

**VALIANO PROJECT**

**APPENDIX J**

**GREENHOUSE GASES ANALYSES REPORT**

*for the*

**DRAFT ENVIRONMENTAL IMPACT REPORT**

PDS2013-SP-13-001, PDS2013-GPA-13-001,  
PDS2013-STP-13-003, PDS2013-TM-5575,  
PDS2013-REZ-13-001, PDS2013-ER-12-08-002

APRIL 2015

*Prepared for:*

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PLANNING & DEVELOPMENT SERVICES  
5510 OVERLAND AVENUE, SUITE 310  
SAN DIEGO, CALIFORNIA 92123

# **Greenhouse Gas Analyses Report**

## **Valiano Project**

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PDS2013-STP-13-003, PDS2013-TM-5575,  
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## GLOSSARY OF TERMS AND ACRONYMS

AB	Assembly Bill
ADT	average daily traffic
AEP	Association of Environmental Professionals
AQMD	Air Quality Management District
BACT	Best Available Control Technology
BAU	business-as-usual
BMP	best management practices
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CalEPA	California Environmental Protection Agency
CALGreen	California Green Building
CalRecycle	California Department of Resources Recycling and Recovery
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CAS	2009 California Climate Adaptation Strategy
CAT	Climate Action Team
CBG	California Green Builder
CCTP	Climate Change Technology Program
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEUS	California Commercial End Use Survey
CF	chlorofluoride
CFC	chlorofluorocarbon
CH <sub>4</sub>	methane
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
County	County of San Diego
cy	cubic yard
DU	dwelling unit
EIR	Environmental Impact Report
EO	Executive Order
EPIC	Energy Policy Initiative Center
F	Fahrenheit

## GLOSSARY OF TERMS AND ACRONYMS (cont.)

GHG	greenhouse gas
GWP	global warming potential
HARRF	Hale Avenue Resource Recovery Facility
HFC	hydrofluorocarbon
HVAC	heating, ventilation and air conditioning
ICLEI	International Council on Local Environment Initiatives
IPCC	Intergovernmental Panel on Climate Change
kBTU	kiloBritish Thermal Units
kWh	kilowatt hours
LCFS	Low Carbon Fuel Standard
LEED	Leadership in Energy and Environmental Design
MMT	million metric tons
mph	miles per hour
MPOs	Metropolitan Planning Organizations
Montreal Protocol	Montreal Protocol on Substances That Deplete the Ozone Layer
MT	metric ton
N <sub>2</sub> O	nitrous oxide
NHTSA	National Highway Traffic Safety Administration
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	oxides of nitrogen
NSHP	New Solar Home Partnership
OAL	Office of Administrative Law
ODCs	ozone depleting substances
OPR	Office of Planning and Research
PDF	project design feature
PDS	Planning and Development Services (County of San Diego)
PFC	perfluorocarbon
PM	Particulate Matter
ppm	parts per million
Protocol	California Climate Action Registry General Reporting Protocol
PSD	Prevention of Significant Deterioration
PUC	Public Utilities Commission
PV	photovoltaic



## GLOSSARY OF TERMS AND ACRONYMS (cont.)

RASS	Residential Appliance Saturation Survey
RCP	Regional Comprehensive Plan
Rincon MWD	Rincon Del Diablo Municipal Water District
RPS	Renewable Portfolios Standard
RTAC	Regional Targets Advisory Committee
RW	reclaimed water
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SDAB	San Diego Air Basin
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas and Electric
SEP	2009 County Strategic Energy Plan
SF <sub>6</sub>	hexafluoride
SMAQMD	Sacramento Metropolitan Air Quality Management District
SR	State Route
SWP	state water project
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
U.S.	United States
USEPA	U.S. Environmental Protection Agency
VMT	vehicle miles traveled
VOCs	volatile organic compounds
VWD	Vallecitos Water District
WTWRF	wastewater treatment and water reclamation facility

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## EXECUTIVE SUMMARY

This report evaluates the potential greenhouse gas (GHG) emission impacts associated with the Valiano Project (“Project” or “Proposed Project”). An assessment was made to estimate the total GHG emissions that would be emitted as a result of construction and operation of the Proposed Project. Construction sources of GHG emissions include heavy construction equipment, worker Vehicle Miles Traveled (VMT), and water use. Operational sources of GHG emissions sources include energy, transportation, and solid waste.

