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3.0 ALTERNATIVES

The California Environmental Quality Act requires consideration of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives" [14 CCR, 15126.6(a)]. Thus, the focus of an alternatives analysis should be on alternatives that "could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects" [14 CCR 15126.6(c)].

The CEQA Guidelines further provide that "[a]mong the factors that may be used to eliminate alternatives from detailed consideration in an Environmental Impact Report (EIR) are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts" (Id.).

The following sections discuss alternatives to the proposed Project. These include the "no project" alternative, project site alternatives, linear facility alternatives, and technology alternatives. These alternatives are discussed in relation to the environmental, public policy, and regulatory considerations involved in developing the proposed Project.

3.1 PROJECT OBJECTIVES

The Project's basic objectives are to:

- Respond to the SDG&E 2009 solicitation for conventional generation sources that will operate under a tolling agreement (i.e., utilizing natural gas provided by SDG&E) and will provide reliable and efficient peaking and load-shaping power to meet needs of SDG&E service area and facilitate integration of variable renewable sources to the grid;
- Use a site location within SDG&E's service territory that has infrastructure with available capacity and ability to reliably support Project electric transmission, fuel supply, and water needs with minimal impact on existing infrastructure systems or required new construction;
- Use a site that is commercially available, including control for reasonable access and linear facility rights-of-way; and
- Develop a site that has compatible zoning, compatible adjacent land uses, and is located away from sensitive receptors.

3.2 NO PROJECT ALTERNATIVE

3.2.1 Description

If the No Project alternative is selected, the Applicant would not receive authorization to construct and operate a new power generation facility. As a result, the proposed Project site would not be developed and could potentially be used for some other use, consistent with current zoning. Energy that would have been produced by the proposed Project would need to be generated by another source and imported to the San Diego area and used to balance generation against load needs. Common available sources include older power generation facilities that operate less efficiently and release larger quantities of air pollutants than the

proposed Project. Additionally, none of these existing sources would be able to provide local generation for the City of San Diego while allowing SDG&E to supply the greater San Diego area with additional energy from its electric transmission system.

The purpose of a power plant, such as the proposed Project, is to generate and provide electric power to SDG&E's customers. To generate and sell power in today's market, generating facilities need to be built and operated so as to be cost-effective and competitive with existing resources. The purpose of the Project is to provide the City of San Diego with a local source of generation (increasing local reliability) while providing voltage support for SDG&E's electric transmission system. SDG&E is adding renewable power generating facilities to its power generation portfolio. These facilities produce electricity that is highly variable and dependent on the availability of sunlight or wind to generate power. An intermediate/peaking load facility is needed to rapidly provide additional power as demand increases (i.e., hot weather peak demands), or provide supplemental power during transient reductions in the power generated by these renewable plants, or operate at night. Additionally, this Project will enhance the reliability and availability of the 230kV electrical grid in the San Diego area.

The No Project Alternative would delay SDG&E's efforts to improve the reliability and efficiency of power supply to its customers. The No Project Alternative would also forego all of the benefits associated with the proposed Project. The No Project Alternative would result in greater socioeconomic impacts caused by electric supply shortfalls, and would increase air pollution because the new, less polluting peaking generation plants would not replace the older, less efficient peaking power plants with greater emission levels. Additionally, the No Project Alternative would result in the import of electricity and the need for additional transmission capacity to bring the electricity to the San Diego area.

In summary, the No Project Alternative would not serve the growing needs of the San Diego area and southern California's businesses and residents for efficient and reliable, generation resources that can provide peaking and load-shaping power to balance load from variable renewable generating sources. Moreover, it would deprive the region of the significant benefits (low water usage, high efficiency generation) that the Project provides. Finally, the No Project Alternative would not meet the basic objectives of the proposed Project.

3.2.2 Potential Environmental Impacts

The Project will produce electricity to be sold into SDG&E's service area while consuming less fuel and emitting less air pollution for each energy unit generated when compared to other existing, older fossil fuel generation facilities. This is a beneficial environmental impact.

Potential environmental impacts from the No Project Alternative would result in greater fuel consumption and air pollution because new power plants, including the Project, would not be brought into operation to displace production from older, less efficient plants that have higher air emissions. An analysis of the environmental impacts from the No Project Alternative is included in Section 3.3.4.

3.3 PROPOSED AND ALTERNATIVE PROJECT SITES

In order to meet the proposed Project objectives and to comply with the requirements of CEQA and the Warren-Alquist Act, the Applicant considered three alternative locations for an electrical

generation project. Facilities common to all alternatives include a 230kV gen tie, 230kV utility switchyard and access road, and 8-inch diameter natural gas pipeline lateral. Figures 3.1-1 through 3.1-3 show the locations of the alternative project locations. The alternative projects include the following as described in the following sections:

- Alternative A (Figure 3.1-1)
- Alternative B (Figure 3.1-2)
- Alternative C (Figure 3.1-3)

For the proposed Project site and all three alternative locations, the gen tie would connect to the SDG&E Mission to Miguel 230kV transmission line. The natural gas pipeline lateral would connect to SDG&E's Line 2010, located along Mast Boulevard.

3.3.1 Proposed Site

The proposed Project will be a nominal 100 MW intermediate/peaking load facility operating up to 3,800 hours per year using natural gas-fired reciprocating engine technology. The Project will be located west of the City of Santee, south of the Sycamore Landfill, and north of State Route (SR) 52 in the City of San Diego, California. The proposed Project consists of four main components including the approximately 11-acre power plant site located within a 21.6-acre privately owned parcel, 230kV gen tie, 230kV utility switchyard that will include circuit breakers and disconnects, and an 8-inch diameter natural gas pipeline lateral.

The gen tie will head north from the site, west along the southern boundary of the landfill, and north for 4,200 feet. At this point it will be undergrounded for 1,400 feet into the proposed utility switchyard. The gen tie will be undergrounded to cross the existing SDG&E 230kV lines to Mission Substation (see Figure 2.1-1). The total route length is approximately 5,600 feet.

A new SDG&E 230kV utility switchyard at the POI will be configured as a line-break of the existing SDG&E 230kV transmission line that will include circuit breakers and disconnects and an access road.

The proposed natural gas pipeline lateral will be built in the public ROW from the intersection of Mast Boulevard and Sycamore Landfill Road north to the proposed site. The gas pipeline lateral will be located on the north side of Sycamore Landfill Road. The total route length is approximately 2,000 feet.

Access to the proposed plant site will be from Sycamore Landfill Road.

The proposed plant site was selected because it meets all of the Project's basic objectives and avoids significant environmental impacts through the following characteristics:

- The site provides nearby infrastructure for clean-burning natural gas fuel and electric transmission for interconnection to the power plant with minimal impact on existing infrastructure systems or required new construction.
- The Applicant is working with the City of San Diego Development Services Department to obtain the necessary permits and approvals for compliance with zoning and land use requirements.

