

4.2 GREENHOUSE GAS EMISSIONS

This section of the EIR analyzes the potential environmental effects of greenhouse gas (GHG) emissions and climate change from implementation of the proposed project. No comments addressing GHG emissions were received in response to the Initial Study/Notice of Preparation (IS/NOP) circulated for the proposed project.

For this EIR, emissions from sources such as construction, vehicles, energy consumption, solid waste generation, and water distribution are inventoried and discussed quantitatively and qualitatively. All emissions inventories are presented in metric tons unless otherwise indicated. Appendix C contains the GHG worksheet that was used to calculate data for this section.

Data used to prepare this section were taken from various sources and publications prepared by a number of professional associations and agencies that have suggested approaches and strategies for complying with CEQA's environmental disclosure requirements. Such organizations include the California Attorney General's Office (AGO), the California Air Pollution Controls Officers Association (CAPCOA), the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), and the Association of Environmental Professionals (AEP). Full reference-list entries for all cited materials are provided in Section 4.2.4 (References).

4.2.1 Environmental Setting

The proposed project is located within the South Coast Air Basin (Basin). The regional climate within the Basin is considered semi-arid and is characterized by warm summers, mild winters, infrequent seasonal rainfall, moderate daytime onshore breezes, and moderate humidity. Climate change within the Basin is influenced by a wide range of emission sources, such as utility usage, heavy vehicular traffic, industry, and meteorology.

■ Climate Change Background

Parts of the Earth's atmosphere act as an insulating "blanket" for the planet. This "blanket" of various gases traps solar energy, which keeps the global average temperature in a range suitable for life. The collection of atmospheric gases that comprise this blanket are called "greenhouse gases" based on the idea that these gases trap heat like the glass walls of a greenhouse. These gases, mainly water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), ozone (O₃), and chlorofluorocarbons (CFCs), all act as effective global insulators, reflecting visible light and infrared radiation back to earth. Most scientists agree that human activities, such as producing electricity and driving internal combustion vehicles, have contributed to the elevated concentration of these gases in the atmosphere. As a result, the Earth's overall temperature is rising. Warmer global temperatures will lead to changes in rainfall patterns, smaller polar ice caps, a rise in sea level, and a wide range of impacts on plants, wildlife, and humans.

The relationship of water vapor and ozone as GHGs is poorly understood. It is unclear how much water vapor acts as a GHG since water vapor can also produce cloud cover which reflects sunlight away from Earth and counteracts its effect as a GHG. Also, water vapor tends to increase as the Earth warms, so it

is not well understood whether the increase in water vapor is contributing to or is a result of climate change. Ozone tends to break down in the presence of solar radiation, but this is not sufficiently understood by the scientific community to fully evaluate. For these reasons, methodologies approved by the IPCC, United States Environmental Protection Agency (USEPA), and the California Air Resources Board focus on carbon dioxide, nitrous oxide, methane, and chlorofluorocarbons. The following provides a brief description of each of these GHGs.

Carbon Dioxide

The production and absorption of carbon dioxide occurs through the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees and wood products, and as a result of other chemical reactions, such as those required to manufacture cement. Globally, the largest source of human based CO₂ emissions is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, and industrial facilities. A number of specialized industrial production processes and product uses, such as mineral or metal production, and the use of petroleum-based products, leads to CO₂ emissions.

CO₂ is removed from the atmosphere (or sequestered) when it is absorbed by plants as part of the biological carbon cycle. Natural sources of CO₂ occur within the carbon cycle where billions of tons of atmospheric CO₂ are removed by oceans and growing plants and are emitted back into the atmosphere through natural processes. When in balance, total CO₂ emissions and removals from the entire carbon cycle are roughly equal. Since the Industrial Revolution in the 1700s, most scientists agree that human activities, including burning of oil, coal, and gas and deforestation, increased CO₂ concentrations in the atmosphere by 35 percent as of 2005.

Methane

Methane is emitted from a variety of both human-related and natural sources. CH₄ is emitted during the production and transport of coal, natural gas, and oil, from livestock and other agricultural practices, and from the decay of organic waste in municipal solid waste landfills. It is estimated that 60 percent of global CH₄ emissions are related to human activities. Natural sources of CH₄ include wetlands, gas hydrates,⁹ permafrost, termites, oceans, freshwater bodies, non-wetland soils, and wildfires. CH₄ emissions levels from a particular source can vary significantly from one country or region to another. These variances depend on many factors, such as climate, industrial and agricultural production characteristics, energy types and usage, and waste management practices. For example, temperature and moisture have a significant effect on the anaerobic digestion process, which is one of the key biological processes resulting in CH₄ emissions from both human and natural sources. Also, the implementation of technologies to capture and utilize CH₄ from sources such as landfills, coalmines, and manure management systems affects the emissions levels from these sources.

Nitrous Oxide

Concentrations of nitrous oxide also began to rise at the beginning of the Industrial Revolution reaching 314 parts per billion (ppb) by 1998. Microbial processes in soil and water, including those reactions that

⁹ Gas hydrates are crystalline solids that consist of a gas molecule, usually methane, surrounded by a “cage” of water molecules.

occur in fertilizer containing nitrogen, produce nitrous oxide. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to the atmospheric load of N₂O.

