CHAPTER 9 ALTERNATIVES

9.1 INTRODUCTION

Appendix F of the most current California Energy Commissions (CEC) Power Plant Site Certification Regulations (CEC, 2007) requires a discussion of proposed alternatives to the power plant, including the No Project Alternative. This section identifies and evaluates the alternatives considered in the development of the proposed Kings River Conservation District Community Power Plant (KRCD CPP), including the alternative of no power plant or No Project Alternative.

A reasonable range of alternatives that could feasibly attain the basic objectives of the proposed KRCD CPP are identified and evaluated in this chapter. These include the no project alternative, alternative project site locations and alternative pipeline routings for linear facilities (i.e., transmission, gas and water supply), alternative water supplies and project designs, configurations and technologies.

9.2 COMMUNITY CHOICE AGGREGATION PROGRAM

KRCD, on behalf of the San Joaquin Valley Power Authority (Authority), filed California's first Community Choice Aggregation (CCA) Implementation Plan (Plan) with the California Public Utilities Commission (CPUC) on January 29, 2007. The Plan was submitted in accordance with California Assembly Bill (AB) 117 (2002-Migden), which permits cities, counties, or joint power agencies (like the Authority) to aggregate and procure power for the electrical loads of the residents, businesses, and municipal facilities within their respective jurisdiction. The CPUC certified the Plan on April 30, 2007 thereby allowing the final planning and contracting requirements between KRCD and the Authority to commence the CCA Program.

The Authority[1] is a public agency current comprised of 11 member cities and two counties formed for the purposes of implementing a CCA Program serving the greater Fresno region of the San Joaquin Valley. The CCA Program will provide electricity customers the opportunity to join together to procure electricity from competitive suppliers, with such electricity being delivered over the transmission and distribution systems of Pacific Gas and Electric Company (PG&E) and Southern California Edison (SCE). All current PG&E and SCE customers within the Authority's service area will receive information describing the CCA Program. As provided by law, all the customers will be automatically enrolled in the CCA Program unless they affirmatively elect to opt-out and remain a full requirement customers of PG&E or SCE. Thus, participation in the CCA Program is completely voluntary.

[1] Current Authority members include the cities of: Clovis, Corcoran, Dinuba, Hanford, Kerman, Kingsburg, Lemoore, Parlier, Reedley, Selma and Sanger; as well as Kings and Tulare Counties.

The Authority's primary objective in implementing the CCA Program is to enable consumers within its service area to take advantage of the opportunities granted by AB 117. The benefits to consumers include the ability to reduce energy costs; stabilize electric rates; increase local electric generation reliability; influence which technologies are utilized to meet their electricity needs (including a potential increased utilization of local and regional renewable energy); ensure effective planning of sufficient resources and energy infrastructure to serve the Authority members' residents and businesses; and improve the local/regional economy.

The Authority intends to contract with KRCD, and KRCD will act as the exclusive agent on behalf of the Authority and will provide all power services to the Authority, utilizing KRCD staff as well as private sector contractors and qualified energy suppliers. The Authority and KRCD are currently in the final stages of negotiating a Power Services Agreement to formalize this relationship.

The Authority's efforts to form a CCA Program began with the development of a memorandum of understanding (MOU) dated March 1, 2005, between Authority members and KRCD. The MOU provided for a detailed feasibility study concerning CCA. The Feasibility Study was completed in September 2006. The Feasibility Study indicates that there are numerous benefits (and certain risks) to Authority members in further development and ultimate implementation of a CCA Program. The MOU Parties retained an independent energy consulting firm to perform a "peer review" of the Feasibility Study. This peer review generally agreed with the analysis and conclusions of the Feasibility Study, and also recommended that the MOU parties continue with the development of a CCA Program.

Each Authority member subsequently adopted an ordinance declaring its election to implement a CCA program by and through the member's participation in the Authority, as described herein. The final Plan was adopted at a duly noticed public hearing of the Authority on January 25, 2007 and is available on the Community Choice website[2].

The KRCD CPP will be a key element of the KRCD power resource portfolio serving the Authority. It will also serve to improve reliability and lower generation costs for electricity customers of the Authority. The economic viability of the KRCD CPP will allow KRCD and the Authority to take on additional energy related programs within their respective jurisdictions including the development of robust local renewable energy projects and an increase in local energy efficiency programs and effectiveness. Each of these are discussed in greater detail in the Plan.

[2] www.communitychoice.info

KRCD has recently issued a request for proposals (RFP) for renewable energy supply in support of the Authority's CCA Program. KRCD received a significant response, both in response to the RFP and subsequently, from firms, local governmental agencies, and individuals for the development of several renewable energy projects within or near the KRCD service territory.

9.3 PROJECT OBJECTIVES

The KRCD CPP is being proposed in direct support of the CCA program. Primary objectives of the KRCD CPP include:

- Construct and operate a 565 MW, natural gas-fired combined cycle generating facility that can provide base load generation to support the CCA program;
- Provide the greater Fresno area, a Local Capacity Area that is currently deficient for generating resources,[3] with additional reliable and inexpensive in-area gas-fired generation that will help meet the expected electrical demand growth in the greater Fresno area;
- Provide energy at reduced cost to local residents. Electricity from the project will be sold at prices lower than those that will be charged by an investor-owned utility or power producer because KRCD is a local resource agency that can access low-cost, tax-exempt financing;
- Partner with current utility companies to allow them continue delivering electricity over their wires to CCA participants, and to provide traditional utility functions such as meter reading, billing and maintenance services;
- Provide an economic benefit of local municipal ownership of a portion of the power supply;
- Develop a site consistent with community planning at a location that is supported by the local community;
- Safely produce electricity without creating significant environmental impacts;
- Continue KRCD's role as a developer and operator of electric generation;
- Promote the development of local energy efficiency programs and renewable resources that cannot be accomplished without the CCA Program, which is only viable with the economic advantage made available by the development of the KRCD CPP;
- Provide for overall economic expansion of the region by providing electricity at rates below those currently provided by PG&E and SCE; and

[3] California Independent System Operator, 2007 Local Capacity Technical Analysis Report and Study Results, Corrected Version April 28, 2006

- Provide water supply and quality benefits to the local area. The KRCD CPP will utilize discharge water from the City of Parlier and the City of Sanger wastewater treatment plants (WWTPs), thereby lessening the need for the cities to expand their wastewater disposal facilities as their communities grow. The project will also improve the quality of groundwater in the local area by reducing the amount of salts introduced into the groundwater basin from percolated WWTP effluent.

9.4 NO PROJECT ALTERNATIVE

Under the No Project Alternative, the KRCD CPP will not be constructed. If the KRCD CPP is not constructed, the long-term objectives of the CCA program may not be met. Electricity required to serve CCA loads would need to be generated, exclusively, by other sources, perhaps by an older gas-fired generating facility that operates less efficiently and might result in greater environmental impacts than the proposed facility. Even if a new generating plant was constructed to serve the CCA loads, it will likely be constructed by a private entity and therefore be more costly to CCA participants. This is because the private entity will not likely be eligible for the tax-exempt financing and will likely have to pay a return on equity to its shareholders. These costs will then be passed on to the CCA participants in the form of higher energy prices. These excess costs could result in the CCA Program never reaching its true potential, in which case all the benefits discussed above (including lower costs, increased renewable energy development and additional energy efficiency programs) will be lost to the region, its citizens and the State.

9.5 CONSIDERATION OF PERMITTED SITES

To support CCA program objectives, KRCD initially considered the purchase of a licensed or partially licensed but not constructed power plant project. KRCD considered procurement of the San Joaquin Valley Energy Center which was licensed by the CEC in January 2004. KRCD also considered procurement the Avenal Energy Center which began the CEC licensing process in October 2001 but which was subsequently suspended in October 2002.

The acquisition of an already permitted or partially permitted project will likely have allowed for more rapid development of a power plant due to the availability of environmental and engineering information. However, the project acquisition process will have had several uncertainties, and it was unclear as to whether an agreement could have been negotiated between KRCD and the sellers within a reasonable time frame.

After a review of these licensed and partially licensed sites, and after preliminary discussions with the owners of these sites, KRCD determined that the development of a new site was more consistent with the overall objectives of CCA. This is because it will allow for a “fresh start” in

designing a plant to meet the size and shape of the CCA load profile. Based on this determination, permitted or partially permitted sites were eliminated from further consideration and the focus shifted to development of a new power plant on a new site.

9.6 ALTERNATIVE SITE LOCATIONS

9.6.1 Preliminary Site Evaluation

Potential plant development sites were identified within the KRCD service territory.[4] The KRCD service territory is shown on Figure 9-1. Initially, KRCD used Geographic Information Systems (GIS) as a tool for identifying potential sites based on predefined parameters, which generally included proximity to transmission, water sources and natural gas supplies. Based on the initial GIS investigations, a preliminary list of over 200 sites was developed. Since project objectives include providing local ownership of a power plant in the greater Fresno region and developing a project to meet expected demand growth in the Fresno region, only potential sites in Fresno and Kings County were considered. Potential sites in Tulare County were not considered because it was determined that there will be little direct benefit to consumers in the greater Fresno area.

Subsequent GIS evaluations were then focused on several factors to narrow down the list of 200 potential sites. Additional factors that were considered included:

- The proximity to water resources, historical sites, and endangered or threatened plant and wildlife species and habitat;
- Parcels of suitable size, compatible land uses and zoning, and with willing sellers;
- Areas with a greater likelihood of public acceptance of a power plant; and
- Areas with minimal environmental mitigation impacts and associated mitigation costs.

Based on these considerations, the list was narrowed down to 28 qualified sites. Table 9-1, located at the end of this chapter, includes some of the basic land use, zoning, ownership, water supply, sensitive receptor and high-pressure natural gas and electric transmission line distance information for the 28 site locations considered.

9.6.2 Secondary Site Evaluation

Upon further consideration by KRCD, two of the 28 potential sites, appeared to best support the objectives of CCA for development of a power plant. Information on these two sites is provided in Table 9-2. These two sites were subject to additional feasibility analysis, as described below.

[4] The KRCD service territory covers 1.2 million acres in portions of Fresno, Kings and Tulare Counties.

9.6.2.1 Excelsior Site

KRCD first examined the potential development of the project on KRCD-owned property located southeast of the intersection of Excelsior and 16 ¼ avenues in the northeastern corner of Kings County, near Lemoore Air Force Base. This property is referred to as the Excelsior site and is shown on Figure 9-2. KRCD completed a fatal flaw analysis for this Excelsior site and determined that the site is located in a designated flood zone. In addition, transmission studies performed by KRCD revealed that the cost of transmission interconnection for the Excelsior site was likely prohibitive. Therefore, development of a power plant was not considered feasible at this site.

9.6.2.2 Selma-Kingsburg-Fowler Sites

After development at the Excelsior site was judged infeasible, KRCD considered development on property owned by the Selma-Kingsburg-Fowler (SKF) County Sanitation District. Multiple SKF-owned parcels were originally considered. The parcels were located adjacent to the SKF County Sanitation District WWTP, approximately two miles west of the City of Kingsburg and adjacent to PG&E's Kingsburg-McCall double circuit 115-kilovolt (kV) transmission line. As shown on Figure 9-2, these parcels are collectively referred to as the SKF site. The SKF site was attractive for power plant development because of its remote location with respect to sensitive receptors, ease of access, proper zoning, proper size, proximity to a WWTP, availability of water for power plant cooling, and flat terrain. KRCD completed a preliminary siting study for the SKF site and identified a preferred parcel for development of a power plant. Negotiations were conducted with SKF for the development of the power plant on this site. However, SKF and KRCD could not agree on a mutually beneficial set of terms for development of a power plant and for the sale of SKF wastewater to KRCD for power plant cooling. Therefore, development of a power plant was not considered feasible at this site. Therefore, KRCD moved forward with development of the Parlier WWTP site.