- The site is distant from sensitive receptors.
- The site is commercially available with good access on existing roads.
- The site would have reliable water supply from infrastructure that has available capacity and ability to support Project electric generation with minimal impact on existing infrastructure systems and would minimize new construction.
- The site is adequately sized and configured to fit the proposed Project's generating capacity.
- An SDG&E 230kV transmission line near the site can be used for interconnection of the proposed project. As a result, comparatively few impacts would result from interconnection of new generating capacity.

A detailed description of the proposed Project is presented in Section 2.0. The proposed plant site, utility switchyard, gen tie, and gas pipeline lateral are shown on Figure 2.1-1. The discussion of each alternative project location below includes the same components as the proposed Project.

3.3.2 Alternative Project Sites

3.3.2.1 Alternative A

The Alternative A plant site (parcel number 36608057) would be situated on property owned by Sycamore Landfill located immediately south of the existing landfill property boundary (see Figure 3.1-1). The Alternative A plant site is currently zoned Heavy Industrial (IH-2-1) and will be withdrawn from the Multi-Habitat Planning Area (MHPA) as designated by the City of San Diego Multi-Species Conservation Program (MSCP) Subarea Plan through the Sycamore Landfill CEQA process currently in progress. A power plant would be consistent with the proposed zoning.

The Alternative A plant site would be surrounded by industrial and open space uses. The closest residential uses to the plant site, which are potentially sensitive noise receptors, are located approximately 4,500 feet south of this plant site. There is a school located approximately 5,000 feet southeast of this plant site.

Alternative A is not a viable alternative as it is not available for purchase or lease. Further it would require the acquisition of additional land from the landfill, which also may not currently be available. The Alternative A gen tie route would head west from the Alternative A plant site to the Alternative A switchyard, for a total of 2,200 feet. The gen tie route would cross a parcel of land that contains several high voltage transmission structures and distribution structures and the gen tie would need to be undergrounded through this area.

The Alternative A utility switchyard would be located just west of the SDG&E Mission to Miguel 230kV transmission line as shown on Figure 3.1-1.

The Alternative A gas pipeline lateral would be approximately 4,800 feet long along Sycamore Landfill Road.

Access to the Alternative A plant site would be from Sycamore Landfill Road. Access to this site would be approximately 4,800 feet long along the existing road.

3.3.2.2 Alternative B

The Alternative B plant site would be situated on privately-owned property (parcel number 36607031) within the City of San Diego (Figure 3.1-2). The site is currently zoned Residential (RS 1-8); a power plant would not be consistent with the current zoning.

The Alternative B plant site would be surrounded by industrial and open space uses. The closest residential uses to the Alternative B plant site, which are potentially sensitive noise receptors, are located approximately 5,600 feet southeast of this plant site. There is a school located approximately 6,300 feet southeast of this plant site. The SDG&E Mission to Miguel 230kV transmission line is adjacent to this plant site. Through preliminary negotiations with the landowner it was determined that the Alternative B plant site is being proposed as mitigation for coastal disturbance for another project and site control cannot be obtained for this parcel.

Alternative B would require equal or greater grading requirements (in quantity and complexity) as the proposed Project.

The Alternative B gen tie route would head north from the Alternative B plant site to the Alternative B utility switchyard, for a total of 800 feet. The gen tie route would cross a parcel of land that contains several high voltage transmission structures and distribution structures and the gen tie would need to be undergrounded for the entire length of the route.

The Alternative B utility switchyard would be located just west of the SDG&E Mission to Miguel 230kV transmission line as shown on Figure 3.1-2.

The Alternative B gas pipeline lateral would be within the same easement as the Alternative B access road described below.

The Alternative B plant site access road would be along the existing Sycamore Landfill Road and a new road would be created west along the south side of the Sycamore Landfill into the Alternative B plant site. The total length of the Alternative B plant site access road is approximately 6,400 feet.

3.3.2.3 Alternative C

The Alternative C plant site would be situated on property owned by the Sycamore Landfill (parcel number 36603110) within the City of San Diego (Figure 3.1-3). The Alternative C plant site is currently zoned Residential (RS 1-8); a power plant would not be consistent with the zoning.

The site would be surrounded by industrial and open space uses. The closest residential uses to Alternative C plant site, which are potentially sensitive noise receptors, are located approximately 7,200 feet southeast of this plant site. There is a school located approximately 7,600 feet southeast of this plant site.

The Alternative C plant site would require as much or more grading (in quantity and complexity) than the Project site.

The Alternative C gen tie route would head north from the Alternative C plant site to the Alternative C utility switchyard, for a distance of 1,500 feet.

The Alternative C utility switchyard would be located north of Alternative C and west of the Sycamore Landfill as shown on Figure 3.1-3.

The Alternative C gas pipeline lateral would be within the same easement as the Alternative C access road described below.

The Alternative C plant site access road would be along the existing Sycamore Landfill Road and a new road would be created along the south side of the Sycamore Landfill, then north along the west side of Sycamore Landfill, then west into the Alternative C plant site. The total length of the Alternative C plant site access road is 8,700 feet.

3.4 ENVIRONMENTAL CONSIDERATIONS

In this section, the potential environmental impacts of the three alternative projects and the No Project Alternative are discussed. Potential environmental impacts from implementation of the proposed Project are presented in more detail in each of the 16 environmental subsections of Section 4 of this AFC.

Each of the alternative sites would have similar impacts in most of the environmental areas because they would be constructed using similar methods and cross similar habitat. The differences between sites, although minor, are discussed as applicable in the sections below. It should be noted that these differences are slight and construction of any of the alternative sites would not likely result in significant adverse impacts.

Each of the linear facilities would have similar impacts in most of the environmental areas because they would be constructed using similar methods and cross similar habitat. The differences between routes, although minor, are discussed as applicable in the sections below. It should be noted that these differences are slight and construction of any of the alternative routes would not likely result in significant adverse impacts.

3.4.1 Cultural Resources

All alternative projects are expected to have similar cultural impacts. All alternative projects were included within the cultural resources survey area for the proposed Project and no historic resources were identified. A cultural resources record search was conducted at the South Coastal Information Center, with supplemental information provided by the San Diego Museum of Man and the Santee Historical Society. This search determined that cultural resource sensitivity is generally low to moderate.

The linear routes for Alternatives A, B, and C were sited in previously disturbed areas wherever possible. Small cultural resources, if discovered, can be avoided through small route changes within the linear corridors (gen tie, gas line, and access road), and by altering span length. Mitigation measures described in Section 4.1 would reduce or mitigate potential significant impacts on significant cultural resources.

Under the No Project Alternative, there would be no impact to cultural resources.

3.4.2 Land Use

The proposed Project is located within the City of San Diego in areas zoned Residential (RS 1-8) and is within the MHPA. A zone change and General Plan Amendment will be required for the proposed Project, which will also require an MHPA boundary modification.