Chlorofluorocarbons

Chlorofluorocarbons are not naturally occurring. They were synthesized for uses as refrigerants, aerosol propellants, and cleaning solvents. Since their creation in 1928, the concentrations of CFCs in the atmosphere have risen. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken, and levels of the major CFCs are now remaining static or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years. Since they are also a GHG, along with such other long-lived synthesized gases as CF₄ (carbontetrafluoride) and SF₆ (sulfurhexafluoride), they are of concern. Another set of synthesized compounds called HFCs (hydrofluorocarbons) are also considered GHGs, though they are less stable in the atmosphere and therefore have a shorter lifetime and less of an impact. CFCs, CF₄, SF₆, and HFCs have been banned and are no longer available. Therefore, these GHGs are not included further in this analysis.

■ Potential Effects of Global Climate Change

Climate change could have a number of adverse effects. Although these effects would have global consequences, in most cases they would not disproportionately affect any one site or activity. In other words, many of the effects of climate change are not site-specific. Emission of GHGs would contribute to the changes in the global climate, which would in turn, have a number of physical and environmental effects. A number of general effects are discussed below.

Sea Level Rise and Flooding. The California Climate Change Center predicts that sea level in California would rise between 10.9 to 71.6 centimeters (cm) (0.36 to 2.3 feet) above existing mean sea level (MSL) by 2099 as a result of climate change.¹⁰ Measurements taken in the City of Alameda indicate that the current rate of sea level rise is about 0.29 foot per century. Therefore, projected climate change effects on sea level would increase the existing rate of sea level rise by 0.07 to 1.94 feet per century.¹¹ When combined with astronomical tides, even a 1-foot increase in MSL would result in the 100-year

¹⁰ California Climate Change Center, *Projecting Future Sea Level*, A Report from the California Climate Change Center, CEC-500-2005-202-SF, Prepared by D. Cayan, P. Bromirski, K. Hayhoe, M. Tyree, M. Dettinger, and R. Flick, Table 3 (Projected global sea level rise (SLR) (cm) for the SRES A1fi, A2, and B1 greenhouse gas emission scenarios. SLR for A2 and B1 scenarios is estimated by combining output recent global climate change model simulations with MAGICC projections for the ice melt component. SLR estimates for A1fi estimated from MAGICC based on A2 temperature changes scaled according to those in A1fi) (March 2006), p. 19.

¹¹ California Climate Change Center, *Climate Warming and Water Supply Management in California: White Paper*, A Report from Climate Change Center, CEC-500-2005-195-SF, Prepared by J. Medelin, J. Harou, M. Olivares, J. Lund, R. Howitt, S. Tanaka, M. Jenkins, K. Madani, and T. Zhu. Chapter 2 (Potential Impacts of Climate Change on California's Water Resources), Table 2-6 (Relative Sea Level Trends for Eight Tide Gauges Along the Coast of California with 50 Years or More of Record) (March 2006).

event high tide peak occurring at the 10-year event frequency.¹² In other words, the frequency of a current 100-year high tide (about 9.5 feet above current MSL) would occur 10 times more often if sea levels increase by 1 foot above current MSL.

In the future, precipitation events are predicted to vary in terms of timing, intensity, and volume according to many climate change models. Extreme storm events may occur with greater frequency. Changes in rainfall and runoff could affect flows in surface water bodies, causing increased flooding and runoff to the storm drain system.

Water Supply. California Health and Safety Code Section 38501(a) recognizes that climate change “poses a serious threat to the economic well-being, public health, natural resources, and the environment of California,” and notes, “the potential adverse impacts of [climate change] include...reduction in the quality and supply of water to the state from the Sierra snowpack.” As most of the state, including the City of El Segundo, depends on surface water supplies originating in the Sierra Nevada, this potential water supply reduction is a concern.

Most of the scientific models addressing climate change show that the primary effect on California’s climate would be a reduced snow pack and a seasonal shift of peak flows in streams. A higher percentage of the winter precipitation in the mountains would likely fall as rain rather than as snow in some locations, reducing the overall snowpack. Further, as temperatures rise, snowmelt is expected to occur earlier in the year. As a result, peak runoff would likely come a month or so earlier. The end result of this would be that the state may not have sufficient surface storage to capture the early runoff, and so, absent construction of additional water storage projects, a portion of the current supplies would flow to the oceans and be unavailable for use in the state’s water delivery systems.

Water Quality. Climate change could have adverse effects on water quality, which would in turn affect the beneficial uses (habitat, water supply, etc.) of surface water bodies and groundwater. The changes in precipitation discussed above could result in increased sedimentation, higher concentration of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface water bodies. Sea level rise, discussed above, could result in the encroachment of saline water into freshwater bodies.

Ecosystems and Biodiversity. Climate change could have effects on diverse types of ecosystems, from alpine to deep-sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation would occur, which would potentially have an effect on the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states that “20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts within this century if global mean temperatures exceed 2

¹² California Climate Change Center, *Climate Warming and Water Supply Management in California: White Paper*, A Report from Climate Change Center, CEC-500-2005-195-SF, Prepared by J. Medelin, J. Harou, M. Olivares, J. Lund, R. Howitt, S. Tanaka, M. Jenkins, K. Madani, and T. Zhu. Chapter 2 (Potential Impacts of Climate Change on California’s Water Resources), Table 2-6 (Relative Sea Level Trends for Eight Tide Gauges Along the Coast of California with 50 Years or More of Record) (March 2006).

to 3°C (3.6 to 5.4°F) relative to pre-industrial levels.”¹³ Shifts in existing biomes¹⁴ could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate. In general terms, climate change would put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity.