After initiating the engineering and environmental analysis at the Parlier WWTP site and at the request of SKF and local government agencies, KRCD reconsidered the development of the KRCD CPP at the SKF site. After additional investigation and negotiations, development at the SFK Site was again found to be infeasible as the parties were unable come to a commercial agreement. However, in order to provide a thorough Alternative Site Analysis for CEQA purposes, the SKF Site was carried forward for further analysis as provided below.

Table 9-2
General Information for Excelsior & SKF Sites
KRCD CPP

Description	Zoning	Current Use/Description	Owner	Transmission		Natural Gas		Water Source	County	Acres
Excelsior Site	Exclusive Agriculture District	Agricultural Property is under a Williamson Act contract	KRCD	PG&E	>20 miles	SCG	4 miles	Groundwater	Kings	88.8
SKF Site	Agriculture	Vacant	SKF	PG&E	>10 miles	SCG	<30 miles	Wastewater	Fresno	20+
Acronyms: SCG – Southern California Gas Company										

9.6.2.3 Additional Sites Identification

After development at the Excelsior and SKF sites was judged infeasible, KRCD redirected its efforts towards more detailed evaluations of additional potential sites in Fresno County. Additional criteria for the project were developed to better support the objectives of CCA and additional focus was placed on finding a site in the east side of the KRCD service territory. Sites in the east side of the service territory will benefit from the following:

- Use of reclaimed water for power plant cooling, preferably from a local WWTP. The use of this water source is in agreement with State Water Resources Control Board Policy 75-58, which encourages the use of reclaimed water rather than fresh water for power plant cooling;
- Electrical interconnection at PG&E's McCall Substation based on regional transmission system conditions and the fact that the majority of potential CCA load is currently served by PG&E; and
- Natural Gas interconnection into the Southern California Gas (SCG) system based on regional gas market conditions.

Several new potential sites were identified. These are shown on Figure 9-3 as the Sanger WWTP Site Area, the Channel Road Site, the Lincoln Avenue Site Area and the Parlier WWTP Site. For purposes of this alternatives analysis, the Channel Road Site is considered as part of the Sanger WWTP Site Area. Similarly, two parcels in the Lincoln Avenue area are analyzed as the Lincoln Avenue Site Area. Only one parcel was considered at the Parlier WWTP. These sites are further described below and additional information is provided in Table 9-3.

Table 9-3
General Information for East Side Sites
KRCD CPP

No.	Description	Zoning	Current Use/Description	Owner	Transmission		Natural Gas Distance		Water Source	County	Acres
1	Parlier WWTP	Agriculture	Vineyards/ Agriculture	Private	PGE	5 miles	SCG	<30 miles	Wastewater	Fresno	32
Sanger WWTP Site Areas											
2a	Sanger Site	Agriculture	Irrigated pasture Adjacent to Sanger WWTP	City of Sanger	PGE	>1 mile	PGE	<30 miles	Wastewater	Fresno	˜30
2b	Channel Road Site	Agriculture	Vineyards Close to Sanger WWTP	Private	PGE	6 miles	SCG	<30 miles	Wastewater	Fresno	>30
Lincoln Avenue Site Areas											
3a	Lincoln Avenue South	Agriculture	Percolation ponds located onsite	City of Sanger	PGE	>1 mile	SCG	<30 miles	Wastewater	Fresno	120
3b	Lincoln Avenue North	Agriculture	Cleared and Fallowed	City of Sanger	PGE	>1 mile	SCG	<30 miles	Wastewater	Fresno	20

Parlier WWTP Site – Preferred Site

The Parlier WWTP site is adjacent to, and on the south of, the Parlier WWTP. The City of Parlier is considering using this site to expand its current wastewater effluent percolation disposal area. However, the expansion will not be necessary if the proposed KRCD CPP is built on the site. The KRCD CPP will use Parlier WWTP effluent for power plant cooling that otherwise will require disposal. Therefore, the property will not be required by the City of Parlier. The property is privately owned, approximately 32 acres in size and is currently planted in vineyards. The property is currently under a Williamson Act contract. There are less than five residential areas are in the direct vicinity of the site.

Sanger WWTP Site Areas

Multiple sites were considered near the Sanger WWTP. The first site that was considered is currently used for irrigated pasture with reclaimed water as its source and is referred to in Table 9-3 as the Sanger Site. The City of Sanger owns the site, and currently leases it to a private party. The city is proposing to develop the site for power generation to provide "behind the meter" electrical service to the adjacent Sanger WWTP. The second site that was considered is referred to in Table 9-3 as the Channel Road Site. The Channel Road Site is privately owned and planted in vineyards. There are multiple residential properties in the area of the Sanger WWTP sites and development of multiple new single-family homes is continuing in the area.

Both sites are in the same general area and are not substantially different with regards to environmental conditions.

Lincoln Avenue Site Areas

The use of available City of Sanger owned property near their Lincoln Avenue effluent percolation and evaporation ponds was also considered for potential power plant development. Effluent from the Sanger WWTP is currently piped to the Lincoln Avenue ponds for disposal. Property on both the north and south sides of Lincoln Avenue was considered for power plant development. The sites are referred to in Table 9-3 as Lincoln Avenue North and Lincoln Avenue South. There are approximately 120 acres available south of Lincoln Avenue near the ponds. There are also 20 acres available on the north side of Lincoln Avenue. The north side land is cleared and fallow, and surrounded by orchards and vineyards. There are a few smaller older residential properties in the direct vicinity of both sites. There is a railroad adjacent to the South Lincoln Avenue site. Both sites are in the same general area and are not substantially different with regards to environmental conditions.

9.6.2.4 Environmental Considerations

This section provides a brief comparison of the potential environmental impacts associated with the three alternative site areas that were considered for development of the KRCD CPP (the Sanger WWTP Site Area, the Lincoln Avenue Site Area and the SKF Site) with the project site (the Parlier WWTP Site). Table 9-4, which follows the environmental comparison, provides a summary comparison of the alternative site areas that were considered, followed by a comparison of the environmental impacts. Additional environmental analysis is also included in Chapter 8, Environmental Considerations.

Air Quality

Each of the site areas is located within the same air basin. The types and quantities of emissions produced as a result of construction and operation of the proposed KRCD CPP will be similar at each site area. Each area generally has a small number of sensitive receptors in the area. A slightly greater residential population is located near the Sanger WWTP site area, where single-family homes are under construction nearby. Impacts to human populations and the environment may differ slightly between the site areas due to the location of residences and other human uses in the areas. Air impacts at each site area will be reduced to less than significant levels with the implementation of Best Available Control Technology (BACT), fugitive dust emissions and the use of emission offsets. However, none of the alternative sites would significantly reduce potential impacts to air quality when compared to the project site.

Noise

Each of the site areas is located in a rural area with relatively quiet background noise levels. As there are a small number of residences in the vicinity of each site area, the potential for noise impacts is similar at each site, with a slightly higher impact potential at the Sanger WWTP site area due to additional planned residential development. Since mitigation will be incorporated at the project site reducing any potential impacts to less than significant levels, none of the alternative sites are preferable.

Visual Resources

The potential for visual impact is similar at each site area due to the similar number of sensitive receptors located near each site area. There is a slightly higher potential impact at the Sanger WWTP site area due to additional planned residential development. While the project site does have sensitive receptors that may view the project components, with the implementation of mitigation measures any potential impacts will be reduced to less than significant levels. Since each of the alternative sites would require similar mitigation measures, no alternative site would be preferable to the Project Site.

Land Use & Agriculture

Generally, each site is currently used for agricultural purposes. The Lincoln Avenue south site is used for effluent disposal, the Lincoln Avenue north site is fallow. The Parlier WWTP site is planted with vineyards, zoned agricultural and under a Williamson Act contract. The Sanger site is used for irrigated pasture and the Channel Road Site is planted in vineyards. The SKF Site is not currently under a Williamson Act Contract. In order to mitigate for the loss of farmland that would occur at any of the sites that are currently used for agriculture, KRCD would implement a farmland preservation program intended to result in the permanent preservation of sustainable farmland. The farmland preservation program will either establish a permanent farmland conservation easement on an equivalent number of farmland acres to be designated by the County of Fresno or will consist of farmland mitigation fees payable to a farmland trust such as the American Farmland Trust. This program is discussed further in Section 8.4, Land Use and Agriculture. With the implementation of this program, development at the Project Site would not result in significant land use impacts and therefore, no alternative site is preferable.

The KRCD is a "local agency" in accordance with Government Code section 53090 and, therefore, is exempt from local permitting and zoning requirements. Land use issues are similar for all of the site areas. No significant land use or agricultural impacts are anticipated at any of the site areas.

Water Resources

The KRCD CPP will use treated wastewater from both the Parlier WWTP and Sanger WWTP (via the Lincoln Avenue evaporation ponds) for power plant cooling. Pipelines to both the Parlier WWTP and Sanger's Lincoln Ponds will be necessary for the Sanger WWTP and Lincoln Avenue Sites. A pipeline to the SKF wastewater WWTP would be required as well. Total water demand of the KRCD CPP will be the same at each of the site areas and since all of the alternatives and development at the Parlier WWTP Site would use reclaimed water, no impacts to water resources would occur at any of the sites.

Traffic and Transportation

Each of the site areas is readily accessible by existing roadways. The Parlier WWTP site will most likely be accessed from Highway 99 by heading east on Manning Avenue, then south on South Bethel Avenue. The Sanger site areas will most likely be accessed from Highway 99 by heading east on Manning Avenue, then North on Academy Avenue and east on East Central Avenue. The Lincoln Avenue site area will most likely be accessed from Highway 99 by heading east on Manning Avenue, then North on Academy Avenue and then east on Lincoln Avenue. The SKF Site would most likely be accessed from Highway 99 by heading west on Kamm Avenue. The Lincoln Avenue sites are closer to an existing rail line and, therefore, will require less roadway travel with heavy equipment as compared with the other site areas. However, the KRCD CPP would implement a construction traffic control plan and will repair any damage to roadways due to construction traffic at any of the sites. Therefore none of the alternative sites would significantly reduce potential traffic and transportation impacts over the insignificant impacts at the project site.

Public Health

Each of the site areas is in a rural and agricultural area with a small number of residences in direct proximity. There is a slightly higher potential for impacts at the Sanger WWTP site area due to additional planned residential development near the area. However, with the implementation of BACT and with the sole use of natural gas as fuel, potential impacts to public health will be less than significant at all sites.

Hazardous Materials and Waste Management

The same quantities and types of hazardous materials will be used and stored at each of the site areas. The same quantities of waste will be generated, and will need to be disposed of at each site area. Therefore, development at any of the alternative sites would not be environmentally preferable.

Worker Health and Safety

Worker health and safety issues for each of the site areas are the same since the construction and operational practices of the proposed KRCD CPP are the same regardless of the site selected.

Geologic Resources and Hazards

Each of the site areas is in the same general area and, therefore, is likely be subject to the same geologic hazards.