The Alternative A plant site is located within the City of San Diego in areas currently zoned Industrial. The site will be withdrawn from the MHPA as designated by the City of San Diego MSCP Subarea Plan through the Sycamore Landfill CEQA process currently in progress. The Alternative A switchyard is currently zoned Residential (RS 1-8) and is within the MHPA. A zone change and General Plan Amendment would be required for the Alternative A switchyard and the Alternative A plant site will need to be withdrawn from the MHPA.

The Alternative B plant site is currently zoned Residential (RS 1-8) and is within the MHPA. A zone change and General Plan Amendment will be required for the Alternative B plant site and will need to be withdrawn from the MHPA.

The Alternative C plant site is currently zoned Residential (RS 1-8) and is within the MHPA. A zone change and General Plan Amendment will be required for the Alternative C plant site and the project will need to be withdrawn from the MHPA. The Alternative C switchyard is located in an Industrial zone (IH 2-1) and is not within the MHPA; the Alternative C switchyard would be consistent with existing land uses and policies and would not require any changes in land use.

As components of the proposed Project and alternative projects would need a zone change, General Plan Amendment, and withdrawal from the MHPA, there would be no advantage of any one alternative from a land use perspective.

Under the No Project Alternative, the land uses would remain as they are, and are presumed to be consistent with existing land use plans and policies.

3.4.3 Noise

The closest residence to the proposed Project site is 2,400 feet to the southeast of the site across Mast Boulevard. Sources of environmental noise in the Project area include the industrial landfill operations and vehicle traffic on local roads. Construction noise may be periodically audible at several residential receptor locations; construction will be largely limited to daytime hours. The facility will be designed to comply with the City of San Diego, City of Santee, and CEC's requirements.

All other alternative sites are located further from residences. Sources of environmental noise for all alternatives would be the same as the proposed Project site.

No noise impacts would occur under the No Project Alternative.

3.4.4 Traffic and Transportation

All of the sites are easily accessible via SR 52 off of the Mast Boulevard exit. The area can be accessed by heading east from the Mast Boulevard exit and north on Sycamore Landfill Road. The proposed Project would be accessed by arterial and collector roads. The proposed Project

and alternatives would be accessed from Sycamore Landfill Road, therefore all traffic impacts would be the same. Transportation requirements would be the same regardless of alternative.

Project design features have been proposed to avoid or minimize Project impacts to traffic and transportation facilities and are described in Section 4.4.

The No Project Alternative would have no impact on traffic and transportation.

3.4.5 Visual Resources

The potential for visual resource impacts associated with each of the sites varies depending on the relative visibility of the sites from roads, residences, and recreational users of the Mission Trails Park, and the length and potential visibility of any new transmission lines that the power plant would require. Visual impacts are also a function of the surrounding facilities.

The proposed Project and alternatives are located in the City of San Diego near the Sycamore Landfill. Land within 1 mile of the proposed Project site and alternative sites are primarily used for industrial purposes, particularly the Sycamore Landfill, or for informal recreation. The proposed Project and alternatives are located close to Mission Trails Regional Park, and receives current used as unofficial recreational lands. The proposed Project and alternatives are also located west of the Santee Boulders, a popular rock climbing spot on private lands. Though not modeled, it is anticipated that the Visual Sphere of Influence of the proposed Project and alternatives would be similar as the sites are less than 1 mile apart. Visual impacts during construction and operation would be similar for the proposed Project and alternatives.

The Project visual impact analysis documented in Section 4.5.2 specifically accounts for adopted design features that would reduce the visual impacts from the Project. The assessment concluded that visual impacts from the construction and/or operation of the Project are not anticipated to be significant, based on consideration of visual sensitivity and the degree of visual change at key observation point (KOP) 1 (the location of the nearest residential viewers to the proposed Project site) or the other viewpoints. As a result of this conclusion, specific measures intended to mitigate visual impacts from the Project (beyond those already incorporated into the Project description) have not been identified or proposed.

The No Project Alternative would avoid visual impacts from the development of a power plant and would avoid introducing additional tall structures such as exhaust stacks and transmission lines into an already industrial setting.

3.4.6 Socioeconomics

The proposed Project and alternatives are located in the City of San Diego. The socioeconomic impacts would be similar among the alternatives since they are all located in the City of San Diego (see Section 4.6 for additional discussion of socioeconomic impacts).

Under the No Project Alternative, no economic benefit would be realized within the region of influence.

3.4.7 Air Quality

The power plant's configuration and operation would be essentially the same from an air quality perspective at every location. The type and quantity of air emissions from the proposed Project and alternatives would be identical. However, the impacts on the human population and the environment may differ slightly because of the location of residences and other human uses in the project vicinity. Local terrain is similar at all sites and not likely to significantly change impacts. All of these sites are in the same air district and air basin and any required mitigation acquired by the Applicant would be equally appropriate for every site.

It is expected that electricity generated from the proposed Project and alternatives would support SDG&E by acting to balance generation against load demand. Under the No Project Alternative, it is likely that older plants, which create more air pollution than the proposed Project, would continue to be dispatched at times when their dispatch would likely be displaced by operation of the more efficient, lower emitting Project. Because these older plants are less efficient, the resulting emissions of both criteria pollutants and greenhouse gases per MWh of energy delivered to the grid would be greater. Many of these existing plants cannot provide the fast-ramping, flexible dispatch afforded by the proposed Project and therefore will not support SDG&E's greater reliance upon variable renewable generating sources, which will contribute to a reduction in cumulative basin-wide air pollution. Thus, the No Project Alternative would forego potential emissions reductions due to increased reliance upon variable renewable sources. In addition, due to electrical losses that would result from the transmission of power over longer distances if this intermediate peaking facility is not constructed, the amount of power that would need to be generated to meet demand within San Diego and the resulting emissions would be greater. In addition, additional transmission lines may be required to carry this additional electrical load. Thus, for the No Project Alternative, the air quality would be significantly worse than if the Project were not built.

3.4.8 Public Health

With the exception of the Alternative C plant site, all alternative sites and the proposed Project site are located within 1 mile of sensitive receptors such as schools, hospitals, churches, residential areas, or other facilities that would potentially be considered sensitive receptors for public health. The Alternative C plant site is located approximately 1.3 miles from the nearest sensitive receptors.

Results from an air toxics risk assessment based on emissions modeling indicate that there will be no significant incremental public health risks from construction or operation of the proposed project (see Section 4.8). At a screening level, the proposed Project, Alternative A, Alternative B, and Alternative C appear equivalent with respect to this environmental resource. Under the No Project alternative, the Project would not be built; therefore, there would be no change to public health.

3.4.9 Hazardous Materials Handling

The same quantity of hazardous materials would be stored and used at the proposed and alternative locations.

The No Project Alternative would avoid the transportation, use, and storage of hazardous materials during construction and operation of a power plant.

3.4.10 Worker Health and Safety

Potential impacts on worker health and safety are activity-specific rather than site-specific. Regardless of the location, the Project will prepare appropriate health and safety plans to protect workers and reduce the potential for injuries. Therefore, the worker safety impacts from all of the alternative sites are equivalent.