Human Health Impacts. Climate change may increase the risk of vector-borne infectious diseases, particularly those found in tropical areas and spread by insects—malaria, dengue fever, yellow fever, and encephalitis.¹⁵ While these health impacts would largely affect tropical areas in other parts of the world, effects would also be felt in California. Warming of the atmosphere would be expected to increase smog and particulate pollution, which could adversely affect individuals with heart and respiratory problems, such as asthma. Extreme heat events would also be expected to occur with more frequency, and could adversely affect the elderly, children, and the homeless. Finally, the water supply impacts and seasonal temperature variations which could occur as a result of climate change could affect the viability of existing agricultural operations, making the food supply more vulnerable.

■ Potential Effects of Human Activity on Climate Change

The burning of fossil fuels, such as coal and oil, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in CO₂ emissions (and thus substantial increases in atmospheric concentrations). In 1994, atmospheric CO₂ concentrations were found to have increased by nearly 30 percent above pre-industrial (c. 1760) concentrations.

The effect each GHG has on climate change is measured as a combination of the volume of its emissions, and its global warming potential (GWP), and is expressed as a function of how much warming would be caused by the same mass of CO₂. Thus, GHG emissions are typically measured in terms of pounds or tons of CO₂ equivalents (CO₂e), and are often expressed in metric tons of CO₂ equivalents (MT CO₂e) or millions of metric tons of CO₂ equivalents (MMT CO₂e).

- **Global Emissions.** Worldwide emissions of GHGs in 2004 were nearly 30 billion tons of CO₂e per year (including both on-going emissions from industrial and agricultural sources, but excluding emissions from land-use changes).¹⁶
- **U.S. Emissions.** In 2004, the United States emitted 7.1 billion tons of CO₂e. Of the four major sectors nationwide—residential, commercial, industrial, and transportation—transportation accounts for the highest percentage of GHG emissions (approximately 35 to 40 percent); these emissions are entirely generated from direct fossil fuel combustion. In 2008, the United States

¹³ Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)] (Cambridge, United Kingdom: Cambridge University Press, 2007).

¹⁴ A biome is a major ecological community classified by the predominant vegetation, and hence animal inhabitants.

¹⁵ U.S. Environmental Protection Agency, *Climate Change—Health and Environmental Effects* (2008), <http://www.epa.gov/climatechange/effects/health.html#climate> (accessed December 13, 2009)

¹⁶ United Nations Framework Convention on Climate Change, Sum of Annex I and Non-Annex I Countries Without Counting Land Use, Land-Use Change, and Forestry (LULUCF), Predefined Queries: GHG total without LULUCF (Annex I Parties). Bonn, Germany. http://unfccc.int/ghg_emissions_data/predefined_queries/items/3814.php (accessed May 2, 2007).

emitted 6.9 billion tons of CO₂e, with transportation accounting for the highest percentage of GHG emissions, approximately 32 percent.¹⁷

- **State of California Emissions.** In 2004, California emitted approximately 483 million tons of CO₂e, or about 6 percent of the U.S. emissions. This large number is due primarily to the sheer size of California compared to other states. By contrast, California has one of the fourth lowest per-capita GHG emission rates in the country, due to the success of its energy-efficiency and renewable energy programs and commitments that have lowered the state’s GHG emissions rate of growth by more than half of what it would have been otherwise. Another factor that has reduced California’s fuel use and GHG emissions is its mild climate compared to that of many other states. In 2008, California’s GHG emissions were approximately 478 MMT CO₂e, generally attributed to the reduced travel, and therefore, transportation emissions.¹⁸
 - > The California Energy Commission found that transportation is the source of approximately 41 percent of the state’s GHG emissions, followed by electricity generation (both in-state and out-of-state) at 23 percent, and industrial sources at 20 percent. Agriculture and forestry is the source of approximately 8.3 percent, as is the source categorized as “other,” which includes residential and commercial activities.¹⁹

Various aspects of constructing, operating, and eventually discontinuing (demolition and disposal of waste) the use of industrial, commercial and residential development will result in GHG emissions. Operational GHG emissions result from energy use associated with heating, lighting, and powering buildings (typically through natural gas and electricity consumption), pumping and processing water (which consumes electricity), as well as fuel used for transportation and decomposition of waste associated with building occupants. New development can also create GHG emissions in its construction and demolition phases in connection with the use of fuels in construction equipment, creation and decomposition of building materials, vegetation clearing, and other activities. However, it is noted that new development does not necessarily create entirely new GHG emissions. Occupants of new buildings are often relocating and shifting their operational-phase emissions from other locations.

4.2.2 Regulatory Framework

Global climate change is addressed through the efforts of various federal, state, regional, and local government agencies as well as national and international scientific and governmental conventions and programs. These agencies work jointly and individually to understand and regulate the effects of greenhouse gas emissions and resulting climate change through legislation, regulations, planning, policy-making, education, and a variety of programs. The significant agencies, conventions, and programs focused on global climate change are discussed below.

¹⁷ U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2009, EPA# 430-R-11-005 (April 15, 2011).

¹⁸ U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008, EPA# 430-R-10-006 (April 2010).

¹⁹ California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004—Final Staff Report, publication # CEC-600-2006-013-SF (Sacramento, CA, December 22, 2006, updated January 23, 2007).

■ Federal

U.S. Environmental Protection Agency

The USEPA is responsible for implementing federal policy to address global climate change. The federal government administers a wide array of public-private partnerships to reduce GHG intensity generated by the United States. These programs focus on energy efficiency, renewable energy, methane and other non-CO₂ gases, agricultural practices, and implementation of technologies to achieve GHG reductions.

■ State

California Air Resources Board

The California Air Resources Board (ARB), a part of the California EPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, ARB conducts research, sets state ambient air quality standards, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. ARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. ARB has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts.