Soils

Due to the rural nature of the area and the proximity of the site areas to each other, expected soil conditions are comparable and best management practices will be employed regardless of the site area to reduce soil erosion during construction.

Socioeconomics

There is no difference in the socioeconomic impacts or benefits between the site areas since construction and operation of the proposed KRCD CPP will be the same regardless of the location.

Cultural Resources

The site areas are located in the same rural agricultural area and provide the same potential for discovery of cultural resources. Impacts to cultural resources at each site area will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.

Paleontological Resources

The site areas are located in the same rural agricultural area and provide the same potential for discovery of paleontological resources. Impacts to paleontological resources at each site area will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.

Biological Resources

The site areas are located in the same rural agricultural area and provide the same potential for impacts to biological resources. The Sanger WWTP Site Area, Lincoln Avenue Site Area and SKF Site are associated with the same USGS quadrangle maps used to generate queries of the CNDDB for special-status plants and wildlife relative to the Parlier WWTP Site. A table summarizing project specific USGS quadrangle maps is provided in Appendix 8.16-1. Summary reports generated from CNDDB searches of the USGS quadrangle maps listed in Appendix 8.16-1 are provided in Appendix 8.16-2. Impacts to biological resources at each site area will be mitigated to less than significant levels through the implementation of appropriate mitigation

measures. No significant impacts to biological resources are anticipated at any of the site areas. A detailed discussion of the environmental impacts associated with the KRCD CPP can be found in Section 8.16, Biological Resources.

Table 9-4
Summary Comparison of the Preferred and Alternative Site Areas
KRCD CPP

Resource Area	Parlier WWTP Site	Sanger WWTP Site Area	Lincoln Avenue Site Area	SKF Site
Air Quality	Air impacts will be reduced to less than significant levels with the implementation of appropriate mitigation measures.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.
Noise	Site is located in a rural area with relatively quiet background noise level with a small number of residences in the immediate vicinity.	Slightly higher potential for noise impacts due to increases in residential development.	No substantial difference from preferred site.	No substantial difference from preferred site.
Visual Resources	There are less than five residences in the immediate vicinity. Visual impacts will be reduced to less than significant levels with the implementation of appropriate mitigation measures including the addition of landscaping to shield views.	Slightly higher potential for visual impacts due to increases in residential development.	No substantial difference from preferred site.	No substantial difference from preferred site.
Land Use & Agriculture	The KRCD is a "local agency" in accordance with Government Code section 53090 and therefore is exempt from local permitting and zoning requirements. The site is currently planted in vineyards, which will removed prior to project construction to. The property is also a under Williamson Act contract, which will be cancelled prior to project initiation. No significant land use impacts are anticipated. There will be no significant impact to agriculture, since KRCD will mitigate for the loss of farmland.	No substantial difference from preferred site.	No agricultural lands will have to be taken out of production for construction of the KRCD CPP.	Development will not require cancellation of a Williamson Act contract.

Table 9-4
Summary Comparison of the Preferred and Alternative Site Areas
KRCD CPP

Resource Area	Parlier WWTP Site	Sanger WWTP Site Area	Lincoln Avenue Site Area	SKF Site
Water Resources	The site is adjacent to the Parlier WWTP, but will require an approximately five-mile long pipeline to the Sanger WWTP (via the Lincoln Avenue evaporation ponds) to provide power plant cooling water supply.	The site areas are adjacent to the Sanger WWTP – Lincoln Ponds, but will require an approximately five-mile pipeline to the Parlier WWTP to provide power plant cooling water supply. No substantial difference from preferred site.	The site areas will require an approximately two-mile pipeline to Sanger WWTP (Lincoln Ponds), and a seven-mile interconnection to Parlier WWTP for power plant cooling water supply.	The site will require a new pipeline of less than one-mile to long to the SKF WWTP to provide power plant cooling water supply.
Traffic & Transportation	Site is readily accessible by existing roadways. No significant impacts on traffic are expected.	No substantial difference from preferred site.	Site areas are adjacent to an existing rail line.	No substantial difference from preferred site.
Public Health	The site is located in rural and agricultural areas with less than five residences in direct proximity. Given the design of the project, public health impacts are expected to be insignificant.	Though there is increased residential development in the area, there is no substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.
Hazardous Materials & Waste Management	The quantities and types of hazardous materials that will be used and stored on site and the quantities of waste generated and required for disposal will be less than significant.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.
Geologic Resources & Hazards	No known natural resources occur at the site and geologic impacts are expected to be less than significant.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.

Table 9-4
Summary Comparison of the Preferred and Alternative Site Areas
KRCD CPP

Resource Area	Parlier WWTP Site	Sanger WWTP Site Area	Lincoln Avenue Site Area	SKF Site
Soils	Due to the rural nature of the area and the generally close proximity of the alternative sites, soil conditions are expected to be comparable and best management practices will be employed regardless of the site area and to reduce soil erosion during construction.	No substantial difference from preferred site.	No substantial difference from preferred site.	Soil conditions are expected to be comparable to the Parlier WWTP site. No substantial difference from preferred site.
Socioeconomics	There will be no significant socioeconomics impacts.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.
Cultural Resources	Any impacts to cultural resources will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.
Paleontological Resources	Any impacts to paleontological resources will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.
Biological Resources	Any impacts to biological resources will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.	No substantial difference from preferred site.	No substantial difference from preferred site.	No substantial difference from preferred site.

9.6.3 Final Site Selection

The site areas discussed above were evaluated and KRCD determined that no one site area was environmentally advantageous compared to the others. The following provides a discussion of why two of the site areas were ultimately eliminated from consideration, and how the preferred site was selected.

Sanger WWTP Site Area

The Sanger WWTP site area is located in the PG&E gas service area and not in the SCG service area. As this does not satisfy one of the key siting criteria (location within the SCG territory), the Sanger WWTP site area was eliminated from further consideration. In addition, this site area was eliminated due to increasing residential use, as multiple single-family homes were under construction in the general area at the time the sites were originally identified. Construction of the KRCD CPP at the Sanger WWTP site area will also increase the length of the natural gas pipeline interconnection by approximately seven miles over the length of the natural gas pipeline interconnection required for the Parlier WWTP site.

Lincoln Avenue Site Areas

The Lincoln Avenue site area was ultimately eliminated from further consideration due to the longer length and higher estimated cost for the natural gas pipeline interconnection relative to the Parlier WWTP site.

SKF Site

The Parlier WWTP site and the SKF site were reevaluated to determine if one site was deemed environmentally advantageous. Based on this additional analysis, KRCD determined that neither site was environmentally advantageous as compared to the other. KRCD has already purchased the Parlier WWTP site and has will-serve letters from the Parlier and Sanger WWTPs to provide wastewater to the project. In order to pursue development of the project at the SKF site, KRCD will need to reopen negotiations on development of a mutually beneficial set of terms for development of a power plant on SKF owned property and for the sale of SKF wastewater to KRCD for use in cooling the plant. It is unclear as to whether the necessary agreements could have been negotiated between KRCD and SKF and within a reasonable timeframe. A primary objective of the development of the KRCD CPP is to construct and operate the plant in support of the CCA program and delays in negotiating an agreement for development at the SKF site could jeopardize program objectives. Since development at one site over the other was not environmentally advantageous, the decision was made to continue with development of the KRCD CPP at the Parlier WWTP site as the Preferred Site.

9.6.4 Preferred Site

The Parlier WWTP site located on South Bethel Avenue has been identified by KRCD as the preferred site for development of the KRCD CPP. This is due to its proximity to the Parlier WWTP (adjacent to the north), resulting in a relatively short reclaimed water supply line. The land was also recently purchased from a willing seller and at a reasonable price. The development of a power plant on the site will directly benefit CCA participants Parlier and Sanger.

9.6.5 Other Sites Considered

After the preferred site was identified and preliminary engineering and environmental investigation was initiated, a nearby landowner suggested an alternative nearby parcel for the development of the KRCD CPP. This site is located south of Manning Avenue near the intersection of Highland Avenue. Subsequent discussions with the owner of this Manning Avenue site revealed that the sale price per acre of the site will be approximately twice the sale price per acre of the Parlier WWTP site. The site is also much bigger than needed for the development of the KRCD CPP. Construction of the KRCD CPP at this Manning Avenue site will increase the cost of the project, and therefore not help meet the economic objective of providing affordable power to CCA participants. Therefore, this Manning Avenue site was eliminated from further consideration.

9.7 ALTERNATIVE LINEAR FACILITIES

As described in detail in Chapter 2, Project Description, the offsite linear facilities required for the KRCD CPP include an electric transmission line, a natural gas supply pipeline and a water supply pipeline for power plant cooling. Figure 1-3, in Chapter 1, Executive Summary shows the project site construction staging and laydown areas and associated linear facilities. The proposed offsite natural gas and water supply pipelines will be constructed primarily along existing road rights-of-way. New right-of-way will be secured for the electric transmission line and for the gas and water pipelines as appropriate. The environmental impacts associated with the linear facilities are described in Chapter 8, Environmental Considerations.

Potable water for domestic use will be supplied by a new groundwater well to be installed on the project site. There is no offsite linear associated with the potable water supply. Domestic wastewater will be discharged to the Parlier WWTP. The sewer interconnection is located at the northern boundary of the project site. There is no offsite linear associated with the domestic sewer discharge. Since none of these interconnections require off-site facilities, no alternatives were considered.

The following discussion relates to alternative routes considered for the electric transmission, natural gas and water pipelines.

9.7.1 Electric Transmission Interconnection

The KRCD CPP will require an interconnection to PG&E's McCall Substation which is approximately five miles west of the project site. The interconnection will be to the McCall Substation 230 kilovolt (kV) bus and will include a new 230 kV double circuit line, including new steel poles and access facilities. PG&E and the California Independent System Operator (CAISO) studied the feasibility of the transmission interconnection in the KRCD CPP

Interconnection Feasibility Study Report (CAISO, 2007a) and in the Interconnection System Impact Study Report (CAISO, 2007b). Additional information on these reports is included in Chapter 4, Electric Transmission.

KRCD requested that PG&E explore the feasibility of placing the new transmission line within existing PG&E rights-of-way between the KRCD CPP project site and McCall Substation. PG&E reported back to KRCD that PG&E does not own adjacent vacant rights-of-way that will accommodate the KRCD CPP interconnection. Also, the existing PG&E easements and rights-of-way are specific to the existing lines only and do not provide additional rights for another tower line. The use of existing PG&E right-of-way for the transmission interconnection was therefore considered not feasible and this alternative was eliminated from further consideration.

Since use of PG&E's right-of-way is not a viable option, KRCD will obtain a new right-of-way for the transmission interconnection between the project site and McCall Substation. KRCD retained a consulting engineer to identify potential routing options and constraints, and to prepare conceptual transmission structure and insulator and hardware designs and drawings. Based on this study, four potential transmission line routes were identified. These potential route options are shown on Figure 9-4.

Some of these alternatives were subsequently eliminated from further consideration. Route 2, which generally proceeds west along property section lines, was eliminated from further consideration because it will cross through a residential development that is proposed near the intersection of Del Rey and Dinuba avenues. Route 3, proposed to parallel Manning Avenue, was eliminated due to the number of business located just of the Manning Avenue road right-of-way.

As described below, the two potential transmission line routing options that were further analyzed were Route 1 and the preferred route. Both routes will use new, non-PG&E (KRCD owned) rights-of-way parallel to the existing PG&E rights-of-way.