The County of San Diego (County) released a memorandum entitled “*2015 GHG Guidance – Recommended Approach to Addressing Climate Change in CEQA Documents*” on January 21, 2015. The *Guidance* includes a screening-level emission threshold 900 metric tons (MT) of carbon dioxide equivalent (CO<sub>2</sub>e), based on a report by the California Air Pollution Control Officers Association (CAPCOA) entitled “CEQA & Climate Change,” dated January 2008, to evaluate whether a project must conduct further analysis. If a project exceeds the screening-level threshold, it is required to reduce unmitigated emissions by at least 16 percent to ensure that cumulative GHG impacts are less than significant.

The Project would be required to comply with the 2013 Title 24 Energy Code (which exceeds the 2008 Energy Code by a minimum of 15 percent); the 2013 CALGreen Building Code, which requires 50 percent diversion of on-site construction waste and on-going operational waste through reuse and recycling; reduction of potable water use by 20 percent; low-flow water and bathroom fixtures; reduction of wastewater generation by 20 percent; weather-based irrigation systems; provide areas for storage and collection of recyclables and yard waste; roof anchors and pre-wiring to allow for the installation of photovoltaic systems; and prepare a Construction and Demolition Debris Management Plan in compliance with Sections 68.508 through 68.518 of the County of San Diego Municipal Code that requires 90 percent of inerts and 70 percent of all other materials to be recycled.

In addition to the regulatory requirements listed above, the Project would incorporate several design features and best management practices to reduce construction and operational GHG emissions. The energy features would also be verified in the Title 24 Compliance Report submitted during the building permit process. These features include:

- Participation in the California Green Builder Program;
- Enhanced heating, ventilation and air condition (HVAC) systems and duct seals insulation (15 percent above Title 24);
- Enhanced ceiling, attic and wall insulation (15 percent above Title 24);
- High-efficiency water heaters (with 19 percent of residential water heating needs accommodated by solar water heaters);
- Energy-efficient three-coat stucco exteriors;
- High-efficiency window glazing;
- Energy Star appliances and energy-efficient lighting;

- Rooftop solar photovoltaic panels that would supply at minimum of 30 percent of residential electricity needs per planning area (Neighborhoods 1-5);
- Residential electric vehicle charging stations that would provide electrical capacity and appropriate circuitry in proximity to vehicle parking areas and/or garages;
- Parallel hot water piping or hot water recirculation systems;
- Buyer-optional high-efficiency clothes washers;
- Drought-tolerant landscaping plan;
- High efficiency drip irrigation systems;
- The use of reclaimed water from the proposed wastewater treatment and water reclamation facility (WTWRF) for outdoor irrigation;
- The Project would provide areas for storage and collection of recyclables and yard waste for each residence;
- Maximization of shade and minimization of impervious surfaces;
- Low-volatile organic compound (VOC) coatings and sealants during construction and operation;
- Natural gas fireplaces;
- Use of Tier 4 construction equipment;
- Building products that have at least 10 percent recycled content;

The Project-related construction activities are estimated to generate approximately 4,056 MT CO<sub>2</sub>e. Construction emissions are amortized over 20 years, such that the proposed construction activities would contribute an average of 203 MT per year of CO<sub>2</sub>e emissions. The Project-related operational and amortized construction GHG emissions are estimated to generate approximately 6,883 MT of CO<sub>2</sub>e per year.

The Project's required compliance with state and federal regulations governing the automobile industry, combined with Project features, would reduce the emissions by 17 percent, from 6,883 to 5,717 MT of CO<sub>2</sub>e emissions per year. The Proposed Project is consistent with the goals of Assembly Bill (AB) 32 within the County of San Diego General Plan Conservation Element and would not conflict with a statewide GHG plan. Thus, with the statewide and Project design measures identified in this report, it is expected that cumulative impacts with respect to Project-related GHG emissions would be less than significant.

## 1.0 INTRODUCTION AND PROJECT DESCRIPTION

This report evaluates the significance of the Proposed Project's contribution of greenhouse gas (GHG) emissions to statewide GHG emissions and GHG emissions reduction targets. To evaluate the incremental effect of Project development on statewide and global climate change, it is important to have a basic understanding of the nature of the global climate change problem.