Executive Order S-3-05

California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following GHG emission reduction targets:

- By 2010, California shall reduce GHG emissions to 2000 levels
- By 2020, California shall reduce GHG emissions to 1990 levels
- By 2050, California shall reduce GHG emissions to 80 percent below 1990 levels

Assembly Bill (AB) 32, the California Global Warming Solutions Act Of 2006

In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. AB 32 focuses on reducing GHGs in California. ARB has determined the statewide levels of GHG emissions in 1990 to be 427 MMT CO₂e. ARB has adopted the Climate Change Scoping Plan, which outlines the state's strategy to achieve the 2020 GHG limit set by AB 32. This Scoping Plan proposes a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California, improve the environment, reduce dependence on oil, diversify energy sources, save energy, create new jobs, and enhance public health.

Part of California's strategy for achieving GHG reductions under AB 32 are the early action greenhouse gas reduction measures, which include the following: a low carbon fuel standard; reduction of emissions

from non-professional servicing of motor vehicle air conditioning systems; and improved landfill methane capture.²⁰

Senate Bill 375

Senate Bill 375 (SB 375), which establishes mechanisms for the development of regional targets for reducing passenger vehicle greenhouse gas emissions, was adopted on September 30, 2008. On September 23, 2010, California ARB adopted the vehicular greenhouse gas emissions reduction targets that had been developed in consultation with the metropolitan planning organizations (MPOs); the targets require a 7 to 8 percent reduction by 2020 and between 13 to 16 percent reduction by 2035 for each MPO. SB 375 recognizes the importance of achieving significant greenhouse gas reductions by working with cities and counties to change land use patterns and improve transportation alternatives. Through the SB 375 process, MPOs, such as the Southern California Council of Governments (SCAG), which includes Los Angeles County, will work with local jurisdictions in developing sustainable communities strategies (SCS) designed to integrate development patterns and the transportation network in a way that reduces greenhouse gas emissions while meeting housing needs and other regional planning objectives. SCAG's reduction target for per capita vehicular emissions is 8 percent by 2020 and 13 percent by 2035.²¹ The MPOs will prepare their first SCS according to their respective regional transportation plan (RTP) update schedule; to date, no region has adopted an SCS. The first of the RTP updates with SCS strategies are expected in 2012.

Senate Bill 97

SB 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. In March 2010, the California Office of Administrative Law promulgated CEQA amendments that provide regulatory guidance with respect to the analysis and mitigation of the potential effects of GHG emissions, as found in CEQA Guidelines Section 15183.5. To streamline analysis, CEQA provides for analysis through compliance with a previously adopted plan or mitigation program under special circumstances.

Executive Order S-13-08

Executive Order S-13-08, the Climate Adaptation and Sea Level Rise Planning Directive, provides direction for how the state should plan for future climate impacts. The first result is the 2009 California Adaptation Strategy (CAS) report which summarizes the most recent science on climate change impacts in the state to assess vulnerability and outlines possible solutions that can be implemented within and across state agencies to promote resiliency.

California Code of Regulations (CCR) Title 24

CCR Title 24, Part 6 (California's Energy Efficiency Standards for Residential and Nonresidential Buildings) (Title 24) were first established in 1978 in response to a legislative mandate to reduce

²⁰ California Air Resources Board, *Proposed Early Actions to Mitigate Climate Change in California* (April 20, 2007), http://www.arb.ca.gov/cc/ccea/meetings/042307workshop/early_action_report.pdf.

²¹ California Air Resources Board, *Proposed SB 375 Greenhouse Gas Targets: Documentation of the Resulting Emission Reductions based on MPO Data* (August, 9 2010).

California's energy consumption. The standards are updated periodically to increase the baseline energy efficiency requirements. Although it was not originally intended to reduce GHG emissions, electricity production by fossil fuels results in GHG emissions and energy efficient buildings require less electricity. Therefore, increased energy efficiency results in decreased GHG emissions. The 2008 standards are the most recent version which went into effect in January 1, 2010.

CCR Title 24, Part 11 (California's Green Building Standard Code) (CALGreen) was adopted in 2010 and went into effect January 1, 2011. CALGreen is the first statewide mandatory green building code and significantly raises the minimum environmental standards for construction of new buildings in California. The Mandatory provisions in CALGreen will reduce the use of VOC emitting materials, strengthen water conservation, and require construction waste recycling.

■ Regional

South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD) is the agency principally responsible for comprehensive air pollution control in the South Coast Air Basin, which includes the counties of Los Angeles, Riverside, San Bernardino, and Orange. In order to provide GHG emission guidance to the local jurisdictions within the Basin, the SCAQMD has organized a Working Group to develop GHG emissions analysis guidance and thresholds.

SCAQMD released a draft guidance document regarding interim CEQA GHG significance thresholds in October 2008. On December 5, 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for projects where the SCAQMD is the lead agency. SCAQMD proposed a tiered approach, whereby the level of detail and refinement needed to determine significance increases with a project's total GHG emissions. The tiered approach defines projects that are exempt under CEQA and projects that are within the jurisdiction of and subject to the policies of a GHG Reduction Plan as less than significant.

Air Quality Management Plan

The SCAQMD and SCAG are the agencies responsible for preparing the Air Quality Management Plan (AQMP) for the Basin. The most recent comprehensive plan is the 2007 AQMP adopted on July 13, 2007. The 2007 AQMP is designed to meet the state and federal Clean Air Act planning requirements and focuses on ozone and PM_{2.5}. The 2007 AQMP incorporates significant new emissions inventories, ambient measurements, scientific data, control strategies, and air quality modeling. SCAQMD is currently working on an updated AQMP that is anticipated to be completed in 2012.

