3.5 Greenhouse Gas Emissions

Introduction

This section describes the affected environment and regulatory setting for greenhouse gas (GHG) emissions and climate change. It also describes the GHG and climate change impacts that would result from implementation of the Project and provides mitigation measures to reduce such impacts, where applicable. Cumulative impacts are discussed at the end of this section. Additional information on GHG emissions and the technical data used to prepare this section is provided in Appendix 3.4.

No comments related to GHG emissions were received in response to the Notice of Preparation (NOP) (Appendix 1).

Existing Conditions

This section provides a discussion of global climate change and GHG emissions as they relate to the Project.

The unique chemical properties of GHGs enable them to become well mixed within the atmosphere and transported over long distances. Consequently, unlike other resource areas that are concerned primarily with localized Project impacts (e.g., within 1,000 feet of the Project site), the global nature of climate change requires a broader approach to analysis. Although this section focuses on GHG emissions generated at the Project site as a result of construction and operation, the analysis considers potential regional and global GHG impacts.

Regulatory Setting

Federal

Climate change is widely recognized as an imminent threat to the global climate, economy, and population. The U.S. Environmental Protection Agency (EPA) acknowledged potential threats posed by climate change in a Cause or Contribute Finding, which found that GHG emissions from new motor vehicles contribute to pollution and threaten public health and welfare. This finding was necessary prior to EPA action to adopt new vehicle emissions standards to reduce GHG emissions. Federal climate change regulation under the federal Clean Air Act (CAA) is also currently under development for both existing and new sources. Standards for carbon dioxide (CO_2) emissions from new fossil-fuel electric power plants are proposed by EPA and outlined in President Obama's 2013 Climate Action Plan (CAP). Federal vehicle emission standards have been established that take into account the need for GHG emissions reductions. Despite these actions, there is still no comprehensive overarching federal law related specifically to the reduction of GHG emissions.

Corporate Average Fuel Economy Standards (2010–2012). The current Corporate Average Fuel Economy (CAFE) standards that went into effect in 2012 for vehicles incorporated stricter fuel economy standards, equivalent to those previously promulgated by the State of California (see the Assembly Bill 1493 discussion below), into one uniform federal standard. The changes are expected to reduce GHG emissions from new vehicles by roughly 25 percent, relative to business-as-usual (BAU) conditions, by 2016.

In October 2012, EPA and the National Highway Traffic Safety Administration (NHSTA) established the final rule for fleet-wide passenger cars and light trucks, model years 2017 to 2025. The new CAFE standards were aimed at achieving an emissions rating of 163 grams of CO_2 per mile, or the equivalent of 54.5 miles per gallon (mpg), by model year 2025. Fleet-wide fuel economy standards will become more stringent with each subsequent model year through 2025. Because of a statute that requires NHSTA to set average fuel economy standards five model years at a time, NHSTA requires model years 2017 to 2022 to have an industry fleet-wide average of 40.3 to 41.0 mpg and estimates that 2025 vehicles will be in the range of 48.7 to 49.7 mpg.[1]

EPA Endangerment and Cause and Contribute Findings (2009). On December 7, 2009, under Section 202(a) of the CAA, EPA signed the Endangerment and Cause or Contribute Findings for GHGs. Under the Endangerment Finding, EPA finds that current and projected concentrations of six key well-mixed GHGs—CO_2, methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and hydrofluorocarbons (HFCs)—in the atmosphere threaten public health and the welfare of current and future generations. Under the Cause or Contribute Finding, EPA finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

These findings do not impose any requirements on industry or other entities. However, these actions are a prerequisite to finalizing EPA's new CAFE standards for light-duty vehicles, which EPA proposed in a joint proposal that included the U.S. Department of Transportation's CAFE standards (see above).

EPA Regulation of GHG Emissions under the CAA (2010–2012 [ongoing]). Under the authority of the CAA, EPA is beginning to regulate GHG emissions, starting with large stationary sources. In 2010, EPA set GHG thresholds to define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. In 2012, EPA proposed a carbon pollution standard for new power plants.

State

California has adopted statewide legislation to address various aspects of climate change and GHG mitigation. Much of this establishes a broad framework for the state's long-term GHG reduction and climate change adaptation program. The former and current governors of California have issued several Executive Orders (EOs) related to the state's evolving climate change policy. Summaries of key policies, EOs, regulations, and legislation at the state level that are relevant to the Project are provided below.

Executive Order S-3-05 (2005). EO S-3-05 asserted that California is vulnerable to the effects of climate change. To combat this concern, the order established the following GHG emissions reduction targets:

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

[1] U.S. Environmental Protection Agency. 2012. *Federal Register.* Vol. 77. No. 199. October 15, 2012. Rules and Regulations: 62627. Available: <http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/2017-25_CAFE_Final_Rule.pdf>. Accessed: February 8, 2016.

Executive Orders are legally binding only on state agencies. Accordingly, EO S-3-05 guides state agencies' efforts to control and regulate GHG emissions but has no direct binding effect on local government or private actions. The secretary of the California Environmental Protection Agency (CalEPA) is required to report to the governor and state legislature biannually regarding the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this EO.

Assembly Bill 1493—Pavley Rules (2002, Amendments 2009)/Advanced Clean Cars (2011). Known as "Pavley I," the Assembly Bill (AB) 1493 standards were the nation's first GHG standards for automobiles. AB 1493 required the California Air Resources Board (ARB) to adopt vehicle standards that would lower GHG emissions from new light-duty automobiles to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (referred to previously as "Pavley II," now referred to as the "Advanced Clear Cars" measure) has been proposed for vehicles built during model years 2017 through 2020. Together, the two standards are expected to increase average fuel economy to roughly 43 mpg by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14 percent. In June 2009, EPA granted California's waiver request, enabling the state to enforce its GHG emissions standards for new motor vehicles, beginning with the current model year.

EPA and ARB are currently working together on a joint rulemaking effort to establish GHG emissions standards for passenger vehicles built during the 2017 to 2025 model years. The Interim Joint Technical Assessment Report evaluated four potential future standards that ranged from 47 to 62 mpg by 2025.[2] The official proposal was released by both EPA and ARB on December 7, 2011, and unanimously approved by ARB on January 26, 2012.[3]

Renewable Energy Standard/Renewable Portfolio Standard (2002/2006/2011). Senate Bill (SB) 1078 (2002) and SB 107 (2006) created the Renewable Energy Standard (RES) program, which required electric companies to increase their procurement of eligible renewable energy resources by at least 1 percent of their retail sales annually, until reaching 20 percent by 2010. SB 2X 1 (2011) required a Renewable Portfolio Standard (RPS, functionally the same thing as the RES) of 33 percent by 2020.

Assembly Bill 32, California Global Warming Solutions Act (2006). The Global Warming Solutions Act of 2006 sets the same overall GHG emissions reduction goals outlined in EO S-3-05 while further mandating that ARB create a plan that includes market mechanisms and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." EO S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.

Executive Order S-01-07, Low-Carbon Fuel Standard (2007). Governor Schwarzenegger set forth the low-carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Senate Bill 375—Sustainable Communities Strategy (2008). SB 375 provides for a new regional planning process that coordinates land use planning, regional transportation plans, and transportation funding priorities to help California meet the GHG reduction goals established in AB 32. SB 375 requires

[2] U.S. Environmental Protection Agency. et. al. 2010. *Interim Joint Technical Assessment Report: Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2017–2025.* Available: <http://www.epa.gov/oms/climate/regulations/ldv-ghg-tar.pdf>. Accessed: February 8, 2016.

[3] California Air Resources Board. 2012. *News Release – California Air Resources Board Approves Advanced Clean Car Rules*. Release #12-05. January 27, 2012. Available: <http://www.arb.ca.gov/newsrel/newsrelease.php?id=282>. Accessed: February 8, 2016.

metropolitan planning organizations to incorporate a "sustainable communities strategy" (SCS) in their Regional Transportation Plans. The goal of the SCS is to reduce regional vehicle miles traveled (VMT) through land use planning and consequent transportation patterns in combination with the Regional Transportation Plan that provide for needed transportation investments, including transit. The Metropolitan Transportation Commission and Association of Bay Area Governments adopted the Sustainable Communities Strategy and the 2040 Regional Transportation Plan, titled *Plan Bay Area*, in July 2013. The Metropolitan Transportation Commission is currently working on a strategic update to the SCS, called *Plan Bay Area 2040*, which builds on prior work to develop an efficient transportation network, provide more housing choices, and grow the region in a financially and environmentally responsible way. *Plan Bay Area* expressly states that it does not require any changes to local land use policies or environmental review processes.[4]

Plan Bay Area consistency is discussed in Section 3.1, *Land Use and Planning*, but is not discussed further in this section.

California Green Building Standards Code—Title 24, Part 11 (2010). In January 2010, the California Building Standards Commission adopted the statewide mandatory Green Building Standards Code (CALGreen [California Code of Regulations (CCR), Title 24, Part 11]). CALGreen applies to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure.

CALGreen requires the installation of energy- and water-efficient indoor infrastructure for all new projects beginning after January 1, 2011. CALGreen also requires builders to develop a waste management plan for newly constructed buildings and divert at least 50 percent of the construction materials generated during project construction (CALGreen Sections 4.408 and 5.408).

The CEC adopted the 2013 Building Energy Efficiency Standards contained in the CCR, Title 24, Part 6 (also known as the California Energy Code), and associated administrative regulations in CALGreen Part 11, which took effect on January 1, 2014. The 2013 Building Energy Efficiency Standards call for building materials that are 25 percent more efficient than previous materials for residential construction. Part 11 also established voluntary standards, including standards related to the planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. Under these standards, builders can specify windows, insulation, lighting, ventilation systems, and other features that reduce energy consumption in homes and businesses.