9.7.1.1 Route Descriptions

Preferred Route

The preferred route for the electric transmission interconnection is identified on Figure 9-4. It exits the plant site directly to the west, then proceeds north along the property lines of parcels to the west of Bethel Avenue across Manning Avenue, and then west paralleling the south side of PG&E's right-of-way to Del Rey Avenue, where it turns northwest crossing under the existing PG&E 230kv Balch-McCall and Haas-McCall transmission lines, and continues west on the north side of the PG&E rights of way along Parlier Avenue to the McCall Substation.

Alternate Route 1

Alternate Route 1 for the electric transmission interconnection is also identified on Figure 9-4. It is similar to the preferred route, except that it does not cross under the existing PG&E 230kV transmission lines, but rather remains on the south side of the existing PG&E rights of way until it reaches McCall substation.

9.7.1.2 Summary Comparison of Preferred and Alternative Transmission Line Route

Environmental and Construction Considerations

A discussion of the impacts for each environmental discipline is provided below followed by Table 9-5, which provides a brief comparison between the preferred and alternative transmission line routes.

Air Quality

Emissions from construction equipment and fugitive dust will occur during construction of either of the electric transmission line routes. Generally, air emissions will be slightly less for a shorter route. However, both the preferred and alternative routes are the same length (approximately five miles long). With proposed mitigation (including water for dust control and the use of low emission construction equipment), air emission impacts will be less than significant for either the preferred or alternative route.

Noise

Construction noise associated with transmission line construction will be primarily limited to daytime hours. No significant noise impacts are anticipated with either route.

Visual Resources

Both the preferred and alternative transmission lines will be constructed using double circuit steel poles placed approximately every 600 to 800 feet. Poles will range in height from 90 feet to 125 feet. For the portion of the transmission line route that follows the existing PG&E rights-of-way, the alternate route will be placed adjacent on the south to three existing PG&E transmission lines of similar size, whereas the preferred route will be located approximately one-quarter mile north of the PG&E right-of-way. While the alternative route will blend in with the existing PG&E transmission lines, the preferred route will be the only transmission line of its size in the immediate area and therefore it will be more visible. No significant visual impacts are anticipated with either route.

Land Use & Agriculture

There could be some temporary losses of agriculture associated with the construction of the either transmission line route as both routes cross land used for agricultural purposes. Steel poles

associated with either route will be placed to minimize any land use impacts and minimize the potential for permanent losses of agricultural land. The preferred route was selected after input from landowners and was designed to limit the number of parcels (and thereby landowners) affected. No significant land use or agricultural impacts are anticipated with either route.

Water Resources

Some quantities of water will be required for dust control (as part of the proposed mitigation for potential air quality impacts) and soil recompaction. Both transmission line routes will have similar water requirements since they are the same length and will involve the same number of steel poles. No significant water resources impacts are anticipated with either route.

Traffic and Transportation

Public roadways will be used to access both the preferred and alternative transmission line routes. Potential impacts to traffic and transportation are a function of the number and type of intersections crossed, street traffic and width of the right-of-way, which are similar for both routes. Construction activities will be temporary and are not expected to significantly impact level of service (LOS) for either route. No significant traffic and transportation impacts are anticipated from the construction of with either route.

Public Health

Public health issues arising from construction of the transmission line are related to air quality emissions from construction equipment and fugitive dust. No significant public health impacts are anticipated with either route.

Hazardous Materials and Waste Management

Similar amounts of waste will be generated from the construction of either the preferred or alternative transmission line route. No significant hazardous waste or waste management impacts are anticipated with either route.

Geologic Resources and Hazards

Regardless of the transmission line route constructed, it will be designed to meet all applicable codes-including current seismic safety codes. No significant geologic resource impacts or hazards are anticipated with either route.

Soils

Regardless of the transmission line route constructed, best management practices and appropriate erosion control measures will be implemented to minimize potential for wind and water erosion during construction. No significant soils impacts are anticipated with either route.

Cultural Resources

Neither the field survey along the preferred route nor the "windshield" survey along the alternative route resulted in the discovery of any significant archaeological and historical sites that will be impacted. Both routes are located in the same rural agricultural area and provide the same potential for discovery of cultural resources. Impacts to cultural resources along either the preferred or alternative route will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.

Paleontological Resources

Neither the field survey along the preferred route nor the "windshield" survey along the alternative route resulted in the discovery of any fossils. Both routes are located in the same rural agricultural area and provide the same potential for discovery of paleontological resources. Impacts to paleontological resources along either the preferred or alternative route will be mitigated to less than significant levels through the implementation of appropriate mitigation measures.

Biological Resources

The preferred and alternative transmission line routes are located in the same rural agricultural area and provide the same potential for impacts to biological resources. The routes are associated with the same USGS quadrangle maps used to generate queries of the CNDDB for special-status plants and wildlife relative to the Parlier WWTP Site. A table summarizing project specific USGS quadrangle maps is provided in Appendix 8.16-1. Summary reports generated from CNDDB searches of the USGS quadrangle maps listed in Appendix 8.16-1 are provided in Appendix 8.16-2. Any impacts to biological resources along the transmission line routes will be mitigated to less than significant levels through the implementation of appropriate mitigation measures. No significant impacts to biological resources are anticipated along either of the routes.

Table 9-5
Summary Comparison of the Preferred and Alternative Transmission Line Route
KRCD CPP

Resource Area	Preferred Route (5 miles in length)	Alternative Route (5 miles in length)
Air Quality	Impacts from construction are primarily a result of emissions from construction equipment and fugitive dust during construction. Air emission impacts will not be significant.	No substantial difference from preferred route.
Noise	Construction noise will be limited to daytime hours. No significant noise impacts are	No substantial difference from preferred route.

Table 9-5
Summary Comparison of the Preferred and Alternative Transmission Line Route
KRCD CPP

Resource Area	Preferred Route (5 miles in length)	Alternative Route (5 miles in length)
	anticipated.	
Visual Resources	Transmission line will be the only transmission line of its size in the immediate area and therefore it will be more visible than the alternate route. No significant visual impacts are anticipated with either route.	Transmission line will blend in with the existing transmission PG&E lines to the north.
Land Use & Agriculture	There could be some temporary losses of agriculture associated with the construction of either transmission line route as both routes cross land used for agricultural purposes. No significant land use or agricultural impacts are anticipated with either route.	No substantial difference from preferred route.
Water Resources	Some quantities of water will be required for dust control (as part of the proposed mitigation for potential air quality impacts), and soil recompaction. No significant water resources impacts are anticipated with either route.	No substantial difference from preferred route.
Traffic & Transportation	Multiple public roadways will be used to access both the transmission line routes. No significant traffic impacts are anticipated.	No substantial difference from preferred route.
Public Health	Public health issues arising from construction of the transmission line is related to air quality emissions from construction equipment and fugitive dust. No significant public health impacts are anticipated.	No substantial difference from preferred route.
Hazardous Materials & Waste Management	Similar amounts of waste will be generated from the construction of either the preferred or alternative transmission line. No significant hazardous waste or waste management impacts are anticipated with either route.	No substantial difference from preferred route.
Geologic Resources & Hazards	The transmission line will be designed to meet all applicable codes including current seismic safety codes. No significant geologic resource impacts or hazards are anticipated.	No substantial difference from preferred route.
Soils	The transmission line route constructed, best management practices and appropriate erosion control measures will be implemented to minimize potential for wind and water erosion during construction.	No substantial difference from preferred route.

Table 9-5 Summary Comparison of the Preferred and Alternative Transmission Line Route KRCD CPP		
Resource Area	**Preferred Route (5 miles in length)**	**Alternative Route (5 miles in length)**
Cultural Resources	The field survey did not result in the discovery of any significant archaeological and historical sites that will be impacted by the construction.	No substantial difference from preferred route.
Paleontological Resources	The field survey did not result in the discovery of any fossils that will be impacted by the construction.	No substantial difference from preferred route.
Biological Resources	The field survey did not result in the discovery of any biological resources that will be impacted by the construction.	No substantial difference from preferred route.

9.7.1.3 Summary

The differences between the preferred and alternative transmission line routes are generally minor. The potential exception is Visual Resources, where the preferred route will be more visible to the local community than alternative route which will blend in with similar PG&E transmission lines in the area. With either route, potential impacts will be less than significant with the implementation of applicable mitigation measures. The preferred route has the advantage of limiting the number of landowners affected.

9.8 NATURAL GAS PIPELINE

During project planning, it was determined a new interconnection to SCG Line 7000 near the City of Visalia, California will be required to meet the natural gas demands of the KRCD CPP. As part of the preliminary planning process, KRCD retained a consulting engineering firm to perform a pipeline route study, compressor location evaluation, gas hydraulic calculations, construction cost estimate, and right-of-way evaluation. Based on this study, three potentially viable pipeline routes were identified to interconnect the KRCD CPP to Line 7000. SCG then studied these routing options to ensure each will meet their needs as the fuel transporter and/or supplier.

The alternative routes considered for the natural gas pipeline interconnection ranged in length from approximately 26 to 30 miles. Because of the distance and potential environmental impacts associated with the gas interconnection, a preferred route and an alternative route were identified. Figure 9-5 shows both the preferred and two alternative gas pipeline routes (identified as Proposed Route and Alternatives 1 and 2). Alternative Route 2, as shown on Figure 9-5, was not considered a viable option both because it is the longest of the three routes and has the highest estimated construction costs.

9.8.1 Route Descriptions

Preferred Route

The connection to the SCG system will be at an existing SCG pigging and regulator station near the City of Visalia in Tulare County. From the interconnection point to the SCG local transmission system, the proposed route will head directly north for several miles before jogging to the west around the town of Goshen then due north again before turning to follow the northwesterly path of the Highway 99 and the Union Pacific Railway. After following the path of the Highway 99 for several miles, the pipeline will then cross under both Highway 99 and the Union Pacific Railway on the north side of the Town of Traver. North of Traver the route jogs east a half mile before heading north along Road 40 to Avenue 408 and then west for several miles where it crosses the Kings River. After crossing the Kings River the line then will head due north again on Road 32 where it will cross into Fresno County approximately one-quarter mile from Mountain View Avenue. Road 32 is named Smith Avenue in Fresno County. Once reaching Mountain View Avenue in Fresno County, the pipeline route turns west to Bethel Avenue before the pipeline route heads north for approximately two and one-half miles to the KRCD CPP project site. The total distance of the proposed is estimated at 26.35 miles

The pipeline will be installed along existing road rights-of-way and just off the paved areas. The preferred route includes multiple Fresno and Tulare County road crossings; irrigation canal crossings; two Union Pacific Railroad crossings; highway crossing of Highway 99 and 298 and State Highway 201 and crossings of the Cross Creek and Kings River. It is estimated that the preferred route will require approximately 16 bore crossings and one crossing under the Kings River to be installed by Horizontal Direction Drill (HDD) (SPEC, 2006). Pipeline installation outside of these crossings will likely be installed using open trenches.

Alternative Route

The alternative route is west of Highway 99 and will proceed generally south and west from the project site and then east approximately seven miles to interconnect to SCG Line 7000. The alternative route is approximately 30 miles in length and is shown on Figure 9-5. The pipeline will be installed along existing road rights-of-way and just off the paved areas. The alternative route includes multiple Fresno, Kings and Tulare County road crossings; irrigation canal crossings; two Union Pacific Railroad crossings; highway crossing of Highway 99 and crossings of the East Branch Cross Creek, Cross Creek and Kings River. It is estimated that the preferred route will require approximately 17 bore crossings and two crossing to be installed by HDD (SPEC, 2006). Pipeline installation outside of these crossings will likely be installed using open trenches.