■ Local

City of El Segundo General Plan

The Air Quality Element of the City of El Segundo General Plan addresses the problems of maximum air pollution levels; reducing the health and economic impacts of air pollution; complying with the requirements of the 1991 AQMP for the South Coast Air Basin (SCAB); determining the best means of

addressing the AQMP measures for local government, and increasing awareness of local community and governmental responsibility for air quality. The Air Quality Element policies and actions that are relevant to the proposed project are identified below.

- Goal AQ12** Reduction in Residential, Commercial, and Industrial Energy Consumption
 - Objective AQ12-1** Enact the recommendations of the AQMP Energy Working Group for commercial and residential buildings and adopt ordinances to mitigate air quality impacts from water and pool heating systems
 - Policy AQ12-1.2** It is the policy of the City of El Segundo that the City encourage the incorporation of energy conservation features in the design of new projects and the installation of conservation devices in existing developments.
 - Policy AQ12-1.3** It is the policy of the City of El Segundo to provide incentives and/or regulations to reduce emissions from residential and commercial water heating.
 - Policy AQ12-1.4** It is the policy of the City of El Segundo that new construction not preclude the use of solar energy systems by uses and buildings on adjacent properties and consider enactment of a comprehensive solar access ordinance.

- Goal AQ14** Prevent Exposure of People, Animals, and Other Living Organisms to Toxic Air Pollutants
 - Objective AQ14-1** Restrict emissions of toxic air contaminants in and around the City and insure that sources which impact the City comply with all federal, state, regional, and local regulations.
 - Policy AQ14-1.1** It is the policy of the City of El Segundo to protect residents and others from exposure to toxic air pollutants by identifying major sources of toxic contaminants in and around the City and insuring that the sources comply with all federal, state, regional, and local regulations.

- Goal AQ15** Prevent Exposure of People, Animals, and Other Living Organisms to Unhealthful Levels of Air Pollution
 - Objective AQ15-1** Reduce unsafe levels of air pollutants impacting the City.
 - Policy AQ15-1.1** It is the policy of the City of El Segundo to protect the residents of the City and others from exposure to unsafe levels of air

pollution, including but not limited to, pollutants such as volatile organic compounds, particulates, oxides of nitrogen, oxides of sulphur, lead, ozone, and carbon monoxide, by taking all appropriate air pollution control measures to reduce unsafe levels of air pollutants impacting the City.

Policy AQ15-1.2 It is the policy of the City of El Segundo to coordinate with the SCAQMD to ensure that all elements of the AQMP regarding reduction of all air pollutant emissions are being met and are being enforced.

4.2.3 Impacts and Mitigation Measures

■ Analytic Method

The impact analysis for the El Segundo 540 East Imperial Avenue Specific Plan project is based on a GHG emissions analysis, which is presented in the environmental analysis, below. GHG emissions associated with the development and operation of the proposed project were estimated using the CalEEMod software, trip generation data from the project traffic analysis prepared by Kimley-Horn and Associates, Inc., emissions factors from the California Climate Action Registry, and other sources. The methodology and assumptions used in this analysis are detailed below for construction and operational activities. Refer to Appendix C for model output and detailed calculations.

Because the impact each GHG has on climate change varies, a common metric of CO₂e is used to report a combined impact from all of the GHGs. The effect each GHG has on climate change is measured as a combination of the volume of its emissions, and its global warming potential, and is expressed as a function of how much warming would be caused by the same mass of CO₂. Thus, GHG emissions in this analysis are measured in terms of metric tons of CO₂ equivalents (MT CO₂e).

Construction

Construction activities can alter the carbon cycle in many different ways. Construction equipment typically utilizes fossil fuels, which generates GHGs such as carbon dioxide, methane, and nitrous oxide. Methane may also be emitted during the fueling of heavy equipment. The raw materials used to construct new buildings can sequester carbon; however, demolition of structures can result in the gradual release of the carbon stored in waste building materials into the atmosphere as those materials decompose in landfills. Since the exact nature of the origin or make-up of the construction materials is unknown, construction-related emissions are typically based on the operation of vehicles and equipment during construction.

Construction is a temporary source of emissions necessary to facilitate development in the proposed project area. Although these emissions are temporary, they must be accounted for, as the impact from the emissions of GHGs is cumulative. Based on current SCAQMD methodology, all of the GHGs

emitted during construction are amortized over an estimated 30-year project lifetime. The amortized emissions are then combined with the operational emissions to provide a cumulative estimate of annual GHG emissions for the proposed project.

Operation

The following operational activities are typically associated with the operation of residential and senior living facilities that will contribute to the generation of GHG emissions in the project area:

- **Vehicular trips**—Vehicle trips generated by growth within the project area would result in GHG emissions through combustion of fossil fuels. Carbon dioxide emissions were determined based on the annual vehicle miles traveled (VMT) provided in the traffic analysis with trip rates and average trip lengths in the CalEEMod software averaged to match as close as possible the VMT in the traffic analysis. Methane and nitrous oxide emissions were estimated using the VMT from the traffic analysis and USEPA emissions factors for on-road vehicles.
- **On-site use of natural gas and other fuels**—Natural gas would be used by the project area development for heating of residential space, resulting in a direct release of GHGs. The use of landscaping equipment would also result in on-site GHG emissions. Estimated emissions from the combustion of natural gas and other fuels from the implementation of the proposed project is based on the number of dwelling units and square footage of communal living areas, and as estimated by the CalEEMod software. GHG emissions associated with building envelope energy use vary based on the size of the structures, the type and extent of energy-efficiency measures incorporated into structural designs, and the type and size of equipment installed. Complete building envelope details could not be incorporated into the project inventory, as such information was not available at the time of the analysis. Therefore, it was assumed that the building envelopes would comply with the current minimal standards for all business-as-usual (BAU) analysis and for new development in the project area.
- **Electricity use**—Electricity is generated by a combination of methods, which include combustion of fossil fuels. By using electricity, new development in the project area would contribute to the indirect emissions associated with electricity production. Indirect emissions from the use of electricity at the proposed project site are based on the number of dwelling units and square footage of communal living areas, and as estimated by the CalEEMod software.
- **Water use and wastewater generation**—California’s water conveyance system is energy-intensive, with electricity used to pump and treat water. Typically, development in the proposed project area would contribute to indirect emissions by consuming water and generating wastewater. Water consumption and wastewater generation, and the associated emissions, were calculated based on the number of residential units and square feet of communal living areas in CalEEMod.
- **Solid waste**—Disposal of organic waste in landfills can lead to the generation of methane, a potent greenhouse gas. By generating solid wastes, proposed development would contribute to the emission of fugitive methane from landfills, as well as CO₂, CH₄ and N₂O from the operation of trash collection vehicles.

■ Thresholds of Significance

The following thresholds of significance are based on Appendix G of the 2011 CEQA Guidelines. For purposes of this EIR, implementation of the proposed project may have a significant adverse impact on greenhouse gas emissions if it would do any of the following:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases

The CEQA Guidelines do not have numeric or qualitative thresholds of significance for greenhouse gas emissions. The CEQA Guideline Amendments, adopted in December 2010, state that each local lead agency must develop its own significance criteria based on local conditions, data, and guidance from public agencies and other sources.

The SCAQMD is the agency principally responsible for comprehensive air pollution control in the Los Angeles County area. In order to provide GHG emission guidance to the local jurisdictions within the South Coast Air Basin, the SCAQMD organized a Working Group to develop GHG emission analysis guidance and thresholds. SCAQMD released a draft guidance document regarding interim CEQA GHG significance thresholds in October 2008. On December 5, 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for projects where the SCAQMD is lead agency. SCAQMD proposed a tiered approach, whereby the level of detail and refinement needed to determine significance increases with a project's total GHG emissions. The tiered approach defines projects that are exempt under CEQA and projects that are within the jurisdiction of, and subject to, the policies of a GHG Reduction Plan as less than significant, and provides thresholds of significance.

For the purposes of this analysis and based on full consideration of the available information, residential projects that meet the following criteria will be determined to have a less-than-significant impact with respect to the emissions of greenhouse gases:

- The residential project must limit the emissions of greenhouse gases to 3,500 MT CO₂e annually or less, pursuant to SCAQMD's draft GHG emissions threshold for residential project-level analysis.
- The individual project must comply with the plans and policies of SB 375 and the AB 32 Scoping Plan adopted by California ARB for the purpose of reducing the emissions of greenhouse gases.

■ Effects Not Found to Be Significant

No effects have been identified with respect to greenhouse gas emissions other than the effects that are addressed in the following section. The effects addressed in the following section were not found to be significant with mitigation incorporated.

■ Project Impacts and Mitigation

Threshold Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Impact 4.2-1 Implementation of Option 1 or Option 2 of the proposed project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. This would be a *less-than-significant* impact.

Development of the proposed 540 East Imperial Avenue Specific Plan Project would generate GHGs through the construction and operation of new residential uses. GHGs from the proposed project would arise from sources associated with project operation, including direct sources such as motor vehicles, and natural gas consumption, and indirect sources such as solid waste handling and treatment and electricity generation. Emissions from these operational sources are estimated and presented below.

Following the SCAQMD recommendations, construction emissions would be amortized over an anticipated 30-year structure lifetime and added to the operational emissions to provide an average annual emissions estimate. Table 4.2-1 (Estimated Annual Emissions, Option 1) and Table 4.2-2 (Estimated Annual Emissions, Option 2) shows the estimated GHG emissions for the construction and operation of Option 1 and Option 2, respectively, with the incorporation of all state policies and mitigation measures listed below. Detailed assumptions and emission calculations are included in Appendix C.

Table 4.2-1 Estimated Annual Emissions, Option 1	
<i>Emission Source</i>	<i>Metric Tons CO₂e</i>
Amortized Construction ^a	24.39
Area Source ^b	7.74
Energy	536.09
Mobile	1,493.72
Solid Waste	127.12
Water Use	77.88
<i>Total</i>	<i>2,267.4</i>
SCAQMD Residential Screening Threshold	3,500
Significant?	No
<small>SOURCE: CalEEMod 2011.1 was used to determine all emissions. CalEEMod output is included in Appendix C. Service Population is the sum of employees and residents of the proposed project.</small>	
<small>a. Total construction emissions are 731.70 MT CO₂e.</small>	
<small>b. Area Source emissions include only emissions from landscaping equipment.</small>	

<i>Emission Source</i>	<i>Metric Tons CO₂e</i>
Amortized Construction ^a	12.42
Area Source ^b	1.48
Energy	177.30
Mobile	575.81
Solid Waste	26.83
Water Use	14.86
Total	808.70
SCAQMD Residential Screening Threshold	3,500
Significant?	No

SOURCE: CalEEMod 2011.1 was used to determine all emissions. CalEEMod output is included in Appendix C. Service Population is the sum of employees and residents of the proposed project.

a. Total construction emissions are 372.6 MT CO₂e.

b. Area Source emissions include only emissions from landscaping equipment.