The next set of energy efficiency standards will be the 2016 Building Energy Efficiency Standards, which are currently going through the rule-making process. These are expected to be adopted in 2016 and take effect on January 1, 2017. According to the CEC, single-family homes built to the 2016 standards will use about 28 percent less energy for lighting, heating, cooling, ventilation, and water heating than those built to the 2013 standards.

In 2008, California set energy-use reduction goals, targeting zero net energy (ZNE) use in all new homes by 2020 and commercial buildings by 2030. The ZNE goal means new buildings must use a combination of improved efficiency and distributed renewable energy generation to meet 100 percent of their annual energy need. The proposed draft 2016 standards do not require ZNE. However, they will make important steps toward further changing residential building practices in California. The 2019 standards

[4] Metropolitan Transportation Commission. 2013. *Plan Bay Area: Strategy for a Sustainable Region*. Metropolitan Transportation Agency and Association of Bay Area Governments. Adopted: July 18, 2013. Available: <http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf>. Accessed: October 16, 2015.

are expected to take the final step toward achieving ZNE for newly constructed residential buildings throughout California. Later standards are expected to require ZNE for newly constructed commercial buildings.

State CEQA Guidelines. The California Environmental Quality Act (CEQA) Guidelines require lead agencies to describe, calculate, or estimate the amount of GHG emissions that would result from a project. Moreover, the guidelines emphasize the necessity to determine potential climate change effects of a project and propose mitigation as necessary. They also confirm the discretion of lead agencies to determine appropriate significance thresholds but require the preparation of an environmental impact report (EIR) if "there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with adopted regulations or requirements" (Section 15064.4).

State CEQA Guidelines Section 15126.4 includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions, which may include, among other items, measures in an existing plan or mitigation program for the reduction of emissions, required as part of the lead agency's decision; implementation of project features, designs, or other measures to substantially reduce energy consumption or GHG emissions; off-site measures, including offsets that are not otherwise required, to mitigate a project's emissions; and measures that sequester carbon or carbon-equivalent emissions.

GHG Cap-and-Trade Program (2010/2011). On October 20, 2011, ARB adopted the final cap-and-trade program for California. The California cap-and-trade program is a market-based system with an overall emissions limit for affected sectors. Examples of affected entities include CO_2 suppliers, in-state electricity generators, hydrogen producers, petroleum refiners, and other large-scale manufacturers and fuel suppliers. The cap-and-trade program is currently regulating more than 85 percent of California's emissions. Compliance requirements took effect according to the following schedule: (1) electricity generation and large industrial sources in 2012 and (2) fuel combustion and transportation sources in 2015. Cap-and-trade allowance auction proceeds are used to fund a variety of investments. The first 3-year investment plan prioritizes (1) sustainable communities and clean transportation, including low-carbon freight equipment, with specific emphasis on efforts that would be beneficial for disadvantaged communities located near ports, railyards, freeways, and distribution centers; (2) energy efficiency and clean energy; and (3) natural resources and waste diversion.[5] The second 3-year plan (fiscal years 2016/2017 through 2018/2019), submitted to the legislature in January 2016, complements the first investment plan while focusing on investments that will lead to a range of co-benefits in the areas of public health, water quality and supply, and habitat protection.[6]

Executive Order B-30-15, Brown (2015). EO B-30-15 established a medium-term goal for 2030 of reducing GHG emissions to 40 percent below 1990 levels. It also required ARB to update its current AB 32 Scoping Plan to identify measures to meet the 2030 target. The executive order supports EO S-3-05, described above, but currently is binding only on state agencies.

[5] California Air Resources Board. 2013. *Cap-and-Trade Auction Proceeds Investment Plan: Fiscal Years 2013–2014 through 2015–2016.* Available: <http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final_investment_plan.pdf >. Accessed: February 9, 2016.

[6] California Air Resources Board. 2016. *Cap-and-Trade Auction Proceeds Second Investment Plan: Fiscal Years 2016–2017 through 2018–2019.* Available: <http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/16-17-final-second-investment-planii.pdf>. Accessed: February 9, 2016.

Local

Bay Area Air Quality Management District. The **Bay Area Air Quality Management District's** (BAAQMD's) 2011 *CEQA Guidelines*[7] outline advisory thresholds for stationary-source and land use development projects. The mass emissions threshold for stationary-source projects is 10,000 metric tons (MT) of carbon dioxide equivalent (CO_2e) per year. For land use development projects, the guidelines establish three potential analysis criteria for determining project significance: compliance with a qualified CAP, a mass emissions threshold of 1,100 MT CO_2e, and a GHG efficiency threshold of 4.6 MT CO_2e per service population (project jobs + projected residents).

The guidelines do not identify a GHG emissions threshold for construction-related emissions. However, BAAQMD recommends that GHG emissions from construction be quantified and disclosed and that a determination regarding the significance of the GHG emissions be made with respect to whether a project is consistent with AB 32 GHG emissions reduction goals. BAAQMD further recommends that best management practices (BMPs) be incorporated to reduce GHG emissions during construction, as feasible and applicable. BMPs may include, but are not limited to, using alternative-fuel (e.g., biodiesel, electric) construction vehicles/equipment (at least 15 percent of the fleet), using building materials that are at least 10 percent local, and recycling or reusing at least 50 percent of construction waste or demolition materials.

Menlo Park Climate Action Plan. The City of Menlo Park (City) CAP (adopted annually)[8] proposes local emissions reduction strategies to help meet AB 32 targets. The CAP provides the emissions inventory for 2005 to 2013, the emissions forecast for 2020, a reduction goal for 2020, and a recommendation for GHG reduction strategies. Given the emissions inventory and forecast for 2020, the City adopted a GHG emissions reduction target in June 2013 of 27 percent below 2005 levels by 2020 to meet the goals of AB 32. The CAP recommends various community and municipal strategies for near-term and mid-term consideration. The emissions reduction strategies are generally focused on community actions because more than 99 percent of the emissions are from community sources.

In October 2015, the City released an updated CAP with emissions for the years between 2005 and 2013, provided an update on the progress of the projects selected in the previous CAP update, and provided a list of CAP projects for fiscal years 2015/2016 through 2019/2020. Included in the near-term projects are projects that a) incorporate CAP strategies and GHG emissions reductions into the general plan update; b) incorporate ZNE and Leadership in Energy and Environmental Design (LEED) Silver requirements into planning requirements and building codes to increase efficiency in new buildings; c) implement an Energy Star ratings requirement, or other performance tracking methodology, into planning requirements for new buildings; d) consider developing an energy-efficient/renewable energy plan for the commercial and residential sector to re-invigorate energy upgrades for existing buildings; e) consider resiliency strategies for protecting Menlo Park land in the projected sea-level rise zone.

CEQA authorizes reliance on a previously approved GHG emissions reduction plan (i.e., a CAP) that was prepared as a Plan for the Reduction of Greenhouse Gas Emissions, per Section 15183.5 of the CEQA Guidelines. This section of the guidelines establishes opportunities for CEQA tiering when projects are consistent with adopted GHG emissions reduction plans, their impacts can be considered less than significant, and their contributions to cumulative emissions are not cumulatively considerable, provided the GHG emissions reduction plans meet certain criteria established under Section 15183.5.

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[7] Bay Area Air Quality Management District. 2011. *California Environmental Quality Act Air Quality Guidelines*. May. San Francisco, CA. As noted in Section 3.4, *Air Quality*, BAAQMD currently does not recommend using the May 2011 guidelines; however, the 2011 guidelines include substantial evidence that supports the impact assessment methodology and significance thresholds contained therein. Thus, the 2011 guidelines are used for this EIR.

[8] City of Menlo Park. 2009. *Climate Change Action Plan*. Available: <http://www.menlopark.org/305/Climate-Action-Plan>. Accessed: January 2016.

The City's CAP does not meet these tiering requirements because the CAP does not include specific thresholds of significance for determining the significance of GHG emissions, nor has the CAP been adopted in a public process following environmental review. Consequently, because the City's CAP does not satisfy the tiering requirements of CEQA established in Section 15183.5 of the State CEQA Guidelines, it is not used to determine the significance of Project-related GHG emissions, as described below. However, for informational purposes, this analysis compares the Project against measures found in the City's CAP.

Menlo Park General Plan. The general plan guides development and use of land within the city. Several goals and policies of the Land Use and Circulation Element of the general plan apply broadly to GHG emissions, as follows.

> **Goal I-H:** To promote the development and maintenance of adequate public and quasi-public facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
>
> *Policy I-H-2:* The use of water-conserving plumbing fixtures in all new public and private development shall be required.
>
> *Policy I-H-3:* Plant material selection and landscape and irrigation design for City parks and other public facilities and in private developments shall adhere to the City's Water Efficient Landscape Ordinance.
>
> *Policy I-H-7:* The use of reclaimed water for landscaping and any other feasible uses shall be encouraged.
>
> *Policy I-H-12:* Street orientation, placement of buildings, and use of shading should contribute to the energy efficiency of the community.
>
> **Goal II-B:** To promote the use of public transportation.
>
> *Policy II-B-1:* The City shall consider transit modes in the design of transportation improvements and the review and approval of development projects.
>
> *Policy II-B-3:* The City shall promote improved public transit service and increased transit ridership, especially to office and industrial areas and schools.
>
> **Goal II-C:** To promote the use of alternatives to the single-occupant automobile.
>
> *Policy II-C-1:* The City shall work with all Menlo Park employers to encourage employees to use alternatives to the single-occupancy automobile in their commute to work.
>
> **Goal II-D:** To promote the safe use of bicycles as a commute alternative and for recreation.
>
> *Policy II-D-3:* The design of streets within Menlo Park shall consider the impact of street cross sections, intersection geometrics, and traffic control devices on bicyclists.
>
> *Policy II-D-4:* The City shall require new commercial and industrial development to provide secure bicycle storage facilities onsite.

The following policies from the Open Space and Conservation Element of the City's General Plan pertain to the Project.