Under the No Project alternative, there would be no construction and, therefore, no impacts to workers.

3.4.11 Waste Management

The same quantity of waste will be generated at the proposed site and all alternative sites. The environmental impact of waste disposal would not differ significantly between the alternative sites.

The No Project alternative would eliminate the need to dispose of liquid and solid waste from the construction and operation of the power plant.

3.4.12 Biological Resources

Special status species that are recorded, or that potentially occur in the region, are the same for all sites. Based upon the California Natural Diversity Database (CNDDB) search conducted for the proposed Project, all alternative sites are within the potential habitat range of two Special Status Species, the San Diego barrel cactus (*Ferocactus viridescens)* and the Variegated dudleya (*Dudleya variegata*). The proposed Project plant site and all alternative plant sites contain San Diego barrel cactus that would need to be translocated if within the area of disturbance of the site (see discussion in Section 4.12). The Alternative B plant site also contains Variegated dudleya that would need to be translocated if within the area of disturbance of the site. It is anticipated that none of the sites would directly affect threatened or endangered species from development of the Project.

Each of the linear routes would generally follow roads and ROWs that are partly disturbed and any additional construction would avoid sensitive plants wherever possible. Small sites can be avoided if discovered through small changes within the transmission line corridor and span length, minor changes to linear routes, or translocation of plants. The switchyard would be sited to minimize impacts to sensitive plants. There is a slight possibility of bird collisions with the gen tie; the risk of collision would not be significantly different between the proposed and alternative gen ties.

To minimize the impacts to sensitive plants, a Sensitive Plant Relocation plan will be prepared similar to the existing plan currently approved for the adjacent Sycamore Landfill. The sensitive plants will be relocated to the existing Sycamore Landfill relocation site or to the proposed exchange parcel or other suitable habitat area as deemed appropriate by the City of San Diego.

The Applicant will use Avian Power Line Interaction Committee (APLIC) guidelines in the design of the gen tie line to prevent impacts to bird species from electrocutions or collision during operation of the gen tie line.

None of the sites would directly impact wetlands or waters of the U.S. None of the sites would adversely impact wildlife habitat.

Under the No Project Alternative, no additional biological impacts would occur.

3.4.13 Water Resources

Domestic water will be delivered to the Project and kept in a storage tanks located onsite. Therefore, all sites are generally equivalent with respect to water use.

The No Project alternative would not create an additional demand for domestic water.

3.4.14 Agriculture and Soils

The proposed Project and alternatives are sited in an area that is not currently used for agricultural purposes. All plant sites have a relatively low capability to support commercial crop production. The proposed Project and alternatives will not affect any Prime Farmlands or other important farmlands because the topography of the area is not conducive to farming and surrounding areas have already been developed for urban land uses (industrial and residential).

Under the No Project alternative, soils currently used for agricultural purposes would not be affected.

3.4.15 Paleontological Resources

The occurrence of fossil sites near the proposed Project and alternatives are within similar geologic environments indicating a potential for scientifically important fossil remains being encountered by earth-moving activities during this project. The potential of encountering sediments of high paleontological sensitivity is likely during earth-moving and excavating construction activities.

Mitigation measures described in Section 4.15 would reduce or mitigate potential significant impacts on significant paleontological resources or unique geological formations, should any such resources be discovered during construction from the proposed Project or alternatives. With the implementation of mitigation measures, paleontological impacts for all of the sites could be mitigated below the level of significance.

The No Project Alternative would not affect paleontological resources.

3.4.16 Geological Hazards and Resources

The local geology of the proposed Project and alternatives is the same due to the proximity of the sites to each other. Due to the screening level of this analysis and proximity of the sites to each other, no site-specific seismic analysis was performed. The potential for seismic impacts would be essentially the same for all sites and could be addressed in plant design.

The No Project Alternative would not affect geological hazards and resources.

3.4.17 Comparison of Alternative Sites

Table 3.4-1 provides a summary of the evaluation screening results for generation project alternatives. Screening of each alternative consisted of evaluating each alternative with respect to compatibility with the following screening criteria:

- Feasibly attaining most of the basic objectives of the Project
- Potential for the alternative to avoid or substantially lessen environmental effects of the Project

Alternatives that are not compatible with both of these goals were screened out and not further evaluated.

Table 3.4-1 Screening of Site Alternatives

Alternative	Compatibility with Screening Criteria	Retained/Eliminated From Further Consideration	Rationale for Elimination
Alternative A	Yes	Retained	N/A
Alternative B	Yes	Retained	N/A
Alternative C	Yes	Retained	N/A
No Project Alternative	No	Eliminated	Does not meet Project objectives

The No Project Alternative was eliminated from further consideration because it does not meet the Project objectives. All other alternatives were retained for further evaluation.

3.4.18 Comparison of the Proposed and Alternative Sites

Table 3.4-2 compares the important siting criteria of the proposed Project with the alternative sites. As described in the previous section, the environmental impacts of the proposed Project and alternatives would be similar for the majority of resources. All sites are near the industrial Sycamore Landfill, proximate to high pressure natural gas pipelines and 230kV transmission lines, and have minimal biological and cultural sensitivity. None of the Proposed project or alternatives are compatible with existing land use plans and policies.

The comparison of alternatives is made among the following categories:

- **Institutional Factors.** Institutional factors are an assessment of the ease of obtaining rights-of-way, public agency support, required permits, etc.
- **Engineering/Construction Feasibility.** Engineering/construction feasibility is an assessment of how the linear feature can be physically placed along a given route and the engineering feasibility of the project site and switchyard.
- **Length of Linear Features.** Length of the linear features is important because cost and potential environmental impacts are usually functions of length.

- **Environmental Factors.** Environmental factors are an initial assessment of which sites would have the least impact on the environment. Environmental impacts must be either not significant or mitigable to a less-than-significant level.

Table 3.4-2 Comparison of the Proposed Project and Alternatives

Characteristic[1]	Proposed Project	Alternative A	Alternative B	Alternative C
Institutional Factors				
Site control	Yes	No	No	No
Engineering/Construction Feasibility				
Underground transmission line required	Yes	Yes	Yes	No
New access road construction required	Yes	Yes	Yes	Yes
Equal or greater site grading requirements than proposed project	n/a	Yes	Yes	Yes
Length of Linear Features				
Length of gas lateral/access road (feet)	2,000	4,800	6,400	8,700
Length of gen tie (feet)	5,600	2,200	800	1,500

Note: [1] The characteristics contained in Table 3.4-2 are only those characteristics where the proposed Project and alternatives are different. As the environmental factors do not significantly differ between the proposed Project and alternatives, they are not included in Table 3.4-2.

As previously described in the beginning of this section, the focus of an alternatives analysis should be on alternatives that "could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects" [14 CCR 15126.6(c)]. There are no alternatives identified that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. There is no significant difference from an environmental or institutional factors standpoint among the alternative sites. Therefore, the selection of the proposed Project site is based on Institutional factors, engineering/construction feasibility, and length of the linear features.

