8.0 ALTERNATIVES

8.1 Introduction

This chapter discusses alternatives to the proposed project. Alternatives were evaluated and considered as part of the project formulation process. In addition, the California Energy Commission (CEC) requires a review of alternatives to satisfy the requirements of the California Environmental Quality Act (CEQA).

According to CEQA, the focus of the alternatives analysis is 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" (CEQA, 14 CCR 1516.6(c)). A range of alternatives that could feasibly accomplish most of the proposed project's objectives are described below. In addition to the project alternatives considered, CEQA requires an evaluation of a No Project Alternative, which is also described below. The alternatives are:

- No Project Alternative (no project would be undertaken)
- Alternative site locations
- Alternative energy generation technologies
- Alternative configurations and linear facility locations

8.2 Project Objective

The objective of the proposed project is to design, build, own, and operate the CPV Sentinel Energy Project (CPVS) in order to meet the need for additional electric generation capacity, energy, and ancillary services in Southern California and, in particular, quick-start peaking capacity needs identified by Southern California Edison (SCE), the CEC, the California Public Utilities Commission (CPUC), and the California Independent System Operator (CAISO) for the Los Angeles Basin Local Capacity Requirements area. In February 2007, SCE executed a long-term contract for the capacity, energy, and ancillary services from five of the eight proposed CPVS units, to be delivered to SCE at Devers substation by August 1, 2010. CPV Sentinel is seeking to enter into long-term contracts with load serving entities for the remaining three units, and SCE has short-listed the project for its remaining three units in its NewGen Standard Track RFO process for delivery to the SCE system between 2012 and 2013.

CPV Sentinel has identified several basic objectives for the development of a power project. These objectives include:

- To construct and operate an 850-MW, natural gas-fired, simple cycle generating facility specifically designed to serve electricity demand in the Southern California region.

- To provide competitively priced electricity for sale to electric service providers. SCE, the CAISO, CPUC, and CEC have identified the Los Angeles Basin Local Capacity Requirements (LCR) area, where the project is located, as a local resource area in particular need of the quick-start peaking capacity, energy, and ancillary services that the proposed project will provide.

- To help meet expected electrical demand growth in Southern California, in particular, the rapidly growing portions of Riverside County and the Coachella Valley.

- To generate power at a location near the electric load, thus increasing reliability of the regional electricity grid and reducing regional dependence on imported power.

- To site the project at a location zoned and planned for industrial use with ready access cooling water, natural gas, and electrical interconnection.

- To build new generation that will require minimal additional project-specific transmission system upgrades.

- To develop the proposed project in a manner that allows CPV Sentinel to satisfy its obligations under its power purchase agreement with SCE.

- To develop a project that provides a reasonable rate of return on CPV Sentinel's investment.

8.3 No Project Alternative

The No Project Alternative is an alternative required by CEC's regulations and CEQA. Denial of this application by the CEC would, in effect, be the No Project Alternative. Should this occur, the primary result would be the loss of an 850-MW of generating capacity to provide energy to the State of California.

If the No Project Alternative was selected:

- Approximately 35.5 acres of land would remain undeveloped, approximately 1.5 acres of land would remain vacant;

- Approximately 85 acres of land would remain undisturbed from construction of the power plant as well as the installation of pipelines, transmission lines, and access road;

- Approximately 1,100 acre-feet per year of existing water would remain allocated to the Mission Springs Water District and not be used for industrial purposes;

- There would be a loss of approximately $5.1 million of annual property tax revenue for Riverside County;

- There would be a loss of approximately $26 million in sales tax revenues;

- Land uses, habitat, ambient noise, landform, and visual quality of the area would remain unchanged; and

- There would be a loss of approximately 350 construction jobs with an estimated payroll of $40 million, 14 permanent jobs with an estimated payroll of $1.3 million, and 387 indirect jobs with an estimated payroll of $15 million.

The adverse consequences of the No Project Alternative include the following:

- **Loss of generating capacity to serve California load** – The State of California is in the midst of an energy supply shortfall to meet existing and future electrical loads. Development of new energy supplies is not meeting increasing demands in the state (CEC, 2005). SCE has been authorized to acquire approximately 1,500 MW of dispatchable capacity by 2013, and has requested approval from the CPUC to expand the amount of capacity to 2,000 MW by 2013 in order to meet its resource adequacy requirements.