9.8.1.1 Summary Comparison of Preferred and Alternative Gas Pipeline Routes

Environmental and Construction Considerations

A discussion of the impacts for each environmental discipline is provided below followed by Table 9-6, which provides a brief comparison between the preferred and alternative natural gas pipeline routes.

Air Quality

The preferred gas pipeline route is expected to have approximately 16 bore crossings (including multiple creek, river, highway, canal and railroad crossings) and one Kings River crossing to be installed by HDD (SPEC, 2006). The alternative gas pipeline route is expected to have approximately 17 bore crossings (including multiple creek, river, highway, canal and railroad crossings) and two Kings River crossings to be installed by HDD (SPEC, 2006).

Emissions from construction equipment and fugitive dust will occur during construction at either of the pipeline routes. Generally, air emissions will be slightly less for the shorter preferred route (26.11 miles) versus the alternative route (29.76 miles). With proposed mitigation (including water for dust control and the use of low emission construction equipment) air emission impacts will be less than significant for either the preferred or alternative gas pipeline routes.

Noise

Construction noise associated with gas pipeline construction will be primarily limited to daytime hours. Since the preferred route is slightly shorter than the alternative route (26.11 miles versus 29.76 miles); there will be a slight preference for the preferred route. No significant noise impacts are anticipated with either route.

Visual Resources

All features associated with the gas pipeline, both for the preferred and alternative routes, will be below ground. Disturbed ground surface will be restored to pre-construction conditions. The gas pipeline will require the need for a compressor and metering station. However, these facilities will be located on the KRCD CPP project site regardless of the route selected. No significant visual impacts are anticipated with either route.

Land Use & Agriculture

Both potential routes will cross multiple city and/or county jurisdictions. However, both routes will primarily follow existing road rights-of-way. Necessary easement and encroachment permits will be secured prior to pipeline construction. No significant land use impacts are

anticipated with either route. Neither route will significantly impact agricultural resources, as they will be constructed in road right-of-way.

Water Resources

Some quantities of water will be required for dust control (as part of the proposed mitigation for potential air quality impacts), soil recompaction, and for hydrostatic testing of the pipeline. The amount of water required is directly related to the length of the pipeline route. Therefore, the preferred route will use less water than the alternative route due to its shorter distance. However, this difference is not expected to be significant. No significant water resources impacts are anticipated with either route.

Traffic and Transportation

Public roadways will be used to access both the preferred and alternative gas pipeline routes. Potential impacts to traffic and transportation are a function of the number and type of intersections crossed, street traffic and width of the right-of-way. Pipeline construction activities will be temporary as construction activities move down the pipeline route and are not expected to significantly impact the LOS for either route. No significant traffic and transportation impacts are anticipated from the construction of with either route.

Public Health

Public health issues arising from construction of the gas pipeline are related to air quality emissions from construction equipment and fugitive dust. No significant public health impacts are anticipated with either route.

Hazardous Materials and Waste Management

Nonhazardous wastewater will be generated from the hydrostatic testing of the natural gas pipeline. Hydrostatic testing water will also be collected, tested and appropriately disposed of in accordance with applicable permitting requirements. The preferred route will use less water than the alternative route due to its shorter distance; resulting in less water that will require disposal.

The preferred route requires approximately 16 bore locations and one area of HDD while the alternative route requires approximately 17 bore locations and has two areas where HDD is required. The installation of the natural gas pipeline will also require a crossing of the Kings River, which will be installed using HDD to avoid impacts to the river, its bed or its banks. Drilling mud, consisting of nontoxic bentonite clay, will be used to both lubricate and cool the drilling bit. Any wastes generated as a result of borings or HDD will be properly disposed of. There will be slightly more water and spoils requiring disposal for the alternative route as compared to the preferred route. Neither route will result in significant impacts to hazardous

materials and waste management because all waste materials will be tested and properly disposed of regardless of the route selected.

Geologic Resources and Hazards

Regardless of the gas pipeline route is constructed, it will be designed to meet all applicable codes, including current seismic safety codes. No significant geologic resource impacts or hazards are anticipated with either route.

Soils

Both the preferred and alternative gas pipeline routes will be constructed in road rights-of-way. Neither route will impact soil resources.

Cultural Resources

A total of 22 resources were identified and recorded within the surveyed portions of the KRCD CPP project area. Thirteen of these resources were identified along the natural gas pipeline route. These included three ditches, eight canals, one slough and one concrete foundation. A "windshield survey" of the alternative gas pipeline route was also conducted. Several features were notes adjacent to or crossing the route. These include an historic marker for the former Willow Grove School, the Kingsburg Cemetery, 14 canal features, one railroad crossing, two bridges, 26 ranch complexes, 16 residences and six barns. No significant impacts to cultural resources are anticipated with either route.

Paleontological Resources

Reconnaissance surveys of the proposed and alternative natural gas pipeline were also conducted and areas not obscured by farmland or heavy vegetation were visually examined. No fossils were discovered along either route.

Biological Resources

Both the preferred and alternative gas pipeline routes follow road rights-of-way that are partially disturbed and do not provide habitat for threatened or endangered species. Both the preferred and alternative routes include multiple canal and creek crossings where the pipeline will be installed by boring to avoid the potential for biological impacts. The preferred route includes one crossing of the Kings River and the alternative route has two such crossings. These crossings will be installed by HDD to avoid the potential for biological impacts. With the implementation of applicable mitigation measures, neither route will result in significant impacts to biological resources.

Plant species observed during field surveys of the natural gas pipeline routes and laydown areas included puncture vine (Tribulus terrestris), filaree (Erodium sp.), black mustard (Brassica nigra), common mallow (malva neglecta), fox-tail barley (Hordeum sp.), marestail (Conyza canadensis), common sunflower (Helianthus annuus), Johnson grass (Sorghum halapense), ripgut brome (Bromus rigidus), prickley lettuce (Lactuca serriola), fiddleneck (Amsinkia intermedia), and milk thistle (Silybum marianum).

Wildlife species observed during field surveys included California ground squirrel (Spermophilus beecheyi), mourning dove (Zenaida macroura), house sparrow (Passer domesticus), white-crowned sparrow (Zonotrichia leucophrys), Brewer's blackbird (Euphagus cyanocephalus), American crow (Corvus brachyrhynchos), common raven (Corvus corax), house finch (Carpodacus mexicanus), black phoebe (Sayornis nigricans), rock dove (Columba livia), American kestrel (Falco sparverius), red-tailed hawk (Buteo jamaicensis), red-winged blackbird (Agelaius phoeniceus), killdeer (Charadrius vociferus), California quail (Callipepla californica), spotted towhee (Pipilo maculatus), ruby-crowned kinglet (Regulus calendula), western meadowlark (Sturnella neglecta), northern mockingbird (Mimus polyglottos), scrub jay (Aphelocoma insularis), Say's phoebe (Sayornis saya), and red-shoulderd hawk (Buteo lineatus).

Queries of the CDFG CNDDB produced polygons for special-status plants, animals and sensitive habitats in Tulare and Fresno counties. Habitat for the San Joaquin kit fox and potential Northern Claypan vernal pools exist along alternative and preferred gas pipeline routes in northern Tulare County.

Table 9-6
Summary Comparison of the Preferred and Alternative Natural Gas Pipeline Routes
KRCD CPP

Resource Area	Preferred Route (26.11 miles in length)	Alternative Route (29.76 miles in length)
Air Quality	Impacts from construction are primarily a result of emissions from construction equipment and fugitive dust will occur during construction at either of the pipeline routes. Air emission impacts will not be significant.	Slightly greater emissions impacts from longer pipeline length and one additional bore crossing and one additional HDD crossing.
Noise	Minor preference for the preferred route since it is shorter and will likely be constructed faster than the alternative route. No significant noise impacts are anticipated.	Slightly greater noise impacts due to longer pipeline length and longer construction period.
Visual Resources	All features associated with the gas pipeline, both for the preferred and alternative routes, will be below ground. Disturbed ground surface will be	No substantial difference from preferred route.

Table 9-6 **Summary Comparison of the Preferred and Alternative Natural Gas Pipeline Routes** **KRCD CPP**		
Resource Area	**Preferred Route** **(26.11 miles in length)**	**Alternative Route** **(29.76 miles in length)**
	restored to pre-construction conditions. No significant visual impacts are anticipated.	
Land Use & Agriculture	Both potential routes will cross multiple city and county jurisdictions and require easements and encroachments prior to pipeline construction. No significant land use impacts are anticipated. The pipeline routes will be constructed in road rights-of-way and will not impact agricultural resources.	No substantial difference from preferred route.
Water Resources	Water will be required for dust control soil recompaction and for hydrostatic testing of the pipeline. The amount of water used is directly related to the length of the pipeline route. The preferred route will use less water than the alternative route due to its shorter distance. No significant water resources impacts are anticipated.	Slightly greater water requirements as compared to the preferred alternative due to longer pipeline length.
Traffic & Transportation	Multiple public roadways will be used to access both the preferred gas pipeline routes. Pipeline construction activities will also be temporary as construction activities move down the pipeline route. No significant traffic impacts are anticipated.	No substantial difference from preferred route.
Public Health	Public health issues arising from construction of the gas pipeline is related to air quality emissions from construction equipment and fugitive dust. No significant public health impacts are anticipated.	No substantial difference from preferred route.
Hazardous Materials & Waste Management	Potential hazardous material impacts will result from the disposal of the water used for pipeline hydrostatic testing. The 16 bore locations and 1 HDD crossing will generate spoils that will require disposal. No significant impacts to hazardous materials and waste management are anticipated.	There will be more water and spoils requiring disposal for the alternative route as compared to the preferred route since the route is longer and includes one additional bore crossing and one additional HDD crossing.
Geologic Resources & Hazards	The pipeline will be designed to meet all applicable codes including current seismic safety codes. No significant geologic resource impacts or hazards are anticipated.	No substantial difference from preferred route.

Table 9-6
Summary Comparison of the Preferred and Alternative Natural Gas Pipeline Routes
KRCD CPP

Resource Area	Preferred Route (26.11 miles in length)	Alternative Route (29.76 miles in length)
Soils	The pipeline will be constructed using best management practices an appropriate erosion control measures will be implemented to minimize potential for wind and water erosion during construction.	No substantial difference from preferred route
Cultural Resources	Thirteen resources were identified during field surveys including three ditches, eight canals, a slough and a concrete foundation. A "windshield survey" of the alternative gas pipeline route was also conducted. Several features were notes adjacent to or crossing the route. No significant impacts to cultural resources are anticipated with either route.	These include an historic marker for the former Willow Grove School, the Kingsburg Cemetery, 14 canal features, one railroad crossing, two bridges, 26 ranch complexes, 16 residences and six barns. No substantial difference from preferred route
Paleontological Resources	No fossils were discovered during field surveys.	No substantial difference from preferred route
Biological Resources	The pipeline route follows road rights-of-way that are partially disturbed and do not provide habitat for threatened or endangered species. The multiple canal, and creek crossings where pipeline will be installed by boring to avoid the potential for biological impacts. The crossing of the Kings River will be installed by HDD to avoid the potential for biological impacts. No significant biological resources impacts are anticipated.	No substantial difference from preferred route.
Construction Methods	The majority of the preferred pipeline route is Type 1 construction. Approximately 10 miles of Type 2 construction and 1.5 miles Type 3 construction.	The majority of the alternative pipeline route is Type 1 construction. Approximately 15 miles of Type 2 construction and 2 miles of Type 3 construction are anticipated for the alternative route. There are no major differences in the pipeline construction types other than the fact that the alternative route is longer than the preferred route.