> **Goal OSC4:** Promote Sustainability and Climate Action Planning.
>
> *Policy OSC4.1:* Sustainable Approach to Land Use Planning to Reduce Resource Consumption. Encourage, to the extent feasible (1) a balance and match between jobs and housing, (2) higher density residential and mixed-use development to be located adjacent to commercial centers and transit corridors, and (3) retail and office areas to be located within walking and biking distance of transit or existing and proposed residential developments.
>
> *Policy OSC4.2:* Sustainable Building. Promote and/or establish environmentally sustainable building practices or standards in new development that would conserve water and energy, prevent stormwater pollution, reduce landfilled waste, and reduce fossil fuel consumption from transportation and energy activities.

*Policy OSC4.*3: Renewable Energy. Promote the installation of renewable energy technology, such as on residences and businesses, through education, social marketing methods, establishing standards, and/or provide incentives.

Policy OSC4.4: Vehicles Using Alternative Fuel. Explore the potential for installing infrastructure for vehicles that use alternative fuel, such as electric plug-in recharging stations.

Policy OSC4.5: Energy Standards in Residential and Commercial Construction. Encourage projects to achieve a high level of energy conservation, exceeding standards set forth in the California Energy Code for Residential and Commercial development.

Policy OSC4.6: Waste Reduction Target. Strive to meet the California State Integrated Waste Management Board per-person target of waste generation per person per day through their source reduction, reuse, and recycling programs.

ConnectMenlo General Plan Update. The City General Plan (Land Use and Circulation Elements) and M-2 Area Zoning Update, also known as ConnectMenlo, is under way. Although not yet adopted, the following draft goals and policies in ConnectMenlo pertain to the Project and are identified for informational purposes.

Goal LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.

Policy LU-7.1: Sustainability. Promote sustainable site planning, development, landscaping, and operational practices that conserve resources and minimize waste.

Policy LU-7.5: Reclaimed Water Use. Implement use of adequately treated "reclaimed" water (recycled/nonpotable water sources such as, graywater, blackwater, rainwater, stormwater, foundation drainage, etc.) through dual plumbing systems for outdoor and indoor uses, as feasible.

Policy LU-7.9: Green Building. Support sustainability and green building best practices through the orientation, design, and placement of buildings and facilities to optimize their energy efficiency in preparation of state zero-net energy requirements for residential construction in 2020 and commercial construction in 2030.

Program LU-7.A.: Green Building Operation and Maintenance. Employ green building and operation and maintenance best practices, including increased energy efficiency and the use of renewable energy and reclaimed water, and install drought-tolerant landscaping for all projects.

Goal CIRC-3: Increase mobility options to reduce traffic congestion, greenhouse gas emissions, and commute travel time.

Policy CIRC-3.1: Vehicle Miles Traveled. Support development and transportation improvements that help reduce per capita vehicle miles traveled.

Policy CIRC-4.1: Global Greenhouse Gas Emissions. Encourage the safer and more widespread use of nearly zero-emission modes, such as walking and biking, and lower emission modes, such as transit, to reduce greenhouse gas emissions.

Policy CIRC-5.1: Transit Service and Ridership. Promote improved public transit service and increased transit ridership, especially to employment centers, commercial destinations, schools, and public facilities.

Environmental Setting

Overview of Climate Change

The phenomenon known as the *greenhouse effect* keeps the atmosphere near the earth's surface warm enough for the successful habitation of humans and other life forms. GHGs in the lower atmosphere play a critical role in maintaining temperature and trap some of the long-wave infrared radiation emitted

from the earth's surface that would otherwise escape to space. According to AB 32, California's Global Warming Solutions Act, GHGs encompass the following gases: CO_2, CH_4, N_2O, PFCs, SF_6, and HFCs. State CEQA Guidelines (Section 15364.5) also identify these six gases as GHGs.

Visible sunlight passes through the atmosphere without being absorbed. Some of the sunlight striking the earth is absorbed and converted to heat, which warms the surface. The surface emits infrared radiation to the atmosphere where some of it is absorbed by GHGs and re-emitted toward the surface; some of the heat is not trapped by GHGs and escapes into space. Human activities that emit additional GHGs to the atmosphere increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and amplifying the warming of the earth.[9]

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs in excess of natural levels enhance the greenhouse effect, which contributes to global warming of the earth's lower atmosphere and induces large-scale changes in ocean circulation patterns, precipitation patterns, global ice cover, biological distributions, and other changes to the earth's system. This is collectively referred to as *climate change*.

The Intergovernmental Panel on Climate Change (IPCC) has been established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC estimates that average increases in global temperatures between 2000 and 2100 could range from 1.1° Celsius, with no increase in GHG emissions above 2000 levels, to 6.4° Celsius, with a substantial increase in GHG emissions.[10] Large increases in global temperatures could have substantial adverse effects on natural and human environments in California and on the rest of the planet.

Principal Greenhouse Gases

The primary GHGs include CO_2, CH_4, N_2O, HFCs, and SF_6, as defined by California law; the State CEQA Guidelines contain a similar definition of GHGs (Health and Safety Code 38505(g); CCR, Title 14, Section 15364.5). Because the construction and operation of office and hotel land uses generate primarily CO_2, CH_4, N_2O, the following discussion focuses on these pollutants.

To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method to compare GHG emissions is the global warming potential (GWP) methodology defined in the IPCC Fourth Assessment Report (AR4) reference documents.[11] Note that ARB is currently transitioning from the GWP values within the Second

[9] Center for Climate and Energy Solutions. 2011. *The Greenhouse Effect*. Available: <http://www.c2es.org/facts-figures/basics/greenhouse-effect>. Accessed: January 2016.

[10] Intergovernmental Panel on Climate Change. 2007. Introduction. In B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer, (eds.), *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*. Cambridge, UK, and New York, NY: Cambridge University Press. Available: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter1.pdf>. Accessed: January 2016.

[11] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller (eds.). Available: <http://www.ipcc.ch/ipccreports/ar4-wg1.htm>. Accessed: January 2016.

Assessment Report[12] to the more recent AR4 GWP values as it develops GHG emissions estimates and potential emissions reductions for the scoping plan update. Therefore, GWP methods from the AR4 are used in the analysis and reported in Table 3.5-1.

The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO_2e, which compares the gas in question to that of the same mass of CO_2 (CO_2 has a global warming potential of 1 by definition). Table 3.5-1 lists the GWP of CO_2, CH_4, and N_2O; their lifetime; and their abundance in the atmosphere. Each of these gases is described briefly below.

Table 3.5-1. Lifetimes and Global Warming Potentials of Several Greenhouse Gases

Greenhouse Gases	Global Warming Potential (100 years)	Lifetime (years)	2014 Atmospheric Abundance
CO_2 (ppm)	1	50–200	394[a]
CH_4 (ppb)	25	9–15	1,893
N_2O (ppb)	298	121	326

Sources:

Myhre, G., D. Shindell, F. M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J. F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura, and H. Zhang. 2013. Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T. F., D. Qin, G. K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley (eds.). Cambridge, UK, and New York, NY: Cambridge University Press, pp. 659–740.

Blasing, T. J. 2014. *Recent Greenhouse Gas Concentrations*. DOI: 10.3334/CDIAC/atg.032. Updated: February. Available: <http://cdiac.ornl.gov/pns/current_ghg.html>. Accessed: October 16, 2015.

National Oceanic and Atmospheric Administration. 2016. *Earth System Research Laboratory Up-to-Date Weekly Average CO_2 at Mauna Loa*. Available: <http://www.esrl.noaa.gov/gmd/ccgg/trends/weekly.html>. Accessed: January 13, 2016.

Notes:

[a] 394 ppm is the 2016 abundance measured at Mauna Loa as of January 3, 2016.

ppm = parts per million by volume.

ppb = parts per billion by volume.

Carbon Dioxide. CO_2 is the most important anthropogenic GHG and accounts for more than 75 percent of all GHG emissions caused by humans. Its atmospheric lifetime of 50 to 200 years ensures that atmospheric concentrations of CO_2 will remain elevated for decades, even after mitigation efforts to reduce GHG concentrations are promulgated.[13] The primary sources of anthropogenic CO_2 in the atmosphere include the burning of fossil fuels (including fuels burned in motor vehicles), gas flaring, cement production, and land use changes (e.g., deforestation, oxidation of elemental

[12] Intergovernmental Panel on Climate Change. 1996. *1995: Science of Climate Change*. Second Assessment Report. Cambridge, UK: Cambridge University Press.

[13] Intergovernmental Panel on Climate Change. 2007. Introduction. In B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer, (eds.), *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*. Cambridge, UK, and New York, NY: Cambridge University Press. Available: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter1.pdf>. Accessed: January 2016.

carbon). CO_2 can also be removed from the atmosphere by photosynthetic organisms. Atmospheric CO_2 has increased from a pre-industrial concentration of 280 parts per million (ppm) to 394 ppm.[14,15]

Methane. CH_4, the main component of natural gas, is the second most abundant GHG and has a GWP of 25.[16] Sources of anthropogenic emissions of CH_4 include rice production, cattle ranching, natural gas usage, landfill outgassing, and coal mining.[17] Certain land uses function as both a source and a sink for CH_4. For example, wetlands are a terrestrial source of CH_4, whereas undisturbed aerobic soils act as a CH_4 sink (i.e., they remove CH_4 from the atmosphere). Atmospheric CH_4 has increased from a pre-industrial concentration of 715 parts per billion (ppb) to 1,893 ppb.[18,19]

Nitrous Oxide. N_2O is a powerful GHG, with a GWP of 298.[20] Anthropogenic sources of N_2O include agricultural processes (e.g., fertilizer application), nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. N_2O also is used in rocket engines and racecars and as an aerosol spray propellant. Natural processes, such as nitrification and denitrification, can also produce N_2O, which can be released to the atmosphere by diffusion. In the United States, more than 70 percent of N_2O emissions are related to agricultural soil management practices, particularly fertilizer application.