Alternative A would require a longer gas lateral than the proposed Project and would require construction of a new access road to the site. Alternative A would require a shorter gen tie than the proposed Project. Alternative A would require significantly more grading (in quantity and complexity) than the proposed Project. The Alternative A plant site is not currently available for purchase or lease. Therefore, Alternative A was eliminated for consideration for the Project.

Alternative B would require a longer gas lateral than the proposed Project and would require construction of a new access road to the site. Alternative B would require the shortest gen tie line, though the gen tie would need to be entirely undergrounded. Alternative B would require equal or greater grading requirements (in quantity and complexity) than the proposed Project. Through preliminary negotiations with the landowner it was determined that Alternative B is being proposed as mitigation for coastal disturbance for another project and site control cannot be obtained for this parcel. Therefore, Alternative B was eliminated for consideration for the Project.

Alternative C would require the longest gas lateral of all the alternatives and would require construction of a new access road to the site. Alternative C is the only transmission route of the three alternatives that would not need to be undergrounded. Alternative C would have greater grading requirements (in quantity and complexity) than the proposed Project. Therefore, Alternative C was eliminated for consideration for the Project.

Due to the factors mentioned above, Alternatives A, B and C were eliminated for consideration for the Project.

3.5 ALTERNATIVE TECHNOLOGIES

The configuration of the proposed Project was selected from a wide array of technology alternatives. Generation technology alternatives included renewable energy technologies, simple-cycle gas turbines, combined-cycle gas turbines, and reciprocating engines. In addition to power generating technologies, fuel technology alternatives, NO_x control alternatives, inlet air cooling alternatives, and heat rejection alternatives were considered.

Alternative technologies were evaluated with respect to commercial availability, their ability to achieve the Project's objectives of providing highly efficient, dispatchable peaking and load-shaping power to support the integration of variable renewable sources, environmental merits and comparative impacts (i.e., land/space requirements, water consumption, emissions control, visual impacts, waste generation), and cost-effectiveness.

3.5.1 Alternative Power Generation Technologies

Alternative power generation technologies considered for the Project include natural gas turbine-based steam or combustion power plants as well as renewable energy technologies. The natural gas turbine-based steam or combustion power plant technologies include:

- Conventional Boiler and Steam Turbine Processes
- Conventional Simple-Cycle Combustion Turbine Processes
- Conventional Combined-Cycle Processes
- Kalina Combined-Cycle Processes
- Advanced Combustion Turbine Processes

The renewable energy technologies considered include:

- Hydroelectric Processes
- Geothermal Processes
- Ocean Wave Energy Processes
- Biomass Conversion / Combustion Processes
- Solar Energy Processes
- Wind Energy Processes

3.5.1.1 Conventional Boiler and Steam Turbine Processes

This technology generates high pressure steam by burning natural gas in the furnace of a conventional boiler. The high pressure steam is directed to the inlet of a steam turbine-generator, and used to rotate the turbine and the associated generator to produce electricity. The low pressure steam that is discharged from the turbine is then condensed in a cooling tower or air cooler and the condensate returned to the boiler. If a cooling tower is used, the plant's efficiency is slightly higher than if an air cooler is used for cooling the condensate. However, the cooling tower requires a constant water source to offset the water lost in evaporation and as blowdown. More land is generally required for air coolers than for cooling towers.

The boiler and steam turbine require the use of very high quality water to avoid the generation of scale and solids within the water system. This high quality water requires a high performance water treatment system that can remove the impurities in the source water and produce the ultra-pure water needed. The cooling tower water may also require treatment depending on the source and quality of the water used to supply the cooling tower. Additionally, a relatively high amount of waste is generated due to the water treatment system and associated reject water.

This technology is well established, having been used in countless power plants worldwide. Typical thermal efficiencies of up to approximately 36 percent can be achieved by Boiler/Steam Turbine plants when utilizing natural gas. However, this technology is best used for continuously operating power plants, due to the need to maintain the steam pressure in the boiler.

The conventional boiler and steam turbine technology does not meet project needs because of its inability to quickly ramp up to meet demand as needed to meet SDG&E's dispatch pattern, and its resulting lower overall efficiency due to the need to maintain high readiness for peaker operation (i.e., with frequent start-stop cycles). The proposed Project is designed to have a 10-minute cold-start to full capacity and as many as four start-up events per day. Consequently, a conventional boiler/steam turbine design would be poorly suited to the Project and would fail to achieve a fundamental project objective. Additionally, this technology, although proven reliable and commercially available, would involve considerably greater water consumption and waste generation and would also require significantly greater space. For these reasons, use of a conventional boiler and steam turbine is inappropriate and was rejected from consideration for the Project.

3.5.1.2 Conventional Simple-Cycle Combustion Turbine Processes

In simple-cycle combustion turbines, air is compressed at the inlet to the combustion turbine and fuel (natural gas) is then introduced into the gas turbine and the resulting air/fuel mixture is ignited. The combustion of the air/fuel mixture produces more gases and a considerable amount of heat. Ambient air is passed through the turbine on the outside of the combustion chamber to help cool the combustion chamber by transferring heat to the air as it passes the chamber. The ambient air volume rapidly increases as it is heated, increasing the pressure of the air in the process. This hot air is then combined with the combustion gases resulting in a large volume of hot, pressurized gases. The hot, pressurized gases are then directed through a set of vanes or blades in the turbine, forcing the blades to rotate and in turn rotate the turbine drive shaft. A generator typically is attached to the other end of the drive shaft and is rotated, generating the electricity. The exhaust gases are vented from the turbine to the atmosphere through exhaust stacks.

The combustion of natural gas generates emissions of NO_x and CO which must are controlled through the use of add-on controls. The air emission control systems for the simple-cycle combustion turbines often use a combination of direct water injection and catalyst systems to reduce the NO_x and CO emissions. Thus, use of a simple-cycle turbine could result in increased water consumption and require additional storage and water sources.

Simple-cycle combustion turbines are able to achieve thermal efficiencies up to approximately 38 percent. These systems are capable of rapidly reaching their operating peak, which makes them suitable for use in peaking power production. However, gas turbines are designed and built in fixed sizes (capacities) and are most efficient when they are operated at or near their design load capacity, i.e., the efficiency of the system decreases as a turbine is operated at reduced load. For a 100 MW project, either one (LMS100) or two (LM6000) turbines would be needed. Because simple-cycle gas turbines typically have a limited turn-down ratio, use of only one or two gas turbines would not provide the same flexibility that will be afforded by use of multiple reciprocating engines, as proposed for the Project. Nor would use of a simple-cycle turbine afford the same degree of efficiency in generation across the entire load range, as will the proposed Project. In addition, simple-cycle turbines generally operate at a higher heat rate than the proposed reciprocating engines and could therefore result in increased emissions of both GHGs and criteria pollutants per MWh-generated. A simple cycle turbine-generator could also result in increased water usage for water injection for emissions control and increased land requirements. For these reasons, simple-cycle combustion turbine technology was rejected as an alternative to the proposed Project.