Construction Methods

As defined above in Table 9-7, different construction types have been identified for gas pipeline installation.

Table 9-7
Definitions of Pipeline Construction Types
KRCD CPP

Type	Definition
Type 1	Pipeline construction in the shoulder of rural roadways with work areas between 15 and 20 feet wide. General qualifications are (1) construction in shoulder of narrow roadways; (2) construction in shoulder of rural roadways that feed a medium number of residences; and (3) construction in shoulder of rural roadways with medium to heavy traffic flow that cannot be detoured or closed and will require traffic control.
Type 2	Pipeline construction in the shoulder of rural roadways with work area greater than 20 feet wide. General qualifications are (1) construction in shoulder of wide roadway; (2) construction in shoulder of rural roadway that feed little to no residences; and (3) construction in shoulder of rural roadways that can be detoured or closed during construction.
Type 3	Pipeline construction in paved surface of light or light industrial area.
Type 4	Pipeline construction in railroad right-of-way, parallel to existing railroad tracks.
Type 5	Pipeline installed by boring.
Type 6	Pipeline installed by directional drill.
Source: SPEC, 2006	

The majority of the preferred pipeline route is considered to be Type 1 construction. Approximately 10 miles of Type 2 construction and 1.5 miles Type 3 construction are anticipated for the preferred route. The majority of the alternative pipeline route is also considered to be Type 1 construction. Approximately 15 miles of Type 2 construction and two miles of Type 3 construction are anticipated for the alternative route. Information on road, railroad, creek and river crossings is provided above and is similar for both the preferred and alternative pipeline routes. There are no major differences in the pipeline construction types between the preferred and alternative gas pipeline routes.

9.8.1.3 Summary

The differences between the preferred and alternative natural gas pipeline routes are generally minor. The potential for impacts is generally less with the preferred route than the alternative route because it is shorter. With either of the routes, potential impacts will be less than significant with the implementation of applicable mitigation measures. The preferred route was selected because it was the shortest of the identified potential routes and also because it was the least costly.

9.9 WATER PIPELINE

The KRCD CPP requires an offsite interconnection to the Sanger WWTP Lincoln ponds for reclaimed cooling water supply. Two optional routes are being proposed for this pipeline interconnection, as shown on Figure 1-3 in Chapter 1, Executive Summary. Both Option 1 and Option 2 will generally be constructed within road right-of-way; however, Option 2 also crosses some privately-owned land. Both water pipeline Option 1 and Option 2 have the potential to be constructed and are therefore potential environmental impacts of both options are evaluated in Chapter 8, Environmental Considerations. No additional water pipeline alternatives were considered.

9.10 ALTERNATIVE WATER SUPPLIES

9.10.1 Cooling Water Alternatives

The CEC studies the use of water for power plant cooling in its 2003 Integrated Energy Report Proceeding (IERP). This proceeding produced the following policy:

Consistent with State Water Resources Control Board (SWRCB) Policy 75-58, and the Warren-Alquist Act, the CEC will approve the use of fresh water for cooling purposes by power plants which it licenses only where alternative water supply sources and alternative technologies are shown to be "environmentally undesirable" or "economically unsound" (CEC, 2003).

The SWRCB Policy also specifies that to protect water quality and quantity, cooling water for power plants should come from the following sources (in order of preference):

1. Wastewater being discharged to the ocean;
2. Ocean;
3. Brackish water from natural sources or irrigation return flow;
4. Inland wastewater of low total dissolved solids (TDS); and
5. Other inland waters.

In order for the KRCD CPP to comply with IERP 2003 and SWRCB Policy 75-58, an evaluation of potential water supply sources was conducted. The following alternative water supply sources were identified and considered and ultimately eliminated from further consideration based on the reasons provided below:

Wastewater Being Discharge to the Ocean/Ocean Water

The proposed KRCD CPP will be over 100 miles from the ocean, and therefore, these two potential water sources are not feasible alternatives.

Sanger WWTP Industrial Effluent

The Sanger WWTP receives industrial wastewater that originates primarily from two large water users. Between 1999 and 2005, the average flow through the industrial water treatment plant was about 240 acre-feet per year (AFY). The long-term reliability of this water is unknown since the flow is seasonal and it is dependent on only two local businesses that may change their water demands, relocate, or go out of business. This water supply source will therefore not provide an uninterruptible, constant and secure water source for the KRCD CPP and therefore was eliminated from further consideration.

Deep Groundwater Pumping

Groundwater could be pumped from new deep wells that reach below the influence of the percolated effluent and most irrigation induced water quality problems. These wells will probably extend to depths of 500 or 600 feet and penetrate a semi-confining layer that is generally found at a depth of 350 feet in the area. This groundwater will almost surely have better quality than the shallow groundwater, which will equate to lower power plant operating costs, especially with the zero liquid discharge treatment (ZLD) system. Deep groundwater pumping for process water demands, which represent 99 percent of the water demands, will not be consistent with California Water Code section 13550 et seq., and the SWRCB Resolution 75-58 and, therefore, was eliminated from further consideration.

City of Parlier Water System

The City of Parlier provides domestic water to its surrounding community. Detailed water delivery data for Parlier was not collected. However, water deliveries were roughly estimated based on the City population and typical water demands in the area. The City of Parlier had a population of about 13,000 in July 2006. Assuming a water demand of 275 gallons per day, the total annual water demand was 1.3 billion gallons or 4,000 AFY . The power plant process water demands are estimated to be 3,485 AFY. Meeting this demand will increase the demand on the existing Parlier water system by about 85 percent. The Parlier water system will probably be severely stressed or possibly incapable of meeting this demand and therefore provision of water from the City of Parlier water system was eliminated from further consideration.

Surplus Surface Water Purchases

Local water supplies that could be available to the KRCD CPP include San Joaquin River water and Kings River water. However, these water supplies are already over allocated and their use will most likely only be possible through a water sales agreement. This option presents several problems, namely finding a party that is willing to sell their water, and finding a constant, reliable supply. Any water sales agreement will probably be limited to surplus or floodwaters rather than base allocations. Surplus and floodwaters will not be available on a regular basis.

The KRCD CPP will need reliable and almost daily water deliveries to operate. As a result, surplus water purchases from the Kings and San Joaquin Rivers are not considered viable alternatives and therefore were eliminated from further consideration.

New Water Rights

KRCD could apply for new water rights to meet the power plant water demands. However, most rivers and streams in California are already over allocated. Securing a new water supply that is reliable and can be delivered year round is very unlikely. The few water rights in California that are unallocated are mostly surplus and floodwater that are available on a sporadic and unpredictable basis. In addition, the process to secure the water rights will also be costly and probably require several years to acquire regulatory and legal approval. In addition, new water rights will probably be from fresh water sources, which will violate the aforementioned policies that seek to limit fresh water use for power plant process water. As a result, application for new water rights are not considered a realistic alternative for satisfying water demands and therefore was eliminated from further consideration.

Consolidated Irrigation District Surface Water

The proposed site is located in the service area of the Consolidated Irrigation District (CID), which has surface water rights on the Kings River. CID performs local groundwater management including groundwater level monitoring and groundwater recharge and is responsible for securing and distributing surface water to approximately 145,000 acres. Most of this acreage is located within Fresno County and includes the cities of Sanger and Parlier as well as the KRCD CPP project site. CID's principal surface water supply comes from the Kings River and is diverted into the CID Canal and distributed through a network of canals totaling approximately 500 miles in length. KRCD may have the option to purchase some water from CID. However, no evidence was found that the project site is connected to receive surface water from CID. The current irrigation demands of the site appear to be met with the on-site well. Water from the Kings River is considered fresh or potable water. Therefore, using this water supply for the power plant process demands will violate the aforementioned State policies that seek to limit fresh water use for power plant process water. As a result, using of water from the Kings River was eliminated from further consideration.

Shallow Groundwater Pumping

Shallow wells could be installed near the Sanger and Parlier WWTP percolation ponds or at the project site to recover percolated effluent. The well locations, depths and well perforations will be designed to collect percolated effluent and avoid fresh groundwater. As a result, the water supply will essentially be the wastewater effluent from the Parlier WWTP after having traveled a short distance through the near surface soils and being partially filtered by the soils. The capital

costs and operating costs associated with shallow groundwater pumping for certain scenarios are less than those associated with overland reclamation of the reclaimed effluent.

This alternative was studied extensively and it was decided that shallow groundwater pumping should be a secondary (not primary) source of process water for the KRCD CPP. Direct utilization of WWTP effluent (as described below under Preferred Cooling Water Supply) will be the primary source of process water for the KRCD CPP. This decision was based on the expectation that direct utilization of WWTP effluent will benefit the groundwater aquifer at both sites. Shallow groundwater pumping was selected as a secondary source of process water and will be used to supplement any deficiencies in the quantity of available WWTP effluent as well as a backup operational supply.

Preferred Cooling Water Supply

The preferred cooling water supply for the KRCD CPP is to directly utilize reclaimed domestic wastewater from the city of Parlier and Sanger WWTPs. Effluent from the WWTPs is presently sent to percolation ponds, but could be made available to the KRCD CPP on a daily basis in fairly predictable quantities. Effluent generation was estimated based on population growth projections. Projections show that beginning in 2010, the effluent will be adequate to meet all process water demands. This is an ideal water source and therefore will be used to meet process water demands. The wastewater will be piped to the power plant via a new underground pipeline. This water supply source will be supplemented by a backup supply provided by up to four new percolated effluent wells to be installed in the project site and aimed at collecting wastewater from the Parlier WWTP ponds that has percolated into the ground. The proposed water supply plan for the KRCD CPP is discussed further in Chapter 6, Water Supply and in Section 8.5, Water Resources.

In the case of KRCD CPP, one of the dominant reasons why the site was selected was because of the availability of reclaimed water from the WWTPs. In part, KRCD CPP selected the proposed location because of available water as well as the opportunity to benefit to the WWTPs by meeting current and future growth demands on the treatment plants.

9.10.2 Potable Water Alternatives

Existing On-Site Groundwater Well

The project site has an existing well with a 20 horsepower motor that presently irrigates about 31 acres of vineyards. A short-term (10-minute) pump test was performed on the well in September 2006. The test determined that the well has a maximum pumping capacity of 550 gallons per minute (gpm). However, since the pump test was only performed for 10 minutes it does not provide sufficient information for evaluating the long-term reliability of the well. The well

probably has a long-term capacity between 250 and 550 gpm. This rate may be even higher if the well pump and motor are limiting factors. It should be noted that the well has been the sole water source for 31 acres of vineyards. Assuming an annual crop water consumption of 3 feet, the well has probably been able to produce about 100 AFY. During peak summer months the well has probably produced at least 15 acre-feet per month. The well has only been used for crop irrigation and likely does not include an annular seal, which is required if the well supplies potable water therefore this alternative was eliminated from further consideration.