The implementation of state-mandated regulations and SCAQMD regulations would result in the reduction of GHG emissions. The following state and SCAQMD regulations were included in the calculation of emission reductions:

State Reduction Measures

Transportation

- **Assembly Bill 1493: Pavley I & Pavley II:** *Assembly Bill (AB) 1493 (Pavley) required the ARB to adopt regulations that will reduce GHG from automobiles and light-duty trucks by 30 percent below 2002 levels by the year 2016, effective with 2009 models.*
- **Executive Order S-1-07 (Low Carbon Fuel Standard):** *The Low Carbon Fuel Standard (LCFS) requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.*
- **Tire Pressure Program:** *The AB 32 early action measure involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications.*
- **Low Rolling Resistance Tires:** *This created an energy efficiency standard for automobile tires to reduce rolling resistance.*
- **Low Friction Engine Oils:** *This AB 32 early action measure would increase vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications.*
- **Cool Paints and Reflective Glazing:** *This AB 32 early action measure is based on measures to reduce the solar heat gain in a vehicle parked in the sun.*
- **Goods Movement Efficiency Measure:** *This AB 32 early action measure targets system wide efficiency improvements in goods movement to achieve GHG reductions from reduced diesel combustion.*
- **Heavy-Duty Vehicle Emission Reduction:** *This AB 32 early action measure would increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB approved technology to reduce aerodynamic drag and rolling resistance.*

- **Medium and Heavy Duty Vehicle Hybridization:** *The implementation approach for this AB 32 measure is to adopt a regulation and/or incentive program that reduce the GHG emissions of new trucks (parcel delivery trucks and vans, utility trucks, garbage trucks, transit buses, and other vocational work trucks) sold in California by replacing them with hybrids.*

Energy

- **AB 1109 Energy Efficiency Requirements for lighting:** *Assembly Bill (AB 1109) mandated that the California Energy Commission (CEC) adopt energy efficiency standards for general purpose lighting. These regulations, combined with other state efforts, shall be structured to reduce statewide electricity and natural gas consumption.*
- **Electrical Energy Efficiencies:** *This measure captures the emission reductions associated with electricity energy efficiency activities included in ARB's AB 32 Scoping Plan that are not attributed to other R1 or R2 reductions as described in this report. This measure includes energy efficiency measures that ARB views as crucial to meeting the state-wide 2020 target, and will result in additional emissions reductions beyond those already accounted for in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations; hereinafter referred to as, "Title 24 Energy Efficiency Standards"), etc.*
- **Natural Gas Energy Efficiencies:** *This measure captures the emission reductions associated with natural gas energy efficiency activities included in ARB's AB 32 Scoping Plan that are not attributed to other R1 or R2 reductions, as described in this report. This measure includes energy efficiency measures that ARB views as crucial to meeting the state-wide 2020 target, and will result in additional emissions reductions beyond those already accounted for in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations; hereinafter referred to as, "Title 24 Energy Efficiency Standards") etc.*

Water

- **California Green Building Code:** *Reduction of indoor water consumption beyond business-as-usual by 20 percent is mandatory for residential and non-residential development.*

Solid Waste

- **California Integrated Waste Management Board** requires 50 percent diversion rate for all local jurisdictions.

SCAQMD Reduction Measure

- **SCAQMD Rule 445** states that no permanent wood burning devices can be installed in new development and only clean burning devices can be sold for use existing residences.

Existing Plus Project Analysis

The existing plus project analysis compares the project's incremental contribution to existing emissions. In this case, the project would result in the replacement of all existing development on the site which includes eight unoccupied buildings, a baseball field, and parking lot. The GHG emissions from the existing site usage were estimated using CalEEMod for the 0.5-acre baseball field. Table 4.2-3 (Existing Plus Project Annual Operational Emissions) presents the existing site's operational emissions in comparison with the emissions calculated for Option 1 and Option 2 of the proposed project. Option 1's annual emissions are estimated to be 2,264.23 MT CO₂e above the annual emissions currently generated

from the existing project site usage, and Option 2's annual emissions are estimated to be 805.54 MT CO₂e above the annual emissions currently generated from the existing project site usage.

<i>Emission Sources</i>	<i>Existing MT CO₂e</i>	<i>Option 1 MT CO₂e</i>	<i>Option 2 MT CO₂e</i>
Amortized Construction	N/A	24.39	12.42
Area Source	0.00	7.74	1.48
Energy	0.00	536.09	177.30
Mobile	1.20	1,493.72	575.81
Solid Waste	0.02	127.12	26.83
Water Use	1.94	77.88	14.86
Total	3.16	2,267.40	808.70
Increase from Existing	N/A	2,264.23	805.54

SOURCE: CalEEMod 2011.1 was used to determine all emissions. CalEEMod output is included in Appendix C.

The state regulations and SCAQMD measures described above would serve to reduce the proposed project's GHG emissions, under Option 1 or Option 2, such that the proposed project would not exceed the SCAQMD Residential Screening Threshold. However, to ensure that the proposed project's long term operational GHG emissions are reduced to less-than-significant levels, the following project-specific mitigation measures must be incorporated. Before the City issues a building permit, the project applicant will be required to provide appropriate information documenting its emissions reduction.