The supply shortfall has resulted in governmental initiatives to bring on-line new generating capacity. Power plants that have recently been approved by the CEC are not expected to completely resolve the state's shortfall. The No Project Alternative would eliminate a source of 850 MW of peak power supply during high demand that is needed to alleviate the shortfall in generating capacity and ease the energy situation in California.

- **Loss of reliability –** Under certain circumstances, supply shortfalls can result in planned or unplanned blackouts. During blackouts, emergency standby generators are used as an alternative source of power. These generators typically run on fuels (e.g., diesel) that have much higher emissions than natural gas and are much less efficient. Thus, the absence of reliable sources of power can lead to serious air quality and public health consequences.

- **Loss of increase in energy conversion efficiency** – As gas-fired combustion turbine generators (CTGs) operating in simple cycle mode, the proposed power plant would be one of the most efficient peaking generating facilities in its class. Its highly efficient energy conversion capability (natural gas to electricity) would produce less air emissions and other environmental effects per kilowatt hour of energy produced than most of the power plants that are currently operating and those that are being constructed on an expedited basis to provide immediate power to the state. When in operation, the power plant would incrementally increase the state's average energy conversion efficiency. Under the No Project Alternative, the increase in efficiency would not be realized because less efficient, older plants would run more hours of the year.

8.4 Site Alternatives

As a basis for selecting the site, the following criteria were used:

- **Proximity to infrastructure** – The site must be located in close proximity to high-voltage transmission lines, a high-pressure major gas transmission system, and potential water source(s).

- **Environmental viability** – The site should have few or no environmentally sensitive areas and should allow development with minimal environmental impacts.

- **Minimal impact on surrounding community** – The site should enable the development of a power plant with minimal negative impact on the surrounding community.

- **Compliance with Laws, Ordinances, Regulations, and Standards** – The site should provide opportunity for compliance with all LORS.

Given the project objective of providing power to the LA Basin LCR area, siting the project near the Devers substation was critical due to the ability of Devers substation to deliver power to customers within the region. The importance of interconnecting at Devers substation is illustrated by the fact that both projects selected in SCE's response to the fast-track Request for Offers involved connections at the Devers substation. Therefore, initial site selection efforts focused on identifying a suitable electrical interconnection location, and the SCE Devers substation was identified as a desirable location for interconnection to the SCE high-voltage transmission grid. Given these conditions, locating a power plant close to the Devers substation was considered optimal. Therefore, the analysis of alternatives sites was limited to sites near the Devers substation. The areas north, west, south, and directly east of the Devers substation were evaluated but eliminated from further evaluation based on the following:

- **Areas to the north of Devers substation –** This area consists of multiple 5- to 10-acre lots owned by multiple private land owners. The sites would have to be aggregated and would require a longer natural gas pipeline and transmission line. Procurement/control of the lots was also deemed problematic due to the need to negotiate with multiple landowners.

- **Areas to the west of Devers substation –** The area west of Devers substation is undeveloped, with wind farm development further west. The area directly west of the Devers substation has just been approved by the Riverside County Planning Commission for further wind farm development (Dillon Wind Farm). The Environmental Impact Report (EIR) for the Dillon Wind Farm project was recently certified by the Riverside County Planning Commission in May 2007. This area was eliminated for further consideration due to current and future planned wind farm development.

- **Area to the south of Devers substation –** This site was the location for the Ocotillo Power Plant proposed for development in 2001. The AFC for the proposed Ocotillo power plant was submitted to the CEC in 2001. Subsequently, the project was terminated and the power plant was not constructed. Current zoning of this area would not allow for the development of the proposed project. Furthermore, it was concluded that this site was not a feasible option due to the current development of wind turbines on the site. As a result, further investigation was not pursued.

- **Area directly east of the Devers substation** – SCE owns this property and is reserving it for future possible expansion. Therefore, the proposed project was moved 700 feet east of the substation.