### 1.1 Understanding Global Climate Change

Global climate change is a change in the average weather of the earth, which can be measured by wind patterns, storms, precipitation, and temperature. The earth's climate is in a state of constant flux with periodic warming and cooling cycles. Extreme periods of cooling are termed "ice ages," which may then be followed by extended periods of warmth. For most of the earth's geologic history, these periods of warming and cooling have been the result of many complicated, interacting natural factors that include: volcanic eruptions which spew gases and particles (dust) into the atmosphere; the amount of water, vegetation, and ice covering the earth's surface; subtle changes in the earth's orbit; and the amount of energy released by the sun (sun cycles). However, since the beginning of the Industrial Revolution around 1750, the average temperature of the earth has been increasing at a rate that is faster than can be explained by natural climate cycles alone.

With the Industrial Revolution came an increase in the combustion of carbon-based fuels such as wood, coal, oil, natural gas, and biomass. Industrial processes have also created emissions of substances that are not found in nature. This in turn has led to a marked increase in the emissions of gases that have been shown to influence the world's climate. These gases, termed "greenhouse" gases, influence the amount of heat that is trapped in the earth's atmosphere. Because recently observed increased concentrations of GHGs in the atmosphere are related to increased emissions resulting from human activity, the current cycle of "global warming" is generally believed to be largely due to human activity. Of late, the issue of global warming or global climate change has arguably become the most important and widely debated environmental issue in the United States and the world. Because climate change is caused by the collective of human actions taking place throughout the world, it is quintessentially a global or cumulative issue.

### 1.2 Greenhouse Gases of Primary Concern

Global climate change refers to changes in Earth's temperature, wind patterns, precipitation and storms. Global temperatures are moderated by naturally occurring atmospheric gases, including water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs, such as HFC-23), perfluorocarbons (PFCs; such as CF<sub>4</sub>), and sulfur hexafluoride (SF<sub>6</sub>), which are known as GHGs. The potential of a gas to trap heat and warm the atmosphere is measured by its global warming potential (GWP). GHGs either break down or are absorbed over time. Thus, the potential of a gas to contribute to global warming is limited by the time it is in the atmosphere, or its "atmospheric lifetime." To account for these effects, GWPs are calculated over a 100-year time horizon (U.S. Environmental Protection Agency [USEPA] 2010a). Because of its relative abundance in the atmosphere and its relatively long atmospheric lifetime,

carbon dioxide has been designated the reference gas for comparing GWPs. Thus, the 100-year GWP of CO<sub>2</sub> is equal to one (see Table 1).

<b>Table 1</b> <b>GLOBAL WARMING POTENTIAL (GWP) AND</b> <b>ATMOSPHERIC LIFETIMES (YEARS)</b>		
<b>Gas</b>	<b>Atmospheric Lifetime (Years)</b>	<b>100-year GWP<sup>a</sup></b>
Carbon Dioxide (CO <sub>2</sub> )	50-200	1
Methane (CH <sub>4</sub> ) <sup>b</sup>	9-15	21
Nitrous oxide (N <sub>2</sub> O)	120	310
HFC-23	264	11,700
HFC-125	32.6	2,800
HFC-134a	14.6	1,300
HFC-143a	48.3	3,800
HFC-152a	1.5	140
HFC-227ea	36.5	2,900
HFC-236fa	209	6,300
HFC-4310mee	17.1	1,300
CF <sub>4</sub>	50,000	6,500
C <sub>2</sub> F <sub>6</sub>	10,000	9,200
C <sub>4</sub> F <sub>10</sub>	2,600	7,000
C <sub>6</sub> F <sub>14</sub>	3,200	7,400
SF <sub>6</sub>	3,200	23,900

Source: USEPA 2010a.

a. GWPs used here are calculated over 100-year time horizon.

b. The methane GWP includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO<sub>2</sub> is not included.

### 1.2.1 Types of GHGs

Water vapor is the most abundant and variable GHG in the atmosphere. It is not considered a pollutant; it maintains a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves (Association of Environmental Professionals; [AEP] 2007).

CO<sub>2</sub> is an odorless, colorless GHG. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic (human-caused) sources of CO<sub>2</sub> include the burning of fuels such as coal, oil, natural gas, and wood. Concentrations are currently around 379 parts per million (ppm); some scientists say that concentrations may increase to 1,130 CO<sub>2</sub> equivalent (CO<sub>2</sub>e) ppm by 2100 as a direct result of anthropogenic sources (Intergovernmental Panel on Climate Change; [IPCC] 2007). Some predict that this will result in an average global

temperature rise of at least 7.2° Fahrenheit (°F) (IPCC 2007). The GWP of CO<sub>2</sub> is defined as one; the GWP of other GHGs is expressed as multiples of the GWP of CO<sub>2</sub>.