City of Parlier Water System

The City of Parlier water system could feasibly meet the small potable water demands at the power plant of approximately two AFY. However, the proposed site is in a rural area where most domestic water demands are met with on-site groundwater wells. As a result, the closest City of Parlier water main line is located about one-mile from the project site. Therefore, it could be costly to extend the water main to the project site therefore this alternative was eliminated from further consideration.

Preferred Potable Water Supply

Potable water demands on the KRCD CPP project site will be met by the drilling of a new groundwater well on the project site. The proposed potable water supply plan for the KRCD CPP is discussed further in Chapter 6, Water Supply and in Section 8.5, Water Resources.

9.11 ALTERNATIVE PROCESS WATER TREATMENT OPTIONS

The California Code of Regulations requires that power plant cooling water receive tertiary level treatment. The reclaimed water supplies from the Parlier and Sanger WWTPs is only treated to secondary standards. Therefore, to be used as cooling water, the wastewater effluent must receive tertiary disinfection, or alternatively could be percolated, pumped from wells, and disinfected. Therefore, KRCD will construct a tertiary treatment plant on the project site.

An alternative to the tertiary treatment facility will be to install extraction wells at the percolation ponds. The wastewater effluent could be percolated (which will provide further treatment through filtration in the soils), pumped from wells, disinfected, and then piped to the power plant. The California Code of Regulations does not specifically address the suitability of percolated effluent as cooling water. Nevertheless, another regional power plant has recently been given approval to use percolated effluent for cooling water. This recovered percolated effluent alternative includes the continued delivery of effluent to percolation ponds, and the construction of extraction wells to pump the percolated effluent when needed for delivery to the power plant. For each site, the number and location of wells will ultimately be determined by a detailed hydrogeological study and test hole drilling. Facilities for extraction wells may also

include on-site piping, backup diesel generators for each well, a disinfection system, and a remote Supervisory Control and Data Acquisition (SCADA) system so that pumping could be automatically adjusted to meet power plant demands.

This alternative is associated with the use of shallow groundwater pumping to recover percolated effluent and the primary use of this alternative was discussed in Shallow Groundwater Pumping above. The alternative will be used in conjunction with the secondary process water source.

9.12 ALTERNATIVE WASTEWATER DISCHARGE OPTIONS

There will be no wastewater discharges from the KRCD CPP because all cooling water will be processed through a ZLD system. Therefore, no alternative wastewater discharge options were considered. This alternative method eliminates the need for returning concentrated brine to the WWTPs. This is the preferable alternative since it reduces outflow flows and dissolved solids discharges from the WWTPs.

9.13 ALTERNATIVE PROJECT CONFIGURATIONS

9.13.1 Alternative Cooling Systems

9.13.1.1 Inlet Air Cooling Alternative

The combustion turbine generator (CTG) output and efficiency both increase as the turbine inlet air temperature decreases. The summer ambient air temperatures for the KRCD CPP are sufficiently high to warrant some form of inlet air cooling to improve plant performance. The two common forms of CTG inlet air cooling are evaporative cooling and air chilling.

Evaporative cooling uses water sprayed into the turbine inlet air supply to reduce the temperature to near the ambient wet-bulb temperature. The amount of temperature reduction is limited by the ambient relative humidity. Air chilling is capable of cooling the air temperature far below the ambient wet-bulb temperature and can operate over a wide range of ambient conditions and perform better than evaporative coolers when the humidity is high. Inlet air chillers use mechanical or absorption refrigeration to produce a cold fluid that is used for cooling the inlet air. The chillers are more complex to operate and have a much greater capital cost than evaporative coolers.

Based on the ambient temperature and relative humidity profiles of the KRCD CPP, and on capital costs, evaporative cooling using inlet air fogging system was chosen to optimize the plant output and efficiency. If energy costs should significantly increase in the future, the evaporative cooling system could be retrofitted with the more expensive air chillers if economic to do so.

9.13.1.2 Dry Cooling (Air Heat Exchanger) Versus Wet Cooling

As discussed above, an inlet air chiller system requires a separate cooling system, including either a wet cooling tower or dry cooling (i.e., an air heat exchanger). Use of a wet cooling tower will increase the KRCD CPP water consumption and wastewater discharge by approximately 25 percent over a configuration with no chillers.

An alternative form of cooling for the chiller system will be a dry system in which the rejected heat load is sent into the atmosphere using an air heat exchanger. This reduces the water consumption of the chiller system. Dry cooling technology was evaluated as an alternative project configuration. While dry cooling technology has been utilized in California, a 100 percent dry cooled facility will greatly impact the project's capital cost and plant output and efficiency. For dry cooling, as the ambient temperature increases, the cooling system of the plant cannot reject as much heat, and consequently, the backpressure of the steam turbine condenser will increase. As the condenser pressure increases, the steam turbine output drops. Because the steam turbine has a maximum limit on the backpressure, as the air temperature rises the steam flow will need to be decreased, which in turn reduces the output of the steam turbine. In general, the output difference between dry cooling and wet cooling will start to be seen when the temperature rises above 70 degrees Fahrenheit (°F), and increases as the temperature rises further. During peak conditions, when temperatures exceed 90°F, an estimated three percent or greater reduction in plant output and efficiency and greater greenhouse gas emissions can be expected when using dry, rather than wet cooling.

In addition, dry cooling systems require a much larger footprint and are taller and will likely generate more noise than a conventional cooling tower. There are also added operation and maintenance related costs associated with the dry cooled system. Dry cooling technology does not meet the objective of CCA to provide low cost power and to optimize plant design to decrease ongoing operation and maintenance costs. However, the overall effectiveness (ability to cool inlet air) of the chiller system is reduced, while increasing its cost, noise emissions and site space required for the equipment.

9.13.1.3 Wet/Dry Cooling (Hybrid System)

An alternative to both wet and dry cooling systems is a hybrid system, which uses elements of both wet and dry cooling. Capital costs for a hybrid system will be less and performance greater than those achieved using a dry cooling system. A hybrid system will be designed to improve plant performance on hot days and to limit water use during cool operating periods.

A hybrid cooling system uses a parallel condensing cooling system where the steam turbine exhaust steam is condensed simultaneously in both a standard steam surface condenser (SSC)

and in an air cooled direct condenser (ACC). The amount of steam condensed in each device depends on the overall heat rejection load, availability of makeup water and ambient conditions. During operation, the condensing pressures in both the SSC and ACC constantly equilibrate due to self-adjustment of steam flows entering each device. For example, if the water temperature in the surface condenser were incrementally raised, steam flow to the surface condenser will decrease. Steam flow to the direct condenser then will increase, and turbine backpressure will increase slightly. As ambient conditions, load conditions and heat rejection capability of each device vary over time; the steam flow to each automatically adjusts without any active components being required on the steam side. Steam flowing to the SSC is taken off the main steam duct in a manner that best suits the specific steam turbine exhaust configuration and steam duct routing to the ACC. A conventional circulating water system interconnects the SSC with a conventional mechanical draft cooling tower system. Steam condensed in the SSC is returned to the main condensate tank via a condensate forwarding pump. The air ejection system is appropriately connected to both the SSC and the ACC.

The primary benefit of this type of system is that, if a small amount of makeup water is available, a "wet" side or cooling tower can be used to enhance cooling efficiency relative to full dry cooling. The ACC fans of the hybrid system dry side are operated are operated at full speed during the warmer periods of the year. When in operation, the hybrid system wet side cooling tower fan speeds are adjusted to maintain a prescribed evaporation rate. Compared to the proposed cooling system, for the same fuel input, the plant will generate less power due to higher backpressure and auxiliary loads, making the plant less efficient.

It is estimated that with a hybrid wet/dry system, the KRCD CPP will occupy over one acre more than with the selected cooling system, the dry side will extend to a height of 90 to 110 feet, and the plant's electrical output will be reduced. In addition, more fuel must be burned in order to generate the same power as from the KRCD CPP resulting in an increase in air emissions.

If the proposed KRCD CPP water source were to have significant environmental impacts associated with its use, then a hybrid wet/dry system might require further consideration. However, the lack of environmental impacts of the water used for the KRCD CPP does not justify the tradeoff. Therefore, this alternative was eliminated.

9.13.2 Air Pollution Emission Control Analysis

To minimize nitrogen oxide (NOx) emissions from the KRCD CPP, the CTGs will be equipped with dry low NOx (DLN) combustors and the heat recovery steam generators (HRSGs) will be equipped with post-combustion selective catalytic reduction (SCR) using aqueous ammonia as

the reducing agent. This combination of NOx emissions control equipment was determined as Best Available Control Technology (BACT) for the CTG/HRSGs.

DLN combustors were selected because they provide for lower NOx emissions than other types of in-combustor NOx emissions control. (e.g., water or steam injection). For the KRCD CPP CTGs, DLN is capable of achieving 9 parts per million (ppm) NOx as compared with 25 ppm for water or steam injection. Use of the DLN technology also results in lower water consumption by the KRCD CPP.

Three additional NOx control alternatives were also considered:

- SCR;
- SCONOx™; and
- XONON™.

SCR is a proven technology and is used frequently in combined-cycle applications such as the KRCD CPP's F Class CTGs. Ammonia is injected into the exhaust gas upstream of a catalyst. The ammonia reacts with NOx in the presence of the catalyst to form nitrogen and water and significantly lower emissions. SCONOx™ (SCONOx) consists of an oxidation catalyst, which oxidizes carbon monoxide (CO) to carbon dioxide (CO2) and NO (nitrous oxide) to NO2 (nitrogen dioxide). The NO2 is adsorbed onto the catalyst, and the catalyst is periodically regenerated. XONON™ (XONON) achieves NOx as well as CO and volatile organic compound (VOC) emissions control through the combustion process using a catalyst to limit the combustor temperature to below the temperature where NOx is formed. The XONON module is attached directly within the gas turbine combustor.

For the KRCD CPP during steady-state operation, DLN combustors in combination with SCR will limit NOx emissions to two ppm. While SCONOx and XONON have be applied to CTGs for the reduction of NOx emissions, neither of these emissions control technologies can provide a lower emissions limit than that achieved through the use of DLN combustion in combination with SCR and more importantly, neither of these other technologies has been applied to the size or class of CTGs to be used for the KRCD CPP.

These conclusions regarding other NOx control methods are mirrored in the recent Applications for Certification prepared for various similar projects, including the South Bay Replacement Project and the San Joaquin Valley Energy Center, as well as in the California Air Resource Board (CARB) May 2004 Report to the Legislature on Gas-Fired Power Plant NOx Emissions Controls and Related Environmental Impacts. As noted in the CARB report, neither SCONOx nor XONON

have been applied to F Class CTGs. Applications of SCONOx have been limited to smaller units (40-50 MW). Similarly, XONON, which appears capable of achieving three rather than two ppm NOx, has only been applied to small CTGs (e.g., less than 20 MW).

Based on the use of SCR, the following reducing agent alternatives were then considered for use with the SCR system:

- Anhydrous ammonia;
- Aqueous ammonia; and
- Urea.

Anhydrous ammonia is suitable for use, but its handling and storage are of more concern than is the use of aqueous ammonia. Aqueous ammonia (29 percent ammonia, 71 percent water solution), which has been used in many combined-cycle facilities, is also suitable for use with the SCR system and has been selected for the KRCD CPP. Urea has not been commercially demonstrated for use with SCR on gas turbines attempting to meet the extremely low NOx levels proposed for the KRCD CPP. Therefore, this reducing agent was eliminated from consideration.