8.5 Generation Technology and Design Alternatives

When the project is constructed, the proposed project will supply SCE with capacity, energy, and ancillary services from five of the eight proposed units, in order to supply energy to the California market. The proposed project is designed based upon SCE's requirements, which include the following:

- Meet all air emission permit limits (during startup, shutdown, and operation);

- Provide automatic generation control (AGC) to comply with the requirements of the CAISO; and

- Meet resource adequacy requirements and ensure grid reliability for the Los Angeles Basin LCR area.

8.5.1 Generation Technology Alternatives

A variety of energy generation technologies were evaluated as part of the response to the SCE's Request for Offers (RFO). In order to meet SCE's resource adequacy requirements, the SCE issued its New Gen RFO (D. 06-07-029) for 1,500 MW of new generation capacity. The SCE RFO indicates a need for peaking generation that is capable of starting up within 10 minutes (quick-start) and that is preferably located within the Los Angeles Basin LCR area.

Various generation technologies were considered but dismissed based on failure to comply with the RFO parameters. These included:

- Fossil-fueled/steam electric (gas turbine, conventional boiler fueled by natural gas, distillate or coal)
- Nuclear
- Solar

- Biomass
- Hydroelectric
- Wind
- Geothermal

Fossil – An evaluation of fossil generation technology necessarily involves consideration of both generation technology and fuel alternatives. Technology alternatives include combustion turbine-generation (both simple and combined cycle) and conventional boilers. Fuel alternatives include natural gas, coal, and distillate. Of the fuel alternatives, natural gas, with its lower sulfur dioxide and particulate emissions, is the preferable fossil fuel for use in California. Local air district air permitting regulations prohibit the use of coal. Distillate fuels are also discouraged for units that are designed to run more than a limited number of hours per year.

Nuclear – Nuclear generation was not considered to be a feasible technology because of the associated long lead time and high initial capital cost. No new nuclear power plants have been constructed in California since Diablo Canyon, and little of the engineering and construction industry capacity required for this technology is available at present. Furthermore, it would take more than 5 years to permit such a facility, and a similar amount of time for construction. In addition, the State of California has a moratorium on the construction of any new nuclear facilities until a licensed permanent waste disposal facility is in operation.

Solar – Solar technology is most appropriate as a demand reduction technology. When operated to supply individual energy users, it reduces the amount of energy required from the electrical grid. However, it cannot be controlled by a central system operation that increases/decreases facility output in response to systemwide energy demand. Solar thermal technologies do not provide the continuous reliable power. Solar facilities use large tracts of land; parabolic troughs typically require approximately 4 to 5 acres per megawatt output (CEC, 1996). In order to produce 850 MW, approximately 3,000 to 4,000 acres of land would be needed for a parabolic trough system. This would be more than 26 times the amount of land to be used by the proposed project. Therefore, this technology was not considered to be a feasible technology for the proposed project.

Biomass – Biomass technology is similar to conventional boiler facilities but is generally limited to a much smaller project size (typically 10 to 25 MW) and has lower thermal conversion efficiency. In order to produce 850 MW, more than 20 biomass units would be required. Emissions from biomass projects are typically greater than from gas-fired projects. The ability to meet air quality requirements, especially with this many units, may not be achievable. Because of size and efficiency limitation, biomass technology was not selected.

Hydroelectric – Hydroelectric technology was determined to be infeasible because of the extensive time such a project would require and significant impacts typically associated with hydroelectric development. A significant obstacle to development of a privately initiated hydroelectric facility is acquisition of land suitable for this technology. In addition, the environmental review and approval process for a new hydroelectric project of similar scale to the proposed project could take more than 5 years. Construction could take several more years. Such a project would not come on line for 8 or more years. Such long lead times and the uncertainty of the licensing process make this technology infeasible as a technology alternative.

Wind – Wind energy was not considered to be a feasible technology for several reasons. Due to the natural intermittent availability of wind resources, wind energy is not always available. This technology is characterized by a low average capacity factor and therefore does not provide a source of reliable energy. It also requires significant land area and the installation of a large number of individual machines to form a significant amount of generating capacity in aggregate. Wind generation farms generally

require large tracts of land; approximately 17 acres of land are needed to produce 1 megawatt of electricity (CEC, 1996). In order to produce 850 MW, approximately 12,000 acres of land would be required. This would be more than 300 times the amount of land used by the proposed project. With these characteristics, wind energy was rejected as a feasible technology alternative.