N_2O concentrations in the atmosphere have increased 18 percent from pre-industrial levels of 270 ppb to 326 ppb.[21,22]

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[14] National Oceanic and Atmospheric Administration. No date. *Greenhouse Gases*. Available: <http://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php>. Accessed: October 16, 2015.

[15] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller (eds.). Available: <http://www.ipcc.ch/ipccreports/ar4-wg1.htm>. Accessed: January 2016.

[16] Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura, and H. Zhang. 2013. Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley (eds.). Cambridge, UK, and New York, NY: Cambridge University Press, pp. 659–740.

[17] Center for Climate and Energy Solutions. 2011. *The Greenhouse Effect*. Available: <http://www.c2es.org/facts-figures/basics/greenhouse-effect>. Accessed: January 2016.

[18] U.S. Environmental Protection Agency. 2011. *Science: High GWP Gases and Climate Change*. Last Revised: February 9, 2011. Available: <http://www.epa.gov/highgwp/scientific.html>. Accessed: October 16, 2015.

[19] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller (eds.). Available: <http://www.ipcc.ch/ipccreports/ar4-wg1.htm>. Accessed: January 2016.

[20] Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J. F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura, and H. Zhang. 2013. *Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley (eds.). Cambridge, UK, and New York, NY: Cambridge University Press,, pp. 659–740.

[21] Carbon Dioxide Information Analysis Center. 2013. *Recent Greenhouse Gas Concentrations*. Last Revised: February 2014. Available: <http://cdiac.ornl.gov/pns/current_ghg.html>. Accessed: February 9, 2016.

[22] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller (eds.). Available: <http://www.ipcc.ch/ipccreports/ar4-wg1.htm>. Accessed: January 2016.

Greenhouse Gas Emissions Inventories

A GHG inventory is a quantification of all GHG emissions and sinks[23] within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a particular building or person). Although many processes that emit GHGs are difficult to evaluate for their emissions potential, several agencies have developed tools to quantify emissions from certain sources.

Table 3.5-2 outlines the most recent global, national, statewide, and local GHG inventories to help contextualize the magnitude of potential Project-related emissions.

Table 3.5-2. Global, National, State, and Local GHG Emissions Inventories

Emissions Inventory	CO_2e (metric tons)
2010 IPCC Global GHG Emissions Inventory	52,000,000,000
2013 EPA National GHG Emissions Inventory	6,673,000,000
2013 ARB State GHG Emissions Inventory	459,300,000
2007 SFBAAB GHG Emissions Inventory	102,550,000
2013 City of Menlo Park GHG Emissions Inventory	360,427

Sources:
Intergovernmental Panel on Climate Change. 2015. *Climate Change 2014: Synthesis Report*. Available: <http://www.ipcc.ch/report/ar5/syr>.
U.S. Environmental Protection Agency. 2015. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2013: Executive Summary.* Available: <http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Chapter-Executive-Summary.pdf>. Accessed: October 16, 2015.
California Air Resources Board. 2015. *California Greenhouse Gas Emission Inventory for 2000–2013 – Category as Defined in the 2008 Scoping Plan*. Last Revised: April 24, 2015. Available: <http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_2000-13_20150831.pdf>. Accessed: October 16, 2015.
Bay Area Air Quality Management District. 2010. *Source Inventory of Bay Area Greenhouse Gas Emissions.* Available: <http://hank.baaqmd.gov/pln/documents/regionalinventory2007_003_000_000_000.pdf>. Accessed: October 16, 2015.
City of Menlo Park. 2015. *Climate Action Plan Update and Status Report*. October.
Notes:
CO_2e = carbon dioxide equivalent.
IPCC = Intergovernmental Panel on Climate Change
EPA = U.S. Environmental Protection Agency
ARB = California Air Resources Board
SFBAAB = San Francisco Bay Area Air Basin

Project Site Inventory

Existing development at the Project site consists of 10 buildings with approximately 1.02 million gross square feet of industrial, warehouse, office, and research and development uses. Existing emissions associated with current operations at the TE Connectivity Campus are considered in the discussion below, with the exception of Building 23. Although Building 23 is located on the Project site, its operation is not part of the Project and, therefore, is not included in the analysis.

[23] A greenhouse gas sink is a process, activity, or mechanism that removes a GHG from the atmosphere.

An inventory of the GHG emissions generated by existing uses at the TE Connectivity Campus is provided later in this section in the Existing/Background Conditions portion of Table 3.5-5. GHG emissions were estimated by using the California Emission Estimator Model (CalEEMod), version 2013.2.2. The emissions of individual GHG gases (CO_2, CH_4, and N_2O) were estimated and total CO_2e emissions were calculated by using the GWP for each gas. The inventory includes the following emissions.

- **Area-Source Emissions.** Area-source emissions result from direct emissions sources, including emissions from landscaping equipment. These emissions were estimated using CalEEMod default emission factors and land use assumptions.
- **Emissions Associated with Energy Use.** The generation of electricity through the combustion of fossil fuels typically yields CO_2 and, to a much smaller extent, CH_4 and N_2O. By consuming electricity, existing facilities generate indirect GHG emissions. Electrical power is supplied to the Project site by Pacific Gas and Electric (PG&E). Accordingly, indirect GHG emissions from electricity usage are calculated with the PG&E carbon-intensity factor used by the City of 0.641 pound per kilowatt hour (lb/kWh).[24] The combustion of natural gas onsite for heating and other purposes in buildings generates direct emissions of CO_2 and, to a much smaller extent, CH_4 and N_2O. Information regarding existing electricity and natural gas usage, which was analyzed to estimate GHG emissions from existing facilities, is based on the usage data provided in the Project Energy and Water Analysis[25] by PAE Engineers.
- **Emissions Associated with Water Supply.** GHG emissions are also generated by the infrastructure used to distribute and treat the domestic water supply and the infrastructure used to collect and treat wastewater. By consuming water and generating wastewater, development at the existing site contributes to these emissions. Information regarding emissions associated with existing water demand is provided in the Energy and Water Analysis prepared for the Project.[26]
- **Solid Waste Disposed Emissions.** Fugitive CH_4 emissions associated with solid waste management have been estimated for use in this analysis, based on the method used by CalEEMod.
- **Vehicular Emissions.** For this analysis, it was assumed that the baseline existing uses would not include any employees at the existing site. Accordingly, mobile-source (vehicular) GHG emissions are not included with existing uses.

The above sources represent the vast majority of the GHG emissions associated with existing development on the TE Connectivity Campus. Existing facilities may emit a small amount of HFCs from leakage and the service of refrigeration and air-conditioning equipment, as well as the disposal of equipment at the end of its life; however, the contributions of these emissions to the total inventory are most likely quite small.

[24] CalEEMod. 2015. *User's Guide*. Appendix D Table 1.2. Available: <http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixd.pdf?sfvrsn=2>. Accessed: February 9, 2016.

[25] PAE Engineers. 2015. *Facebook TE Campus: Energy & Water Analysis*. September 24.

[26] PAE Engineers. 2015. *Facebook TE Campus: Energy & Water Analysis*. September 24.

Ozone has the characteristics of a GHG; however, unlike regulated GHGs, ozone in the troposphere is relatively short lived and, therefore, has localized rather than global effects. According to ARB,[27] it is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides [NO_X] and reactive organic gases [ROGs]) to global warming. Therefore, the inventory of emissions associated with existing/background conditions presented in Table 3.5-5, later in this section, represents an estimate of all emissions that are directly and indirectly associated with current onsite operations.

Predicted Effects of 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. Emissions of GHGs would contribute to 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. Measurements taken in the San Francisco Bay (Bay) indicate that the current rate of sea-level rise is about 3.5 inches per century at Alameda and 8.4 inches per century at San Francisco.[28] Climate change effects on sea levels could lead to even higher rates of sea-level rise (accelerated sea-level rise). The different scenarios and models that are used to predict sea-level rise result in different estimates of the magnitude of sea-level rise. For example, the California Climate Change Center predicts that accelerated sea-level rise could result in a sea-level rise in California of 4.3 to 28.2 inches above the existing mean sea level (msl) by 2099.[29] The California Climate Action Team projects that sea levels could rise as much as 71.6 inches by 2099.[30]

In October 2011, the San Francisco Bay Conservation and Development Commission (BCDC) adopted the latest amendment to the Bay Plan. The Bay Plan states that the Bay will rise 10 to 17 inches by 2050, 17 to 32 inches by 2070, and 55 to 69 inches by the end of the century if current trends continue.[31]

[27] California Air Resources Board. 2004. *Fact Sheet, Climate Change Emission Control Regulations.* Available: <http://www.arb.ca.gov/cc/factsheets/cc_newfs.pdf>. Accessed: February 8, 2016.

[28] California Department of Water Resources. 2006. *Progress on Incorporating Climate Change into Planning and Management of California's Water Resources Technical Memorandum Report.* Table 2-6. Available: <http://www.water.ca.gov/climatechange/docs/DWRClimateChangeJuly06.pdf>. Accessed: February 8, 2016.

[29] Cayan, D. P. Bromirski, K. Hayhoe, M. Tyree, M. Dettinger, and R. Flick. 2006. *Projecting Future Sea Level*. California Energy Commission. Table 3. July 2006. Available:<http://www.energy.ca.gov/2005publications/CEC-500-2005-202/CEC-500-2005-202-SF.PDF>. Accessed: February 8, 2016.

[30] California Climate Action Team. 2010. *Executive Summary, 2010 Climate Action Team Report to Governor Schwarzenegger and the California and Legislature*. December. Available: <http://www.energy.ca.gov/2010publications/CAT-1000-2010-005/CAT-1000-2010-005.PDF>. Accessed: February 8, 2016.