MM4.2-1

Before the City issues a building permit, the developer must demonstrate that the design of the proposed buildings or structures meets or exceeds the most recent Title 24 Energy Efficiency Standards, subject to review by the Planning and Building Safety Department. Documentation of compliance with this measure must be provided to the Planning and Building Safety Department for review and approval before the City issues the permit. Installation of the identified design features or equipment will be confirmed by the Planning and Building Safety Department before it issues a certificate of occupancy. The following design features should be considered by the developer as a way to achieve Title 24 Energy Efficiency Standards compliance in excess of the minimum requirement:

- *Increase in insulation such that heat transfer and thermal bridging is minimized*
- *Limit air leakage through the structure or within the heating and cooling distribution system to minimize energy consumption*
- *Incorporate dual-paned or other energy efficient windows*
- *Incorporate energy efficient space heating and cooling equipment*
- *Incorporate energy efficient light fixtures*
- *Incorporate energy efficient appliances*
- *Incorporate energy efficient domestic hot water systems*
- *Incorporate solar panels into the electrical system as feasible*
- *Incorporate cool roofs/ light-colored roofing*

- Or incorporate other measures that will increase the energy efficiency of building envelope in a manner that when combined with the other options listed above exceeds current Title 24 Energy Efficiency Standards by a minimum of 20 percent

- MM4.2-2** Before the City issues a building permit, the developer must provide a landscape plan that includes shade trees around main buildings, particularly along southern elevations where practical, and will not interfere with constraints. Documentation of compliance with this measure must be provided to the Planning and Building Safety Department for review and approval.
- MM4.2-3** All showerheads, lavatory faucets, and sink faucets within the residential units, and where feasible within non-residential developments, must comply with the California Energy Conservation flow rate standards.
- MM4.2-4** Low-flush toilets must be installed within all Congregate Care units as specified in Health and Safety Code Section 17921.3.
- MM4.2-5** The developer must ensure that landscaping of common areas for the proposed project uses drought-tolerant and smog-tolerant trees, shrubs, and groundcover to ensure long-term viability and to conserve water and energy.
- MM4.2-6** The developer must ensure that the landscape plan for the proposed project includes drought-resistant trees, shrubs, and groundcover within the parking lot and perimeter.
- MM4.2-7** The developer must ensure that designs for the proposed project include all illumination elements to have controls to allow selective use as an energy conservation measure.
- MM4.2-8** Before the City issues any certificate of occupancy, the developer must demonstrate that the proposed projects' interior building lighting supports the use of compact fluorescent light bulbs or equivalently efficient lighting to the satisfaction of the Planning and Building Safety Department.
- MM4.2-9** The developer must consider providing preferential parking spaces for ultra-low-emission vehicles and alternative fueled vehicles to encourage the use of alternative fuels and ultra-low-emission vehicles. Documentation of compliance with this measure must be provided to the Planning and Building Safety Department for review and approval.
- MM4.2-10** Before the City issues a building permit, the developer must demonstrate that the proposed project is designed to incorporate exterior storage areas for recyclables and green waste and adequate recycling containers located in public/common areas. Installation of the identified design features or equipment will be reviewed and approved by the Planning and Building Safety Department before the City issues a certificate of occupancy.
- MM4.2-11** All common-area irrigation areas for the proposed project must consider systems that are capable of being operated by a computerized irrigation system that includes an on-site weather station/ET gage capable of reading current weather data and making automatic adjustments to independent run times for each irrigation valve based on changes in temperature, solar radiation, relative humidity, rain, and wind. In addition, the computerized irrigation system must also consider the ability to be equipped with flow-sensing capabilities, thus automatically shutting down the irrigation system in the event of a mainline break or broken head. These features will assist in conserving water, eliminating the potential of slope failure due to mainline breaks, and eliminating over-watering and flooding due to pipe and/or head breaks. Documentation of compliance with this measure must be provided to the Planning and Building Safety Department for review and approval.

MM4.2-12 *The developer must, where feasible, incorporate passive solar design features into the buildings, which may include roof overhangs or canopies that block summer shade, but that allow winter sun, from penetrating south facing windows.*

Incorporation of mitigation measures MM4.2-1 through MM4.2-12, as well as compliance with state, regional and local regulations, would ensure that the proposed project's GHG emissions are reduced to the lowest level feasible. Accordingly, the proposed project would result in a ***less-than-significant*** impact.

Threshold	Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?
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Impact 4.2-2 **Implementation of Option 1 or Option 2 of the proposed project would not conflict with implementation of SB 375 or AB 32, the statewide policies for reducing GHG emissions. This would be a *less-than-significant* impact.**

AB 32, The Global Warming Solutions Act of 2006 establishes California's target to reduce emissions back to 1990 levels by the year 2020. SB 375, a follow up to AB 32, establishes targets for reducing emissions from passenger vehicles. The SCAQMD draft CEQA thresholds for GHG emissions were developed following AB 32 and SB 375 in order to aid the state in reaching these targets. The CEQA threshold was developed to evaluate a project's GHG emissions as well as its consistency with AB 32 and SB 375. Incorporation of mitigation measures MM4.2-1 through MM4.2-12 would ensure that GHG emissions are reduced beyond the Title 24 Energy Efficiency Standards, which were established to achieve compliance with AB 32. Therefore, the analysis provided under Impact 4.2-1 above also provides an analysis of both options of the proposed project's consistency with AB 32 and SB 375. Since both options of the proposed project would produce emissions that are below the SCAQMD threshold, both options of the proposed project are consistent with AB 32 and SB 375, the statewide policies for reducing GHG emissions. Because both options are consistent with these policies, this impact is considered ***less than significant***, and no mitigation is required.

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