Geothermal – Geothermal technology was determined to be infeasible because it is limited to specific geologic conditions that are present only in certain areas of California.

8.5.2 Plant Design Alternatives

8.5.2.1 Project Configuration Alternatives

The CPVS will consist of eight General Electric LMS100 combustion turbines. The power purchase agreement between CPV Sentinel and SCE requires that the CPVS include five LMS100 combustion turbines in a simple cycle mode. Other generation configurations would not meet the goals and objectives of CPVS or the requirements of the Power Purchase Agreement.

8.5.2.2 Heat Rejection Alternatives

CPVS will use mechanical draft cooling towers to reject heat from the LMS100 intercoolers and LMS100 oil coolers. An air-cooled heat exchanger was considered as an alternative. The wet cooling tower was found to be the most cost-effective heat rejection system and produces the highest plant efficiency.

The advantages of an air-cooled heat exchanger include reductions in makeup water requirements, water vapor plumes, and cooling tower drift. Among the disadvantages of the air-cooled heat exchanger are the land area requirements and high cost. Heat exchanger performance is inversely related to the temperature of the cooling medium. The local climate in the project area is characterized by high dry-bulb temperatures and low wet-bulb temperatures (i.e., low relative humidity). Consequently, the performance the LMS intercoolers cooled using an air-cooled heat exchanger (which is inversely related to dry-bulb temperature) is poor compared to the performance of the LMS intercoolers cooled using a cooling tower (which is inversely related to wet-bulb temperature). The air-cooled heat exchanger's relatively poor performance results in relatively high gas turbine intercooling air temperature, which negatively affects gas turbine output and efficiency. This negative impact causes a decrease in overall plant output and efficiency. The air-cooled heat exchanger also uses more auxiliary power due to the greater number and horsepower of its fans as compared to the wet cooling tower. As a result, net plant output and efficiency are further reduced. In addition, the capital cost and land requirements of an air-cooled heat exchanger greatly exceed the cost of a surface heat exchanger, circulating water system, and wet cooling.

The air-cooled heat exchanger's disadvantages of reduced plant output, reduced plant efficiency, and higher capital costs were found to significantly outweigh the advantage of reduced water consumption. See Table 8.5-1 for details on comparisons between wet and dry cooling.

8.5.2.3 Direct Piping of Municipal Wastewater

The direct delivery of reclaimed municipal wastewater for power plant cooling at the proposed project site has been determined to be infeasible, primarily due to the distance required for the distribution pipeline and the large wastewater storage capacity that would be required on site.

On an annual average basis, the Horton Wastewater Treatment Plant (WWTP) processes approximately 1,500 afy. The proposed project would consume a maximum of 1,100 afy if operated at the capacity factor associated with the permit limits proposed in this AFC. However, the peak project water demand would be 2,059 gallons per minute (gpm), whereas the average wastewater production rate at the Horton WWTP is approximately 1,390 gpm (based on permitted capacity of 2 mgd). At present, the Horton

WWTP does not operate at its upper permitted capacity—it operates at approximately 75 percent of its capacity. Direct delivery of wastewater to the proposed plant would require a delivery pipeline and a large storage capacity on site. The required storage capacity is estimated to be approximately 30 million gallons, and together with the wastewater pipeline would require incremental investment of a financed cost of approximately $20 million. This cost, together with other economic impacts such as higher pumping costs, would not allow the proposed project to meet its objective of providing competitively priced electricity. Other impacts associated with construction of the piping and storage tank would also be significant. Thus, this scenario is not considered feasible.