[31] San Francisco Bay Conservation and Development Commission. 2011. Resolution No. 11-08: Adoption of Bay Plan Amendment No. 1-08, Adding New Climate Change Findings and Policies to the Bay Plan and Revising the Bay Plan Tidal Marsh and Tidal Flats, Safety of Fills, Protection of the Shoreline, and Public Access Findings and Policies. Page 11. Adopted October 2011. Available:<http://www.bcdc.ca.gov/proposed_bay_plan/10-01Resolution.pdf>. Accessed: February 8, 2016.

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.[32] Alterations in the flow regime and subsequent flood potential could also occur from effects of climate change on local and regional precipitation patterns.

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 that "the potential adverse impacts of [climate change] include…reduction in the quality and supply of water to the state from the Sierra snowpack." Because most of the state, including the Bay Area, depends on surface water supplies originating in the Sierra Nevada, this water supply reduction is a concern.

Most of the scientific models for climate change show that the primary effect on California's climate would be a reduced snow pack and a shift in streamflow seasonality. A higher percentage of the winter precipitation in the mountains would most likely fall as rain rather than as snow in some locations, thereby reducing the overall snowpack. Furthermore, as temperatures rise, snowmelt is expected to occur earlier in the year, resulting in a peak runoff that would very likely come a month or so earlier. However, the state may not have enough surface storage to capture this early runoff. Absent the construction of additional water storage projects, a portion of current supplies would be lost to the ocean rather than made available 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 concentrations 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.[33]

Ecosystems and Biodiversity. Climate change is expected to have effects on diverse types of ecosystems, from alpine to deep-sea habitats. As temperatures and precipitation change, seasonal shifts in vegetation would occur; this could affect the distribution of associated flora and fauna. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states that "[a]pproximately 20 to 30 percent of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5°C to 2.5°C" relative to pre-industrial levels.[34] Shifts in existing biomes could also make ecosystems vulnerable to encroachment from foreign species. These disruptions can cause ripple effects in food webs for a wide range of organisms. In general terms, climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity.[35]

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[32] U.S. Environmental Protection Agency. 2013. *Climate Change Indicators in the United States: Weather and Climate.* Last updated: November 11, 2015. Available: <http://www.epa.gov/climatechange/science/indicators/weather-climate/index.html>. Accessed: February 8, 2016.

[33] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: Impacts, Adaptation, and Vulnerability.* Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.). Cambridge, UK: Cambridge University Press, 1,000 pp. Available: <https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4_wg2_full_report.pdf>. = Accessed: February 9, 2016.

[34] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: Impacts, Adaptation, and Vulnerability*. Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.). Cambridge, UK: Cambridge University Press, 1,000 pp. Available: <https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4_wg2_full_report.pdf>. Accessed: February 9, 2016.

[35] U.S. Environmental Protection Agency. 2013b. *Ecosystems Impacts and Adaptation.* Last Updated: November 4, 2015. Available:<http://www3.epa.gov/climatechange/impacts/climate-impacts.html>. Accessed February 9, 2016.

Human Health Impacts. Climate change may also increase the risk of vector-borne infectious diseases, particularly those found in tropical areas and spread by insects, such as Lyme disease and West Nile Virus. The presence of harmful bacteria and *Cryptosporidium* and *Giardia*, water-borne parasites, could also increase in the event of heavy rainfall or flooding and contaminate drinking water. Although these health impacts would affect largely tropical areas in other parts of the world, effects would also be felt in California. Warming of the atmosphere would be expected to increase ground-level ozone, 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 sensitive populations, such as the elderly and children. Finally, the water supply impacts and seasonal temperature variations expected as a result of climate change could affect the viability of existing agricultural operations, making the food supply more vulnerable.[36]

Heat Island Effect. Although not directly caused by climate change, the heat island effect may be exasperated by the increased frequency of heating days due to climate change. The heat island effect is created by paved urban areas that tend to absorb rather than reflect solar radiation because of the dark asphalt surfaces, resulting in greater temperatures above and surrounding these areas compared with temperatures in nearby rural areas. According to EPA, this effect can result in greater demand for air-conditioning, increased air pollution and GHG emissions due to increased energy demands, heat-related illness and mortality, and effects on water quality.[37]

Environmental Impacts

This section describes the impact analysis related to GHGs and climate change for the Project. It describes the methods used to determine the impacts of the Project and lists the thresholds used to conclude whether an impact would be significant. Impacts are determined to be no impact (NI), less than significant (LTS), less than significant with mitigation (LTS/M), or significant and unavoidable (SU). Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany each impact discussion, as needed.

Thresholds of Significance

GHG emissions are fundamentally a cumulative impact issue. No single development project would result in GHG emissions that would be great enough to affect global warming or climate change in isolation. However, cumulative global emissions could change the radiative balance of the atmosphere. As such, Project-level effects in isolation would be less than significant. The analysis below is a cumulative impact analysis.

In accordance with Appendix G of the State CEQA Guidelines, the Project would have a significant effect if it would result in any of the conditions listed below.

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. (For the purposes of this analysis, a "significant impact" from GHG emissions would occur if emissions were to exceed thresholds described below.)

[36] U.S. Environmental Protection Agency. 2015b. *Climate Impacts on Human Health*. Last Updated: November 4, 2015. Available: <http://www3.epa.gov/climatechange/impacts/health.html>. Accessed: February 9, 2016.

[37] U.S. Environmental Protection Agency. 2015c. *Heat Island Impacts*. Last updated: October 1, 2015. Available: <http://www.epa.gov/heat-islands/heat-island-impacts>. Accessed: February 9, 2016.

- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs. (For the purposes of this analysis, applicable plans include the AB 32 Scoping Plan and the City's CAP [consistency with the goals in EO B-30-15 and EO S-3-05 is also evaluated].)

Greenhouse Gases

GHG emissions are evaluated by using guidance and thresholds outlined in BAAQMD's *CEQA Guidelines* for consistency with the GHG reduction targets for 2020 established in AB 32. For the period after 2020, GHG emissions will be evaluated by modifying the relevant BAAQMD GHG threshold for AB 32 to the 2030 period, taking into account the GHG reduction target in EO B-30-15, as discussed below.

BAAQMD's *CEQA Guidelines* do not identify a quantitative GHG emission threshold for construction-related emissions. Instead BAAQMD recommends that GHG emissions from construction be quantified and disclosed and that a determination regarding the significance of these GHG emissions be made with respect to whether a project is consistent with the AB 32 GHG emissions reduction goals. BAAQMD further recommends incorporation of BMPs to reduce GHG emissions during construction, as feasible and applicable. BMPs may include the use of alternative-fuel (e.g., biodiesel, electric) construction vehicles and equipment (at least 15 percent of the fleet), using building materials that are at least 10 percent local, and recycling or reusing at least 50 percent of construction waste or demolition materials.

With respect to Project operations, BAAQMD's guidelines establish three potential analysis criteria for land use development projects:

- Compliance with a qualified CAP, with a goal consistent with AB 32,
- A mass emissions threshold of 1,100 MT of CO_2e per year, or
- A GHG efficiency threshold of 4.6 MT of CO_2e per service population (project jobs + projected residents).

BAAQMD thresholds are based on the AB 32 GHG reduction goals and a "gap analysis" that attributes an appropriate share of GHG emissions reductions to new land use development projects in BAAQMD's jurisdiction.[38] The efficiency threshold (4.6 MT of CO_2e per service population) was calculated by dividing the AB 32 GHG reduction target for land use development emissions in California by the estimated 2020 population and employment level.[38] BAAQMD thresholds are tied directly to AB 32 and statewide emissions reduction goals for 2020.

There is no adopted state plan that addresses GHG emissions reduction beyond 2020. However, long-term goals for 2030 and 2050 have been articulated in EO B-30-15 and EO S-3-05, respectively (see above). Executive orders are binding only on state agencies.

Achieving the executive orders' 2030 and 2050 GHG emissions reduction goals will require systemic changes in how energy is produced and consumed through all sectors of the economy (as discussed in greater detail in the impact analysis below). Because the mix of technologies, strategies, and policy choices the state will ultimately choose to implement to achieve the 2030 and 2050 goals is not readily ascertainable at this time, any accounting of future GHG emissions from an individual development project cannot reflect the scope and scale of reductions that may occur as the state transitions toward long-term goals. Furthermore, in absence of a state plan to achieve these long-term goals, it is difficult to identify the "fair share" of reductions to be applied at the local or project level.

[38] Bay Area Air Quality Management District. 2010. *Proposed Thresholds of Significance*. May.

The Association of Environmental Professionals (AEP) Climate Change Committee recommended in a 2015 white paper that CEQA analyses for multiple-phase projects with post-2020 development not only "consider consistency with the 2020/AB 32-based framework but also analyze the consequences of post-2020 GHG emissions in terms of their impacts on the reduction trajectory from 2020 toward 2050."[39] AEP further recommends that the "significance determination…should be based on consistency with *substantial progress* along a post-2020 trajectory."[40] The AEP white paper is advisory only and is not binding guidance or an adopted set of CEQA thresholds. The Project would continue to generate operational GHG emissions in future years; thus, a post-2020 discussion is warranted.

Consistent with general scientific understanding that there will be a need for deeper reductions in GHG emissions in the post-2020 period, this EIR evaluates operational GHG emissions by using two different metrics: (1) a BAAQMD-recommended efficiency threshold based on the 2020 reduction target in AB 32 and (2) an efficiency metric based on the 2030 reduction target in EO B-30-15, taking into account the need for GHG reductions to meet the near-term reduction targets in AB 32 and the need for greater reductions beyond the AB 32 target in the post-2020 period.