3.5.1.3 Conventional Combined-Cycle Processes

A combined-cycle power plant combustion turbines (equivalent to the simple-cycle combustion turbine-generator) and steam turbines to improve the overall power plant efficiency, relative to a simple-cycle plant, by capturing and utilizing waste heat from the combustion turbines to generate additional power in the steam turbine. The combustion turbine's hot exhaust is passed through a heat recovery steam generator (HRSG) to create high pressure steam which is then used to drive a steam turbine-generator. This technology is able to achieve high thermal efficiencies, typically in the 50 to 60 percent under a steady-state operation. The high efficiency resulting from the additional heat recovery and power generation systems is achieved when these systems are at their normal operating temperatures and pressures. Consequently, a combined-cycle power plant is more appropriate for intermediate to baseload power plants and is not an appropriate choice for a peaking plant. If a cooling tower is used to condense the steam from the last stage of the turbine, the plant's efficiency is slightly higher than if an air cooler is used for cooling the condensate. However, the cooling tower requires a constant water source to offset the water lost in evaporation and as blowdown. Additionally, the presence of the HRSG requires the use of very high quality water to avoid the generation of scale and solids within the steam system. This high quality water requires a high performance water treatment system that can remove the impurities in the source water and produce the ultra-pure water needed. The cooling tower water may also require treatment depending on the source and quality of the water used to supply the cooling tower.

Due to the complexity of the heat recovery systems in the combined-cycle power plant, it has a large capital cost that is more appropriate for a baseload power plant than a peaker plant. It also requires greater space due to the need for the steam turbine-generator and HRSG combination,

the water treatment system, and the water storage and waste holding tanks or air cooled condenser.

While turbine vendors have developed fast-start technology, such technology is currently only available for larger "frame" turbines, which are much larger than the proposed Project. Operation of a larger capacity turbine at only a fraction of its capacity to meet the demand of a 100 MW plant would likely reduce the overall efficiency of the combined-cycle plant, such that it would be inferior to, or no better than, that of the proposed reciprocating engines. In addition, although once-through steam generators (OTSG) could be used in place of conventional HSRG technology, affording faster start-up times than a conventional combined-cycle plant, the steam cycle would still need to be warmed to generate any efficiency gain, relative to a simple-cycle operation. For a plant such as the proposed Project that is intended for peaking/firming and shaping power with multiple daily startups, use of an OTSG would therefore likely provide little to no efficiency gain. To assure that the plant's capacity was available to quickly be brought online, the plant would need to maintain the steam cycle in some standby- or partial load-mode when not dispatched, which would be neither practical nor economical for a project intended to operate no more than 4,000 hours per year. Additionally, combined-cycle power plants require the use of very high quality water and involve much greater water consumption if cooling towers are used for cooling; if air cooled, the Project would require considerably greater space for an air cooled condenser, which would also consume significant auxiliary load, reducing the plant's overall efficiency and therefore erasing some of the gains attributable to the steam cycle. For these reasons, a combined-cycle power plant is not an appropriate choice for a project intended to provide peaking and load-shaping power to the grid. Hence, combined-cycle technology was eliminated from consideration.

3.5.1.4 Kalina Combined-Cycle Process

The Kalina Cycle is a patented process that was developed in the 1980s. This technology is similar to the conventional combined-cycle, except a mixture of ammonia and water is used in place of pure water in the steam cycle. The Kalina Cycle could potentially increase combined-cycle thermal efficiencies by several percentage points. The Kalina Cycle has been successfully demonstrated in a number of industrial applications where waste heat is available. However, this technology was eliminated from consideration because it is still in the development phase and has not been demonstrated in commercial-scale power plants.

3.5.1.5 Advanced Combustion Turbine Processes

There are a number of efforts to enhance the thermal efficiency of combustion turbines by injecting steam or staged firing. These include the steam-injected gas turbine (STIG), the intercooled steam-recuperated gas turbine (ISRGT), the chemically-recuperated gas turbine (CRGT), and the humid air turbine (HAT) cycle. The STIG and HAT processes use the moisture from the steam or humid air to cool the gas turbine blades. However, due to the extra compression effort required in the front end of the turbine combustion chamber, these processes are less efficient than other technologies, and both use large amounts of treated, high quality water. The ISRGT, CRGT, and HAT technologies are not commercially available. Consequently, all of these technologies were eliminated from consideration.

3.5.1.6 Hydroelectric Power Processes

Hydroelectric processes use turbines to convert the momentum of moving water into electricity. This is normally achieved through the use of a dam, or in some cases, a pumped storage facility. In order to replace the Project, a new hydroelectric project would require a flowing river or a series of reservoirs that could store water for a pumped storage project. Both of these processes require a large quantity of water, which is scarce in southern California. Most of the sites that have sufficient water (i.e., flowing rivers or a combination of reservoirs at different elevations and a readily available water supply) for hydroelectric facilities have already been developed in California and the remaining potential sites face lengthy environmental licensing periods. No rivers are located in the vicinity of the Project, and the use of pumped storage would require a much larger site area and result in a significantly larger environmental footprint than the Project. It is highly unlikely that this technology could be implemented within 3 to 5 years from the date of the RFO and online by 2014. Therefore, the hydroelectric option was eliminated from consideration.

3.5.1.7 Geothermal Processes

Geothermal power plants are similar to the conventional steam turbine facilities described previously, with exception that the heat is generated by the high temperature and pressure geothermal fluids that are pumped from deep underground. These geothermal fluids are used to turn the turbines and generate the electricity. Geothermal power plants typically provide baseload power and do not have the fast-ramping flexibly that could provide peaking and load-shaping power to the grid to help integrate intermittent renewables. Geothermal power plants must be located in close proximity to sources of geothermal energy. Geothermal development is not viable at the Project location because suitable thermal vents and strata are not present. Geothermal generation would not meet the Project's objectives and was therefore eliminated from consideration.

3.5.1.8 Ocean Wave Energy Processes

Wave energy is generated by the influence of wind on the ocean surface. Over the last few decades, more than 1,000 patents were filed for wave power conversion machines, with a number of device types proving to have technical and commercial potential. These devices may be located at the shoreline, in the near-shore environment (i.e., in water less than about 125 feet deep), or offshore. At the present time very few of these devices have been tested at full-scale, and even fewer devices are ready for early adoption in commercial development projects. Therefore, this technology is not commercially available. Additionally, the Project site is not located near enough the ocean to make ocean wave energy processes feasible. This technology was therefore eliminated from consideration.

3.5.1.9 Biomass Conversion / Combustion Processes

Energy production from a biomass power plant may come from the direct combustion of the biomass materials or from the conversion of the biomass into another fuel (such as alcohol or methane) and subsequent combustion of that fuel. The combustion process is used to heat steam boilers to generate steam for a steam turbine. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes.