8.6 Water Supply Alternatives

The CEC implements state water policy to minimize the use of fresh water, promote alternative cooling technologies, and minimize or avoid degradation of the quality of the state's water resources. The state's water policy, adopted by the State Water Resources Control Board (SWRCB), is specified in Resolution 75-58. The Commission's 2003 Integrated Energy Policy Report (IEPR) provides that "...the Commission will approve use of fresh water for cooling purposes…only where alternative water supply sources and alternative cooling technologies are shown to be 'environmentally undesirable' or 'economically unsound.'" Economically unsound is defined as economically or otherwise infeasible. Feasible means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, legal, social, and technological factors.

CPV Sentinel evaluated several different alternative water supply and conservation options as part of the proposed project. Other potential sources of water, as listed in SWRCB Resolution 75-58, were considered but deemed to be infeasible, as summarized below.

8.6.1 Ocean Water

Ocean water is not considered a feasible alternative since this water source is not locally available. The proposed project site is located in an inland valley, more than 68 miles from the ocean.

8.6.2 Brackish Water from Irrigation Return Flow or Groundwater

There is no agricultural irrigation in the upper Coachella Valley, and the nearest known source of brackish water is the Coachella Canal, located more than 20 miles to the southeast. Thus, there is no water of this type available to the proposed project.

Limited information is available regarding the use of poorer quality groundwater from deeper zones in the vicinity of the proposed project. The base of the fresh water occurs about 4,000 feet below mean sea level at the proposed project site (DWR, 2004) or about 3,000 feet below the site. The limited data available indicate the deeper strata may be largely nonwater-bearing. Few wells have been drilled to these depths. While it is conceivable that a water supply could be developed from those deeper materials, determining whether that supply exists could entail substantial expense in drilling exploratory wells to find strata that might yield significant amounts of water to wells. Furthermore, even if promising water-bearing strata were identified, substantial uncertainties would remain as to the sources of recharge for those strata, and the long-term viability of production from such zones. The costs to install wells with depths in excess of 3,000 feet would be infeasible. Therefore, use of poorer quality groundwater from deeper zones is considered infeasible.

Groundwater in the Desert Hot Springs Subbasin has relatively poor water quality (highly mineralized and high temperatures). Currently this water supplies the local spa resort industry. This water source is located more than 5 miles northeast of the proposed project site. Costs that would be associated with construction of infrastructure to extract, treat, and convey groundwater from the Desert Hot Springs

Subbasin to the proposed project site are expected to be significant. Therefore, use of this groundwater source is not considered feasible.

8.6.3 Other Sources of Municipal Wastewater

After the Horton WWTP, the next closest source of treated wastewater is the Mission Springs Water District (MSWD) Desert Crest WWTP. This facility is much smaller than the Horton WWTP, with a capacity of 180,000 gallons per day (125 gpm) (URS, 2005). It produces an average daily flow of 50,000 gpd (34.7 gpm) of secondary treated wastewater. This plant is located approximately 10 miles to the east of the proposed project site. Reclaimed wastewater from this treatment plant is not economically feasible for use because of the small output of the plant and its great distance from the proposed project site.

The closest plant operated by the Coachella Valley Water District (CVWD) is the Palm Desert wastewater reclamation plant. This plant serves the communities of Indian Wells, Palm Desert, and Rancho Mirage, as well as a portion of Cathedral City, and provides recycled water to irrigate several golf courses in the area. The current tertiary treatment capacity at this plant is 15 million gallons per day (10,410 gpm) (MWH, 2005). In 2004, the plant treated approximately 12,100 acre-feet of wastewater and provided approximately 4,700 acre-feet of reclaimed water (MWH, 2005). This plant is located more than 20 miles away from the proposed project site. All of the current output of tertiary treated wastewater from this plant is already committed to irrigation uses. Even if wastewater was available, potential environmental impacts that would be associated with construction of infrastructure to convey reclaimed water directly to the proposed project site from the Palm Desert plant would be expected to be significant. Therefore, direct use of reclaimed water from the plant, even if it would be available, is not considered feasible.

The Desert Water Agency (DWA) also produces reclaimed water at its plant; however, all of the current production of tertiary treated wastewater from the DWA plant is already committed to irrigation uses.

While other plants in the region provide reclaimed water (either secondary or tertiary treated), they are either located too far away or have insufficient amounts of reclaimed water available to provide a feasible source of water to support the proposed project.