- Project emissions are compared to BAAQMD's efficiency threshold of 4.6 MT of CO_2e per service population. Emissions in excess of BAAQMD's thresholds could impede attainment of statewide GHG reduction targets for 2020 established under AB 32.
- Project emissions are compared to a "substantial progress" efficiency indicator of 2.6 MT of CO_2e per service population. The substantial progress efficiency indicator was calculated for 2030 and based on the GHG reduction goal established under EO B-30-15 (40 percent reduction below 1990 levels by 2030, taking into account the 1990 emissions levels and the projected 2030 statewide population and employment levels). Emissions in excess of the substantial progress efficiency indicator of 2.6 MT of CO_2e per service population could conflict with the trajectory of long-term GHG reduction goals. Although a similar metric was not calculated for 2050, the analysis of substantial progress through 2030 on a trajectory toward 2050 reduction targets is used in this EIR to disclose consistency of the Project with the long-term reductions called for in EO S-3-05.[41]

Table 3.5-3 summarizes the operational GHG thresholds and the "substantial progress" efficiency metric considered in this EIR.

[39] Association of Environmental Professionals. 2015. *Beyond 2020: The Challenge of Greenhouse Gas Reduction Planning by Local Governments*. Draft. March 16.

[40] Association of Environmental Professionals. 2015. *Beyond 2020: The Challenge of Greenhouse Gas Reduction Planning by Local Governments*. Draft. March 16.

[41] Achieving the 2030 and 2050 GHG reduction goals of the Executive Orders will require systemic changes in how energy is produced and consumed through all sectors of the economy (as discussed in greater detail in the discussion of the AB 32 Scoping Plan and Executive Orders). Because the mix of technologies, strategies, and policies the state will ultimately choose to implement to achieve the 2030 and 2050 goals is not readily ascertainable at this time, it is not possible to account for the scope and scale of reductions that will occur as a result of state regulations in the future.

Table 3.5-3. Operational GHG Thresholds/Substantial Progress Efficiency Metrics

Analysis Condition	Threshold/Metric	Basis
2020 Development	4.6 MT of CO_2e per service population	BAAQMD-adopted threshold based on AB 32
2030 Development	4.6 MT of CO_2e per service population	BAAQMD-adopted thresholds based on AB 32
	2.6 MT of CO_2e per service population	EO B-30-15 (40 percent reduction below 1990 levels)[a]

Note:
[a] Calculation of 2.6 MT of CO_2e is based on state land use sector emissions being 40 percent below 1990 levels, combined with the forecast population and employment levels in 2030.

Climate Change Effects

In a recent court case (December 17, 2015), the California Supreme Court held that lead agencies are not required to analyze the impacts of the environment on a project's future users or residents, unless the project exacerbates existing environmental hazards (see *California Building Industry Association* [CBIA] *v. Bay Area Air Quality Management District*, Supreme Court Case No. S213478) or the legislature indicates by specific code (Public Resources Code Sections 21096, 21151.8, 21155.1, 21159.21, 21159.22, 21159.23, and 21159.24) that a defined environmental hazard associated with airport noise and safety, school projects, certain kinds of housing, and transit priority projects must be addressed. Therefore, this analysis does not assess the potential for climate change impacts from existing sources of GHGs on onsite Project uses.

Methods for Analysis

GHG emissions associated with construction and operation of the Project were quantified by using standard and accepted software tools, techniques, and emissions factors. A summary of the methodology is provided below. A full list of assumptions can be found in Appendix 3.4.

Construction

Construction of the Project would demolish existing buildings on the Project site (Buildings 301–306). Construction of the Project would generate short-term emissions of CO_2, CH_4, and N_2O. Direct emissions would originate from the exhaust of mobile and stationary construction equipment as well as employee vehicles and haul trucks. These sources were evaluated by using methodologies consistent with CalEEMod (version 2013.2.2), ARB's EMFAC2014 model, and the methods summarized in Section 3.4, *Air Quality.* Indirect GHG emissions from water use for fugitive dust control and electricity use during the construction period were estimated by using consumption data provided by the Project Sponsor[42] and default emission factors from CalEEMod.

Operation

Operation of the facilities at the Project site currently generates GHG emissions, which would be eliminated and then replaced with operational emissions associated with the Project. The difference in operational emissions between the Project and the existing uses represents the net impact of the

[42] Gehry Partners, LLP. 2015.

Project. Sources of operational emissions include vehicle exhaust, energy usage, area sources,[43] water consumption, and waste and wastewater generation. Emissions generated by these sources were taken into account when analyzing long-term operational impacts associated with the Project. Emissions for the Project and the existing conditions were estimated using CalEEMod.[44] Emissions from mobile sources during operation were calculated using the same methodology described for criteria pollutants in Section 3.4, *Air Quality*.

The Project would include implementation of water reduction strategies, including the use of low-flow fixtures for faucets and a water-efficient landscaping design, as described in Chapter 2, *Project Description*. In addition, the Project Sponsor would pursue LEED Gold 2009 level of certification for Building 21 and Building 22 under the New Construction rating system. Additional sustainability measures would be implemented to meet LEED certification, but specific details on the types and anticipated reductions are currently unknown. Accordingly, the analysis does not account for any additional water reductions, energy efficiency improvements, or other emissions benefits associated with LEED certification. The analysis does consider electricity consumption that is expected to occur with use of the onsite recycled water system. Annual electricity consumption for this system was provided by the Project Sponsor, and GHG emissions from electricity consumption were quantified by using the PG&E carbon-intensity factor of 0.641 lb/kWh.[45]

CalEEMod modeling accounts for state actions to reduce GHG emissions, including Pavley I, ARB's Low-Carbon Fuel Standard, and the Renewable Portfolio Standard. Emissions benefits achieved by Pavley II/Advanced Clean Cars were added to the modeling, assuming a 2 percent reduction in light-duty vehicle emissions.

Impacts and Mitigation Measures

Impact GHG-1: Greenhouse Gas Emissions. The Project would not generate GHG emissions, either directly or indirectly, that would have a significant impact on the environment. (LTS/M)

Construction

Construction of the Project would generate direct emissions of CO_2, CH_4, and N_2O from the exhaust of mobile and stationary construction equipment as well as employee vehicles and haul trucks. Indirect emissions would be generated from water use for fugitive dust control and electricity use during the construction period. Estimated construction emissions associated with the Project are summarized in Table 3.5-4. Model output and calculation spreadsheets are provided in Appendix 3.4. It was assumed that the duration of construction would be approximately 4 years, consisting of three primary phases that would correspond to each of the new Project buildings. Construction at each building would require four to five sub-phases.

[43] "Area sources" include consumer products, architectural coatings, and landscaping equipment.

[44] The Project would result in emissions from vehicle exhaust, but existing uses would not produce vehicle exhaust because there would be no employees working at the site.

[45] CalEEMod. 2015. *User's Guide*. Appendix D Table 1.2. Available: <http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixd.pdf?sfvrsn=2>. Accessed: February 9, 2016.

Table 3.5-4. Estimated Construction GHG Emissions

Year	CO_2	CH_4	N_2O	CO_2e
2016	1,066	< 1	< 1	1,074
2017	1,333	< 1	< 1	1,341
2018	2,364	< 1	< 1	2,379
2019	1,832	< 1	< 1	1,844
2020	187	< 1	< 1	188
Electricity and Water Use[a]	92	< 1	< 1	93
Total	6,874	1	< 1	6,919

Note:
[a] Emissions would occur from the consumption of electricity and water during the entire construction period.

As shown in Table 3.5-4, Project construction would generate 6,919 MT of CO_2e over the projected 4-year construction period. This is equivalent to the emissions of approximately 1,463 passenger vehicles for a single year.[46] Consistent with established protocols and published guidance from other lead agencies and air districts, construction emissions are amortized over the expected operational life of a project (assumed to be 30 years). Amortized over 30 years, construction emissions would be equivalent to 231 MT of CO_2e per year. Construction emissions would be primarily the result of diesel-powered construction equipment and heavy-duty haul truck usage. As discussed above, BAAQMD's *CEQA Guidelines* do not identify a GHG emission threshold for construction-related emissions. However, they do recommend implementation of BMPs to help control and reduce GHG emissions. Therefore, the construction GHG impact is conservatively considered ***potentially significant***.

MITIGATION MEASURES. Consistent with BAAQMD's *CEQA Guidelines*, the Project would implement Mitigation Measure GHG-1.1, which would require the implementation of construction BMPs, including switching construction equipment from conventional technologies to hybrid, compressed natural gas, electric, biodiesel, or renewable diesel (at least 15 percent of the fleet); the use of local building materials; and the reuse of materials onsite, such as concrete. Compliance with Mitigation Measure GHG-1.1 would reduce the GHG emissions shown in Table 3.5-4 and ensure that construction-related GHG emissions would be consistent with the City's CAP and BAAQMD-recommended BMPs.[47] Therefore, construction of the Project would result in a ***less-than-significant impact with mitigation***.

GHG-1.1: Implement BAAQMD Best Management Practices for Construction. The Project Sponsor shall require all construction contractors to implement the BMPs recommended by BAAQMD to reduce GHG emissions. Emissions reduction measures shall include, at a minimum, the use of local building materials (at least 10 percent), the recycling and reuse of at least 50 percent of construction waste or demolition material, and the use of alternative-fuel vehicles for construction vehicles/equipment (at least 15 percent of the fleet).

[46] U.S. Environmental Protection Agency. 2014. *Greenhouse Gas Equivalencies Calculator*. Last Revised: April 16, 2014. Available: <http://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>. Accessed: February 2, 2016.

[47] Impacts of Mitigation Measure GHG-1.1 are not explicitly quantified because BAAQMD has not adopted a mass emissions threshold for construction. For reference, electrically powered equipment can reduce GHG emissions by up to 70 percent and CNG by 20 percent, depending on the type of equipment and carbon intensity of electric power. Diesel HPR (renewable biodiesel) has been shown to reduce tailpipe GHGs by 40 percent without engine modifications.

Operation

Project operation would generate direct and indirect GHG emissions. Sources of direct emissions include vehicle trips, natural gas combustion, and landscaping activities. Indirect emissions would be generated by electricity consumption, waste and wastewater generation, and water use. Similar emissions sources are currently operating on the Project site. Emissions generated by these uses represent the existing conditions against which the Project must be evaluated.

