The purpose of describing and analyzing the No Project alternative is to allow a comparison of the impacts of approving the proposed Project with the impacts of not approving the proposed Project.

In this case, if the Project were not constructed the existing land uses at the proposed Project sites would likely remain in their current condition and the present uses would continue (e.g., agricultural uses at the proposed compressor station and certain well pads; gas production at certain existing well pads). The Applicants are aware of no potential development or project that would be implemented to change the status quo in the event the Project does not proceed. No potentially significant impacts would occur under the No Project alternative. The No-Project alternative does not meet any of the Project objectives.