In addition to NOx emissions controls, the CTG/HRSGs will include an oxidation catalyst as BACT for CO and VOC emissions. The oxidation catalyst is a post-combustion device, which combines CO and oxygen in the exhaust stream into CO2. The only other available BACT for CO is good combustion practices. While efficient combustion will be maintained in the CTGs, the use of only good combustion practice will result in CO emissions that are 4-5 times greater than those resulting from the use of a CO catalyst. Similarly, the options for control of VOC emissions from the CTGs consisted of good combustion practices and an oxidation catalyst with the catalyst provided for significantly lower emissions. Additional information regarding emissions controls for the KRCD CPP is provided in Air Quality Appendix 8.1-4, Best Available Control Technology Analysis.

9.14 ALTERNATIVE TECHNOLOGIES

KRCD has reviewed a number of alternative methods of generating electrical power, including coal, oil, biomass, solar, geothermal, and other renewable energy projects, as described below.

9.14.1 Coal and Oil

Coal and oil are alternative sources of energy for baseload projects. However, these technologies result in lower efficiency and higher capital costs. Also, because coal contains fuel-bound nitrogen, unabated emissions of NOx from coal projects are typically significantly higher than

unabated natural gas-fired emissions. Coal also has a relatively high ash and sulfur content, producing potentially significant emissions of particulates and sulfur dioxide (SO2) as compared to a natural gas fired plant. Space requirements, water usage and the cost of generation for coal and oil technologies are also relatively higher when compared to natural gas-fired technologies. Development of a coal or oil fueled facility will not meet the objectives of the CCA program including providing participants with low cost power and an optimized plant design.

9.14.2 Biomass

Combustion technology and pollution control equipment exist which allow the burning of biomass wastes, which typically include forestry and mill wastes in the form of wood chips, agricultural field crop and food processing wastes or plants grown as fuel. The emissions of a biomass facility are slightly higher than that of a natural gas-fired facility. Water requirements of a biomass and a natural gas-fired facility are approximately the same.

Biomass projects will also require a guaranteed fuel supply to achieve a level of reliability comparable to gas-fired projects. This guarantee is difficult to obtain when the source of fuel can be from an industrial process (sawmill), which is subject to business cycles or agricultural wastes subject to yearly crop rotations. Also, if the biomass is grown in acreage dedicated to the project, environmental impacts could include an increase in water use and the impact in growing the crop to be used as fuel. Development of a coal or oil fueled facility will not meet the objectives of the CCA program including providing participants with low cost power and an optimized plant design to decrease ongoing operation and maintenance costs.

9.14.3 Solar

Solar projects use solar energy to produce steam for power production and augment this energy with gas-firing during periods of low solar insolation and/or ambient temperatures. Solar projects can also involve significant land use – at approximately five acres per MW. Gas-firing can account for as much as 10 percent of energy production. Also, solar projects consume more water than a combined cycle project such as the KRCD CPP. Additionally, solar projects are less economically attractive in terms of both capital and operation and maintenance costs. Development of solar facility will not meet the objectives of the CCA program including providing participants with low cost power and an optimized plant design to decrease ongoing operation and maintenance costs.

9.14.4 Geothermal

Geothermal energy is a commercially available alternative. However, geothermal development locations are limited and there are none available in the area proposed for the KRCD CPP. Development of a geothermal facility is not viable option at the KRCD CPP project location and

it was therefore eliminated from consideration. Development of a geothermal facility will not meet the objectives of the CCA program including improve energy reliability for all residents and businesses in the greater Fresno area.

9.14.5 Hydroelectric

There were no potential hydroelectric sites identified within the KRCD service territory that will meet the generation demands to be met by the KRCD CPP and also will meet the objectives of the CCA program including improve energy reliability for all residents and businesses in the greater Fresno area.

9.14.6 Wind

Wind generating facilities rely on the presence of wind to produce electricity at any given time. The KRCD CPP is a baseload facility designed to supply a firm number of MWs of electricity in support of the CCA program whose goals include improving energy reliability and meeting expected electrical demand growth in the greater Fresno area. There were no potential wind generation sites identified within the KRCD service territory that will meet the generation demands of the proposed KRCD CPP.

9.15 REFERENCES

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Table 9-1
Summary of Potential Sites for a Baseload Generation Plant
KRCD CPP

No.	Description	Current Owner	Zoning	Current Use	Transmission Owner	Size (kV)	Distance (ft)	Natural Gas Owner	Line #	Size	Distance (ft)	APN	County	Water Source	Distance In feet	Acres	Comments
1	Line to Sanger	Varies by location	n/a	Fallow	PGE	230	<1500	PGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Residential nearby
2	Sanger - Balch 230kV fold	Varies by location	n/a	n/a	PGE	230	<1500	PGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	~ 15 Residents w/in 1/4 mi., Church ~ 1mi.
3	Conejo - Del Rey	Selma-Kingsburg-Fowler County Sanitation District	Agriculture	Fallow Vacant	PGE	n/a	<1500	PGE	n/a	n/a	<1500	n/a	Fresno	Ground Water Waste Water Reservoir	n/a	39	Relocated as denoted on map
4	North of McCall substation	Circle K Ranch/ Fallow	Agriculture	Agriculture	PGE	n/a	<1500	PGE	n/a	n/a	<1500	345- 031-20	Fresno	Ground Water	n/a	23	
5	Adams - Del Rey	Alves Trust	Agriculture	Vineyard Orchards	PGE	230	1 mi	PGE	n/a	n/a	<1500	353-020-07 S	Fresno	Ground Water	n/a	40	
6	Adams - Fruit	Dwayne Cardoza	Agriculture	Vineyard Orchard	PGE	n/a	<1500	PGE	n/a	n/a	<1500	334-370-07	Fresno	Ground Water	n/a	18	For Sale
7	Jensen WWTP	Fresno County RWRF	Agriculture	Fallow Substation Corn	PGE	n/a	<1500	PGE	n/a	n/a	1.5 mi	327-030-38 T	Fresno	Ground Water Reservoir Waste Water	n/a	80	
8	Weber - Herndon	FMFCD	Industrial	PG&E Substation	PGE	n/a	<1500	PGE	n/a	n/a	<1500	504-130-24 T	Fresno	Ground Water Surface Water	n/a	42	Possibly outside of District
9	Cornelia - Laguna	Laverne Coehlo Trust	Agriculture	Orchard, Dairy	PGE	230	<1500	SCG	n/a	10	<1500	053-150-11 S	Fresno	Surface Water Ground Water	1500	237	Dairy and Cotton on property
10	Bethel - Nebraska	SKF County Sanitation District	n/a	Percolation Pond	PGE	115	<1500	SCG	n/a	6	<1500	393-211-02 T	Fresno	Surface Water Ground Water Waste Water	0	99	Removed
11	Grantland – West Mountain View	Paul & Swaranjit Singh	Agriculture	Vineyard	PGE	230	<1500	PGE	138	16	<1500	041-120-55 S	Fresno	Surface Water Ground Water	19000	234	
12	South Bethel - East. Nebraska	Walter and Laura Short Trust	Recreational	Golf Course	PGE	115	<1500	SCG	n/a	8	<1500	393-310-36 S	Fresno	Surface Water Ground Water	100	85	
13	Nevada – West Esperanza	Richard S Burford	Agriculture	Agriculture	PGE	230	<1500	PGE	111	12	<1500	040-050-11 S	Fresno	Surface Water Ground Water	3200	134	
14	Nevada - West Esperanza	John and Anna Kinnunen	Agriculture	Agriculture	PGE	230	<1500	PGE	111	12	<1500	040-050-40	Fresno	Surface Water Ground Water	4000	126	
15	Dockery - Floral	Donald Serimian	Residential	Potential Subdivision	PGE	115	<1500	SCG	n/a	8	<1500	389-020-56	Fresno	Surface Water Ground Water	600	88	
16	McMullin - West Esperanza	Reclamation District No. 1606	n/a	n/a	PGE	230	<1500	PGE	111	12	<1500	040-050-06 T	Fresno	Surface Water Ground Water	2800	85	
17	McMullin - West Esperanza	Terranova Ranch, Inc.	Agriculture	Agriculture	PGE	230	<1500	PGE	111	12	<1500	040-050-04	Fresno	Surface Water Ground Water	3800	168	
18	Mc. Mullin - Floral	Terranova Ranch, Inc.	Agriculture	Agriculture	PGE	230	<1500	PGE	111	12	<1500	030-120-18	Fresno	Surface Water Ground Water	800	639	
19	South Cherry - East Floral	Ralph and Sandra Feaver Trust	Agriculture	Vineyard	PGE	115	<1500	SCG	n/a	8	<1500	338-050-64	Fresno	Surface Water Ground Water	2700	98	
20	South Elm - West Floral	Charles Pedreira	Agriculture	Agriculture	PGE	115	<1500	SCG	n/a	8	<1500	338-050-39 S	Fresno	Surface Water Ground Water	1300	155	horse ranch, possibly old dairy
21	Highway 99 - South Leonard	Quinn Company	M-2 – Industrial	Vineyard	PGE	115	<1500	SCG	138	6	<1500	348-130-49 S	Fresno	Surface Water Ground Water	1300	84	Removed
22	South Blythe - West Dinuba	Lindy Farms	Agriculture	Agriculture	PGE	230	<1500	PGE	138	16	<1500	035-130-03	Fresno	Surface Water Ground Water	5300	339	

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No.	Description	Current Owner	Zoning	Current Use	Transmission Owner	Size (kV)	Distance (ft)	Natural Gas Owner	Line #	Size	Distance (ft)	APN	County	Water Source	Distance In feet	Acres	Comments
23	South Highland - East Manning	Melvin and Deborah Kazarian	Agriculture	Orchards	PGE	230	<1500	PGE	138	6	<1500	345-190-23	Fresno	Surface Water Ground Water	400	103	
24	South Highland - East South	Circle K Ranch	Agriculture	Vineyard	PGE	230	<1500	PGE	138	6	<1500	345-031-24	Fresno	Surface Water Ground Water	400	81	
25	South Walnut - West Sumner	Jeffrey Wayne and Velvet Jue	Agriculture	Agriculture	PGE	115	<1500	PGE	138	16	<1500	335-020-06 S	Fresno	Surface Water Ground Water	800	155	
26	South West - West. Adams	Richard and Tamara Spomer	Agriculture	Agriculture	PGE	115	<1500	PGE	138	16	<1500	335-020-78 S	Fresno	Surface Water Ground Water	4000	110	
27	South Bryan - West Whitesbridge	Ida Pretzer Trust	Agriculture	Agriculture	PGE	230	<1500	PGE	118	8	<1500	326-022-36	Fresno	Surface Water Ground Water	n/a	133	
28	26 1/4 - Excelsior	KRCD	AX – Exclusive Agricultural	Vacant	PGE	230	33 mi	SCG	n/a	n/a	4 miles	n/a	Kings	Ground Water Surface Water	2-6 miles	89	Property under Williamson Act contracts

Acronyms:
PGE – Pacific Gas and Electric Company
kV – Kilovolt
WWTP - Wastewater Treatment Plant
RWRF – Regional Water Reclamation Facility
FMFCD – Fresno Metropolitan Flood Control District
SKF – Selma Kingsburg Fowler

Note: Data denoted by "n/a" was not applicable, not available, or not considered in the site analys