Estimated operational emissions under existing and Project conditions are summarized in Table 3.5-5, which shows GHG emissions associated with existing and background conditions (i.e., conditions without the Project). The area-, energy-, waste-, and water-source emissions are those emissions that are generated by the existing land uses. Mobile-source emissions under existing/background conditions are zero because there are no active employees at the TE Connectivity Campus.

The Project portion of Table 3.5-5 shows GHG emissions associated with the Project in 2020 and 2040. The area-, energy-, waste-, and water-source emissions are those emissions that would be generated only by the Project. It was conservatively assumed that these emissions would be constant in future years (i.e., future gains in efficiency and other emissions benefits would not occur). Mobile-source emissions as a direct result of the Project are shown for 2020 and 2040 because the rate of emissions from Project-employee vehicles would decrease between 2020 and 2040 with advancements in vehicle technology and the turnover of older, more heavily polluting vehicles. Thus, it is more comprehensive to assess mobile-source emissions for two separate years.

The Net Emissions portion of Table 3.5-5 shows the net GHG emissions that are attributable to the Project. As shown in this section of the table, the mobile-source emissions generated by the Project are the dominant source of emissions. The Project's net mass emissions (i.e., the sum of the area-, energy-, waste-, water-, and mobile-source emissions and amortized construction emissions over 30 years) for 2020 and 2040 are shown, along with emissions per service population. Amortized construction emissions are shown in this table of operational emissions and added to the Project's net emissions to be consistent with industry standards.

Given the emissions in Table 3.5-5, net Project emissions from all non-mobile sources combined would result in a net reduction of GHG emissions because the Project's emissions would be below the existing baseline emissions. The majority of the Project-generated GHG emissions would be the result of mobile sources (associated with Project-employee and visitor trips; employee-shuttle and vanpool trips; vendor, contractor, and delivery trips; and trips associated with the hotel). There is no existing baseline level of mobile-source emissions because, as discussed previously, this EIR assumes there are no active employees at the TE Connectivity Campus. With the inclusion of mobile-source emissions, total Project GHG emissions in 2020 and 2040 would result in a net increase in emissions relative to the TE Connectivity Campus, but emissions would not exceed the current BAAQMD efficiency threshold or 2030 "substantial progress" efficiency metric.

Given the Project's level of emissions in 2020 and 2040 (2.3 and 1.3 MT of CO_2e per service population, respectively) compared with the BAAQMD efficiency threshold (4.6 MT of CO_2e per service population) and 2030 "substantial progress" efficiency metric (2.6 MT of CO_2e per service population), the Project would result in a ***less-than-significant*** impact related to GHG emissions.

Table 3.5-5. Estimated Operational GHG Emissions, Full Buildout[a]

Condition/Source	CO_2	CH_4	N_2O	CO_2e
Existing/Background Conditions				
Area Sources[b]	< 1	< 1	—	< 1
Energy Sources[b]	10,351	1	< 1	10,413
Waste Generation[b]	192	11	—	475
Water Consumption[b]	62	1	< 1	100
Mobile Sources[b]	0	0	0	0
Total Baseline Emissions[b]	10,605	13	< 1	10,989
Project				
Area Sources[c]	< 1	< 1	—	< 1
Energy Sources[c]	4,178	< 1	< 1	4,208
Waste Generation[c]	204	12	—	505
Water Consumption[c]	87	3	< 1	171
Mobile Sources in 2020[d]	20,787	< 1	< 1	20,900
Mobile Sources in 2040[d]	14,223	< 1	< 1	14,290
Amortized Construction Emissions (30 years)				*231*
Total Project Emissions in 2020	25,255	15	< 1	26,015
Total Project Emissions in 2040	18,691	15	< 1	19,405
Net Emissions				
Area Sources[e]	< 1	< 1	—	< 1
Energy Sources[e]	-6,173	< 1	< 1	-6,205
Waste Generation[e]	12	1	0	30
Water Consumption[e]	24	1	< 1	71
Mobile Sources – 2020[e]	20,787	< 1	< 1	20,900
Mobile Sources – 2040[e]	14,233	< 1	< 1	14,290
Amortized Construction Emissions (30 years)				*231*
Net Mass Emissions – 2020[f]				15,026
Net Mass Emissions – 2040[f]				8,416
Emissions per Service Population – 2020[g]				2.3
Emissions per Service Population – 2040[g]				1.3
Current BAAQMD Efficiency Threshold (MT/Service Population)				4.6
2030 "Substantial Progress" Efficiency Metric (MT/Service Population)				2.6

Notes:

a. Metric tons/year.

b. These are emissions associated with the TE Connectivity Campus only.

c. These are emissions associated with the Project only. It was conservatively assumed that these emissions would be constant in the future years.

d. These are mobile-source emissions in 2020 and 2040 as a direct result of the Project. These vehicle emissions associated with the Project decrease between 2020 and 2040 with advancements in vehicle technology and the turnover of older, more heavily polluting vehicles.

e. These are the differences in emissions between the Project in 2020 and 2040 and the baseline conditions for each type of emissions source.

f. This is the total difference in emissions (i.e., the sum of all three emissions sources combined) between the Project in 2020 and 2040 and the baseline conditions. This value includes the amortized Project construction emissions.

g. Assumes a service population of 6,550 employees.

As discussed above, although the state has a plan to achieve the AB 32 2020 target in the AB 32 Scoping Plan and the myriad adopted regulations to support AB 32, the state currently does not have a plan to achieve a 2030 or 2050 goal. Therefore, any calculation of post-2020 emissions cannot take into account future state or federal actions to achieve long-term reductions. As discussed under Impact GHG-2, in the analysis of consistency with the goals of EO B-30-15 and EO S-3-05, the achievement of long-term GHG emissions reduction targets will require substantial change in terms of how energy is produced and consumed as well as other substantial economy-wide changes, many of which can be implemented only by the state and federal government. For example, the recently adopted SB 350 requires that renewable energy make up 50 percent of the electricity supply by 2030. This has not been incorporated into the Project emissions estimates for comparison with the 2030 efficiency threshold. In addition, placing the entire burden of meeting long-term reduction targets on local government or new development would be disproportionate and most likely ineffective; thus, state and federal action will be critical components of meeting long-term reduction goals.

Impact GHG-2: Conflicts with Applicable Plans and Policies. The Project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. (SU)

Two plans have been adopted for the purposes of reducing GHG emissions that are relevant to the Project: the AB 32 Scoping Plan and the City of Menlo Park CAP. Project consistency with these two plans is reviewed below. In addition, the Project's consistency with EO S-3-05 and EO B-30-15 is reviewed.

Consistency with AB 32 Scoping Plan

California adopted AB 32 in 2006, which codified the state's GHG emissions reduction targets for the future. ARB adopted the AB 32 Scoping Plan as a framework for achieving AB 32. The AB 32 Scoping Plan outlines a series of technologically feasible and cost-effective measures to reduce statewide GHG emissions, including (1) expanding energy-efficiency programs, (2) increasing electricity production from renewable resources to at least 33 percent of the statewide electricity mix, (3) increasing automobile efficiency, (4) implementing the Low-Carbon Fuel Standard, and (5) developing the cap-and-trade program. As discussed above, the vast majority of the Project's GHG emissions would result from mobile sources. Multiple AB 32 Scoping Plan measures address GHG emissions from transportation fuels. For example, the cap-and-trade program, through the regulation of fuel suppliers, will account for GHG emissions from the Project and require emissions from covered sectors to be reduced by the amount needed to achieve AB 32's 2020 goal. Likewise, the-Low Carbon Fuel Standard requires a 10 percent reduction in the carbon intensity of transportation fuels by 2020 and, therefore, creates incentives for broader-scale deployment of alternative vehicle fuels, including electricity. Similarly, the state's Renewable Portfolio Standard mandates that the state's utilities dramatically increase (to 33 percent by 2020) the percentage of electricity sales that are generated by eligible renewable generation sources. Together, these elements of the AB 32 Scoping Plan will ensure that overall statewide emissions will decrease to the extent necessary to achieve AB 32's emissions reduction goals. The Project does not impede implementation of any of these elements. Additionally, the Project's emissions would not exceed the BAAQMD efficiency threshold, which is based on consistency with the AB 32 reduction target. Therefore, the Project would have a ***less-than-significant*** impact on consistency with the AB 32 Scoping Plan.

Consistency with City of Menlo Park Climate Action Plan

As discussed above, the City of Menlo Park adopted a CAP in 2009 to reduce municipal government and community GHG emissions. In October 2015, the City released a report[48] that updated the CAP with emissions for the years between 2005 and 2013, provided an update on the progress of the projects selected in the previous year's CAP update, and provided a list of CAP projects for fiscal years 2015/2016 through 2019/2020. The 2015 CAP update and status report is currently in draft form. The most recent finalized update to the CAP is from July 2011. As such, the Project is evaluated for consistency with the 2011 CAP Assessment Report,[49] as shown in Table 3.5-6.

Table 3.5-6. Consistency of Project with CAP Community Strategies

CAP Strategies	Project Compliance
Energy Efficiency	
Consider adopting sustainable development/green building standards that exceed California's 2010 Green Building Code (CalGreen) for residential and commercial	The Project's building performance would exceed by at least 15 percent the minimum requirements of California's Title 24-2013, Part 6, Energy Code Standards.
Consider actively marketing and providing additional incentives for residents to participate in the new Regional Energy Upgrade California Program	This strategy is not applicable to local development because it is a City-sponsored education program designated for further study.
Expand Menlo Park Municipal Water District conservation programs	This strategy is not applicable to local development because it is a City-sponsored program designated for further study. However, the Project would implement water-saving infrastructure and equipment, including plumbing fixtures, steamers, dishwashers, and other equipment. Water consumption monitoring would also be used. Additionally, the Project would involve the use of a recycled water system that would use so-called "blackwater" from plumbing fixtures on the site for non-potable uses, such as in toilets and for landscaping purposes. Please refer to Chapter 2, *Project Description*, for a complete list.
Consider developing an energy efficiency/renewable energy program for residential sector	This strategy is not applicable to local development because it is a City-sponsored program designated for the residential sector and not commercial development.
Develop a commercial energy efficiency program to encourage businesses to participate in a free energy efficiency audit when business license is issued or renewed	This strategy is not applicable to local development because it is a City-sponsored program designated for further study.