CH<sub>4</sub> is a gas and is the main component of natural gas used in homes. It has a GWP of about 21, or 21 times the GWP of CO<sub>2</sub>. A natural source of CH<sub>4</sub> is from the decay of organic matter. Geological deposits known as natural gas fields contain CH<sub>4</sub>, which is extracted for fuel. Other sources are from decay of organic material in landfills, fermentation of manure, and cattle digestion.

N<sub>2</sub>O, also known as laughing gas, is a colorless gas and has a GWP of about 310. N<sub>2</sub>O is produced by microbial processes in soil and water, including reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (e.g., nylon and nitric acid production) also emit N<sub>2</sub>O. It is used in rocket engines, as an aerosol spray propellant, and in race cars. During combustion, NO<sub>x</sub> (NO<sub>x</sub> is a generic term for mono-nitrogen oxides, NO and NO<sub>2</sub>) is produced as a criteria pollutant and is not the same as N<sub>2</sub>O. Very small quantities of N<sub>2</sub>O may be formed during fuel combustion by nitrogen and oxygen (American Petroleum Institute [API] 2004).

Fluorocarbons are gases formed synthetically by replacing all hydrogen atoms in CH<sub>4</sub> or ethane with chlorine and/or fluorine atoms. Chlorofluorocarbons (CFCs) are nontoxic, nonflammable, insoluble, and chemically nonreactive in the troposphere (the level of air at earth's surface). Chlorofluorocarbons were first synthesized in 1928 for use as refrigerants, aerosol propellants and cleaning solvents. They destroy stratospheric ozone; therefore, their production was stopped by requirements of the Montreal Protocol (as described in Section 1.1.1). Fluorocarbons have a GWP of between 140 and 11,700, with the lower end being for HFC-152a and the higher end being for HFC-23.

SF<sub>6</sub> is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It has the highest GWP of any gas – 23,900. SF<sub>6</sub> is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Ozone is a GHG, although unlike the other GHGs, it is relatively short-lived in the troposphere and, therefore, is not global in nature. According to the California Air Resources Board (CARB), it is difficult to make an accurate determination of the contribution of ozone precursors (NO<sub>x</sub> and volatile organic compounds [VOCs]) to global warming (CARB 2006).

A summary of the most common naturally occurring and artificial GHGs is provided in Table 1.

Of the gases listed in Table 1, CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, are produced by both natural and anthropogenic (human) sources. The remaining gases HFCs, chlorofluorides (CFs), and SF<sub>6</sub>, are the result of solely human processes.

The increase in the earth's temperature is expected to have wide ranging effects on the environment. Although global climate change is anticipated to affect all areas of the globe, there are numerous implications of direct importance to California. Statewide average temperatures

are anticipated to increase by between 3 and 10.5°F by 2100. Some climate models indicate that this warming may be greater in the summer than in the winter. This could result in widespread adverse impacts to ecosystem health, agricultural production, water use and supply, and energy demand. Increased temperatures could reduce the Sierra Nevada snowpack and put additional strain on the state's water supply. In addition, increased temperatures would be conducive to the formation of air pollutants, resulting in poor air quality.

It is also important to note that even if GHG emissions were to be eliminated or dramatically reduced, it is projected that the effect of those emissions would continue to affect global climate for centuries.

### **1.3 Project Location and Description**

The Proposed Project includes an approximately 239-acre site in an unincorporated portion of San Diego County (County) within the Eden Valley portion of the San Dieguito Community Planning Area near the cities of San Marcos and Escondido. The Project site is located approximately 1.7 miles west of Interstate 15 (I-15) and 0.6 mile south of State Route 78 (SR-78) at its closest points. Principal site access is from SR-78, Nordhal Road and Country Club Drive, from which a number of smaller surface streets (e.g., Hill Valley Drive, Eden Valley Lane and Mt. Whitney Road) extend along or near the northern and eastern property boundaries.

The Proposed Project consists of a gated residential community with 326 single-family dwelling units (DUs) and related facilities within a total developed area of approximately 92 acres. The residential development is divided into five distinct neighborhoods, with a minimum lot size of 5,870 square feet and an overall average lot size of approximately 14,600 square feet. The proposed development also incorporates a number of related amenities and facilities, including a 2.3-acre private Community Park and Recreation Center, a 1.2-acre private park, a 0.5-acre Trail Head Park, a 2.7-acre public Neighborhood Park, an on-site wastewater treatment and water reclamation facility (WTWRF) and wet weather storage area, three pump (lift) stations and an existing barn complex in the southeastern portion of the site that would be retained.