Large quantities of the biomass "fuel" are not generated in the vicinity of the Project site and would need to be trucked to the site, with the potential for a significant impact on local traffic volumes. The storage and handling of the biomass would require additional space, and the power plant footprint would be larger than that for the proposed Project. The construction and operational costs of the biomass power plant tend to be higher than conventional steam boiler/turbine systems and the proposed reciprocating engine units burning natural gas. Although classified as renewable, the emissions of criteria pollutants from a biomass power plant are, in many cases, significantly greater than the emissions from the proposed Project burning PUC-grade natural gas. As previously noted, the Project objectives include utilization of natural gas provided to the Project by SDG&E pursuant to a tolling agreement. Consequently, construction of a biomass power plant instead of the proposed gas-fired reciprocating engines would defeat a Project objective. While this technology is considered to be commercially available, it is not a feasible technology for the proposed Project and was eliminated from consideration.

3.5.1.10 Solar Energy Processes

Most of these technologies collect solar radiation, heat water to create steam, and use the steam to power a steam turbine/generator. Photovoltaic technologies convert the sunlight directly into electricity. In both cases, power is only available while the sun shines so the units do not supply power that can be cycled up or down to follow demand as a peaking power plant is designed to operate. Solar energy fails to meet project needs for peaking, load-shaping generation, which, by definition, is intended to balance integration of intermittent renewable sources such as solar to the grid. Additionally, the acreage required per MW generated is high, with a 100 MW photovoltaic project site requiring between 600 to 1,000 acres of relatively flat land. Not enough land is available at the Project site to deliver sufficient energy to meet project needs. The cost of solar power is also relatively high when compared to conventional technologies burning natural gas. Because a solar project would be inconsistent with the fundamental objective of providing firming and shaping power intended to balance variable renewable generating sources (such as solar), solar generation technology is not an alternative to the Project and was eliminated from consideration.

3.5.1.11 Wind Energy Processes

In California, the average wind generation capacity factor has been 25 to 30 percent and, like solar, cannot be cycled up and down to track demand. The cost of generation is generally above the cost of combined-cycle units burning natural gas. Based on current technology, the production of 100 MW of electrical power would potentially require between 25 and 30 wind turbines, spaced out along available ridge lines. The Project site is not suitable for wind energy development and therefore not feasible.

Additionally, wind power does not meet the peaking power plant operational needs and is fundamentally inconsistent with the Project objective of providing peaking, load-shaping generation that can be flexibly and efficiently dispatched to assure reliability and grid stability as intermittent renewable sources such as wind are increasingly integrated to the grid. A wind project would fail to meet a fundamental Project objective and cannot be considered a feasible alternative for the Project.

3.5.1.12 Comparison of Power Generation Technologies

A variety of alternative power generation technologies were considered for the Project, some of which are well established while others are still in the development or demonstration phases. Table 3.5-1 provides a summary of the evaluation of the alternative technologies based on the following screening criteria:

- Commercial availability of the technology
- Feasibility of being implemented at the site
- Operational constraints of the technology to match with the demands for rapidly generating electricity when dispatched and providing load-firming and shaping power to support variable renewable generating sources
- Compatibility with the potential for the alternative to avoid or substantially lessen any significant environmental effects of the project
- Ability to efficiently and cost effectively produce electrical power and help meet the electrical demands on SDG&E in the greater San Diego area

Alternative technologies that did not meet these criteria were eliminated and not further evaluated.

Table 3.5-1 Alternative Power Generation Technologies

Alternative	Compatibility with Screening Criteria	Retained/ Eliminated From Further Consideration	Rationale for Elimination
Conventional Boiler and Steam Turbine Processes	Commercially Available? Yes Implementable at Project Site? No Operational constraints? Yes Environmental Impacts? Larger Cost Effective? No	Eliminated	Additional land disturbance to fit into Project site; lower efficiency under partial load conditions; not suitable for peaker plant rapid dispatch demands; higher water consumption
Conventional Simple-Cycle Combustion Turbine Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? Yes Environmental Impacts? Larger Cost Effective? No	Eliminated	Additional land disturbance to fit into Project site; lower efficiency under partial load conditions; higher water consumption
Conventional Combined-Cycle Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? Yes Environmental Impacts? Larger Cost Effective? No	Eliminated	Additional land disturbance to fit into Project site; lower efficiency under partial load conditions; not suitable for peaker plant rapid dispatch demands; marginal to no efficiency gains from steam cycle generation in peaking plant; higher water consumption and/or auxiliary load for cooling
Kalina Combined-Cycle Processes	Commercial Availability? No Implementable at Project Site? Operational constraints? Environmental Impacts? Cost Effective?	Eliminated	Not demonstrated for commercial operation.

Alternative	Compatibility with Screening Criteria	Retained/ Eliminated From Further Consideration	Rationale for Elimination
Advanced Combustion Turbine Processes	Commercial Availability? Limited Implementable at Project Site? No Operational constraints? Yes Environmental Impacts? Yes Cost Effective? No	Eliminated	The demonstrated options are based on combustion turbines (which were eliminated) and use large quantities of water. Other processes are not demonstrated for commercial operation.
Hydroelectric Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? No Environmental Impacts? Larger Cost Effective? Worse	Eliminated	No feasible rivers or suitable lakes present in the general area, much larger area required, large quantities of water required.
Geothermal Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? Yes Environmental/Comparative Yes Impacts? No Cost Effective?	Eliminated	No geothermal resources near project site; unsuitable technology for providing peaking or load-shaping power or for location near urban area; larger environmental impacts.
Ocean Wave Energy Processes	Commercial Availability? No Implementable at Project Site? Operational constraints? Environmental/Comparative Impacts? Cost Effective?	Eliminated	Not demonstrated for commercial operation.
Biomass Conversion / Combustion Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? Yes Environmental Impacts? Larger Cost Effective? No	Eliminated	Larger land/space requirements higher truck traffic, water demands - greater environmental impact than proposed Project; does not meet project objective of using gas provided by SDG&E.
Solar Energy Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? Yes Environmental Impacts? Larger Cost Effective? No	Eliminated	Large land requirement; cannot be cycled to follow demand; only available during daylight hours; fundamentally inconsistent with need for load-shaping and firming resource
Wind Energy Processes	Commercial Availability? Yes Implementable at Project Site? No Operational constraints? Yes Environmental/Comparative Larger Impacts? No Cost Effective?	Eliminated	Highly visible; larger land area required due to number of wind turbines required; Greater cost than proposed Project; cannot be cycled to follow demand due to variability of wind; fundamentally inconsistent with need for load-shaping and firming resource.