8.6.4 Other Inland Waters

Potable water from the local water supply agencies was considered. MSWD is the local purveyor of potable water in the area. The nearest connection to the water supply system is approximately 300 feet south of the proposed project site, where a water supply pipeline runs east-west along Dillon Road. This pipeline is part of the MSWD's Valley View distribution system. The source of water for this system is the MSWD's Well No. 27 (located south of Dillon Road and east of Indian Avenue). This well has a capacity of 1,100 gpm and feeds a storage tank with a capacity of 0.31 million gallons. Due to limited capacity of the nearby distribution system, use of this system as the sole supply of water for the proposed project's process water supply was determined not to be feasible. However, the proposed project would use this source as the plant's potable water supply (1 to 4 gpm). In addition, if CPV Sentinel and MSWD reach agreement on this point, this source could be used as a backup source to the proposed plant's site wells.

To recharge groundwater supplies, CVWD and DWA obtain imported water supplies from the State Water Project (SWP), which is managed by the Department of Water Resources (DWR). CVWD and DWA are 2 of 29 agencies holding long-term water supply contracts with the State of California for SWP water. CVWD's entitlement to SWP water is 23,100 acre-ft/yr, while DWA's is 38,100 acre-ft/yr, for a combined total of 61,200 acre-ft/yr. SWP water originates from rainfall and snowmelt in Northern California. Runoff is stored in Lake Oroville, the project's largest storage facility, and then released

down the Feather River to the Sacramento River and the Sacramento-San Joaquin Delta. Water is diverted from the delta into the Clifton Court Forebay and then pumped into the 444-mile-long California Aqueduct. SWP water is stored in San Luis Reservoir, which is jointly operated by the DWR and the U.S. Bureau of Reclamation. Six pumping stations lift the water more than 3,000 feet and energy is recovered at power plants along the aqueduct. (MWH, 2002)

CVWD and DWA do not directly receive their SWP water. Instead, their SWP water is delivered to Metropolitan Water District pursuant to the exchange agreement described above. Metropolitan in turn delivers an equal amount of Colorado River water to CVWD and DWA at the Whitewater River and the Mission Creek percolation basins. CVWD is participating in the East Branch Enlargement to provide the capacity to obtain additional water from the SWP when it is available. Nearly 1.7 million acre-feet of Colorado River water has been delivered through the exchange.

There are two connections to the Colorado River Aqueduct (CRA) in the Coachella Valley. One connection is located where the aqueduct crosses the Whitewater River, which is more than 4 miles away from the proposed project site. The other connection is located near Indian Avenue and Worsley Road, approximately 4 miles north of the proposed project site. Both CVWD and DWA currently import CRA water into the Whitewater Spreading Facility and the Mission Creek percolation basin.

While the proposed project could possibly contract with either CVWD or DWA for direct use of SWP water through the SWP exchange program, the release of water to the replenishment basins is not done on a continuous basis—the water releases are controlled entirely by Metropolitan Water District and often releases are separated by several months with no releases. The proposed project would require water on a continuous basis whenever it is dispatched. Therefore, use of SWP or CRA water is not considered feasible.

No other inland waters exist. There are no surface water supplies available, no other nearby sources of reclaimed water, or no water sources other than groundwater recovery of treated wastewater that is percolated and stored in the Coachella Valley Groundwater Basin. Therefore, other inland water alternatives are considered environmentally and economically unfeasible.

8.7 Transmission Interconnection Route Alternatives

The proposed project site is located approximately 700 feet east of the Devers substation. SCE will design, construct, own, and operate the transmission facilities between the proposed project and the Devers substation.

Other areas considered for the transmission line interconnection include the area directly west of the proposed project site (rather than south and turning west), which would be a shorter route for the transmission interconnection to the SCE Devers substation. Figure 8.7-1 shows the area that was evaluated for an alternative transmission line route. However, SCE owns the property and is reserving this area for possible future expansion. Therefore, the project was moved 700 feet east of the substation.

In addition, variations in transmission voltage, tower configuration, and circuit configuration were evaluated against the selection criteria before selecting the final configuration.