Wastewater generated by the Proposed Project would be treated by an on-site WTWRF which would be owned and operated by the San Diego County Sanitation District. The County WTWRF design has developed specific design criteria and standards for an "Aero-Mod" wastewater treatment plant, a plant process design that is currently being used in the Rancho Santa Fe Community Facilities District. "Aero-Mod" is a company based in Kansas that offers a packaged wastewater treatment plant approach based on the extensive use of "common-wall" construction between basins, performing a version of the extended aeration wastewater treatment process. Extended aeration is a conservative approach to the activated sludge process that relies upon treating the wastewater for an extended period of time (approximately 24 hours on average).

The Project would be required to construct wet weather storage to meet the Regional Water Quality Control Board's (RWQCB) requirement for approximately 90 days of recycled water storage. Therefore, a total of 6.4 million gallons of storage would be provided at the proposed 1.6-acre wet weather storage area located north of Neighborhood 5.



Figure 1 provides a regional location map of the Project, and Figure 2 provides the Project site plan.

## **1.4 Regulatory Requirements and Project Design Features that Reduce GHG Emissions**

### **1.4.1 Regulatory Requirements**

The Project would be required to comply with the following regulations for the reduction of GHG emissions:

- 2013 Title 24 Energy Code, which exceeds the 2008 Energy Code by a minimum of 15 percent
- 2013 CALGreen Building Code, which requires:
  - 50 percent diversion of on-site construction waste and on-going operational waste through reuse and recycling
  - Reduction of potable water use by 20 percent
  - Low-flow water and bathroom fixtures
  - Reduction of wastewater generation by 20 percent
  - Weather-based irrigation systems
  - Provide areas for storage and collection of recyclables and yard waste
  - Inclusion of roof anchors and pre-wiring to allow for the installation of photovoltaic systems
- Prepare a Construction and Demolition Debris Management Plan in compliance with Sections 68.508 through 68.518 of the County of San Diego Municipal Code that requires 90 percent of inerts and 70 percent of all other materials to be recycled.

### **1.4.2 Project Design Features and Construction Best Management Practices**

#### ***1.4.2.1 California Green Builder Program***

The Proposed Project would be designed in accordance with the Building Industry Association's California Green Builder (CGB) program, a professionally recognized green building program that identifies building performance standards to achieve improved energy efficiency, water conservation, sustainable materials use, waste reduction, lumber conservation, indoor air quality, and heat island avoidance. The CGB program is a program recognized by the California Energy Commission as one of several green building performance rating systems available to potentially lower GHG emissions from buildings (CBSC 2010).

The key CGB design features accounted for in the Proposed Project's GHG reduction estimates include: 15 percent greater energy efficiency than Title 24 2008 energy code (now required as part of the 2013 Title 24 energy code) and install low flow water fixtures to achieve greater water savings than the current plumbing code (now required as part of the 2013 CALGreen Building Code). These features would be included as building permit conditions and verified prior to the issuance of final certificate of occupancy.

### **1.4.2.2 Energy Efficiency**

The Project would include several features that would improve energy efficiency beyond the 2013 Title 24 energy efficiency requirements, including:

- Enhanced heating, ventilation and air condition (HVAC) systems and duct seals insulation (15 percent above Title 24);
- Enhanced ceiling, attic and wall insulation (15 percent above Title 24);
- High-efficiency water heaters (with 19 percent of residential water heating needs accommodated by solar water heaters);
- Energy-efficient three-coat stucco exteriors;
- High-efficiency window glazing;
- Energy Star appliances and energy-efficient lighting;
- Rooftop solar photovoltaic panels that would supply at minimum of 30 percent of residential electricity needs per planning area (Neighborhoods 1-5);
- Residential electric vehicle charging stations that would provide electrical capacity and appropriate circuitry in proximity to vehicle parking areas and/or garages.

These energy features would undergo independent third-party inspection and diagnostics as part of the CGB verification and commissioning process. The energy features would also be verified in the Title 24 Compliance Report submitted during the building permit process.