As shown in Table 3.5-1, all alternative technologies were found to be incompatible with the screening criteria, for various reasons. With regard to the natural gas turbine-based steam or combustion power plant technologies, most of these technologies are commercially available. However, these alternative generating technologies were rejected for failing to achieve

fundamental project objectives due to their relatively low efficiency at low load, low turn-down ratios and difficulty achieving fast-start times. While simple-cycle combustion turbines can provide peaking power with fast-start capability, they only come in fixed sizes and typically have low turn-down ratios. To meet the 100 MW demand proposed for the Project, this would require use of one or two combustion turbines, which are typically less efficient than the proposed reciprocating engines and therefore result in greater emissions of greenhouse gases per megawatt-hour generated to the grid. In contrast, the proposed reciprocating engines can be dispatched at a variety of load levels and operate efficiently across the entire load range.

With regard to the renewable energy technologies, these were eliminated because, in general, they could not meet the need for new dispatchable peaking and load-shaping power that will help facilitate integration of intermittent renewable generating sources, in particular, wind and solar resources, to the grid.

Therefore, the proposed technology was selected for the Project.

3.5.2 Fuel Technology Alternatives

Other fuels such as propane, LNG, and LS fuel oils were eliminated from consideration because SDG&E's RFO specifically called for projects that would operate pursuant to a tolling agreement, i.e., projects that would utilize PUC-quality natural gas provided by SDG&E to generate electricity. Accordingly, use of any other fuel would defeat a project objective. Moreover, PUC-grade natural gas is the best (cleanest) fuel choice with respect to all criteria pollutants under consideration. In addition, these other fuel sources would all be eliminated due to technical infeasibility for the Project. Onsite propane storage would be impractical from the standpoint of tank number or tank sizes, safety and the constant need for deliveries, etc. LNG is not commercially available in the Project region at this time. LS fuel oil does not match the design of the proposed engines; nor would use of LS fuel oil constitute a clean fuel choice.

3.5.3 NO_x Control Alternatives

To minimize NO_x emissions from the Project, the reciprocating engines will be equipped with a post-combustion SCR using urea as the reducing agent. Two post-combustion NO_x control alternatives were considered:

- SCR
- $SCONO_x$™

SCR is a proven technology and is used frequently in combined cycle and reciprocating engine applications. Ammonia (urea) is injected into the exhaust gas upstream of a catalyst. The ammonia reacts with NO_x in the presence of the catalyst to form nitrogen and water.

$SCONO_x$™ is a new technology that to date has not been implemented on reciprocating engines $SCONO_x$™ consists of an oxidation catalyst, which oxidizes CO to carbon dioxide (CO_2) and nitric oxide (NO) to nitrogen dioxide (NO_2). The NO_2 is adsorbed onto the catalyst, and the catalyst is periodically regenerated. Although a potentially promising technology, $SCONO_x$™ has not been commercially demonstrated on a large power plant, nor has the technology been demonstrated on large natural gas fired lean burn reciprocating engines such as those proposed for the facility.

Standard 3-Way Catalysts (NSCR) were considered, but eliminated because no manufacturer could be identified to supply NSCR for engines with the exhaust flow of the Wartsila engines. Additionally, even if NSCR were available, it would be less effective than the proposed BACT technologies of SCR for NO_x and an oxidation catalyst for CO. This was based upon a technical analysis that indicated that NSCR is not an effective or recommended control for the plant "lean-burn" power cycle engines.

The following reducing agent alternatives were considered for use with the SCR system:

- Anhydrous ammonia
- Aqueous ammonia
- Urea

Anhydrous ammonia is used in many combined cycle facilities for NO_x control, but is more hazardous than diluted forms of ammonia. Aqueous ammonia (19 percent ammonia, 81 percent water solution) is not proposed for the Project because of its safety characteristics and availability within the region.

The SCR emission control system will use atomized urea in the presence of a catalyst to reduce NO_x in the exhaust gases of the engines. Urea will be injected into the exhaust gas stream via a grid of nozzles located upstream of the catalyst module. The subsequent chemical reaction will reduce NO_x to nitrogen gas and water vapor, resulting in a NO_x concentration in the exhaust gas no greater than 5 ppm, ppmvd at 15 percent oxygen. An excess of urea must be injected to ensure an acceptable NO_x control efficiency. Unreacted ammonia (slip) will be limited to 10 ppm. Urea is a more stable catalyst than ammonia and eliminates the associated safety hazards posed by either anhydrous or aqueous ammonia.

3.5.4 Heat Rejection Alternatives

The Project will employ a closed-loop industrial cooling system cooled by circulating water, with heat rejection provided by a network of radiators and fans (very similar to the common automobile or dry cooling). The Wartsila standard closed-loop radiator cooling system minimizes water use with only 1.6 gpm of water usage with the plant operating at full load.

Wärtsilä does not offer another cooling option with their large reciprocating engines, so no other alternatives were considered.

3.6 REFERENCES

CEC (California Energy Commission). 2008. Rules of Practice and Procedure Power Plant Site Certification and Designation of Transmission Corridor Zones. July 2008. CEC-140-2008-003. Available at http://www.energy.ca.gov/2008publications/CEC-140-2008-003/CEC-140-2008-003.PDF Accessed June 1, 2011.

FIGURES

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Legend

- Alternative A Plant Site
- Alternative A Switchyard
- Alternative A Gen Tie
- Alternative A Gas Lateral and Access Road
- Existing 230 kV T-Lines (2)

Cogentrix

QUAIL BRUSH GENERATION PROJECT

FIGURE 3.1-1
ALTERNATIVE A

0 500 1,000 2,000
Feet

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Legend

- Alternative B Plant Site
- Alternative B Switchyard
- Alternative B Gen Tie
- Alternative B Gas Lateral and Access Road
- Existing 230 kV T-Lines (2)

Cogentrix

QUAIL BRUSH GENERATION PROJECT

FIGURE 3.1-2
ALTERNATIVE B

0 500 1,000 2,000
Feet

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Legend

- Alternative C Plant Site
- Alternative C Switchyard
- Alternative C Gen Tie
- Alternative C Gas Lateral and Access Road
- Existing 230 kV T-Lines (2)

Cogentrix

QUAIL BRUSH GENERATION PROJECT

FIGURE 3.1-3
ALTERNATIVE C

0 500 1,000 2,000
Feet

TETRA TECH EC, INC.

DATA ADEQUACY WORKSHEETS

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Alternatives** Project: ____ Technical Staff: ____

Project Manager: Eric Solorio Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (b) (1) (D)	A description of how the site and related facilities were selected and the consideration given to engineering constraints, site geology, environmental impacts, water, waste and fuel constraints, electric transmission constraints, and any other factors considered by the applicant.	3.3.1		
Appendix B (f) (1)	A discussion of the range of reasonable alternatives to the project, or to the location of the project, including the no project alternative, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and an evaluation of the comparative merits of the alternatives. In accordance with Public Resources Code section 25540.6(b), a discussion of the applicant's site selection criteria, any alternative sites considered for the project, and the reasons why the applicant chose the proposed site.	3.2, 3.3, 3.4, 3.5		
Appendix B (f) (2)	An evaluation of the comparative engineering, economic, and environmental merits of the alternatives discussed in subsection (f)(1).	3.3, 3.4, 3.5		