8.8 Gas Supply Route Alternatives

The proposed project will consume 0.06 trillion cubic feet (Tcf) of natural gas over a 3-year period; projected out over 30 years, the consumption would be 0.63 Tcf (6,500 million Btu/hr). Delivery of natural gas in this volume requires interconnection to a major gas transmission line or to a local distribution network with sufficient transmission capacity to serve the power plant's needs. The proposed project will be connected to the Indigo Energy Facility via a 2.6-mile-long natural gas line. The line will

trend north from Indigo Energy Facility, then west on Dillon Road, north along the proposed access road, and enter the project site.

The other alternative routes considered for delivery of natural gas to the project site are as follow:

- Alternative A: Gas line west from Indigo Energy Facility along unpaved portion of 19th Avenue, north on Karen Avenue, west on Dillon Road, north on the site access road to the project site.
- Alternative B: Gas line west from Indigo Energy Facility along unpaved portion of 19th Avenue, north on Karen Avenue, west on 16th Avenue and north of the site access road to the project site.
- Alternative C: Gas line north from Indigo Energy Facility, turning either west on Dillon Road or west on 16th Avenue, then north on the site access road to the project site.
- Alternative D: Gas line north from Indigo Energy Facility, west on 16th Avenue, north on unpaved portion of Karen Avenue, then construction of an access road leading to the east side of the project site.

These areas are shown on Figure 8.7-1. The proposed project's gas route will be a combination of Alternatives A and C described above. There is currently an existing SoCalGas 8-inch-diameter line running north of Indigo Energy Facility to Dillon Road. The proposed project's route will optimize the use of this right-of-way by replacing this 8-inch-diameter line with a 24-inch-diameter gas line. Alternatives B and D were eliminated from further consideration due to site control and easement restrictions in these areas.

8.9 References

CEC (California Energy Commission), 2005. 2005 Integrated Energy Policy Report CEC-100-2005-007-ES. November.

CEC (California Energy Commission), 2006. Cost and Value of Water Use at Combined-Cycle Power Plants. CEC-500-2006-034. http://energy.ca.gov/pier/final_project_reports/CEC-500-2006-034.html. April.

CEC (California Energy Commission, 1996. Energy Aware: Planning Guide II: Energy Facilities. P700-96-006. www.energy.ca.gov/reports/70096006.pdf.

DWR (California Department of Water Resources), 2004. *California's Groundwater*. DWR, Bulletin 118, Updated February 27.