[48] City of Menlo Park. 2015. *Staff Report: Update on the City of Menlo Park's Climate Action Plan Update and Status Report for 2015*. Available: <http://www.menlopark.org/DocumentCenter/View/8414>. Accessed: February 8, 2016.

[49] City of Menlo Park. 2011. *Climate Action Plan Assessment Report*. July. Available: <http://www.menlopark.org/DocumentCenter/View/1343>. Accessed: February 9, 2016.

CAP Strategies	Project Compliance
Consider local energy efficiency and renewable energy financing program	This strategy is not applicable to local development because it is a City-sponsored program designated for further study.
Consider development of an ordinance for energy and water efficiency standards for transfer of title transactions	This strategy is not applicable to local development because it is a City-sponsored program designated for further study.
Transportation	
Consider amending the City's General Plan to include new sustainability policies, goals and programs	These strategies are designated for further study and would be City-sponsored policies, goals, and programs that are not developed at this time and, therefore, not applicable to the Project.
Consider social marketing programs/campaigns to promote alternative transportation (walking, biking, public transit, etc.)	This strategy is not applicable to local development because it is a City-sponsored education program designated for further study. However, the Project's TDM program would utilize educational and promotional events to encourage employees to use alternative modes of travel.
Consider implementation for City Car Sharing Program	This is a City-managed strategy. It should be noted, however, that the Project would include a car-sharing program on the Campus.
Implement Bike Improvements	This is a City-managed strategy. It should be noted, however, that the Project would include bike amenities (bike shops, lockers, towel service, etc.) on the Campus.
Solid Waste	
Consider adopting a zero waste policy with 75 percent diversion by 2020 and 90 percent diversion by 2030.	These strategies are designated for further study and would be City-sponsored infrastructure and/or ordinance efforts to reduce solid waste disposal that would not be applicable to a land use project.
Consider adopting a mandatory commercial recycling ordinance	These strategies are designated for further study and would be City-sponsored infrastructure and/or ordinance efforts to reduce solid waste disposal that would not be applicable to a land use project. However, the Project would divert approximately 60 percent of construction waste from landfills.
Other	
Establish Climate Action Plan monitoring and progress reporting program	These strategies are designated for further study and would be City-sponsored policies, goals, and programs that are not applicable to the Project.
Expand Green Business Certification Program; include green business education to new business permit applicants	This strategy is not applicable to local development because it is a City-sponsored education program designated for further study.
Consider amending the City's General Plan to include a "GHG reduction strategy" as outlined in the new CEQA Guidelines	These strategies are designated for further study and would be City sponsored policies, goals, and programs that are not developed at this time and therefore not applicable to the Project.
Develop social marketing campaign to educate residents on reducing their personal greenhouse gas emissions.	This strategy is not applicable to local development because it is a City sponsored education program designated for further study.

CAP Strategies	Project Compliance
Develop a promotion and education program to encourage local and or organic food production	This strategy is not applicable to local development because it is a City sponsored education program designated for further study.
Consider an educational program and/or local ordinance to limit vehicle idling	This strategy is not applicable to local development because it is a City-sponsored program and ordinance designated for further study. Additionally, ARB has already implemented an idling heavy-duty truck emissions reduction program that restricts truck idling to 5 minutes.
Research opportunities to improve methane capture at Marsh Road Landfill (Methane Emissions Mitigation)	These strategies are designated for further study and would be City-sponsored infrastructure and/or ordinance efforts to reduce emissions from solid waste disposal at a specific facility that would not be applicable to a land use project.

Sources: City of Menlo Park. 2011. *Climate Action Plan Assessment Report*. July. Available: <http://www.menlopark.org/DocumentCenter/View/1343>. Accessed: February 9, 2016.

As shown in Table 3.5-6, the Project would not conflict with any of the applicable measures in the City's CAP. Further, because the Project would not result in GHG emissions that exceed the applicable thresholds, the Project would not impede achievement of the City's CAP GHG emissions reduction target. Impacts related to CAP consistency would be ***less than significant.***

Consistency with Executive Orders EO S-3-05 and EO B-30-15

As discussed above, EO B-30-15 established an interim GHG reduction target of 40 percent below 1990 levels by 2030, and EO S-3-05 established a long-term goal of reducing statewide GHG emissions to 80 percent below 1990 levels by 2050. Achieving these long-term GHG reduction policies will require systemic changes in how energy is produced and used.

There a number of studies that discuss potential mechanisms for limiting California's economy-wide emissions to the equivalent of 40 percent below the 1990 level by 2030 and 80 percent below the 1990 level by 2050. For instance, ARB and other state agencies commissioned Energy + Environmental Economics (E3) to develop GHG emissions reduction scenarios for 2030 that would set the state on the course toward its 2050 GHG emissions reduction goal.[50] Other studies include a report by the California Center for Science and Technology (CCST),[51] a California Department of Transportation report that discusses GHG emissions reductions from the transportation sector alone,[52] and a study published in the

[50] Energy + Environmental Economics. 2015. *Summary of the California State Agencies' PATHWAYS Project: Long-term Greenhouse Gas Reduction Scenarios*. January 26. Available: <http://www.energy.ca.gov/commission/fact_sheets/documents/E3_Project_Overview_20150130.pdf>. See also Energy + Environmental Economics. 2015. *Pathways to Deep Decarbonization in the United States*. May 13. Available: <www.arb.ca.gov/research/lectures/speakers/williams/williams.pdf> (modeling results for United States, assuming 80 percent reduction in GHG emissions by 2050 compared with 1990 levels). Accessed: February 8, 2016.

[51] California Council on Science and Technology. 2012. *California's Energy Future – Portraits of Energy Systems for Meeting Greenhouse Gas Reduction Targets.* September. Available: <http://www.ccst.us/publications/2012/2012ghg.pdf>. Accessed: February 6, 2016.

[52] California Department of Transportation. 2015. *California Transportation Plan 2040*. March. Draft. Available: <http://www.dot.ca.gov/hq/tpp/californiatransportationplan2040/>. Accessed: February 8, 2016.

academic journal, *Science*, that analyzes the changes that will be required to reduce GHG emissions to 80 percent below 1990 levels by 2050.[53] In general, these studies reach similar conclusions. Deep reductions in GHG emissions can be achieved only with significant changes in electricity production, transportation fuels, and industrial processes (e.g., decarbonizing electricity production, electrifying transportation, implementing widespread adoption of low-carbon or no-carbon transportation fuels, electrifying non-transportation direct fuel uses, increasing energy efficiency, avoiding waste emissions, increasing carbon sequestration, replacing high GWP gases, and other measures).

The systemic changes that will be required to achieve the 2030 and 2050 GHG reduction goals set forth by executive order will require significant policy, technical, and economic solutions. Decarbonization of the transportation fuel supply will require electric and plug-in hybrid electric vehicles to make up the vast majority of light-duty vehicles. Some changes, such as the use of biofuels to replace petroleum for aviation, cannot be accomplished without action by the federal government. Further, achieving the 2050 GHG reduction goals will require California to increase dramatically the amount of electricity that is generated by renewable generation sources and, correspondingly, advance significantly the deployment of energy storage technology and smart-grid strategies, such as price-responsive demand and the smart charging of vehicles. This would entail a significant redesign of California's electricity system.

In evaluating the Project's emissions for consistency with EO S-3-05 and EO B-30-15, it is important to note that these broad-scale shifts in how energy is produced and used are outside of the control of the Project. The changes necessitated by the state's long-term climate policy will require additional policy and regulatory changes, which are unknown at this time. As a consequence, the extent to which the Project's emissions and resulting impacts will be mitigated through implementation of such statewide (or nationwide) changes is not known. Furthermore, implementation of such additional policy and regulatory changes is in the jurisdiction of state-level agencies (e.g., ARB) and federal-level agencies, not the City or the Project..

As discussed above under Impact GHG-1, Project GHG emissions would be below the 2030 "substantial progress" efficiency metric. Additionally, because large reductions will need to be achieved through state (and very likely federal) action, the Project's actual emissions may be even less than the levels discussed in this document; however, the specific value of heretofore unknown state (or federal) action cannot be presumed at this time. Conclusions must be made with the estimates of emissions presented in this document. Although it is estimated that the Project would be consistent with the 2030 goal of EO B-30-15, it cannot be determined whether the Project would be consistent with the long-term goal specified in EO S-3-05. Again, it is possible that future state and federal actions may reduce Project emissions below the 2050 reduction target, but this cannot be known at this time. Thus, it is conservatively assumed that the Project's emissions would be inconsistent with the goals in EO S-3-05. This impact is considered ***significant and unavoidable.***

[53] Science. 2012. *The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity.* James H. Williams, et al. (eds.). Available: <http://www.sciencemag.org/content/335/6064/53.full> (subscription service). Accessed: February 8, 2016.

Cumulative Impacts

GHGs and climate change are exclusively cumulative impacts. There is no non-cumulative GHG emission impact from a climate change perspective.[54] Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. GHGs are emitted by countless sources worldwide, accumulate in the atmosphere, and have long atmospheric lifetimes. No single emitter of GHGs is large enough to trigger global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative. In accordance with scientific consensus regarding the cumulative nature of GHGs, the analysis above considers the cumulative contribution of Project-related GHG emissions, and no additional cumulative impact analysis has been provided.

[54] California Air Pollution Control Officers Association. 2008. *CEQA and Climate Change*. January. Available: <http://www.capcoa.org/wp-content/uploads/2012/03/CAPCOA-White-Paper.pdf>. Accessed: February 8, 2016.