### **1.4.2.3 Water Conservation**

The Project would incorporate the following features to reduce water use:

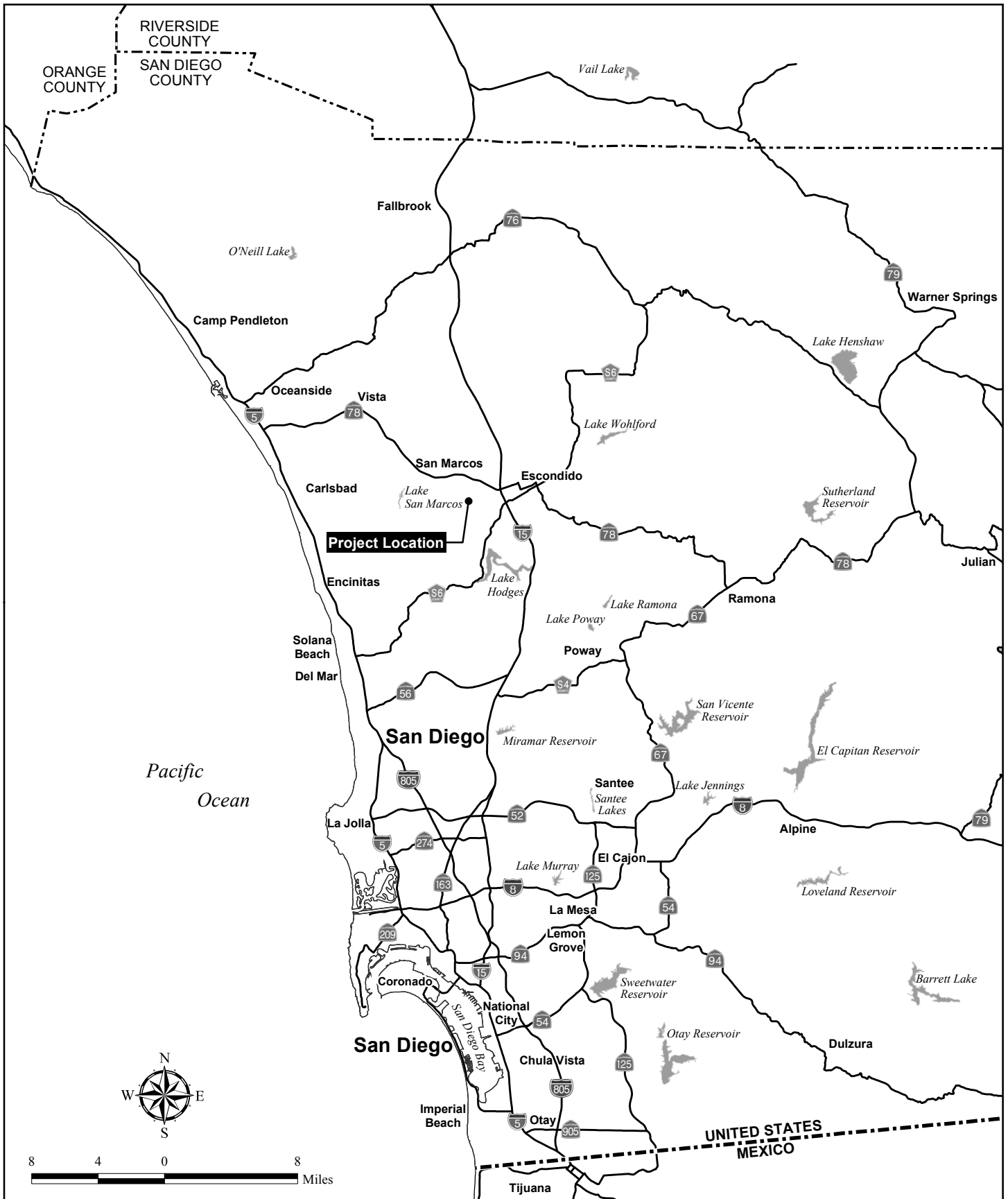
- Parallel hot water piping or hot water recirculation systems;
- Buyer-optional high-efficiency clothes washers;
- Drought-tolerant landscaping plan;
- High efficiency drip irrigation systems; and
- The use of reclaimed water from the proposed WTWRF for outdoor irrigation.

### **1.4.2.4 Materials Use and Waste Reduction**

The Project would provide areas for storage and collection of recyclables and yard waste for each residence.

### **1.4.2.5 Pollutant Control and Heat Island Reduction**

To maximize shade and reduce heat island effects, the landscape plan includes strategic location of deciduous trees and other vegetation. Impervious surfaces would also be minimized and pervious pavers used instead where practical. No CFC-based refrigerants would be used, and interior finishes, adhesives, sealants, paints and coatings, and carpet systems would be low in



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## Regional Location Map

VALIANO

Figure 1