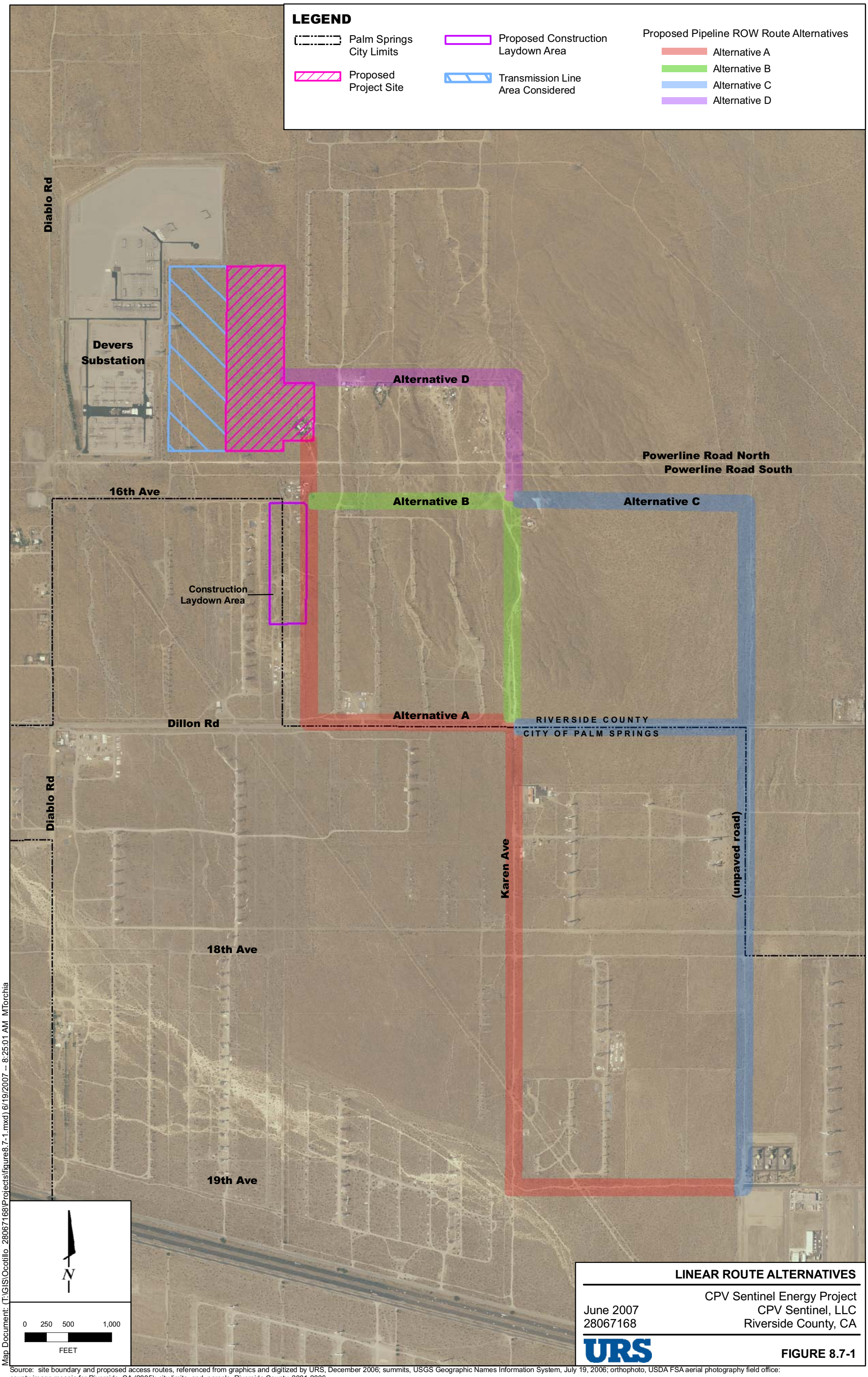
MWH (Montgomery Harza Watson), 2002. Coachella Valley Final Water Management Plan, September.

MWH (Montgomery Harza Watson), 2005. Coachella Valley Water District Urban Water Management Plan, December.

URS Corporation, 2005. MSWD Comprehensive Water System Master Plan. October 17.

Table 8.5-1
Comparison of Wet and Dry Cooling

		Cooling Tower	Dry Cooler	Compare Dry to Wet
Estimated Performance				
SCE Test Condition (107°F)				
Net Power per LMS	kw	90,701	79,812	-12%
Net Heat Rate	Btu/kwh (LHV)	8,291	8,491	2%
High Ambient (120°F)				
Net Power per LMS	kw	88,991	68,016	-24%
Net Heat Rate	Btu/kwh (LHV)	8,333	8,794	6%
Dimensions				
Length	ft	211 ft for 5x sized tower, 127 ft for 3x sized tower	180	Dry cooler for single LMS is approx same size (sq. ft.) as cooling tower for 5 LMS
Width	ft	55 ft	64.5	
Height	ft	36 ft to fan deck, 46 ft fan stack ht	30	
Equipment Costs				
	kUSD	$2,210 delivered and erected	$2,500 equipment only	Dry cooler is approx 5 times as costly



LINEAR ROUTE ALTERNATIVES

CPV Sentinel Energy Project
CPV Sentinel, LLC
Riverside County, CA

June 2007
28067168

URS

FIGURE 8.7-1

Map Document: (T:\GIS\Ocotillo_28067168\Projects\figure8.7-1.mxd) 6/19/2007 -- 8:25:01 AM MTorchia

Source: site boundary and proposed access routes, referenced from graphics and digitized by URS, December 2006; summits, USGS Geographic Names Information System, July 19, 2006; orthophoto, USDA FSA aerial photography field office: county image mosaic for Riverside, CA (2005); city limits, and, parcels, Riverside County, 2001-2006